



# Recycling Activity in Western Australia

2009-10

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Final report



**Waste Authority**

*Towards*  
**ZERO WASTE**  
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## Waste Authority

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### Final report

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**Report No** 3

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## Appendix

Appendix A

Reprocessor survey

# EXECUTIVE SUMMARY

The recovery of materials for recycling has many environmentally beneficial outcomes. Not only does it reduce the amount of material sent to landfill, it helps conserve limited material resources and reduce energy and water use required to manufacture new products.

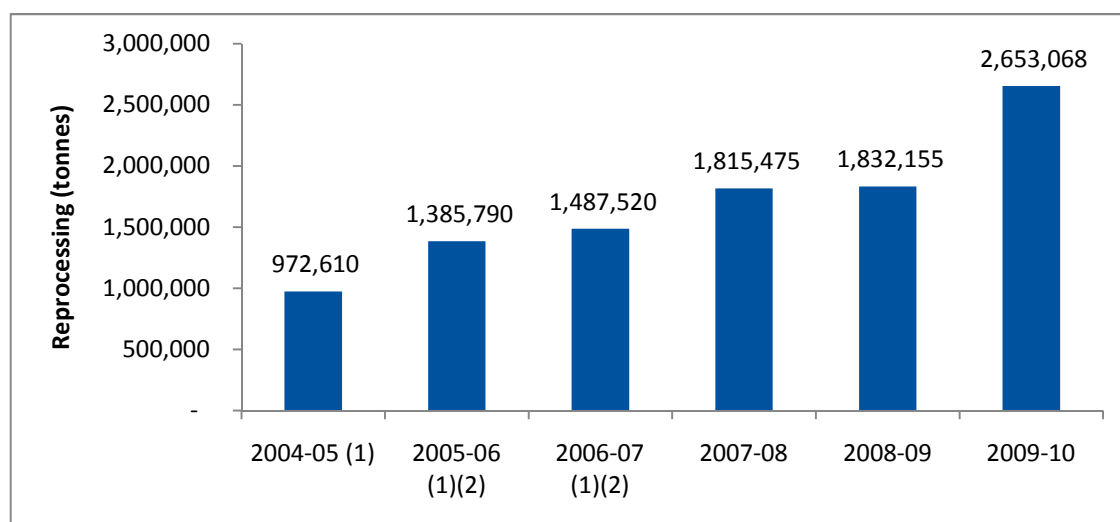
## Survey method

A survey of total recycling activity in Western Australia for 2009–10 was undertaken in August–September 2010 by Hyder Consulting. The survey covered all materials recovered for recycling in Western Australia, as well as exported materials. Any materials imported into the state for recycling were excluded.

All known local (Western Australian based) and interstate recycling destinations were identified, as well as export destinations overseas.

## Statewide recycling

Recycling in WA reached a total of 2 653 068 tonnes in 2009–10, a significant increase on recycling activity in recent years. The survey results show an increase of just over 820 000 tonnes from that reported for 2008–09. While some of this increase may be due to an improved survey response, reprocessors confirm there has been a strong increase across most materials.



**Figure E-1 Total recycling activity, WA 2004-05 to 2009-10**

1. Includes whole bricks, excluded from later studies as these are deemed to be for reuse
2. Adjusted from previous reports to include only consistent categories

## Recycling by material

Quantities of each material type reprocessed during 2009–10 are presented in Table E-1. The most significant changes in reported recycling during 2009–10 in terms of quantity were in the C&D materials and paper and cardboard material categories, which increased by 487 452 and 222 831 tonnes respectively.

**Table E-1 Annual recycling by material type 2009–10**

Material type	Tonnes	Proportion of recycling (%)
C&D materials	1210 993	46%
Organics	459 542	17%
Paper & cardboard	453 858	17%
Metals	450 294	17%
Glass	27 744	1%
Textiles	21 179	1%
Rubber	15 520	1%
Plastic	13 938	1%
<b>TOTAL</b>	<b>2653 068</b>	<b>100%</b>

## Recycling by sector

Almost 50% of material recovered for recycling during this period was sourced from the C&D sector (Table E-2).

**Table E-2 Sector origins of WA sourced reprocessed materials, WA 2009–10**

Sector origin	Tonnes	%
Municipal	550 629	21
C&I	807 113	30
C&D	1295 326	49
<b>TOTAL</b>	<b>2653 068</b>	<b>100</b>

## Recycling by geographic source

Of the materials presented for recycling in WA, 89% came from the metropolitan area and 11% from non-metropolitan areas (Table E-3). As the C&D sector makes up nearly 50% of materials recycled, a correspondingly large proportion of recycling is from the metropolitan area.

**Table E-3 Geographic source of WA sourced reprocessed materials, WA 2009–10**

Material type	Metropolitan (%)	Non-metropolitan (%)
C&D materials	99	1
Organics	84	16
Paper & cardboard	86	14
Metals	68	32
Glass	99	1
Textiles	100	0
Rubber	94	6
Plastic	75	25
<b>TOTAL</b>	<b>89</b>	<b>11</b>

All C&D materials are reprocessed locally. As a result, 64% of material collected in WA was reprocessed in WA, with most of the remainder going to export and interstate transfer being a small component (3%) (Table E-4).

**Table E-4 Destination of WA sourced reprocessed materials, WA 2009–10**

Sector origin	Number of destinations	Tonnes	%
<b>Western Australia</b>	66	1700 284	64
<b>Interstate</b>	11	77 219	3
<b>Export</b>	Unknown	875 566	33
<b>TOTAL</b>	<b>77</b>	<b>2653 068</b>	<b>100</b>

## Diversification from landfill

Landfill data for the metropolitan area during 2009–10 was provided by WA Department of Environment and Conservation. Based on population data for metropolitan and non-metropolitan regions of WA, this data was extrapolated to estimate the total quantity of waste sent to landfill in WA. Data for both the metropolitan area and WA are provided in Table E-5.

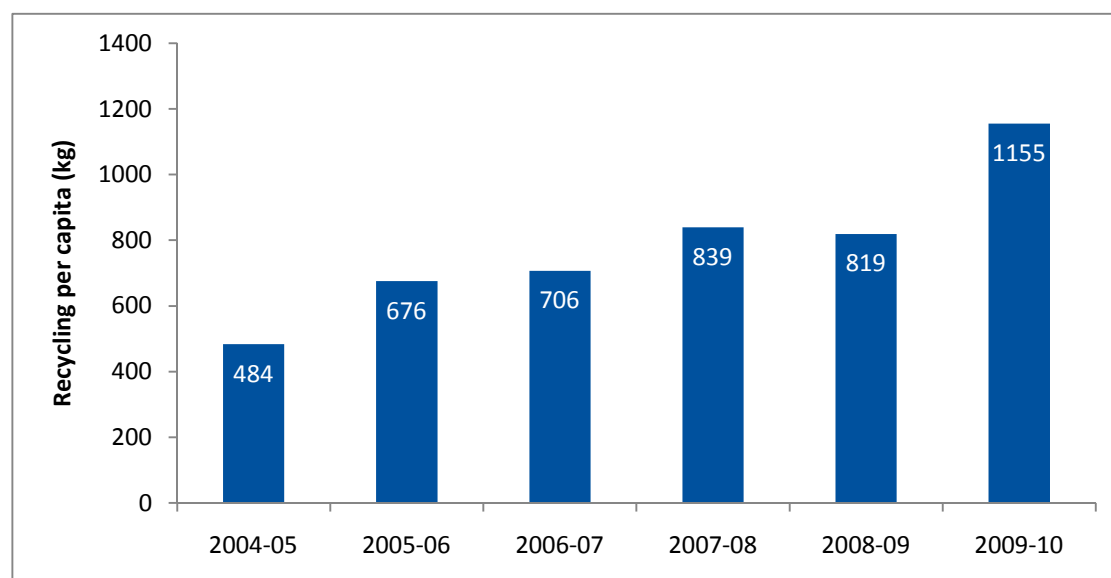
In 2009–10 diversion from landfill in the metropolitan area was 40.6%, up significantly from 34.2% the previous year. Diversion from landfill has improved despite a 26% increase in waste generation, which indicates an improved market for reprocessed materials.

**Table E-5 Annual recycling and overall waste diversion**

	2008–09		2009–10		08-09 to 09–10
	Metro area	WA	Metro area	WA	Metro area change
Diversion from landfill (tonnes)	1 580 183	1 832 155	2 355 047	2 653 068	49%
Waste to landfill (tonnes)	3 041 556 <sup>1</sup>	4 752 431 <sup>2</sup>	3 451 538 <sup>1</sup>	5 393 028 <sup>2</sup>	13%
Total waste generation (tonnes)	4 621 740	6 584 587	5 806 585	8 046 096	26%
<b>Diversion rate</b>	34.2%	27.8%	40.6%	33.0%	19%
Population <sup>3</sup>	1 431 616	2 236 900	1 469 696	2 296 400	3%
Per capita diversion (kg/person)	1 104	819	1 602	1 155	45%
Per capita landfill (kg/person)	2 125	2 125	2 348	2 348	11%
Per capita total waste (kg/person)	3 228	2 944	3 951	3 504	22%

1. Metropolitan landfill data provided by Department of Environment and Conservation, Waste Management Branch.
2. Extrapolated from metropolitan landfill data based on the ratio of metropolitan to non-metropolitan WA population.
3. Population as at 30 June 2009 (2008–09 data) and 2010 (2009–10) data. From ABS, Publication 3101.0–Australian Demographic Statistics.

Recycling activity undertaken in WA during 2009–10 increased dramatically compared to that of previous years (Figure E-2). This is consistent with the recovery expected following the prevailing global economic conditions of previous years.



**Figure E-2 Per capita recycling activity, WA 2004-05 to 2009–10**

Calculations based on population as at 30 June of respective financial years. From ABS, Publication 3101.0–Australian Demographic Statistics.

While an interstate comparison was not possible due to the unavailability of 2009-10 recycling data for many of the other states and territories, it is likely that recycling activity recorded for WA is more comparable with that of other states on a per capita basis.

# 1 Total recycling in Western Australia

The recovery of materials that have reached end of life for recycling into new products has many important environmentally beneficial outcomes. Not only does it reduce the amount of material sent to landfill and therefore the environmental impacts of landfilling, it helps conserve limited material resources and reduce energy and water use required to manufacture new products. Measuring and reporting on recycling activity is an important exercise that allows responsible agencies to make appropriate planning and management decisions to further increase the proportion of generated waste recovered for recycling.

## 1.1 Survey method

A survey of total recycling activity in Western Australia for 2009–10 was undertaken in August–September 2010 by Hyder Consulting. The survey covered all materials recovered for recycling in Western Australia, as well as exported materials. Any materials imported into the state for recycling were excluded.

All known local (Western Australian based) and interstate recycling destinations were identified, as well as export destinations overseas.

Recycling data was obtained from the following sources:

- 1** Reprocessors
  - site visits of the key recycling sites in the Perth 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:
  - Compost Australia
  - Plastics and Chemicals Industries Association (PACIA)
  - Publishers National Environment Bureau (PNEB).
- 3** Australian Customs Service export data
  - Quantity of materials exported for recycling from WA for 2009–10.

Data on reprocessed materials was sought for the 2009–10 financial years on the quantity (by weight), and origin and destination of reprocessed materials. The full questionnaire sent to reprocessors is provided in Appendix A. All reprocessors were identified through an extensive consultation with government, recycling collectors and reprocessors.

Data from all known recycling destinations of material generated in Western Australia has been compiled into this report and, as such, the reported recycling data is believed to be comprehensive. It is possible that some smaller Western Australian based material reprocessors or interstate destinations may not have been identified, in which case the reported recycling quantities would be slightly conservative.

Sector origins have been split into the following categories:

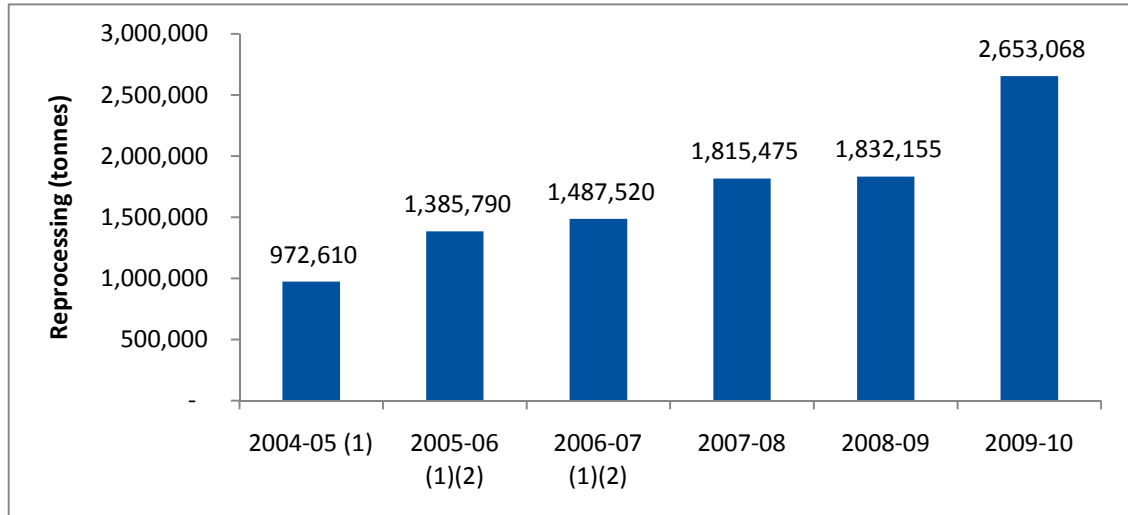
- municipal
- commercial and industrial (C&I)

- construction and demolition (C&D).

Material collected for recycling was also split according to geographic source into the categories metropolitan and non-metropolitan.

