Victorian Recycling Industries Annual Survey

2011-12

Sustainability Victoria

State Government Victoria

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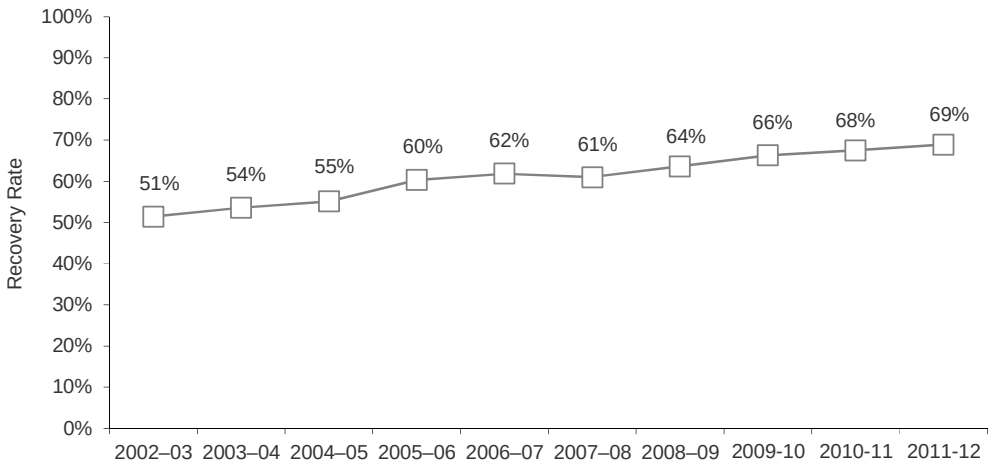
In 2011—12 Victoria's resource recovery rate increased by 1% to reach 69% [*Figure 1*]

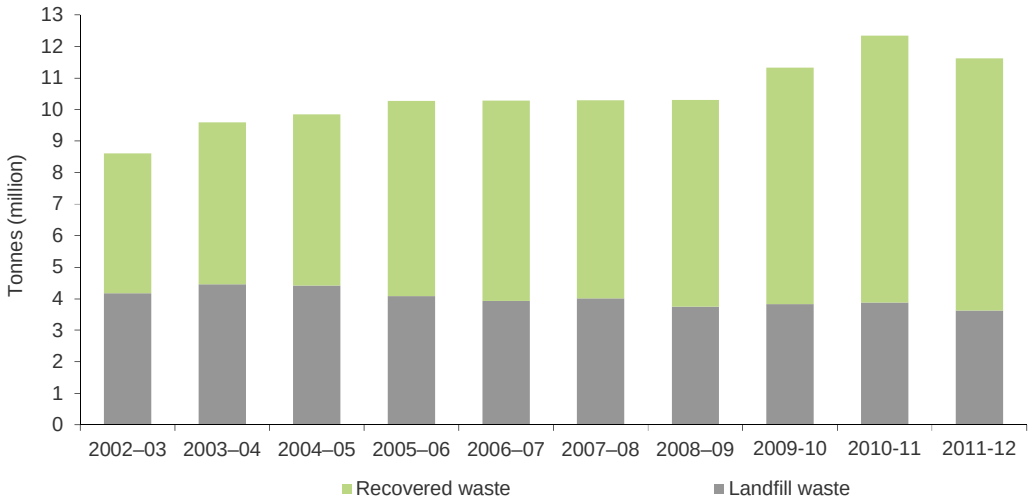
Figure 1 Resource recovery rate of solid waste, Victoria 2002—03 to 2011–12



The amount of waste being sent to landfill reduced for the first time since 2008—09 from 3.88 million tonnes in 2010—11 to 3.61 million tonnes in 2011—12 [*Figure 2*], whilst the amount of waste diverted from landfill for recycling also dropped for the first time since 2002—03 from 8.46 million tonnes to 8.14 million tonnes.

This is largely due to a 16% reduction in the amount of Construction & Demolition material recovered in 2011—12. Feedback from survey respondents suggests that this reduction is likely to reflect a downturn in the construction sector during the period.

Figure 2 Waste generation, Victoria 2002–03 to 2011–12



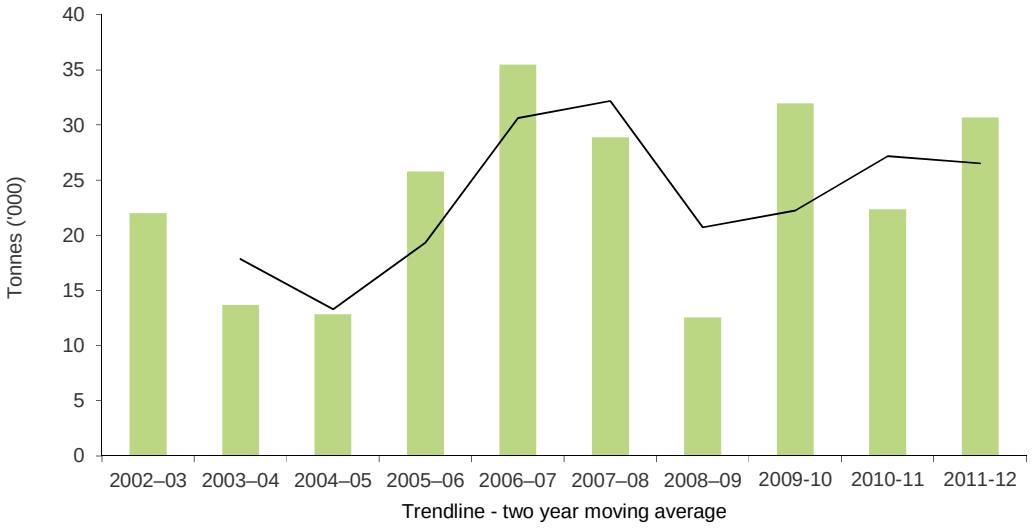
Despite the challenges posed by the fluctuating global commodities market and other factors, Victoria's resource recovery industry has demonstrated resilience, with some growth in particular streams (e.g. Paper / cardboard, Organics and Metal) and declines in others (e.g. Construction & Demolition and Rubber).

1.2 Key increases in materials recovered for reprocessing

The Paper / cardboard category continued to increase its recovery, jumping from 1.21 million tonnes to 1.66 million tonnes in the 2011—12 financial year, representing a 37% increase and continuing a consistent upward trend. This is due in large part to waste paper and cardboard exported overseas, increasing from 376,000 tonnes in 2010—11 to 645,000 tonnes in 2011—12 and is mainly attributable to an increased demand for waste paper in China.

Food organics – sourced almost entirely from the Commercial & Industrial sector and consisting of bi—products from the manufacture of dairy, confectionary, bread and other food stuffs – also increased by 37% to over 30,000 tonnes after dipping to 22,000 in 2010—11. This increase is largely due to additional tonnages reported by a new organics reprocessor and is indicative of the volatile nature of food organics reprocessing; the recovery of which has fluctuated constantly throughout the history of this data collection [*Figure 3*].

Figure 3 Recovery of Food organics, Victoria 2002—03 to 2011–12



Despite challenges created by commodity price fluctuations, Metal recovery is back on track – after falling to below 1.4 million tonnes in 2010—11 – to post a recovery of 1.47 million tonnes for 2011—12; the highest amount recorded since records began.

1.3 Main decreases in materials recovered for reprocessing

In 2011—12, the recovery of Construction and demolition waste fell for the first time since 2007—08 reaching just over 3.5 million tonnes and dropping by 16% overall. Industry sources suggest that this reduction is directly attributable to a downturn in construction activity.

Recovery of Batteries in Victoria in 2011—12 fell from 28,000 tonnes in 2010—11 to just over 4,000 tonnes in 2011—12. Industry sources have indicated that this is due to batteries recovered in Victoria being largely exported (overseas and interstate) for reprocessing; and as this is a survey of reprocessors exclusively, these exported tonnes would not be included in the data.

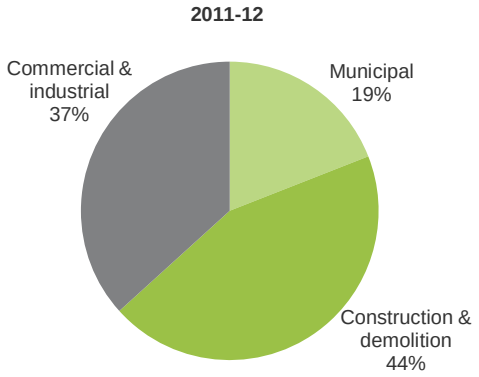
Recovery of Car bodies in 2011—12 fell for the first time in four years to just under 89,000 tonnes, a decrease of 34%. This decrease comes after a peak two—year period of 153,000 tonnes and 135,000 tonnes collected in 2009—10 and 2010—11 respectively. Industry sources suggested that this spike in recovery was due to low prices of new cars post—global financial crisis coupled with high global steel prices; this decrease for 2011—12 correlates directly with a slump in international steel prices and a downturn in the local industry.

1.4 Sources of material

Of the material received for reprocessing during 2011–12, 81% was sourced from industry – down from 83% in 2010–11. A total of 44% was received from the Construction & demolition sector and 37% came from Commercial & industrial operations[1] [*Figure 4*]. The contribution of the Municipal sector, primarily sourced from kerbside collections, was down 1 percentage point to 19%.

85 per cent of material recovered in Victoria remains in the State for reprocessing, while international exports of waste material recovered in Victoria are increasing – up from 10% in 2010—11 to 15% in 2011—12 with a small quantity going interstate.

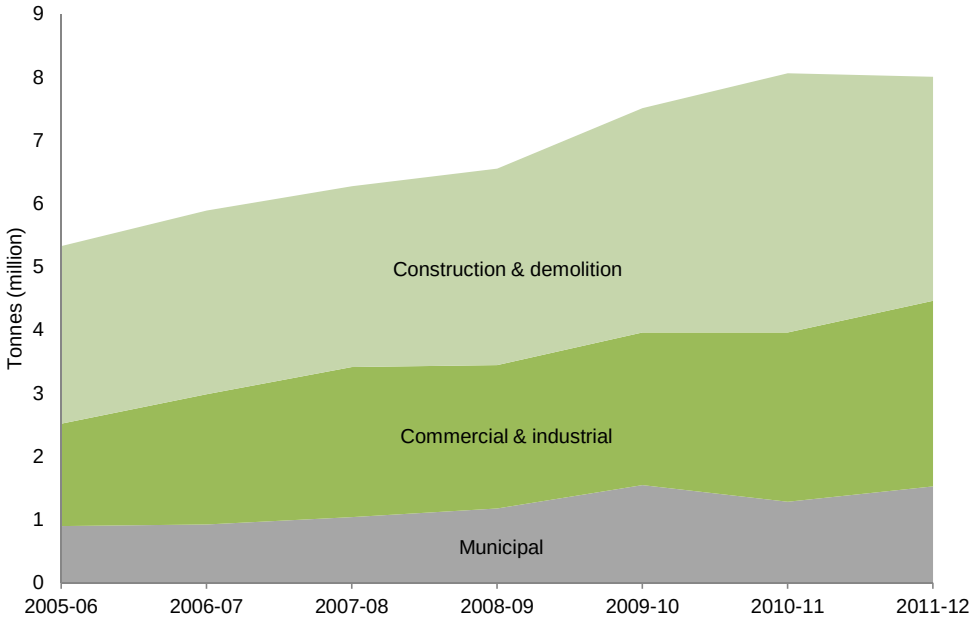
Figure 4 Source sectors of secondary–use material received for reprocessing (by weight), excluding imports, Victoria 2011–12



[1] See Appendix D: Glossary

Figure 5 shows that despite fluctuations, material recovery in all three material sectors – Municipal, Commercial & Industrial and Construction & Demolition has consistently trended upward since 2005—06; the first year in which Victorian material recovery data was collected according to source sector.

Figure 5 Victorian material recovery by source sector 2005—06 to 2011—12



Note: The three material sectors in the above graph combine to create a cumulative total.

