Government of South Australia
Zero Waste SA

Hyder

# Zero Waste South Australia

## Recycling activity in South Australia

2008-09 Financial year

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# Zero Waste South Australia

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### 2008-09 Financial year

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# Overview

The 2008–09 SA diversion rate at 70.4% is the highest recorded over the last six years. This is the highest of any Australian state.

The waste to landfill quantity has dropped from 2007–08 to its lowest level in the last six years. Total waste to landfill has reduced by over 16% since 2003-04.

Despite a year where international recycling markets were hit by the global financial crisis, 2.55 million tonnes of materials was diverted from landfill to recycling in South Australia during 2008–09. This was down approximately 2% from 2.61 million tonnes in 2007–08.

The SA per capita recycling rate has decreased slightly from 2007-08 to 1,573 kg per capita (down 3.5%). This rate is higher than any other state, and secondly only to the ACT.

The highest recorded reprocessing quantities, by weight and in decreasing order, were concrete (984 735 tonnes), steel (271 277 tonnes) and timber (254 866 tonnes).

While recycling activity in SA was slightly lower during 2008-09, landfilling continued to decrease resulting in a high diversion rate. As the population continues to grow, 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 | 2008-09 | Change | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 07-08 to 08-09 | 03-04 to 08-09 |
| Diversion from landfill (tonnes) | 2 041 776 | 2 623 367 | 2 395 582 | 2 434 128 | 2 611 214 | 2 552 202 | -2.3% | 25.0% |
| Waste to landfill (tonnes) | 1 277 892 | 1 180 128 | 1 157 925 | 1 144 429 | 1 130 000 | 1 071 895 | -5.1% | -16.1% |
| Total waste generation (tonnes) | 3 319 668 | 3 803 495 | 3 553 507 | 3 578 557 | 3 741 214 | 3 624 167 | -3.1% | 9.2% |
| **SA diversion rate (%)** | **61.5%** | **69.0%** | **67.4%** | **68.0%** | **69.8%** | **70.4%** | **0.9%** | **14.5%** |
| South Australian population | 1 534 000 | 1 542 000 | 1 550 042 | 1 584 500 | 1 601 800 | 1 622 700 | 1.3% | 5.8% |
| Per capita diversion (kg/person) | 1 331 | 1 701 | 1 545 | 1 536 | 1 630 | 1 573 | -3.5% | 18.2% |
| Per capita landfill (kg/person) | 833 | 765 | 747 | 722 | 705 | 661 | -6.4% | -20.7% |
| Per capita total waste (kg/person) | 2 164 | 2 467 | 2 293 | 2 258 | 2 336 | 2 233 | -4.4% | 3.2% |

In 2008–09 there was 35 339 tonnes of recyclate materials imported into South Australia for reprocessing or 1.4% of total local reprocessing. These materials were mostly from Western Australia and the Northern Territory and include glass (14 704 tonnes), steel (10 095 tonnes) and polyethylene terephthalate (PET) (3 254 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.

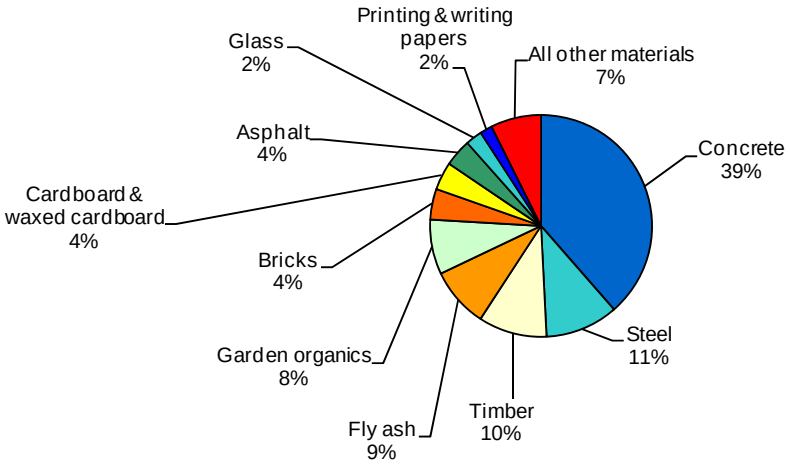


**Figure E-1 Composition of recovered materials (by weight), SA 2008–09**

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

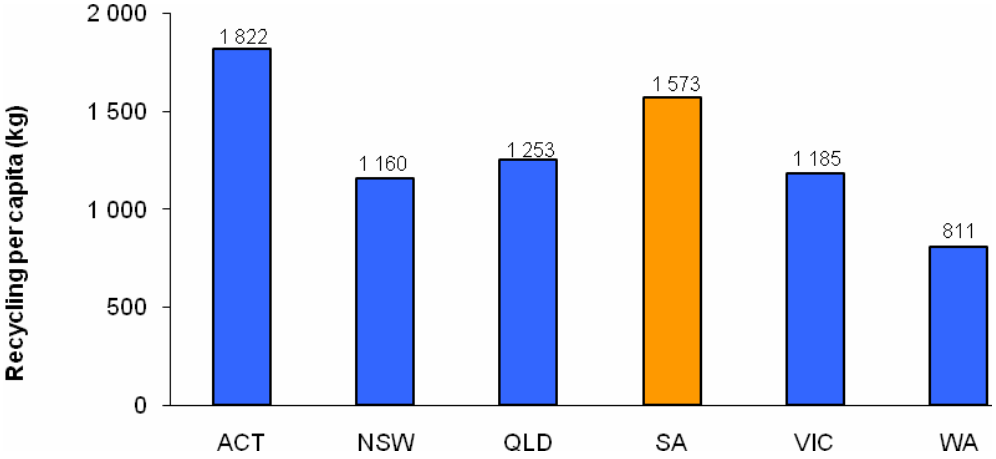


**Figure E-2 Comparison of reported per capita recycling activity (by State)**

Note: Estimates of waste generation, recycling and landfill disposal have been developed based on the best available data for each state/territory. The following material categories were excluded from the Queensland figure to improve comparability with other state data: acid sulphate soil, biosolids, manure & agricultural waste, mineral processing waste and other regulated wastes.

The SA data is for 2008–09. The VIC and ACT data is for 2007-08. The data presented for NSW, QLD and WA is for 2006-07. The ACT data is sourced from the *2009 Progress update towards No Waste*. The QLD data is sourced from the *State of waste and recycling in Queensland 2008, technical report*. The VIC data is sourced from *Towards Zero Waste Strategy, Progress Report* for 2007–08. The WA data is sourced from *Review of Total Recycling Activity in Western Australia 2006-07* report. The NSW data is sourced from the *Waste Avoidance and Resource Recovery, Progress Report 2008*. Population statistics sourced from the ABS were also used. All figures have been rounded.

The recycling figures presented in Figure E-2 are as reported by each state or territory, and therefore differ in the materials included. For this reason, these figures may differ to those

reported in the Waste and Recycling in Australia report, where an attempt was made to standardise the recycling figures for each jurisdiction. For example, the figure presented in Figure E-2 for Queensland, includes fly ash, contaminated and acid sulphate soils and other regulated wastes. If these materials are excluded, recycling per capita is approximately 900 kg. A similar situation would likely be the case for each state and territory.

## Survey method

A survey of total recycling activity in South Australia for 2008–09 was undertaken in November-December 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 2008–09 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 2008–09**

| Sector origin | Quantity | |
|---|---|---|
| | (tonnes) | (%) |
| Municipal | 398 495 | 15.6% |
| C&I | 788 664 | 30.9% |
| C&D | 1 365 043 | 53.5% |
| **Total** | **2 552 202** | **100.0%** |

**Table E-3 Destination of SA sourced reprocessed materials, SA 2008-09**

| Reprocessing destination | Number of destinations | Reprocessed material destination | |
|---|---|---|---|
| | | (tonnes) | (%) |
| South Australia | 55 | 2 103 774 | 82.4% |
| Interstate | 16 | 123 250 | 4.8% |
| Export | 1 | 325 177 | 12.7% |
| **Total** | **72** | **2 552 202** | **100.0%** |

The number of South Australian reprocessors has decreased slightly from 57 in the 2007–08 year study to 54 in the 2008–09 study. This is due to the identification of new SA based reprocessors, as well as previous participants reporting no onsite reprocessing of South Australian-sourced materials during 2008–09.

The number of interstate destinations has dropped from 21 in 2007–08.

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.

**Table E-4 Reprocessed material quantities, SA 2003-04 to 2008-09**

| | | Total recovery (tonnes) | | | | | |
|---|---|---|---|---|---|---|---|
| | Material | 2003–04 | 2004–05 | 2005–06 | 2006-07 | 2007–08 | 2008–09 |
| | **Masonry materials** | | | | | | |
| 1 | Asphalt | 100 000 | 92 000 | 85 900 | 83 640 | 103 070 | 101 484 |
| 2 | Bricks | 165 000 | 85 700 | 102 475 | 43 962 | 90 486 | 113 993 |
| 3 | Concrete | 877 000 | 899 492 | 762 134 | 793 710 | 818 116 | 984 735 |
| 4 | Soil, fines waste, clay & clean fill | 162 400 | 132 400 | 70 989 | 63 251 | 90 837 | 19 831 |
| | **Metals** | | | | | | |
| 5 | Steel | 264 200 | 247 840 | 278 028 | 323 850 | 365 391 | 271 277 |
| 6 | Aluminium | 19 000 | 20 443 | 22 171 | 20 845 | 24 434 | 21 895 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | Non-ferrous metals (ex. Al) | 13 000 | 16 639 | 19 470 | 24 300 | 21 755 | 18 495 |
| | **Organics** | | | | | | |
| 8 | Food organics | 0 | 10 540 | 6 005 | 3 981 | 5 796 | 4 820 |
| 9 | Garden organics | 130 100 | 188 610 | 222 499 | 209 725 | 202 397 | 203 558 |
| 10 | Timber | 116 700 | 300 980 | 255 728 | 275 385 | 241 387 | 254 866 |
| 11 | Organics - other | 0 | 89 790 | 81 625 | 82 636 | 79 359 | 41 666 |
| | **Paper & cardboard** | | | | | | |
| 12 | Cardboard & waxed cardboard | 91 000 | 72 117 | 106 943 | 96 436 | 122 537 | 104 128 |
| 13 | Liquid paperboard | 0 | 971 | 1 239 | 1 373 | 1 476 | 1 475 |
| 14 | Magazines | 0 | 4 650 | 5 918 | 4 680 | 5 728 | 7 313 |
| 15 | Newsprint | 31 398 | 35 917 | 40 607 | 40 000 | 41 393 | 40 219 |
| 16 | Phonebooks | 1 303 | 1 685 | 2 042 | 2 042 | 2 000 | 5 051 |
| 17 | Printing & writing papers | 12 300 | 12 593 | 18 803 | 30 574 | 42 745 | 45 877 |
| | **Plastics** | | | | | | |
| 18 | Polyethylene terephthalate (PET) | 0 | 5 544 | 4 753 | 5 704 | 5 440 | 5 200 |
| 19 | High density polyethylene (HDPE) | 0 | 2 728 | 3 036 | 2 779 | 2 821 | 2 685 |
| 20 | Polyvinyl chloride (PVC) | 0 | 329 | 365 | 363 | 317 | 408 |
| 21 | Low density polyethylene (LDPE) | 0 | 4 063 | 5 043 | 5 403 | 3 375 | 2 954 |
| 22 | Polypropylene (PP) | 0 | 1 272 | 1 252 | 1 542 | 1 202 | 1 529 |
| 23 | Polystyrene (PS) | 0 | 613 | 332 | 167 | 365 | 540 |
| 24 | Other plastics | 8 607 | 792 | 1 107 | 922 | 1 755 | 462 |
| | **Glass** | | | | | | |
| 25 | Glass | 45 600 | 49 500 | 50 067 | 50 110 | 53 224 | 61 552 |
| | **Other materials** | | | | | | |
| 26 | Fly ash | 0 | 335 000 | 236 343 | 260 913 | 272 000 | 223 000 |
| 27 | Foundry sands | 0 | 9 006 | 6 755 | 2 000 | 0 | 0 |
| 28 | Leather & textiles | 4 080 | 1 564 | 2 419 | 2 348 | 2 376 | 3 052 |
| 29 | Tyres & other rubber | 88 | 590 | 1 535 | 1 486 | 9 434 | 10 138 |
| | **Total** | **2 041 776** | **2623 367** | **2 395 582** | **2 434 128** | **2 611 214** | **2 552 202** |

Notes:1. All plastics data is sourced from the 2008 calendar year (PACIA report).

