Government of South Australia
Zero Waste SA

Hyder

Zero Waste South Australia

Recycling Activity in South Australia

2007 - 2008 financial year

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Overview

In 2007–08 2.61 million tonnes of materials was diverted from landfill to recycling in South Australia. This was up from 2.43 million tonnes recycled in 2006–07 and is an increase recycling of 7.3%.

The 2007–08 SA diversion rate is the highest recorded in the last five years at 69.8%. The SA per capita recycling rate has increased to the second highest level in the last five years at 1 630 kg/capita (up 6.1%).

The waste to landfill quantity has dropped from 2006–07 to it lowest level in the last five years.

The highest recorded reprocessing quantities, by weight and in decreasing order, were concrete (818 116 tonnes), steel (365 391 tonnes) and fly ash (272 000 tonnes).

Recycling activity in SA continues to increase, whilst landfilling continues to decrease. As the population continues to grow, passing the 1.6 million mark during 2007–08, the recycling and reprocessing industry needs to continue to expand with it.

Table E-1 Annual South Australian landfill diversion and overall waste recycling

	2003–04	2004–05	2005–06	2006–07	2007–08	Change
Diversion from landfill (tonnes)	2 041 776	2 623 367	2 395 582	2 434 128	2 611 214	7.3%
Waste to landfill (tonnes)	1 277 892	1 180 128	1 157 925	1 144 429	1 130 000	-1.3%
Total waste generation (tonnes)	3 319 668	3 803 495	3 553 507	3 578 557	3 741 214	4.5%
SA diversion rate (%)	**61.5%**	**69.0%**	**67.4%**	**68.0%**	**69.8%**	**1.8%**
South Australian population	1 534 000	1 542 000	1 550 042	1 584 500	1 601 800	1.1%
Per capita diversion (kg/person)	1 331	1 701	1 545	1 536	1 630	6.1%
Per capita landfill (kg/person)	833	765	747	722	705	-2.3%
Per capita total waste (kg/person)	2 164	2 467	2 293	2 258	2 336	3.4%

In 2007–08 there was 37 891 tonnes of recyclate materials imported into South Australia for reprocessing or 1.4% of total local reprocessing. These materials were mostly glass (15 011 tonnes), steel (9 729 tonnes) and polypropylene (3 920 tonnes). These quantities are not included in the recycling total due to their non South Australian source.

The composition of recycled materials is outlined in Figure E- 1.

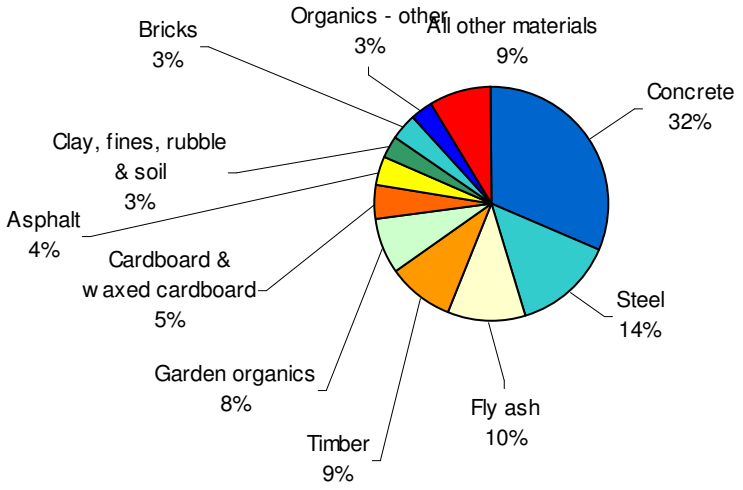

Figure E- 1 Composition of recovered materials (by weight), SA 2007–08

Presented in Figure E- 2 is a comparison of per capita recycling activity nationally.

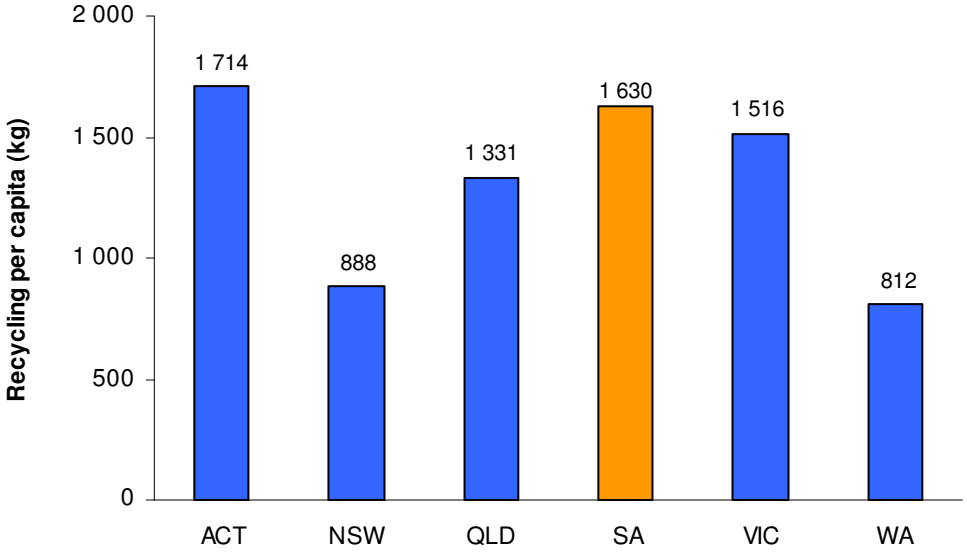

Figure E- 2 Comparison of reported per capita recycling activity (by State)

Note: All data is the latest available for each of the States. The SA and ACT data is for 2007–08. The QLD and VIC data is for 2006–07. Data presented for WA is for 2005–06 and for NSW is for 2004–05. The ACT data is sourced from the *2008 Progress update towards No Waste*. The QLD data is sourced from *the state of waste and recycling in Queensland 2007* report. The VIC data is sourced from *Towards Zero Waste Strategy, Progress Report* for 2006–07. The WA data is sourced from *Review of Total Recycling Activity in WA 2006* report. The NSW data is sourced from the *NSW Waste Avoidance and Resource Recovery Strategy 2007 Overview* report. Population statistics sourced from the ABS were also used. Note that materials included in recycling data in some states may be excluded from others.

A survey of total recycling activity in South Australia for 2007–08 was undertaken in January / February 2009 by Hyder Consulting. The survey covered all materials recovered for reprocessing in South Australia, as well as exported materials. Any materials imported into the state for reprocessing were excluded.

All known local (South Australian based) and interstate reprocessing destinations were identified, as well as exports overseas.

Recycling data was obtained from the following sources:

1 Reprocessors

- site visits of the key reprocessing sites in the Adelaide metropolitan area
- telephone / e-mail surveys of all other recycling companies

2 Data collated from pre-existing annual surveys, undertaken by the following national organisations:

- Ash Development Association of Australia (ADAA)
- Compost Australia
- Plastics and Chemicals Industries Association (PACIA)
- Publishers National Environment Bureau (PNEB)

3 Australian Customs Service export data.

Data on reprocessed materials was sought for the 2007–08 financial year on the quantity (by weight), and origin and destination of reprocessed materials. The full questionnaire sent to reprocessors is provided in Appendix A.

Data from all known reprocessing destinations of material generated in South Australia has been compiled into this report and as such the reported recovery data is believed to be comprehensive. It is possible that some smaller South Australian based material reprocessors or interstate destinations may have been overlooked, in which case the reported recovery quantities would be slightly conservative.

Sector origins have been split into the following categories:

- household/municipal
- commercial and industrial (C&I)
- construction and demolition (C&D).

Table E-2 Sector origins of SA sourced reprocessed materials, SA 2007–08

Sector origin	Quantity	
	(tonnes)	(%)
Municipal	402 677	15.4%
C&I	951 355	36.4%
C&D	1 257 182	48.1%
Total	**2 611 214**	**100.0%**

Table E-3 Destination of SA sourced reprocessed materials, SA 2007–08

Reprocessing destination	Number of destinations	Reprocessed material destination	
		(tonnes)	(%)
South Australia	57	2 065 412	79.1%
Interstate	21	95 084	3.6%
Export	N / A	450 718	17.3%
Total	**78**	**2 611 214**	**100.0%**

The number of South Australian reprocessors has increased from 56 in the 2006–07 year study to 57 in the 2007–08 study. This is due to the identification of new SA based reprocessors, as well as previous participants reporting no reprocessing for 2007–08.

The number of interstate destinations has dropped from 24 in 2006–07.

Table E-4 Reprocessed material quantities, SA 2003–04 to 2007–08

	Material	Material category	Total recovery 2003–04 (tonnes)	Total recovery 2004–05 (tonnes)	Total recovery 2005–06 (tonnes)	Total recovery 2006–07 (tonnes)	Total recovery 2007–08 (tonnes)
1	Asphalt	Masonry materials	100 000	92 000	85 900	83 640	103 070
2	Bricks	Masonry materials	165 000	85 700	102 475	43 962	90 486
3	Concrete	Masonry materials	877 000	899 492	762 134	793 710	818 116
4	Soil, fines waste, clay & clean fill	Masonry materials	162 400	132 400	70 989	63 251	90 837
5	Steel	Metals	264 200	247 840	278 028	323 850	365 391
6	Aluminium	Metals	19 000	20 443	22 171	20 845	24 434
7	Non-ferrous metals (ex. Al)	Metals	13 000	16 639	19 470	24 300	21 755
8	Food organics	Organics	0	10 540	6 005	3 981	5 796
9	Garden organics	Organics	130 100	188 610	222 499	209 725	202 397
10	Timber	Organics	116 700	300 980	255 728	275 385	241 387
11	Organics - other	Organics	0	89 790	81 625	82 636	79 359
12	Cardboard & waxed cardboard	Paper & cardboard	91 000	72 117	106 943	96 436	122 537
13	Liquid paperboard	Paper & cardboard	0	971	1 239	1 373	1 476
14	Magazines	Paper & cardboard	0	4 650	5 918	4 680	5 728
15	Newsprint	Paper & cardboard	31 398	35 917	40 607	40 000	41 393
16	Phonebooks	Paper & cardboard	1 303	1 685	2 042	2 042	2 000
17	Printing & writing papers	Paper & cardboard	12 300	12 593	18 803	30 574	42 745
18	Polyethylene terephthalate (PET)	Plastics[1]	0	5 544	4 753	5 704	5 440
19	High density polyethylene (HDPE)	Plastics[1]	0	2 728	3 036	2 779	2 821
20	Polyvinyl chloride (PVC)	Plastics[1]	0	329	365	363	317
21	Low density polyethylene (LDPE)	Plastics[1]	0	4 063	5 043	5 403	3 375
22	Polypropylene (PP)	Plastics[1]	0	1 272	1 252	1 542	1 202
23	Polystyrene (PS)	Plastics[1]	0	613	332	167	365
24	Other plastics	Plastics[1]	8 607	792	1 107	922	1 755
25	Glass	Glass	45 600	49 500	50 067	50 110	53 224
26	Fly ash	Other materials	0	335 000	236 343	260 913	272 000
27	Foundry sands	Other materials	0	9 006	6 755	2 000	0

28	Leather & textiles	Other materials	4 080	1 564	2 419	2 348	2 376
29	Tyres & other rubber	Other materials	88	590	1 535	1 486	9 434
Total			**2 041 776**	**2623 368**	**2 395 582**	**2 434 128**	**2 611 214**

Notes:

1. All plastics data is sourced from the 2007 calendar year (PACIA report).

While not assessed in detail as part of this study, it is recognised that direct reuse of many products occurs on a significant scale without reprocessing. Where possible throughout this report, any reuse activity has been identified in general terms, but not quantified. Products regularly reused include cars, appliances, clothing, building materials and books.

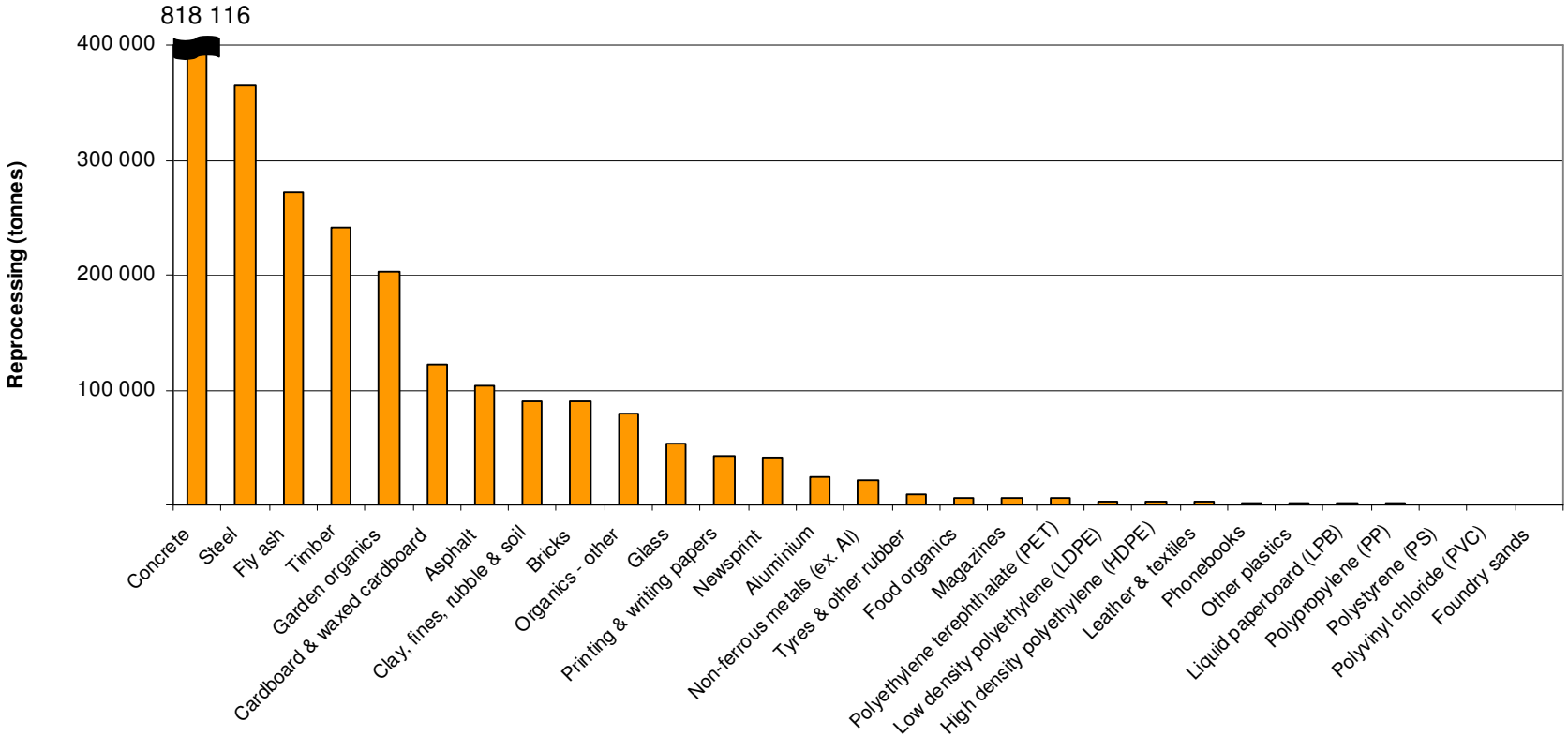

Figure E- 3 Reprocessing by material (by weight), SA 2007–08

1 Masonry materials

1.1 Quantity recovered and reprocessing location

The masonry materials recovery data presented in this report has been provided by reprocessors. It includes concrete, asphalt, brick & rock and rubble.

