Version 2: April 2022

AUSTRALIAN PACKAGING CONSUMPTION & RECOVERY DATA 2019-20

APCO
AUSTRALIAN PACKAGING COVENANT ORGANISATION

Acknowledgements
We acknowledge and thank the packaging manufacturing and reprocessing companies around Australia that took the time to respond to our information request for this project. The completion of this study was only possible because of your valuable and expert contributions.

Authors
Report prepared by Envisage Works, IndustryEdge, Randell Environmental Consulting and Sustainable Resource Use on behalf of the Australian Packaging Covenant Organisation.

CONTENTS

EXECUTIVE SUMMARY

Background

In 2018, all levels of Australian government, including representatives from local, state and territory and federal governments, came together with industry to launch Australia's 2025 National Packaging Targets (2025 Targets), providing a clear mandate to deliver a new sustainable pathway for packaging in Australia.

This report provides packaging consumption and recovery data for Australia for financial year 2019–20, to inform the measurement of progress towards the 2025 Targets. This is the third iteration of the report, and builds on the baseline data from 2017-2018 and 2018-19.

The data in this report is also intended to support strategic planning across the life cycle of packaging – design, manufacturing, use, disposal, and end-of-life – to improve sustainability.

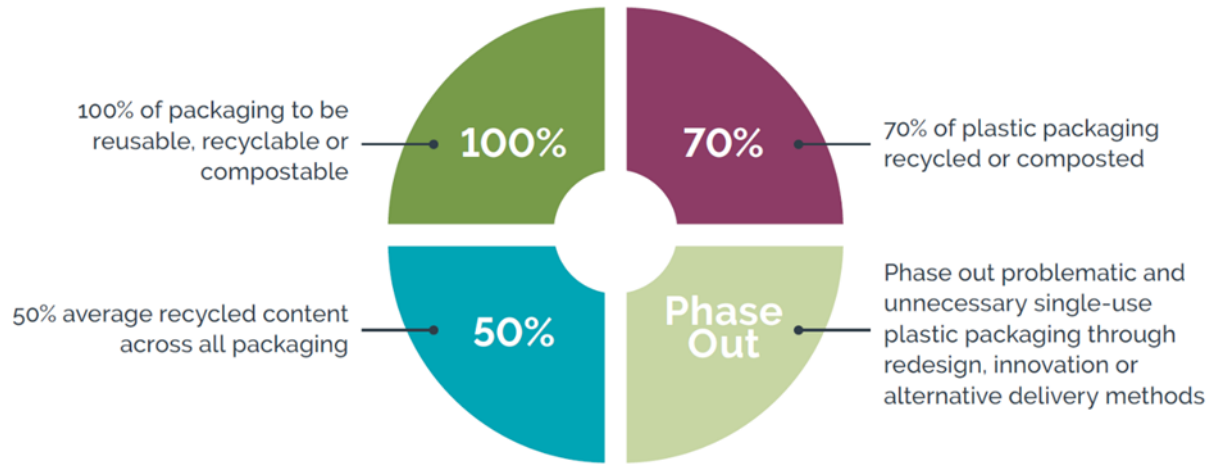

Figure E-1 – Australia's 2025 National Packaging Targets

Packaging consumption

2019–20

Total packaging placed on market (POM) in Australia in 2019–20 is estimated at 6.27 million tonnes. POM means that the packaging has been made available to the end-consumer (including business users). It includes locally manufactured and imported packaging (filled or unfilled).

Of the 6.27 million tonnes of packaging POM in 2019–20, over half was paper & paperboard packaging (52.3%), followed by glass packaging (18.4%), plastic packaging (17.9%), wood packaging (7.4%), and metal packaging (4.0%).

Estimates for packaging POM by material group are provided in **Table E-1** and **Figure E-2**. The aggregated accuracy range estimates for each of the material groups are also provided as error bars in **Figure E-2**.

Table E-1 – Packaging POM in 2019–20, by material group

Material group	POM			Accuracy range
	(tonnes)	(%)	(kg/person)	(±%)
Paper & paperboard	3 277 000	52.3%	128	6%
Glass	1 156 000	18.4%	45	12%
Plastic	1 124 000	17.9%	44	20%
Metal	248 000	4.0%	10	12%
Wood	462 000	7.4%	18	38%
Total	**6 266 000**	**100.0%**	**244**	**12%**

The accuracy ranges are weighted sum averages of packaging manufacturer reported estimates of the level of accuracy (±%) of packaging POM. The accuracy range provides an estimate of the range within which the true value can be found, with the reported value being the best estimate of the true value.

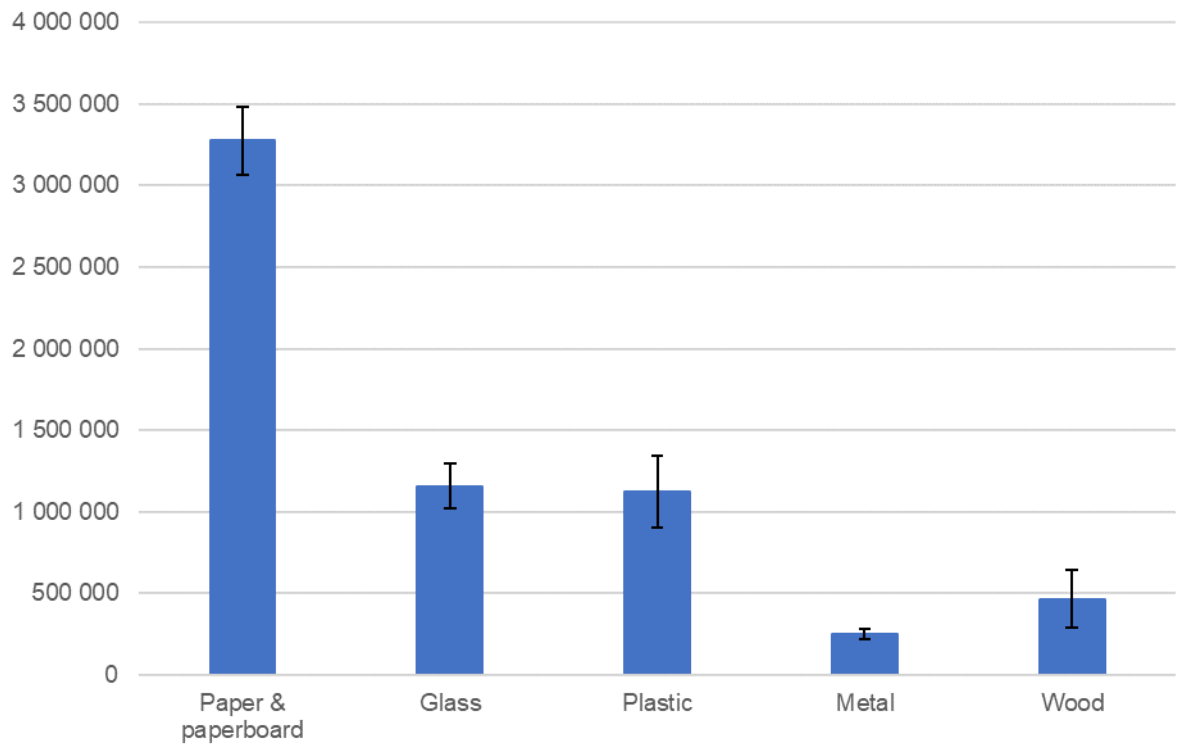

Figure E-2 – Packaging POM in 2019–20, by material group (tonnes)

Progress from 2017–18 to 2019–20

Table E-2 compares POM data by material group from 2017–18 to 2019–20.

In 2019–20, packaging POM increased by 6% compared to the 2018–19 estimate of 5.92 million tonnes.

The survey identified more business-to-business (B2B) wood packaging POM in 2019–20, which has influenced the result. Excluding wood provides a more comparable trend estimate. This gives an estimated total packaging POM of 5.80 million tonnes in 2019–20, virtually unchanged from an estimate of 5.79 million tonnes in 2018–19.

The most significant trends in packaging POM, excluding wood, were an increase in plastic packaging (+12%) and a reduction in glass packaging (-10%).

Table E-2 – Packaging POM from 2017–18 to 2019–20, by material group

Material group	2017–18	2018–19	2019–20	Change 2018–19 to 2019–20
	(tonnes)	(tonnes)	(tonnes)	(%)
Paper & paperboard	2 901 000	3 262 000	3 277 000	0%
Glass	1 273 000	1 283 000	1 156 000	-10%
Plastic	1 067 000	1 000 000	1 124 000	12%
Metal	213 000	246 000	248 000	1%
Wood	NR[a]	124 000	462 000	272%
Total (tonnes)	**5 453 000**	**5 916 000**	**6 266 000**	**6%**
Total (kg/person)	**218**	**233**	**244**	**5%**

a) NR – Not reported.

Packaging recovery

2019–20

Total Australian post-consumer packaging recovery in 2019–20 is estimated at 3.42 million tonnes (±14%). This recovery estimate is measured at the out-going gate of the secondary processing facility for the used packaging.

Of the packaging recovered in 2019–20, over two thirds were paper & paperboard packaging (65.2%), followed by glass packaging (20.5%), plastic packaging (5.2%), wood packaging (5.0%), and metal packaging (4.1%).

Estimates for post-consumer packaging recovery by material group are provided in **Table E-3** and **Figure E-3**. The estimates include post-consumer packaging collected through municipal, commercial and industrial (C&I), and container deposit scheme (CDS) collection services.

Table E-3 – Post-consumer packaging recovery in 2019–20, by material group

Material group	Recovery			Accuracy range
	(tonnes)	(%)[a]	(kg/person)	(±%)
Paper & paperboard	2 229 000	65.2%	87	13%
Glass	699 000	20.5%	27	9%
Plastic	179 000	5.2%	7	11%
Metal	139 000	4.1%	5	17%
Wood	171 000	5.0%	7	50%
Total	**3 416 000**	**100.0%**	**133**	**14%**

a) Percent contribution to the total tonnes of packaging recovered, not the individual material recovery rate.

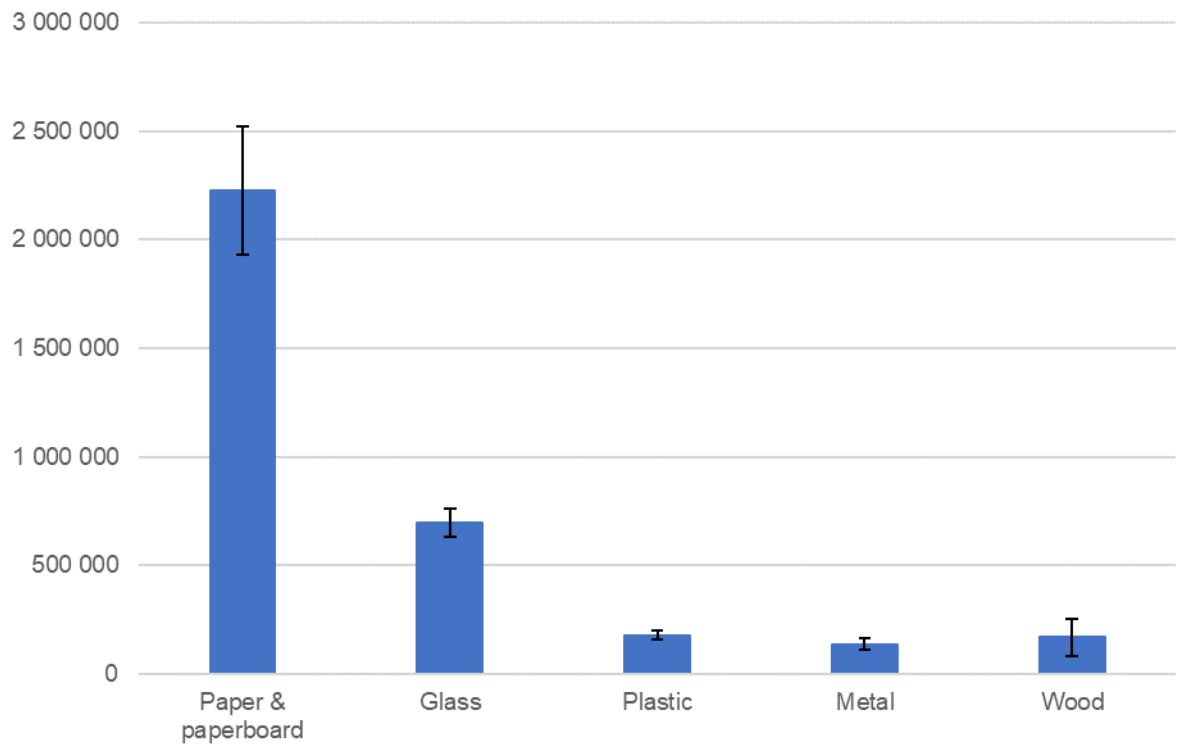

Figure E-3 – Post-consumer packaging recovery in 2019–20, by material group (tonnes)

Progress from 2017–18 to 2019–20

Table E-4 compares recovery data by material group from 2017–18 to 2019–20.