2. Introduction

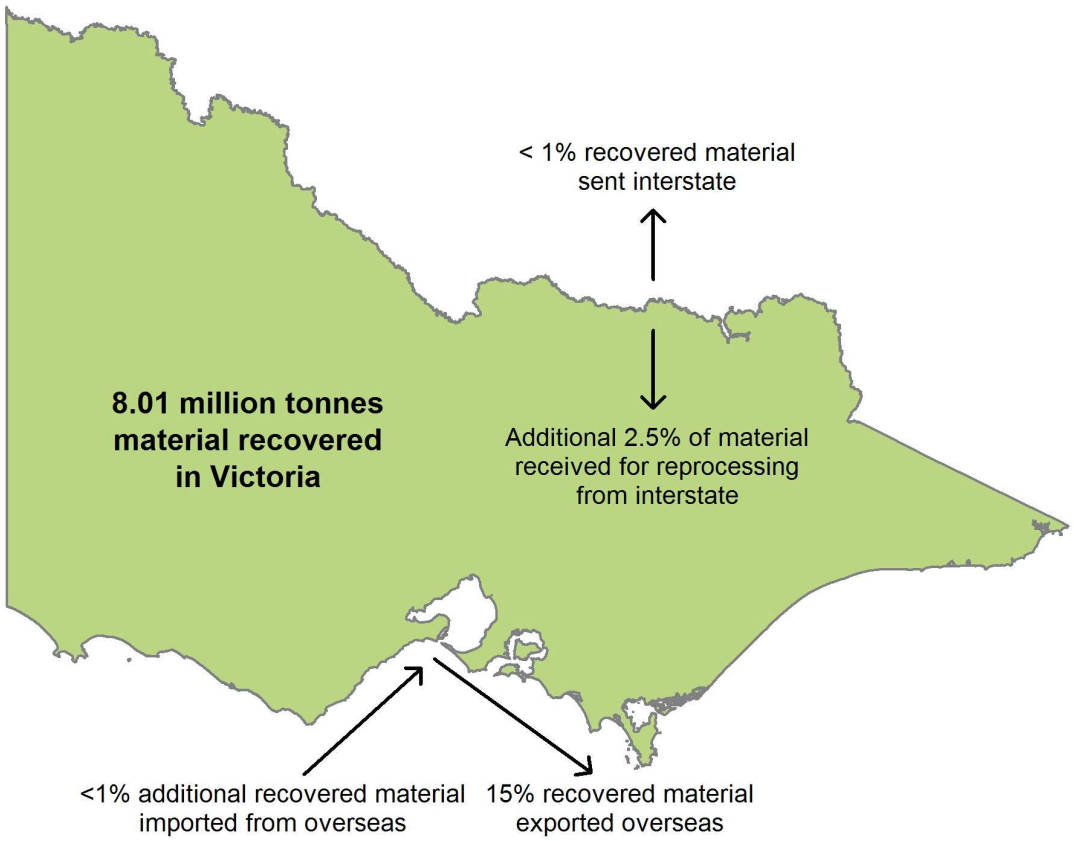
Each year, Sustainability Victoria collects detailed data on the Victorian reprocessing industry through a voluntary industry–wide survey. The *Victorian Recycling Industry Annual Survey* provides the central source of information to monitor Victoria's recycling industry performance.

As well as monitoring the performance of Victoria's reprocessors and the amount of solid waste diverted from landfill, the survey:

- provides an understanding of the current and historical state of materials recovery and reprocessing across a number of sectors and material types
- is used to measure the performance of Victorian government strategies
- communicates the achievements of industry to government, business and the community, and
- demonstrates the benefits of recycling to industry and the public at large.

Recycling and reprocessing are well–established activities in Victoria. The reprocessing industry recovers a wide range of recyclable material from the waste stream for reuse in the production of commodities such as metals, concrete, plastics, glass and compost. Materials recovered by the reprocessing industry are predominantly from within Victoria, with a small amount received from interstate. Although Victoria's current reprocessing capacity is predominantly local, some waste material is exported interstate or overseas for reprocessing [*Figure 6*].

Figure 6 Flow of material for reprocessing, Victoria 2011–12



Of the 8.01 million tonnes of material that was recovered in Victoria in 2011—12:

- 2.5% of the material was received from interstate
- less than 1% of the material was imported from overseas
- 15% of the material was exported overseas
- less than 1% of the material was sent interstate, and
- 85% of the material remained in Victoria.

Material for reprocessing is sourced from three sectors across Victoria: Construction & demolition (C&D), Commercial & industrial (C&I), and Municipal[2].

[2] For information about these sectors see Appendix D: Glossary.

The primary reprocessing industries in Victoria are:

- smelters and foundries of steel, aluminium and other non–ferrous metals
- crushing plants and auxiliary screening of concrete, brick, asphalt and related materials
- paper / cardboard and de–inking pulp mills
- composting facilities
- glass product manufacturers
- rubber product manufacturers, and
- plastics converters and processors.

These and other reprocessing operations make a significant contribution to the Victorian economy in employment and investment[3], and generate substantial cost savings in the production of more affordable (but usually similarly effective) recycled materials. Among the environmental benefits of reprocessing materials are:

- reduced greenhouse gases (methane emissions) from landfill and energy–intensive primary production processes,
- savings in water and electricity in production, using recycled feedstock, of metals, concrete, paper and glass,
- savings of raw materials, e.g. mineral ores used in virgin metal production and timber and oil used in paper production and
- reduced groundwater and soil contamination from landfill, and the preservation of landfill space.

The *Victorian Recycling Industries Annual Survey 2011–12* was conducted in September and October 2012 and sought data from 66 Victorian reprocessors, excluding 43 plastic reprocessors surveyed as part of the *2011 National Plastics Recycling Survey*[4]. A total of 53 reprocessors – or 80% responded, estimated between them to account for more than 95% by weight of all material recovered in Victoria.

Although Sustainability Victoria has sought to verify information provided in survey returns with individual reprocessors, it is not possible to validate all of the data in this report.

Survey findings are subject to the accuracy of data provided by individual reprocessors, and caution is advised when comparing data. For more information on the survey approach, please refer to the detailed methodology in Appendix A.

[3] Victorian Government, *Getting Full Value: the Victorian Waste and Resource Recovery Policy, 2013*

[4]Sustainable Resource Use (2012), *2011—12 National Plastics Recycling Survey*, report to the Plastics and Chemicals Industries Association.

3. Total materials recovered for recycling

3.1 Recovery and trends

In 2011—12 Victoria's resource recovery rate increased by 1% to reach 69% [*Figure 7*].

The amount of waste being sent to landfill reduced for the first time since 2008—09 from 3.88 million tonnes in 2010—11 to 3.61 million tonnes in 2011—12 [*Figure 2*], whilst the amount of waste diverted from landfill for recycling also dropped for the first time since 2002—03 from 8.46 million tonnes to 8.14 million tonnes [*Figure 8*].

This is largely due to a 16% reduction in the amount of Construction & Demolition material recovered in 2011—12. Feedback from survey respondents suggests that this reduction is likely to reflect a downturn in the construction sector during the period.

Figure 7 Resource recovery rate of solid waste, Victoria 2002–03 to 2011–12

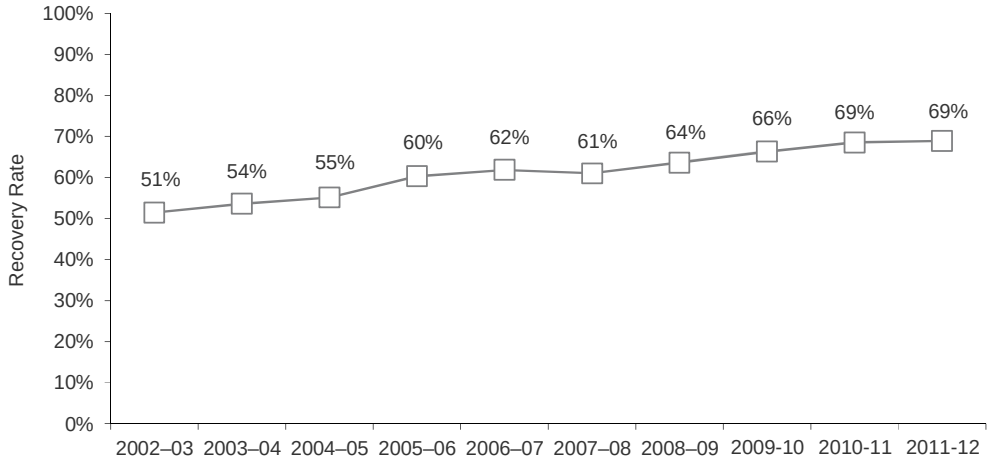
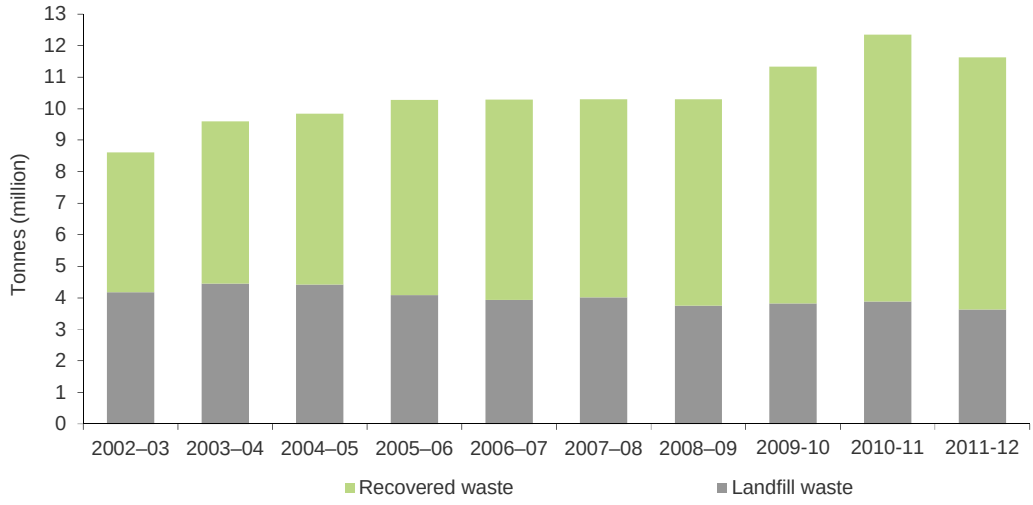
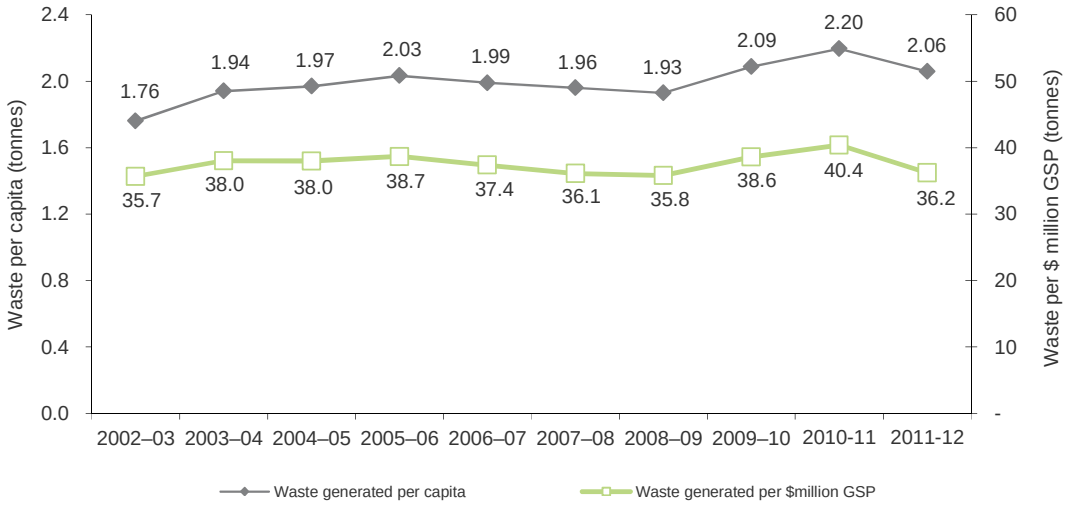


Figure 8 Waste generation, Victoria 2002–03 to 2011–12



In 2011–12, waste generation per capita fell to 2.06 tonnes, a decrease of 4.4% on the previous year. The amount of material recovered per capita also fell, down 2.7% to 1.42 tonnes. Waste generation relative to Gross State Product (GSP) fell 10.3% in 2011–12 to 36.2 tonnes of waste generated for every million dollars of GSP [*Figure 9*] [*Table 1*].

Figure 9 Total waste generation relative to economic and population trends, Victoria 2002–03 to 2011–12



Note: Historical figures have been recalculated and updated using rebased GSP figures sourced from the ABS and population figures sourced from the Department of Planning and Community Development.

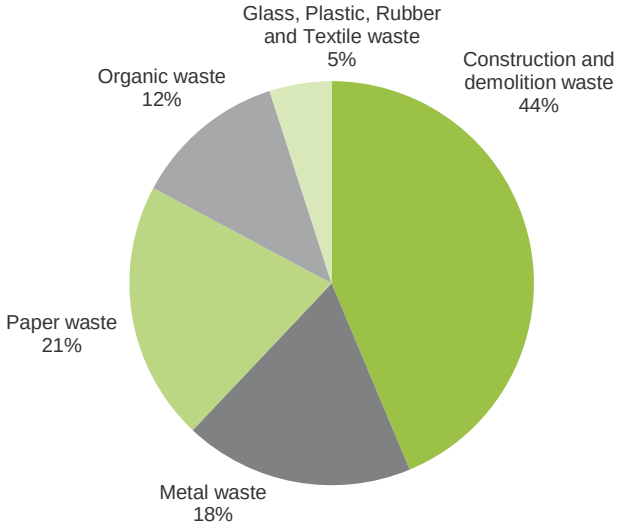
Table 1 Total waste generation relative to economic and population trends, Victoria 2002–03 to 2011–12

Report year	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12
Tonnes										
Waste generated per capita	1.76	1.94	1.97	2.03	1.99	1.96	1.93	2.09	2.20	2.06
Tonnes										
Waste generated per $million GSP	35.7	38.0	38.0	38.7	37.4	36.1	35.8	38.6	40.4	36.2
Tonnes (million)										
Total Waste Generation	8.60	9.59	9.84	10.27	10.28	10.29	10.30	11.33	11.95	11.63

3.2 Composition of material

The types of solid material recovered for reprocessing in 2011–12 is presented in Figure 10. Construction and demolition waste accounted for 44% of all material recovered for reprocessing by weight.