## 1.2 Statewide recycling

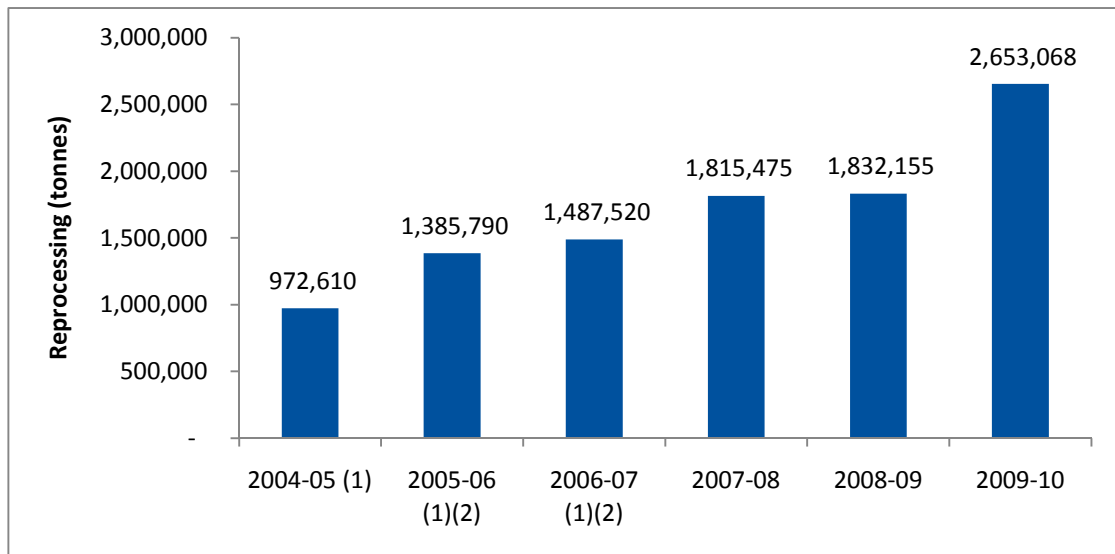
Recycling in WA reached a total of 2653 068 tonnes in 2009–10, a significant increase on recycling activity in recent years (Figure 1-1). The survey results show an increase of over 820 000 tonnes since 2008–09. While some of this increase may be due to an improved survey response, reprocessors confirm there has been an increase across most materials.



**Figure 1-1 Total recycling activity, WA 2004-05 to 2009–10**

1. Includes whole bricks, excluded from later studies as these are deemed to be for reuse
2. Adjusted from previous reports to include only consistent categories

Western Australians recycled approximately 1160 tonnes per capita during 2009-10 (Figure 1-2). With the exception of a slight decrease during 2008-09, WA has recorded a steady increase in per capita recycling since 2004-05, and a significant increase during 2009-10. This increase coincides with a major expansion of C&D recycling in WA.



**Figure 1-2 Per capita recycling activity, WA 2004-05 to 2009-10**

Calculations based on population as at 30 June of respective financial years. From ABS, Publication 3101.0—Australian Demographic Statistics.

While an interstate comparison was not possible due to the unavailability of 2009-10 recycling data for many of the other states and territories, it is likely that recycling activity recorded for WA is more comparable with that of other states on a per capita basis.

## 1.3 Recycling by material

Detailed information on recycling in WA has been recorded and reported on since 2004–05. An overview of this data is presented in Table 1-1. The most significant changes in reported recycling from 2008–09 to 2009–10 in terms of quantity, were in the C&D materials and paper and cardboard material categories. While recycling of asphalt and bricks declined during 2009–10, recycling of concrete and sand, soil, clean fill and rubble increased significantly during 2009–10. This is likely due to the increased landfill levy and growing acceptance of reprocessed concrete in road-making applications. In the paper and cardboard material category, cardboard and paper packaging, and white office paper recycling increased by 150% and 206% respectively.

**Table 1-1 Annual recycling by material type 2004-2010**

Material type	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	Change 2008-09 to 2009-10
<b>C&amp;D materials</b>							
Asphalt	N/A			136 669	166 896	115 090	-31%
Concrete	103 110	89 040	102 260	265 603	344 035	759 301	121%
Bricks	87 520 <sup>1</sup>	81 880 <sup>1</sup>	76 890 <sup>1</sup>	13 918	15 684	12 050	-23%
Sand, soil, clean fill, rubble	143 240 <sup>2</sup>	183 280 <sup>2</sup>	214 720 <sup>2</sup>	190 472	196 925	324 553	65%
<b>Metal</b>							
Aluminium ( non-packaging)	16 510	13 270	13 910	20 677	15 310	16 404	7%
Aluminium packaging	2470	1390	1700	2023	2109	2289	9%
Non-ferrous metals (ex. Al)	18 650 <sup>3</sup>	16 580 <sup>3</sup>	27 230 <sup>3</sup>	15 815	12 621	17 826	41%
Steel (non-packaging)	237 900	393 190	457 460	447 145	341 118	411 665	21%
Steel packaging	970	3430	1000	4609	4026	2109	-48%
<b>Paper &amp; cardboard</b>							
Cardboard / paper packaging	91 060 <sup>4</sup>	108 500 <sup>4</sup>	120 330 <sup>4</sup>	128 243	121 786	304 286	150%

Liquid paperboard	N/A	N/A	N/A	750	750	750	0%
Old newsprint (including directories)	74 640	86 690	91 230	80 698	81 576	66 349	-19%
White office paper	20 120	12 500	14 200	26 865	26 915	82 473	206%
<b>Glass</b>	18 000	18 000	20 800	25 167	26 667	27 744	4%
<b>Plastics<sup>5</sup></b>							
ABS/SAN	7 130	13 360	18 130	66	44	46	4%
EPS				40	357	13	-96%
HDPE				7824	6700	5 474	-18%
L/LDPE				4177	3685	1 498	-59%
Nylon				0	0	3	N/A
Other plastic				241	713	254	-64%
PET				3090	3751	2 842	-24%
PP				2637	2983	2 370	-21%
PS				459	530	430	-19%
PU				683	3	532	19604%
PVC	982	652	476	-27%			
<b>Tyres</b>	1900	5000	5550	2550	2035	15 520	663%
<b>Textiles</b>	1240	1560	1550	66 171	51 361	21 179	-59%
<b>Organics</b>							
Food organics	148 150	358 120	320 560	6798	7177	7453	4%
Garden organics				178 563	221 125	210 965	-5%

Other organic	N/A			158 044	157 943	195 571	24%
Wood / timber	N/A			24 498	16 677	45 553	173%
<b>TOTAL</b>	<b>972,610</b>	<b>1,385,790</b>	<b>1,487,520</b>	<b>1,815,475</b>	<b>1,832,155</b>	<b>2,653,068</b>	<b>45%</b>

<sup>1</sup> Includes rubble and whole bricks

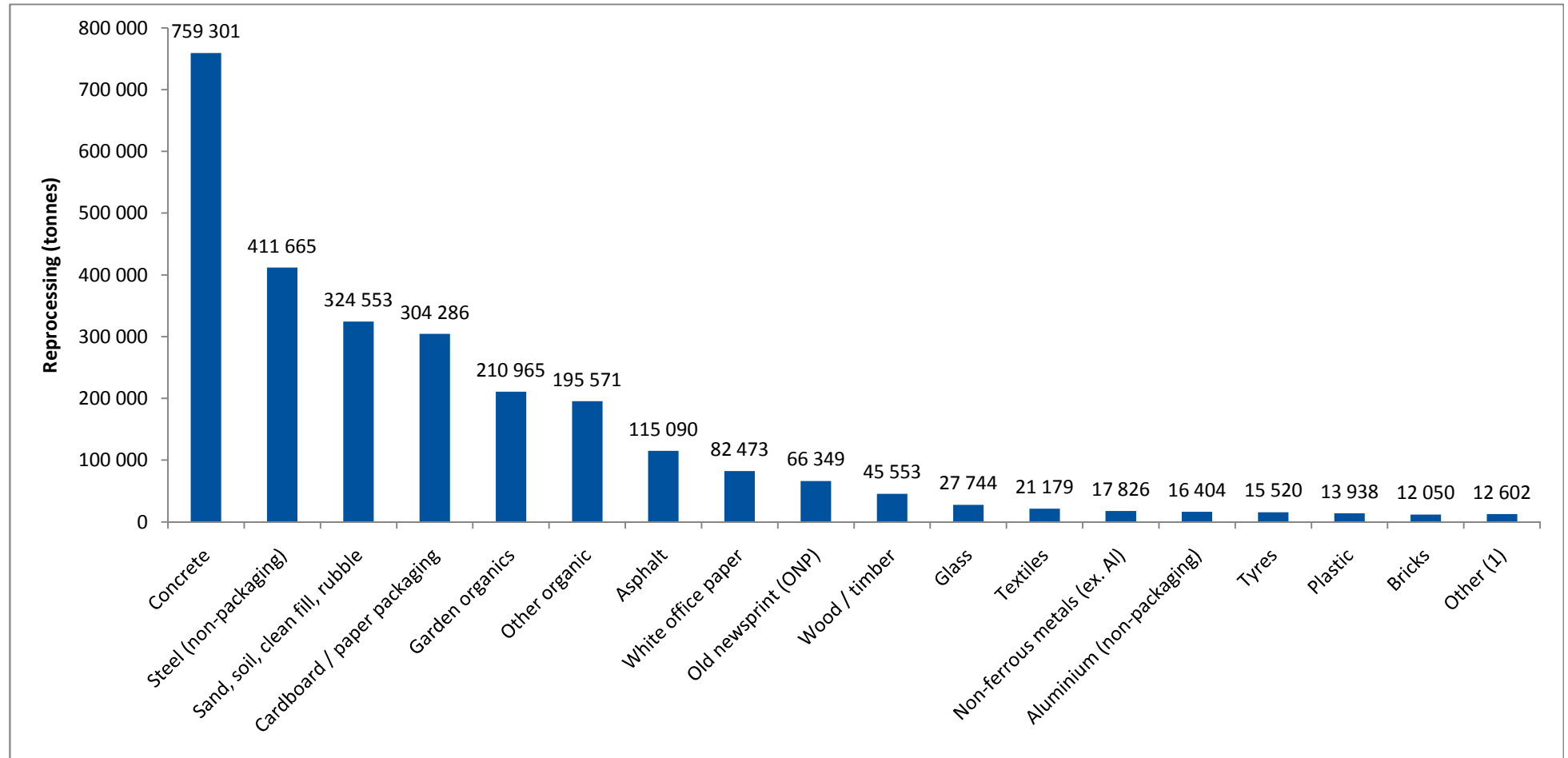
<sup>2</sup> Includes sand only

<sup>3</sup> Includes batteries

<sup>4</sup> Includes mixed paper

<sup>5</sup> All plastics data is collected on a calendar year basis. Data presented is for the years 2004–05 respectively (PACIA reports).

Figure 1-3 shows the top 16 material types reprocessed in WA by material type. The quantity of concrete reprocessed during 2009–10 was by far the most significant of all material types, making up approximately 28% of recycling activity during this period. This is nearly twice that of the next most reprocessed material—steel (non-packaging).



**Figure 1-3 Recycling by material (by weight), WA 2009–10**

1. Includes food organics, aluminium packaging, steel packaging and liquid paperboard.

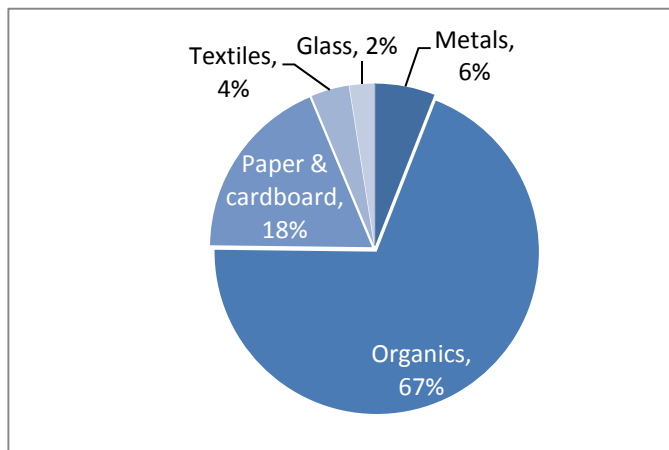
## 1.4 Recycling by sector

The C&I and C&D sectors made up a larger proportion of recycling activity in WA during 2009–10 compared with 2008–09. Approximately 49% of material recovered for recycling during this period was sourced from the C&D sector.

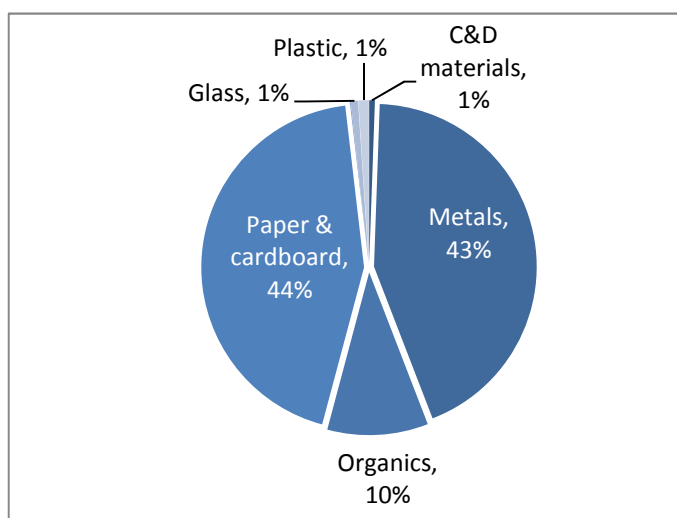
**Table 1-2 Sector origins of WA sourced reprocessed materials, WA 2009–10**

Sector origin	Tonnes	%
Municipal	550 629	21
C&I	807 113	30
C&D	1295 326	49
<b>TOTAL</b>	<b>2653 068</b>	<b>100</b>

The breakdown of material types sourced from each sector—municipal, C&I and C&D—are presented in the figures below. Glass and metals are the only material categories to be sourced from all three source sectors.



**Figure 1-4 Municipal recycling composition, WA 2009–10**



**Figure 1-5 C&I recycling composition, WA 2009–10**

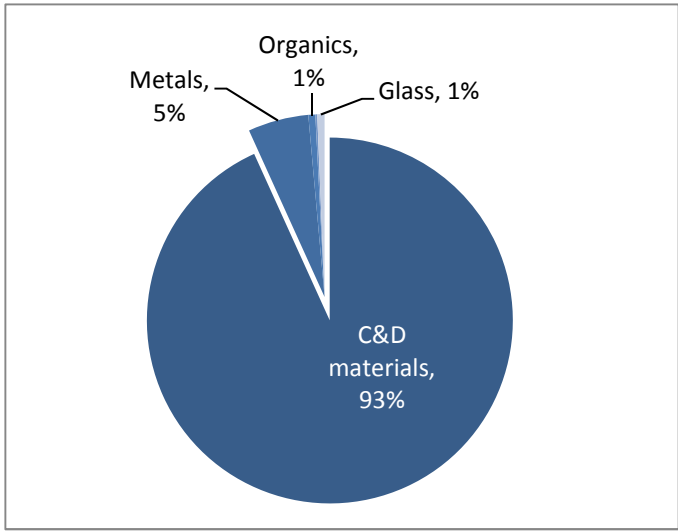


Figure 1-6 C&D recycling composition, WA 2009-10

## 1.5 Recycling by geographic source

Of the materials presented for recycling in WA, 89% came from the metropolitan area and 11% from non-metropolitan areas (Table 1-3). As the C&D sector makes up almost 50% of materials recycled, a correspondingly large proportion of recycling is from the metropolitan area. The ratio of metropolitan and non-metropolitan sourced material does differ for particular materials.