There was a significant decrease in the quantity of aluminium, PET and liquid paperboard (LPB) recovered during 2008-09 despite a doubling of the container deposit from 5c to 10c in September 2008. However, aluminium packaging comprises only a small proportion of aluminium collected for reprocessing, meaning that aluminium followed the trend observed in other metals despite the increased deposit. To some extent the same applies to PET.

In the case of LPB, as a low volume material exposed entirely to export markets, the reported decline in material handled could be due to a poorer export situation based on currency and demand.

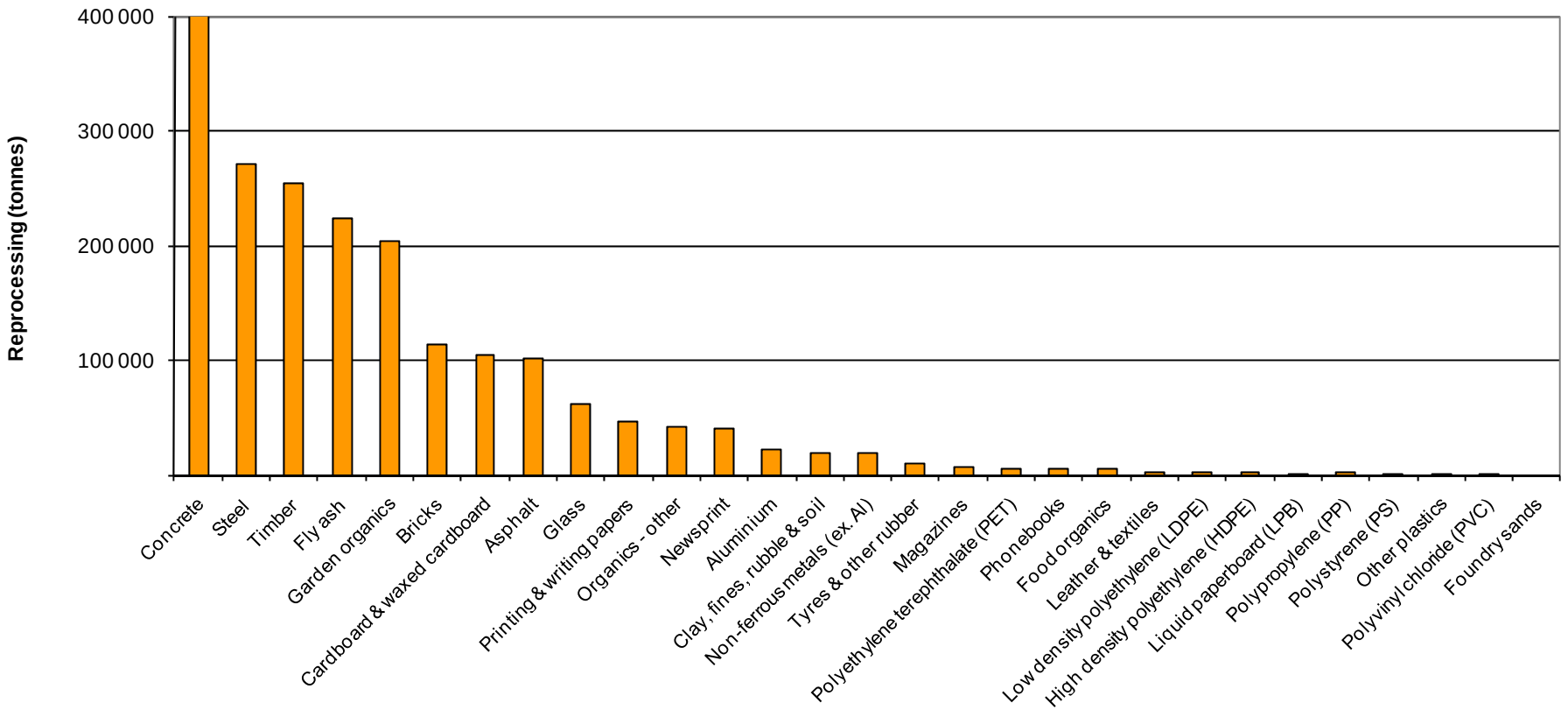


**Figure E-1 Reprocessing by material (by weight), SA 2008–09**

# 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 asphalt, bricks, concrete, clay, fines, rubble and soil.

The quantity of masonry materials recovered in SA and the location of reprocessing, during 2008–09, is presented in Table 1-5. The quantity recovered was 1 220 043 tonnes, 80.7% of which was concrete (Figure 1-3). 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 2008–09**

| Material | Net recovery[1] | Reprocessing location | | |
|---|---|---|---|---|
| | (tonnes) | SA | Interstate | Export |
| Asphalt | 101 484 | 100% | 0% | 0% |
| Bricks | 113 993 | 100% | 0% | 0% |
| Concrete | 984 735 | 100% | 0% | 0% |
| Clays, fines, rubble & soil | 19 831 | 100% | 0% | 0% |
| **Total** | **1,220,043** | **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.

The quantity of bricks recovered for reprocessing increased from approximately 90 000 tonnes in 2007-08 to almost 114 000 tonnes in 2008-09. Within the roadbase market, bricks act as a buffer to market demand. In 2007-08 a plentiful supply of concrete resulted in an active exclusion of brick material from road base mixes. As demand has grown in 2008-09, the market has been prepared to receive a higher proportion of brick material and this has meant reprocessors have been able to receive and reprocess this material in larger quantities.

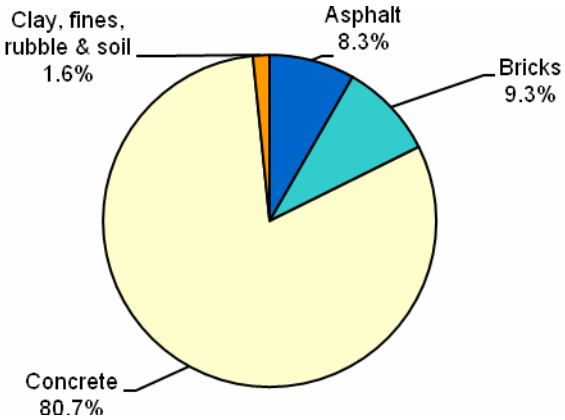


**Figure 1-3 Composition of recovered masonry materials (by weight), SA 2008–09**

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

**Table 1-6 Masonry material recovery (by source sector), SA 2008–09**

| Material | Source sector | | | |
|---|---|---|---|---|
| | Municipal | C&I | C&D | Total |
| Asphalt | 0 | 0 | 101 484 | 101 484 |
| Bricks | 0 | 0 | 113 993 | 113 993 |
| Concrete | 0 | 0 | 984 735 | 984 735 |
| Clays, fines, rubble & soil | 0 | 0 | 19 831 | 19 831 |
| **Total** | **0** | **0** | **1,220,043** | **1,220,043** |

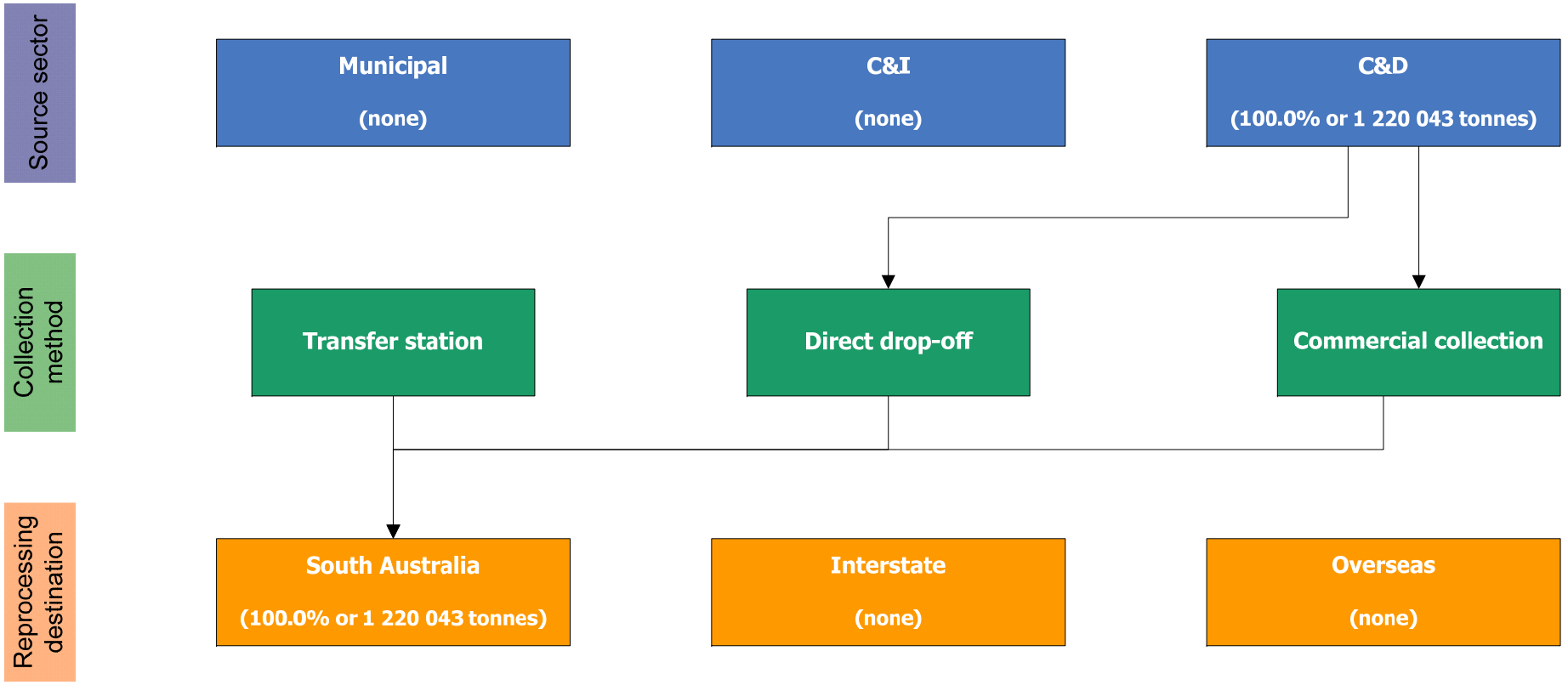


**Figure 1-4 Flow of masonry material reprocessing, SA 2008-09**

## 1.2 Source and end products

**Table 1-7 Masonry material source products, SA 2008–09**

| 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 2008–09**

| Material | End products |
|---|---|
| Asphalt | Road base, quarry rehabilitation material |
| 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), quarry rehabilitation material |

## 1.3 Recycling activity, trends, barriers and reuse

### 1.3.1 Trends

Presented in Figure 1-5 and Table 1-9 is the annual masonry materials recycling data for SA for the period of 2003–04 to 2008–09. The recovery of masonry materials increased during 2008-09, achieving the second highest level in the six years.

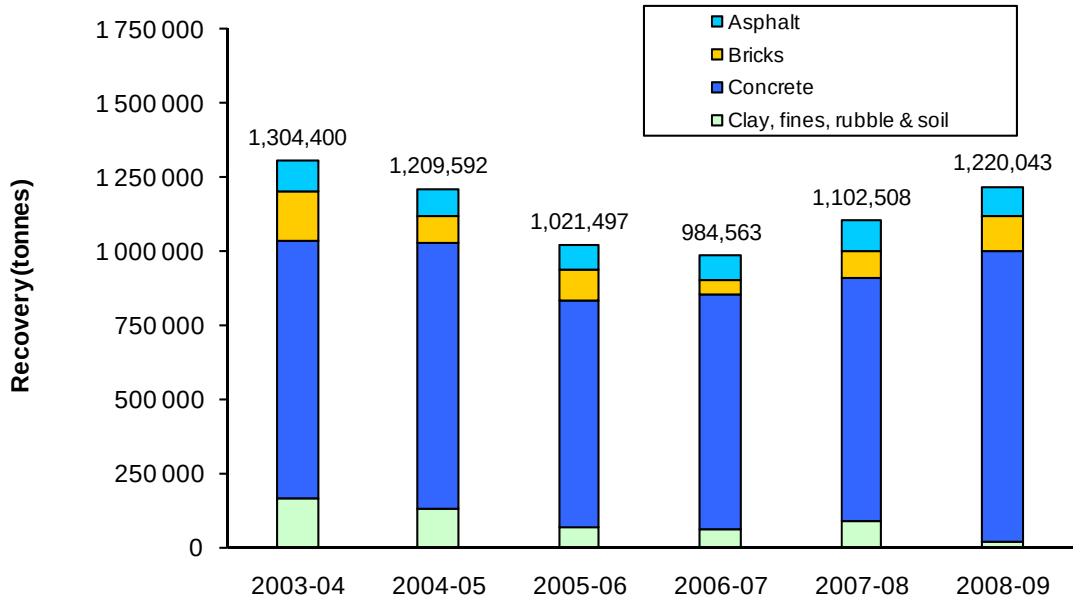


**Figure 1-5 Annual masonry materials recovery, SA 2003–04 to 2008–09**

The continued increase in the recovery of masonry materials reflects the more favourable market conditions reported by reprocessors. Many construction contracts are also allowing increased proportions of recycled products to be used by contractors.