Packaging recovery in 2019-20 was 3.42 million tonnes, which was a 14.6% increase (+434,000 tonnes) on the 2018–19 packaging recovery estimate of 2.98 million tonnes.

Excluding wood, 3.25 million tonnes of packaging were recovered in 2019–20, a 10.4% increase on the 2018–19 estimate of 2.94 million tonnes.

Table E-4 – Post-consumer packaging recovery from 2017–18 to 2019–20, by material group

Material group	2017–18	2018–19	2019–20	Change 2018–19 to 2019–20
	(tonnes)	(tonnes)	(tonnes)	(%)
Paper & paperboard	1 817 000	2 045 000	2 229 000	9%
Glass	582 000	574 000	699 000	22%
Plastic	173 000	182 000	179 000	-2%
Metal	102 000	137 000	139 000	2%
Wood	NR[a]	44 000	171 000	284%
Total (tonnes)	**2 673 000**	**2 982 000**	**3 416 000**	**15%**
Total (kg/person)	**107**	**118**	**133**	**13%**

a) NR – Not reported.

Packaging recovery rates

2019–20

The Australian post-consumer packaging recovery rate in 2019–20 is estimated at 55%. This is based on the recovery of each material group as measured at the out-going gate of the secondary processing facility for the used packaging (summarised above), divided by the related packaging POM by material group.

Paper & paperboard has the highest recovery rate at 68%, followed by glass packaging (60%), metal packaging (56%), wood packaging (37%), and plastic packaging (16%).

Table E-5 – Post-consumer packaging recovery rates in 2019–20, by material group

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Paper & paperboard	3 277 000	2 229 000	68%
Glass	1 156 000	699 000	60%
Plastic	1 124 000	179 000	16%
Metal	248 000	139 000	56%
Wood	462 000	171 000	37%
Total	**6 266 000**	**3 416 000**	**55%**

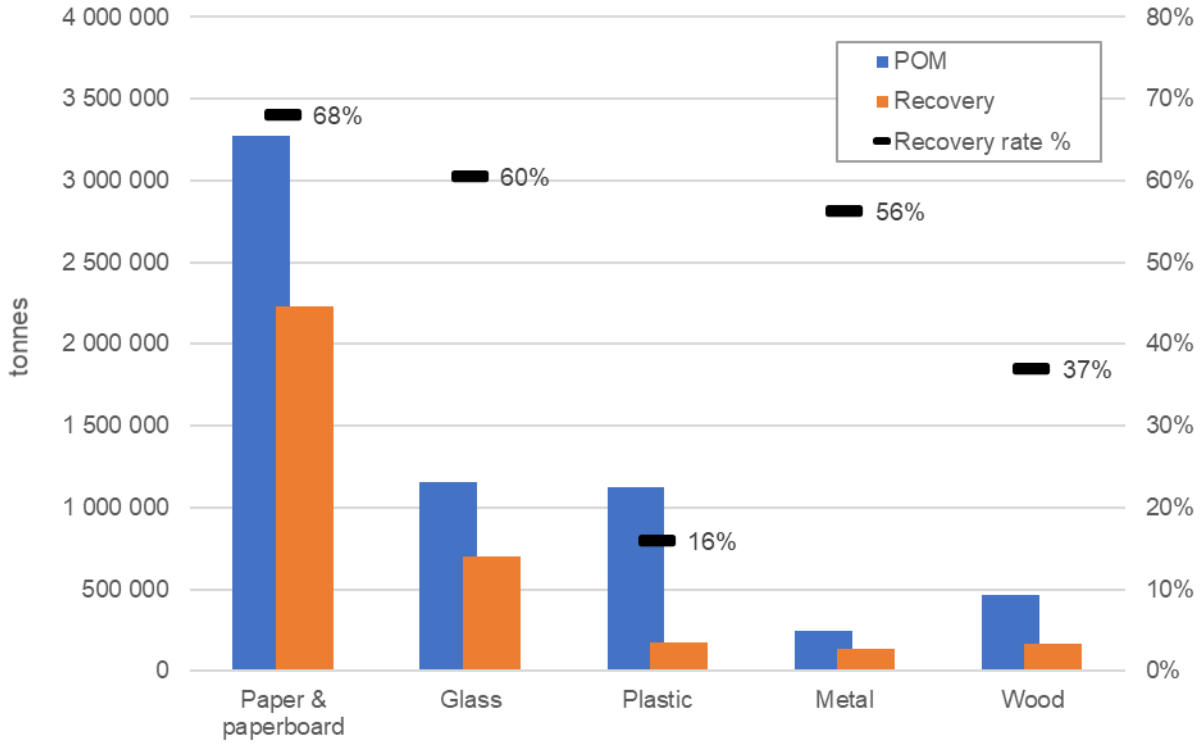

Figure E-4 – Post-consumer packaging recovery rates in 2019–20, by material group

Progress from 2017-18 to 2019-20

Table E-6 and **Figure E-5** compare recovery rates by material group from 2017–18 to 2019–20.

In 2019-20 there was a marked increase in the glass packaging recovery rate compared to the previous year, underpinned by increasing glass packaging recovery due to the increasing maturity of container deposit schemes in NSW and Queensland in that year. In addition, the use of glass into construction applications grew strongly from 2018–19 to 2019–20, with most of the increase in Victoria.

Table E-6 – Post-consumer packaging recovery rates from 2017–18 to 2019–20, by material group

Material group	2017–18	2018–19	2019–20	% change[a] 2018–19 to 2019–20
	(%)	(%)	(%)	(%)
Paper & paperboard	63%	63%	68%	5%
Glass	46%	45%	60%	16%
Plastic	16%	18%	16%	-2%
Metal	48%	56%	56%	1%
Wood	NR[b]	36%	37%	1%
Total	**49%**	**50%**	**55%**	**4%**

a) % change values are calculated prior to rounding the annual values. See Section 1.4 for more details.
b) NR – Not reported.

While the recovery rate fell slightly for plastic, from 18% to 16%, and increased slightly for metals, the underlying accuracy ranges for the POM and recovery estimates mean that it is not possible to state whether a real change in recovery rates for plastic and metal packaging has occurred.

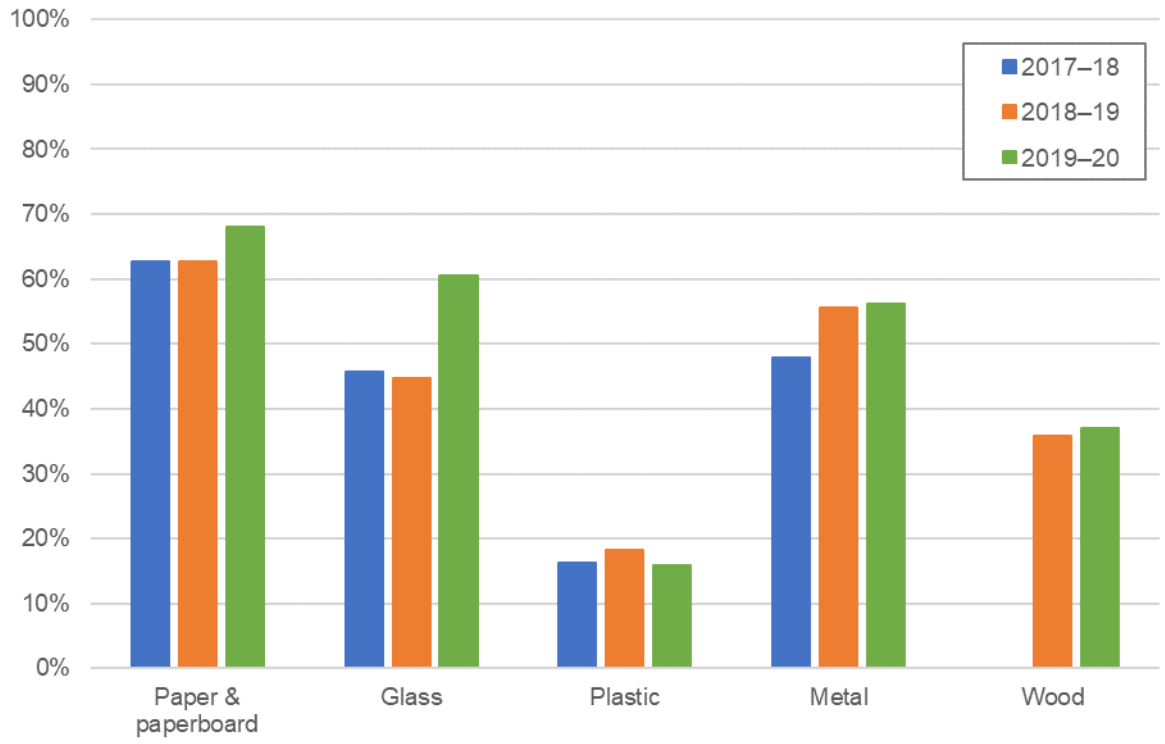

Figure E-5 – Post-consumer packaging recovery rates from 2017–18 to 2019–20, by material group (tonnes)

Packaging recycled content

2019–20

Estimates of the recycled content incorporated into packaging POM in 2019–20, by material group, are provided in **Table E-7** and **Figure E-6**. The post-consumer recycled (PCR) content across all packaging was 2.3 million tonnes, or 39% of total packaging POM (excluding wood). The pre-consumer recycled content was 0.7 million tonnes (11%), and 2.9 million tonnes (50%) was sourced from virgin (primary) feedstocks.

Table E-7 – Packaging POM in 2019–20, by material group (excluding wood) and recycled content

Material group	Post-consumer source		Pre-consumer source		Virgin source		Total
	(tonnes)	%	(tonnes)	%	(tonnes)	%	(tonnes)
Paper & paperboard	1 768 000	54%	500 000	15%	1 009 000	31%	**3 277 000**
Glass	428 000	37%	73 000	6%	655 000	57%	**1 156 000**
Plastic	36 000	3%	16 000	1%	1 071 000	95%	**1 124 000**
Metal	28 000	11%	71 000	29%	149 000	60%	**248 000**
Total	**2 260 000**	**39%**	**660 000**	**11%**	**2 884 000**	**50%**	**5 805 000**

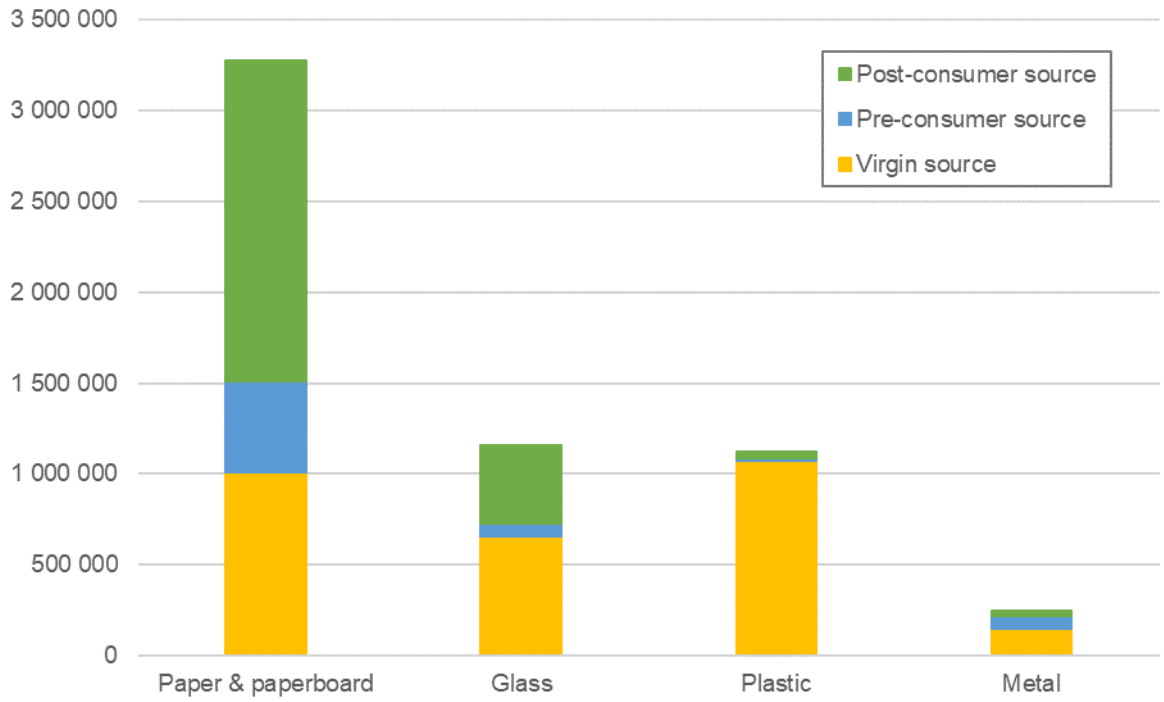

Figure E-6 – Packaging POM in 2019–20, by material group (excluding wood) and recycled content (tonnes)

Progress from 2017-18 to 2019-20

Table E-8 compares the post-consumer recycled (PCR) content of packaging by material group from 2017–18 to 2019–20.