**Table 1-3 Geographic source of WA sourced reprocessed materials, WA 2009–10**

Material type	Metropolitan (%)	Non-metropolitan (%)
C&D materials	99	1
Organics	84	16
Paper & cardboard	86	14
Metals	68	32
Glass	99	1
Textiles	100	0
Rubber	94	6
Plastic	75	25
<b>TOTAL</b>	<b>89</b>	<b>11</b>

The destination of recyclables also varies enormously by material. As a result, 64% of material recycled in WA was reprocessed within the state, with most of the remainder going to export. Interstate transfer was a small component (Table 1-4).

There are probably opportunities to increase the ratio of local recycling with materials such as glass, plastics and rubber.

**Table 1-4 Destination of WA sourced reprocessed materials, WA 2009–10**

Sector origin	Number of destinations	Tonnes	%
<b>Western Australia</b>	66	1700 284	64
<b>Interstate</b>	11	77 219	3
<b>Export</b>	Unknown	875 566	33
<b>TOTAL</b>	<b>77</b>	<b>2653 068</b>	<b>100</b>

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 recycling. 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.

## 1.6 Waste generation and diversion

Landfill data for the metropolitan area during 2009–10 was provided by WA Department of Environment and Conservation. Based on population data for metropolitan and non-metropolitan regions of WA, this data was extrapolated to estimate the total quantity of waste sent to landfill in WA. Data for both the metropolitan area and WA are provided in Table 1-5

The 2009–10 metropolitan diversion rate of 40.6% represents an increase of approximately 19% compared with that recorded for 2008–09. This is up from the 1.8 million tonnes reported for 2008–09.

Waste diversion is a measure of what proportion of material reaching end of life is recycled rather than disposed. While the diversion rate recorded in WA during 2009–10 improved significantly from that recorded the previous year, it still lags well below that achieved in some other states.

The highest recorded recycling quantities, by weight were concrete (759 301 tonnes), steel (non-packaging) (411 665 tonnes) and sand, soil, clean fill, rubble (324 553 tonnes) respectively.

**Table 1-5 Annual recycling and overall waste diversion**

	2008–09		2009–10		08-09 to 09–10
	Metro area	WA	Metro area	WA	Metro area change
Diversion from landfill (tonnes)	1 580 183	1 832 155	2 355 047	2 653 068	49%
Waste to landfill (tonnes)	3 041 556 <sup>1</sup>	4 752 431 <sup>2</sup>	3 451 538 <sup>1</sup>	5 393 028 <sup>2</sup>	13%
Total waste generation (tonnes)	4 621 740	6 584 587	5 806 585	8 046 096	26%
<b>Diversion rate</b>	34.2%	27.8%	40.6%	33.0%	19%
Population <sup>3</sup>	1 431 616	2 236 900	1 469 696	2 296 400	3%
Per capita diversion (kg/person)	1 104	819	1 602	1 155	45%
Per capita landfill (kg/person)	2 125	2 125	2 348	2 348	11%
Per capita total waste (kg/person)	3 228	2 944	3 951	3 504	22%

1. Metropolitan landfill data provided by Department of Environment and Conservation, Waste Management Branch.
2. Extrapolated from metropolitan landfill data based on the ratio of metropolitan to non-metropolitan WA population.
3. Population as at 30 June 2009 (2008–09 data) and 2010 (2009–10) data. From ABS, Publication 3101.0–Australian Demographic Statistics.

Figure 1-Figure 1-7 shows total recycling for each material category for of the 2009–10 financial year.

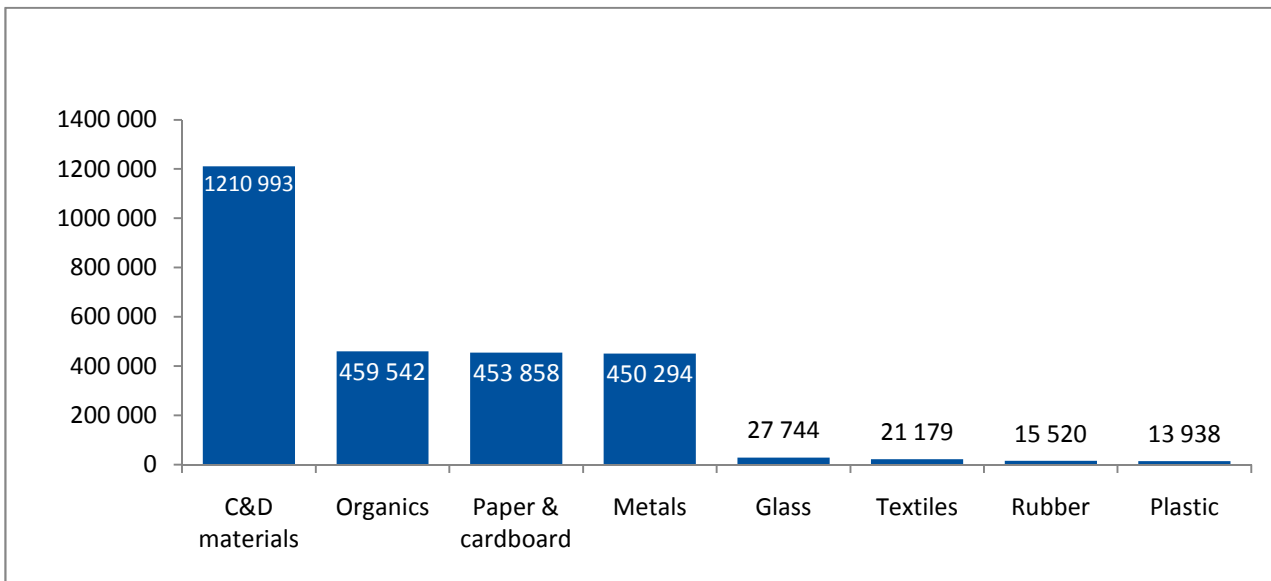


Figure 1-7 Total recycling by material category, WA 2009–10

## 2 Recycling industry in Western Australia

### 2.1 Employment in the recycling sector

Reprocessors were asked to provide the number of full-time equivalent (FTE) employees engaged in recycling activities within their company during the 2009–10 financial year. Approximately 82% of reprocessors surveyed by Hyder responded to this question, reporting 419 FTE employees engaged in recycling in WA. An additional 41 FTE employees were reported by interstate reprocessors of WA sourced material.

These figures do not however include those employees engaged in plastics or organics recycling, as this data is obtained from third parties, who do not collect employment data. Furthermore, these figures represent employment associated with recycling activities only, and does not therefore include collection, sorting, and downstream use of reprocessed materials.

Based on the number of tonnes reported by reprocessors that supplied employee data, a pro-rata calculation was applied to the total tonnes reprocessed in WA during 2009–10, including organics and plastics recycling activity. This gives an employment figure of approximately 552 FTEs for all reported recycling activity during 2009–10. As plastic recycling is more labour intensive than other materials, this figure is likely to be an understating of total employment.

As reuse of products / materials is not a feature of this survey, the employment of people in activities such as clothing and e-waste resale and reuse, brick cleaning and building products reuse are not included. The reuse sector is highly employment intensive and there may be several thousand people working in this sector.

The collection and sorting of material for recycling is also a large employment sector with over 1000 FTE employees estimated.

### 2.2 Estimated annual turnover

Reprocessors surveyed by Hyder were also asked to provide an estimate of their turnover associated with recycling activities during the 2009–10 financial year. As this is considered commercially sensitive information by many businesses, the response rate to this question was relatively low, at approximately 38.5%. Turnover reported by WA-based reprocessors totalled \$201,457,000 for 2009–10, with an additional \$21,500,000 reported by interstate reprocessors of WA sourced material.

As is the case for employment data, these figures do not include turnover for plastics or organics reprocessors, as data for these materials is obtained from third parties, which do not collect turnover data. Furthermore, these figures relate to turnover associated with the mechanical recycling process only, and do not therefore include turnover generated by the collection, sorting, downstream use of reprocessed materials, etc.

Based on the number of tonnes reported by reprocessors that supplied estimated annual turnover, a pro-rata calculation was applied to the total tonnes reprocessed in WA during 2009–10. This gives an annual turnover of approximately \$327,047,500 for all surveyed recycling businesses.

## 2.3 Gate fees by material category

Data was sought on the gate fees charged, or payments made for material presented for recycling. These fees vary widely depending on geographic location, material quality and seasonal market volatility. For example, there are more than 10 material categories for aluminium and the market value of each changes daily.

The gate fees outlined in Table 2-6 represent a range of fees / payments and a more accurate typical figure is provided where possible. Fees are listed as a negative payment.

**Table 2-6 Range of gate fees / payments by material type, WA 2009–10**

Material category	Range of gate fees / payments	Average gate fee / payment
C&D materials	Reprocessors pay up to \$275 per tonne of bricks. Reprocessors charge between \$10 and \$30 per tonne for other C&D materials.	Average gate fee for C&D materials is \$20 per tonne
Organics	Materials are accepted by reprocessors at no cost.	
Metals	Reprocessors pay between \$40 and \$280 per tonne for steel and between \$1000 and \$1600 per tonne for non-ferrous metals (including aluminium).	Average payment of \$180 per tonne for steel. Average payment of \$1400 per tonne for non-ferrous metals.
Paper & cardboard	Reprocessors pay between \$0 and \$140 per tonne.	Average payment of \$100 per tonne, depending on quality and location
Textiles	Materials are accepted by reprocessors at no cost.	
Glass	Reprocessors pay between \$0 to \$45 per tonne	Average payment of \$30 per tonne.
Plastics	Data not available	
Rubber	Reprocessors charge between \$150 and \$170 per tonne.	Average gate fee of \$155 per tonne.

### 3 Sorting facilities data

Materials collected for recycling, especially those from the municipal and C&I sectors are often sent to material recycling facilities (MRFs) for sorting prior to recycling. Over 137 000 tonnes of the materials collected for recycling in WA during 2009–10 were reported as being processed at MRFs (Table 3-7). This figure excludes sorting losses, which totalled approximately 34% in 2009–10. Losses can take two forms: recyclable materials that were unable to be sorted, and non-recyclable contaminants. The latter form is the most significant source of losses at MRFs.

**Table 3-7** Material processed & recycling losses from material recycling facilities, WA 2009–10

	Tonnes	%
<b>Material processed (tonnes)</b>	137 010	66
<b>Recycling losses (recyclable)</b>	19 094	14
<b>Recycling losses (non-recyclable)</b>	28 837	21
<b>Total losses</b>	47 931	34

## 4 Construction and demolition materials

### 4.1 Quantity recycled and recycling location

The C&D material recycling data presented in this report has been provided by reprocessors. It includes asphalt, bricks, concrete, sand, soil, clean fill and rubble. Note; this material category does not include fly ash.

Over 1.2 million tonnes of C&D materials were collected for recycling during 2009–10 (Table 4-8). The quantity of each C&D material type is presented in Table 4-8 and Figure 4-. More than 62% of C&D materials recycled was concrete. This material was recycled primarily through commercial collections, direct drop-offs and at transfer stations (e.g. skips and bins).

**Table 4-8 C&D materials recycling, WA 2009–10**

Material	Net recycling <sup>1</sup>		Recycling location	
	(tonnes)	WA	Interstate	Export
Asphalt	115 090	115 090	0	0
Bricks	12 050	12 050	0	0
Concrete	759 301	759 301	0	0
Sand, soil, clean fill & rubble <sup>2</sup>	324 553	324 553	0	0
<b>TOTAL</b>	<b>1210 993</b>	<b>1210 993</b>	<b>0</b>	<b>0</b>

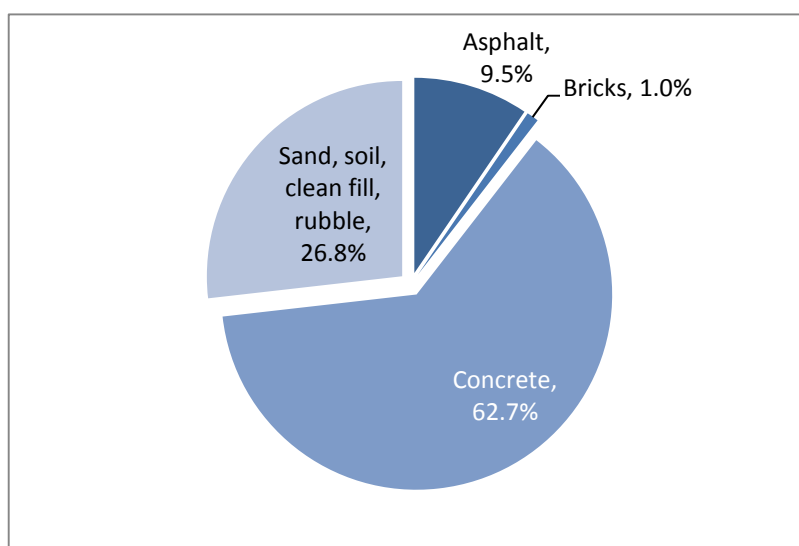
1. Net recycling excludes recycling losses.

2. The 'sand, soil, clean fill & rubble' material type only relates to material that has been diverted from landfill.

Asphalt and brick recycling declined during 2009–10, by 31% and 23% respectively. This is likely due to a reclassification of mixed loads containing asphalt and bricks as concrete. By contrast, concrete recycling increased by 121% during 2009–10, likely due to a greater willingness of the market to accept a blend of materials in road base mixes and other engineering applications.

The impact of the landfill levy on C&D materials recycling is hard to quantify. The increase in C&D recycling can, in part, be seen as a result of the levy. On the other hand, C&D waste to landfill also increased during 2009–10. There therefore seems to have been a reclassification of other sector waste as C&D material or capture of material not previously registered as waste. It is also known that the cost of the landfill charge has not risen in line with the levy, with some operators choosing to absorb part of the levy impact by reducing their margins.

There is an ongoing debate about the definition of the use of sand and soils for land reclamation and whether this constitutes recycling. A view was also expressed that material that is deposited in a separate cell of a landfill could be classified as recycling. This definition was not used in this survey.



**Figure 4-8 Composition of recycled C&D materials (by weight), WA 2009-10**

With the exception of a relatively small amount of sand, soil, clean fill and rubble generated by the C&I sector, all C&D materials were derived from the C&D sector (Figure 4-8).

**Table 4-9 C&D material recycling (by source sector), WA 2009-10**

Material	Municipal	C&I	C&D	Total
Asphalt	0	0	115 090	115 090
Bricks	0	0	12 050	12 050
Concrete	0	0	759 301	759 301
Sand, soil, clean fill & rubble	0	4425	320 128	324 553
<b>TOTAL</b>	<b>0</b>	<b>4425</b>	<b>1206 568</b>	<b>1210 993</b>

The only C&D material recycled during 2009-10 that was sourced from outside the metropolitan area, was a relatively small amount of concrete (Table 4-10 and Figure 4-9).