Composition of material recovered for reprocessing (by weight), Victoria 2011–12



A summary of material recovered in Victoria for reprocessing in 2011–12 is presented in Table 2. Tonnage data for each material type recovered for reprocessing in the past 10 years is presented in Appendix B.

Table 2 Total material types recovered for reprocessing, Victoria 2011–12 and 2010—11

Material Type	Total recovery in Victoria 2011–12	Total recovery in Victoria 2010–11	Change since 2010–11
	Tonnes ('000)	Tonnes ('000)	(%)
Construction and demolition	3,502	4,194	—16%
Metals	1,470	1,390	6%
Paper / cardboard	1,665	1,213	37%
Organics	978	871	12%
Glass	195	196	0%
Plastic	149	146	2%
Rubber	49	55	—10%
Textile	5	5	5%
Total	8,014	8,068	—1%

Note: Percentage change has been based on actual figures rather than the rounded figures shown above.

The Paper / cardboard category continued to increase its recovery, jumping from 1.21 million tonnes to 1.66 million tonnes in the 2011—12 financial years, representing a 37% increase on the previous year.

Food organics also increased by 37% to over 30,000 tonnes after dipping to 22,000 in 2010—11. This is due to the inclusion of data from a new reprocessor of pre—consumer food manufacturing bi—products.

In 2011—12, the recovery of Construction and demolition waste fell for the first time since 2007—08 reaching just over 3.5 million tonnes and dropping by 16% overall.

Recovery of Batteries in Victoria in 2011—12 fell from 28,000 tonnes in 2010—11 to just over 4,000 tonnes in 2011—12.

Table 3 shows that the recovery of each material category has increased, in many cases beyond 100%. The one exception to this is the recovery of Textiles, which industry sources indicate is partially due to a decrease in the recovery of waste emanating from the textile manufacturing industry.

Further information and analysis of recovery levels for each material type is provided in Sections 5 to 12 of this report.

Table 3 Total material types recovered for reprocessing, Victoria 2011–12 and 2002–03

Material Type	Total recovery in Victoria 2011–12	Total recovery in Victoria 2002–03	Change since 2002–03
	Tonnes ('000)	Tonnes ('000)	(%)
Construction and demolition	3,502	1,851	89%
Metals	1,470	971	51%
Paper / cardboard	1,665	818	104%
Organics	978	529	85%
Glass	195	85	128%
Plastic	149	69	116%
Rubber	49	21	139%
Textile	5	84	—194%
Total	8,014	4,428	81%

Note: Percentage change has been based on actual figures rather than the rounded figures shown above.

3.3 Sources of recyclables

With the exception of imports sourced from unknown sectors, 44% of all material received for reprocessing in Victoria during 2011–12 came from the Construction & demolition sector [*Figure 11*]. The combined industry sectors (Commercial & industrial and Construction & demolition) accounted for 81% of all recovered material, up one percentage point from the previous year.

Figure 10 Source sectors of secondary–use materials received for reprocessing (by weight), excluding imports, Victoria 2011–12 and 2010–11.

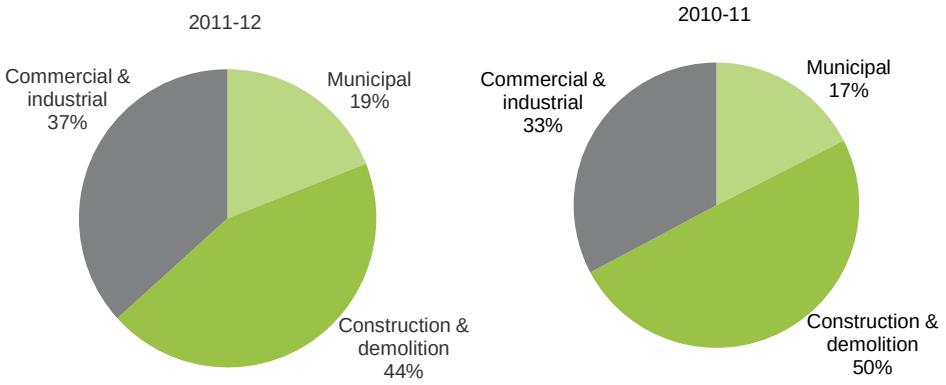
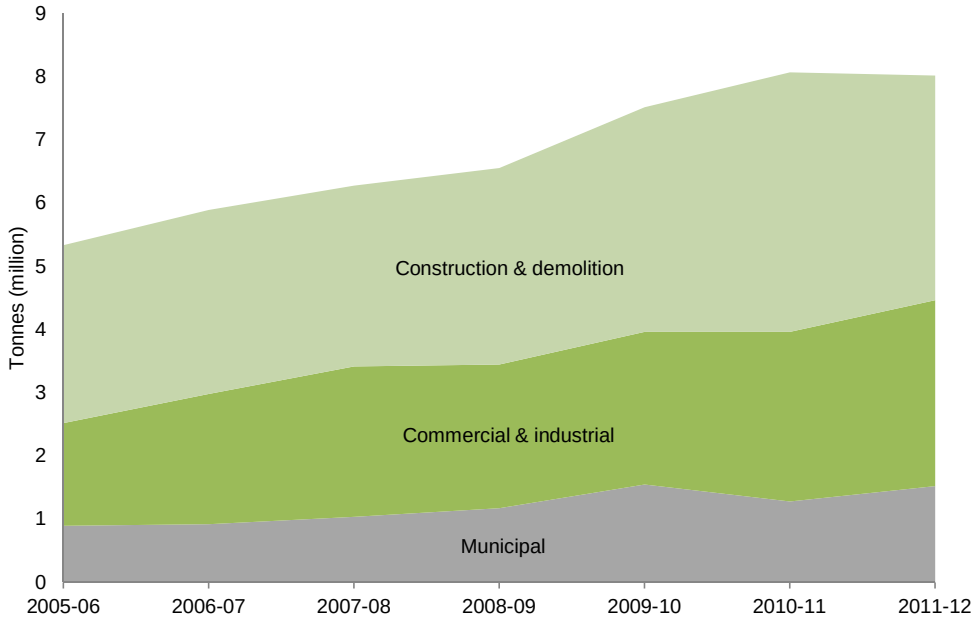


Figure 12 shows that despite fluctuations, material recovery in all three material sectors – Municipal, Commercial & Industrial and Construction & Demolition has consistently trended upward since 2005—06.

Figure 11 Victorian resource recovery by source sector 2005—06 to 2011—12



Note: The three material sectors in the above graph combine to create a cumulative total.

Table 2 details the estimated tonnages of material recovered in Victoria for reprocessing from each source sector and material imported for reprocessing from interstate and overseas.

Table 2 Source sectors of material received by reprocessors, Victoria 2011–12

	Recovered from Victoria			Recovered from interstate & overseas
Material Type	Municipal	Commercial & industrial	Construction & demolition	Imports
	Tonnes ('000)			
Construction and demolition	83	64	3,355	0
Metal	218	1,083	168	19
Paper / cardboard	229	1,436	–	186
Organic	547	411	19	–
Glass	136	59	–	39
Plastic	66	80	3	5
Rubber	1	47	<1	7
Textile	4	1	–	–
	1,281	2,683	4,102	257

Note: Figures reported for the material received by source sector have been extrapolated to include the relative proportions derived from reported data and applied to surveys that did not provide a source sector for the different material types and the export data from the Australian Bureau of Statistics. These proportions were not applied to imports. Figures reported in the table have been rounded to the nearest thousand and individual columns may therefore not add up to the totals reported elsewhere.

3.4 Reprocessing and exports

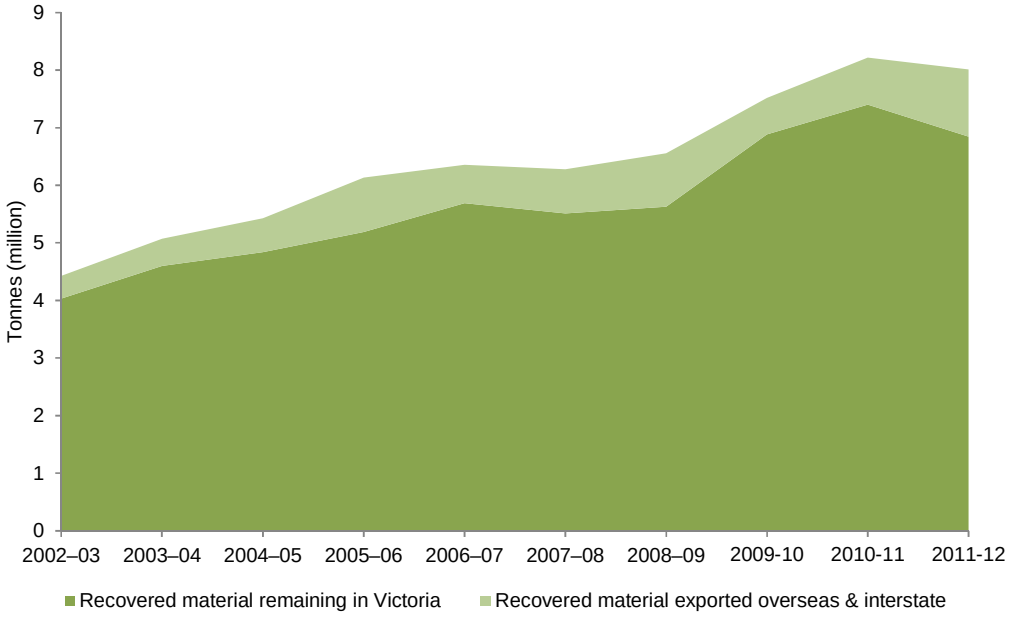
The survey results enable comparisons between the quantities of material recovered for reprocessing in Victorian plants and those exported interstate or overseas for reprocessing. While exports have increased steadily over the past three years, Victoria's current resource reprocessing is still predominantly local [*Figure 13*]. The key materials exported are scrap metals, paper and plastics, all globally traded commodities used in recycling operations worldwide.

During 2011–12, over 6.8 million tonnes of recovered material remained in Victoria to be reprocessed in local plants. This represents a decrease of 8% over the 7.4 million tonnes reprocessed locally in 2010–11, and accounts for 85% of all recovered material.

By contrast, material exported from Victoria for reprocessing increased by 44% to almost 1.2 million tonnes – the highest annual Victorian waste export tonnage ever recorded.

This increase is in large—part due to quantities of paper and cardboard exported to China virtually doubling in 2011—12. It is believed that most of this material had been previously going to landfill with a proportion of it coming from stockpiles, and that an increased demand for paper and cardboard material from China, coupled with an ever—increasing global paper price has made overseas exports a far more viable proposition than it was previously.

Figure 12 Material reprocessed and exported overseas or interstate, Victoria 2002–03 to 2011–12



Note: The two data sources in the above graph combine to create a cumulative total.

3.5 Product markets

Once reprocessed, materials are directed into different markets according to quality and degree of processing required. Commonly reprocessed industrial materials, such as metals and rubber, are generally sold into the manufacturing industry for production of new metal or rubber products. Recovered glass and paper are usually manufactured back into glass and paper. Although paper can be recycled seven or eight times before it loses its 'recyclability', glass bottles and jars can generally be recycled indefinitely.

Material from the construction and demolition industry is usually directed back into the construction industry as recycled concrete, brick and rubble, which are used in building the load–bearing 'base' layers of roads and pavements.

Organic waste is processed at licensed facilities where it is turned into composted soil conditioner and mulch products. Often these materials are then blended with other soil products to be sold by nurseries or used in the landscaping industry. More recycled organic products are now being used in high–value applications such as intensive horticulture and viticulture.

Plastics recovered from the waste stream are reprocessed into an ever–growing range of valuable packaging, construction, household and automotive goods. The *2011 National Plastics Recycling Survey* listed the main products derived from Australian plastics reprocessing operations [*Table 3*].

Table 3 Summary of end products for reprocessed plastics

Plastics ID code	Polymer	Major uses
1	PET	Beverage bottles
2	HDPE	Film, blow moulded containers, pipes
3	PVC	Pipe, floor coverings
4	L / LLDPE	Film (including building and agricultural film, concrete lining, freight packaging, garbage bags, shopping bags), agricultural piping
5	PP	Crates, boxes and plant pots
6	PS	Bar chairs and industrial spools
6	EPS	Waffle pods for under slab construction of buildings
7	ABS / SAN	Injection moulded products
7	Polyurethane	Carpet underlay
7	Nylon	Injection moulding compound
7	Other and mixed	Agricultural piping

Source: Sustainable Resource Use (2021), *2012 National Plastics Recycling Survey*, report to the Plastics and Chemicals Industries Association

5. Metal

5.1 Recovery and trends

Victoria's scrap metal recovery increased by 6% to 1,470,000 tonnes in 2011–12, the largest annual tonnage recorded.