In 2019–20, the total quantity of PCR material in packaging increased by an estimated 23 kt (1%) compared to the previous year.

The PCR content of packaging, excluding wood, increased slightly to 39% in 2019–20.

Table E-8 – Packaging PCR content from 2017–18 to 2019–20, as a percentage of packaging POM, by material group (excluding wood)

Material group	2017–18		2018–19		2019–20	
	(tonnes)	(% of POM)	(tonnes)	(% of POM)	(tonnes)	(% of POM)
Paper & paperboard	1 421 000	49%	1 667 000	51%	1 768 000	54%
Glass	407 000	32%	474 000	37%	428 000	37%
Plastic	23 000	2%	37 000	4%	36 000	3%
Metal	64 000	30%	59 000	24%	28 000	11%
Total	**1 915 000**	**35%**	**2 237 000**	**38%**	**2 260 000**	**39%**

a) NR – Not reported.

There was continued growth reported in the PCR content of paper & paperboard packaging from 2018–19 to 2019–20, underpinned by strong growth in the average PCR content of corrugated cardboard POM. The PCR content of the other material groups was steady, except for metals, which fell notably.

The fall in the metal's PCR content resulted from more detailed and Australian specific survey information being provided by packaging manufacturers on the PCR content of the metal substrate received from suppliers, rather than an actual reduction in the PCR content between 2018–19 and 2019–20.

Packaging recyclability

Estimates of packaging recyclability by recyclability classification and material group are provided in **Table E-9** and **Figure E-7**. Throughout the report the term *packaging recyclability* is used as an umbrella term for reusable, recyclable, or compostable packaging.

The method for determining packaging recyclability uses a scoring framework based on three criteria:

- The availability of a collection system.
- Whether the material is technically recyclable, i.e., it can be sorted and recycled.
- The availability of end markets.

Using this framework each packaging format was classified as having either good recyclability, poor recyclability or being not recyclable.

2019–20

It is estimated that 5.4 million tonnes (86%) of packaging POM in 2019–20 had good recyclability. This was dominated by paper & paperboard (of which 90% had good recyclability) and glass (of which 100% had good recyclability). Almost all metal packaging (97%) was classified as having good recyclability, but only 60% of plastic packaging was classified as having good recyclability. Wood packaging had 78% classified as having good recyclability.

Around 0.7 million tonnes (11%) of packaging was classified as having poor recyclability or not being recyclable. Around 40% of this was plastic packaging, and another 44% was paper & paperboard packaging.

Table E-9 – Recyclable or compostable packaging POM in 2019–20, by recyclability classification

Material group	Good recyclability	Poor recyclability	Not recyclable	Unknown	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Paper & paperboard	90.3%	7.7%	2.0%	0.0%	100.0%
Glass	100.0%	0.0%	0.0%	0.0%	100.0%
Plastic	60.2%	17.0%	8.7%	14.2%	100.0%
Metal	96.9%	3.1%	0.0%	0.0%	100.0%
Wood	77.8%	0.0%	22.2%	0.0%	100.0%
Total (%)	**86.0%**	**7.2%**	**4.2%**	**2.5%**	**100.0%**
Total (tonnes)	**5 392 000**	**450 000**	**265 000**	**160 000**	**6 266 000**

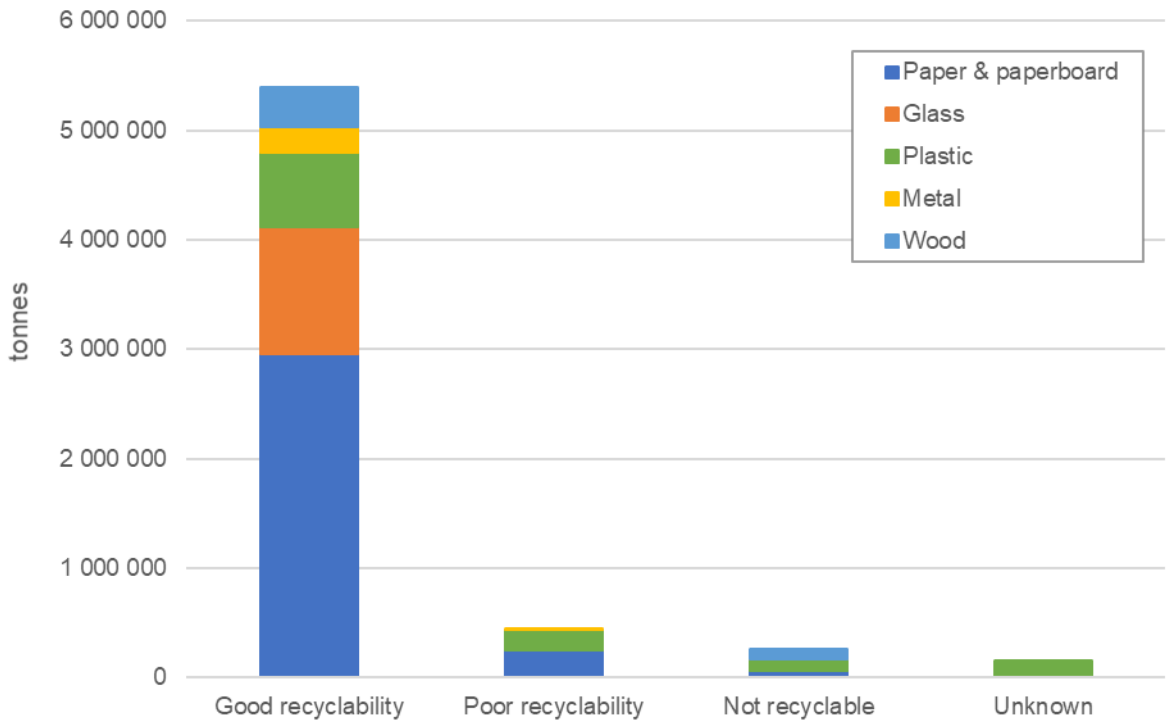

Figure E-7 – Recyclable or compostable packaging POM in 2019–20, by recyclability classification

Progress from 2017-18 to 2019-20

Table E-10 compares the 2017–18 to 2019–20 quantities of packaging with a 'good recyclability' classification.

The fall in the percentage of plastic packaging with good recyclability in 2019-20 is largely due to an increase in the reported quantities of flexible plastic packaging (bags and wraps) onto the market with a poor recyclability classification, and improved detail on the quantities of plastic closures and labels onto the market.

The fall in recyclability for wood packaging is due to improved reporting detail on the composition of wood packaging, specifically with respect to the quantities POM of single-use timber pallets made with unrecyclable fibreboard-based components.

Table E-10 – Packaging with a 'good recyclability' classification from 2017–18 to 2019–20, by material group

Material group	2017–18		2018–19		2019–20	
	(tonnes)	(%)	(tonnes)	(%)	(tonnes)	(%)
Paper & paperboard	2 682 000	92%	2 962 000	91%	2 961 000	90%
Glass	1 273 000	100%	1 283 000	100%	1 156 000	100%
Plastic	627 000	59%	663 000	66%	676 000	60%
Metal	201 000	95%	243 000	99%	240 000	97%
Wood	NR[a]	NR[a]	121 000	98%	359 000	78%
Total	**4 783 000**	**88%**	**5 273 000**	**89%**	**5 392 000**	**86%**

a) NR – Not reported.

Packaging projections

As part of the study, baseline projections of the following have been undertaken:

- **Annual POM estimates from 2019–20 to 2024–25 by material type** – These projections are generally based on manufacturer reported market growth estimates by packaging material type and component group. Population growth estimates have been adopted where survey data was not available.
- **Annual recovery estimates from 2019–20 to 2024–25 by material type** – These projections are based on reprocessor reported (spare) capacity and committed new capacity.

These baseline POM and recovery projections quantify the impact of planned infrastructure changes reported by packaging manufacturers and reprocessors during the surveys undertaken for this project.

Presented in **Table E-11** and **Figure E-8** are annual packaging POM estimates from 2019–20 to 2024–25 by material group. The compound annual growth rate (CAGR) for packaging POM over this period is 2.4% per year.

Table E-11 – Annual packaging POM from 2019–20 to 2024–25, by material group

Material group	2019–20[a]	2020–21	2021–22	2022–23	2023–24	2024–25	5-year CAGR[b]
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(% per yr)
Paper & paperboard	3 277 000	3 378 000	3 481 000	3 588 000	3 698 000	3 811 000	3.1%
Glass	1 156 000	1 172 000	1 189 000	1 207 000	1 224 000	1 242 000	1.4%
Plastic	1 124 000	1 143 000	1 164 000	1 184 000	1 206 000	1 228 000	1.8%
Metal	248 000	252 000	255 000	259 000	263 000	267 000	1.5%
Wood	462 000	470 000	479 000	488 000	497 000	506 000	1.8%
Total	**6 266 000**	**6 415 000**	**6 568 000**	**6 726 000**	**6 888 000**	**7 055 000**	**2.4%**

a) 2019–20 data is actual year data. Data for 2020–21 to 2024–25 are projections.

b) CAGR – Compound annual growth rate.

Between 2019–20 and 2024–25 there is projected to be 789 kt (12.6%) of growth in packaging POM, based largely on packaging manufacturer estimates of prospective market growth. Of this, 534 kt (68%) is projected to be paper & paperboard packaging, 86 kt (11%) glass packaging, 104 kt (13%) plastic packaging, 19 kt (2%) metal packaging and 44 kt (6%) wood packaging.

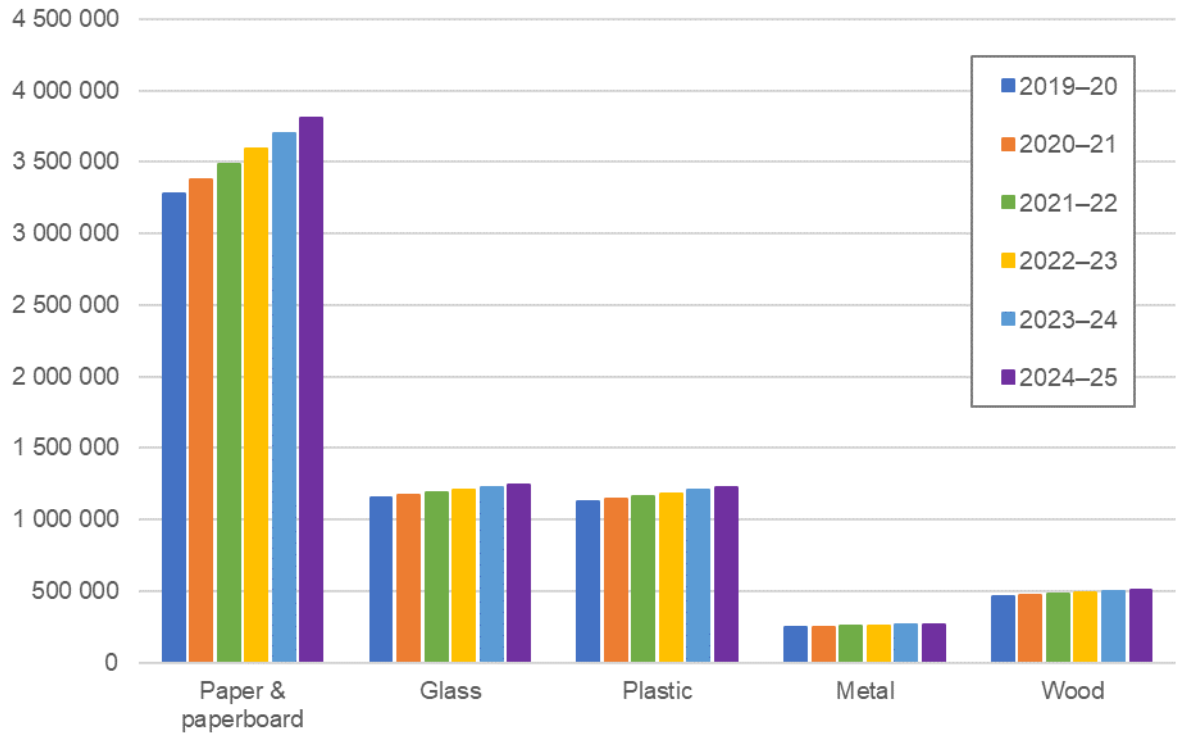

Figure E-8 – Annual packaging POM from 2019–20 to 2024–25, by material group (tonnes)

Presented in **Table E-12** and **Figure E-9** are baseline packaging reprocessing capacity projections (without any further interventions) from 2019–20 to 2024–25 by material group. The 5-year CAGR for baseline reprocessing growth over this period is 2.8% per year, which is only a little higher than that for packaging POM. The estimated increase in capacity over the 5-year period is 500,000 tonnes, with the most significant increases for glass (210,000 tonnes) and plastics (240,000 tonnes).