The quantity of masonry materials recovered in SA and the location of reprocessing, during 2007–08, is presented in Table 1-5. The quantity recovered was 1 102 508 tonnes, 74.2% of which was concrete (Figure 1-1). This material was recovered primarily through commercial collections, direct drop-offs and at transfer stations (e.g. skips and bins).

Table 1-5 Masonry materials recovery, SA 2007–08

Material	Net recovery[1] (tonnes)	Reprocessing location		
		SA	Interstate	Export
Asphalt	103 070	100%	0%	0%
Bricks	90 486	100%	0%	0%
Concrete	818 116	100%	0%	0%
Clays, fines, rubble & soil	90 837	100%	0%	0%
Total	**1 102 508**	**100%**	**0%**	**0%**

1. Net recovery excludes reprocessing losses

2. The 'clay, fines, rubble & soil' material category only relates to material that has been diverted from landfill and is consistent with reporting categories used in NSW, Victoria and WA.

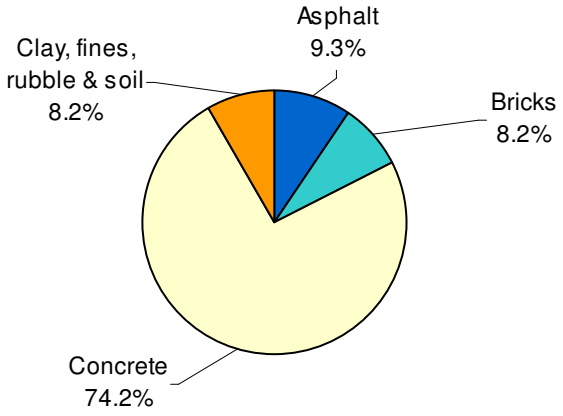

Figure 1-1 Composition of recovered masonry materials (by weight), SA 2007–08

All this recovered material was derived from the C&D (see Table 1-6).

Table 1-6 Masonry material recovery (by source sector), SA 2007–08

Material	Source sector			
	Municipal	C&I	C&D	Total
Asphalt	0	0	103 070	103 070
Bricks	0	0	90 486	90 486
Concrete	0	0	818 116	818 116
Clays, fines, rubble & soil	0	0	90 837	90 837
Total	**0**	**0**	**1 102 508**	**1 102 508**

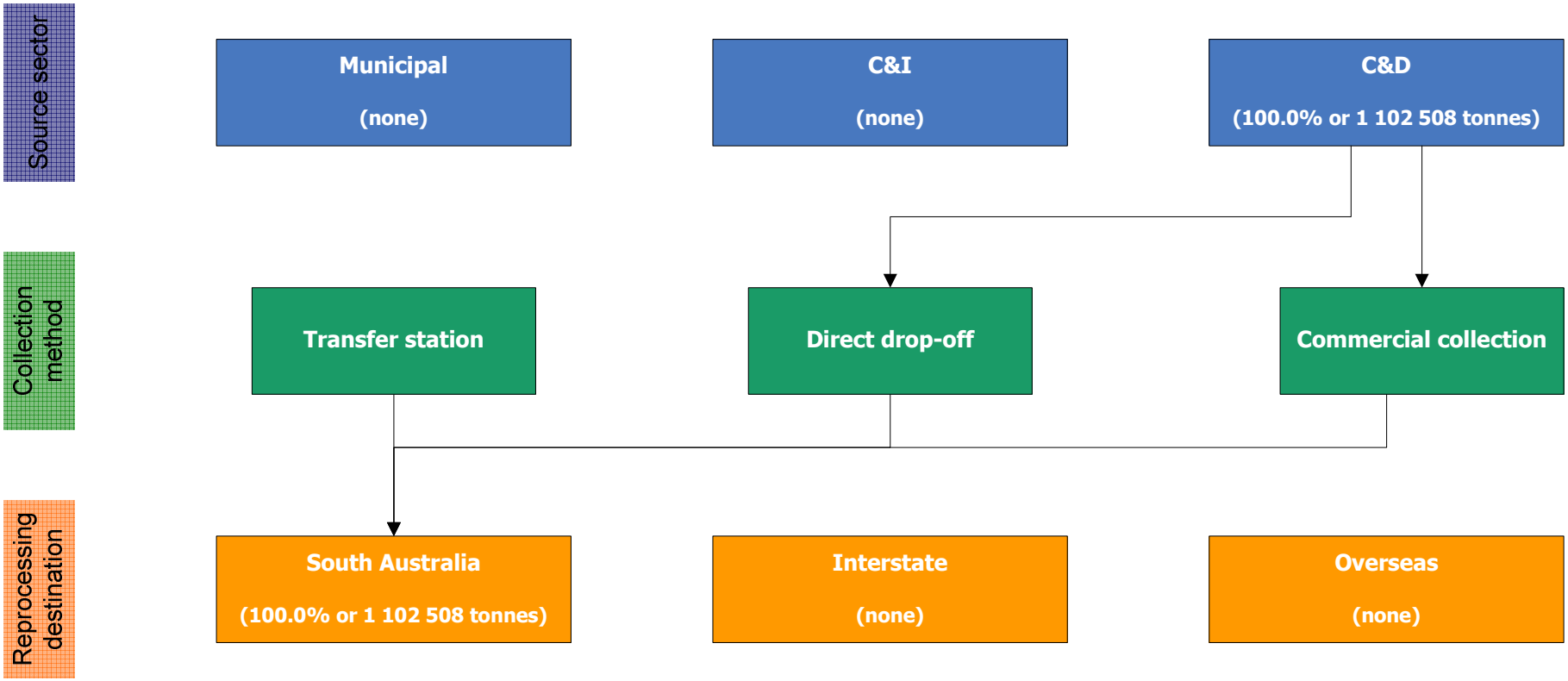

Figure 1-2 Flow of masonry material reprocessing, SA 2007–08

1.2 Source and end products

Table 1-7 Masonry material source products, SA 2007–08

Material	Source products
Asphalt	Roads, footpaths, car parks and kerbing
Bricks	Mainly walls and other general C&D activity
Concrete	Slabs, footings, kerbing, channel and wall
Clays, fines, rubble & soil	General C&D

Table 1-8 Masonry material end products, SA 2007–08

Material	End products
Asphalt	Road base
Bricks	Primarily crushed for road base and drainage
Concrete	Road base and drainage
Clays, fines, rubble & soil	Road base, batters/bunds and compost (bulking agent)

1.3 Recycling activity, trends, barriers and reuse

1.3.1 Trends

Presented in Figure 1-3 and Table 1-9 is the annual masonry materials recycling data for SA for the period of 2003–04 to 2007–08. Until 2007–08, the recovery of masonry materials has steadily declined. Masonry material recycling has been recorded at its third highest level in the last five years.

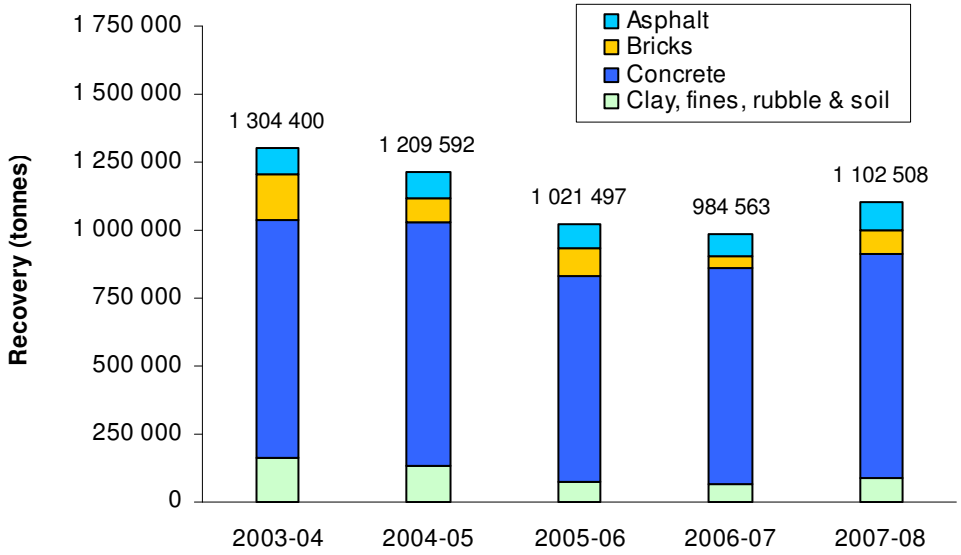

Figure 1-3 Annual masonry materials recovery, SA 2003–04 to 2007–08

The reduction of in recycling experienced in the previous year has been negated by the increase experienced during 2007–08, over 117 000 tonnes. This increase can be attributed to the increased market outlet conditions, as reported by reprocessors, along with a relaxation in specification requirements by the purchasers.

The larger masonry material reprocessors reported being unable to keep up with market demand, with one accessing their material stockpiles in significant quantities to maintain supply.

The brick recycling quantity has bounced back from its apparent slump during 2006–07, with 90 486 tonnes recycled during 2007–08. This resurgence was lead by the recovery of a significant quantity of bricks from a mixed waste stream by one reprocessor, indicating that purchasers are relaxing their previously stringent specifications.

Table 1-9 Annual masonry materials recovery, SA 2007–08

Material	2003–04 recovery (tonnes)	2004–05 recovery (tonnes)	2005–06 recovery (tonnes)	2006–07 recovery (tonnes)	2007–08 recovery (tonnes)
Asphalt	100 000	92 000	85 900	83 640	103 070
Bricks	165 000	85 700	102 475	43 962	90 486
Concrete	877 000	899 492	762 134	793 710	818 116
Clays, fines, rubble & soil	162 400	132 400	70 989	63 251	90 837
Total	**1 304 400**	**1 209 592**	**1 021 497**	**984 563**	**1 102 508**

1.3.2 Barriers

The following were identified by the masonry reprocessing industry as some of the barriers to increasing recovery rates:

- storage capacity limitations on sites
- quality restrictions on inputs to destination products
- price of expanding plant capacity and operating costs
- cost of legal compliance (e.g. EPA requirements)

In spite of the barriers mentioned above, the masonry materials market has returned from its 2006–07 low to record its third largest recovery (by weight) in the last five years. When asked about the 2008–09 financial year, the majority of reprocessors were optimistic that the market would remain strong. There was concern that a lack of large scale demolition could restrict volumes in their gate.

1.3.3 Reuse

There is a small amount of brick cleaning for reuse, some of which has been captured within the 90 486 tonnes reported as being reprocessed. The full scale of brick reuse is unknown.

1.4 Market summary

1.4.1 Market size

Reprocessors generally reported that the masonry material market was large and had capacity to grow. This anecdotal reporting is representative of the influence that civil works and road building has on the quantity recycled. One reprocessor reported using 75% of their stockpile during 2007–08, which indicates that the market size was large.

1.4.2 Market strength

The demand for recycled masonry materials was strong during 2007–08, with all reprocessors indicating that the asphalt, brick and clays, fines, rubble & soil markets are very strong and steady. All but one reprocessor reported that the concrete market was very strong. This reprocessor reported that it was difficult to estimate the strength of the market.

It was reported that there is a lack of government support for the use of recycled asphalt in SA. The need for a consistent end market was also reported and indicates that during 2008–09, the masonry materials market may not be as strong.

For all masonry materials, the quality and contamination rate of the reprocessed material was cited as a potential issue and barrier to increasing market size and strength. There have been a number of business ownership and site establishment changes in the past year.

2 Metals

2.1 Quantity recovered and reprocessing location

The metals materials recovery data presented in this report has been provided by a range of industry sources, including manufacturers, industry groups and reprocessors.

The quantity of metals recovered in SA and the location of reprocessing, during 2007–08, is presented in Table 2-10. The quantity recovered was 411 579 tonnes, 88.8% of which was steel (Figure 2-4). Metals recovery was up significantly in 2007–08, by almost 42 000 tonnes. This material was recovered primarily through commercial collections, direct drop-offs and household recycling collections.

Table 2-10 Metals recovery, SA 2007–08

Material	Net recovery [1]	Reprocessing location		
	(tonnes)	SA	Interstate	Export
Steel [2]	365 391	26%	1%	72%
Aluminium	24 434	0%	34%	66%
Non-ferrous metals (ex. Al) [3]	21 755	7%	28%	66%
Total	**411 579**	**23.6%**	**4.6%**	**71.8%**

1. Net recovery excludes reprocessing losses

2. Includes steel can packaging – refer to Section 8 (Packaging Summary) for more details.

3. Primarily lead and copper.

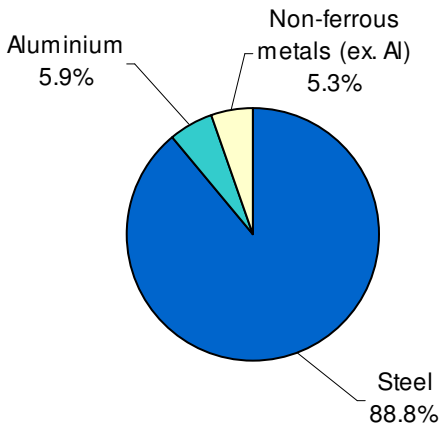

Figure 2-4 Composition of recovered metals (by weight), SA 2007–08

The majority of metals reprocessed in SA were sourced from the commercial and industrial sector and the automotive industry (see Figure 2-5). Less than 12% of metal recycling was sourced from the municipal sector (see Table 2-11).