**Table 4-10 C&D material recycling (by geographic area), WA 2009-10**

Material	Metro	Non-metro	Total
Asphalt	115 090	0	115 090
Bricks	12 050	0	12 050
Concrete	744 744	14 557	759 301
Sand, soil, clean fill & rubble	324 553	0	324 553
<b>TOTAL</b>	<b>1196 437</b>	<b>14 557</b>	<b>1210 993</b>

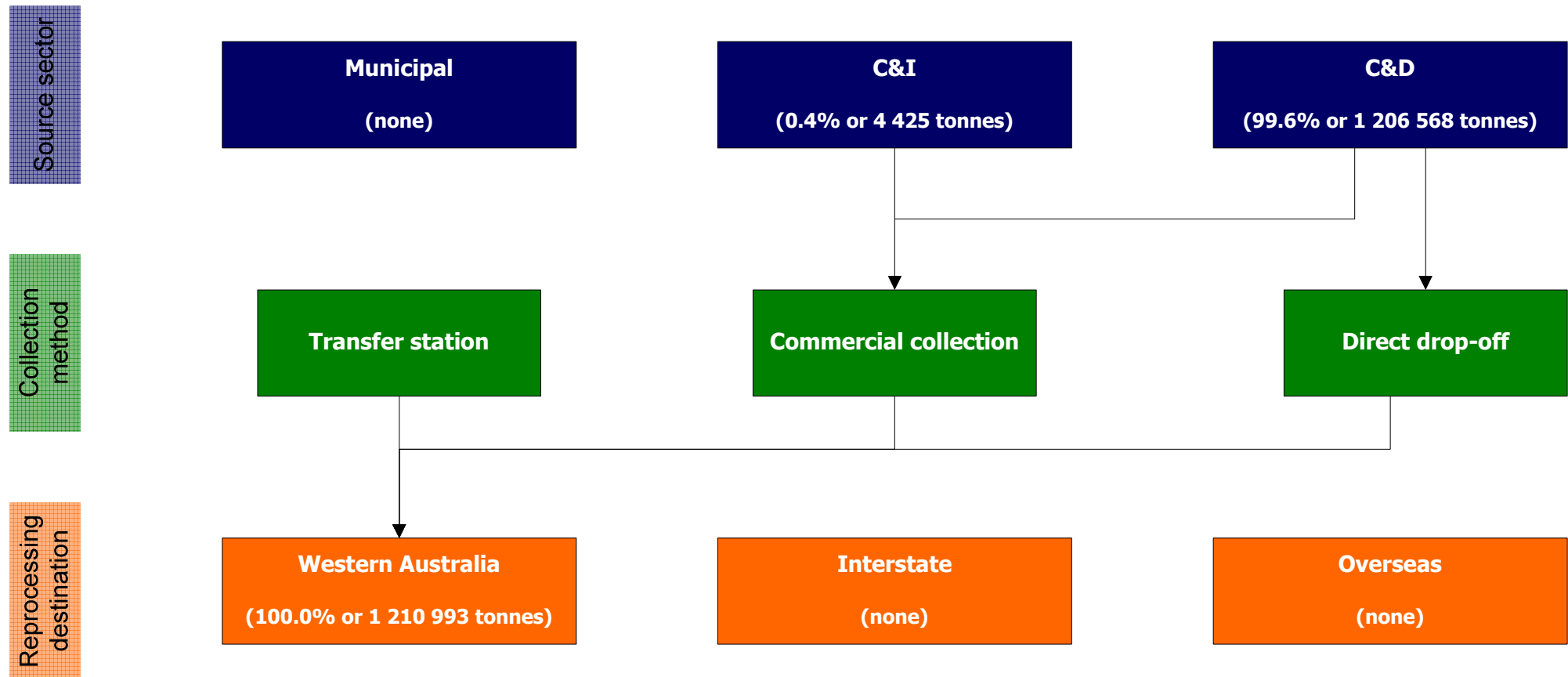
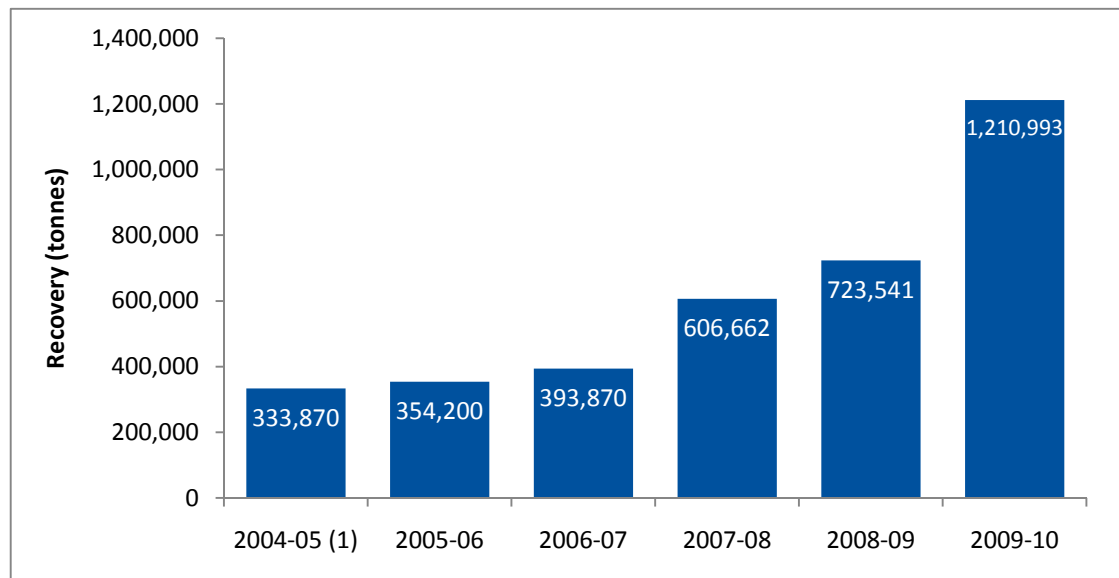


Figure 4-9 Flow of C&D material recycling, WA 2009–10

## 4.2 Recycling activity, trends and barriers

### 4.2.1 Trends

Figure 4-10 presents the annual C&D materials recycling data for WA for the period 2004-05 to 2009-10. The recycling of C&D materials increased significantly during 2009-10, showing the largest increase of all material categories during this period.



**Figure 4-10 Annual C&D materials recycling, WA 2009-10**

1. Includes whole bricks, excluded from later studies as these are deemed to be for reuse

Note: Only aggregated annual recycling figures are presented in this chart as consistent material types were not reported throughout the period represented

Increased recycling recorded for C&D materials was mirrored by an increase in the landfilling in the C&D sector, from 1.5 million tonnes in 2008-09 to 2 million tonnes in 2009-10. Recycling of C&D materials during the survey period, however, was varied, with some materials recycled in smaller quantities than during the previous year (asphalt and bricks) and some showing a significant increase in recycling (concrete and sand, soil, clean fill and rubble). Recycling activity reported by individual reprocessors was also variable during 2009-10, with some reprocessors reporting significant increases in material reprocessed, while others handled less material compared with the previous year.

The C&D sector fluctuates considerably with economic activity and market demand. It is also very affected by transport and disposal costs, which in turn is strongly related to the distance between generation and waste disposal and recycling facilities. The recycling industry is located largely in the eastern areas of the Perth metropolitan area, with much C&D activity occurring in the northern and southern areas, where waste disposal facilities are closer.

The continued growth in concrete recycling reflects the increased willingness of contractors to use this material in road base, especially since the release of the modified Main Roads WA Specification 501 in September 2007. This specification sets out the requirements for materials, including recycled concrete, used in pavement construction. The landfill levy for inert wastes also increase from \$3/m<sup>3</sup> to \$12/m<sup>3</sup> on 1 January 2010, which also helped drive increased recycling of concrete during 2009-10. This was confirmed by reprocessors.

Table 4-11 shows C&D materials recycling by material type for the period 2004–05 to 2009–10. Note, the asphalt and concrete quantities reported for 2005–06 and 2006–07 represent combined quantities for the two materials.

**Table 4-11 Summary C&D materials recycling, WA 2004-05 to 2009–10**

Material	2004–05	2005–06	2006–07	2007–08	2008-09	2009-10
Asphalt	N/A			136 669	166 896	115 090
Concrete	82 450	89 040	102 260	265 603	344 035	759 301
Bricks	103 110 <sup>1</sup>	71 020 <sup>1</sup>	76 890 <sup>1</sup>	13 918	15 684	12 050
Clays, fines, rubble & soil	143 240 <sup>2</sup>	183 280 <sup>2</sup>	214 720 <sup>2</sup>	190 472	196 925	324 553
<b>TOTAL</b>	<b>328 800</b>	<b>354 200</b>	<b>393 870</b>	<b>606 662</b>	<b>723 541</b>	<b>1210 993</b>

1. Includes rubble and whole bricks  
2. Includes sand only

## 4.2.2 Barriers

The following were identified by the C&D recycling industry as some of the barriers to increasing recycling rates:

- the relatively low cost of landfilling and low rate of the landfill levy
- some landfills absorbing the impact of the landfill levy
- continued market resistance to reprocessed materials, especially during the design phase
- competition with reprocessors producing low-grade reprocessed materials
- reluctance of demolition contractors and builders to send materials for recycling
- storage capacity limitations on sites.

## 4.3 Market size and strength

The specification for road base use has provided a strong market outlet for higher quality reprocessed C&D materials. There is some concern that material being crushed in a manner that is not specification compliant could damage the reputation for recycled aggregate and under-cut quality material.

The major challenge for reprocessors is still the ability to get material redirected from landfill for recycling. In this respect, the volume based landfill levy was seen as inadequate and at least one major operator has departed the industry. Demand for material has increased on major projects and this often tests the ability of the sector to provide material in sufficient quantities over a short timeframe. Contributing to this is the low level of stockpiled material due to storage capacity limitations on sites.

The competition on price against quarried material is largely one of geography, with recycled aggregate able to compete more effectively where it has a transport advantage.

The demands of the market can result in more to blending of brick and asphalt material and this is seen in the relative quantities of recycling of these materials.

# 5 Organics

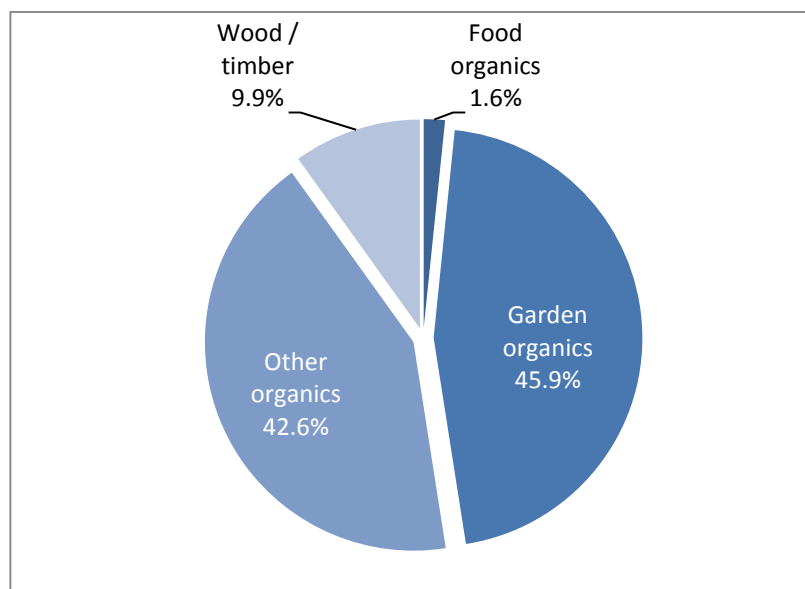
## 5.1 Quantity recycled and recycling location

The organics recycling data presented in this report has been provided by Compost Australia (CA). CA undertakes an annual Organics Industry Survey of organics reprocessors across WA, NSW, Victoria and SA. In addition, wood / timber recycling data has been provided separately by the C&D industry.

Approximately 460 000 tonnes of organic material was collected for recycling in WA during 2009–10 (Table 5-12). Garden organics and other organics each made up over 40% of organics recycling during this period, followed by wood/timber, with less than 2% made up of food organics (Figure 5-11Figure 5-).

**Table 5-12 Organics recycling, WA 2009-10**

Material	Net recycling (tonnes)	Recycling location		
		WA	Interstate	Export
Food organics	7 453	7 453	0	0
Garden organics	210 965	210 965	0	0
Other organics	195 571	195 571	0	0
Wood / timber	45 553	40 470	5 083	0
<b>TOTAL</b>	<b>459 542</b>	<b>454 459</b>	<b>5 083</b>	<b>0</b>



**Figure 5-11 Composition of recycled organics (by weight), WA 2009-10**

Garden organics are currently recovered through kerbside collection systems in a limited number of Perth municipalities, as well as drop off sites at transfer stations and direct delivery 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 shredders

and 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 generated from manufacturing processes and building construction sites.

The "other organics" category primarily consists of the organics fraction recovered from general municipal waste (87% by weight), which would be mostly garden waste. A smaller quantity of other miscellaneous organics as well as oils, grease trap waste and sludges are also included in the "other organics" category. The breakdown of organics recycling by source sector and material type is presented in Table 5-14 and Figure 5-.

In addition to the organic materials presented in Table 5-12, there are a number of other organics materials collected for recycling that were not included in the recycling rate for WA (Table 5-13). As these materials are related to primary industry and are not traditionally sent to landfill, their collection for recycling does not represent a diversion from landfill and they were therefore excluded from recycling calculations. This is consistent with the method adopted in other states.

**Table 5-13 Additional organic materials collected for recycling, WA 2009-10**

<b>Material</b>	<b>(tonnes)</b>
Forestry waste	151 260
Agricultural waste (excluding manures) <sup>1</sup>	33 460
Manures	26 121
Biosolids	32 100
<b>TOTAL</b>	<b>242 941</b>

<sup>1.</sup> Includes straw, animal bedding, animal mortalities, paunch and other miscellaneous agricultural organics.

As source sector and geographic data is not collected by Compost Australia, the origins of recycled organics are estimates based on industry knowledge.

As the majority of reprocessed organics consists of garden organics, over 80% of this material category is sourced from the municipal sector (Table 5-14).

**Table 5-14 Organics recycling (by source sector), WA 2009-10**

<b>Material</b>	<b>Municipal</b>	<b>C&amp;I</b>	<b>C&amp;D</b>	<b>Total</b>
Food organics	0	7453	0	7453
Garden organics	210 965	0	0	210 965
Other organics	152 545	43 026	0	195 571
Wood / timber	7840	29 873	7840	45 553
<b>TOTAL</b>	<b>371 350</b>	<b>80 352</b>	<b>7840</b>	<b>459 542</b>

The majority of food organics and garden organics recovered for recycling were collected in the metropolitan region, due to greater access to appropriate recycling facilities (Table 5-15). Materials collected for recycling in the other organics category is also largely collected in the metropolitan region, as the largest component of this category is organic MSW material reprocessed at Perth's various resource recycling facilities.