Brick and concrete recovery increased significantly on the figures reported for 2007–08. These increases were due largely to the entrance of two new masonry reprocessors into the South Australian market.

**Table 1-9 Annual masonry materials recovery, SA 2008–09**

| Material | 2003–04 recovery (tonnes) | 2004–05 recovery (tonnes) | 2005–06 recovery (tonnes) | 2006–07 recovery (tonnes) | 2007–08 recovery (tonnes) | 2008–09 recovery (tonnes) |
|---|---|---|---|---|---|---|
| Asphalt | 100 000 | 92 000 | 85 900 | 83 640 | 103 070 | 101 484 |
| Bricks | 165 000 | 85 700 | 102 475 | 43 962 | 90 486 | 113 993 |
| Concrete | 877 000 | 899 492 | 762 134 | 793 710 | 818 116 | 984 735 |
| Clays, fines, rubble & soil | 162 400 | 132 400 | 70 989 | 63 251 | 90 837 | 19 831 |
| **Total** | **1 304 400** | **1 209 592** | **1 021 497** | **984 563** | **1 102 508** | **1,220,043** |

### 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
- statutory restrictions on stockpiling of materials

In spite of the barriers mentioned above, the masonry materials market continued to grow during 2008-09, to record its second highest recovery (by weight) in the last six years. When asked about the 2008–09 financial year, the majority of reprocessors were optimistic that the market would remain strong.

### 1.3.3 Reuse

There is a small amount of brick cleaning for reuse, some of which may have been captured within the 113 993 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. However, stockpiles of asphalt and especially concrete increased overall during 2008-09, indicating that market conditions may have been somewhat suppressed.

### 1.4.2 Market strength

The demand for recycled masonry materials was healthy during 2008–09, with reprocessors indicating that markets for all masonry materials were strong despite the economic downturn. Many reprocessors reported that the market was growing in strength as the demand and acceptability of recycled masonry materials increased. The key barrier to increasing market size and strength is therefore the proportion of recycled product allowed in engineering applications.

Many masonry reprocessors also cited the inability to stockpile materials due to regulatory or site constraints as a limiting factor on their ability to accept materials for reprocessing and also respond to upturns in market demand for recycled masonry products.

# 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 2008–09, is presented in Table 2-10. A total of 311 044 tonnes was identified, of which 87.2% was steel (Figure 2-6). Metals recovery was down significantly in 2008–09, by over 100 000 tonnes. This material was recovered primarily through commercial collections, direct drop-offs and household recycling collections.

**Table 2-10 Metals recovery, SA 2008–09**

| Material | Net recovery [1] | Reprocessing location | | |
|---|---|---|---|---|
| | (tonnes) | SA | Interstate | Export |
| Steel [2] | 271 277 | 31% | 0% | 69% |
| Aluminium | 21 895 | 0% | 41% | 59% |
| Non-ferrous metals (ex. Al) [3] | 18 495 | 7% | 27% | 65% |
| **Total** | **311 666** | **27.3%** | **4.5%** | **68.1%** |

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.

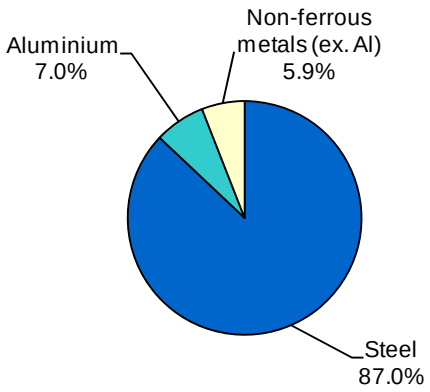


**Figure 2-6 Composition of recovered metals (by weight), SA 2008–09**

The majority of metals reprocessed in SA were sourced from the commercial and industrial sector (see Figure 2-7). Only slightly more than 10% of metal recycling was sourced from the municipal sector (see Table 2-11).

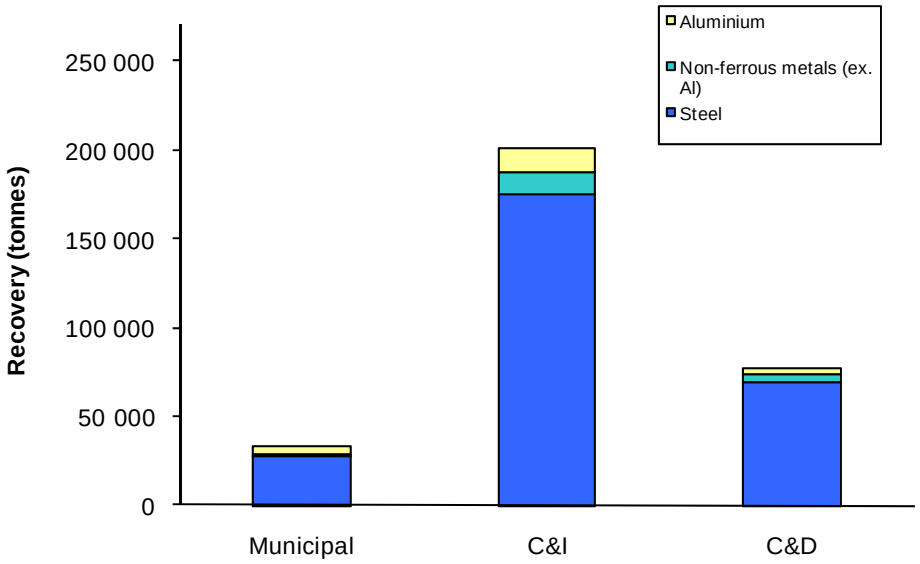


**Figure 2-7 Metals recovery (by source sector), SA 2008–09**

**Table 2-11 Metals recovery (by source sector), SA 2008–09**

| Material | Source sector | | | |
|---|---|---|---|---|
| | Municipal | C&I | C&D | Total |
| Steel | 27 106 | 174 844 | 69 327 | 271 277 |
| Aluminium | 4 550 | 13 830 | 3 515 | 21 895 |
| Non-ferrous metals (ex. Al) | 1 843 | 12 420 | 4 232 | 18 495 |
| **Total** | **33 499** | **201 094** | **77 073** | **311 666** |

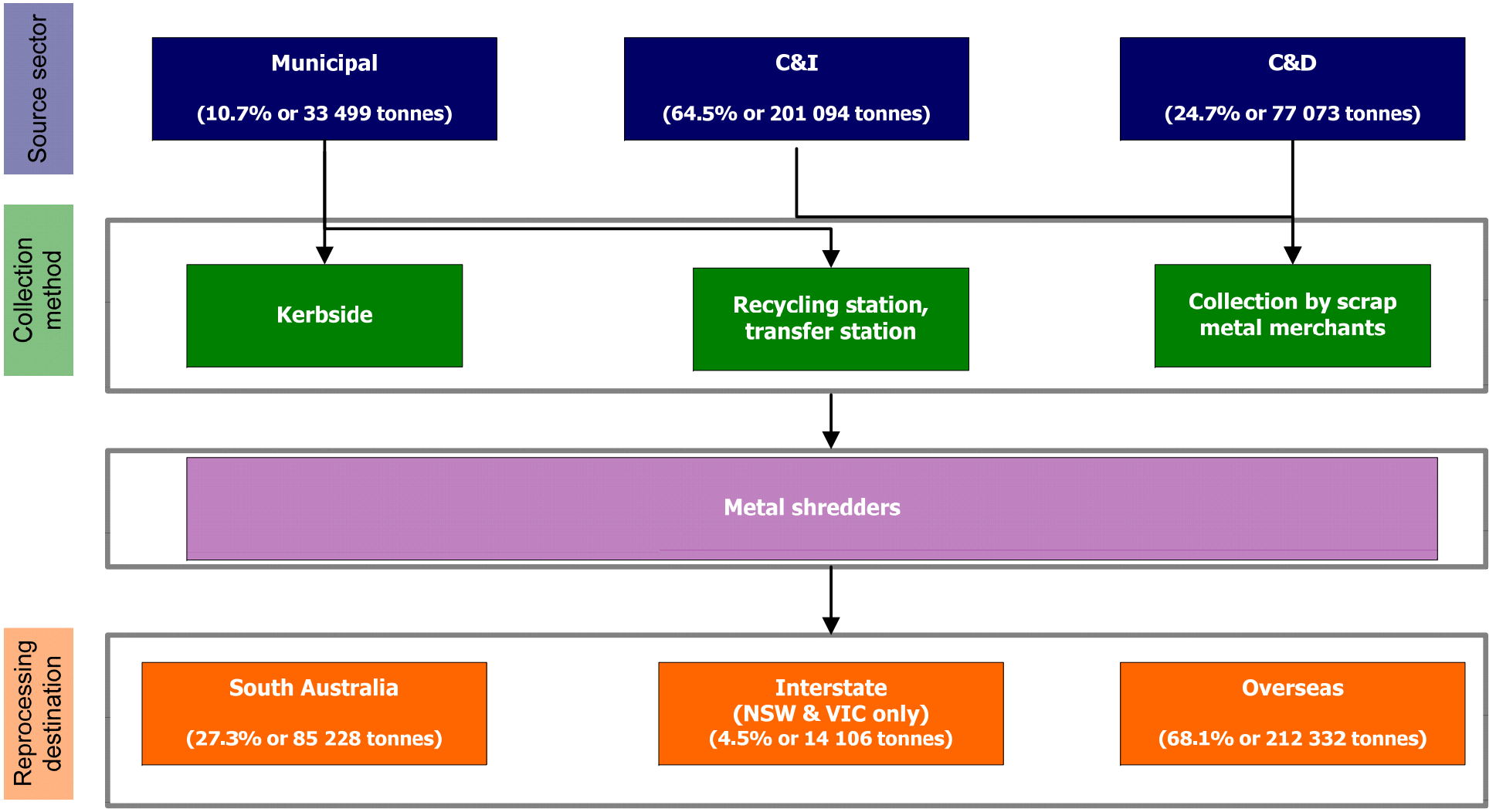


**Figure 2-8 Flow of metals reprocessing, SA 2008–09**

## 2.2 Source and end products

**Table 2-12 Metals source products, SA 2008–09**

| Material | Source products |
|---|---|
| Steel | Pre- and post-consumer, automotive (car bodies), general heavy steel and structural steel, whitegoods, 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 2008–09**

| 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 2-9 and Table 2-14 is the annual metals recycling data for SA for the period 2003–04 to 2008–09. Metals recovery during 2008-09 saw a significant reversal of the steady increases recorded over the previous four years.

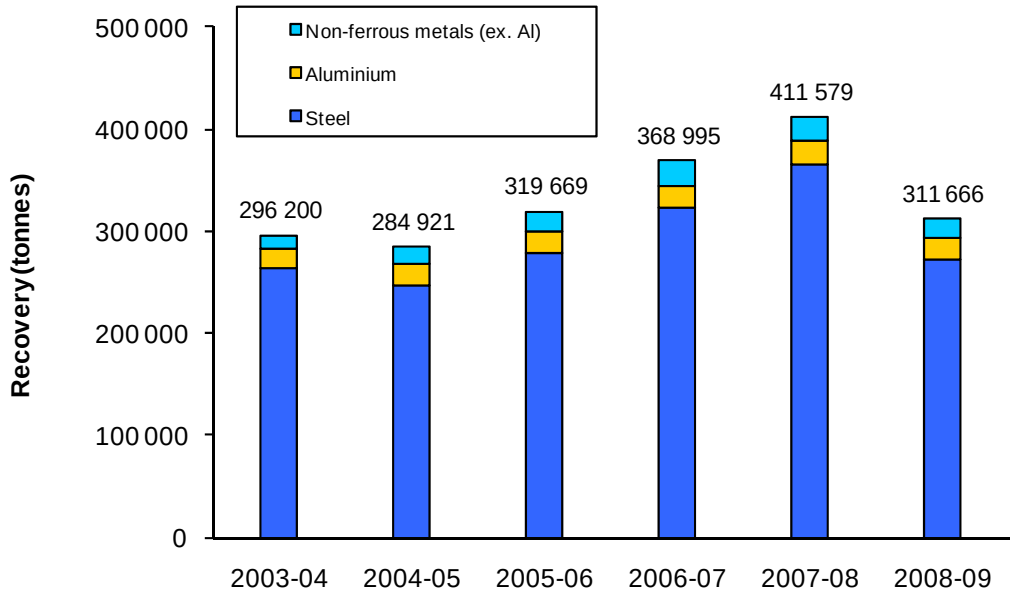


**Figure 2-9 Annual metals recovery, SA 2003–04 to 2008–09**

The metals recycling industry worldwide was hit hard by the global financial crisis during 2008-09. In particular, in September-November 2008 access to credit dried up and the inability to move material forced recyclers to close the gate on receiving scrap for a short period. This is reflected in the significant decline in metal reprocessing reported for 2008-09.