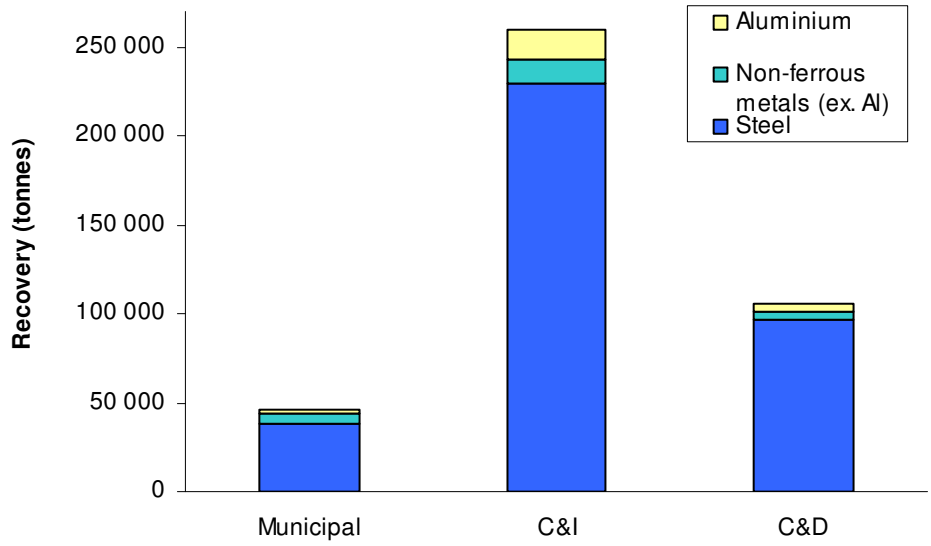

Figure 2-5 Metals recovery (by source sector), SA 2007–08

Table 2-11 Metals recovery (by source sector), SA 2007–08

Material	Source sector			
	Municipal	C&I	C&D	Total
Steel	38 687	229 814	96 889	365 390
Aluminium	2 659	17 301	4 474	24 434
Non-ferrous metals (ex. Al)	5 163	12 727	3 866	21 755
Total	**46 509**	**259 842**	**105 228**	**411 579**

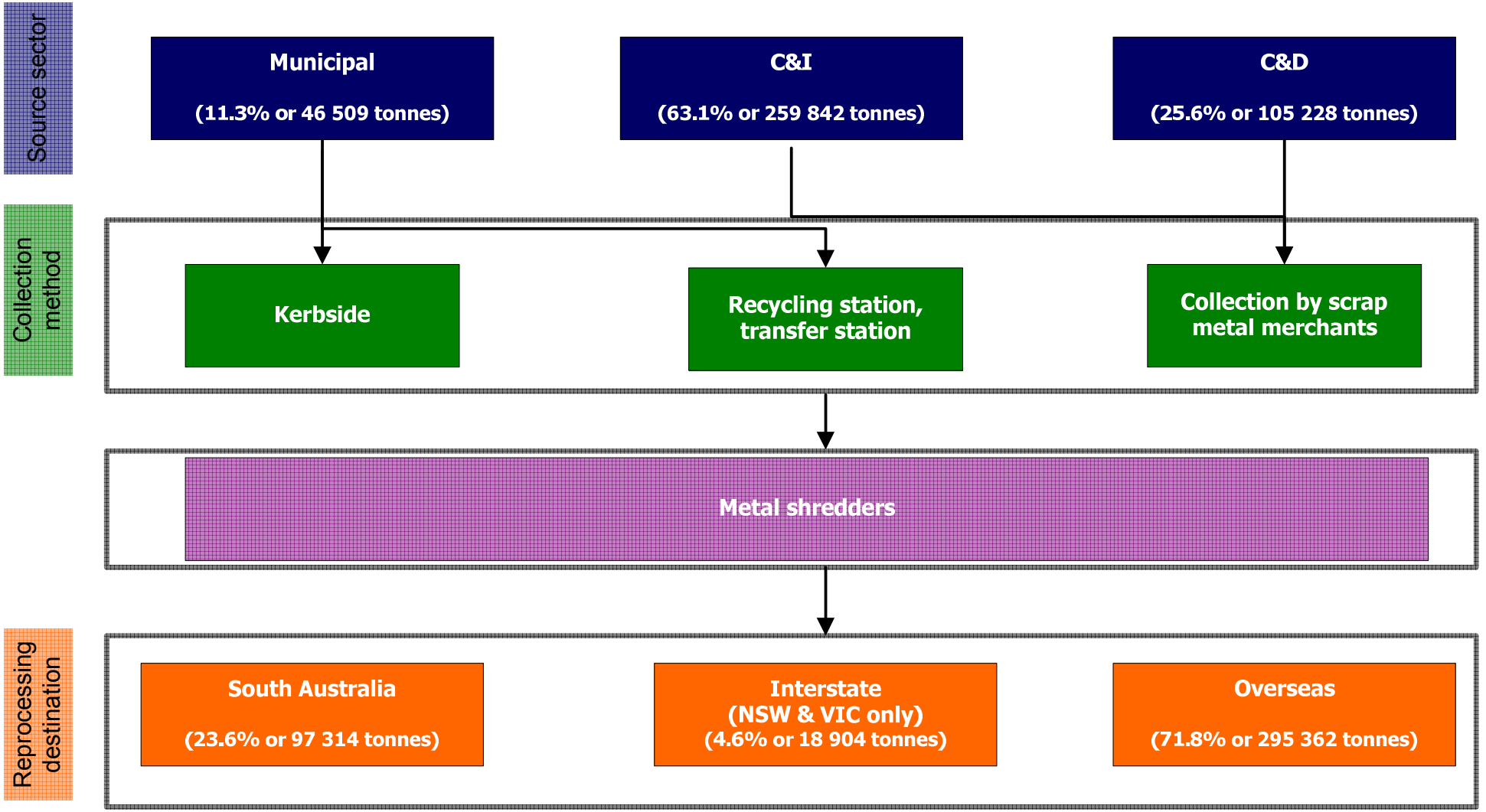

Figure 2-6 Flow of metals reprocessing, SA 2007–08

2.2 Source and end products

Table 2-12 Metals source products, SA 2007–08

Material	Source products
Steel	Pre- and post-consumer, automotive (car bodies), general heavy steel and structural steel, appliances, iron roofing, steel packaging
Aluminium	Windows and doors, automotive engines, assorted industrial scrap and production scrap, aluminium cans, electrical cable, electronic and electrical waste
Non-ferrous metals (ex. Al)	Copper pipe, automotive batteries and cable, general industrial and production scrap, electrical cable

Table 2-13 Metals end products, SA 2007–08

Material	End products
Steel	Many, including car parts, general rod and sheet, mining equipment. Most to export.
Aluminium	Valves and extrusions, automotive parts, building industry and aluminium cans. Most to export.
Non-ferrous metals (ex. Al)	Many, including batteries, cables, valves and extrusions. Most to export.

2.3 Recycling activity, trends, barriers and reuse

2.3.1 Trends

Presented in both Figure 2-7 and Table 2-14 is the annual metals recycling data for SA for the period of 2003–04 to 2007–08. The largest fluctuation in metals reprocessing occurred between 2005–06 and 2006–07.

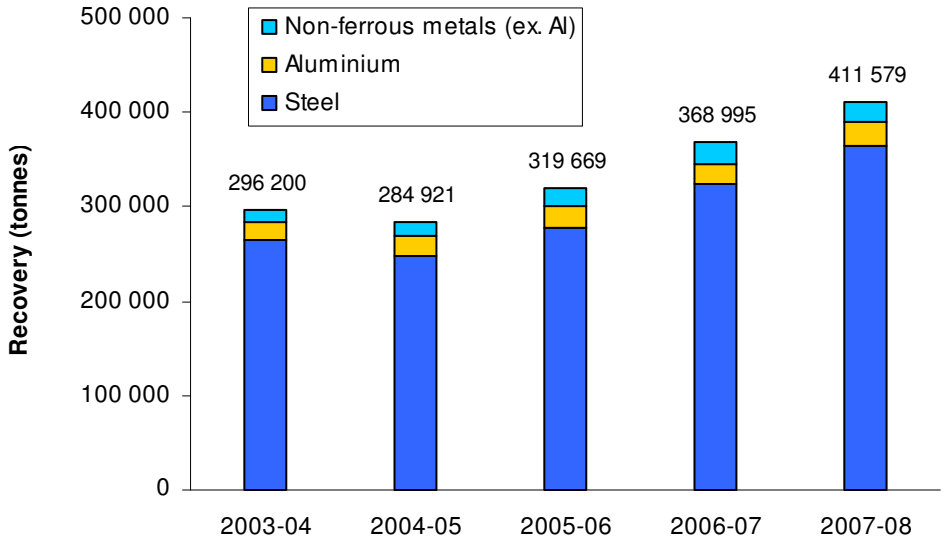

Figure 2-7 Annual metals recovery, SA 2003–04 to 2007–08

Table 2-14 Annual metals recovery, SA 2003–04 to 2007–08

Material	2003–04 recovery (tonnes)	2004–05 recovery (tonnes)	2005–06 recovery (tonnes)	2006–07 recovery (tonnes)	2007–08 recovery (tonnes)
Steel	264 200	247 840	278 028	323 850	365 391
Aluminium	19 000	20 443	22 171	20 845	24 434
Non-ferrous metals (ex. Al)	13 000	16 639	19 470	24 300	21 755
Total	**296 200**	**284 921**	**319 669**	**368 995**	**411 579**

2.3.2 Barriers

The following were identified by the metals reprocessing industry as some of the barriers or inhibitors to increasing recovery rates:

- shredder age and capacity limits throughput
- quality of post-consumer scrap
- yard inadequacies

Looking forward to the 2008–09 financial year, many reprocessors reported concerns about the impact the global financial crisis will have on the metals market. It was reported that during late 2008 prices for metals in both the local and export markets began to drop. It is considered that the financial crisis may be the single largest market barrier during 2008–09.

2.4 Market summary

2.4.1 Market size

Further to the additional shredder being installed during 2006–07 at OneSteel, Sims reported increased shredder capacity during mid–2008. Many reprocessors reported being uncertain about market size. This was expected as the metals market is driven by the worldwide demand for scrap, with demand fluctuating through the year.

High metal prices were maintained throughout 2007–08, with price drops due to the global financial crisis hitting SA reprocessors in late 2008. A temporary international credit crisis in October / November 2008 led to a short term suspension of trade. This has since been alleviated. It is expected that the impact of these price drops will be felt during the 2008–09 financial year.

2.4.2 Market strength

The 2007–08 market was reported to be strong, healthy and constant, with high prices paid for all metals. The market for metals into export markets in Asia was the main driver behind the strength and health. As the global financial crisis takes hold, this driver is expected to weaken significantly. Nationally, NSW and Victoria remained major outlets for aluminium and other non-ferrous metals.

The expected contraction of metal recycling demand due to the closure of Mitsubishi and the retendering of the GMH metals contract was not experienced.

There is a widespread misconception that a dramatic price drop is accompanied by a reduced level of metals recovery. In fact the flow of materials remains relatively constant despite dramatic price shifts.

3 Organics

3.1 Quantity recovered and reprocessing location

The organics recovery data presented in this report has been provided by Compost Australia (CA). CA undertakes an annual *Organics Industry Survey* of organics reprocessors across SA, New South Wales, Victoria and Western Australia. The data generated by the Compost Australia exercise for the 2007–08 financial year has been used in this report. In addition, timber recovery into waste to fuel processes has been provided separately by the C&D industry.

Organics recovery in SA and the location of reprocessing, during 2007–08, is presented in Table 3-15. The major organic material recovered was 241 387 tonnes of timber (Figure 3-8), the next most significant organic recovery stream was garden organics (202 397 tonnes) from municipal sources.

Table 3-15 Organics recovery, SA 2007–08

Material	Net recovery[1]	Reprocessing location		
	(tonnes)	SA	Interstate	Export
Food organics	5 796	100.0%	0.0%	0.0%
Garden organics	202 397	100.0%	0.0%	0.0%
Timber	241 387	100.0%	0.0%	0.0%
Organics - other	79 359	100.0%	0.0%	0.0%
Total	**528 939**	**100.00%**	**0.0%**	**0.0%**

1. Net recovery excludes reprocessing losses

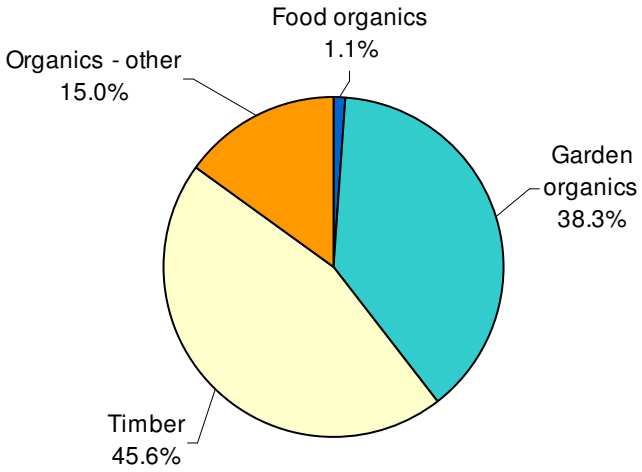

Figure 3-8 Composition of recovered organics (by weight), SA 2007–08

Garden organics are recovered through kerbside collection systems in many Adelaide municipalities and from drop off sites at transfer stations. Most is delivered directly to composting facilities. Only composted garden organics are considered to have been recycled in this survey, and as such data for organic material that has been shredded by mobile shredder, used directly on parks and gardens and manures spread directly onto land have not been included in this survey.

Waste timber is generated in a number of forms. Structural timber is recovered from both residential and commercial demolition projects. Pallets, fencing and furniture are also sources of timber waste. There is also timber off-cuts and sawdust generated from manufacturing processes and building construction sites.

The organics – other category is primarily composed of paper pulp / sludge (63.1% by weight), general agricultural organics (16.0%) and animal bedding (8.9%). Small quantities of animal mortalities (150 tonnes) and paunch (7 500 tonnes) are also included in the organics – other category. The breakdown of organics recovery by source sector and material type is presented in Figure 3-9 and Table 3-16.

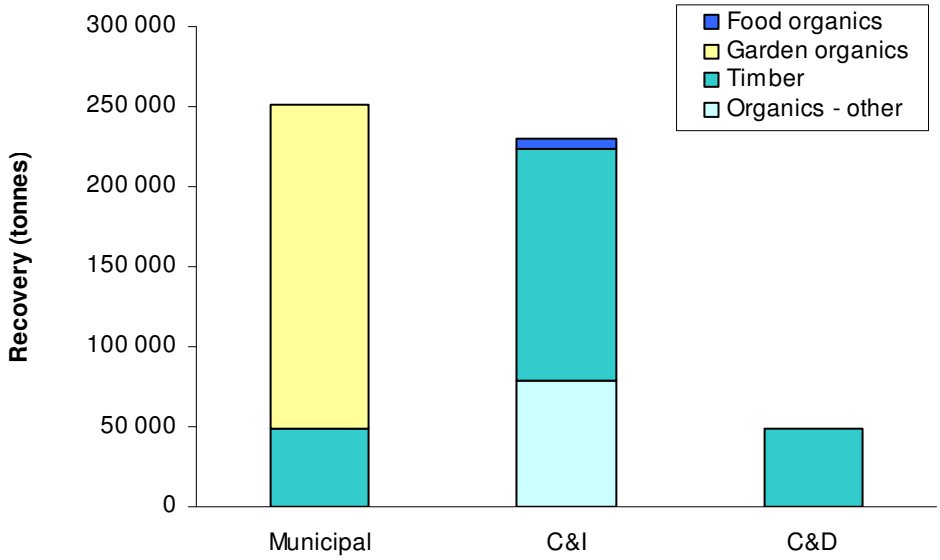

Figure 3-9 Organics recovery (by source sector), SA 2007–08

Table 3-16 Organics recovery (by source sector), SA 2007–08

Material	Source sector			
	Municipal	C&I	C&D	Total
Food organics	0	5 796	0	5 796
Garden organics	202 397	0	0	202 397
Timber	48 277	144 832	48 277	241 387
Organics - other	0	79 359	0	79 359
Total	**250 674**	**229 987**	**48 277**	**528 939**