**Table 5-15 Organics recycling (by geographic area), WA 2009-10**

<b>Material</b>	<b>Metro</b>	<b>Non-metro</b>	<b>Total</b>
Food organics	6708	745	7453
Garden organics	158 224	52 741	210 965
Other organics	183 837	11 734	195 571
Wood / timber	38 085	7468	45 553
<b>TOTAL</b>	<b>386 853</b>	<b>72 689</b>	<b>459 542</b>

Figure 5- shows the flow of organics reprocessed in WA during 2009–10.

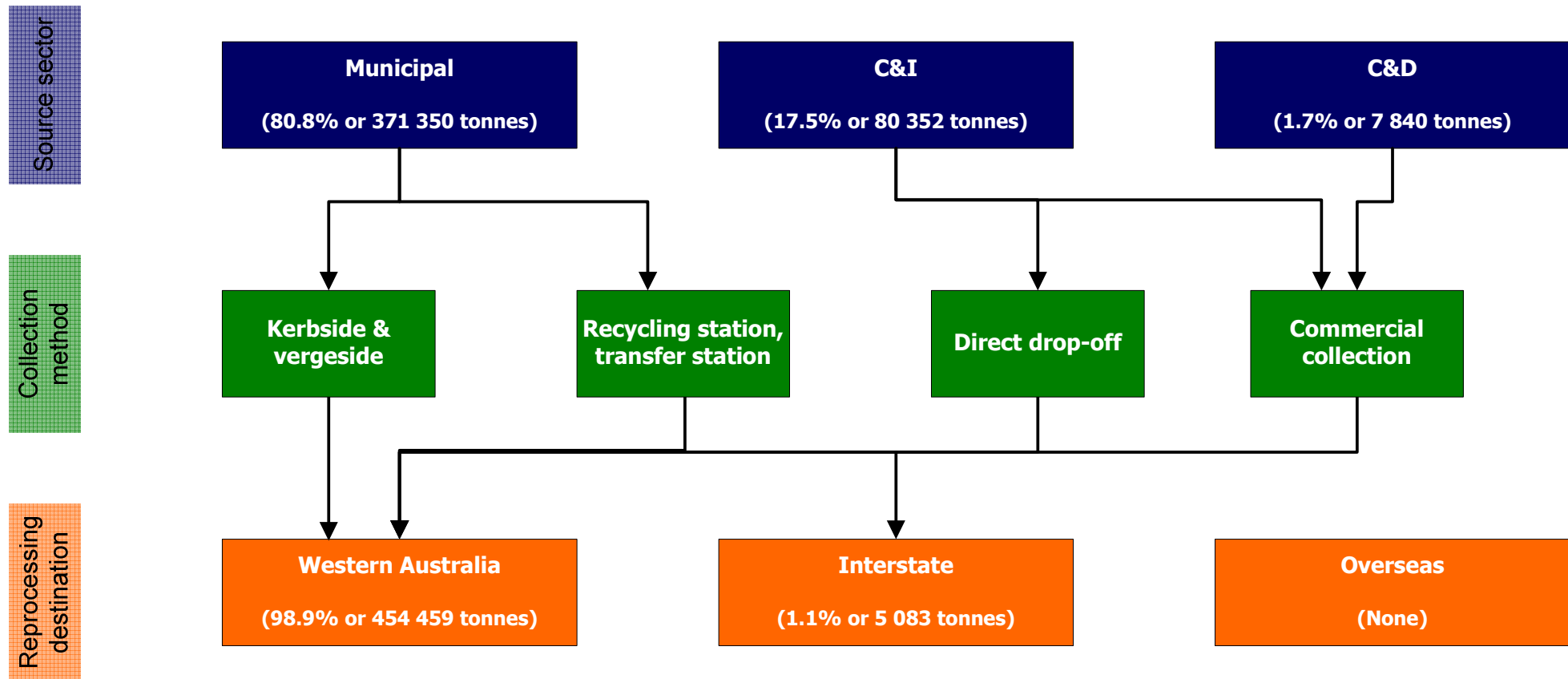
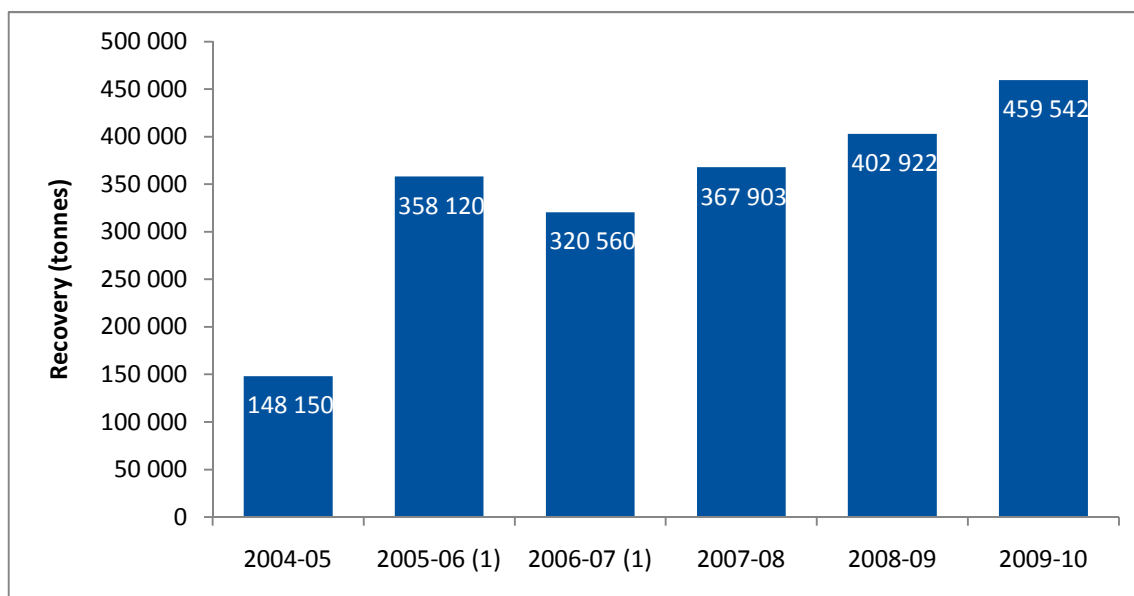


Figure 5-12 Flow of organics recycling, WA 2009–10

## 5.2 Recycling activity, trends and barriers

### 5.2.1 Trends

Annual organics recycling data for WA for the period 2004-05 through 2009-10 is shown in Figure 5-13.



**Figure 5-13 Annual organics recycling, WA 2004-05 to 2009-10**

1. Adjusted from previous reports to include only consistent categories

NB Aggregated figures are presented as data for separate material categories was not available for all reporting periods.

Organics recycling increased by approximately 14% during 2009-10, continuing the trend observed in the previous two years (Table 5-16).

**Table 5-16 Summary organics recycling, WA 2004-05 to 2009-10 (tonnes)**

Material	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Food organics				6 798	7 177	7 453
Garden organics	148 150			178 563	221 125	210 965
Other organics	N/A	358 120	320 560	158 044	157 943	195 571
Wood / timber	N/A			24 497	16 677	45 553
<b>TOTAL</b>	<b>148 150</b>	<b>358 120</b>	<b>320 560</b>	<b>367 903</b>	<b>402 922</b>	<b>459 542</b>

### 5.2.2 Barriers

The following were identified in the Compost Australia industry survey as the key barriers to increasing recycling rates:

- Industry structural economics & government incentives
- Site regulation and planning consent
- Raw materials contamination

- Product quality standards.

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.

## 6 Metals

### 6.1 Quantity recycled and recycling location

The quantity of metals recycled in WA increased during 2009–10, by over 75 000 tonnes, or 20%, to over 450,000 tonnes (Table 6-17). Steel (non-packaging) again contributed over 90% of metal recycling during 2009–10. This material was recycled primarily through commercial collections, direct drop-offs and household recycling collections (Figure 6-14Figure 6-).

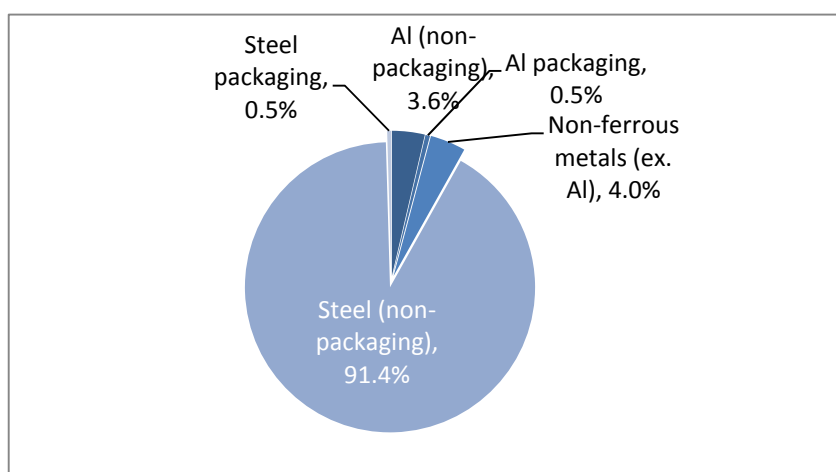
**Table 6-17 Metals recycling, WA & 2009–10**

Material	Net recycling <sup>1</sup> (tonnes)	Recycling location		
		WA	Interstate	Export
Aluminium (non-packaging)	16 404	0	766	15 638
Aluminium packaging	2289	0	210	2079
Non-ferrous metals (ex. Al) <sup>2</sup>	17 826	0	881	16 945
Steel	411 665	0	622	411 043
Steel packaging (non-packaging)	2109	0	0	2109
<b>TOTAL</b>	<b>450 294</b>	<b>0</b>	<b>2480</b>	<b>447 814</b>

1. Net recycling excludes recycling losses.

2. Primarily lead and copper.

During 2008-09 2.2% of metals recovered for reprocessing in WA were reprocessed locally. The absence of any local reprocessing reported for 2009-10 is due to the fact that there are no major metal reprocessor located in WA and any local reprocessing is carried out by small foundries based on market need.



**Figure 6-14 Composition of recycled metals (by weight), WA 2009–10**

The majority of metals (over 77%) reprocessed in WA were sourced from the C&I sector, with only 15% and 7% recycled from the C&D and municipal sectors respectively (Table 6-18).

**Table 6-18 Metals recycling (by source sector), WA 2009–10**

<b>Material</b>	<b>Municipal</b>	<b>C&amp;I</b>	<b>C&amp;D</b>	<b>Total</b>
Aluminium (non-packaging)	2138	10 925	3342	16 404
Aluminium packaging	1377	738	175	2289
Non-ferrous metals (ex. Al)	773	15 090	1963	17 826
Steel (non-packaging)	26 539	321 955	63 171	411 665
Steel packaging	1002	492	615	2109
<b>TOTAL</b>	<b>31 828</b>	<b>349 200</b>	<b>69 266</b>	<b>450 294</b>

Approximately two thirds of metal recovered for recycling in WA during 2009–10 was sourced from the metropolitan area (Table 6-19 and Figure 6-15). This ratio was fairly consistent for all material types, with the exception of non-ferrous metals and steel packaging, of which 93% and 51% originated in metropolitan WA respectively.

**Table 6-19 Metals recycling (by geographic area), WA 2009–10**

<b>Material</b>	<b>Metro</b>	<b>Non-metro</b>	<b>Total</b>
Aluminium (non-packaging)	10 850	5554	16 404
Aluminium packaging	1619	671	2289
Non-ferrous metals (ex. Al)	16 528	1298	17 826
Steel (non-packaging)	276 754	134 910	411 665
Steel packaging	1084	1025	2109
<b>TOTAL</b>	<b>306 835</b>	<b>143 459</b>	<b>450 294</b>

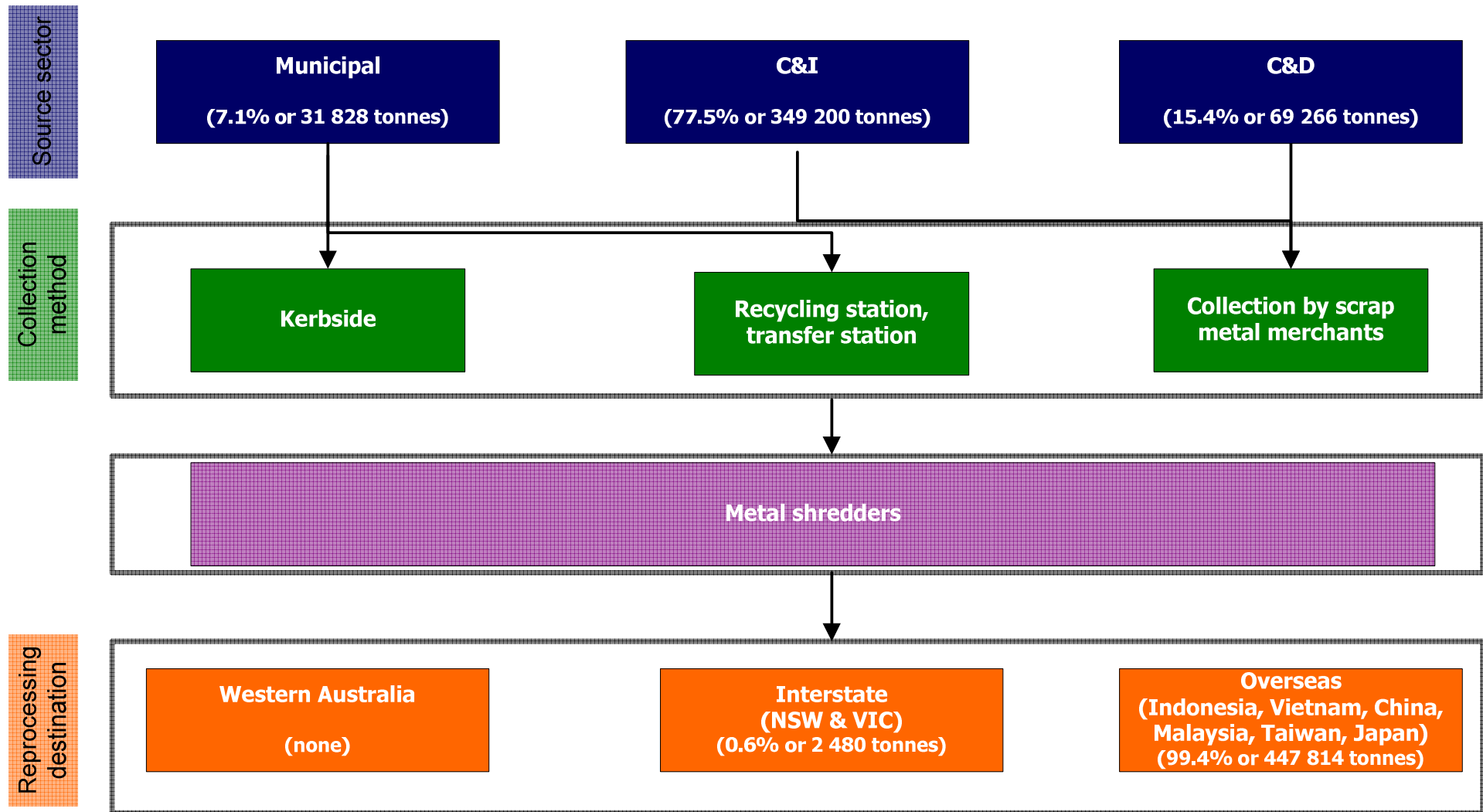


Figure 6-15 Flow of metal recycling, WA 2009–10

## 6.2 Recycling activity, trends and barriers

### 6.2.1 Trends

Presented in Figure 6-16 and Table 6-20 is the annual metals recycling data for WA for the period 2004-05 to 2009-10. Metals recycling during 2009-10 made up much of the ground lost during the previous year. The global financial crisis severely restricted the metals market during 2008-09 and the subsequent recycling reflects increased demand for these materials as the world economy has begun to recover from this downturn.