**Table 2-14 Annual metals recovery, SA 2003–04 to 2008–09**

| Material | 2003–04 recovery (tonnes) | 2004–05 recovery (tonnes) | 2005–06 recovery (tonnes) | 2006–07 recovery (tonnes) | 2007–08 recovery (tonnes) | 2008–09 recovery (tonnes) |
|---|---|---|---|---|---|---|
| Steel | 264 200 | 247 840 | 278 028 | 323 850 | 365 391 | 271 277 |
| Aluminium | 19 000 | 20 443 | 22 171 | 20 845 | 24 434 | 21 895 |
| Non-ferrous metals (ex. Al) | 13 000 | 16 639 | 19 470 | 24 300 | 21 755 | 18 495 |
| **Total** | **296 200** | **284 921** | **319 669** | **368 995** | **411 579** | **311 666** |

### 2.3.2 Barriers

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

- available supply of, and competition for source materials
- quality of post-consumer scrap
- demand fluctuations

## 2.4 Market summary

### 2.4.1 Market size

The concerns expressed by many reprocessors during the previous survey about the impact the global financial crisis on the metals market appear to have been realised during 2008 09. The drop in prices for metals in late 2008 to early 2009 in both the local and export markets as well as a temporary international credit crisis in October-November 2008 led to a short term suspension of trade. In addition, the closure of a major metal reprocessor during December 2008, saw a significant decline in the quantity of metal reprocessing during the survey period. The market quantities for 2009-10 are likely to be back to their previous levels

### 2.4.2 Market strength

The availability of metals during was down somewhat during 2008-09, but not as significantly as reprocessors may have predicted. 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.

However, the demand for metals dropped during 2008-09 duel largely to a decline in export markets in Asia. Exports of all metals decreased significantly during 2008-09 due to a reduction in manufacturing and construction during the global economic crisis. Nationally, NSW and Victoria remained major outlets for aluminium and other non-ferrous metals.

# 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 2008–09 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 2008–09, is presented in Table 3-15. The most significant organic recovery streams were timber, (254 866 tonnes) followed by garden organics (203 558 tonnes) (Figure 3-10).

**Table 3-15 Organics recovery, SA 2008–09**

| Material | Net recovery[1] | Reprocessing location | | |
|---|---|---|---|---|
| | (tonnes) | SA | Interstate | Export |
| Food organics | 4 820 | 100% | 0% | 0% |
| Garden organics | 203 558 | 100% | 0% | 0% |
| Timber | 254 866 | 100% | 0% | 0% |
| Organics - other | 41 666 | 100% | 0% | 0% |
| **Total** | **504 910** | **100%** | **0%** | **0%** |

1. Net recovery excludes reprocessing losses

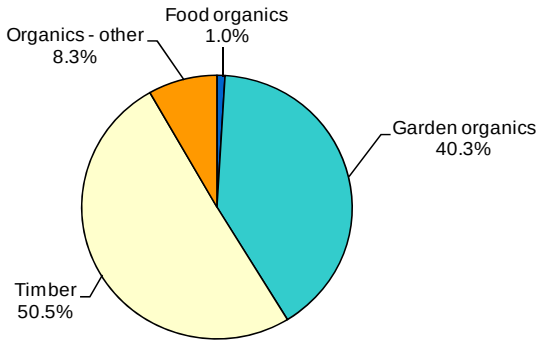


**Figure 3-10 Composition of recovered organics (by weight), SA 2008–09**

Garden organics are recovered through kerbside collection systems in many Adelaide municipalities and from drop off sites at transfer stations or delivered directly to composting facilities. Only composted garden organics are considered to have been recycled in this survey. Therefore, 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 (29.2% by weight), general agricultural organics (29.2%) and animal bedding (15.8%). Small quantities of animal mortalities (525 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 3-11 and Table 3-16.

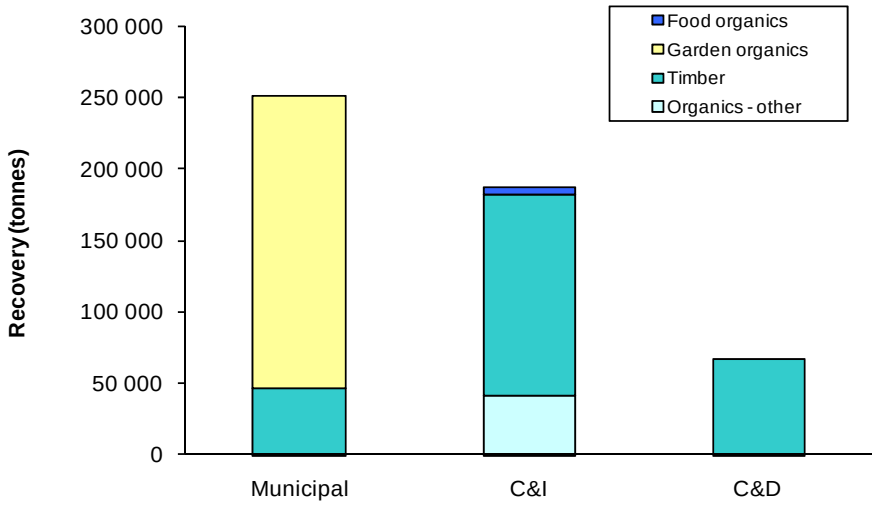


**Figure 3-11 Organics recovery (by source sector), SA 2008–09**

**Table 3-16 Organics recovery (by source sector), SA 2008–09**

| Material | Source sector | | | |
|---|---|---|---|---|
| | Municipal | C&I | C&D | Total |
| Food organics | 0 | 4 820 | 0 | 4 820 |
| Garden organics | 203 558 | 0 | 0 | 203 558 |
| Timber | 46 973 | 140 920 | 66 973 | 254 866 |
| Organics - other | 0 | 41 666 | 0 | 41 666 |
| **Total** | **250 531** | **187 406** | **66 973** | **504 910** |

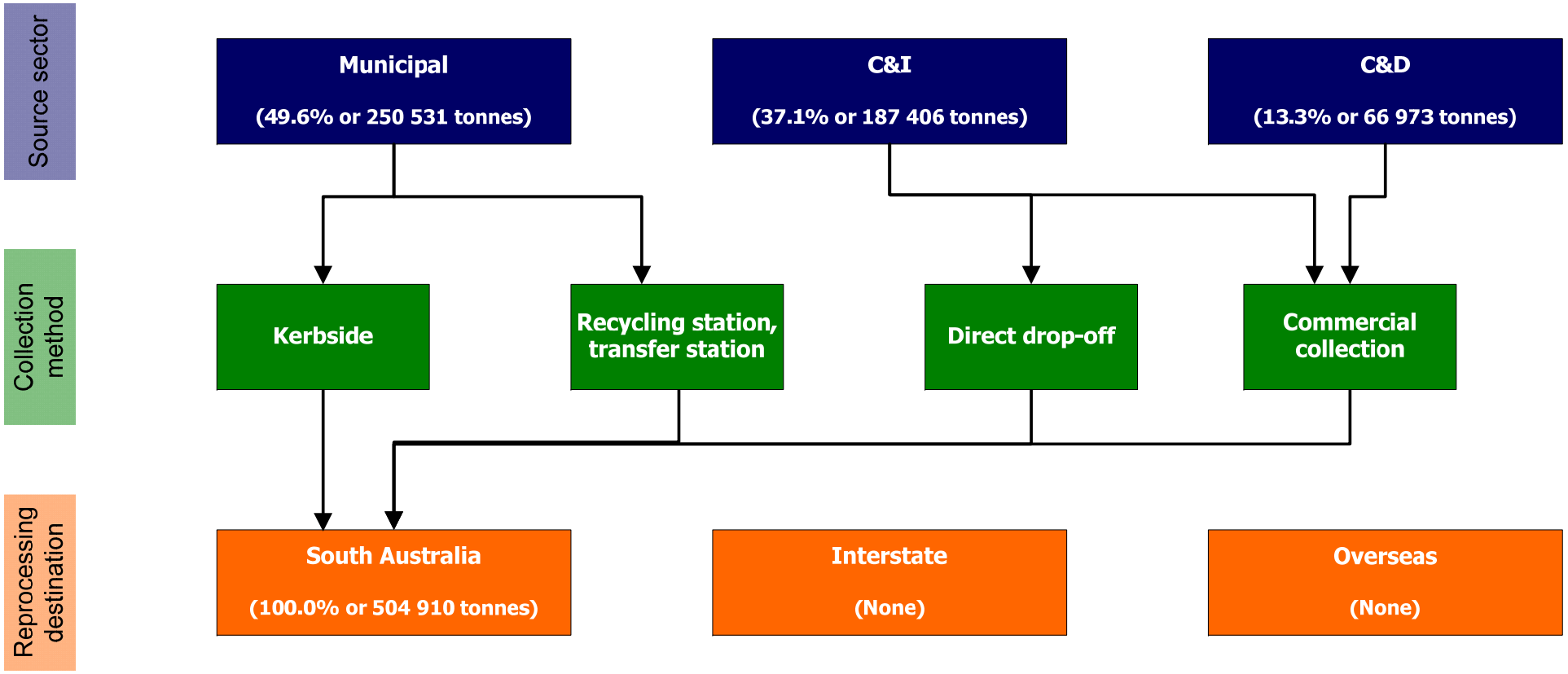


**Figure 3-12 Flow of organics reprocessing, SA 2008–09**

## 3.2 Source and end products

**Table 3-17 Organics source products, SA 2008–09**

| 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 2008–09**

| 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.<br>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 3-13 and Table 3-19 is annual organics recycling data for SA for the period 2003–04 through 2008–09. 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. Additional categories of organics reprocesssssing were included in 2004–05 to improve consistency with other state and national definitions. The use of timber as a fuel in cement manufacture also began in 2004–05, utilising significant quantities of timber previously disposed to landfill.

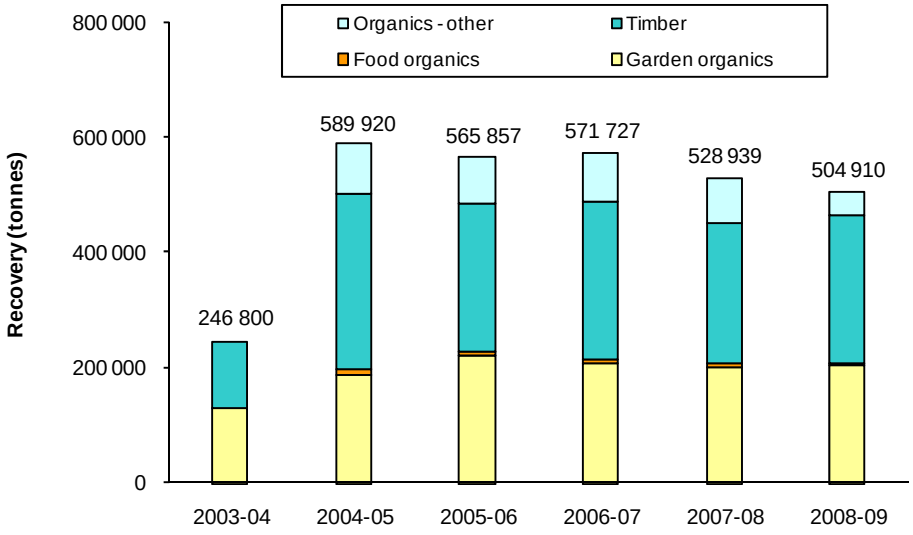


**Figure 3-13 Annual organics recovery, SA 2003–04 to 2008–09**

**Table 3-19 Annual organics recovery, SA 2008–09**

| Material | 2003–04 recovery (tonnes) | 2004–05 recovery (tonnes) | 2005–06 recovery (tonnes) | 2006–07 recovery (tonnes) | 2007–08 recovery (tonnes) | 2008–09 recovery (tonnes) |
|---|---|---|---|---|---|---|
| Food organics | 0 | 10 540 | 6 005 | 3 981 | 5 796 | 4 820 |
| Garden organics | 130 100 | 188 610 | 222 499 | 209 725 | 202 397 | 203 558 |
| Timber | 116 700 | 300 980 | 255 728 | 275 385 | 241 387 | 254 866 |
| Organics - other | 0 | 89 790 | 81 625 | 82 636 | 79 359 | 41 666 |
| **Total** | **246 800** | **589 920** | **565 857** | **571 727** | **528 939** | **504 910** |

The 2008–09 reprocessing total has decreased by over 24 000 tonnes from 2007–08, however it is still down from the high point of over 222 000 tonnes recorded during 2006-07. This decline in reprocessing was observed primarily in the organics – other category. The drop in the

reprocessing of organics – other materials was largely due to a reduction in the quantity of paper pulp and sludge reprocessed, down from over 50 000 tonnes in 2007-08 to approximately 12 000 tonnes in 2008-09.