Table E-12 – Annual packaging reprocessing capacity projections from 2019–20 to 2024–25, by material group

Material group	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25	5-year CAGR[a]
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(% per yr)
Paper & paperboard	2 229 000	2 238 000	2 248 000	2 258 000	2 267 000	2 277 000	0.4%
Glass	699 000	741 000	783 000	825 000	867 000	909 000	5.4%
Plastic	179 000	227 000	275 000	323 000	371 000	419 000	18.6%
Metal	139 000	140 000	141 000	142 000	144 000	145 000	0.9%
Wood	171 000	171 000	171 000	171 000	171 000	171 000	0.0%
Total	**3 416 000**	**3 517 000**	**3 618 000**	**3 719 000**	**3 819 000**	**3 920 000**	**2.8%**

a) CAGR – Compound annual growth rate.

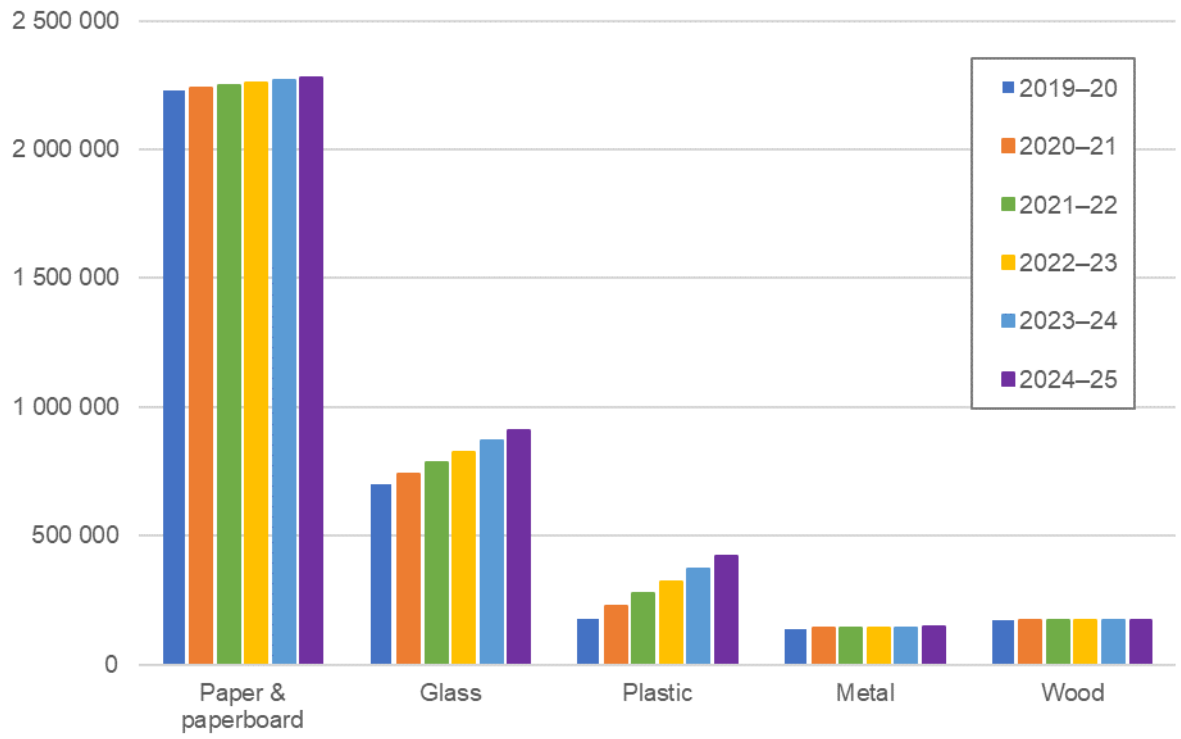

Figure E-9 – Annual packaging reprocessing capacity projections from 2019–20 to 2024–25, by material group (tonnes)

Packaging reuse

This year, the flows of eight reusable packaging systems have been quantified; with three new categories added to the five that were quantified in 2018–19. These flows have not been included in the consumption and recovery data outlined above. This is a continuing exercise to incorporate reusable packaging flows into the core consumption and recovery dataset in the future.

The following reusable packaging systems were quantified:

- **NEW – Drums (200–205 litre)** – All reusable steel and plastic drums in the 200–205 litre capacity range (44-gallon UK or 55 gallon US).
- **NEW – Intermediate bulk containers (IBCs)** – All rigid IBCs are assumed to be reusable (rather than single-use) packaging.
- **NEW – Reusable coffee cups** – Reusable coffee cups with a sealable lid, that are used in an away-from-home setting, and that can be reasonably expected to have avoided the use of a single-use coffee cup.
- **Kegs** – Beer kegs only.
- **Milk crates** – Non-collapsible plastic crates. Limited to dairy product applications only.
- **Pallets** – Reusable timber and plastic pallets only, including display pallets. Single-use pallets are excluded.
- **Returnable plastic crates (RPCs)** – Collapsible plastic crates. Limited to major supermarket systems only.
- **Reusable shopping bags** – Reusable non-woven PP (NWPP) bags, and reusable LDPE bags (supermarket type).

The quantified reusable packaging systems avoided the use of 2.9 million tonnes of single-use packaging. Approximately 91% of the avoided single-use packaging consumption benefit is provided by reusable pallets and beer kegs. The net theoretical reduction in packaging use was 2.7 million tonnes, as there were 0.2 million tonnes of reusable packaging inputs in 2019–20.

Progress towards the 2025 National Packaging Targets

Table E-13 provides a summary of the 2025 National Packaging Targets and the 2017–18 to 2019–20 results against those targets.

Table E-13 – Summary of the National Packaging Targets and progress to 2019–20

Target	Target	2017–18 result	2018–19 result	2019–20 result
100% of all Australia's packaging will be reusable, recyclable or compostable by 2025 or earlier	100%	88%	89%	86%
70% of Australia's plastic packaging will be recycled or composted by 2025	70%	16%	18%	16%
50% average recycled content will be included across all packaging by 2025	50%	35%[a]	38%[a]	39%[a]
Problematic and unnecessary single-use plastic packaging will be phased out	Reduction in priority items[b]	Baseline	-41%[c]	+16%[c]

a) Post-consumer recycled content only. Does not include wood or manufacturing scrap (pre-consumer) recycled content.

b) Priority items are defined as PVC, PS, EPS, oxo-degradable plastics, and retail shopping bags POM.

c) These estimates are subject to a relatively large accuracy range and high year-on-year reporting volatility. Estimated value is relative to the previous year.

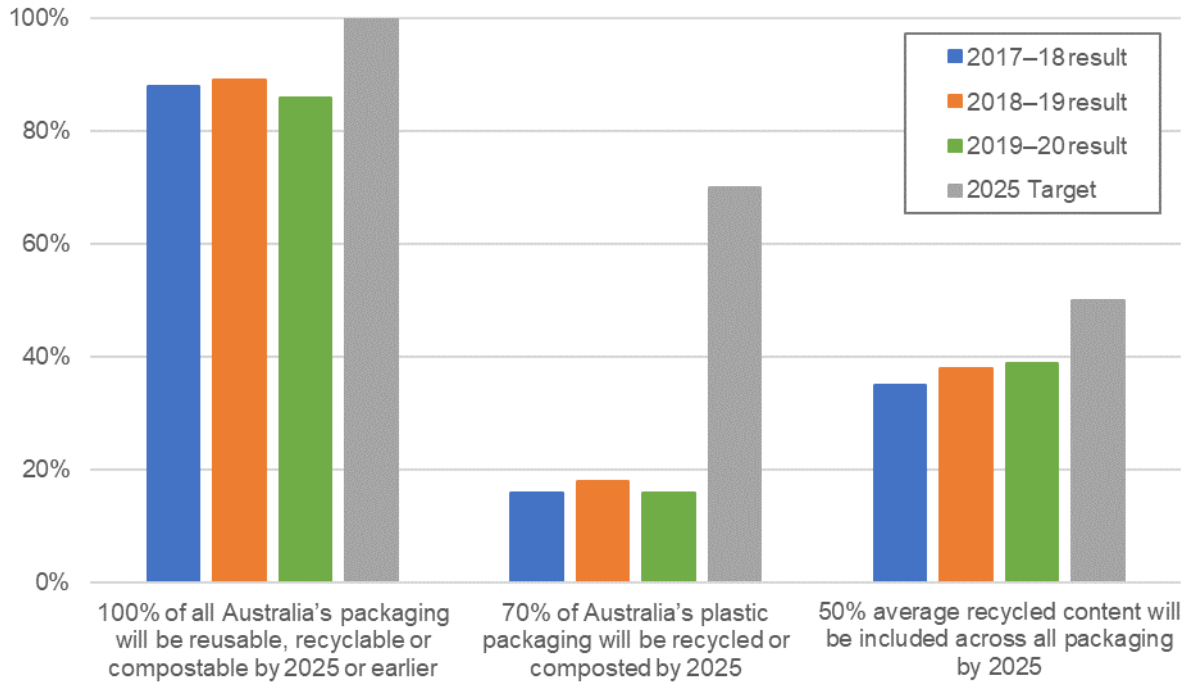

Figure E-10 – Summary of the National Packaging Targets and progress to 2019–20

Project method

Consumption quantification

Locally manufactured Australian packaging consumption was determined through a national survey of packaging manufacturers and importers. Data was estimated for all survey non-respondents based on publicly available data or through consultation with others in the industry.

Imported and exported new packaging has been determined through analysis of Australian Harmonized Tariff Item Statistical Code (HTISC) data.

Packaging consumption is measured in terms of packaging placed on market (POM).

Recovery quantification

Australian packaging recovery was determined through a national survey of packaging reprocessors, with recovery data estimated for all significant survey non-respondents.

Exported scrap packaging was determined through analysis of Australian Harmonized Export Commodity Classification (AHECC) data, and the survey of reprocessors and exporters.

Recovery is measured at the out-going gate of the secondary processing facility for the used packaging. This is the point at which the processed material is typically ‘input ready’ for the manufacture of new packaging or other products. Examples of secondary processing facilities include paper mills, glass beneficiation facilities, plastics flaking and washing facilities, and metal smelting facilities.

The overseas processing losses associated with the export of sorted but unprocessed materials have been estimated based on the losses reported by local operators of secondary processing facilities.

1 INTRODUCTION

1.1 This project

This report provides packaging consumption and recovery data for Australia for the 2019–20 financial year. This is the third iteration of the Packaging Consumption and Recovery Data Report. The previous reports are for the 2017–18 (baseline) and 2018–19 financial years (APCO, 2019; APCO, 2020a). This time period captures the first 3-4 months of the COVID-19 pandemic.

The data will help inform progress towards the 2025 National Packaging Targets (2025 Targets) and support strategic planning across all levels of the life cycle of packaging: design, manufacturing, use, disposal and end-of-life fate.

The 2025 Targets are:

- **100% of all Australia's packaging will be reusable, recyclable or compostable by 2025 or earlier.**
- **70% of Australia's plastic packaging will be recycled or composted by 2025.**
- **50% average recycled content will be included across all packaging by 2025.**
- **Problematic and unnecessary single-use plastic packaging will be phased out through design, innovation, or introduction of alternatives.**

This report also provides forecasts for key packaging flow quantities out to 2025.

Additional data is provided in the following appendices:

- **Appendix A** – Glossary of terms and abbreviations used throughout this report.
- **Appendix B** – Packaging material and component lists.
- **Appendix C** – Consumption and recovery data by state and territory.
- **Appendix D** – Employment and capacity data.

1.2 Project method

Data sources

Packaging consumption and recovery data was obtained from a combination of sources. The main data sources and the related reporting contributions are summarised in **Table 1**.

Table 1 – Data sources and reporting outputs

Data source	Data collection method	Reporting contributions
Packaging manufacturers and importers	National survey undertaken as part of this project.	• Packaging POM (Section 2). • Recovery rate (Sections 3.7–3.9). • Packaging recyclability (Section 3.10). • Packaging losses (Section 4). • Packaging projections (Section 5).
Packaging reprocessing facility operators	National survey undertaken as part of this project.	• Packaging recovery (Section 3). • Recovery rate (Sections 3.7–3.9). • Packaging losses (Section 4). • Packaging projections (Section 5).
Container deposit scheme (CDS) operators	National survey undertaken as part of this project.	• National CD eligible packaging dataset (not published in this report).
Reusable packaging system operators and users	Selective survey undertaken as part of this project.	• Packaging reuse (Section 6).
Organics recyclers and energy recovery facility operators interview form	Selective survey undertaken as part of this project.	• Packaging recovery (Section 3). • Recovery rate (Sections 3.7–3.9). • Packaging losses (Section 4).
Australian import and export data	Australian Customs import/export HTISC/AHECC[1] data extracts (ABS & IndustryEdge, 2021a; 2021b).	• Packaging POM (Section 2). • Packaging recovery (Section 3). • Recovery rate (Sections 3.7–3.9).