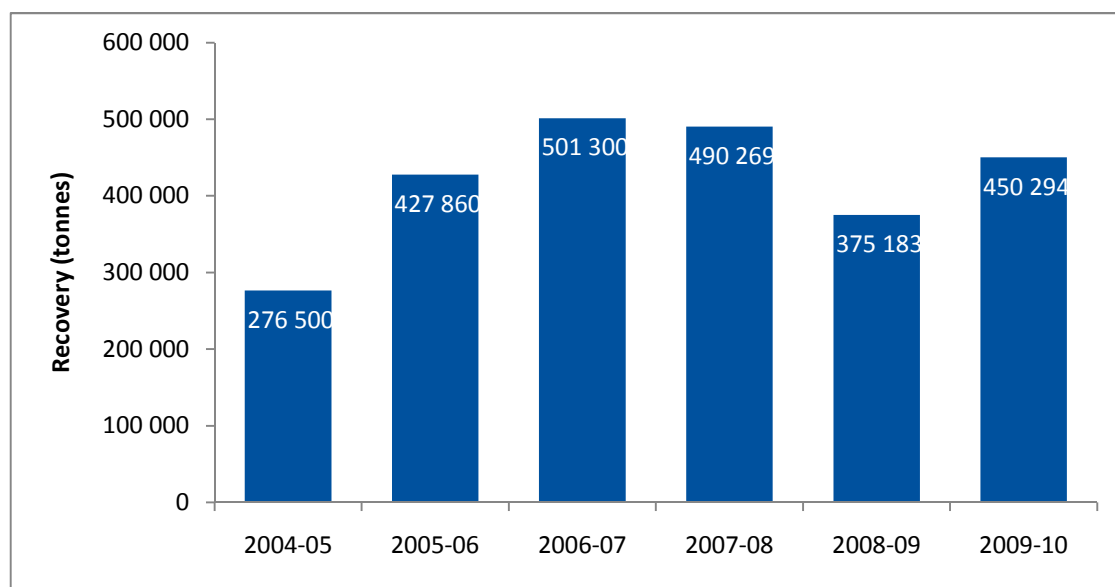


Figure 6-16 Annual metals recycling, WA 2004-05 to 2009-10

Table 6-20 Summary metals recycling, WA 2004-05 to 2009-10

Material	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Aluminium (non-packaging)	16 510	13 270	13 910	20 677	15 310	16 404
Aluminium packaging	2 470	1 390	1 700	2 023	2 109	2 289
Non-ferrous metals (ex. Al)	18 650 <sup>1</sup>	16 580 <sup>1</sup>	27 230 <sup>1</sup>	15 815	12 621	17 826
Steel (non-packaging)	237 900	393 190	457 460	447 145	341 118	411 665
Steel packaging	970	3 430	1 000	4 609	4 026	2 109
<b>Total</b>	<b>276 500</b>	<b>427 860</b>	<b>501 300</b>	<b>490 269</b>	<b>375 183</b>	<b>450 294</b>

<sup>1.</sup> Includes batteries

## 6.2.2 Barriers

The following were identified by the metal recycling industry as some of the barriers to increasing recycling rates:

- strong value of the Australian dollar
- competition for source materials
- fluctuations in demand.

## 6.3 Market size and strength

The market for metals is one in which prices paid are strongly linked to the London metal price. At this point in time, prices paid for steel and non-ferrous metals are buoyant.

The throughput of recycling is however, not dictated by metal prices, but is linked to generation of scrap material within the state as well as global market demand. The recycling in the metals market post-GFC has resulted in more scrap availability and strong market outlets. The competition in the market for scrap is very strong.

# 7 Paper and cardboard

## 7.1 Quantity recycled and recycling location

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

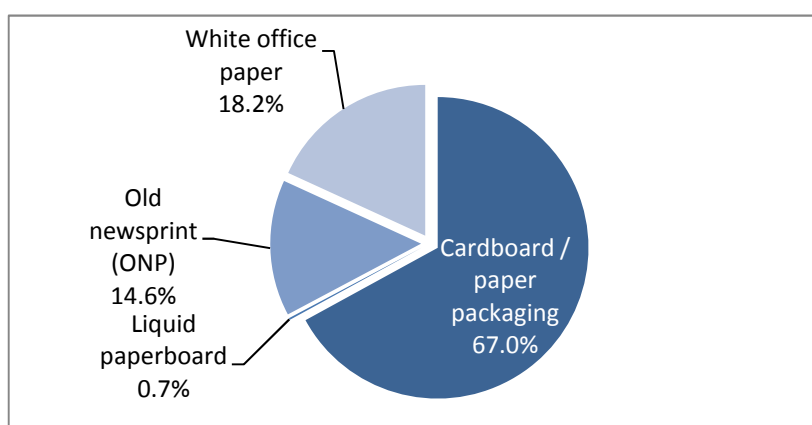
Paper and cardboard recycling increased significantly during 2009–10, by almost 100% to over 450 000 tonnes (Table 7-21). Recycling activity of individual materials however, was variable. While liquid paperboard and old newsprint recycling remained relatively stable, cardboard/paper packaging and white office paper recycling increased significantly. These materials were recycled through both commercial and household recycling collections. As paper is often collected and reprocessed in a mixed form, care should be taken in assessing fluctuations between paper grades.

**Table 7-21 Paper & cardboard recycling, WA 2009–10**

Material	Net recycling <sup>1</sup>		Recycling location	
	(tonnes)	WA	Interstate	Export
Cardboard / paper packaging	304 286	0	0	304 286
Liquid paperboard (LPB)	750	0	0	750
Old newsprint (ONP)	66 349	0	18 578	47 771
White office paper	82 473	0	24 444	58 029
<b>TOTAL</b>	<b>453 858</b>	<b>0</b>	<b>43 022</b>	<b>410 836</b>

<sup>1</sup>. Net recycling excludes recycling losses.

Most of the additional paper and cardboard recycled for recycling during 2009–10 was exported for recycling, with a relatively small proportion sent interstate (Table 7-21). The large increase in export has been confirmed by customs, but the reason for the increase is not known.



**Figure 7-17 Composition of recycled paper & cardboard (by weight), WA 2009–10**

The breakdown of paper and cardboard recycling by source sector and material type is presented in Table 7-22 and Figure 7-17. Most of the additional paper and cardboard recycled during 2009–10 was sourced from the C&I sector, with over 77% sourced from this sector in total.

**Table 7-22 Paper & cardboard recycling (by source sector), WA 2009–10**

Material	Municipal	C&I	C&D	Total
Cardboard / paper packaging	35 260	266 906	2 120	304 286
Liquid paperboard (LPB)	750	0	0	750
Old newsprint (ONP)	55 733	10 616	0	66 349
White office paper	7 617	74 856	0	82 473
<b>TOTAL</b>	<b>99 360</b>	<b>352 378</b>	<b>2 120</b>	<b>453 858</b>

More than 85% of paper and cardboard collected for recycling in WA during 2009–10 was sourced from the metropolitan area (Table 7-23 and Figure 7-18Figure 7-).

**Table 7-23 Paper & cardboard recycling (by geographic area), WA 2009–10**

Material	Metro	Non-metro	Total
Cardboard / paper packaging	261 100	43 187	304 286
Liquid paperboard (LPB)	638	113	750
Old newsprint (ONP)	49 762	16 587	66 349
White office paper	79 585	2 888	82 473
<b>TOTAL</b>	<b>391 084</b>	<b>62 774</b>	<b>453 858</b>

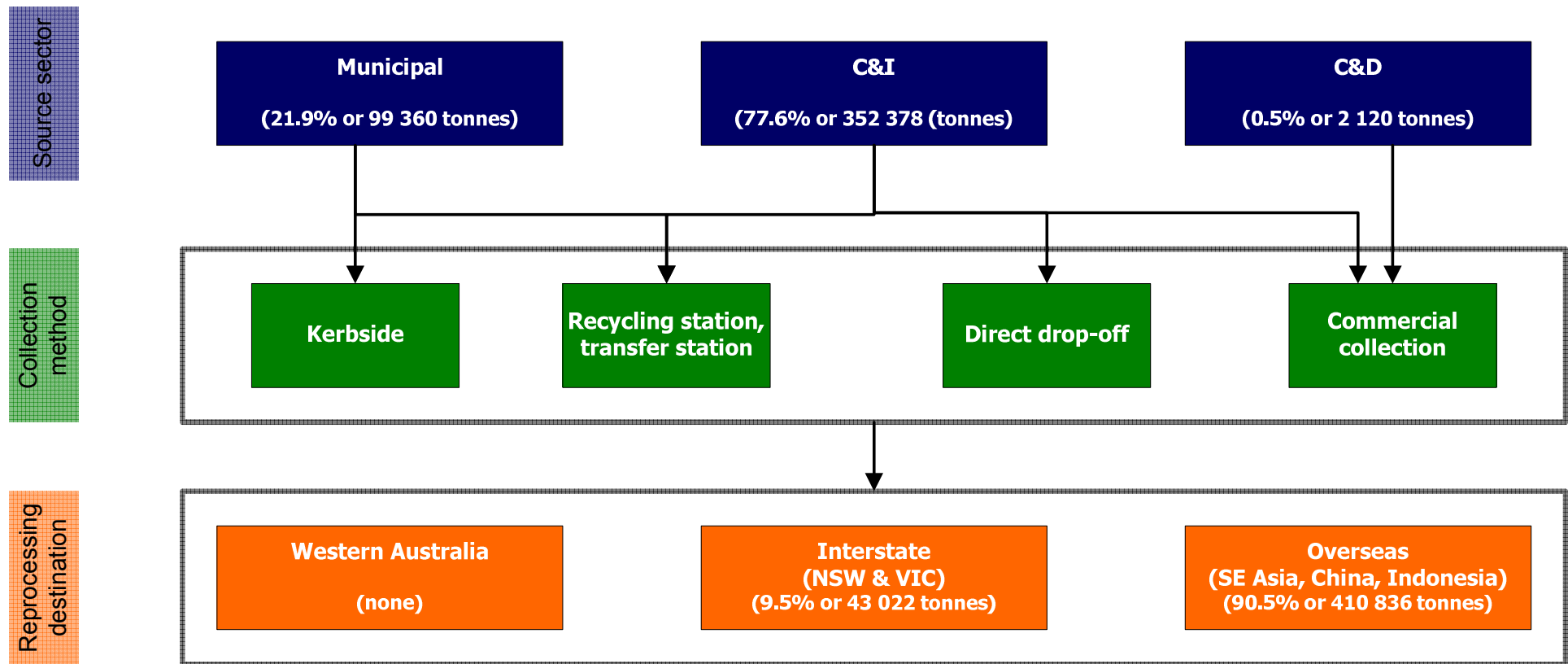


Figure 7-18 Flow of paper & cardboard recycling, WA 2009–10

## 7.2 Recycling activity, trends and barriers

### 7.2.1 Trends

Presented in Figure 7-19 and Table 7-24 is annual paper and cardboard recycling data for WA for the period of 2004-05 through to 2009-10.

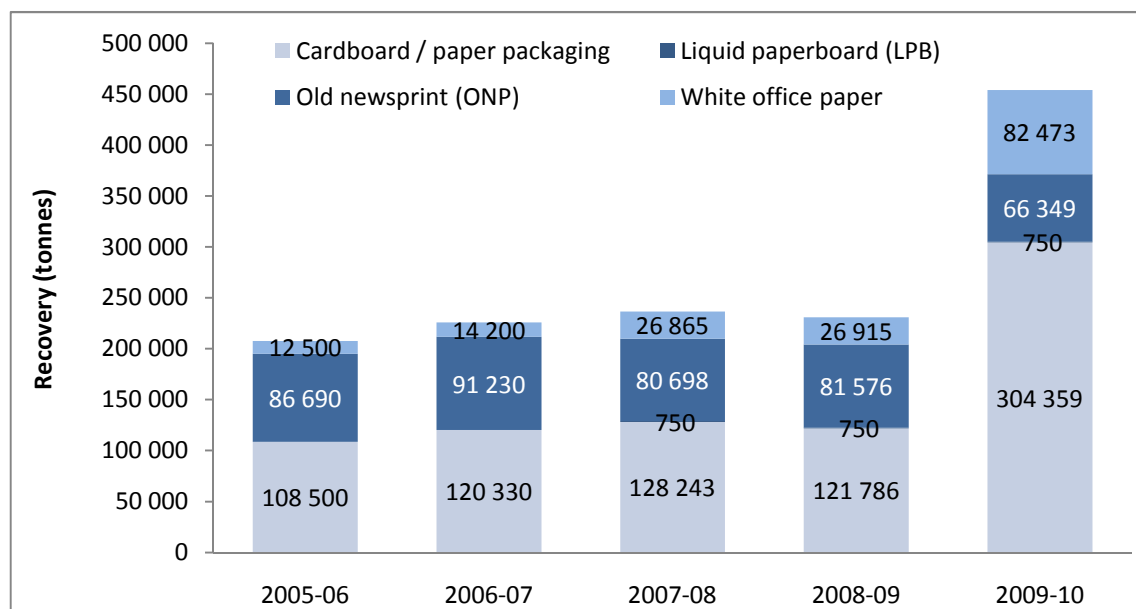


Figure 7-19 Annual paper & cardboard recycling, WA 2004-05 to 2009-10

Cardboard and paper packaging recycling increased significantly during 2009-10, and was by far the highest quantity recorded since 2005-06 (Table 7-24). Caution should be taken when interpreting the increase in paper and cardboard recycling recorded during 2009-10. Data for the following financial year will confirm whether the dramatic increase is an ongoing trend.