### 3.3.2 Barriers

The key issues and barriers impacting upon the market were identified as (ROU 2009):

- raw materials contamination
- gate fees too low (metro areas) / tender appraisal is price driven
- onerous site regulation and planning consent.

The key issues and barriers identified remain relatively 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 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 2008–09, with an increase in timber reprocessing counteracting decreases in other organics reprocessing. The number of organic reprocessors in SA has remained steady from the 2007–08 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 a reversal of the trends observed during 2007-08, with the composted soil conditioner market regaining some of the strength lost during 2007–08 and increasing by 19% during 2008-09. By contrast, the composted mulch market declined in strength during 2008-09 by 14% compared to 2007-08.

# 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 2008–09, is presented in Table 4-20. Paper and cardboard recovery totalled 204 164 tonnes, with 51% of this being cardboard and waxed cardboard (Figure 4-14). This material was recovered through both commercial and household recycling collections.

**Table 4-20 Paper & cardboard recovery, SA 2008–09**

| Material | Net recovery[1] | Reprocessing location | | |
|---|---|---|---|---|
| | (tonnes) | SA | Interstate | Export |
| Cardboard & waxed cardboard [2] | 104 128 | 0.0% | 72.6% | 27.4% |
| Liquid paperboard [2] | 1 475 | 0.0% | 0.0% | 100.0% |
| Magazines [3] | 7 313 | 0.0% | 57.7% | 42.3% |
| Newsprint | 40 219 | 13.0% | 21.0% | 66.0% |
| Phonebooks | 5 051 | 0.0% | 0.0% | 100.0% |
| Printing & writing papers | 45 877 | 0.0% | 18.2% | 81.8% |
| **Total** | **204 064** | **2.6%** | **47.3%** | **50.1%** |

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

During 2008-09 there was a significant increase in the interstate transport of paper and cardboard, but a decrease in the quantity exported from South Australia. South Australia acts as a buffer market for paper and cardboard. In times where local supply is adequate in the eastern states, the South Australian tonnage is exported for reprocessing. As mills in Victoria and New South Wales require additional wastepaper as they did in 2008-09, then interstate shipment from South Australia is utilised at a higher rate.

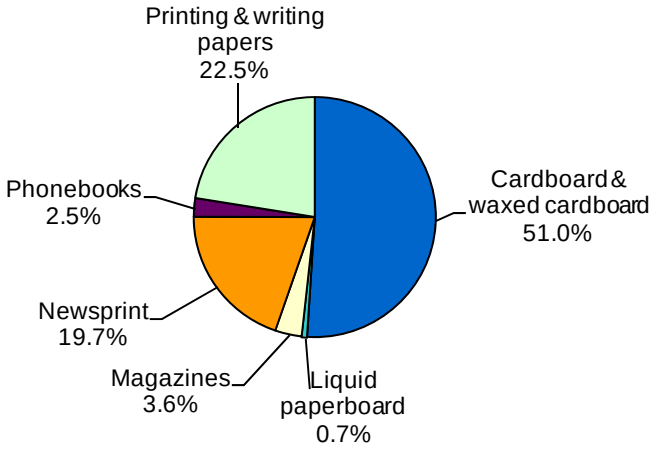


**Figure 4-14 Composition of recovered paper & cardboard (by weight), SA 2008–09**

The breakdown of paper and cardboard recovery by source sector and material type is presented in Figure 4-15 and Table 4-21. The commercial and industrial waste sector was the main source sector except for newspapers where household sourcing dominated.

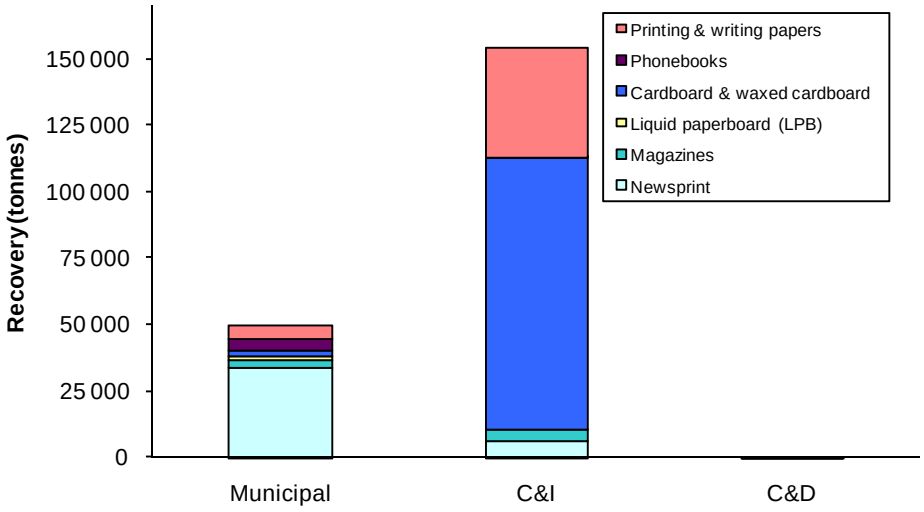


**Figure 4-15 Paper & cardboard recovery (by source sector), SA 2008–09**

**Table 4-21 Paper & cardboard recovery (by source sector), SA 2008–09**

| Material | Source sector | | | |
|---|---|---|---|---|
| | Municipal | C&I | C&D | Total |
| Cardboard & waxed cardboard | 1 900 | 101 659 | 569 | 104 128 |
| Liquid paperboard | 1 475 | 0 | 0 | 1 475 |
| Magazines | 3 093 | 4 220 | 0 | 7 313 |
| Newsprint | 33 784 | 6 435 | 0 | 40 219 |
| Phonebooks | 4 546 | 505 | 0 | 5 051 |
| Printing & writing papers | 4 771 | 41 106 | 0 | 45 877 |
| **Total** | **49 569** | **153 925** | **569** | **204 064** |

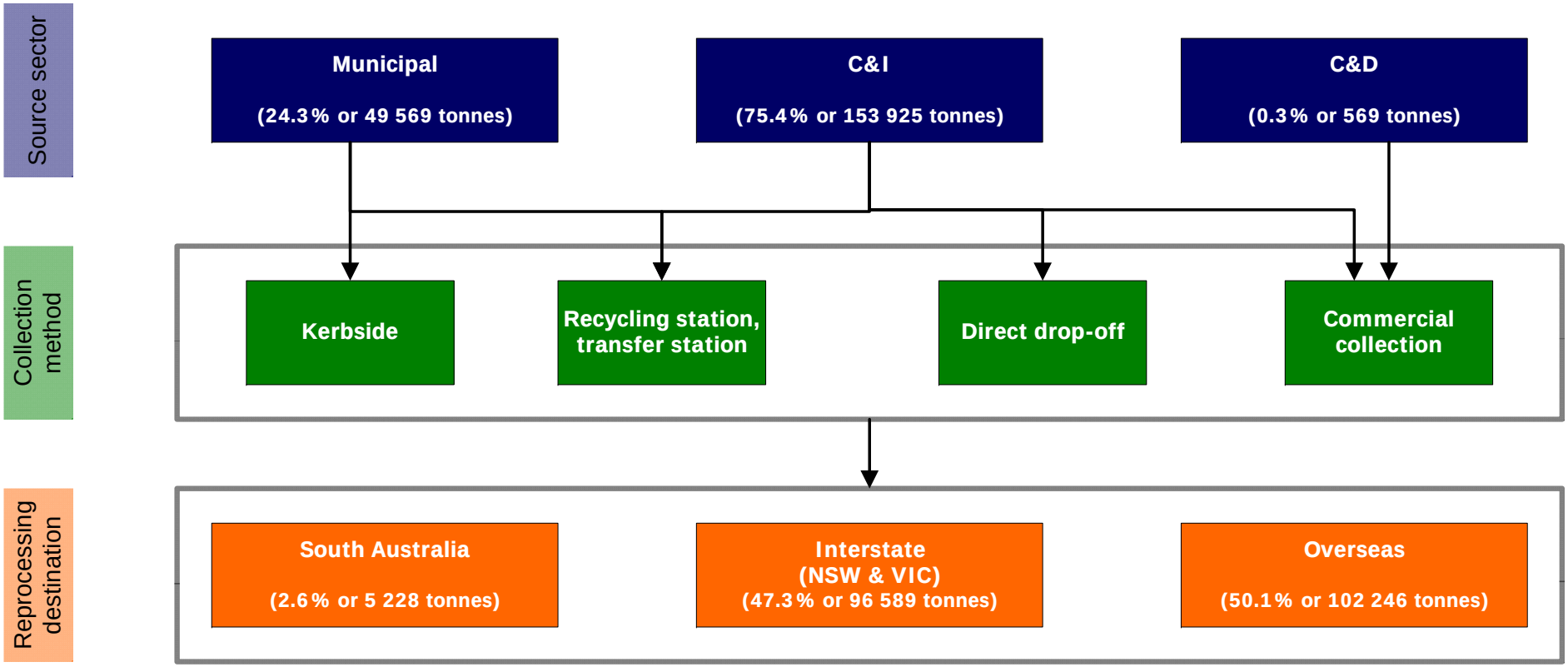


**Figure 4-16** **Flow of paper & cardboard reprocessing, SA 2008–09**

## 4.2 Source and end products

**Table 4-22 Paper and cardboard source products, SA 2008–09**

| 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 2008-09**

| 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 4-17 and Table 4-24 is annual paper and cardboard recycling data for SA for the period of 2003–04 through to 2008–09.

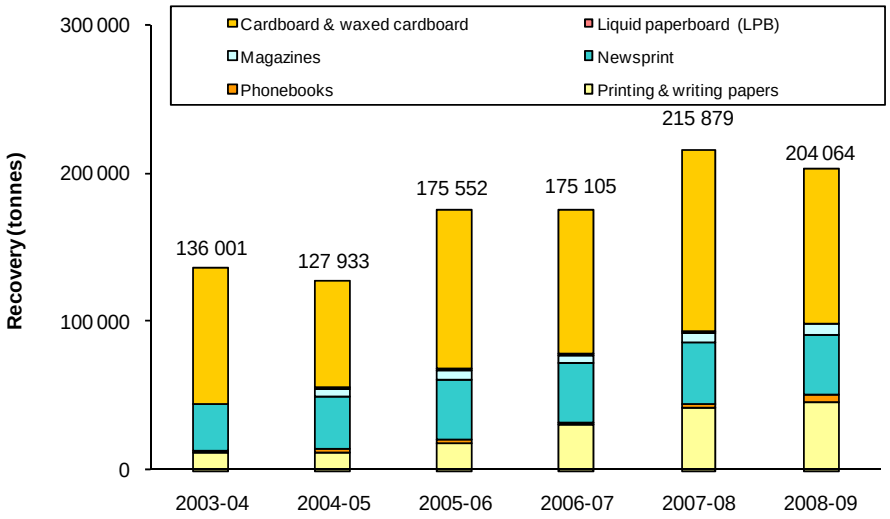


**Figure 4-17 Annual paper & cardboard recovery, SA 2003-04 to 2008-09**

Cardboard recovery is lower than the very strong figure recorded for 2007-08, but remains strong compared to recovery levels recorded in other years. Newspaper recycling rates in SA have risen significantly over the past six years. PNEB data shows that the recycling rate remained stable at 73%. Export quantities are generally lower for 2008-09, particularly in cardboard and waxed cardboard.