1. Australian Harmonized Tariff Item Statistical Code (HTISC) data (imports) / Australian Harmonized Export Commodity Classification (AHECC) data (exports).

Data collection and stakeholder consultation

Survey forms were prepared for the stakeholder groups listed above. Copies of the packaging survey forms can be provided upon request.

Stakeholders to be surveyed were identified through previous survey contacts, APCO Membership lists and the project team's industry knowledge. A summary of the packaging manufacturer and reprocessor survey outcomes by organisation type is provided in **Table 2**. All major manufacturers and reprocessors that were identified were contacted.

Table 2 – Packaging manufacturer, reprocessor and other survey responses (facility count)

Organisation type	Complete – interview /phone/e-mail	Complete – estimated	No response or decline	Total
Manufacturer – fibre	9	1	0	**10**
Manufacturer – glass	5	0	0	**5**
Manufacturer – metals	10	4	2	**16**
Manufacturer – plastics	53	4	15	**72**
Manufacturer – wood	0	0	0	**0**
Reprocessor – fibre	8	1	0	**9**
Reprocessor – glass	11	0	0	**11**
Reprocessor – metals	1	5	0	**6**
Reprocessor – plastics	54	6	3	**63**
Reprocessor – organics	4	0	0	**4**
Container deposit scheme (CDS) operator	6	0	0	**6**
Energy recovery – WtE fuel manufacturer	2	0	1	**3**
Industry group	6	0	0	**6**
Reusable packaging system operator	10	0	0	**10**
Reusable packaging system user	3	0	0	**3**
Total	**182**	**21**	**21**	**224**

Generally, where a significant organisation declined to provide a response, or did not respond within the survey period, it was possible to estimate the level of activity based on publicly available data or through consultation with others in the industry.

It was not possible to estimate production for 15 non-responding plastic packaging manufacturers. However, whole of market estimates of packaging consumption in 2019–20 were available through the Australian Plastics Flows and Fates Study 2019–20 (Envisage, 2021), and the estimates of packaging consumption / packaging placed on the market (POM) were scaled based on the data in this report.

It was not possible to estimate production for two non-responding metal packaging manufacturers. However, it is known that both were producing only small quantities of metal (steel) packaging in 2019–20.

It was not possible to estimate recovery for three non-responding (potential) plastic packaging reprocessors. One of these reprocessors is relatively large and probably did accept significant quantities of scrap plastic packaging during 2019–20. Assuming these three reprocessors did not export any product then local recovery of scrap plastic packaging may be understated in this report by around 2 000–3 000 tonnes (~2% of recovery stated in this report).

However, if these three companies sold any process scrap product into export markets (which was possible) these quantities would be picked up in the analysis of the 2019–20 Australian Customs export data, and so the unquantified amount of scrap plastic packaging recovery would be less.

Determination of packaging consumption

Australian packaging consumption from local sources was determined through a national survey of packaging manufacturers to obtain data on the following packaging attributes:

- Packaging placed on market (POM) by material type – see Appendix B for the consumption related material types list.
- Estimated accuracy range of reported POM, by material type.
- Location of material source – local or overseas.
- Packaging manufacturing losses to recycling or landfill.
- Packaging component group – bottle or jar, carton or box, closure or label, etc.
- Single-use / reusable packaging allocation.
- Degradability rating.
- Recycled content source – post-consumer, pre-consumer or virgin (primary).
- Packaging jurisdiction of use.
- Packaging sector of use, allocated to:
    - Business-to-consumer (B2C) – At home
    - Business-to-consumer (B2C) – Away-from-home (AfH)
    - Business-to-business (B2B).
- Packaging destination by Australian and New Zealand Standard Industrial Classification (ANZSIC) division of use.
- Market growth and capacity change estimates.

POM means that the packaging has been made available to the end-consumer (including business users). The subsequent disposal is following the intended use of the packaging and is considered 'post-consumer' disposal. Packaging losses prior to the point of POM are considered ‘pre-consumer’ losses.

Australian consumption of packaging through the import of finished goods and the import of semi-finished packaging (e.g., sheets of paperboards and rolls of plastic film for local filling) were determined through an extensive analysis of Australian import and export data for the 2019–20 financial year. This was based on the review and analysis of 3,600 Customs import codes and 2,400 export codes.

Codes over threshold values for either quantity or dollar value were allocated on a line-by-line basis to packaging material types and components and converted to an estimated equivalent packaging mass basis.

These allocations were based on code descriptors, or where this did not provide sufficient detail, on supporting research (online and instore) and manufacturer reports of their quantities of imported and exported packaging. Where no other data was available, standard conversions were applied to convert imports/exports of products into equivalent packaging quantities.

There were two main categories of codes that were allocated through the quantification framework:

- **Codes where the imported/exported product is the packaging** – Allocations were undertaken of the (packaging) product to: material type, packaging component, sector of use, data accuracy rating and other data attributes. These codes were also assessed under the following category.
- **Codes which the imported/exported product is contained in primary, secondary and tertiary packaging** – Allocations were undertaken of the packaging (on the product) to: material type, packaging component, sector of use, data accuracy rating and other data attributes.

Due to the relatively sparse information that was available to support many code allocations, the data accuracy rating for these allocations was low to very low, which is quantified in the aggregated accuracy range estimates that are reported.

Determination of packaging recovery

Australian packaging recovery was determined through a national survey of packaging reprocessors to obtain data on the following packaging attributes:

- Recovery by material type – see Appendix B for the recovery related material types list.
- Estimated accuracy range of reported recovery, by material type.
- Level of reprocessing undertaken by facility.
- Packaging reprocessing losses to (downstream) recycling or landfill.
- Post-consumer or pre-consumer material source.
- Waste source sector by collection service: municipal solid waste (MSW), commercial and industrial (C&I) waste, construction and demolition (C&D) waste, and container deposit scheme (CDS) collection services.
- Rigid/flexible classification for reprocessed plastic packaging.
- Packaging source jurisdiction (state or territory).
- Packaging recovery by ANZSIC division of generation.
- Single-use / reusable packaging material source.
- Material use application for processed product – packaging or non-packaging.
- Reprocessing capacity – current and planned changes.
- Stockpile estimates.

The location in the value chain at which recovery is measured is stated in all cases. Recovery is generally measured at the out-going gate of the secondary processing facility for the used packaging. This is the point that the processed material is typically ‘input ready’ for the manufacture of new packaging or other products. Examples of secondary processing facilities include paper mills, glass beneficiation facilities, plastics washing and flaking facilities, and metal smelting facilities.

For materials other than metals, overseas processing losses associated with the export of sorted but unprocessed materials have been estimated based on the losses reported by local operators of secondary processing facilities.

For metals, overseas processing losses associated with the export of sorted but unprocessed materials have been estimated based on IAI (2009, p. 26) and Antrekowitsch (2014) for aluminium and steel packaging losses respectively.

Packaging recovery includes quantities of post-consumer scrap plastic packaging sent to energy recovery in 2019–20. This is estimated to have been 16,000 tonnes in 2019–20, compared with 16,000 tonnes in 2018–19, and 2,000–4,000 tonnes in 2017–18.

Packaging recovery also includes estimates of recovery through composting facilities. This is primarily single-use wood packaging, fibre-based packaging (e.g., cardboard), and very small quantities of compostable plastics packaging.

Determination of packaging recovery rates

The packaging recovery rates determined in this report are generally based on the post-consumer packaging recovery measured at the out-going gate of the secondary processing facility for the used packaging, divided by packaging POM by material group/type.

The exception to this is packaging to organics reprocessing, for which the post-consumer packaging recovery is measured at the in-coming gate of the secondary processing facility.

It is important to note that in the determination of recovery rates packaging POM is assumed to be equivalent to post-consumer used packaging. That is, all packaging placed on the market in 2019–20, also reached end-of-life and was made available for recovery in 2019–20.

Determination of packaging recyclability

The determination of packaging recyclability supports the evaluation of progress against the following 2025 National Packaging Target:

- 100% of all Australia's packaging will be reusable, recyclable or compostable by 2025 or earlier.

Throughout the report the term *packaging recyclability* is used as an umbrella term for reusable, recyclable, or compostable packaging.

The method for determining packaging recyclability uses scores based on the Packaging Recyclability Evaluation Portal (PREP) assessment framework. Generalised PREP extracted scores have been developed for each packaging material type and packaging component combination.

A recyclability classification scoring framework has been developed for both B2C and B2B packaging sectors of use. The assessment framework is based on scoring against the following three criteria:

- Collection system widely available (C).
- Sortable and technically recyclable (S/T).
- End-market available for recovered material (M).

An overall ‘recycling potential’ classification score has been determined for each packaging format, based on the scores for the three criteria above. The overall score is simply the lowest of the three criteria scores.

The B2C and B2B packaging sector scoring frameworks are summarised in the following tables. The primary difference is in the description of the collection system criteria.

Table 3 – Recyclability classification score basis for each criterion – B2C packaging

Classification (score)	**C**	**S/T**	**M**
Good recyclability (2)	The material is widely collected at kerbside (>80% of the kerbside population has access to a council service) or is a soft plastic that can be dropped off at the REDcycle bins.	The material can be readily sorted at a MRF and causes no significant issues for reprocessors.	There is a well-established market for the use of the recycled material.
Poor recyclability (1)	The material is less widely accepted at kerbside (between 60-80% of the kerbside population has access to a council service).	The material can be readily sorted at a MRF but will cause some issues for reprocessors leading to a loss of value.	The material will be classified as an outthrow or it will have a reduced market value that makes its recovery marginal.
Not recyclable (0)	The material is not widely accepted at kerbside (< 60% of the kerbside population has access to a council service).	The material can either not be readily sorted at a MRF or it impacts on the recovery of other materials at the reprocessor.	It is not economical to separate this material for use in other applications.

Table 4 – Recyclability classification score basis for each criterion – B2B packaging

Classification (score)	**C**	**S/T**	**M**
Good recyclability (2)	Collection services for the material (to recovery) are offered by the major commercial collectors in metropolitan areas, at a similar or lower cost than landfill services.	The material can be readily sorted at a C&I MRF and causes no significant issues for reprocessors.	There is a well-established market for the use of the recycled material.
Poor recyclability (1)	Collection services for the material (to recovery) might be offered by major commercial collectors but at higher cost than landfill services or availability of services is more limited.	The material can be readily sorted at a C&I MRF but will cause some issues for reprocessors leading to a loss of value.	The material will be classified as an outthrow or it will have a reduced market value that makes its recovery marginal.
Not recyclable (0)	No collection services for the material (to recovery) are offered by the major commercial collectors.	The material can either not be readily sorted at a C&I MRF or it impacts on the recovery of other materials at the reprocessor.	It is not economical to separate this material for use in other applications.

Determination of reusable packaging

This year a quantification of the following eight reusable packaging systems was undertaken:

- **NEW – Drums (200–205 litre)** – All reusable steel and plastic drums in the 200–205 litre capacity range (44-gallon UK or 55-gallon US).
- **NEW – Intermediate bulk containers (IBCs)** – All rigid IBCs are assumed to be reusable (rather than single-use) packaging.
- **NEW – Reusable coffee cups** – Reusable coffee cups with a sealable lid, that are used in an away-from-home (AfH) setting, and that can be reasonably expected to have avoided the use of a single-use coffee cup.
- **Kegs** – Beer kegs only.
- **Milk crates** – Non-collapsible plastic crates. Limited to dairy product applications only.
- **Pallets** – Reusable timber and plastic pallets only, including display pallets. Single-use pallets are excluded.
- **Returnable plastic crates (RPCs)** – Collapsible plastic crates. Limited to major supermarket systems only.
- **Reusable shopping bags** – Reusable non-woven PP (NWPP) bags, and reusable LDPE bags (supermarket type).

Refer to **Section 6.1** for more detail on the reusable packaging systems quantification method.

1.3 Comparability of 2019–20 data with previous years

The scope and calculation methods have been applied as consistently as possible across all packaging material types and components. However, it is important to note that there are a number of changes that have been adopted that may impact the comparability between the 2017–18 to 2019–20 datasets, and with studies prior to 2017–18. The changes have all been adopted to improve the quality and depth of the packaging quantification dataset.

Scope or method changes between 2018–19 and 2019–20

The noteworthy changes include:

- **Single-use wood-based packaging survey coverage has increased from 2018–19** – Wood-based packaging was under-reported in 2018–19 due to an understatement in imported single-use timber pallets, and local manufacturing in single-use forms of timber packaging.