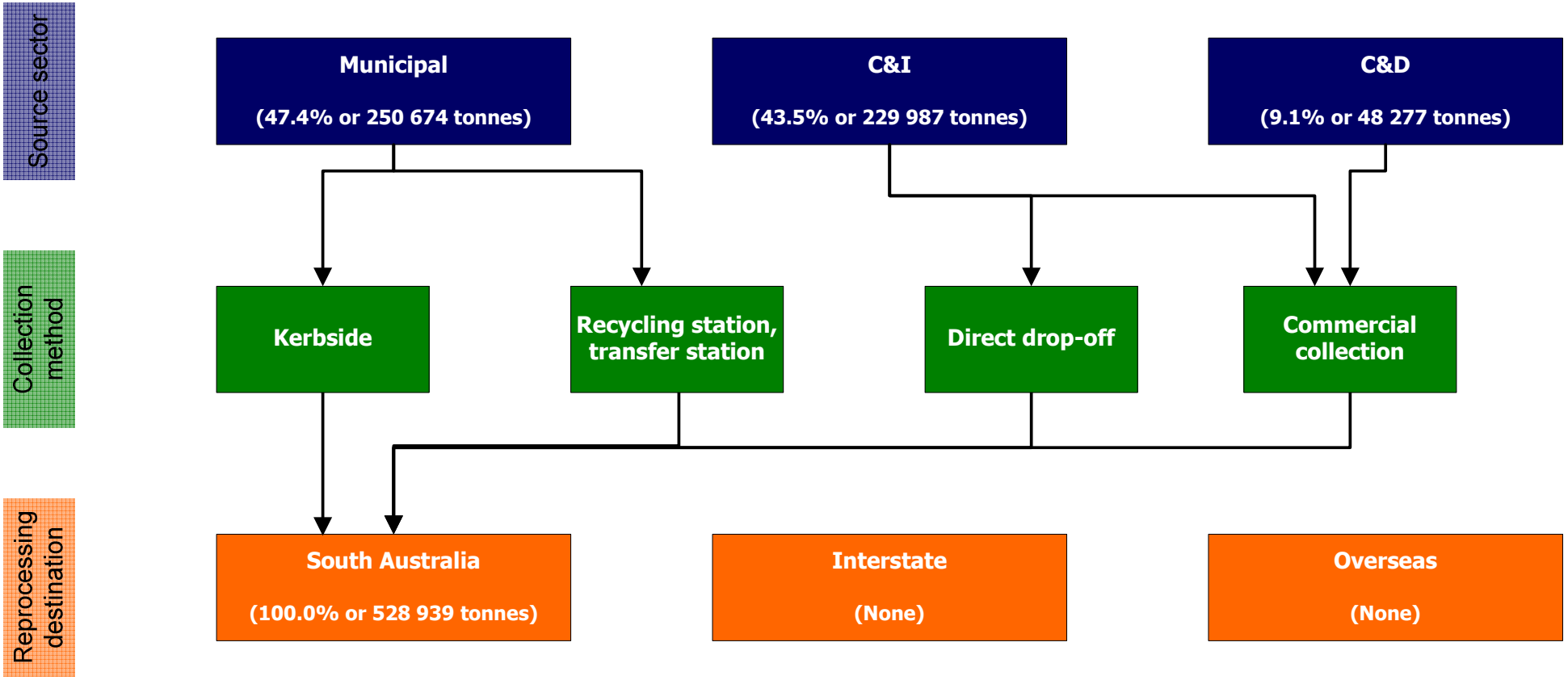

Figure 3-10 Flow of organics reprocessing, SA 2007–08

3.2 Source and end products

Table 3-17 Organics source products, SA 2007–08

Material	Source products
Food organics	Commercial food wastes
Garden organics	Municipal garden organics
Timber	Barks, sawdust, wood/timber packaging, general wood/timber
Organics - other	Paper pulp, sludge, miscellaneous agricultural organics, animal bedding, paunch, animal mortalities

Table 3-18 Organics end products, SA 2007–08

Material	End products
Food organics	Primarily composted soil conditioners, potting mixes and mulches
Garden organics	Primarily composted soil conditioners, potting mixes and mulches
Timber	75% - Composted soil conditioners, potting mixes and mulches. 25% - fuel for cement manufacture (energy recovery)
Organics - other	Primarily composted soil conditioners, potting mixes, mulches and fertilisers

3.3 Recycling activity, trends, barriers and reuse

3.3.1 Trends

Presented in Figure 3-11 and Table 3-19 is annual organics recycling data for SA for the period 2003–04 through 2007–08. Due to significant changes in the data collection methodology from 2004–05, caution should be taken in comparing 2003–04 data with that of later years. For example, in 2004–05 more categories of organics reprocessing were defined to be more consistent with interstate and national definitions. In addition, the use of timber as a fuel in cement manufacture began in 2004–05, utilising significant quantities of timber previously disposed to landfill.

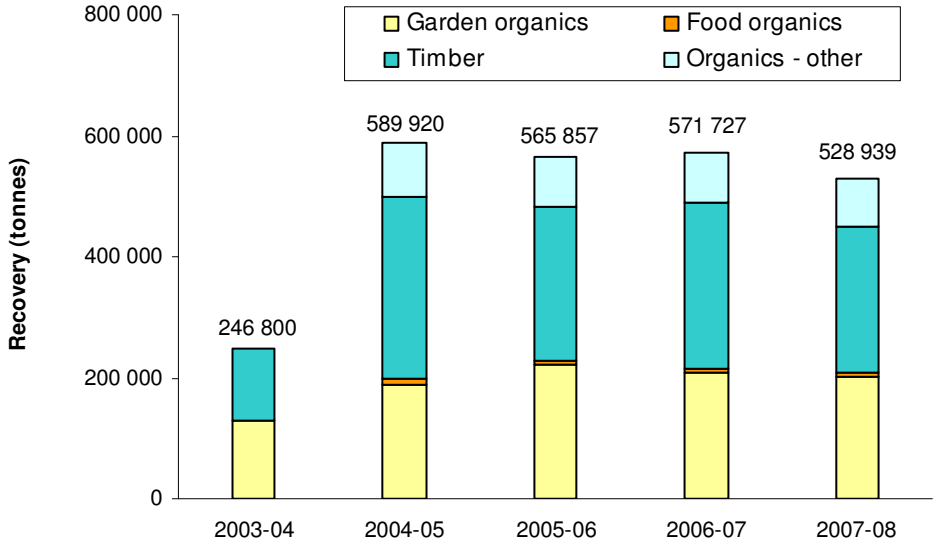

Figure 3-11 Annual organics recovery, SA 2003–04 to 2007–08

Table 3-19 Annual organics recovery, SA 2007–08

Material	2003–04 recovery (tonnes)	2004–05 recovery (tonnes)	2005–06 recovery (tonnes)	2006–07 recovery (tonnes)	2007–08 recovery (tonnes)
Food organics	0	10 540	6 005	3 981	5 796
Garden organics	130 100	188 610	222 499	209 725	202 397
Timber	116 700	300 980	255 728	275 385	241 387
Organics - other	0	89 790	81 625	82 636	79 359
Total	**246 800**	**589 920**	**565 857**	**571 727**	**528 939**

The 2007–08 reprocessing total has dropped by over 42 000 tonnes from 2006–07. It is possible that this drop in reprocessed material is primarily due to the drought. The garden organics figure is similar to that of 2006–07, however it is still down from the high of over 222 000 tonnes.

Food organics has rebounded to 2005–06 levels. It is anticipated that food organics reprocessing will increase in coming years due to the potential recovery of food waste in green waste bins. A trial for this is currently underway in selected municipal areas of Adelaide.

3.3.2 Barriers

The key issues and barriers impacting upon the market were identified as (ROU 2008):

- raw materials contamination
- gate fees too low (metro areas) / tender appraisal is price driven
- research and development of new products/markets (particularly agriculture).

The key issues and barriers identified continue to be consistent from year to year, with reprocessors experiencing the same barriers and inhibitors to market expansion and growth.

3.3.3 Reuse

The primary sources of timber waste are the timber industry and the demolition industry. All identified waste from the timber industry underwent some kind of reprocessing, usually into a composted product. No direct reuse was counted in the data presented.

Some timber waste from the demolition industry is likely to be recovered for reuse by the recycled timber industry, or directly by other groups (e.g. builders and other trades people), however the scale of this reuse activity, and the destination of the reused timber is not known.

3.4 Market summary

3.4.1 Market size and strength

Overall, the organics reprocessing industry in South Australia remained stable and consistent in size through 2007–08, with an increase in timber reprocessing counteracting decreases in garden, food and other organics reprocessing. The number of organic reprocessors in SA has remained steady from the 2006–07 survey, with 31 of 32 reprocessors taking part in the Compost Australia (CA) survey.

As with market size, market strength varies from product to product. Data from CA shows that the pasteurised soil conditioner and composted soil conditioner markets dropped in strength from 2006–07, with quantities sold reducing by 98% and 34% respectively. In contrast, the composted mulch market grew in strength, with quantity sold increasing by more than 100%.

The switch from soil based products to mulch based products is potentially due to market demand, with greater awareness of the need to conserve water in the domestic garden. It may also be due to a change in CA methodology.

4 Paper and cardboard

4.1 Quantity recovered and reprocessing location

The paper and cardboard recovery data presented in this report has been provided by a range of industry sources, including manufacturers, industry groups and reprocessors.

The quantity of paper and cardboard recovered in SA and the location of reprocessing during 2007–08, is presented in Table 4-20. Paper and cardboard recovery totalled 215 879 tonnes, with over 56% of this being cardboard and waxed cardboard (Figure 4-12). This material was recovered through both commercial and household recycling collections.

Table 4-20 Paper & cardboard recovery, SA 2007–08

Material	Net recovery[1]	Reprocessing location		
	(tonnes)	SA	Interstate	Export
Cardboard & waxed cardboard [2]	122 537	0.0%	39.6%	60.4%
Liquid paperboard [2]	1 476	0.0%	0.0%	100.0%
Magazines [3]	5 728	0.0%	46.0%	54.0%
Newsprint	41 393	13.0%	21.0%	66.0%
Phonebooks	2 000	0.0%	0.0%	100.0%
Printing & writing papers	42 745	0.0%	12.2%	87.8%
Total	**215 879**	**2.5%**	**30.2%**	**67.4%**

1. Net recovery excludes reprocessing losses

2. 100% cardboard & LPB packaging – refer to Section 8 (Packaging Summary) for more details

3. Exported magazine material is unknown, any magazine export is captured in newsprint export

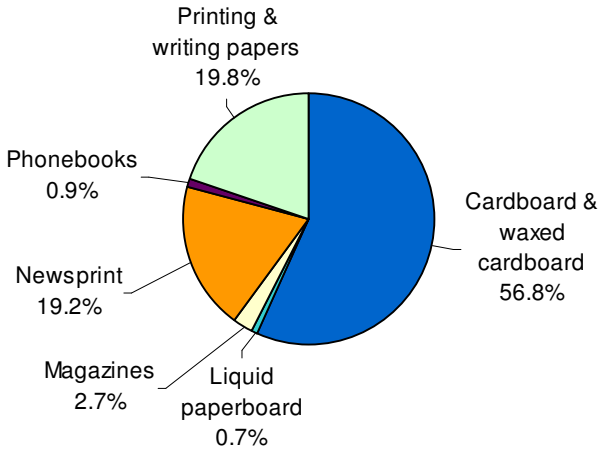

Figure 4-12 Composition of recovered paper & cardboard (by weight), SA 2007–08

The breakdown of paper and cardboard recovery by source sector and material type is presented in Figure 4-13 and Table 4-21. The commercial and industrial waste sector was the main source sector.

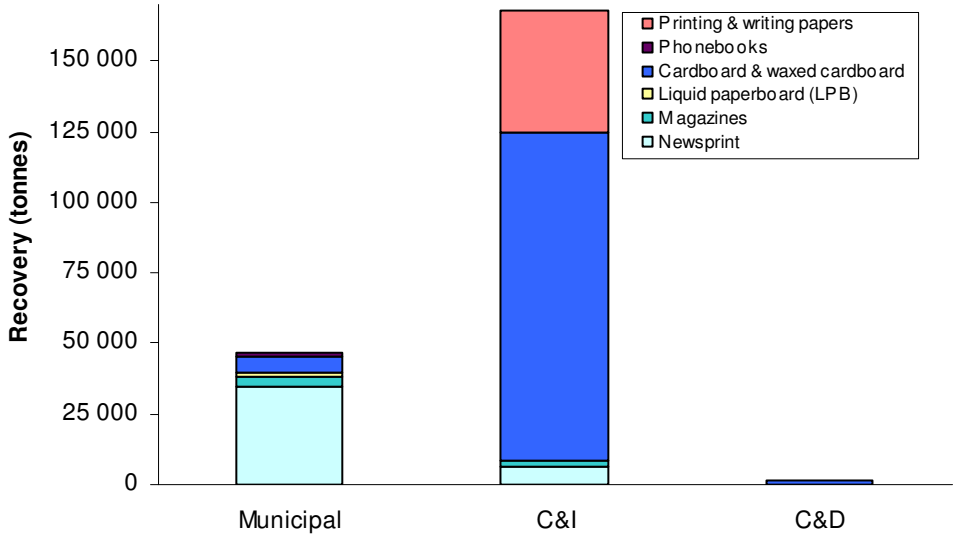

Figure 4-13 Paper & cardboard recovery (by source sector), SA 2007–08

Table 4-21 Paper & cardboard recovery (by source sector), SA 2007–08

Material	Source sector			
	Municipal	C&I	C&D	Total
Cardboard & waxed cardboard	5 432	115 948	1 158	122 537
Liquid paperboard	1 476	0	0	1 476
Magazines	3 514	2 213	0	5 728
Newsprint	34 770	6 623	0	41 393
Phonebooks	1 800	200	0	2 000
Printing & writing papers	0	42 745	0	42 745
Total	**46 992**	**167 728**	**1 158**	**215 879**

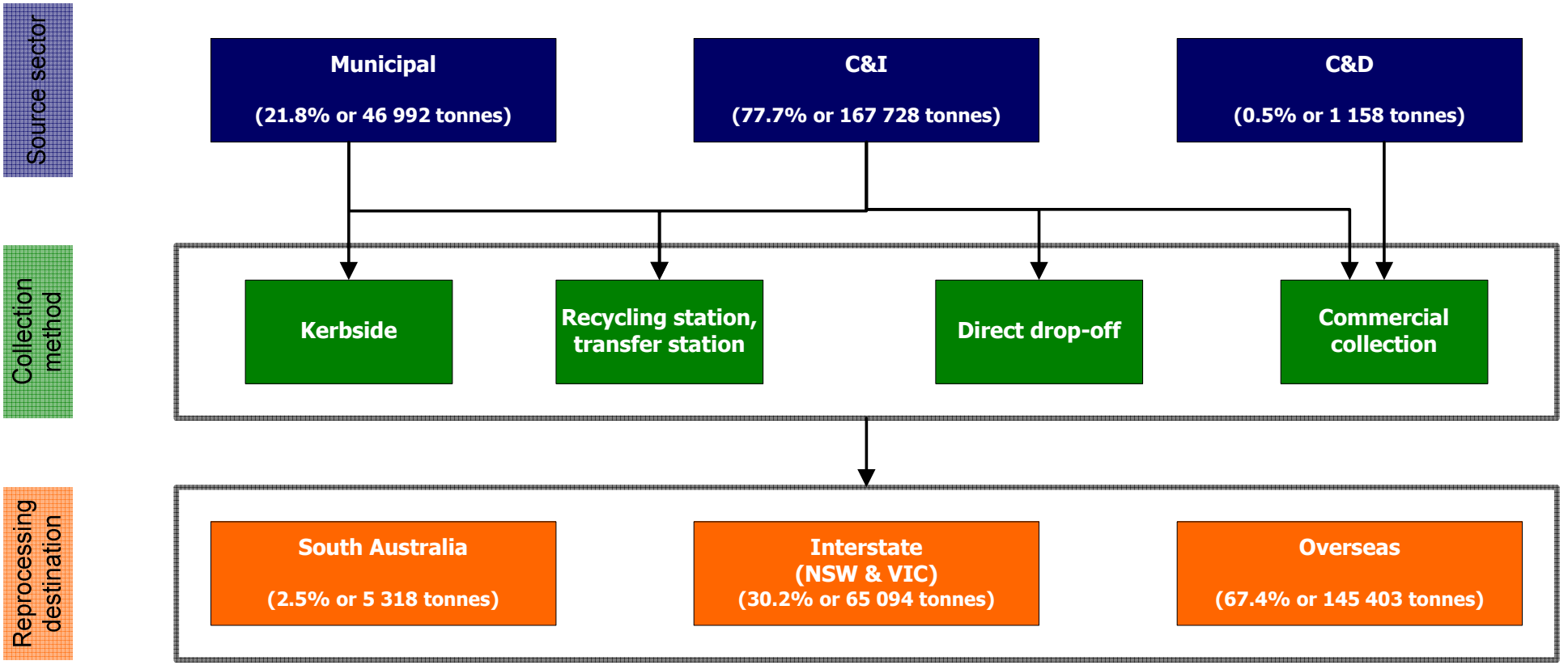

Figure 4-14 Flow of paper & cardboard reprocessing, SA 2007–08

4.2 Source and end products

Table 4-22 Paper and cardboard source products, SA 2007–08

Material	Source products
Cardboard & waxed cardboard	Mostly corrugated cardboard use for the packaging of industrial and consumer goods
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.
Magazines	Pre-consumer waste and post-consumer magazine material in mixed paper to export.
Newsprint	Both pre- and post-consumer newsprint and some magazine material. Includes magazines and TV guides printed on newsprint or improved newsprint.
Phonebooks	Phone books
Printing & writing papers	Office paper and a small amount of packaging paper from office sources