**Table 4-24 Annual paper & cardboard recovery, SA 2003-04 to 2008-09**

| Material | 2003–04 recovery (tonnes) | 2004–05 recovery (tonnes) | 2005–06 recovery (tonnes) | 2006–07 recovery (tonnes) | 2007–08 recovery (tonnes) | 2008–09 recovery (tonnes) |
|---|---|---|---|---|---|---|
| Cardboard & waxed cardboard | 91 000 | 72 117 | 106 943 | 96 436 | 122 537 | 104 128 |
| Liquid paperboard | 0 | 971 | 1 239 | 1 373 | 1 476 | 1 475 |
| Magazines | 0 | 4 650 | 5 918 | 4 680 | 5 728 | 7 313 |
| Newsprint | 31 398 | 35 917 | 40 607 | 40 000 | 41 393 | 40 219 |
| Phonebooks | 1 303 | 1 685 | 2 042 | 2 042 | 2 000 | 5 051 |
| Printing & writing papers | 12 300 | 12 593 | 18 803 | 30 574 | 42 745 | 45 877 |
| **Total** | **136 001** | **127 933** | **175 552** | **175 105** | **215 879** | **204 064** |

The continued growth in printing and writing paper reprocessing is reflective of the buoyant market again during 2008–09, as well as increased C&I collections.

### 4.3.2 Barriers

During 2008-09 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 2008–09 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 local market outlet for waste paper, with almost all (97.4%) going into interstate or export markets. The interstate market has risen significantly from 30.2% in 2007–08 to 47.3% in 2008–09, whilst the export market has decreased by 17.4% from 2007–08. The decreased export market size was driven by waste cardboard, decreasing by over 43 000 tonnes from 2007–08.

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

Whilst the overall export of paper and cardboard dropped during 2008-09, the export of mixed grade paper went against this trend, fuelled by increasing demand from Asia.

Overall the market was stable, despite the prevailing economic conditions.

The price of sorted grades 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 2008 calendar year.

The survey undertaken on behalf of PACIA is careful to avoid any double counting by defining recycling very clearly and excluding other parts of the recovery chain (collectors, sorters, consumers of recyclate).

Based on information from plastics exporters, an assumption was made in previous surveys that almost all exported material was packaging (consumer and industrial). Through more recent awareness that some non-packaging material is now being exported, further discussions have taken place with those facilitating export. They acknowledge that in 2008 more durable plastics (auto components, e-waste material, cable insulation and pipe), was being exported. Estimates are that this would account for between 5–25% of total exports in 2008. Based on this estimate range, it is now assumed in survey calculations that in 2008 15% of exported used plastic for recycling was non-packaging material.

The quantity of plastics recovered in SA and the location of reprocessing for 2008 is presented in Table 5-25. Plastics recovery was 13 778 tonnes, with PET the largest contributor at around 38% (Figure 5-18). Recovery was through commercial and industrial collections and municipal recycling collections.

**Table 5-25 Plastics recovery, SA 2008**

| Material | Net recovery[1] | Reprocessing location | | |
|---|---|---|---|---|
| | (tonnes) | SA | Interstate | Export |
| Polyethylene terephthalate (PET) | 5 200 | 0.1% | 76.7% | 23.2% |
| High density polyethylene (HDPE) | 2 685 | 44.1% | 13.1% | 42.9% |
| Polyvinyl chloride (PVC) | 408 | 58.8% | 26.4% | 14.8% |
| Low density polyethylene (LDPE) | 2 954 | 39.7% | 59.7% | 0.6% |
| Polypropylene (PP) | 1 529 | 62.8% | 5.6% | 31.6% |
| Polystyrene (PS) | 540 | 40.0% | 19.4% | 40.6% |
| Other plastics | 462 | 86.0% | 14.0% | 0.0% |
| **Total** | **13 778** | **30.3%** | **46.9%** | **22.8%** |

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

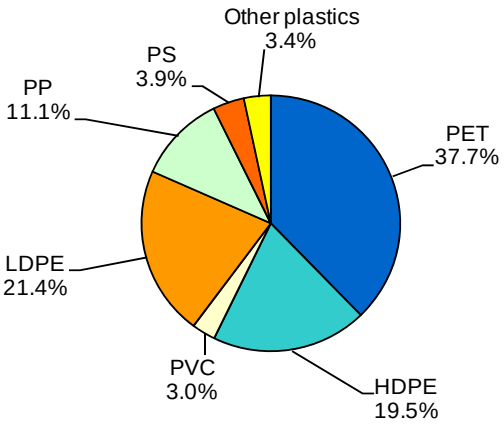


**Figure 5-18 Composition of recovered plastics (by weight), SA 2008**

The breakdown of plastics recovery by source sector and material type is presented in Figure 5-19 and Table 5-26. As a large proportion of durable plastic applications are in the construction and demolition (C&D) sector, the proportion recovered from this sector increased due to this change in method, as shown in Figure 5-19 and Table 5-26. This is despite a decrease in the overall quantity of plastics reprocessing.

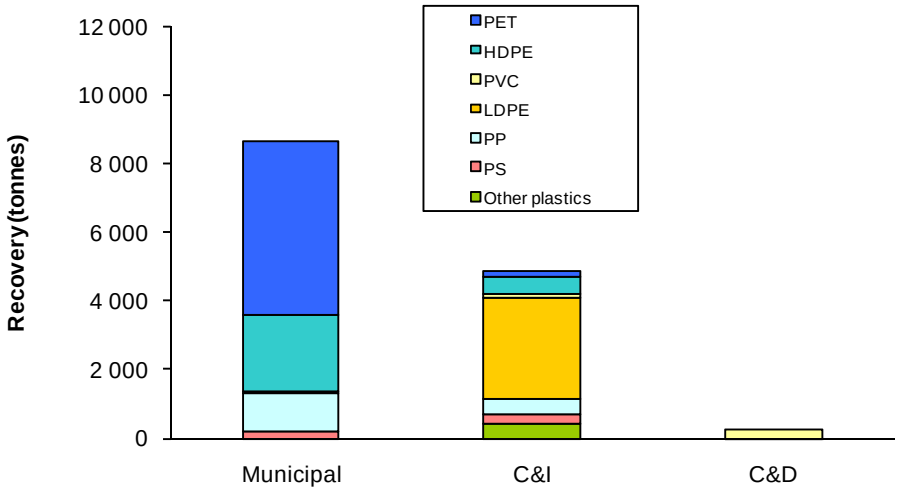


**Figure 5-19 Plastics recovery (by source sector), SA 2008**

As shown in both Figure 5-19 and Table 5-26, the main source of recovered plastics is the municipal sector, the majority of which is PET.

**Table 5-26 Plastics recovery (by source sector), SA 2008**

| Material | Source sector | | | |
|---|---|---|---|---|
| | Municipal | C&I | C&D | Total |
| Polyethylene terephthalate (PET) | 5 056 | 144 | 0 | 5 200 |
| High density polyethylene (HDPE) | 2 170 | 515 | 0 | 2 685 |
| Polyvinyl chloride (PVC) | 60 | 108 | 240 | 408 |
| Low density polyethylene (LDPE) | 0 | 2 954 | 0 | 2 954 |
| Polypropylene (PP) | 1 138 | 391 | 0 | 1 529 |
| Polystyrene (PS) | 220 | 291 | 30 | 540 |
| Other plastics | 0 | 462 | 0 | 462 |
| **Total** | **8 643** | **4 865** | **270** | **13 778** |

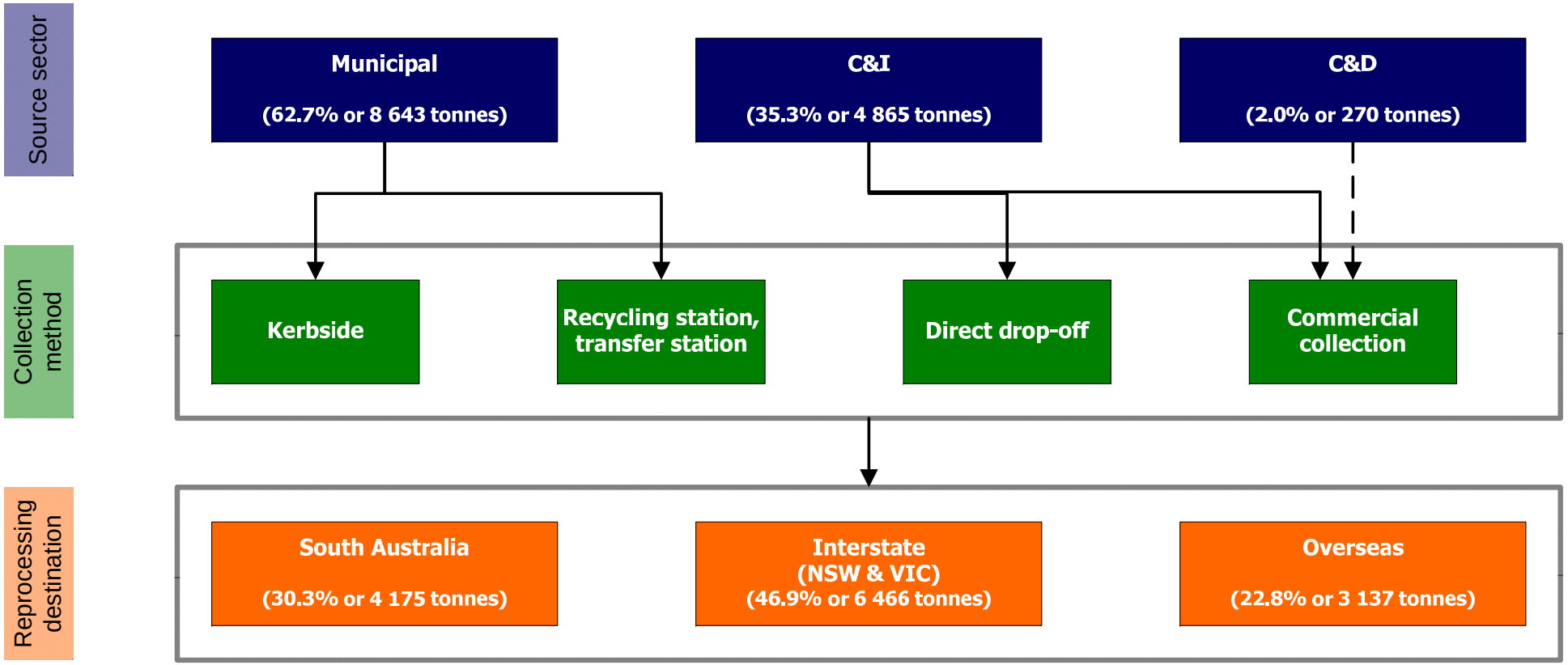


**Figure 5-20 Flow of plastics reprocessing, SA 2008**

## 5.2 Source and end products

**Table 5-27 Plastics source products, SA 2008**

| 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 2008**

| 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, industrial film, water tanks, crates and mixed polymer timber replacement products |
| Polyvinyl chloride (PVC) | Floor coverings, pipes, electrical conduit, clothing, shoes, 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, timber replacement products and garden furniture |
| Polypropylene (PP) | Crates, boxes, plant pots, building materials, electrical cable cover, automotive parts, irrigation fittings and mixed polymer timber replacement products |
| Polystyrene (PS) | Waffle pods, produce boxes, building materials, concrete reinforcement stools, extruded polystyrene and mixed polymer timber replacement products |
| Other plastics | Various |

## 5.3 Recycling activity, trends, barriers and reuse

### 5.3.1 Trends

Presented in Figure 5-21 and Table 5-29 is annual plastics recycling data for SA for the period 2003 to 2008. This data shows the plastics reprocessing market contracted during 2008, with other plastics and LDPE leading the downturn. Overall, plastics reprocessing experienced a 12% decrease from 2007. No data is available for reprocessing by polymer type during 2003.

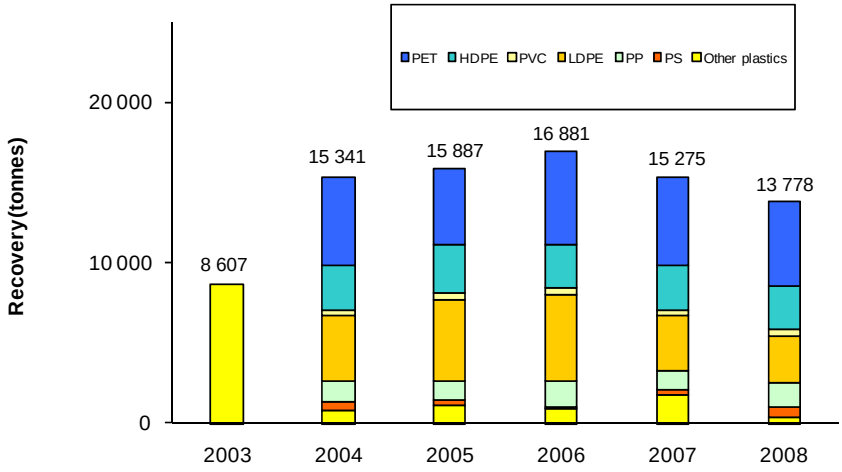


**Figure 5-21 Annual plastics recovery, SA 2003 to 2008**

Recycling of plastics nationally during 2008-09 was affected by the global economic downturn. South Australia was no exception to this trend. In addition, plastics recycling in South Australia has remained fairly constant over the past five years, lending confidence to the expectation that recycling will return to previously recorded levels during the 2009-10 financial year.