Steel (including packaging steel) made up the largest proportion of Victoria's recovered metals, increasing by 14% to over 1.2 million tonnes, while the recovery of Aluminium (incl. cans), Batteries and Car bodies all fell by 32%, 85% and 34% respectively [*Figure 14*].

The decline in the recovery of Batteries is largely due to the bulk of this material being exported interstate for reprocessing which could not be quantified for this survey. While the recovery of Car bodies has reduced in 2011–12, trends indicate that this is steadying in the wake of the post–GFC new car boom.

The decline in the recovery of Aluminium (incl. cans) is in—keeping with the fluctuations typical of this material type over the course of this survey's history. Industry sources have indicated that this is partially due to a very inconsistent global aluminium price that has risen as high as $AUD3,500 per tonne in 2008 and dropped as low as $AUD1,700 per tonne in 2009[5].

Figure 13 Composition of metals recovered for reprocessing (by weight), Victoria 2011–12 and 2010–11

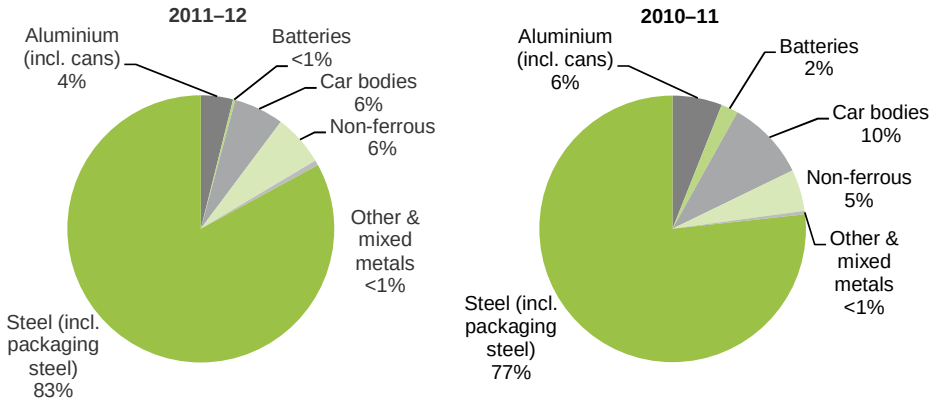


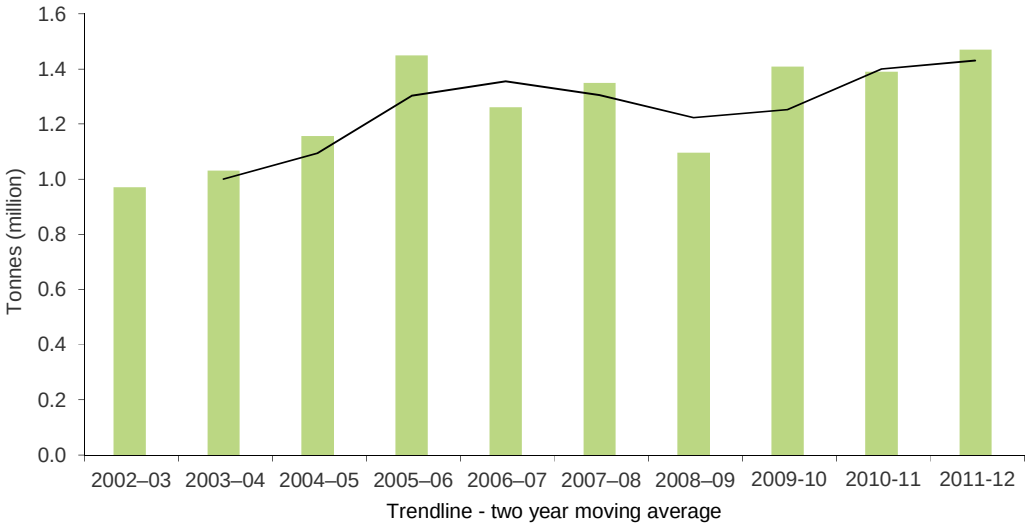
Table 4 Total metals recovered, Victoria 2011–12 and 2010–11

Category	Total recovery in Victoria 2011–12	Total recovery in Victoria 2010–11	Change on previous year
	Tonnes ('000)	Tonnes ('000)	(%)
Aluminium (incl. cans)	57	83	–32%
Batteries	4	28	–85%
Car bodies	89	135	–34%
Non–ferrous	92	69	31%
Other & mixed metals	9	6	49%
Steel (incl. packaging steel)	1,220	1,066	14%
Total	1,389	1,470	6%

[5] Source: http://www.infomine.com/investment/metal—prices/aluminum/5—year/

Figure 15 illustrates the overall upward trend in the domestic and export markets for recyclable metals, which offer a host of environmental and economic benefits – including energy savings of between 56% (steel) and 92% (aluminium) when compared to primary production from virgin ores.

Figure 14 Metals recovered for reprocessing, Victoria 2002–03 to 2011–12

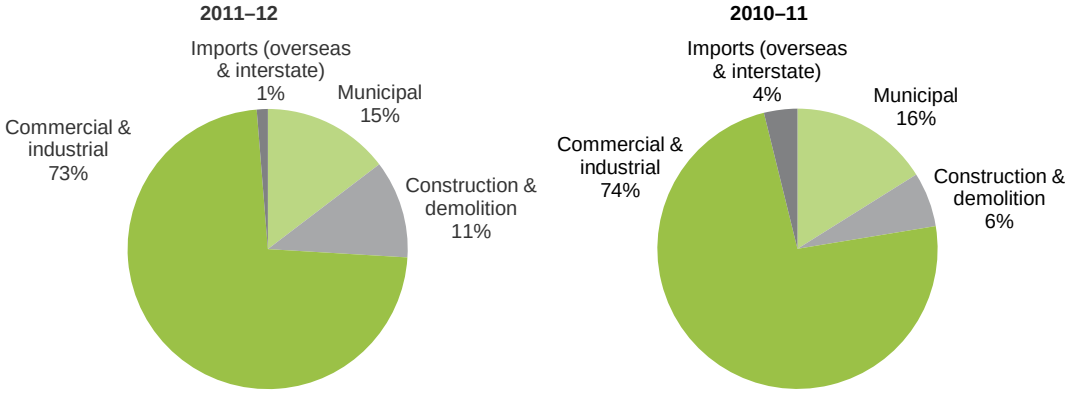


5.2 Sources of recyclables

The Commercial & industrial sector remains Victoria's principal source of recovered metals, accounting for 73% of material received for reprocessing across the state; a decrease of 1% from 2010–11 [*Figure 16*]. Material sourced from the Municipal sector decreased by 1% percent to 218,000 tonnes and contributed 15% of all Victorian metals recovered.

Metal sourced from interstate fell by roughly 75%, from representing 4% of all metal recovered in Victoria in 2010–11 to 1% in 2011–12, however these interstate tonnages are not included in Victorian totals.

Figure 15 Source sectors of scrap metal received for reprocessing (by weight), Victoria 2011–12 and 2010–11



6. Construction and demolition materials

6.1 Recovery and trends

Construction and demolition materials accounted for 44% of all material recovered in Victoria in 2011–12, and total Construction & Demolition recovery was down 16% from 2010–11 to just over 3.5 million tonnes [*Table 5*]. This is the first time that Construction & Demolition recovery has fallen since 2007–08 and industry sources have suggested that this reduction is directly attributable to a downturn in the number of overall construction projects being undertaken in the State [*Figure 17*].

This downturn in the construction sector resulted in reductions of 20—30% in many of the Construction & Demolition material categories with Brick / brick rubble, Rock / excavation stone and Soil & sand falling 30%, 26% and 21% respectively.

Concrete recovery dropped by 16% to 1.8 million tonnes and retained its position as the largest contributor to overall Construction & Demolition recovery comprising 52% of the total.

As well as significantly contributing to the reduction of waste to landfill across the state, the use of recycled concrete eases the electricity and water demands of conventional concrete production, cuts the cost of on–site processing and disposal into landfill for the Construction & demolition sector, and potentially provides more affordable inputs for civil and commercial construction.

Figure 16 Composition of construction and demolition material recovered for reprocessing (by weight), Victoria 2011–12 and 2010–11

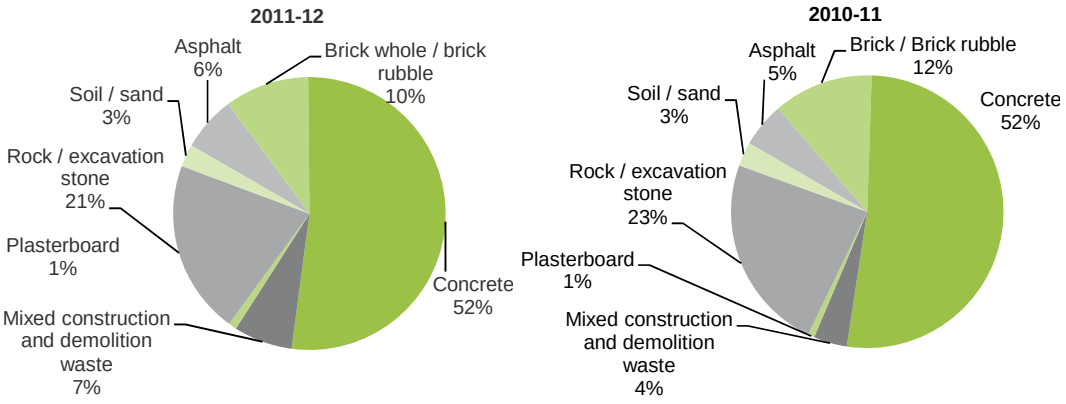
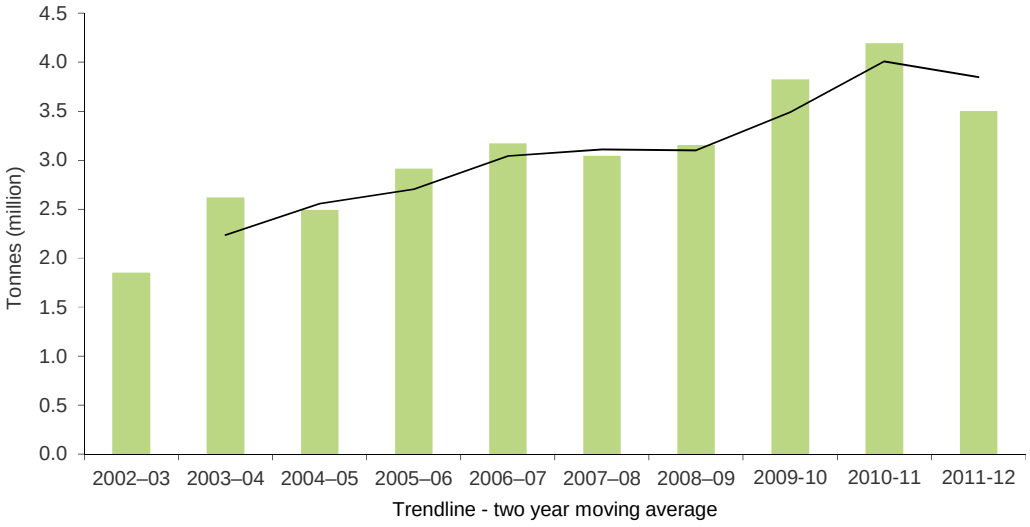


Table 5 Total construction and demolition material recovered, Victoria 2011–12 and 2010–11

Category	Total recovery in Victoria 2011–12	Total recovery in Victoria 2010–11	Change on previous year
	Tonnes ('000)	Tonnes ('000)	(%)
Asphalt	229	223	2%
Brick / brick rubble	350	497	–30%
Concrete	1,829	2,174	–16%
Mixed construction and demolition	243	167	46%
Plasterboard	34	32	6%
Rock / excavation stone	723	980	–26%
Soil / sand	93	118	–21%
Total	3,502	4,194	–16%

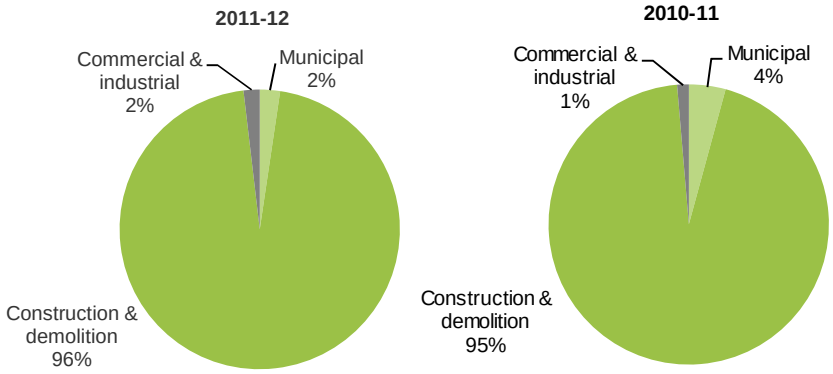
Figure 17 Construction and demolition material recovered for reprocessing, Victoria 2002–03 to 2011–12



6.2 Sources of recyclables

The vast majority of construction and demolition material recovered in Victoria (95%) is sourced directly from commercial and council works sites, which provide a steady stream of concrete, brick rubble, asphalt, rock and excavation stone. However, Figure 19 also shows an increase of waste streams from the Commercial & industrial sector, which contributed 2% and of recovered material in 2011–12.