  A more granular and targeted analysis of imported tertiary single-use wood packaging was undertaken for 2019–20, resulting in more of this material being identified. In addition, comprehensive data on the local wood packaging manufacturing industry use of sawn timber was obtained for the first time (IndustryEdge, 2021). This increase in survey scope has resulted in an apparent jump in wood packaging POM.
- **Reusable wood-based packaging has been incorporated into the 2019–20 result, and the packaging POM and recovery estimates provided in Sections 2 and 3 respectively** – As it was a pilot exercise undertaken for the first time in 2018–19, reusable timber pallets flows were not included in the POM and recovery quantifications in the 2017–18 and 2018–19 iterations of this report.

The inclusion of reusable wood packaging has the effect of raising the packaging POM and recovery estimates by a small amount. However, it has had no notable impact on the *recyclability quantification* relative to the 2017–18 and 2018–19 iterations of this report.

By mass, most of the other reusable packaging systems were already included in the packaging POM and recovery quantifications for the 2017–18 and 2018–19 iterations of this report. However, there were also some other new inclusions of reusable packaging into the main dataset. These quantities were relatively small and had a negligible effect on the packaging POM and recovery quantifications for 2019–20 relative to previous years.

Refer to the 2018–19 report (APCO, 2020a, p. 25) for details on scope or method changes between 2017–18 and 2018–19.

Scope or method changes in 2017–18 that impact comparability with previous years

The noteworthy changes include:

- **This study has standardised packaging consumption to packaging POM** – Previous studies prior to 2017–18 may have included pre-consumer manufacturing losses and recovered scrap in either consumption and/or recovery estimates. This update has impacted consumption and/or recovery estimates compared to previous years, with a corresponding impact on recovery rates.
- **This study has standardised packaging recovery to materials recovered at the out-going gate of secondary processing facilities** – Previous studies prior to 2017–18 may have determined recovery at the incoming MRF gate or various points after that. This standardisation will have the impact of decreasing apparent recovery estimates compared to prior work, with different impacts on recovery rates depending on the recovery point previously adopted.
- **This study reports post-consumer recovery and recovery rates that do not include pre-consumer manufacturing scrap** – Previous studies prior to 2017–18 largely did not consider pre-consumer manufacturing scrap and post-consumer packaging recovery separately. Pre-consumer manufacturing scrap recovery rates can be very high compared to post-consumer recovery rates, so excluding pre-consumer scrap and publishing a discrete post-consumer recovery rate may have the impact of lowering the previously reported (combined pre- and post-consumer) recovery rate.

Other scope limitations

Other ongoing scope limitations include:

- There are other reusable packaging systems that are not yet included in the project scope. See Table B-4 in Appendix B for a listing of all identified reusable packaging systems and their status with respect to scope inclusion/exclusion in the 2019–20 packaging data.

1.4 Data limitations and interpretation

In the tables presented in this report, minor discrepancies may occur between summed totals and the apparent sums of the component items in tables, as summed totals and percentage values are calculated using component item values prior to rounding.

Data in this report should be interpreted as having a maximum of three significant figures. However, to obtain a balance between the proper statement of the accuracy of the data, while minimising the apparent summation discrepancies previously mentioned, mass data in this report has generally been rounded to the nearest 1,000 tonnes.

The accuracy ranges provided in this report are weighted sum averages of the estimated levels of accuracy (±%) reported by packaging manufacturers and reprocessors about their reported packaging material POM or total amount reprocessed. The accuracy range provides an estimate of the range within which the true value can be found, with the reported value being the best estimate of the true value.

In essence, small year-on-year changes in data may be based on data volatility, and so the underlying data uncertainties mean that care should be taken with assigning too much weight to these small movements. However, more weight can be placed on larger year-on-year shifts or consistent trends over a number of years, especially where these shifts or trends are consistent with known significant movements in the market.

2 PACKAGING CONSUMPTION IN 2019–20

This section of the report provides estimates of packaging POM in Australia in 2019–20, with data reported at the following levels:

- Material group.
- Material type.
- Packaging component group.
- Packaging number.
- Packaging material source location.
- Rigid/flexible plastic packaging.
- Degradability rating.
- Recycled content.
- ANZSIC division.

A summary of data for each state and territory is provided in **Appendix C**.

2.1 Material group

Total single-use packaging POM in Australia in 2019–20 is estimated at 6.27 million tonnes (±12%). Estimates for packaging POM by material group are provided in **Table 5** and **Figure 1**. The aggregated accuracy range estimates for each of the material groups are also provided as error bars in **Figure 1**. The estimates include B2C and B2B packaging.

Of the 6.27 million tonnes of packaging POM in 2019–20, over half was paper & paperboard packaging (52.3%), followed by glass packaging (18.4%), plastic packaging (17.9%), wood packaging (7.4%) and metal packaging (4.0%).

Refer to **Appendix A** (page 113) for the glossary of terms and abbreviations used throughout this report.

Table 5 – Packaging POM in 2019–20, by material group

Material group	Total POM		Accuracy range
	(tonnes)	(%)	(±%)
Paper & paperboard	3 277 000	52.3%	6%
Glass	1 156 000	18.4%	12%
Plastic	1 124 000	17.9%	20%
Metal	248 000	4.0%	12%
Wood	462 000	7.4%	38%
Total	**6 266 000**	**100.0%**	**12%**

POM means that the packaging has been made available to the end-consumer (including business users), and the subsequent disposal follows the intended use of the packaging, also known as 'post-consumer' disposal. Packaging losses prior to the point of POM are considered 'pre-consumer' losses and are not included in **Table 5**.

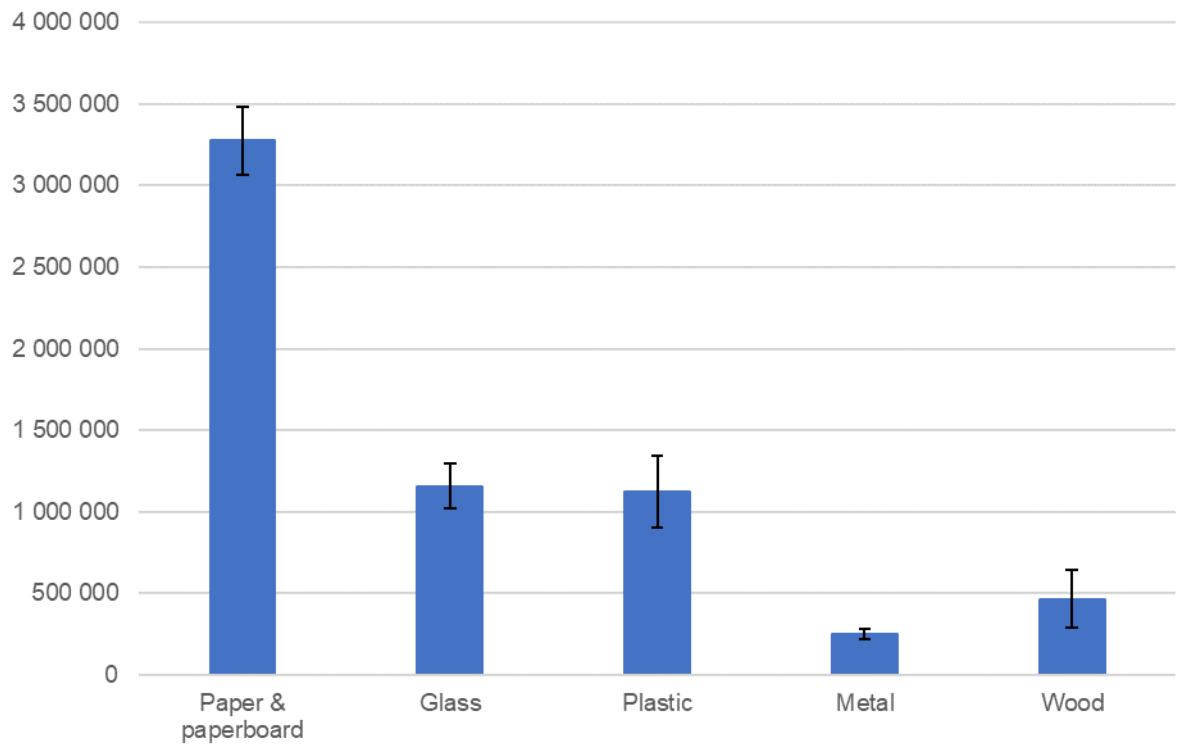

Figure 1 – Packaging POM in 2019–20, by material group (tonnes)

Table 6 and **Figure 2** compare the POM data by material group from 2017–18 to 2019–20.

Table 6 – Packaging POM from 2017–18 to 2019–20, by material group

Material group	2017–18	2018–19	2019–20	Change 2018–19 to 2019–20
	(tonnes)	(tonnes)	(tonnes)	(%)
Paper & paperboard	2 901 000	3 262 000	3 277 000	0%
Glass	1 273 000	1 283 000	1 156 000	-10%
Plastic	1 067 000	1 000 000	1 124 000	12%
Metal	213 000	246 000	248 000	1%
Wood	NR[a]	124 000	462 000	272%
Total (tonnes)	**5 453 000**	**5 916 000**	**6 266 000**	**6%**
Total (kg/person)[b]	**218**	**233**	**244**	**5%**

a) NR – Not reported.
b) ABS, 2018. *3222.0 Projected population (data cube), components of change and summary statistics – Australia, state/territory, greater capital city/balance of state, 2017 (base) to 2066.*

The survey identified more B2B wood packaging POM in 2019–20, which has influenced the result. Excluding wood provides a more comparable trend estimate. This gives estimated total packaging POM at 5.80 million tonnes in 2019–20, virtually unchanged from an estimate of 5.79 million tonnes in 2018–19 (see **Table 6**).

The most significant trends were an increase in plastics consumption (+12%) and a reduction in glass packaging (-10%).

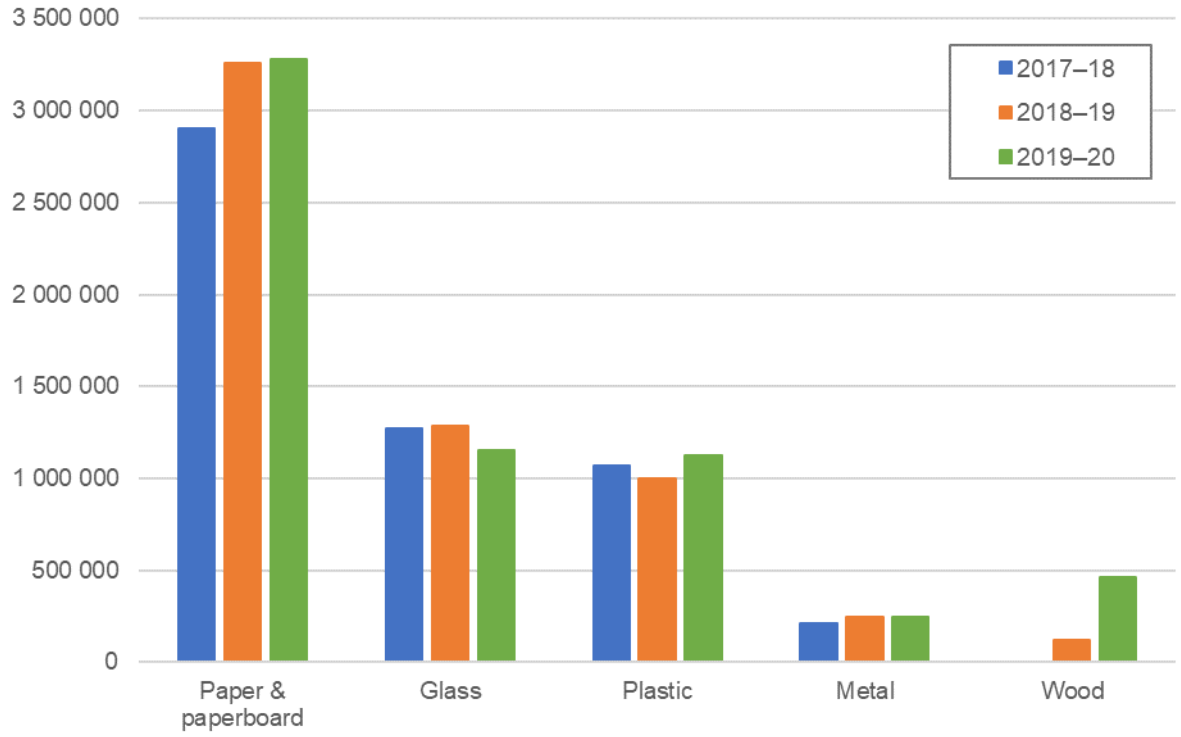

Figure 2 – Packaging POM from 2017–18 to 2019–20, by material group (tonnes)

There has been a reported reduction in glass packaging POM, possibly driven by some substitution with plastic packaging. However, given the underlying data accuracy uncertainties, it is not yet possible to identify strong discernible trends in the relative packaging material splits with the three years of available data.

2.2 Material type

Paper & paperboard packaging

Paper & paperboard packaging POM in Australia in 2019–20 is estimated at 3.3 million tonnes (±6%), which was 52.3% of all packaging POM. Estimates for paper & paperboard packaging POM by material type and sector of use are provided in **Table 7** and **Figure 3**.