Table 4-23 Paper and cardboard end products, SA 2007–08

Material	End products
Cardboard & waxed cardboard	Packaging
Liquid paperboard	Printing and writing paper
Magazines	Newsprint and packaging
Newsprint	Newsprint, packaging, cat litter, newsprint, insulation, building products and dust suppression.
Phonebooks	Newsprint and packaging
Printing & writing papers	Packaging and writing paper

4.3 Recycling activity, trends, barriers and reuse

4.3.1 Trends

Presented in Figure 4-15 and Table 4-24 is annual paper and cardboard recycling data for SA for the period of 2003–04 through to 2007–08.

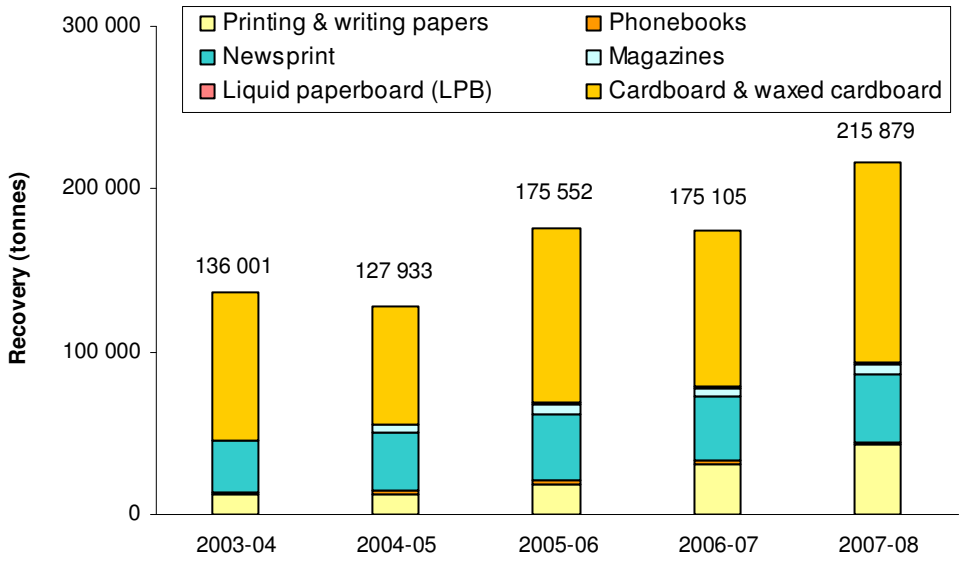

Figure 4-15 Annual paper & cardboard recovery, SA 2003-04 to 2007-08

Cardboard recovery is up based on stronger collection activity in the C&I sectors. Newspaper recycling rates in SA have risen significantly over the past five years, reaching 71.5% in the 2005 calendar year. PNEB data for the 2007 calendar year indicates that the newspaper recycling rate is higher again, at a little under 75%. There have also been increased export quantities, particularly in magazines, printing and writing paper and cardboard grade paper.

Table 4-24 Annual paper & cardboard recovery, SA 2003-04 to 2007-08

Material	2003–04 recovery	2004–05 recovery	2005–06 recovery	2006–07 recovery	2007–08 recovery
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Cardboard & waxed cardboard	91 000	72 117	106 943	96 436	122 537
Liquid paperboard	0	971	1 239	1 373	1 476
Magazines	0	4 650	5 918	4 680	5 728
Newsprint	31 398	35 917	40 607	40 000	41 393
Phonebooks	1 303	1 685	2 042	2 042	2 000
Printing & writing papers	12 300	12 593	18 803	30 574	42 745
Total	**136 001**	**127 933**	**175 552**	**175 105**	**215 879**

The large (greater than 12 000 tonne) increase in printing and writing paper reprocessing is reflective of the very buoyant market during 2007–08, as well as increased C&I collections.

The increase in magazine reprocessing (over 1 000 tonnes) can be attributed to an increase in the export categories in which magazines are located. However, magazines and newsprint are often collected, sorted and exported as a mixed waste stream. As such, it is possible that some material categorised as either newspaper or magazines in the mixed export category is in-fact the other.

4.3.2 Barriers

During 2007-08 reprocessors reported that limited export opportunities and quality of available material were the main barriers to reprocessing activity. Inability to keep up with demand was also a barrier, with several reprocessors calling for more material to reprocess. As with previous years, the efficient collection of printing and writing paper outside households and Adelaide's CBD remains a challenge.

Competition from exporters has continued to be strong through the 2007–08 financial year.

4.3.3 Reuse

Minor newspaper and phonebook reuse activities include; fire-lighting, use as drop-sheets and animal bedding.

4.4 Market summary

4.4.1 Market size

SA continues to have no significant market outlet for waste paper, with almost all (97%) going into interstate or export markets. The interstate market has fallen from 39.7% in 2006–07 to 30.2% in 2007–08, whilst the export market has increased by 10% from 2006–07. The increased export market size was driven by the unsorted mixed grade paper code, increasing by over 25 000 tonnes from 2006–07.

For newsprint a similar case situation exists with Norske Skog capturing a sizable share of old newspapers and the remainder going to export.

Other grade of paper – printing and writing, liquid paperboard and phonebooks – are largely sent to export.

4.4.2 Market strength

The export market for unsorted mixed grade paper grew during the last year, with Asia fuelling the demand. Prices were reportedly strong through the year, with the global financial crisis starting to impact near the end of 2007–08.

Overall the market was strong to very strong, with all reprocessor in agreement on this.

The price of all sorted grades remained buoyant through 2007–08. However, prices and market strength have softened markedly through 2008–09 due to the global financial crisis.

5 Plastics

5.1 Quantity recovered and reprocessing location

The plastics recovery data presented in this report has been sourced from the annual Plastics and Chemicals Industries Association (PACIA) survey of plastics reprocessors. The PACIA study is undertaken on a calendar year basis and the data published here is for the 2007 calendar year.

The quantity of plastics recovered in SA and the location of reprocessing for 2007 is presented in Table 5-25. Plastics recovery was 15 275 tonnes, with PET the largest contributor at around 36% (Figure 5-16). Recovery was through commercial and industrial collections and municipal recycling collections.

Table 5-25 Plastics recovery, SA 2007

Material	Net recovery[1]	Reprocessing location		
	(tonnes)	SA	Interstate	Export
Polyethylene terephthalate (PET)	5 440	0.2%	88.6%	11.2%
High density polyethylene (HDPE)	2 821	40.9%	32.6%	26.5%
Polyvinyl chloride (PVC)	317	50.4%	24.2%	25.3%
Low density polyethylene (LDPE)	3 375	32.4%	47.4%	20.1%
Polypropylene (PP)	1 202	70.3%	9.5%	20.2%
Polystyrene (PS)	365	12.1%	40.5%	47.5%
Other plastics	1 755	23.4%	76.6%	0.0%
Total	**15 275**	**24.3%**	**59.1%**	**16.6%**

1. Net recovery excludes reprocessing losses, but includes plastic packaging – refer to Section 8 (Packaging Summary) for more details.

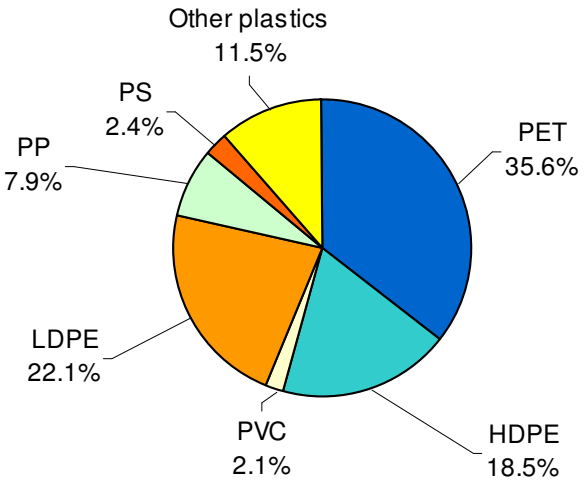

Figure 5-16 Composition of recovered plastics (by weight), SA 2007

The breakdown of plastics recovery by source sector and material type is presented in Figure 5-17 and Table 5-26.

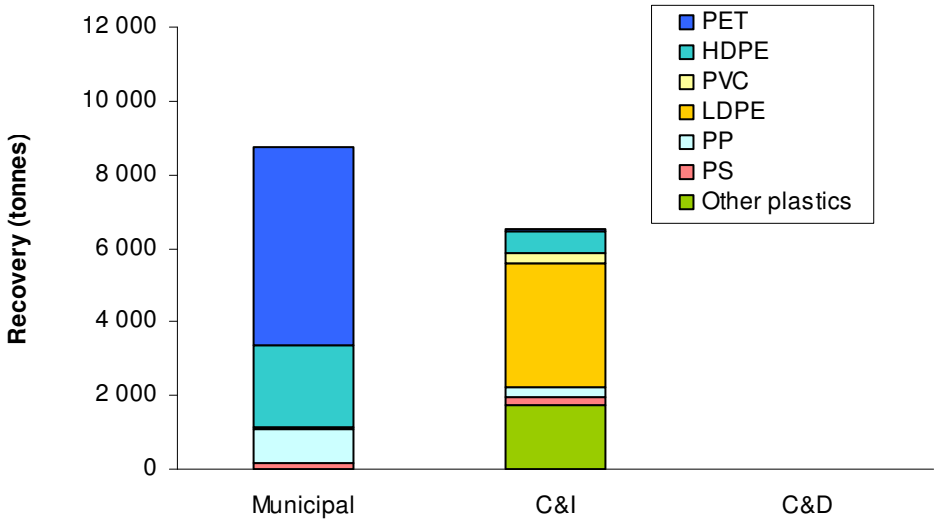

Figure 5-17 Plastics recovery (by source sector), SA 2007

Both Figure 5-17 and Table 5-26 show that the main source sector is the commercial and industrial sector, with the majority of PET coming from the municipal source sector. During 2007 only 10 tonnes was reported as sourced from the C&D sector.

Table 5-26 Plastics recovery (by source sector), SA 2007

Material	Source sector			
	Municipal	C&I	C&D	Total
Polyethylene terephthalate (PET)	5 363	77	0	5 440
High density polyethylene (HDPE)	2 205	616	0	2 821
Polyvinyl chloride (PVC)	80	237	0	317
Low density polyethylene (LDPE)	0	3 375	0	3 375
Polypropylene (PP)	898	294	10	1 202
Polystyrene (PS)	173	192	0	365
Other plastics	4	1 751	0	1 755
Total	**8 723**	**6 541**	**10**	**15 275**

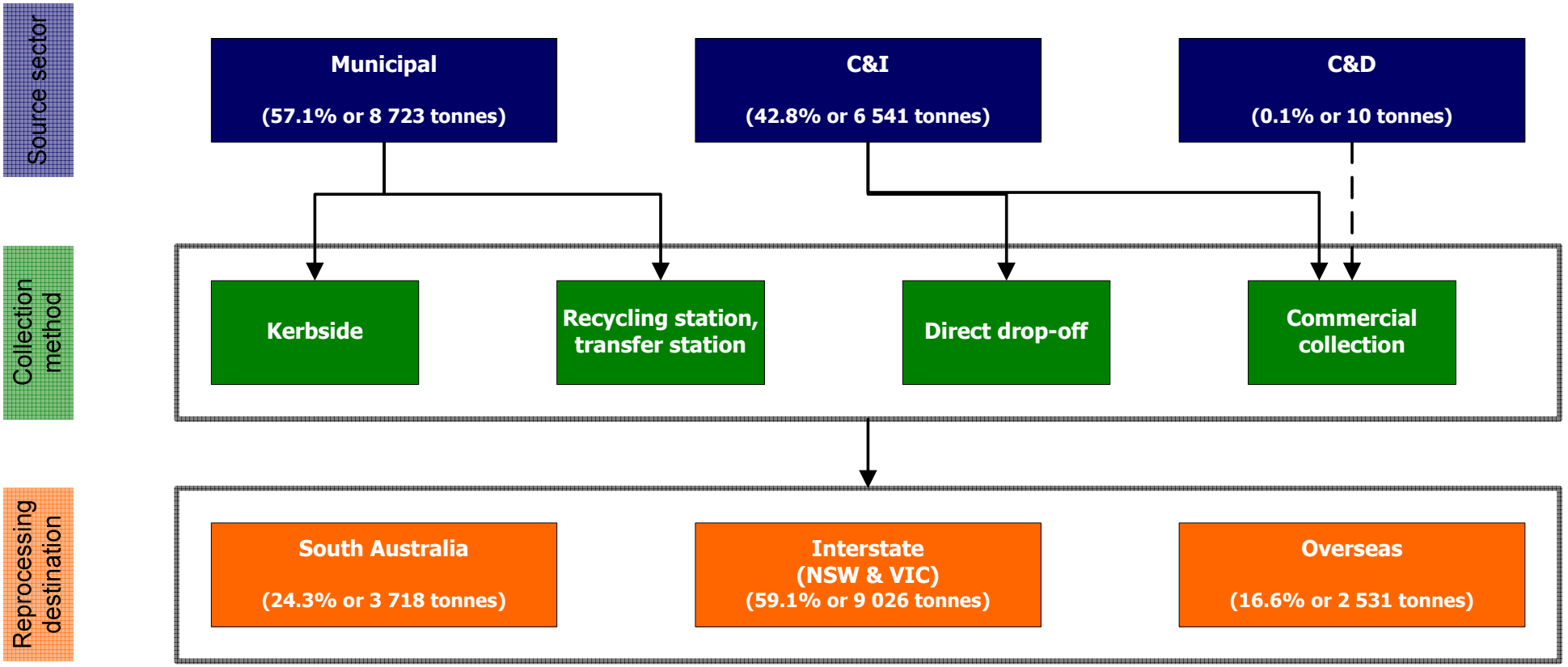

Figure 5-18 Flow of plastics reprocessing, SA 2007

5.2 Source and end products

Table 5-27 Plastics source products, SA 2007

Material	Source products
Polyethylene terephthalate (PET)	Soft drink bottles, fruit juice bottles
High density polyethylene (HDPE)	Milk bottles, manufacturing scrap, other packaging bottles, mobile garbage bins, drums, pipes, crates and pallets
Polyvinyl chloride (PVC)	Manufacturing scrap
Low density polyethylene (LDPE)	Flexible film used as distribution packaging, packaging bottles and manufacturing scrap
Polypropylene (PP)	Manufacturing scrap, rigid packaging applications, pallet strapping and automotive parts
Polystyrene (PS)	Manufacturing scrap, pipe supports, EPS freight packaging and rigid food packaging
Other plastics	Manufacturing scrap and domestic durables