Figure 18 Source sectors of construction and demolition material received for reprocessing (by weight), Victoria 2011–12 and 2010–11



7. Paper / cardboard

7.1 Recovery and trends

The amount of paper and cardboard recovered in the state increased by 37% in 2011–12 to 1.66 million tonnes; up from 1.21 million tonnes in 2010—11 [*Table 6*].

Cardboard / paper packaging recovery increased by 31% to 278,000 tonnes in 2011—12 while both Printing & writing paper and Other (mixed paper) increased by 85% and 44% respectively, recovery of Newsprint / magazines decreased by 11%.

The increases noted in the Cardboard / paper packaging, Printing & writing paper and Other (mixed paper) categories are due in large part to waste paper and cardboard exported overseas — increasing from 376,000 tonnes in 2010—11 to 645,000 tonnes in 2011—12.

This export increase is mainly attributable to an increased demand for waste paper in China, coupled with an ever—increasing global paper price. It is believed that much of this material had been previously going to landfill while a proportion of it was sourced from stockpiles.

Figure 19 Composition of paper and cardboard recovered for reprocessing (by weight), Victoria 2011–12 and 2010–11

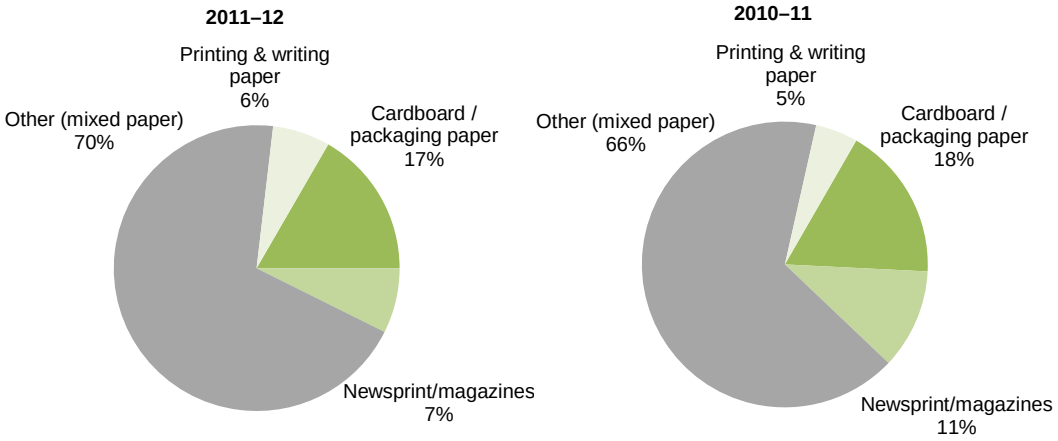
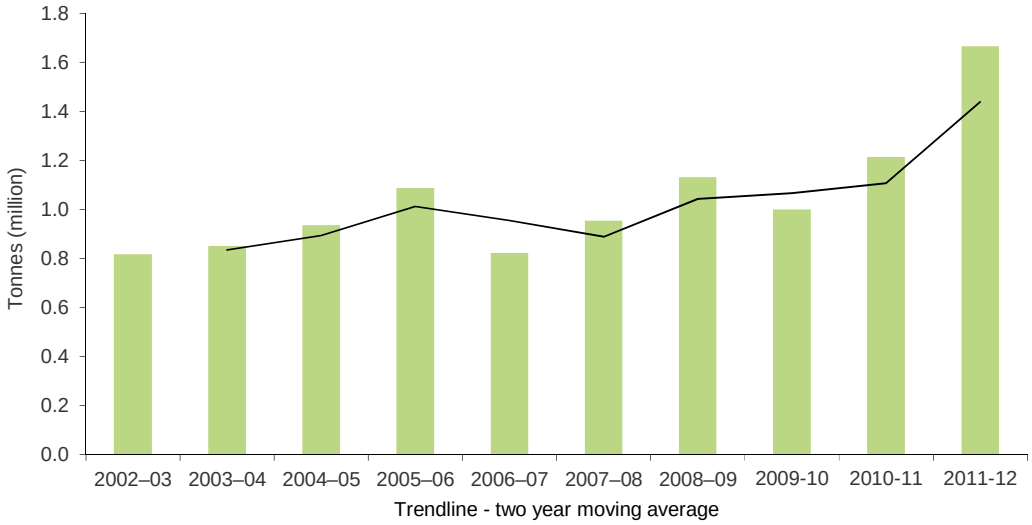


Table 6 Total paper and cardboard recovered, Victoria 2011–12 and 2010–11

Category	Total recovery in Victoria 2011–12	Total recovery in Victoria 2010–11	Change on previous year
	Tonnes ('000)	Tonnes ('000)	(%)
Cardboard / packaging paper	278	211	8%
Newsprint / magazines	123	137	20%
Other (mixed paper)	1,157	805	25%
Printing & writing paper	107	58	32%
Total	1,212	1,665	37%

Figure 20 Paper / cardboard recovered for reprocessing, Victoria 2002–03 to 2011–12



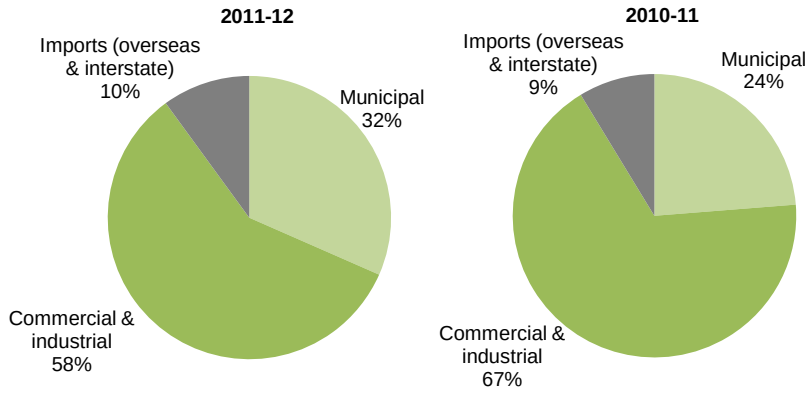
Note: Figures for periods 2004–05 and 2005–06 were over reported and the amounts have not been able to be verified.

7.2 Sources of recyclables

Paper and cardboard reprocessed in Victoria comes from several different sources, with retailers and industrial facilities traditionally supplying much of the cardboard and paper packaging, while commercial collections from offices and schools account for most printing and writing paper. In 2011–12, the Commercial & industrial sector contributed 58% of the State's recovered paper and cardboard, down from 67% the previous year [*Figure 22*].

The proportion of recovered paper and cardboard sourced from overseas and interstate also increased from 9% to 10% in 2011–12.

Figure 21 Source sectors of paper and cardboard received for reprocessing (by weight), Victoria 2011–12 and 2010–11



8. Organics

8.1 Recovery and trends

Organic recovery in Victoria increased by12% in 2011—12, reaching a total of 978,000 after decreasing by 6% to 871,000 tonnes in 2010—11 [*Table 7*]. This increase brings Organic recovery back into line with the relatively steady upward trend it has followed since records began [*Figure 24*].

More than half of the organic material recovered in the state is in the category of Garden organics, which increased by 10% to nearly half a million tonnes in 2011–12 [*Figure 23*]. After falling to 22,000 tonnes in 2010—11, the recovery of Food organics increased by 37% to almost 31,000 tonnes – this is consistent with historical fluctuations.

The Other & mixed organics category – representing mixed organic material, along with manure and sludge – although down by 4% on the previous year, was again a significant contributor to the total organic material recovered representing 19% of the total. Sawdust & other forestry residuals continued to rise steadily, increasing by 4% to 19% in 2011–12.

The two wood and timber categories combined to equate to 12% of all organic recovery in Victoria for 2011—12, and increasing overall by 5%. Wood & timber pallets / packaging increased to 9% and Wood & timber (other than packaging) fell to for 3% of the total.

Figure 22 Composition of organic material recovered for reprocessing (by weight), Victoria 2011–12 and 2010–11

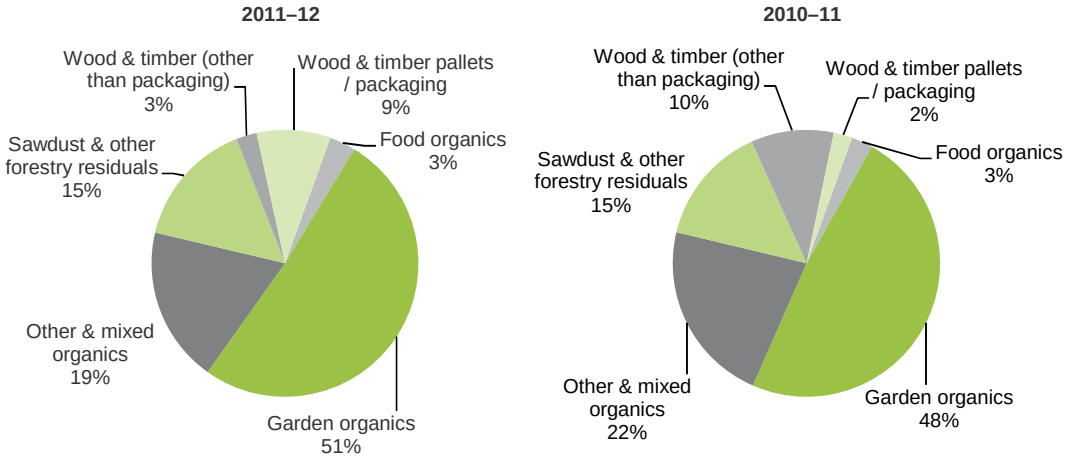
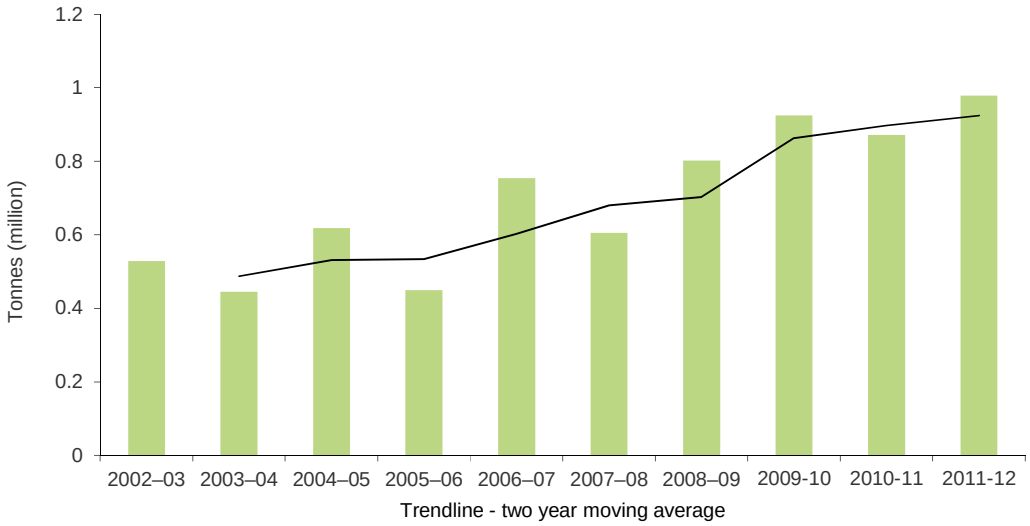


Table 7 Total organic material recovered, Victoria 2011–12 and 2010–11

Category	Total recovery in Victoria 2011–12	Total recovery in Victoria 2010–11	Change on previous year
	Tonnes ('000)	Tonnes ('000)	(%)
Timber	112	107	5%
Food organics	31	22	37%
Garden organics	500	421	10%
Sawdust	150	126	19%
Other organics	185	193	–4%
Total	978	870	12%

Figure 24 shows that since 2003–04, organics recovery, although fluctuating, is generally trending upwards. Identifying trends in this waste stream poses numerous challenges, among them taking into account the impact of natural forces such as long–term drought and legislated water restrictions.