**Table 5-29 Annual plastics recovery, SA 2003 to 2008**

| Material | 2003 recovery (tonnes) | 2004 recovery (tonnes) | 2005 recovery (tonnes) | 2006 recovery (tonnes) | 2007 recovery (tonnes) | 2008 recovery (tonnes) |
|---|---|---|---|---|---|---|
| Polyethylene terephthalate (PET) | 0 | 5 544 | 4 753 | 5 704 | 5 440 | 5 200 |
| High density polyethylene (HDPE) | 0 | 2 728 | 3 036 | 2 779 | 2 821 | 2 685 |
| Polyvinyl chloride (PVC) | 0 | 329 | 365 | 363 | 317 | 408 |
| Low density polyethylene (LDPE) | 0 | 4 063 | 5 043 | 5 403 | 3 375 | 2 954 |
| Polypropylene (PP) | 0 | 1 272 | 1 252 | 1 542 | 1 202 | 1 529 |
| Polystyrene (PS) | 0 | 613 | 332 | 167 | 365 | 540 |
| Other plastics | 8 607 | 792 | 1 107 | 922 | 1 755 | 462 |
| **Total** | **8 607** | **15 341** | **15 887** | **16 881** | **15 275** | **13 778** |

The total weight of exported plastics is accurate, with the data sourced from the Australian Customs Service database.

### 5.3.2 Market conditions

**Table 5-30 Recycling market conditions, SA 2008**

| 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 2008 was identified.

## 5.4 Market summary

### 5.4.1 Market size

During 2008, 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. A large fire at a local plastics reprocessor is expected to affect local reprocessing figures for the 2009-10 financial year.

As with all other materials, the global financial crisis is likely to impact on both consumption and recycling of plastics during the 2009 calendar year. Market prices and size are expected to decrease accordingly.

### 5.4.2 Market strength

The local (SA) plastics market experienced a decline in local demand during 2008, whilst the interstate reprocessing and export markets continued to gain strength.

The export market grew from the 2007 level, with increased levels of PET and HDPE.

Export of low grade mixed plastic grew significantly from 2007 to 2008. This shift to mixed plastics is reflected in local markets, with a contraction in LDPE reprocessed and an increase in other plastics reprocessed.

# 6 Glass

## 6.1 Quantity recovered and reprocessing location

The quantity of glass recovered in SA and the location of reprocessing, during 2008–09, is presented in Table 6-31. Total glass recovery was 61 552 tonnes.

**Table 6-31 Glass recovery, SA 2008–09**

| Material | Net recovery[1] | Reprocessing location | | |
|---|---|---|---|---|
| | (tonnes) | SA | Interstate | Export |
| Glass | 61 552 | 96% | 4% | 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 6-22. Most glass reprocessed was sourced from the municipal sector.

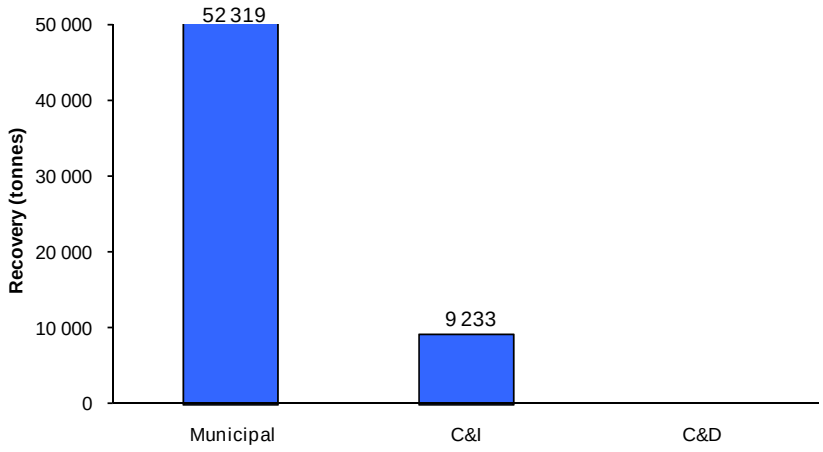


**Figure 6-22 Glass recovery (by source sector), SA 2008–09**

A significant quantity (over 14 000 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 2008–09**

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

Table 6-33 Glass end products, SA 2008–09

| 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 6-23 is the annual glass recycling data for SA for the period 2003–04 to 2008–09. Glass reprocessing in SA has continued its upward trend of the last six years during 2008-09.

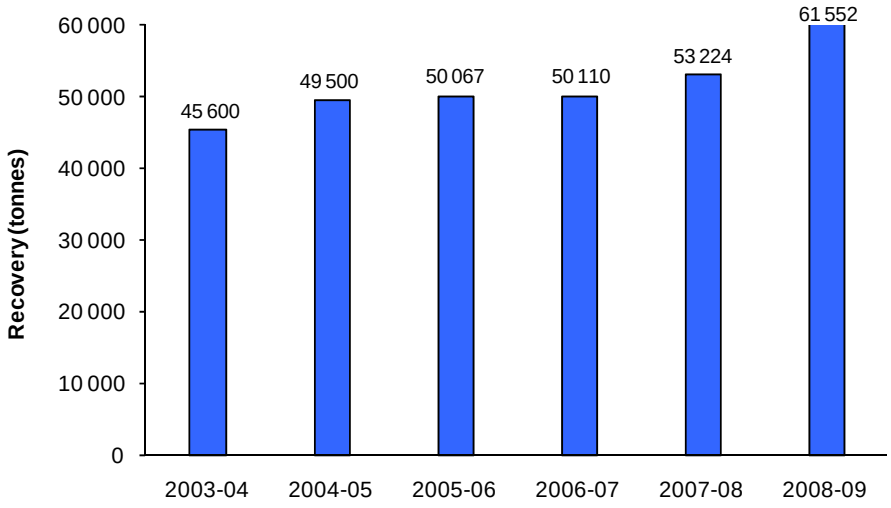


Figure 6-23 Annual glass recovery, SA 2003–04 to 2008–09

### 6.3.2 Reuse

There was no direct large scale reuse of glass identified as taking place in SA during 2008–09.

## 6.4 Market size and strength

The glass recycling market in South Australia is relatively 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 typically very strong, but also 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 increased by over 13% during 2008-09. This is likely due to the increase in the value of container deposits from five to 10 cents in 2008.

# 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 236 190 tonnes, of which fly ash was the majority of material recovered. During 2008–09, no foundry sands were reprocessed.

**Table 7-34 Other materials recovery, SA 2008–09**

| Material | Net recovery[1] | Reprocessing location | | |
|---|---|---|---|---|
| | (tonnes) | SA | Interstate | Export |
| Fly ash[2] | 223 000 | 100% | 0% | 0% |
| Foundry sands[3] | 0 | N/A | N/A | N/A |
| Leather & textiles | 3 052 | 0% | 0% | 100% |
| Tyres & other rubber | 10 138 | 23.4% | 33.1% | 43.5% |
| **Total** | **236 190** | **95.4%** | **1.4%** | **3.2%** |

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 7-24 and Table 7-35.

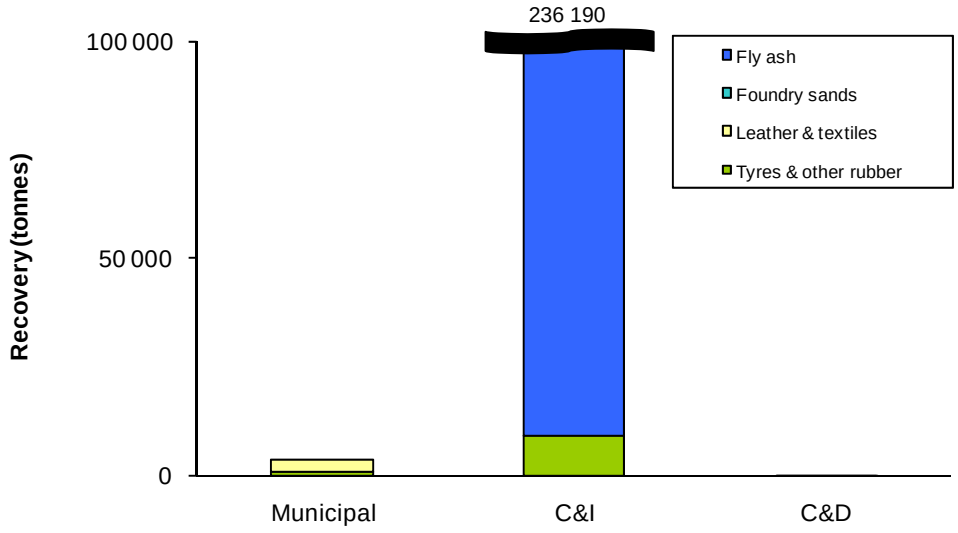


**Figure 7-24 Other materials recovery (by source sector), SA 2008–09**

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 2008–09**

| Material | Source sector | | | |
|---|---|---|---|---|
| | Municipal | C&I | C&D | Total |
| Fly ash | 0 | 223 000 | 0 | 223 000 |
| Foundry sands | 0 | 0 | 0 | 0 |
| Leather & textiles | 3 052 | 0 | 0 | 3 052 |
| Tyres & other rubber | 882 | 9 142 | 114 | 10 138 |
| **Total** | **3 934** | **232 142** | **114** | **236 190** |

## 7.2 Source and end products

**Table 7-36 Other materials source products, SA 2008–09**

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

**Table 7-37 Other materials end products, SA 2008–09**

| Material | End products |
|---|---|
| Fly ash | The construction industry currently consumes (in concrete production) most of the fly ash that is recycled. As stated earlier, SA fly ash is highly desirable in cement manufacture.<br>A recent four-year study conducted by the University of Technology Sydney to assess the viability of fly ash as an agricultural additive to soil, recently concluded. The study, conducted at sites in NSW, Queensland and WA, showed fly ash can improve chemical and structural soil conditions when strategically applied.[1]<br>A program is underway to assess the use of fly ash in the manufacture of man-made aggregates for concrete, there 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. |

[1]Yunusa I, *et al.* (2008) *Utilisation of coal ash in horticultural and agricultural ecosystems*. Prepared for the Ash Development Association of Australia, Sydney.

## 7.3 Recycling activity, trends, barriers and reuse

### 7.3.1 Trends

Presented in Figure 7-25 and Table 7-38 is annual 'other' materials recycling data for SA for the period 2004–05 to 2008–09. Data for 2003–04 is excluded as no fly ash or foundry sands data was available for that period.

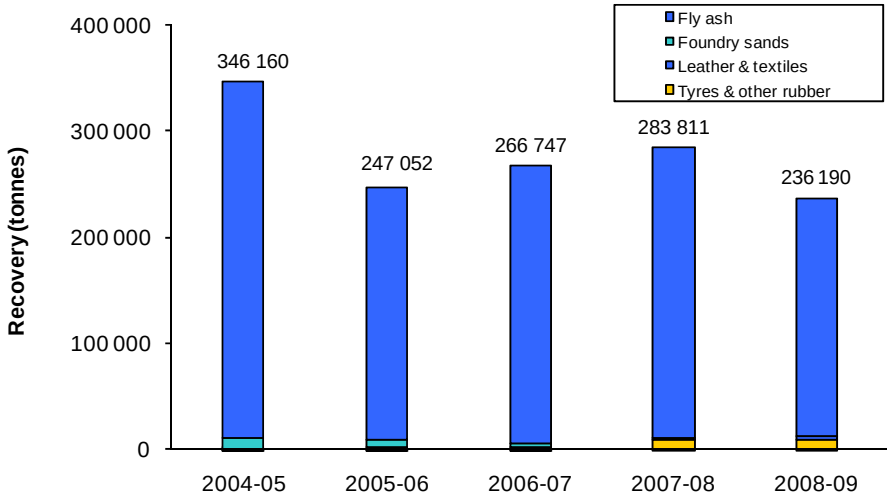


**Figure 7-25 Annual other materials recovery, SA 2004-05 to 2008-09**

The reprocessing of 'other' materials decreased significantly during 2008–09. Foundry sands were not reprocessed during 2008–09 as they were deemed by the EPA as currently unsuitable for inclusion in compost products.