Table 5-28 Plastics end products, SA 2007

Material	End products
Polyethylene terephthalate (PET)	Soft drink bottles, other packaging applications, fibre applications (e.g. geotextiles) and mixed polymer timber replacement products
High density polyethylene (HDPE)	Pallets, agricultural pipes, bins, crates and mixed polymer timber replacement products
Polyvinyl chloride (PVC)	Floor coverings, pipes, hose fitting and garden hoses
Low density polyethylene (LDPE)	Builders film, damp course linings, garbage bags, retail carry bags, mixed polymer timber replacement products, irrigation piping and garden furniture
Polypropylene (PP)	Crates, boxes, plant pots, building materials and mixed polymer timber replacement products
Polystyrene (PS)	Waffle pods, produce boxes, building materials, concrete reinforcement stools and mixed polymer timber replacement products
Other plastics	Various

5.3 Recycling activity, trends, barriers and reuse

5.3.1 Trends

Presented in Figure 5-19 and Table 5-29 is annual plastics recycling data for SA for the period 2003 to 2007. This data shows the plastics reprocessing market contracted during 2007, with LDPE and PP leading the downturn. Overall, plastics reprocessing experienced a 9.5% decrease from 2006. No data is available for reprocessing by polymer type during 2003.

As the plastics data is sourced from the 2007 calendar year PACIA study, the downturn experienced in the plastics industry may be an early sign of a more significant downturn in late 2007-08 due to the global financial crisis. The downturn was not significant and was mostly in the local reprocessing industry.

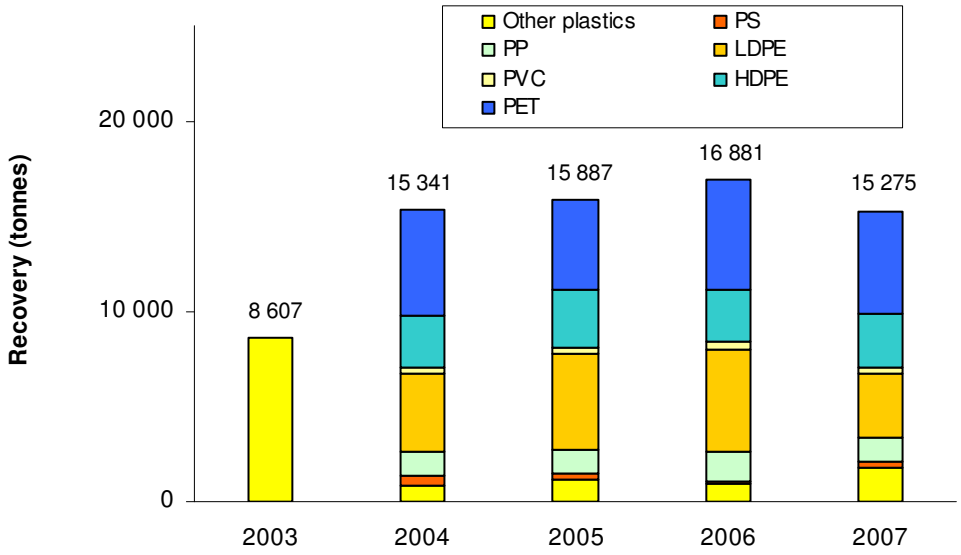

Figure 5-19 Annual plastics recovery, SA 2003 to 2007

Table 5-29 Annual plastics recovery, SA 2003 to 2007

Material	2003 recovery (tonnes)	2004 recovery (tonnes)	2005 recovery (tonnes)	2006 recovery (tonnes)	2007 recovery (tonnes)
Polyethylene terephthalate (PET)	0	5 544	4 753	5 704	5 440
High density polyethylene (HDPE)	0	2 728	3 036	2 779	2 821
Polyvinyl chloride (PVC)	0	329	365	363	317
Low density polyethylene (LDPE)	0	4 063	5 043	5 403	3 375
Polypropylene (PP)	0	1 272	1 252	1 542	1 202
Polystyrene (PS)	0	613	332	167	365
Other plastics	8 607	792	1 107	922	1 755
Total	**8 607**	**15 341**	**15 887**	**16 881**	**15 275**

The total weight of exported plastics is accurate, with the data sourced from the Australian Customs Service database. However, mis-categorisation of plastics can impact on individual polymer weights. The increase in mixed plastic export was a national trend according to the 2007 PACIA study.

5.3.2 Market conditions

Table 5-30 Recycling market conditions, SA 2007

Material	Industry Comments
Polyethylene terephthalate (PET)	Market is highly competitive, especially with regards to overseas competition for Australian recyclate. Continuing issues with cross contamination with other polymers.
High density polyethylene (HDPE)	Export of post-consumer material continues to drive Australian prices up. Continuing issues with cross contamination with other polymers.
Polyvinyl chloride (PVC)	Strong export demand and competition continues. Continuing issues with cross contamination with other polymers. Shrinking manufacturing base in Australia is reducing availability of high quality pre-consumer scrap.
Low density polyethylene (LDPE)	Strong export demand and competition continues. Continuing issues with contamination, primarily from non-polymer sources such as product residues and labels.
Polypropylene (PP)	Tightening supply of right grades and good quality recyclate. Continuing issues with cross contamination with other polymers. Bumper bars and poly pipe in reasonable supply.
Polystyrene (PS)	Recyclate is difficult to come by and exports are driving the domestic price up. Continuing issues with contamination, the source of which is unclear.

5.3.3 Reuse

There is a high level of reuse of plastic freight packaging in the forms of crates, drums and pallets. Beyond this no significant reuse of plastics taking place in SA during 2007 was identified.

5.4 Market summary

5.4.1 Market size

During 2007, the size of the export plastics market continued to grow, with Chinese buyers appearing to lessen their previously exacting requirements. The local (SA) market shrank on the back of one reprocessor reporting a significant reduction in reprocessing. The interstate plastics market grew marginally.

As with all other materials, the global financial crisis is likely to impact on both consumption and recycling of plastics during the 2008 calendar year. Market prices and size are expected to decrease accordingly.

5.4.2 Market strength

The local (SA) plastics market experienced a contraction in strength during 2007, whilst the interstate reprocessing and export markets continued to gain strength. The local reprocessing decreased was lead by one local reprocessor reporting a significantly reduced quantity of C&I sourced plastic.

The export market grew slightly stronger from the 2006 level, with increased levels of un-categorised plastic leaving SA as mixed plastic bales.

Export of low grade mixed plastic grew from 2006 to 2007. This is reflected in local markets, with a contraction in LDPE reprocessed and an increase in other plastics reprocessed. It is expected that this trend is likely to continue into 2008 and 2009.

6 Glass

6.1 Quantity recovered and reprocessing location

The quantity of glass recovered in SA and the location of reprocessing, during 2007–08, is presented in Table 6-31. Total glass recovery was 53 224 tonnes.

Table 6-31 Glass recovery, SA 2007–08

Material	Net recovery[1]	Reprocessing location		
	(tonnes)	SA	Interstate	Export
Glass	53 224	100.00%	0.0%	0.0%

1. Net recovery excludes reprocessing losses – refer to Section 8 (Packaging Summary) for more details

The breakdown of glass recovery by source sector is presented in Figure 6-20. Almost all glass reprocessed was sourced from the municipal sector.

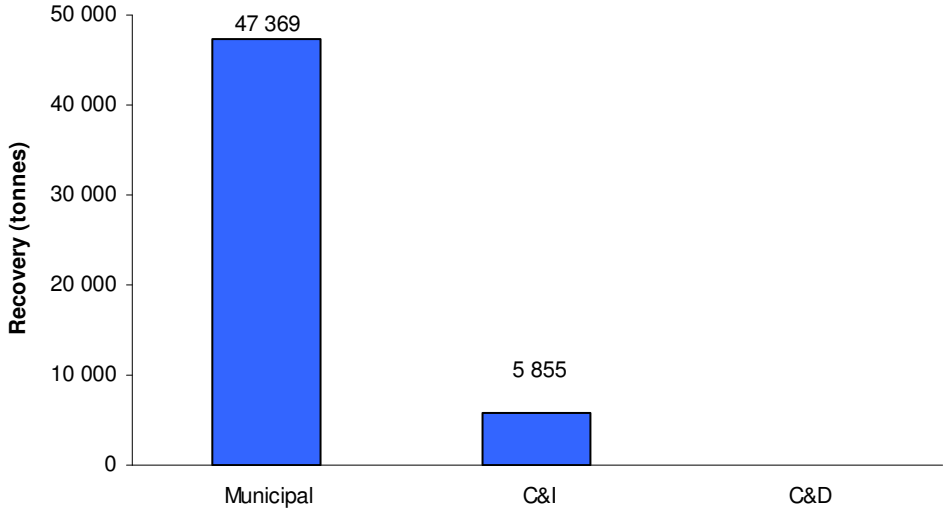

Figure 6-20 Glass recovery (by source sector), SA 2007–08

A significant quantity (over 15 000 tonnes) of bottle glass is imported into SA from across Australia, including WA, Victoria and Tasmania for reprocessing. This material is not included in the quantity of glass recovered due to its interstate source.

6.2 Source and end products

Table 6-32 Glass source products, SA 2007–08

Material	Source products
Glass	Packaging – beer, wine, food Building glass

Table 6-33 Glass end products, SA 2007–08

Material	End products
Glass	Bottle manufacture and reflective beads for road marking

6.3 Recycling activity, trends, barriers and reuse

6.3.1 Trends

Presented in Figure 6-21 is the annual glass recycling data for SA for the period 2003–04 to 2007–08. As can be seen, glass reprocessing in SA has continued its upward trend of the last five years.

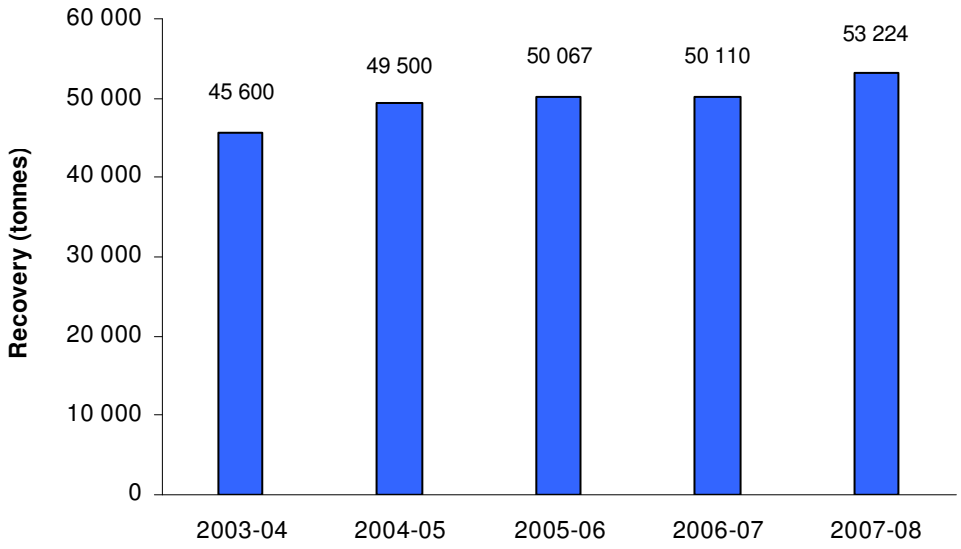

Figure 6-21 Annual glass recovery, SA 2003–04 to 2007–08

6.3.2 Reuse

There was no direct large scale reuse of glass identified as taking place in SA during 2007–08.

6.4 Market Summary

6.4.1 Market size and strength

The market size is large, with significant plant capacity available for increased reprocessing. The SA market is unique in having two glass manufacturing plants within the Adelaide area, both of which help to drive the glass reprocessing industry in SA in terms of size and strength.

The recycled glass market is very strong, however it is subject to price. The CD system in place in SA ensures that a greater amount of glass containers are returned for reprocessing that in other states. Benefits of the CD scheme over kerbside and commercial collection are reduced bottle breakage during collection and transit and significantly reduced levels of contamination. The reduced breakage during collection and transit increases the ability to sort glass from other materials.

Glass reprocessing is heavily linked to demand for cullet. It is expected that this is likely to be reduced by a downturn in sales. It has been reported that, to the end of February 2009, the Australian wine export market fell some 15%. With SA accounting for almost 60% of Australia's wine export, decreasing sales are expected to impact most heavily in SA.

7 Other materials

7.1 Quantity recovered and reprocessing location

The 'other' materials recovery data presented in this report has been provided by a range of industry sources, including manufacturers, industry groups and reprocessors.

The quantity of 'other' materials recovered in SA and the location of reprocessing are presented in Table 7-34. Total other materials recovery was 283 811 tonnes, of which fly ash was the majority of material recovered. During 2007–08, no foundry sands were reprocessed.

Table 7-34 Other materials recovery, SA 2007–08

Material	Net recovery[1]	Reprocessing location		
	(tonnes)	SA	Interstate	Export
Fly ash[2]	272 000	100.0%	0.0%	0.0%
Foundry sands[3]	0	0.0%	0.0%	0.0%
Leather & textiles	2 376	0.0%	0.0%	100.0%
Tyres & other rubber	9 434	24.7%	21.8%	53.5%
Total	**283 811**	**96.7%**	**0.7%**	**2.6%**

1. Net recovery excludes reprocessing losses

2. SA fly ash data provided by the Ash Development Association of Australia (ADAA)

3. SA foundry sands data provided by the Centre for Organic & Resource Enterprises (CORE)

The breakdown of other materials recovery by source sector and material type is presented in Figure 7-22 and Table 7-35.