Table 7-24 Summary paper & cardboard recycling, WA 2004-05 to 2009-10

Material	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Cardboard / paper packaging	91 060 <sup>1</sup>	108 500 <sup>1</sup>	120 330 <sup>1</sup>	128 243	121 786	304 286
Liquid paperboard (LPB)	N/A	N/A	N/A	750	750	750
Old newsprint (ONP) (including directories)	74 640	86 690	91 230	80 698	81 576	66 349
White office paper	20 120	12 500	14 200	26 865	26 915	82 473
<b>TOTAL</b>	<b>185 820</b>	<b>207 690</b>	<b>225 760</b>	<b>236 556</b>	<b>231 027</b>	<b>453 858</b>

<sup>2.</sup> Includes mixed paper

## 7.2.2 Barriers

The following were identified by the paper and cardboard recycling industry as some of the barriers to increasing recycling rates:

- storage capacity limitations on sites
- end to the federal Government insulation rebate scheme.

## 7.3 Market size and strength

WA has no significant local market outlet for paper and cardboard, with all material going into interstate or export markets. Old newsprint and white office paper are the only grades that are sent for recycling within Australia (28% and 30% respectively).

The global market for all paper grades was strong during 2009–10. Most material is exported to mills in Malaysia and Indonesia. Market demand for insulation has dropped, although this is only a relatively small outlet for recycled paper.

There are no present inhibitors to increased export of paper.

## 8 Textiles

### 8.1 Quantity recycled and recycling location

The quantity of textiles recycled in WA and the location of recycling, during 2009–10, is presented in Table 8-25.

**Table 8-25 Textiles recycling, WA 2009–10**

Material	Net recycling (tonnes)	Recycling location		
		WA	Interstate	Export
Textiles	21 179	18 670	0	2 509

1. Net recycling excludes recycling losses.

The breakdown of textiles recycling by source sector is presented in Table 8-30. Most textiles reprocessed were sourced from the municipal sector, as most material is sourced from donated clothing.

**Table 8-26 Textiles recycling (by source sector), WA 2009–10**

Material	Municipal	C&I	C&D	Total
Textiles	20 409	770	0	21 179

All textiles recovered for recycling during 2009–10 were sourced from the metropolitan area (Table 8-27).

**Table 8-27 Textiles recycling (by geographic area), WA 2009–10**

Material	Metro	Non-metro	Total
Textiles	21 179	0	21 179

## 8.2 Recycling activity, trends and barriers

### 8.2.1 Trends

Presented in Figure 8-20 is the annual textiles recycling data for WA for the period 2004-05 to 2009-10. Textiles recycling during 2009-10 was significantly lower than that undertaken during the previous two years. This is possibly due to increased competition with imported rags, as it is difficult for local reprocessors to compete with the low labour costs in some international markets, particularly in Asia.

The dramatic increase reported in 2007-08 is largely due to a larger number of responses from textiles reprocessors.

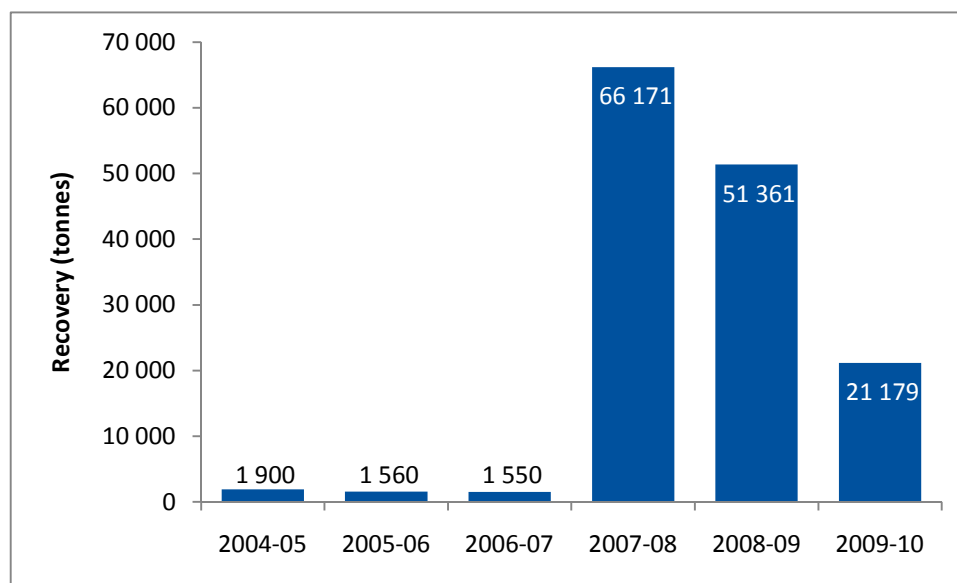


Figure 8-20 Annual textiles recycling, WA 2004-05 to 2009-10

### 8.2.2 Barriers

The following were identified by the textiles recycling industry as some of the barriers to increasing recycling rates:

- low cost of imported rags outcompeting locally produced rags
- issues with collection systems, for example damage to collection bins and restrictions on bin placement.

## 8.3 Market size and strength

Reprocessors commonly reported that the availability of textiles for recycling during 2009-10 was stable, but dependant on seasonal and economic trends. However, reprocessors agreed less strongly on the strength of demand for reprocessed textiles.

The reduction in tonnes of textiles reprocessed indicates the impact of global competition was stronger during 2009-10 than previous years.

## 9 Glass

### 9.1 Quantity recycled and recycling location

The quantity of glass recycled in WA and the location of recycling, during 2009–10, is presented in Table 9-28. Total glass recycling was 27 744 tonnes in 2009–10.

**Table 9-28 Glass recycling, WA 2009–10**

Material	Net recycling (tonnes)	Recycling location		
		WA	Interstate	Export
Glass	27 744	8 571	19 066	107

The breakdown of glass recycling by source sector is presented in Table 9-29. Over 48% of glass collected for recycling in WA during 2009–10 was reported as being sourced from the municipal sector.

**Table 9-29 Glass recycling (by source sector), WA 2007–08 & 2009–10**

Material	Municipal	C&I	C&D	Total
Glass	13 328	5 916	8 500	27 744

The geographic source of glass collected for recycling during the survey period is outlined in Table 9-30. Over 99% of glass collected was sourced from the metropolitan area.

**Table 9-30 Glass recycling (by geographic area), WA 2009–10**

Material	Metro	Non-metro	Total
Glass	27 601	143	27 744

## 9.2 Recycling activity, trends and barriers

### 9.2.1 Trends

Presented in Figure 8-21 Figure 9- is the annual glass recycling data for WA for the period 2004-05 to 2009-10. Glass recycling in WA has continued to increase steadily over the six years for which data has been collected. Glass recycling increased slightly during 2009-10 compared with the previous year, by just over 1 000 tonnes, or 4%.

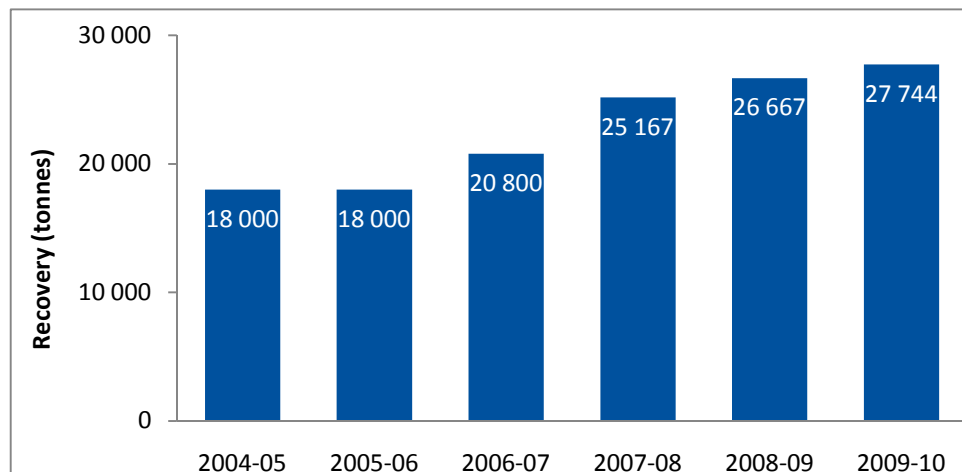


Figure 9-21 Annual glass recycling, WA 2004-05 to 2009-10

### 9.2.2 Barriers

The following were identified by the glass recycling industry as some of the barriers to increasing recycling rates:

- purchase price of source material
- cost of transportation
- continued low cost of landfill.

## 9.3 Market size and strength

The major market outlet for glass remains the beverage container manufacturing plants in South Australia. In addition, there are now significant outlets in Perth. Only a small fraction of glass is exported, due to its relatively high weight and therefore freight cost.

WA will continue to be a feeder market for recycle into glass packaging manufacture.

# 10 Plastics

## 10.1 Quantity recycled and recycling location

The plastics recycling data presented in this report has been sourced from annual Plastics and Chemicals Industries Association (PACIA) surveys of plastics reprocessors.

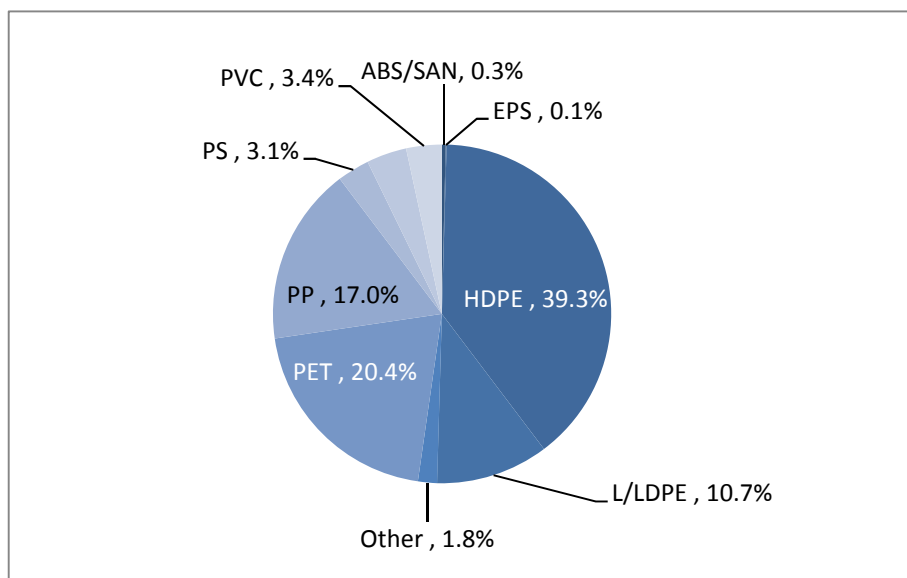
The quantity of plastics recycled in WA and the location of recycling for 2009–10 is presented in Table 10-31. Care should be taken when comparing this data with previous plastics recycling data, which was collected on a calendar year basis. Plastics recycling was 13 938 tonnes during 2009–10. Recycling was through commercial and industrial collections and municipal recycling collections.

**Table 10-31 Plastics recycling, WA 2009–10**

Material	Net recycling <sup>1</sup> (tonnes)	Recycling location		
		WA	Interstate	Export
ABS / SAN	46	46	0	0
EPS	13	4	1	8
HDPE	5 474	1 780	69	3 625
L/LDPE	1 498	463	443	592
Nylon	3	0	3	0
Other plastic	254	249	5	0
PET	2 842	160	0	2 682
PP	2 370	2 239	0	131
PS	430	161	22	247
PU	532	376	156	0
PVC	476	155	6	315
<b>TOTAL</b>	<b>13 938</b>	<b>5 633</b>	<b>706</b>	<b>7 600</b>

1. Net recycling excludes recycling losses.

HDPE was again the largest contributor to plastics recycling during 2009-10 at almost 40% of total plastics recycling, followed by PET at 20% (Figure 10-22).



**Figure 10-22 Composition of recycled plastics materials (by weight), WA 2009-10**

The breakdown of plastics recycling by source sector and material type is presented in Table 10-32 and Figure 10-23. Almost 60% of plastics reprocessed during 2009-10 were sourced from the C&I sector, with most of the remainder from municipal sources (Table 10-32).

**Table 10-32 Estimated plastics recycling (by source sector), WA 2009-10**

Material	Municipal	C&I	C&D	Total
ABS / SAN	0	45	1	46
EPS	6	7	0	13
HDPE	2 999	2 475	0	5 474
L/LDPE	330	911	258	1 498
Nylon	0	3	0	3
Other plastic	0	254	0	254
PET	1 442	1 401	0	2 842
PP	105	2 160	105	2 370
PS	189	210	31	430
PU	0	532	0	532
PVC	261	215	0	476
<b>TOTAL</b>	<b>5 330</b>	<b>8 213</b>	<b>395</b>	<b>13 938</b>

Geographic source data was not available for recycled plastics as this data is not collected as part of the PACIA survey, an estimated split was derived based on the relative population of metropolitan and non-metropolitan areas (Table 10-33 and Figure 10-).