In 2019–20 around 78% of paper & paperboard packaging was corrugated cardboard, of which 77% was used in the B2B sector, and 18% was used in B2C applications. The sector of use of the other 5% could not be identified.

There were no significant changes in the proportion of different material types within this category between 2018-19 (see **Table 6**) and 2019-20.

Table 7 – Paper & paperboard packaging POM in 2019–20, by material type and sector of use

Material type	B2C – At home[a]	B2C – AfH[a]	B2B	Other or unknown	Total[b]		Accuracy range
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)	(±%)
Boxboard/Cartonboard	232 000	9 000	70 000	5 000	**316 000**	**9.6%**	4%
Corrugated cardboard	457 000	39 000	1 875 000	142 000	**2 513 000**	**76.7%**	6%
HWS[c] carrierboard	13 000	12 000	0	0	**25 000**	**0.8%**	3%
Kraft paper	47 000	32 000	99 000	3 000	**180 000**	**5.5%**	6%
Moulded fibreboard	32 000	5 000	18 000	1 000	**56 000**	**1.7%**	9%
PCPB[d] – Aseptic	24 000	4 000	10 000	2 000	**40 000**	**1.2%**	10%
PCPB – Gable top	7 000	1 000	3 000	1 000	**12 000**	**0.4%**	10%
PCPB – Cold cup	1 000	11 000	1 000	0	**13 000**	**0.4%**	20%
PCPB – Hot cup	3 000	18 000	1 000	1 000	**23 000**	**0.7%**	17%
PCPB – Other	3 000	1 000	0	0	**4 000**	**0.1%**	15%
Polymer coated paper	0	1 000	0	0	**1 000**	**0.0%**	20%
Other fibre packaging[e]	2 000	3 000	56 000	34 000	**95 000**	**2.9%**	8%
Total (tonnes)	**821 000**	**135 000**	**2 133 000**	**189 000**	**3 277 000**	**-**	**-**
Total (%)	**25.0%**	**4.1%**	**65.1%**	**5.8%**	**100.0%**	**100.0%**	**6%**

a) Business-to-consumer (B2C) – At home / Business-to-consumer (B2C) – Away-from-home (AfH).
b) Total values are calculated prior to rounding contributing values. See Section 1.4 for more details.
c) HWS – High wet strength carrierboard.
d) PCPB – Polymer coated paperboard.
e) Examples of other fibre packaging include paper bags and food wraps.

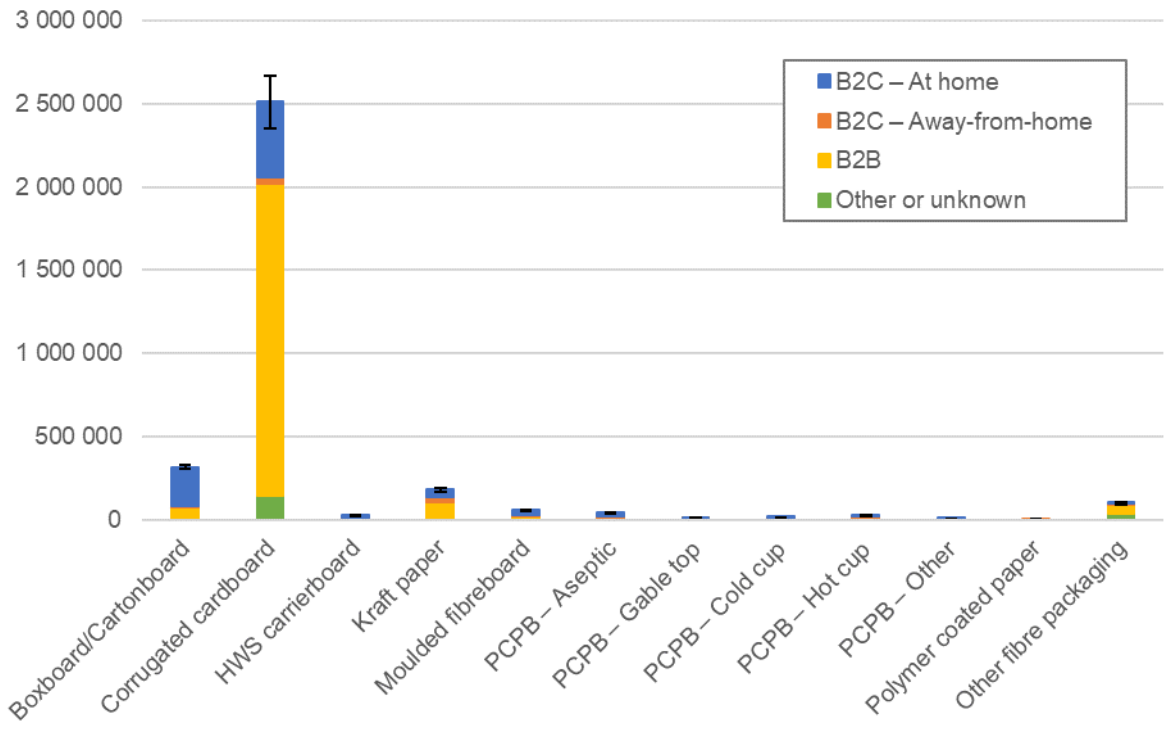

Figure 3 – Paper & paperboard packaging POM in 2019–20, by material type and sector of use (tonnes)

Glass packaging

Glass packaging POM in Australia in 2019–20 is estimated at 1.2 million tonnes (±12%), which was 18.4% of all packaging POM. Estimates for glass packaging POM by material type and sector of use are provided in **Table 8** and **Figure 4**.

Glass packaging consumption is determined for three main colours, which are amber, flint (clear) and green glass. Flint glass makes up 52.4% of glass POM, followed by amber glass (28.9%) and green glass (18.7%). All glass packaging was used in consumer applications, with none reported as POM for the B2B sector.

Between 2018–19 and 2019–20 there was a reported fall in glass packaging POM of 127 000 tonnes (10%) (**Table 6**).

Table 8 – Glass packaging POM in 2019–20, by material type and sector of use

Material type	B2C – At home[a]	B2C – AfH[a]	B2B	Other or unknown	Total		Accuracy range
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)	(±%)
Amber glass	218 000	116 000	0	0	**334 000**	**28.9%**	10%
Flint glass	457 000	149 000	0	0	**606 000**	**52.4%**	13%
Green glass[b]	149 000	67 000	0	0	**216 000**	**18.7%**	11%
Total (tonnes)	**824 000**	**332 000**	**0**	**0**	**1 156 000**	**-**	**-**
Total (%)	**71.3%**	**28.7%**	**0.0%**	**0.0%**	**100.0%**	**100.0%**	**12%**

a) Business-to-consumer (B2C) – At home / Business-to-consumer (B2C) – Away-from-home (AfH).

b) Includes very small quantities of other glass colours (e.g., blue glass).

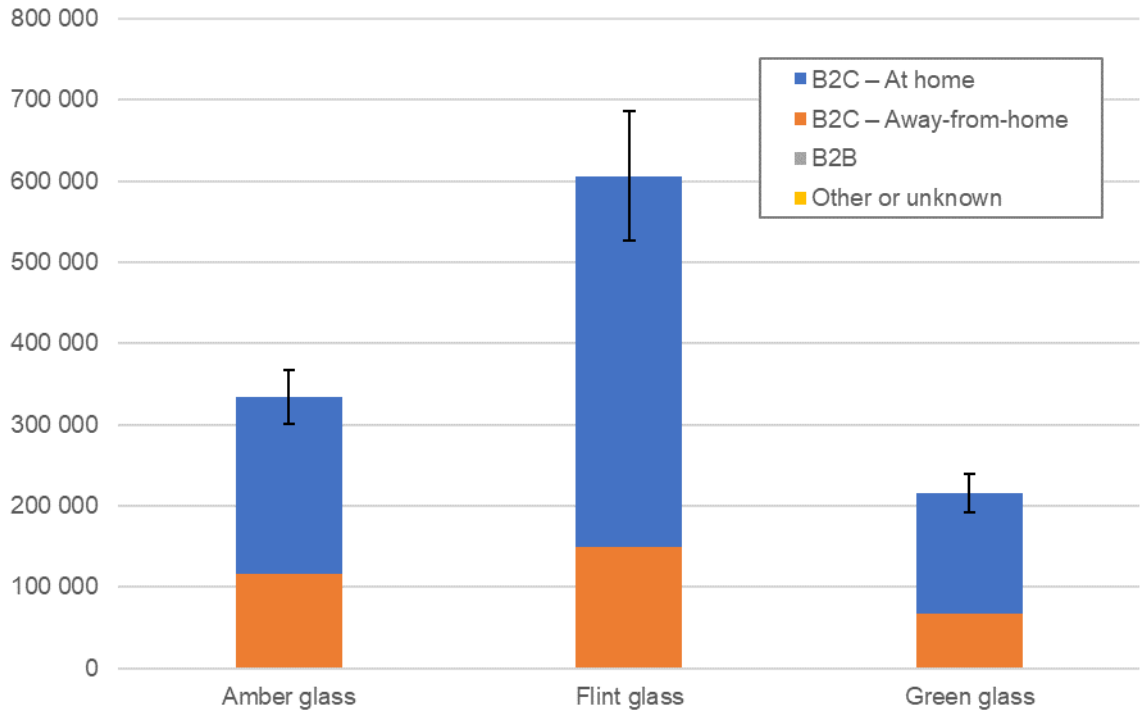

Figure 4 – Glass packaging POM in 2019–20, by material type and sector of use (tonnes)

Plastic packaging

Plastic packaging POM in Australia in 2019–20 is estimated at 1.1 million tonnes (±20%), which was 17.9% of all packaging POM. Estimates for plastic packaging POM by material type and sector of use are provided in **Table 9** and **Figure 5**.

Plastic packaging consumption is dominated by high-density polyethylene (HDPE) (24.5%), low-density polyethylene (LDPE) (24.5%), polypropylene (PP) (19.4%) and polyethylene terephthalate (PET) (14.5%). Around 83% of plastic packaging was used in the B2C sector, with another 17% used in the B2B sector (this is dominated by LDPE films and HPDE or PP in rigid packaging applications).

There appear to have been some noteworthy shifts in consumption of the dominant polymers over the past 12 months (APCO, 2020a, p. 33), with increases in reported POM estimates for PET (6%), PP (41%) and LDPE (18%), and a fall for HDPE (-13%). The reason for the large increase in PP packaging POM is unknown but may be related to the ongoing shift towards substituting PP for some other polymer types, significant changes in inventory levels, or impacts related to the first 3–4 months of the COVID-19 pandemic.

Table 9 – Plastic packaging POM in 2019–20, by material type and sector of use

Material type[a]	B2C – At home[b]	B2C – AfH[b]	B2B	Other or unknown	Total		Accuracy range
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)	(±%)
PET (1)	150 000	10 000	4 000	0	163 000	14.5%	14%
HDPE (2)	241 000	1 000	34 000	0	275 000	24.5%	16%
PVC (3)	12 000	0	5 000	0	17 000	1.5%	17%
LDPE (4)	202 000	1 000	73 000	0	276 000	24.5%	22%
PP (5)	154 000	16 000	48 000	0	218 000	19.4%	15%
PS (6)	7 000	9 000	0	0	17 000	1.5%	15%
EPS (6)	15 000	1 000	7 000	0	23 000	2.0%	22%
Bioplastic (7)	2 000	6 000	0	0	9 000	0.8%	16%
Other (7)	14 000	1 000	5 000	0	20 000	1.8%	14%
Unidentified	91 000	0	13 000	3 000	107 000	9.5%	46%
Total (tonnes)	**888 000**	**45 000**	**188 000**	**3 000**	**1 124 000**	**-**	**-**
Total (%)	**79.0%**	**4.0%**	**16.8%**	**0.2%**	**100.0%**	**100.0%**	**20%**

a) PET (1) – Polyethylene terephthalate (PIC 1) | HDPE (2) – High-density polyethylene (PIC 2) | PVC (3) – Polyvinyl chloride (PIC 3) | LDPE (4) – Low-density polyethylene (PIC 4) | PP (5) – Polypropylene (PIC 5) | PS (6) – Polystyrene (PIC 6) | EPS (6) – Expanded polystyrene (PIC 6). Note that PIC – Plastic identification code. Also referred to as the resin identification code (RIC) in some other countries.

b) Business-to-consumer (B2C) – At home / Business-to-consumer (B2C) – Away-from-home (AfH).