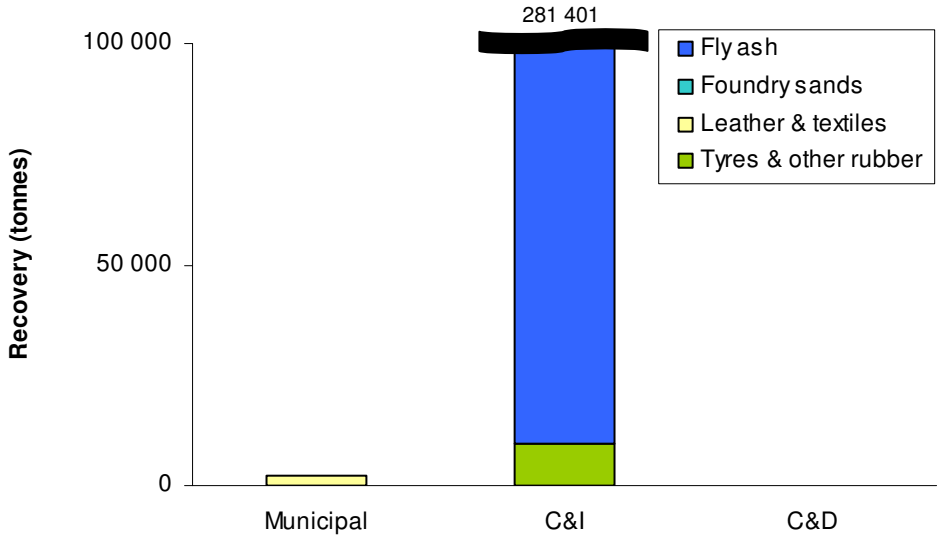

Figure 7-22 Other materials recovery (by source sector), SA 2007–08

Fly ash clearly dominates the other material category, with the commercial and industrial sector the main source of fly ash.

Table 7-35 Other materials recovery (by source sector), SA 2007–08

Material	Source sector			
	Municipal	C&I	C&D	Total
Fly ash	0	272 000	0	272 000
Foundry sands	0	0	0	0
Leather & textiles	2 376	0	0	2 376
Tyres & other rubber	33	9 401	0	9 434
Total	**2 410**	**281 401**	**0**	**283 811**

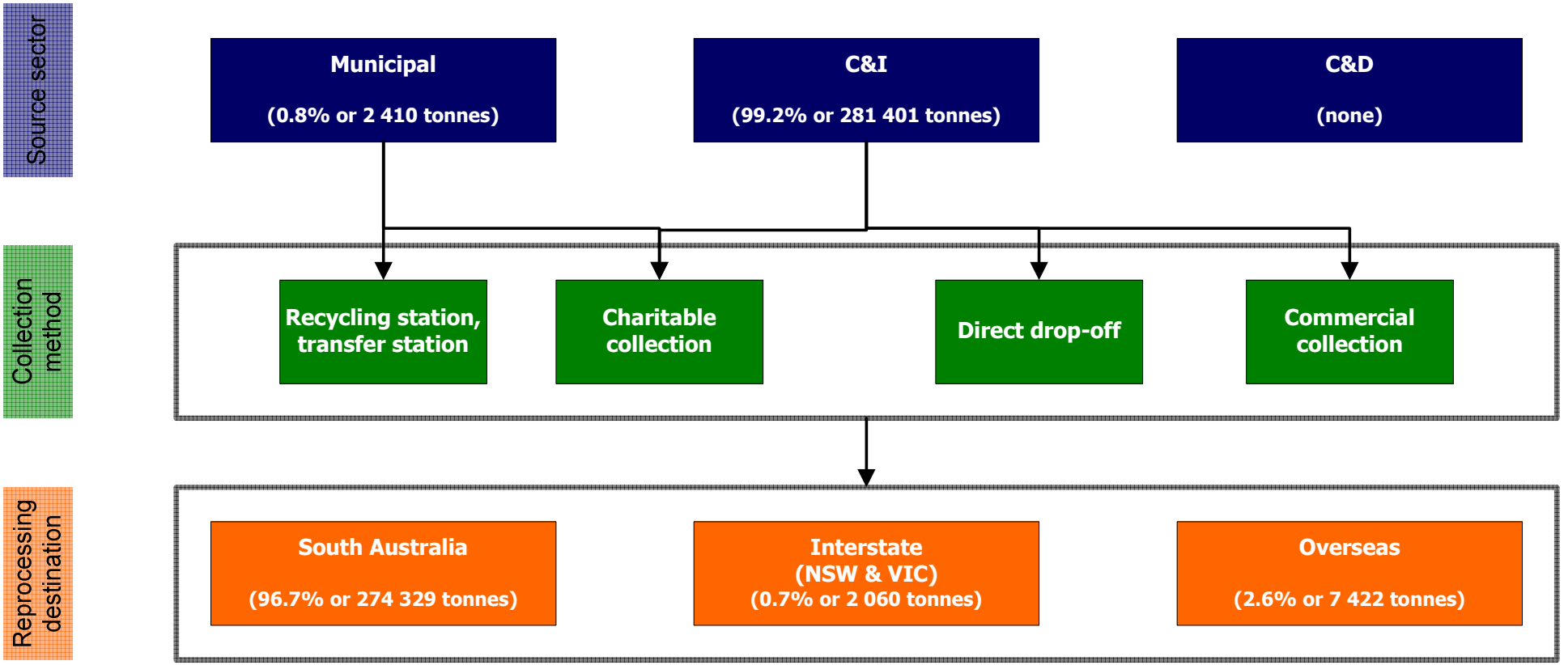

Figure 7-23 Flow of other materials reprocessing, SA 2007–08

7.2 Source and end products

Table 7-36 Other materials source products, SA 2007–08

Material	Source products
Fly ash	Power generation (coal ash)
Leather & textiles	Used clothing
Tyres & other rubber	Truck tyres and passenger car tyres

Table 7-37 Other materials end products, SA 2007–08

Material	End products
Fly ash	The construction industry currently consumes (in concrete) most of the fly ash that is recycled. As stated earlier, SA fly ash is highly desirable in cement manufacture. A program is underway to assess the viability of fly ash as an agricultural additive to soil, one of the objectives of which is to assist carbon sequestration by agricultural soils. A program is underway to assess the use of fly ash in the manufacture of man-made aggregates for concrete, the man-made aggregates could, for example, replace crushed basalt.
Leather & textiles	Significant reuse of clothing here and overseas
Tyres & other rubber	New tyres, industrial adhesives and non-slip paints, road surfacing, brake pads, sporting and playground surfaces.

7.3 Recycling activity, trends, barriers and reuse

7.3.1 Trends

Presented in Figure 7-24 and Table 7-38 is annual 'other' materials recycling data for SA for the period 2004–05 to 2007–08. Data for 2003–04 is excluded as no fly ash or foundry sands data was available for that period.

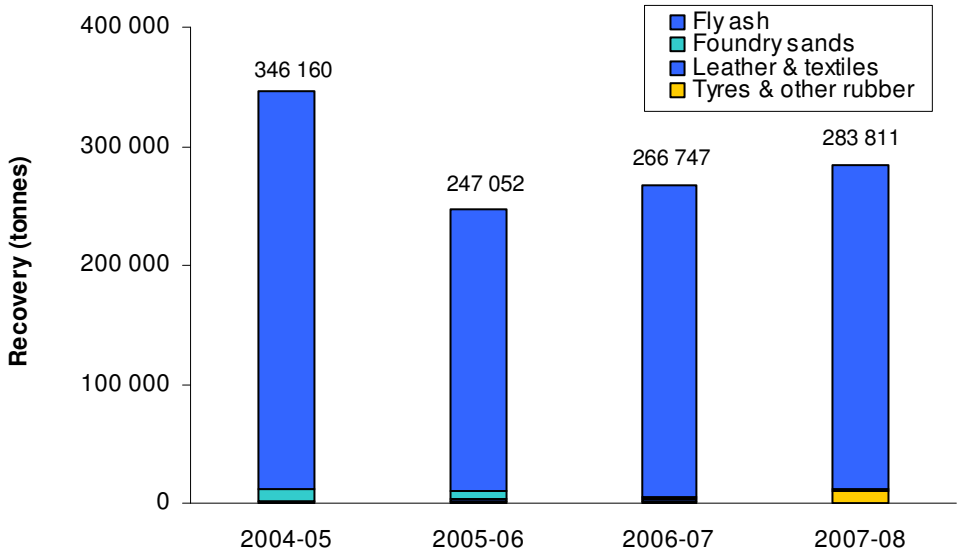

Figure 7-24 Annual other materials recovery, SA 2004-05 to 2007-08

The reprocessing of 'other' materials increased for the second consecutive year during 2007–08, despite the lack of foundry sand reprocessing. Foundry sands were not reprocessed during 2007–08 as they were identified by the EPA as currently unsuitable for inclusion in compost products. The overall increase is largely attributable to increased reprocessing of fly ash as well as tyres and other rubber.

Reprocessing of fly ash rose from 2006–07 to its second highest level in the last five years. Tyre recycling increased dramatically from 2006–07, with the inclusion of a new tyre reprocessor and an increase in exports. No interstate transport of tyres occurred during 2007–08.

Table 7-38 Annual other materials recovery, SA 2003-04 to 2007-08

Material	2003–04 recovery (tonnes)	2004–05 recovery (tonnes)	2005–06 recovery (tonnes)	2006–07 recovery (tonnes)	2007–08 recovery (tonnes)
Fly ash	0	335 000	236 343	260 913	272 000
Foundry sands	0	9 006	6 755	2 000	0
Leather & textiles	4 080	1 564	2 419	2 348	2 376
Tyres & other rubber [1]	88	590	1 535	1 486	9 434
Total	**4 168**	**346 160**	**247 052**	**266 747**	**283 811**

Note:

1. A new reprocessor participated in the 2007–08 study.

7.3.2 Barriers

Presented in Table 7-39 are the general barriers to other materials market development as reported by industry.

Table 7-39 Other materials market barriers, SA 2007–08

Material	Market barriers
Fly ash	Financial: Market is inhibited by the good economic availability of alternative materials, freight costs from point of generation to point of end use and a mismatch between production and purchase requirements. Regulatory: Development of the market potential requires greater capital investment, refinement of the waste stream quality, and an improved regulatory and reporting framework. A view by industry that state regulators need to have a consistent approach, and that ideally, a nationally consistent, evidence-based approach, is required A view by industry that reporting obligations are onerous, and that legislation and policy is required that enables reuse of fly ash and addresses unscientific perception issues relating to the toxicity of fly ash. A concern by the fly ash recycling industry that fly ash may be reclassified as a hazardous waste in South Australia. There are approximately twelve standards describing the use of fly ash across a number of industries. The ash industry is closely involved with the development of Australian Standards on the wider use of fly ash.
Foundry sands	Financial: Good economic availability of alternative materials, inhibiting market. Freight costs from point of generation to point of reuse. Potentially high testing costs for foundry sands. Regulatory: As used foundry sands are an industrial waste, recycling into compost must be shown to be a beneficial reuse application.
Leather & textiles	Local manufacture of rags ceased in 2003–04, however no specific barriers to the market reported.
Tyres & other rubber	Financial: The market for tyre reprocessing is largely determined by the cost of alternative end of life management options, such as shredding and landfilling or exporting for reprocessing. The recycling rate of waste tyres increased due to increased enforcement of regulations governing the disposal of solid wastes and restrictions on the number of times tyres can be re-treaded. The low value of recyclate is, however, limiting the recovery. The movement of tyres is governed by the NEPM covering the transport of controlled wastes between Australian States and Territories. The NEPM is administered at the state and territory level, by the relevant local authority. Inconsistencies in regulations governing the transport of controlled wastes between states can make the interstate movement of tyres onerous, limiting the reprocessing of this waste stream.

7.3.3 Reuse

Leather & textiles (clothing) is the only 'other' material that has significant direct reuse. An unknown quantity of the reported recovery for reprocessing (2 376 tonnes) would be directly reused overseas.

7.4 Market summary

7.4.1 Fly ash

Current market situation

In 2007–08 there was an increase of over 10 000 tonnes in the reuse of fly ash from 2006–07.

South Australian fly ash, in particular, is generally seen as a desirable input into cement manufacturing. Significant quantities of the South Australian coals used in electricity generation, have properties loosely between lignite and bituminous coals, and the fly ash produced is highly suitable as a raw material for cement manufacture.

While no interstate transfer of fly ash took place from South Australia during 2007–08, interstate transfer is now beginning to take place, due to the increasingly strong demand. Transport costs continue to be the key factor limiting the recycling of fly ash.

The coal and cement industries continue to strongly support the fly ash recycling industry.

Market size and strength

Subject to construction and economic activity the fly ash market is estimated to be between 1 and 2 million tonnes in size. The market continues to grow in size and strength, but it is constrained by regulatory impediments which create barriers for use opportunities.

The ADAA and industry partners have a target of increasing the recycling of coal combustion products from 2 million tonnes in 2007 to 4 million tonnes in 2012.

The market has seen growth of 3-4% over the past few years, however the ash recycling industry now has public targets of 15-20% per annum until 2012. This is based upon the target market for ash products of 4 million tonnes by 2012, the majority of this material would be fly ash (80-90%).

7.4.2 Foundry sands

Current market situation

In 2007–08 no foundry sands sourced from SA were recycled. This follows significant decreases in recycling quantities during 2004–05 and 2005–06. The lack of approval from the relevant authority to reprocess the SA sourced foundry sands was the barrier to reprocessing.

The only identified destination product continues to be compost, with the used foundry sands being able to be utilised as a replacement for quarried sands. Foundry operators are generally highly supportive of the used foundry sands recycling industry, and there are increasing numbers of recyclers prepared to receive foundry sands nationally.

Market size and strength

Across Australia, the foundry sand market is very strong and very large. With the exception of SA, all states and territories reprocess foundry sands. The relevant authority in SA is viewed by industry to be the main barrier. Industry sources suggest that the potential South Australian market size for foundry sands is approximately 15 000 tonnes/year, if licensing issues can be addressed.

Used foundry sands are generally taken at no cost by compost companies for recycling. It is difficult to estimated the financial value of the market as the utilisation of used foundry sands represents a cost saving for foundry operators (waste disposal costs) and composters (virgin sand costs). No direct revenues are generated.

National generation goes up and down dramatically, but has tentatively been identified as 100 000 tonnes/year.

7.4.3 Tyres

Market size and strength

The reprocessed tyres market was reportedly buoyant and growing steadily during 2007-08. Currently, inconsistent state regulations, licensing and high reprocessing costs are hindering the further expansion of the industry.

With the inclusion of a new tyres reprocessor in the 2007-08 study, the overall volume of tyres reprocessed has increased significantly. Export of tyres has also contributed to the increase in reprocessing, with more than 550 tonnes of tyres exported in 2007-08 compared to nearly 80 tonnes in 2006–07.

Following from a recent and extensive surveying and data gathering exercise specifically examining tyres, it is forecast that for the 2008–09 financial year and beyond, the export of tyres is set to continue to increase.

8 Packaging summary

The packaging recovery data presented in this report has been provided by a range of sources, including government agencies, super collectors, packaging manufacturers, industry groups and reprocessors. The packaging summary provided in this section identifies packaging material that has already been quantified in the earlier material based sections of this report. As such the quantities identified in this section are not in addition to Sections 2 – 7, but are a sub-set of the data to provide specific information on packaging recovery.

Packaging recovery in SA is presented in Table 8-40. Total packaging recovery was 197 677 tonnes, of which 41 622 tonnes (21.1%) was recovered through the container deposit (CD) system, and 156 054 tonnes (78.9%) was recovered through non-CD routes, such as kerbside recycling and commercial co-mingled collections.