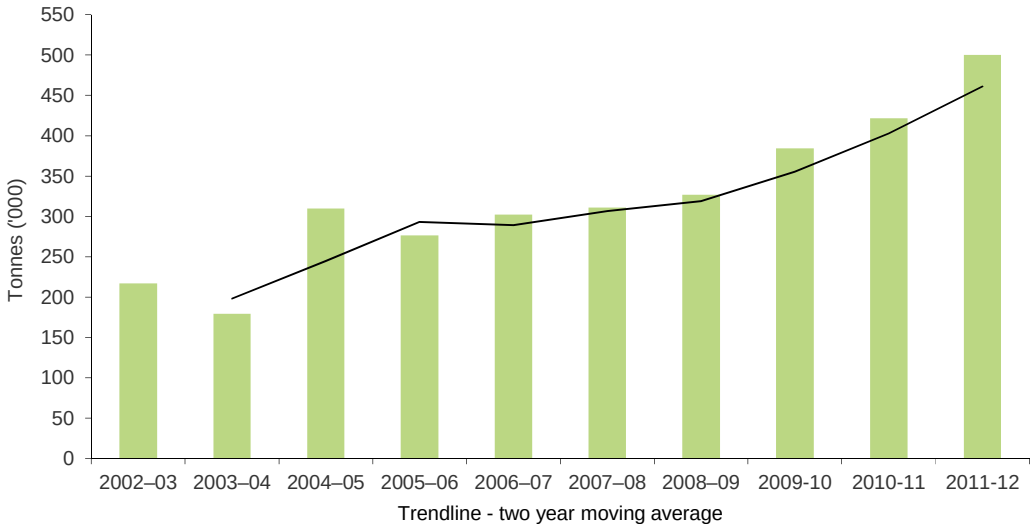
Figure 23 Organic material recovered for reprocessing, Victoria 2002–03 to 2011–12



Note: Garden organics figures for 2003–04 and 2005–06 have been updated to more accurately reflect tonnes recorded in the *Local Government Data Collection Survey 2003–04* and *Victorian Local Government Data Collection 2005–06* reports.

Quantities of garden organics, which are mainly collected by councils, are at the highest level recorded since the survey began. Figure 25 shows that – with the exception of 2007–08, a year of severe drought – garden organics have trended upwards since 2005–06, coinciding with the expansion of the 'three bin' system – for general waste, recyclables and green organics – which has encouraged householders to divert more green organics from landfill.

Figure 24 Garden organic material recovered for reprocessing, Victoria 2002–03 to 2011–12

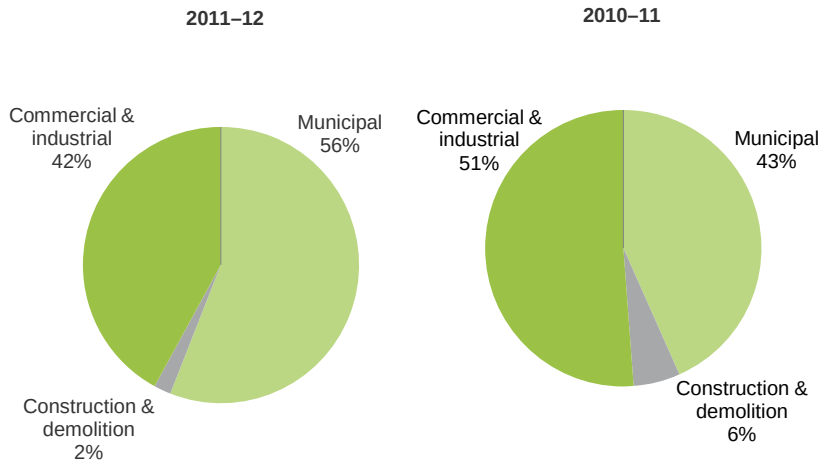


Note: Garden organics figures for 2003–04 and 2005–06 have been updated to more accurately reflect tonnes recorded in the *Local Government Data Collection Survey 2003–04* and *Victorian Local Government Data Collection 2005–06* reports.

8.2 Sources of recyclables

The Municipal sector increased its overall share to overtake the Commercial & Industrial sector as the main source of organics recovery in 2011–12 [*Figure 26*]. The Municipal sector accounted for 56% of all recovered recyclable material, compared to 42% from the Commercial & Industrial. No garden organics were imported from interstate or overseas for reprocessing in Victoria in 2011–12.

Figure 25 Source sectors of organic material received for reprocessing (by weight), Victoria 2011–12 and 2010–11



9. Glass

9.1 Recovery and trends

The quantity of glass recovered for reprocessing in Victoria in 2011–12 remained virtually unchanged from 2010–11 levels, reaching a total of 195,000 tonnes.

Mixed glass waste continued to contribute the majority of all glass recovered with 91% of the total and increasing by 1% to 178,000 tonnes. Recovery of Sheet / laminated glass was reduced by 10% to just below 17,000 tonnes but still managed to account for 9% of the total [*Figure 27*].

Based on historical records, it can be assumed that Mixed glass waste is dominated by glass containers (Mixed glass waste only came into effect as a category in 2007–08)[6].

Figure 26 Composition of glass recovered for reprocessing (by weight), Victoria 2011–12 and 2010–11

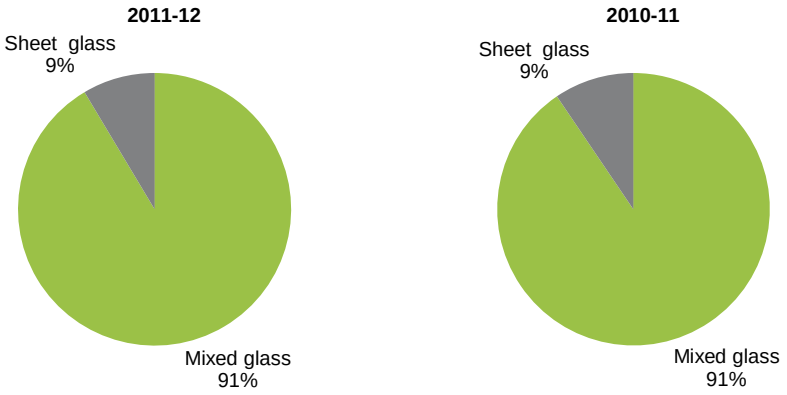


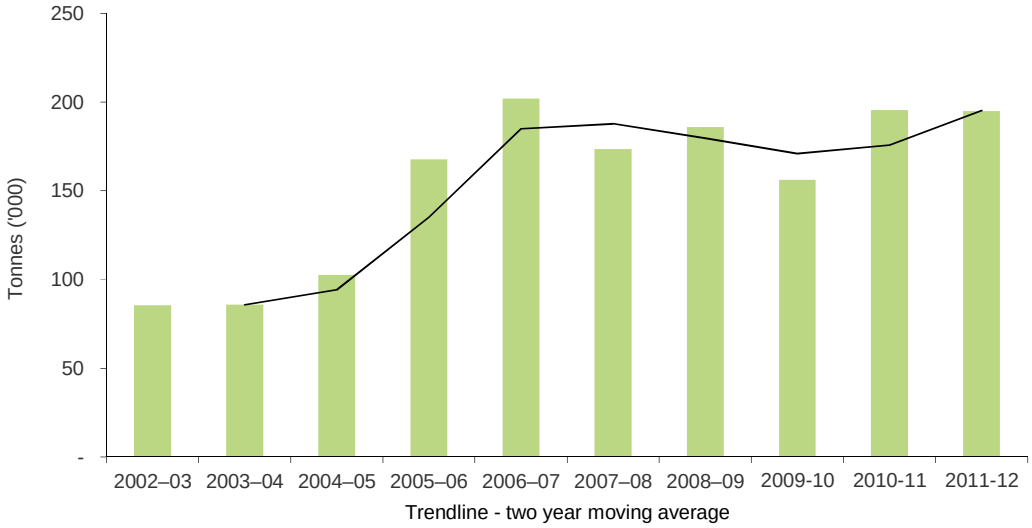
Table 8 Total glass recovered, Victoria 2010–11 and 2009–10

Report Category	Total recovery in Victoria 2011–12	Total recovery in Victoria 2010–11	Change on previous year
	Tonnes ('000)	Tonnes ('000)	(%)
Mixed glass	178	176	1%
Sheet glass	17	18	–10%
Total	195	196	0%

Note: Due to a change in reporting methodology by a major glass reprocessor in 2010–11, the Glass containers category has been completely subsumed within Mixed glass waste.

[6] See Appendix B, Table 11.

Figure 27 Glass recovered for reprocessing, Victoria 2002–03 to 2011–12

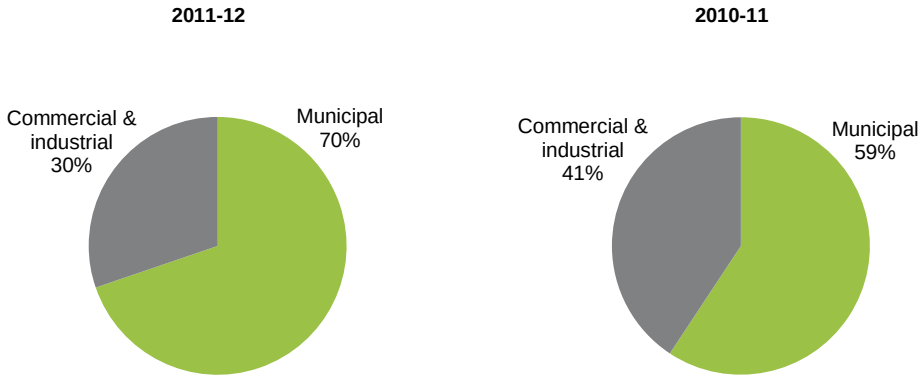


9.2 Sources of recyclables

The Municipal sector's contribution to the glass received for reprocessing during 2011–12 grew by 11% to 70% of the total resulting in glass sourced from the Commercial & Industrial sector to drop from 41% to 30% [*Figure 29*].

The Commercial & industrial sector has steadily increased its contribution to glass recovery in recent years, contributing the majority of Sheet glass recovered in the form of windscreens, broken windows, and off–cuts from the manufacture of glass products.

Figure 28 Source sectors of glass received for reprocessing (by weight), Victoria 2011–12 and 2010–11



10. Plastic

10.1 Recovery and trends

Recovery of plastic for reprocessing in Victoria increased by 2% to almost 150,000 tonnes and Victoria remains Australia's leading plastic recycling state – responsible for reprocessing roughly half of the national total, and home to nearly half of Australia's plastic reprocessors. Domestic and industrial packaging accounts for 68% of all recovered material in Victoria [*Figure 30*].

In 2011–12 the *Victorian Recycling Industry Annual Survey* sourced its plastics reprocessing data from the Plastics and Chemicals Industries Association's (PACIA) *National Plastics Recycling Survey*.

Figure 29 Composition of plastic recovered for reprocessing (by weight), Victoria 2011–12 and 2010–11

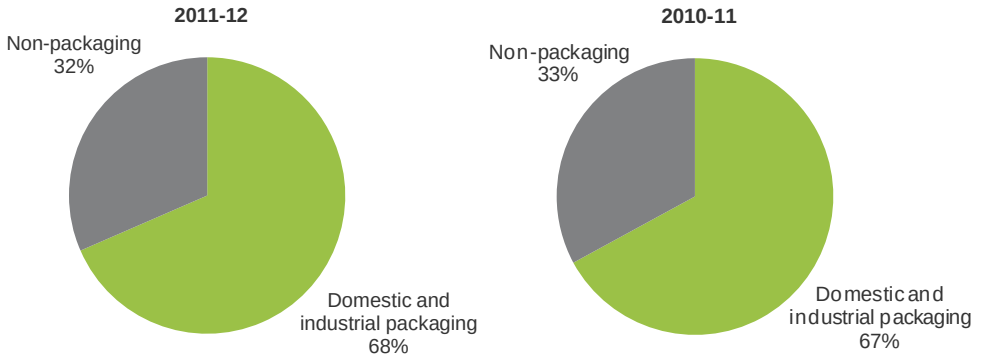
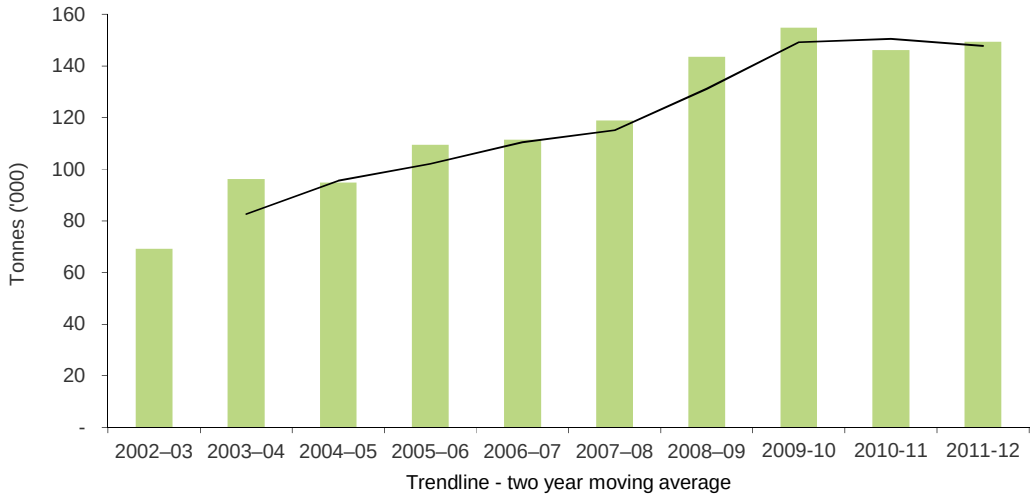


Figure 31 indicates that the recovery of plastic has gradually increased since 2001–02, with a large jump in 2008–09 and continuing into the current reporting period. As well as improved collection systems, sources suggest that much of this increase can be attributed to growing public awareness of the importance of recycling, increased investment in plastic recycling technology, and better quality raw materials that require less effort and expense to recycle.