Reprocessing of fly ash fell from 2007–08 to its lowest level in the last five years. Tyre recycling however, increased by over 10% from the very high level recorded in 2007–08. More than 40% of tyres recovered during 2008-09 were exported for reprocessing, primarily to Vietnam[2].

**Table 7-38 Annual other materials recovery, SA 2003-04 to 2008-09**

| Material | 2003–04 recovery | 2004–05 recovery | 2005–06 recovery | 2006–07 recovery | 2007–08 recovery | 2008-09 recovery |
|---|---|---|---|---|---|---|
| | (tonnes) | (tonnes) | (tonnes) | (tonnes) | (tonnes) | (tonnes) |
| Fly ash | 0 | 335 000 | 236 343 | 260 913 | 272 000 | 223 000 |
| Foundry sands | 0 | 9 006 | 6 755 | 2 000 | 0 | 0 |
| Leather & textiles | 4 080 | 1 564 | 2 419 | 2 348 | 2 376 | 3 052 |
| Tyres & other rubber | 88 | 590 | 1 535 | 1 486 | 9 434 | 10 138 |
| **Total** | **4 168** | **346 160** | **247 052** | **266 747** | **283 811** | **236 190** |

[2] Hyder Consulting, *Study into End of Life Tyres.* Prepared for the National Environment Protection Council, March 2009.

## 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 2008–09**

| Material | Market barriers |
|---|---|
| Fly ash | Financial:<br>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.<br>Regulatory:<br>Development of the market potential requires greater capital investment, refinement of the waste stream quality, and an improved regulatory and reporting framework.<br>A view by industry that state regulators need to have a consistent approach, and that ideally, a nationally consistent, evidence-based approach, is required<br>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.<br>A concern by the fly ash recycling industry that fly ash may be reclassified as a hazardous waste in South Australia.<br>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: Cheaply available of alternative materials, inhibiting market.<br>Freight costs from point of generation to point of reuse.<br>Potentially high testing costs for foundry sands.<br>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.<br>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.<br>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 (3 052 tonnes) would be directly reused overseas.

## 7.4 Market summary

### 7.4.1 Fly ash

#### Current market situation

In 2008–09 there was a decrease of 49 000 tonnes in the reuse of fly ash from 2007–08.

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.

Transport costs continue to be the key factor limiting the recycling of fly ash. However, 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 2008–09 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. Foundry sands are not currently

reprocessed in South Australia due to a lack of approvals. Industry sources suggest that the potential South Australian market size for foundry sands is approximately 15 000 tonnes/year.

Used foundry sands are generally taken at no cost by compost companies for recycling. It is difficult to estimate 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 been estimated at 100 000 tonnes/year.

### 7.4.3 Tyres

#### Market size and strength

The reprocessed tyres market was reportedly stable during 2008-09. Currently, inconsistent state regulations, licensing and high reprocessing costs are hindering the further expansion of the industry.

With the inclusion of a new tyre reprocessor in the 2007-08 study, the overall volume of tyres reprocessed has continued to increase, with local reprocessing remaining stable at approximately 24%.

# 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 183 677 tonnes, of which 46 810 tonnes (25.5%) was recovered through the container deposit (CD) system, and 136 867 tonnes (74.5%) was recovered through routes, such as kerbside recycling and commercial co-mingled collections. There was a total of approximately 577 million beverage containers returned during the 2008-09 financial year, 60 million more than during the previous year.

**Table 8-40 Packaging recovery, SA 2008–09**

| | Net recovery (tonnes) | CD recovery (tonnes) | Non-CD recovery[2] (tonnes) |
|---|---|---|---|
| Steel cans | 1 918 | 0 | 1 918 |
| Aluminium cans | 3 790 | 3 790 | 0 |
| Cardboard packaging | 104 128 | 0 | 104 128 |
| Liquid paperboard cartons | 1 475 | 741 | 734 |
| PET packaging | 4 879 | 4 062 | 817 |
| HDPE packaging | 1 986 | 203 | 1 783 |
| PVC packaging | 53 | 0 | 53 |
| LL/LDPE packaging | 2 273 | 0 | 2 273 |
| Polypropylene packaging | 1 248 | 0 | 1 248 |
| Polystyrene packaging | 237 | 0 | 237 |
| Other plastics packaging | 138 | 0 | 138 |
| Glass bottles and jars | 61 552 | 38 014 | 23 538 |
| **Total** | **183 677** | **46 810** | **136 867** |

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

Figure 8-26 and Figure 8-27 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.

CD packaging data is supplied by the EPA and is based on the number of deposits redeemed. This data was provided in tonnes and units for 2008-09, showing the unit/kg conversion rates. By contrast, in previous years data was provided in units only, and conversion rates were sourced from the EPA and super-collectors. These differed slightly across the range of materials last year compared to earlier years. As shown in Table 8-41, the recycling rate for each material

and CD packaging overall has increased since the increase in the deposit from five to ten cents per unit.

**Table 8-41 Comparison of reported and projected CD recycling rates**

| Material | Change 07–08 to 08–09 | |
|---|---|---|
| | Reported | Projected using conversion ratio used in 2007–08 report |
| Glass | 13.54% | 25.84% |
| LPB | 30.69% | 27.95% |
| PET | 0.99% | 12.12% |
| Al | 9.70% | 7.49% |
| **TOTAL** | **12.46%** | **18.23%** |

Despite the increased deposit being in effect for only nine months, it resulted in a 12% increase in recovery. It is projected that if the conversion rate had remained consistent the annual increase would have been approximately 18%.

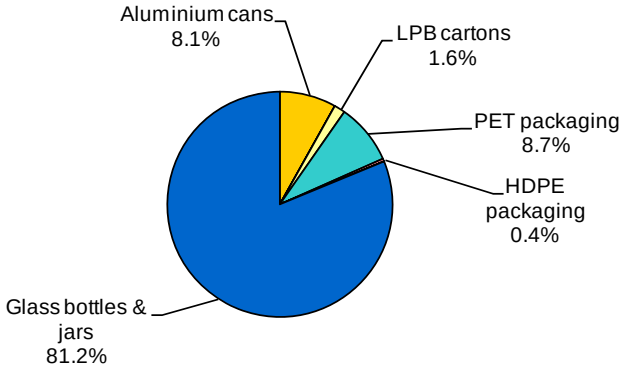


**Figure 8-26 CD packaging recovery (by weight), SA 2008–09**

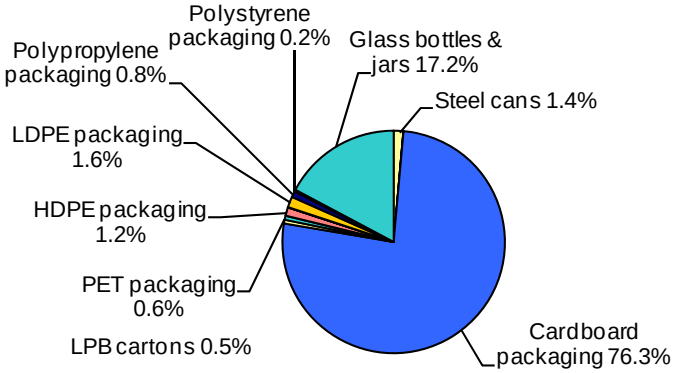


**Figure 8-27 Non-CD packaging recovery (by weight), SA 2008-09**

The increase in the deposit on containers from 5 cents to 10 cents appears to have promoted glass recycling during 2008-09. This trend is not borne out in the recovery rates reported for other CDL materials. it is apparent both form the data collected and from information derived from the collection and reprocessing industry, that the increase in the container deposit has resulted in an increase in recovery. This will become more apparent in a full year of introduction and without the impact of the global financial crisis.

# 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 2008–09, South Australia's recycling efforts prevented the equivalent of approximately 888 989 tonnes of $CO_2$ entering the atmosphere. This is equivalent to about 15% of $CO_2$ emissions from the entire South Australian

transport sector during 2007[3], and equates to taking approximately 205 309 passenger cars off the road for one year.

The provision of a SA specific benefits of recycling assessment has enabled a more accurate calculation of the GHG savings from SA recycling during 2008–09 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 9-28 presents the recycling savings by material category (in terms of CO2 equivalent savings) which resulted from recycling activity in SA during 2008–09.

[3] South Australian Government, Department of Premier and Cabinet, *Report on the operation of the 'Climate Change and Greenhouse Emissions Reduction Act 2007*', November 2009.

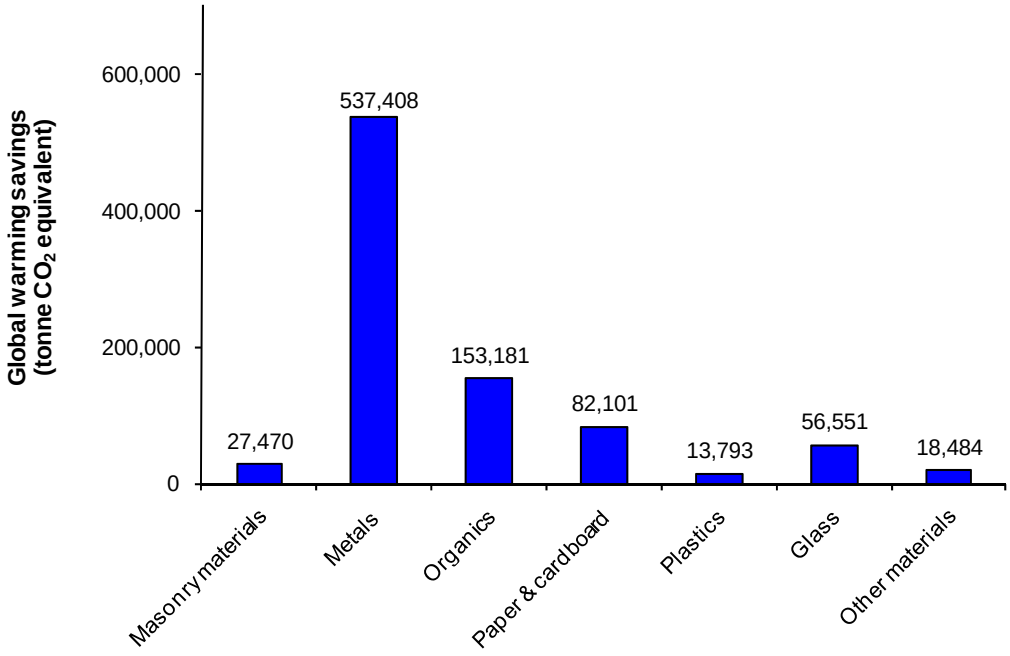


**Figure 9-28 Avoided GHG emissions (by material category), SA 2008–09**

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 9-42 presents the recycling savings by material (in terms of CO2 equivalent savings) which resulted from recycling activity in SA during 2008–09.

**Table 9-42 Total GHG savings for all materials, SA 2008–09**

| Material | Total GHG benefit of recycling (tonnes CO2-e) | Equivalent trees planted required for carbon absorption | Equivalent cars off the road (1 year) |
|---|---|---|---|
| Masonry material [1] | 27,470 | 41,062 | 6,344 |
| Steel | 153,187 | 228,980 | 35,378 |
| Aluminium | 321,432 | 480,466 | 74,234 |
| Non-ferrous metals (ex. Al) | 62,789 | 93,855 | 14,501 |
| Food organics | 2,496 | 3,731 | 577 |
| Garden organics | 46,920 | 70,135 | 10,836 |
| Timber | 83,723 | 125,147 | 19,336 |
| Organics – other | 20,041 | 29,957 | 4,628 |
| Mixed paper including newsprint and cardboard [2] | 82,101 | 122,723 | 18,961 |
| Polyethylene terephthalate (PET) | 6,564 | 9,812 | 1,516 |

| | | | |
|---|---|---|---|
| High density polyethylene (HDPE) | 1,692 | 2,529 | 391 |
| Polyvinyl chloride (PVC) | 769 | 1,150 | 178 |
| Low density polyethylene (LDPE) [3] | 1,132 | 1,692 | 261 |
| Polypropylene (PP) | 2,349 | 3,512 | 543 |
| Polystyrene (PS) [4] | 656 | 981 | 151 |
| Other plastics | 631 | 943 | 146 |
| Glass | 56,551 | 84,531 | 13,060 |
| Fly ash [5] | 6,467 | 9,667 | 1,494 |
| Foundry sands [6] | 0 | 0 | 0 |
| Leather & textiles [7] | 0 | 0 | 0 |
| Tyres & other rubber | 12,017 | 17,962 | 2,775 |
| **Total** | **888,989** | **1,328,833** | **205,309** |

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 |

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| | 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.<br>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).<br>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 2008-09? (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 2008? (tonnes) |
| 6 | What was the stockpile of the material at 30 June 2009? (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 2007-08 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? |