Table 8-40 Packaging recovery, SA 2007–08

Material	Net recovery	CD recovery [1]		Non-CD recovery [2]
	(tonnes)	(units)	(tonnes)	(tonnes)
Steel cans	3 352	N/A	0	3 352
Aluminium cans	3 520	240 122 205	3 455	65
Cardboard packaging	122 537	N/A	0	122 537
Liquid paperboard cartons	1 476	27 961 196	567	909
PET packaging	5 440	96 516 556	4 022	1 418
HDPE packaging	2 588	4 321 604	96	2 492
PVC packaging	104	N/A	0	104
LL/LDPE packaging	3 045	N/A	0	3 045
Polypropylene packaging	1 003	N/A	0	1 003
Polystyrene packaging	226	N/A	0	226
Other plastics packaging	1 162	N/A	0	1 162
Glass bottles and jars	53 224	146 811 468	33 482	19 741
Total	**197 677**	**515 066 606**	**41 622**	**156 054**

1. CD units recovered data has been provided by SA EPA. The tonnes have been calculated using the following unit / kg ratios provided to SA EPA by supercollectors: aluminium cans = 69.5, LPB = 49.3, PET = 24.0, HDPE = 45.0, glass = 4.38.

2. Non-CD recovery also includes CD packaging recovered through non-CD routes.

Figure 8-25 and Figure 8-26 illustrate the breakdown of packaging materials recovery by CD and non-CD. Glass bottles and jars make up the majority of CD packaging recovery, whilst cardboard packaging is the major material recovered through non-CD recovery.

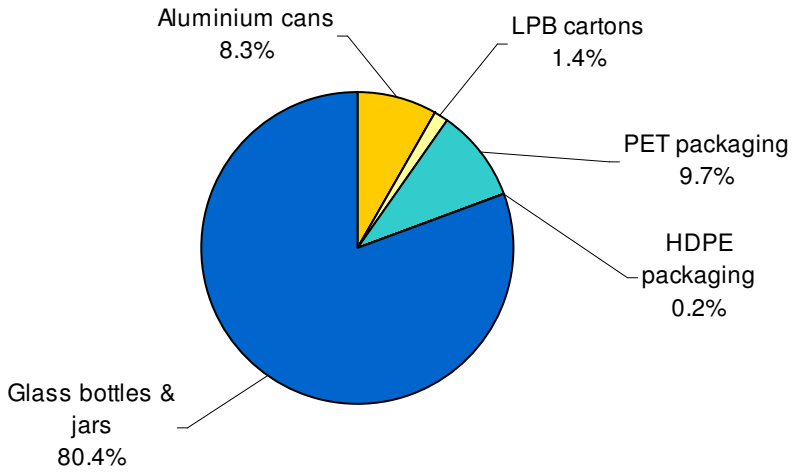

Figure 8-25 CD packaging recovery (by weight), SA 2007–08

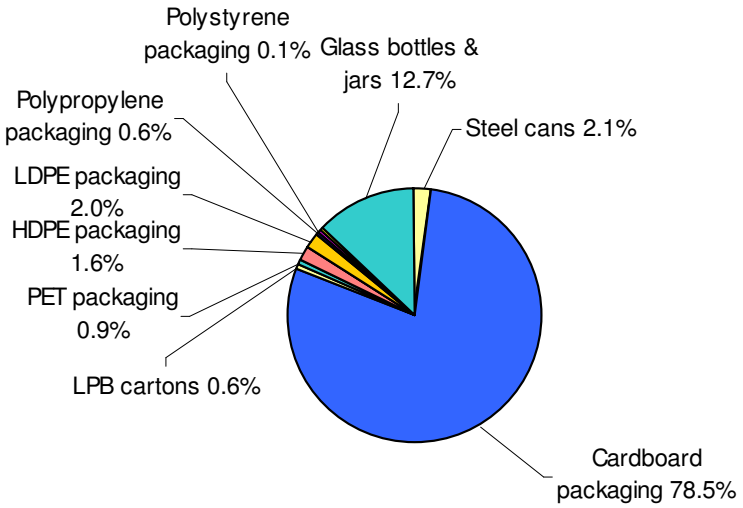

Figure 8-26 Non-CD packaging recovery (by weight), SA 2007-08

The effect of the increase in the deposit on containers - from 5 cents to 10 cents - will likely be seen in the 2008-09 data, but had no impact in the 2007-08 year.

9 Greenhouse gas impacts of recycling activity

9.1 Introduction

Recycling substantially improves South Australia's environment by saving energy, conserving resources and reducing emissions of greenhouse gases (GHGs) to the atmosphere.

Recycling reduces GHG emissions primarily by decreasing the amount of energy used by industry to make products, compared with feedstocks of virgin raw materials. This is because much of the energy used in industrial processes involves burning fossil fuels such as coal, diesel and petrol. Manufacturing the second time around is generally less energy intensive than the first time and consequently recycling can be seen as capturing a proportion of the energy and resources already invested in the material. Additional greenhouse gas savings are derived from reduced emissions of GHGs from landfills (e.g. methane).

9.2 Data sources

The impact of recycling on GHG emission in SA has been estimated in this section by applying the findings of a South Australian specific study *Benefits of Recycling in South Australia (2009)* and a Victorian study *Life Cycle Impact Data for Resource Recovery from Commercial & Industrial and Construction and Demolition Waste (2005)*.

The South Australian study was based upon life cycle assessment (LCA) modelling undertaken by Hyder Consulting. The study assessed the significant environmental costs and benefits associated with the recycling, collection and reprocessing systems of the following wastes:

- steel
- aluminium
- mixed paper including newsprint and cardboard
- source separated paper – predominantly sorted office paper
- glass
- plastics – HDPE and PET
- masonry materials – concrete, asphalt and bricks.

The Victorian study was based upon LCA modelling undertaken by the Centre for Design at RMIT University in Melbourne. The study assessed the environmental savings and impacts of recycling (instead of landfilling) the main C&I and C&D waste materials recovered in Victoria.

Where the material was not included in the South Australian specific study, the Victorian study results were used. Care should be taken in the application of the Victorian based results.

9.3 Results

By substituting secondary-use materials for virgin materials in 2007–08, South Australia's recycling efforts prevented the equivalent of approximately 1.02 million tonnes of CO2 entering the atmosphere. This is equivalent to about 17% of the annual CO2 emissions from the entire South Australian transport sector (2005 transport sector figures), and equates to taking approximately 234 500 passenger cars off the road.

The provision of a SA specific benefits of recycling assessment has enabled a more accurate calculation of the GHG savings from SA recycling during 2007–08 for particular materials.

However, as the study did not include all materials covered in the annual recycling activity audit, the Victorian methodology has had to be used for the following materials:

- non-ferrous metals (excluding aluminium)
- food organics
- garden organics
- timber
- organics – other
- polyvinyl chloride (PVC)
- polypropylene (PP)
- polystyrene (PS)
- other plastics
- fly ash
- foundry sands
- leather and textiles
- tyres and other rubber

As Victoria and SA have a similar energy sourcing profile, there is not likely to be much impact as a result of using Victorian data for these materials.

Figure 9-27 presents the recycling savings by material category (in terms of CO2 equivalent savings) which resulted from recycling activity in SA during 2007–08.

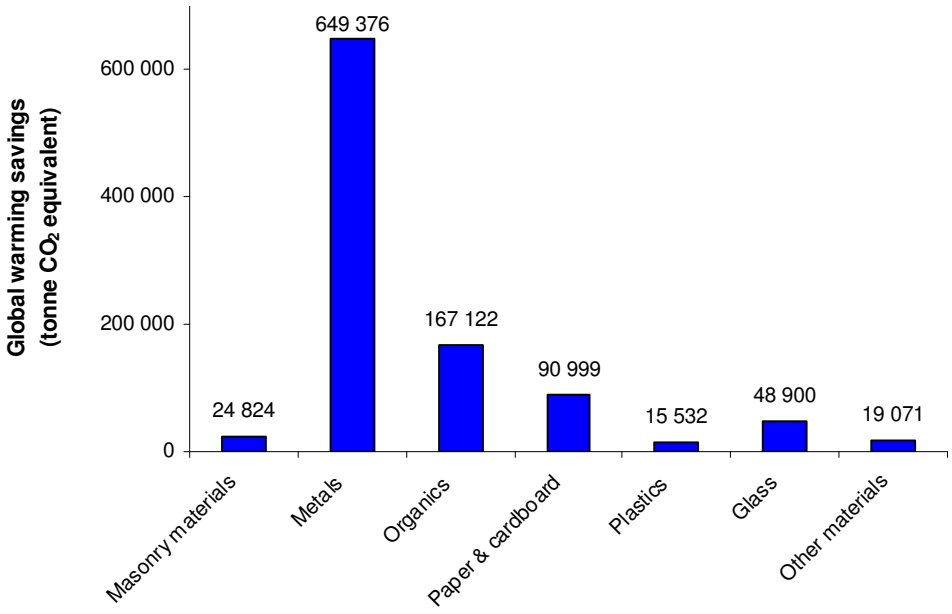

Figure 9-27 Avoided GHG emissions (by material category), SA 2007–08

The LCA modelling showed a GHG emission saving for all materials, when comparing recycling with landfill. The greatest savings in South Australia result from the recycling of steel and aluminium. The metals are also generally recycled back into a product with minimal loss, and have a high density and are therefore efficient to transport.

Table 9-41 presents the recycling savings by material (in terms of CO2 equivalent savings) which resulted from recycling activity in SA during 2007–08.

Table 9-41 Total GHG savings for all materials, SA 2007–08

Material	Total GHG benefit of recycling (tonnes CO2-e)	Equivalent trees planted required for carbon absorption	Equivalent cars off the road
Masonry material [1]	24,824	37,106	5,733
Steel	206,333	308,420	47,652
Aluminium	369,185	551,846	85,262
Non-ferrous metals (ex. Al)	73,858	110,401	17,057
Food organics	3,002	4,487	693
Garden organics	46,653	69,735	10,774
Timber	79,296	118,529	18,313
Organics – other	38,172	57,058	8,816
Mixed paper including newsprint and cardboard [2]	90,999	136,022	21,016
Polyethylene terephthalate (PET)	6,867	10,265	1,586
High density polyethylene (HDPE)	1,859	2,778	429
Polyvinyl chloride (PVC)	598	893	138
Low density polyethylene (LDPE) [3]	1,338	2,001	309
Polypropylene (PP)	1,976	2,954	456
Polystyrene (PS) [4]	498	744	115
Other plastics	2,396	3,582	553
Glass	48,900	73,094	11,293
Fly ash [5]	7,888	11,791	1,822
Foundry sands [6]	0	0	0
Leather & textiles [7]	0	0	0
Tyres & other rubber	11,183	16,715	2,583
Total	**1,015,822**	**1,518,419**	**234,601**

1. The masonry material data presented represents an aggregated category from the SA specific LCA and includes asphalt, bricks, concrete and clay, fines, rubble & soil.

2. The mixed paper including newsprint and cardboard data presented represents an aggregated category from the SA specific LCA and includes cardboard & waxed cardboard, liquid paperboard, magazines, newsprint, phonebooks and printing & writing papers.

3. No specific data was available on the GHG impact of recycling LDPE, it has been assumed that the impact is similar to that of HDPE.

4. No specific data was available on the GHG impact of recycling PS, it has been assumed that the impact is similar to that of 'Other plastics'.

5. No specific data was available on the GHG impact of recycling fly ash, it has been assumed that the

impact is similar to that of concrete (in the Victorian report) on the basis that fly ash is used as a binder in cement and hence concrete was the most closely related category available. It is possible the CO_2 equivalent savings might be overstated, and caution should be taken in the use of this estimation.

6. No specific data was available on the GHG impact of recycling foundry sands, it has been assumed that the impact is similar to that of soil & sand (in the Victorian report) on the basis that foundry sands are used as sand for compost applications and hence soil & sand was the most closely related category available.

7. No data was available on the GHG impact of recycling leather & textiles.

10 Glossary

CD	Container deposit, sometimes referred to as container deposit legislation or CDL. A refundable charge imposed on a range of beverage containers. The deposit is included in the retail price and refunded when the container is returned to a collection point.
Clinical waste	Waste generated by medical, nursing, dental, veterinary, pharmaceutical or other related activity which is poisonous or infectious; likely to cause injury to public health; or contains human tissue or body parts.
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.
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 (N_2O), hydroflurocarbons (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.
Kerbside collection	Collection of household recyclable materials (separated or co-mingled) that are left at the kerbside for collection by local council collection services.
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.
Linear low density polyethylene (LLDPE)	A member of the polyolefin family of plastics. It is a strong and flexible plastic and usually used in film for packaging, bags and for industrial products such as pressure pipe.
Municipal waste	Solid waste generated from domestic (household) premises and council activities such as street sweeping, litter and street tree lopping. Also includes waste dropped off at recycling centres, transfer stations and construction waste from owner/occupier renovations.
Non-ferrous metals	Those metals that contain very little or no iron, e.g. copper, brass, bronze.
Packaging	Plastic 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 packaging, carpet fibres and housewares.

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 reprocessing 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). Examples of this include paper mill 'broke' and plastics 'regrind'.
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 reprocessed 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, reprocessing and manufacture into new products. It also covers the processing of by-products from manufacturing processes which may otherwise be disposed to landfill, for example bark from plantation timber (for compost), and meat waste from abattoirs (for fertiliser). Materials recovered from both pre-consumer (manufacturing losses) and post-consumer (product end-of-life) sources are defined as being able to be diverted from landfill for recycling. However, 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.
Reprocessing	Changing the physical structure and properties of a waste material that would otherwise have been sent to landfill, in order to add financial value to the processed material.
Reuse	Reuse involves recovering value from a discarded resource in its original state without reprocessing or remanufacture.
Solid waste	Waste materials ranging from municipal garbage to industrial waste, but excluding gaseous, liquid, hazardous, clinical and intractable wastes.

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Appendix A

Reprocessor questionnaire

QUESTIONS	
1	What was the reprocessed quantity of the material during 2007/08? (tonnes)
2	What is the estimated accuracy of the data? (+/- %)
3	What are the reprocessing losses? (% or tonnes)
4	What is the split (% or tonnes) of packaging vs. non-packaging material?
5	What was the stockpile of the material at 1 July 2007? (tonnes)
6	What was the stockpile of the material at 30 June 2008? (tonnes)
7	Was this stockpiled material (referred to in Q5 & Q6) reprocessed or unreprocessed?
8	What source state did the material come from? (i.e. did any of the material reported in Q1 originate outside of SA?)
9	What source sector did the material come from?
10	If known, what are the source products?
11	What is the split (% or tonnes) between Pre & Post Consumer? (See definitions below)
12	What is the geographic destination market of the reprocessed material?
13	What is the product destination of the reprocessed material? (i.e. what products are the reprocessed material manufactured into?)
14	What is the destination market sector of the reprocessed material? (i.e. what market was the reprocessed material sold to)
15 a	What is your estimation of the size of the recycled materials markets?
15 b	What is your estimation of the strength of the recycled materials markets?
16	What is the potential to expand reprocessing capacity? Are there any barriers or inhibitors to further growth of recycled material markets?
17	Please comment on any changes in the quantity of the material recycled from the 2006-07 financial year.
18	Please comment on any direct 'reuse' of the material by the market, i.e. where no reprocessing was required (this material should not contribute to the data supplied in Q1).
19	Please include comments on recycling activity trends, market access and any inhibitors to increased activity.
20	Do you know of other players in your market?