Figure 30 Plastic recovered for reprocessing, Victoria 2002–03 to 2011–12[7]

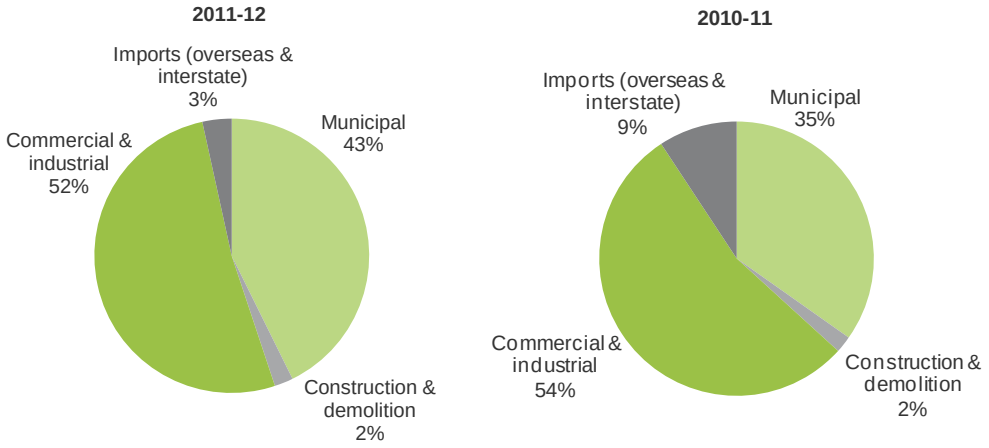


10.2 Sources of recyclables

The influence of Victoria's large manufacturing sector meant the majority of plastics recycled during 2011–12 were sourced from the Commercial & industrial sector [*Figure 32*]. Most of the remaining plastic comes from food and domestic packaging collected by Victoria's councils, which now collect virtually every type of plastic bottle and container (types 1–6).

Figures calculated from the *Victorian Local Government Annual Survey 2010–11* and *2008 Kerbside Garbage Composition: Recent Findings* indicate that the recovery rate of plastic from within the municipal kerbside collection service is roughly 65%.

Figure 31 Source sectors of plastic received for reprocessing, Victoria 2011–12 and 2010–11



[7] In 2009 the Plastics and Chemicals Industries Association's (PACIA) *National Plastics Recycling Survey* changed its reporting period from a calendar year to a financial year basis.

11. Rubber

11.1 Recovery and trends

Nearly 49,000 tonnes of rubber was recovered in Victoria in 2011–12 – a decrease of 10% from the previous year [*Table 9*].

Recovery of Rubber tyres fell by 29% which is almost entirely attributable to a lack of reporting from a medium—sized rubber reprocessor.

Figure 33 shows that although down by 14%, tyres continue to account for the majority of rubber diverted from landfill for reprocessing. Other recovered rubber material – including tyre buffings and tread ends, uncured rubber and extrusion waste accounted for the remainder.

Figure 32 Composition of rubber recovered for reprocessing (by weight), Victoria 2011–12 and 2010–11

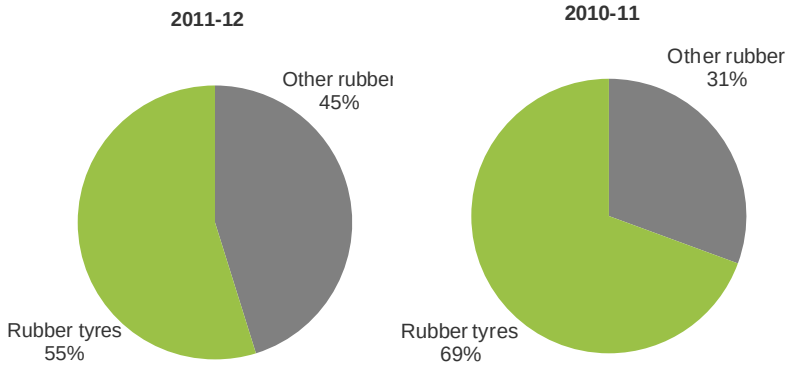
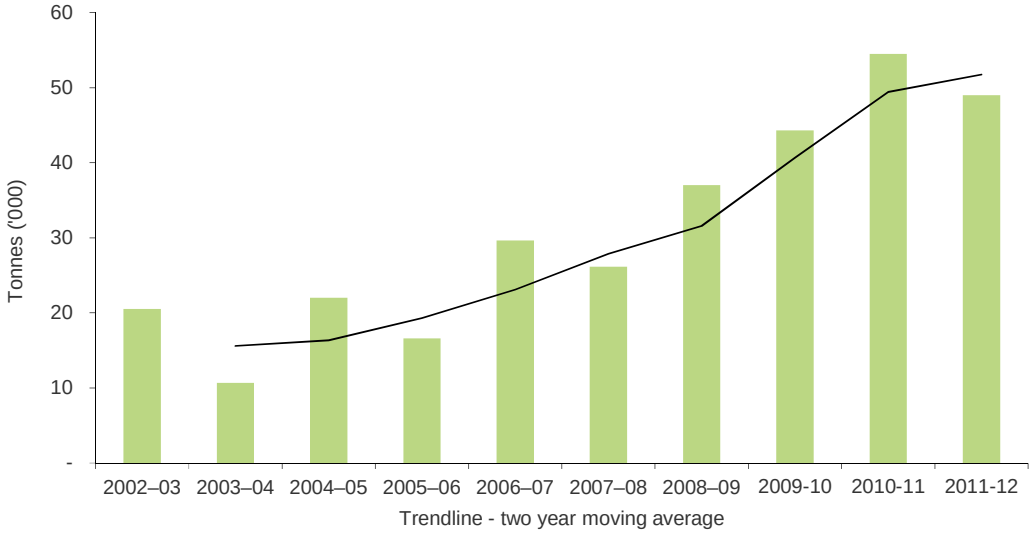


Table 9 Total rubber recovered, Victoria 2011–12 and 2010–11

Report Category	Total recovery in Victoria 2011–12	Total recovery in Victoria 2010–11	Change on previous year
	Tonnes ('000)	Tonnes ('000)	(%)
Other rubber	22	16	32%
Rubber tyres	27	37	—29%
Total	49	54	—10%

Figure 34 shows an increase in rubber recovery in Victoria over the past five years. Although data has fluctuated over the life of the survey, all of the key rubber reprocessors have provided consistent responses to the survey since 2006–07, and it is believed that the totals reported since then provide a more accurate reflection of the state of rubber recycling than in previous years.

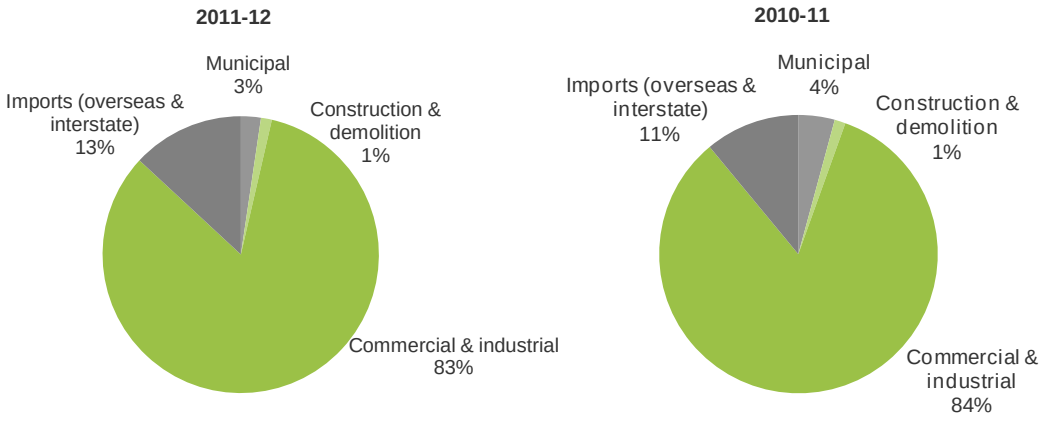
Figure 33 Rubber recovered for reprocessing, Victoria 2002–03 to 2011–12



11.2 Sources of recyclables

Most of the rubber received for reprocessing during 2011–12 (83%) was sourced from the Commercial & industrial sector [*Figure 35*]. The original source of the rubber prior to collection is unknown, although it is assumed that a large proportion comes from domestic vehicles. In the past year, rubber imported from interstate has increased from 11% to 13%.

Figure 34 Source sectors of rubber received for reprocessing (by weight), Victoria 2011–12 and 2010–11



12. Textiles

12.1 Recovery and trends

Once again, mattresses accounted for the majority (68%) of the 5,000 tonnes of textiles recovered for reprocessing in Victoria in 2011–12 [*Table 10*]. Although this data does not include clothing resold through charity shops or exported as relief aid, a new category – Clothing – was added in 2009–10 to reflect the widespread trade in old clothes recycled into commercial rags or carpet underlay. This category does not encompass any clothing recovered for re–use [*Figure 36*].

Figure 35 Composition of textiles recovered for reprocessing (by weight), Victoria 2011–12 and 2010–11

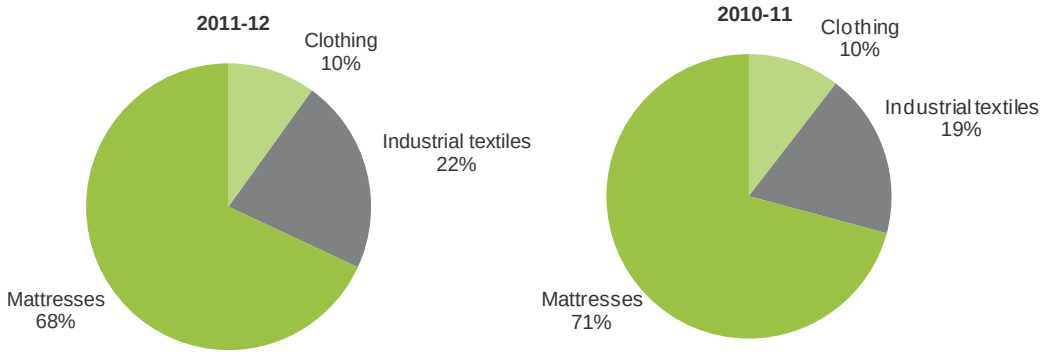
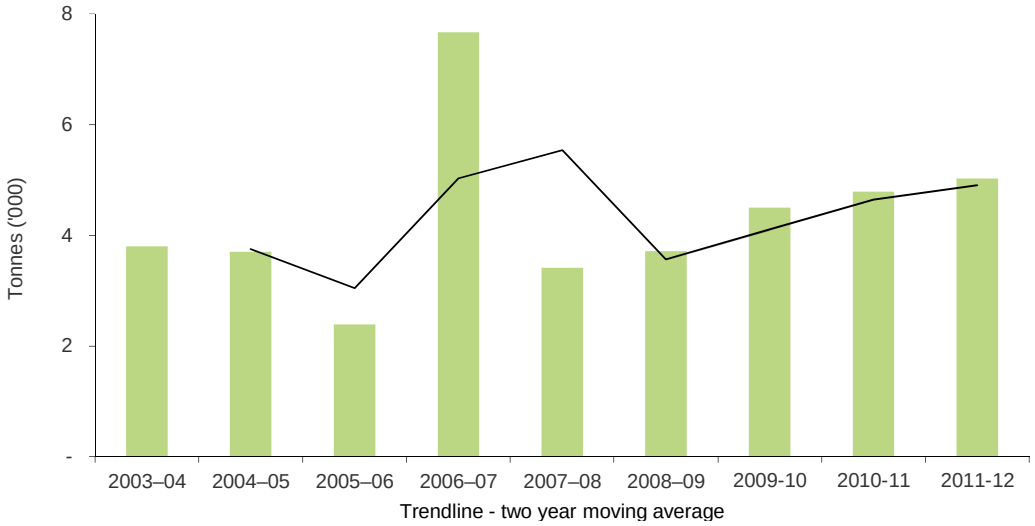


Table 10 Total textiles recovered in Victoria 2010–11 and 2009–10

Report Category	Total recovery in Victoria 2011–12	Total recovery in Victoria 2010–11	Change on previous year
	Tonnes ('000)	Tonnes ('000)	(%)
Industrial textiles	1	<1	–19%
Mattresses	3	3	0%
Clothing (rags)	<1	<1	0%
Total	5	4	6%

Textile recovery figures have fluctuated significantly since the survey began and, for this reason, Figure 37 is limited to data from the past eight years. Data collected before 2003–04 is considered unreliable for historical comparisons because of the smaller proportion of textile reprocessors who took part in the survey until this time.[8]

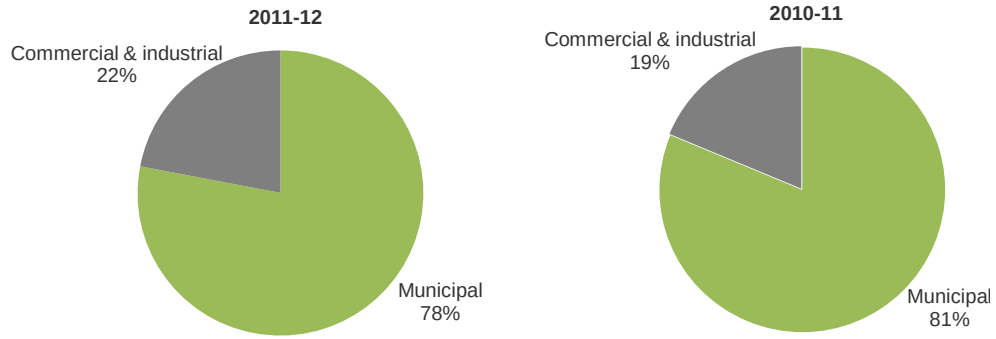
Figure 36 Textiles recovered for reprocessing, Victoria 2003–04 to 2011–12



12.2 Sources of recyclables

The Municipal sector contributed 78% of all materials received by Victoria's textile reprocessors in 2011–12 – a decrease of 3% [*Figure 38*]. The remainder was sourced from the Commercial & industrial sector, including major bed manufacturers and retailers.