**Table 10-33 Estimated plastics recycling (by geographic area), WA 2009–10**

<b>Material</b>	<b>Metro</b>	<b>Non-metro</b>	<b>Total</b>
ABS / SAN	35	12	46
EPS	10	3	13
HDPE	4 106	1 369	5 474
L/LDPE	1 124	375	1 498
Nylon	2	1	3
Other plastic	190	63	254
PET	2 132	711	2 842
PP	1 777	592	2 370
PS	323	108	430
PU	399	133	532
PVC	357	119	476
<b>TOTAL</b>	<b>10 454</b>	<b>3 485</b>	<b>13 938</b>

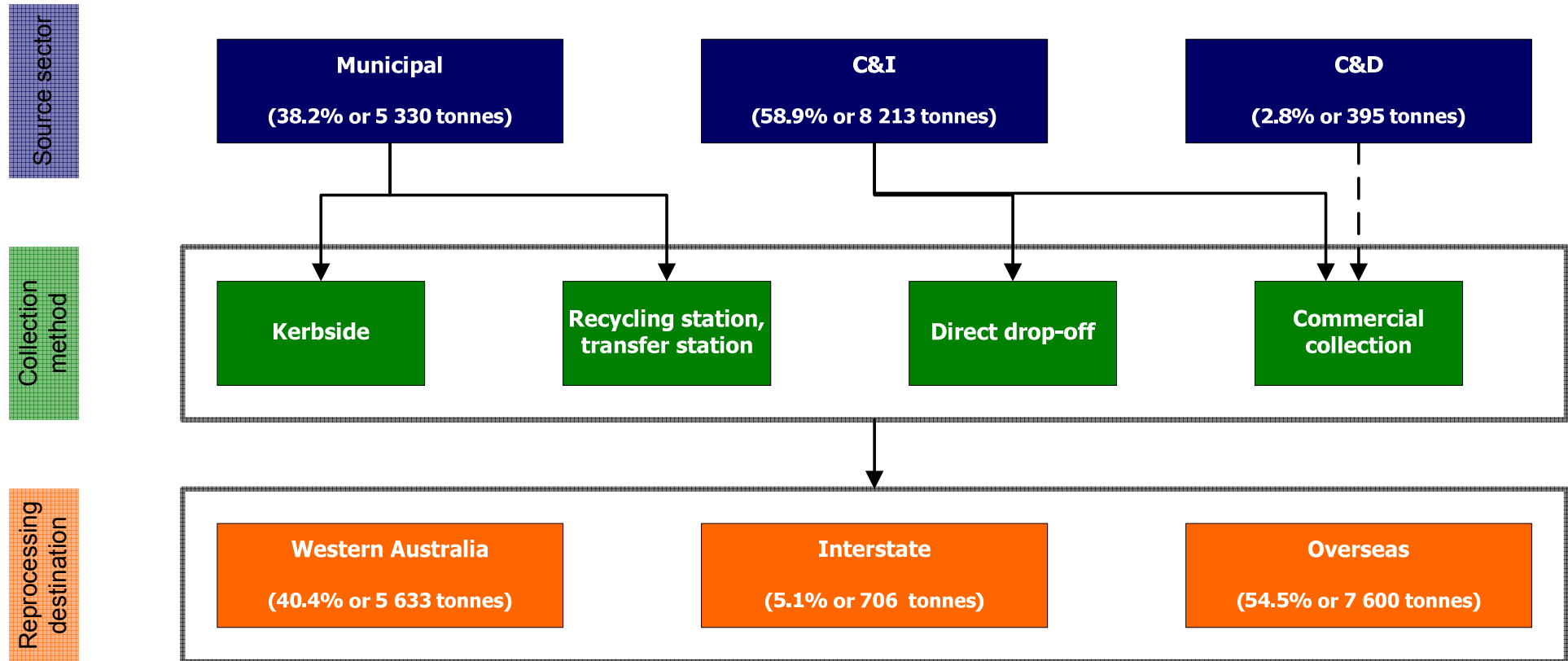


Figure 10-23 Flow of plastics recycling, WA 2009–10

## 10.2 Recycling activity, trends and barriers

### 10.2.1 Trends

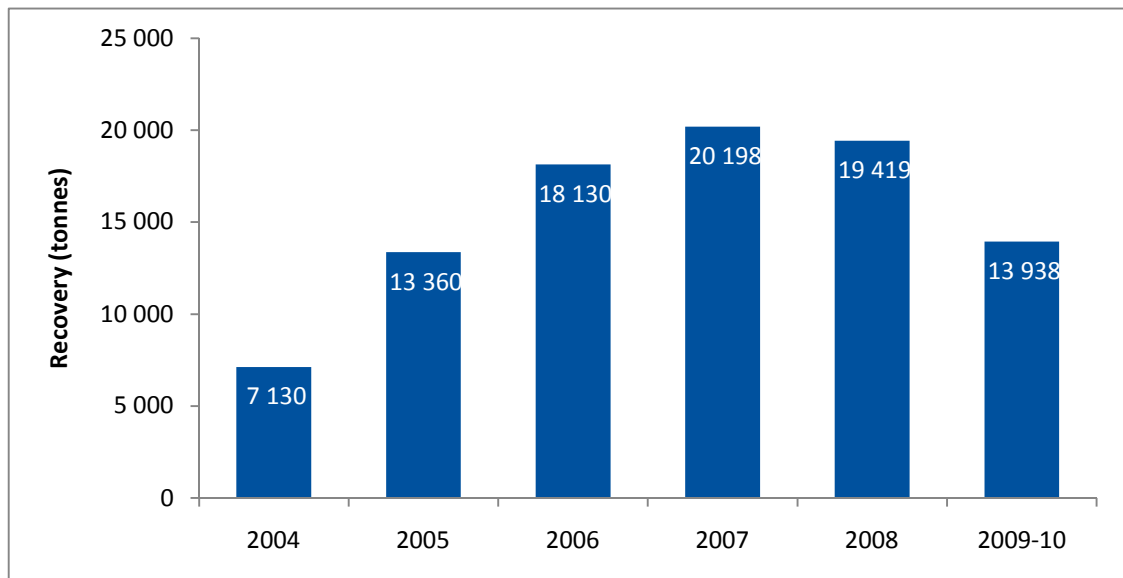
Presented in Figure 10-24 are the annual plastics recycling figures for WA for the period 2004 to 2009–10. This data shows the plastics recycling market continued to contract during 2009–10, with HDPE and LDPE again leading the downturn. Overall, plastics recycling experienced a 31% decrease from 2007, but is still slightly higher than the level of activity during 2005.

The overall WA recycling rate had increased fairly steadily between 2003 and 2007. Similarly to other states, the strong packaging recycling result in 2007 would also have been driven by the record high prices for recycle prior to the financial crisis.

WA had an average year for local recycling, with a complicating factor in that a significant WA reprocessor finished trading sometime during late 2009, and any recovery data for this business for activity during the 2009–10 year was unavailable. It is also understood that other new operators in the WA market may be temporarily stockpiling scrap plastics, however the scale of this activity was unable to be confirmed prior to the finalisation of the survey.

WA also had a poor export year in 2009–10 for used packaging, with a drop of approximately 15% in quantities from 2008; again, this may be linked to the financial crisis.

Industry sources anticipate the WA recycling rates will rebound strongly over the next couple of years.



**Figure 10-24 Annual plastics recycling, WA 2004-05 to 2009–10**

NB Only aggregated annual recycling figures are presented in this chart as consistent material types were not reported throughout the period represented.

Table 10-34 shows the continued decline in HDPE and LDPE recycling in WA since 2007.

**Table 10-34 Summary of plastics recycling, WA 2004-05 to 2009-10**

Material	2004-05	2005-06	2006-07	2007	2008	2009-10
ABS / SAN				66	44	46
EPS				40	357	13
HDPE				7824	6700	5 474
L/LDPE				4177	3685	1 498
Nylon				0	0	3
Other plastic	7130	13 360	18 130	241	713	254
PET				3090	3751	2 842
PP				2637	2983	2 370
PS				459	530	430
PU				683	3	532
PVC				982	652	476
<b>TOTAL</b>	<b>7130</b>	<b>13 360</b>	<b>18 130</b>	<b>20 198</b>	<b>19 419</b>	<b>13 938</b>

### 10.3 Market size and strength

The proportion of recycled plastics exported grew during 2009-10, suggesting the international market for reprocessed plastics remains strong. This resulted in increased competition for local reprocessors during this period. However, a continued balance between local recycling and export is anticipated.

The downturn in PE use in rainwater tanks could have contributed to the lower rate of PE recycling during 2009-10.

# 11 Rubber

## 11.1 Quantity recycled and recycling location

The quantity of rubber recycled in WA and the location of recycling, during 2009–10, is presented in Table 11-35. Total rubber recycling was 15 520 tonnes in 2009–10, a significant increase compared with the previous year. This increase is in large part due to an improved response rate, but also reflects increased export of end-of-life tyres for recycling.

**Table 11-35 Rubber recycling, WA 2009–10**

Material	Net recycling <sup>1</sup> (tonnes)	Recycling location		
		WA	Interstate	Export
Rubber	15 520	1957	6863	6700

1. Net recycling excludes recycling losses.

Tyres collected for recycling are mostly truck tyres from the C&I sector (Table 11-36).

**Table 11-36 Rubber recycling (by source sector), WA 2009–10**

Material	Municipal	C&I	C&D	Total
Rubber	4872	10 011	637	15 520

An overview of the geographic source of rubber recycled for recycling is given in Table 11-37. Approximately 94% of rubber recycling was sourced from the metropolitan area, which also reflects the fact that most tyres are recycled through tyre retailers. Only very small amounts of off the road industry tyres are recovered for recycling due to size and distance to market.

**Table 11-37 Rubber recycling (by geographic area), WA 2009–10**

Material	Metro	Non-metro	Total
Rubber	14 605	915	15 520

## 11.2 Recycling activity, trends and barriers

### 11.2.1 Trends

Presented in Figure 11-25 is the annual rubber recycling data for WA for the period 2004-05 to 2009-10. The significant increase in rubber recycling during 2009-10 was in part due to an increased response rate, but also due to a shift to export as a result of increased market opportunities in Vietnam.

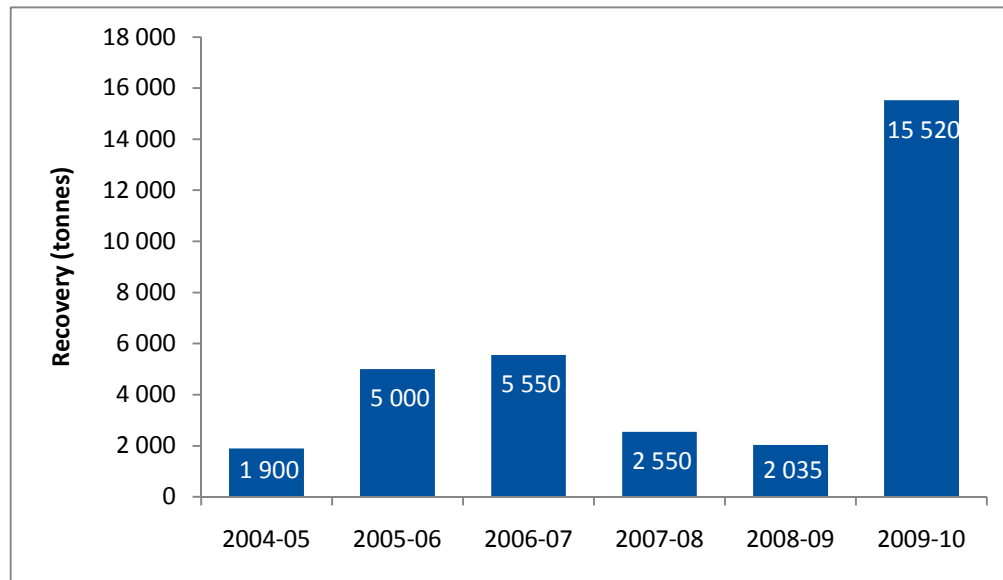


Figure 11-25 Annual rubber recycling, WA 2004-05 to 2009-10

### 11.2.2 Barriers

The key barrier to recycling reported by reprocessors was the classification of tyres as a controlled waste on the tracking form used to trace the transport of waste materials. The level of rubber in passenger vehicle tyres is insufficient for economic recycling.

## 11.3 Market size and strength

There are strong outlets for recycled rubber in the form of tyre crumbing activities. The export market for tyres is also very strong, with outlets in Vietnam, where tyres are used for diesel production. The conversion of tyres into diesel is possible in countries such as Vietnam, where other fuel sources are less readily available and industrial processes are less stringently regulated.

# Glossary

<b>Acrylonitrile-Butadiene-Styrene (ABS)</b>	A thermoplastic commonly used in engineered plastics applications such as mechanical parts. Is a common co-polymer of SAN.
<b>Commercial and industrial waste (C&amp;I)</b>	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.
<b>Construction and demolition (C&amp;D) materials</b>	Materials generally generated by construction and demolition activities and therefore commonly arise from the C&D sector. This group of materials consists of bricks, concrete, asphalt and sand, soil clean fill and rubble for the purposes of this report.
<b>Construction and demolition waste (C&amp;D)</b>	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.
<b>Expanded polystyrene (EPS)</b>	Made of pre-expanded polystyrene beads. Commonly used to form moulded sheets for building insulation and as a packing material.
<b>Garden organics</b>	Organics derived from garden sources e.g. grass clippings, tree prunings.
<b>High density polyethylene (HDPE)</b>	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.
<b>Kerbside collection</b>	Collection of household recyclable materials (separated or co-mingled) that are left at the kerbside for collection by local council collection services.
<b>Low density polyethylene (LDPE)</b>	A member of the polyolefin family of plastics. It is a flexible material and usually used as film for packaging or as bags.
<b>Linear low density polyethylene (LLDPE)</b>	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.
<b>Municipal waste</b>	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.
<b>Non-ferrous metals</b>	Those metals that contain very little or no iron, e.g. copper, brass, bronze.
<b>Nylon</b>	A flexible polymer typically used in fabrics and rope.
<b>Packaging</b>	Plastic material used for the containment, protection, marketing or handling of product.
<b>Polyethylene terephthalate (PET)</b>	A clear, tough, light and shatterproof type of plastic, used to make products such as soft drink bottles, film packaging and fabrics.
<b>Polypropylene (PP)</b>	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.

<b>Polystyrene (PS)</b>	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.
<b>Polyurethane (PU)</b>	A flexible, rigid plastic that can be used in a range of applications including flexible and rigid foams as well as in coatings, adhesives, sealants and elastomers used on floors and automotive interiors.
<b>Polyvinyl chloride (PVC)</b>	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.
<b>Post-consumer material</b>	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.
<b>Pre-consumer material</b>	Material diverted from the waste stream during a manufacturing processes for recycling 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'.
<b>Recovered material</b>	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.
<b>Recycling</b>	<p>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.</p> <p>The term recycling is used to cover a wide range of activities, including collection, sorting, recycling 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).</p> <p>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.</p>
<b>Recycling</b>	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.
<b>Reuse</b>	Reuse involves recovering value from a discarded resource in its original state without recycling or remanufacture.
<b>Styrene Acrylonitrile resin (SAN)</b>	A copolymer plastic consisting of styrene and acrylonitrile. It is widely used in place of polystyrene owing to its greater thermal resistance. SAN is a common co-polymer of ABS.
<b>Solid waste</b>	Waste materials ranging from municipal garbage to industrial waste, but excluding gaseous, liquid, hazardous, clinical and intractable wastes.

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Appendix A

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Reprocessor survey



<b>QUESTIONS</b>	
1	What was the quantity of material reprocessed by your company? (tonnes)
2	What is the estimated accuracy of the data? (+/- %)
3	What were your recycling 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 and 1 July 2008? (tonnes)
6	What was the stockpile of the material at 30 June 2008 and 30 June 2009? (tonnes)
7	Was this stockpiled material (referred to in Q5 & Q6) reprocessed or unprocessed?
8	What source state did the material come from? (i.e. did any of the material reported in Q1 originate outside of WA?)
9	What geographic source did the material come from? (i.e. metropolitan or non-metropolitan) (tonnes or %)
10	What source sector did the material come from?
11	If known, what are the source products?
12	What is the split (% or tonnes) between pre & post consumer? (See definitions below)
13	What is the geographic destination market of the reprocessed material?
14	What is the product destination of the reprocessed material? (i.e. what products are the reprocessed material manufactured into?)
15	What is the destination market sector of the reprocessed material? (i.e. what market was the reprocessed material sold to)
16	How many FTE employees does your company employ?
17	What is the range of gate fees charged for this material?
18	What are the barriers or inhibitors to increased recycling in your opinion?
19	Can you comment on the availability of source materials?
20	Can you comment on the strength of the market into which you sell reprocessed products?
21	Do you know of other reprocessors handling similar materials?