Figure 37 Source sectors of textiles received for reprocessing (by weight), Victoria 2010–11 and 2009–10



[8] See Appendix B, Table 11.

Appendix A Survey methodology

The *Victorian Recycling Industry Annual Survey 2011–12* was conducted in August 2012 and sought data from 66 identified Victorian reprocessors of secondary use materials. This did not include the 43 plastic reprocessors already surveyed by Sustainable Resource Use as part of the *2011-12 National Plastics Recycling Survey*[9], which was the source of the data on plastics recovery contained in this report. Each reprocessor was emailed a survey developed for their specific industry category and asked to provide information for the 2011–12 financial year about the amount of material diverted from landfill (recovered) for reprocessing, including:

- tonnes received by their Victorian site
- tonnes received from other reprocessing facilities
- tonnes imported or exported for reprocessing, both interstate and overseas
- tonnes stockpiled (unprocessed and processed)
- tonnes reprocessed on–site
- amount of material disposed of to landfill due to contamination or as processing waste
- sector/s from which the recovered materials for reprocessing were received
- major products made from their reprocessing operations and the subsequent markets (defined by the ANZSIC code divisions for all materials excluding organics) to which the products are sold
- number of full–time equivalent staff directly employed in the company's recycling operations, and
- levels of expenditure on research and development and capital investment for activities associated with the reprocessing of secondary–use materials.

A total of 51 of the 66 reprocessors responded to the survey, representing a 77% response rate. It is estimated that the 51 responding reprocessors between them recover more than 95% by weight of all material recovered in Victoria.

To avoid double counting, this survey focuses only on material recovered for reprocessing and not other stages of the recovered material life cycle, such as collection, sorting and manufacturing. The survey does not include materials that have been collected and baled only, or that have been resold in their original state for reuse, such as clothing sold through second–hand or charity stores. The omission of reused materials is not in any way intended to undervalue this important activity, but is necessary to avoid double counting of data and to provide clear parameters for the quantification of recycling.

With the exception of rubber, no data was included on materials used in energy recovery facilities.

Additional information was sought from the Australian Bureau of Statistics on the export of materials from Australia to overseas markets for reprocessing during the 2010–11 financial year. This data aims to capture materials exported from companies not surveyed by Sustainability Victoria, such as export traders.

Data on plastics recovery in Victoria was obtained from the Plastics and Chemicals Industries Association's annual survey, *2012 National Plastics Recycling Survey*, and incorporated into this report.

Data on solid waste disposed to licensed landfills was sourced from the Environment Protection

[9] Sustainable Resource Use (2012), *2012 National Plastics Recycling Survey*, report to the Plastics and Chemicals Industries Association.

Authority Victoria's landfill levy returns. As stated by the EPA, the figure represents the amount of material accepted at licensed Victorian landfills, excluding material used as cover. The *Environment Protection Act 1970* provides a rebate for cover material of 15% (at the relevant municipal rate) for each tonne of material deposited at a landfill. The figures shown in Table 11 were calculated by taking the tonnes of material received at landfills (including cover material sourced off site) and reducing this by 15% to allow for the cover material. It is noted that some landfills source cover material on site (e.g. from quarrying activities) and that this is not measured in the tonnes of waste received at landfills. Where landfills have claimed a recycling rebate, this has been subtracted from the figures. Prescribed waste (including low–level contaminated soil) deposited to landfill, including where used as cover, is not included in the above figures.

A number of reviews of landfill levy returns are currently being undertaken and therefore this data may be subject to change.

Where figures for garden organics have been supplied in cubic metres, conversion factors used to convert to tonnes have been based on the *National Greenhouse Accounts (NGA) Factors, June 2010*.

The *Victorian Recycling Industry Annual Survey* measures and reports on data from reprocessors who respond. No estimates are undertaken for non–responding companies. Due to the voluntary nature of the survey, it is expected that there will be a degree of variation from year to year. Every attempt has been made to include the large reprocessing operations to ensure that yearly variations are minimised. Data has been aggregated for reporting purposes at the state level to retain confidentiality.

From 2002–03, the food organics recovery data reported no longer includes any prescribed industrial waste figures, such as meat leftover from rendering processes or grease traps. Evaluation and cross–referencing of reported and actual data has led to adjustments of the previous financial years' data.

Appendix B Materials recovered for reprocessing

Table 11 Total material types recovered for reprocessing, Victoria 2002–03 to 2011–12

Material type	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	% change 2010—11 to 2011—12
Metals											
Aluminium (incl. cans)	41	62	88	83	63	51	32	66	84	57	–32%
Batteries	35	30	33	34	15	36	31	37	28	4	–85%
Car bodies	60	80	65	78	120	26	68	153	135	89	–34%
Non–ferrous	28	13	19	19	65	77	68	74	70	92	31%
Other and mixed metals	–	–	–	–	1	206	1	49	6	9	49%
Steel (incl. packaging steel)	807	848	951	1,234	997	955	896	1,028	1,067	1,220	14%
Total metals	971	1,032	1,156	1,448	1,261	1,349	1,097	1,408	1,390	1,470	6%
Construction and demolition											
Asphalt	84	170	162	139	190	152	225	196	223	229	2%
Brick / brick rubble	250	425	395	385	438	293	243	518	497	350	–30%
Concrete	1,161	1,525	1,477	1,734	1,695	1,717	1,730	2,438	2,175	1,829	–16%
Mixed construction and demolition	–	–	–	–	81	111	91	81	167	243	46%
Plasterboard	21	22	24	27	22	33	37	27	32	34	6%
Rock / excavation stone	293	428	367	419	505	668	656	452	981	723	–26%
Soil and sand	42	49	68	209	239	72	170	108	118	93	–21%
Total construction and demolition	1,851	2,618	2,492	2,912	3,170	3,046	3,154	3,823	4,194	3,502	–16%
Paper / cardboard											

Cardboard / paper packaging	414	366	376	461	389	422	468	196	211	278	31%
Newsprint / magazines	196	194	200	232	122	132	159	114	137	123	–11%
Printing and writing paper	174	246	262	238	73	124	92	44	58	108	85%
Telephone books	10	10	9	10	2	1	0	–	–	–	–
Other (mixed paper)	24	34	90	146	236	275	410	644	806	1,157	44%
Total paper / cardboard	817	850	936	1,087	821	954	1,131	998	1,213	1,665	37%
Organics											
Timber	169	171	229	84	196	123	158	163	107	112	5%
Food organics	22	14	13	26	35	29	12	31	22	31	37%
Garden organics	217	179	310	276	302	311	326	384	422	500	10%
Sawdust	111	76	26	35	144	67	154	127	126	150	19%
Other	10	5	40	29	77	76	149	216	193	185	–4%
Total Organics	529	444	618	449	754	604	801	924	871	978	12%
Glass											
Glass containers	73	73	83	143	188	42	38	–	–	–	–
Sheet / laminated glass	12	13	20	25	14	11	19	19	19	17	–10%
Mixed glass waste	–	–	–	–	–	120	128	137	177	178	1%
Total Glass	85	85	102	167	202	173	185	156	196	195	0%
Plastic	69	96	94	109	111	118	143	154	146	149	2%
Rubber	20	10	22	16	29	26	37	44	55	49	–10%
Textiles	83	3	3	2	7	3	3	4	5	5	5%
Other materials	–	–	–	–	–	–	–	–	–	–	–
Total all materials	4,428	5,142	5,427	6,194	6,358	6,277	6,555	7,516	8,069	8,014	–1%

* Evaluation and cross–referencing of reported and actual data has led to an adjustment of previous financial year data.

Note: Food organics recovery data from 2002–03 no longer includes any prescribed industrial waste figures such as meat leftover from rendering processes or grease traps. Garden organics figures for 2003–04 and 2005–06 have been updated to more accurately reflect tonnes recorded in the *Local Government Data Collection Survey 2003–04* and the *Victorian Local Government Data Collection 2005–06* report

Appendix C Participating reprocessors

Sustainability Victoria would like to recognise and thank the following participants in the *Victorian Recycling Industry Annual Survey 2011–12*. The list below does not indicate all reprocessors who participated in the survey but those that agreed to be recognised.

Allstone Quarries	Gippsland Water	SITA
Amcor Recycling	GP Embelton & Co Pty Ltd	Statewide Waste
Bark King Group Pty Ltd	Norstar	Transpacific Industries Group
C&N Ruggiero	Onesteel	Tyrecycle
Camperdown Compost Co	Peerless Holdings	Waste Converters Recycling
Corio Waste	Spotswood Holdings	
Enviromix	Scatoplus	

Appendix D Glossary

Commercial & industrial (C&I): Comprises solid waste generated by the business sector as well as solid waste created by state and federal government entities, schools and tertiary institutions. Unless otherwise noted, C&I waste does not include waste from the Construction & demolition (C&D) sector.

Commingled materials: Materials mixed together, such as plastic bottles with glass and metal containers. Commingled recyclable materials require sorting after collection before they can be recycled.

Construction & demolition (C&D): Includes waste from residential, civil and commercial construction and demolition activities, such as fill materials (e.g. soil), asphalt, bricks and timber. C&D waste excludes construction waste from owner / occupier renovations, which is included in the municipal waste stream. Unless otherwise noted, C&D waste does not include waste from the C&I sector.

Garden organics: Organics derived from garden sources e.g. grass clippings and tree prunings.

High density polyethylene (HDPE): A member of the polyethylene family of plastics, 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 commingled) that are left at the kerbside for collection by local collection services.

Landfill: Sites that are licensed by EPA Victoria for the disposal of materials (both waste and potentially recyclable material). Also known as tips.

Linear low density polyethylene (LLDPE): A member of the polyolefin family of plastics, LLDPE is a strong and flexible plastic usually used in film for packaging, bags and for industrial products such as pressure pipe.

Low density polyethylene (LDPE): A member of the polyolefin family of plastics, LDPE is a flexible material usually used as film for packaging or as bags.

Mulch: Any composted or non–composted organic material, excluding plastic, which is suitable for placing on soil surfaces to restrict moisture loss from the soil and to provide a source of nutrients to aid plant growth.

Municipal: Solid waste generated from domestic premises (garbage and hard waste) and council activities such as street sweeping, litter collection and street tree lopping. Also includes waste dropped off at transfer stations and construction waste from residential owner / occupier renovations.

Non–ferrous metals: Those metals that contain very little or no iron (e.g. copper, brass, bronze and aluminium).

Polyethylene terephthalate (PET): A clear, tough, light and shatterproof type of plastic, used to make products such as soft drink bottles, film packaging and fabrics.

Polypropylene (PP): A member of the polyolefin family of plastics. PP is light, rigid and glossy and is used to make products such as washing machine agitators, clear film packaging, carpet fibres and housewares.

Polystyrene (PS): A member of the styrene family of plastics, PS is easy to mould and is used to make refrigerator and washing machine components. It can be foamed to make single–use packaging, such as cups, meat and produce trays.

Polyvinyl chloride (PVC): A member of the vinyl family of plastics, PVC can be clear, flexible or rigid and is used to make products such as fruit juice bottles, credit cards, pipes and hoses.

Post–consumer material: Material generated by households or commercial, industrial or 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 process. Excluded is reutilisation of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

Prescribed waste and prescribed industrial (PIW) waste: Those wastes listed in the *Environment Protection (Prescribed Waste) Regulations 1998* and subject to requirements under the industrial waste management policy (prescribed industrial waste) 2000. EPA Victoria closely regulates these wastes because of their potential adverse impacts on human health and the environment. Prescribed wastes carry special handling, storage, transport and often licensing requirements and attract substantially higher disposal levies than non–prescribed solid wastes.

Recovered material: Material that would have otherwise been disposed of as waste, but has instead been collected and recovered (reclaimed) as a material input, in lieu of a new primary material, for a recycling or manufacturing process.

Recovery rate: The recovery rate is the percentage of materials recovered for reprocessing from the total quantity of waste generated.

Recycling (term): used to cover a wide range of activities, including collection, sorting, reprocessing and manufacture into new products.

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 and enable it to be reused.

Solid waste: Non–hazardous, non–prescribed solid waste materials, ranging from municipal garbage to industrial waste.

Waste generation: Generation of unwanted materials including recyclables as well as garbage.