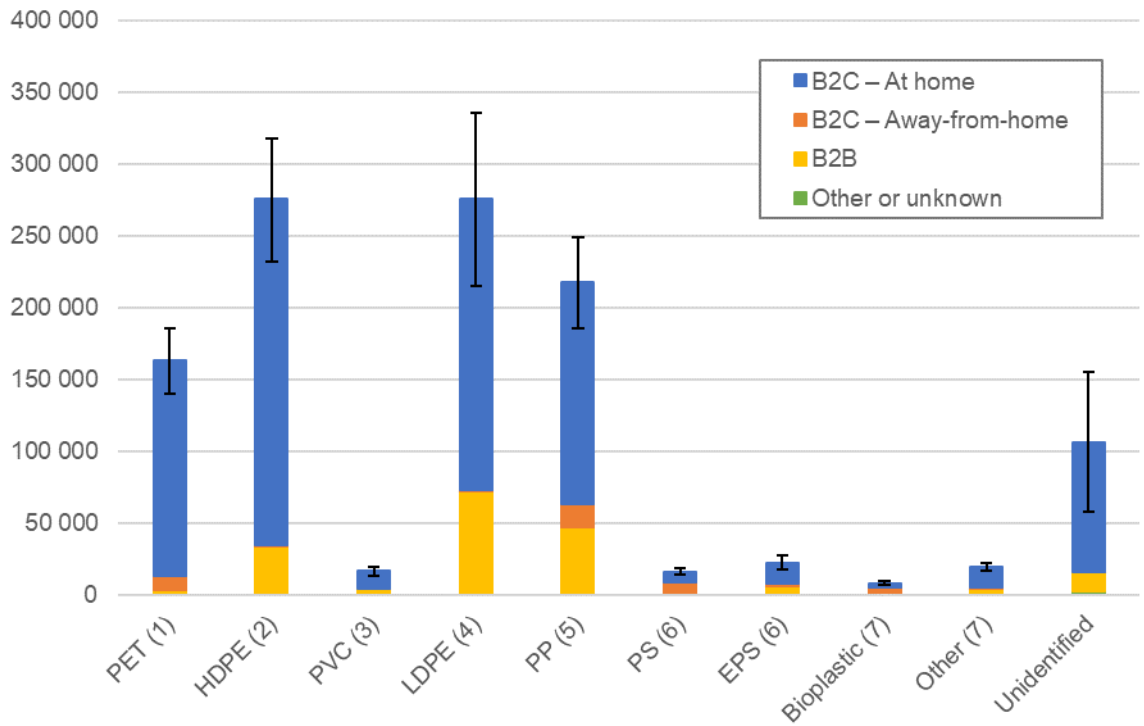

Figure 5 – Plastic packaging POM in 2019–20, by material type and sector of use (tonnes)

Metal packaging

Metal packaging POM in Australia in 2019–20 is estimated at 248,000 tonnes (±12%), which was 4.0% of all packaging POM. Estimates for metal packaging POM by material type and sector of use are provided in **Table 10** and **Figure 6**.

Metal packaging consumption is dominated by tin-plate steel can (56.1%) and aluminium beverage can (33.0%) consumption. An estimated 88% of metal packaging was used in the B2C sector, with the other 12% used in the B2B sector.

Table 10 – Metal packaging POM in 2019–20, by material type and sector of use

Material type	B2C – At home[a]	B2C – AfH[a]	B2B	Other or unknown	Total		Accuracy range
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)	(±%)
Beverage aluminium	45 000	37 000	0	0	82 000	33.0%	10%
Non-beverage aluminium	7 000	0	0	0	7 000	2.9%	10%
Tin-plate steel	119 000	9 000	11 000	0	139 000	56.1%	13%
Mild steel	0	0	19 000	0	19 000	7.8%	17%
Stainless steel	0	0	1 000	0	1 000	0.3%	8%
Total (tonnes)	**170 000**	**47 000**	**31 000**	**0**	**248 000**	**-**	**-**
Total (%)	**68.8%**	**18.8%**	**12.4%**	**0.0%**	**100.0%**	**68.9%**	**12%**

a) Business-to-consumer (B2C) – At home / Business-to-consumer (B2C) – Away-from-home (AfH).

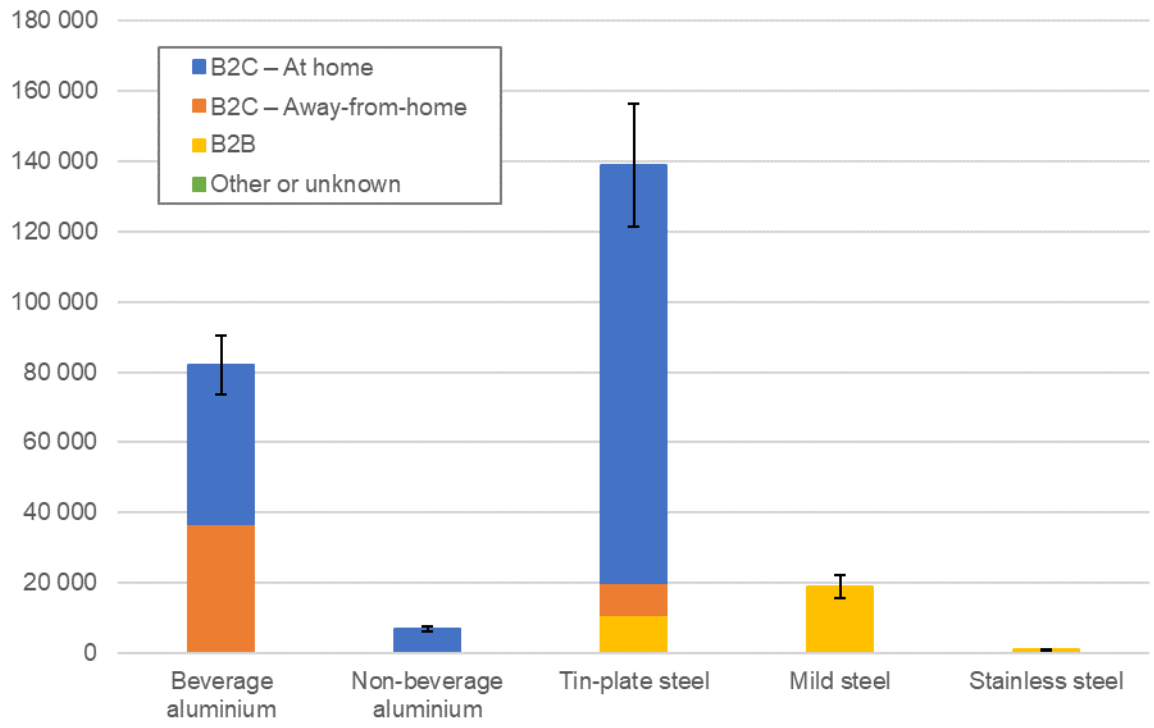

Figure 6 – Metal packaging POM in 2019–20, by material type and sector of use (tonnes)

Wood packaging

Wood packaging POM in Australia in 2019–20 was estimated at 394,000 tonnes (±36%), which was 6.4% of all packaging POM. This includes both single-use and reusable packaging types. Estimates for wood packaging POM by material type and sector of use are provided in **Table 11** and **Figure 7**.

Note that data on reusable wood pallet flows is also provided separately in **Section 6** of this report.

Wood packaging consumption was dominated by softwood use (71.3%). More than 99% of wood packaging was used in the B2B sector. The packaging components included are pallets, skids, crates, and cable reels.

Note that all estimates have large accuracy ranges due to the uncertainties associated with estimating imported single-use wood pallets and skids carrying goods.

Table 11 – Wood packaging POM in 2019–20, by material type and sector of use

Material type	B2C – At home[a]	B2C – AfH[a]	B2B	Other or unknown	Total		Accuracy range
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)	(±%)
Low-density fibreboard	0	0	50 000	0	50 000	10.8%	50%
Oriented strand board	0	0	50 000	0	50 000	10.8%	50%
Hardwood	0	0	81 000	0	81 000	17.5%	50%
Softwood	1 000	1 000	278 000	0	281 000	60.8%	31%
Total (tonnes)	**1 000**	**1 000**	**459 000**	**0**	**462 000**	**-**	**-**
Total (%)	**0.2%**	**0.3%**	**99.5%**	**0.0%**	**100.0%**	**100.0%**	**38%**

a) Business-to-consumer (B2C) – At home / Business-to-consumer (B2C) – Away-from-home (AfH).

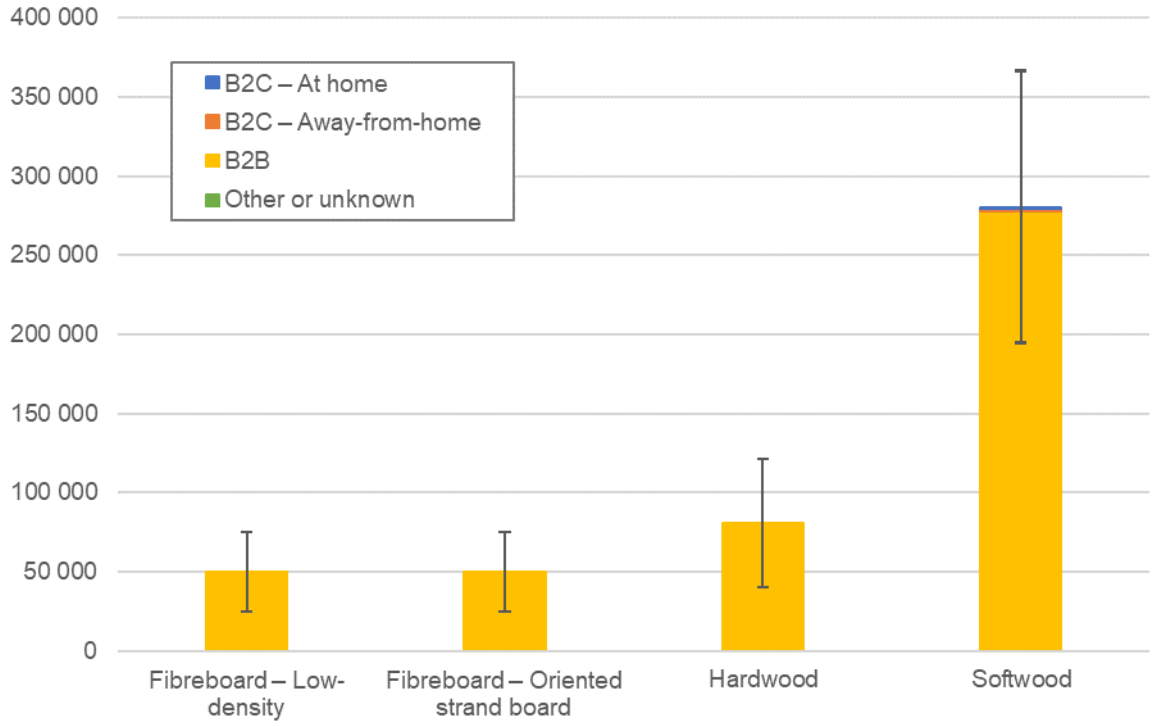

Figure 7 – Wood packaging POM in 2019–20, by material type and sector of use (tonnes)

2.3 Packaging component group

In this section of the report, estimates of packaging POM by packaging component group are presented. Information at the packaging component group level is useful as it is related to the recyclability of the material and supports the estimation of the quantities of rigid and flexible plastic packaging components onto the market (**Section 2.6**).

Estimates for packaging POM by material group and component group are provided in **Table 12** and **Figure 8**.

The major packaging component groups are cartons or boxes (46.8%), which are almost entirely paper & paperboard based, and bottles or jars (23.2%), which are split approximately 4:1 between glass and plastic containers POM on a mass basis.

The major changes seen between 2018–19 (APCO, 2020a, p. 37) and 2019–20 were a fall in packaging POM for shopping bags (-60%), tubs, trays, or punnets (-19%) and bottles or jars (-15%) and an increase for bags or pouches (64%).

Table 12 – Packaging POM in 2019–20, by material group and component group

Component group	Paper & paperboard	Glass	Plastic	Metal	Wood	Total	
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)
Bag or pouch	95 000	0	351 000	0	0	446 000	7.1%
Barrel or drum	0	0	22 000	23 000	7 000	51 000	0.8%
Bottle or jar	0	1 156 000	298 000	0	0	1 454 000	23.2%
Can	0	0	0	218 000	0	218 000	3.5%
Carton or box	2 885 000	0	0	0	45 000	2 930 000	46.8%
Closure or label	0	0	38 000	4 000	0	42 000	0.7%
Pallet or bin	0	0	12 000	0	408 000	420 000	6.7%
Shopping bag	0	0	20 000	0	0	20 000	0.3%
Tableware	60 000	0	25 000	0	2 000	88 000	1.4%
Tub, tray or punnet	57 000	0	109 000	3 000	0	169 000	2.7%
Tube or cartridge	0	0	13 000	0	0	14 000	0.2%
Wrap	81 000	0	106 000	0	0	186 000	3.0%
Other	99 000	0	35 000	0	0	134 000	2.1%
Unknown	0	0	96 000	0	0	96 000	1.5%
Total	**3 277 000**	**1 156 000**	**1 124 000**	**248 000**	**462 000**	**6 266 000**	**100.0%**

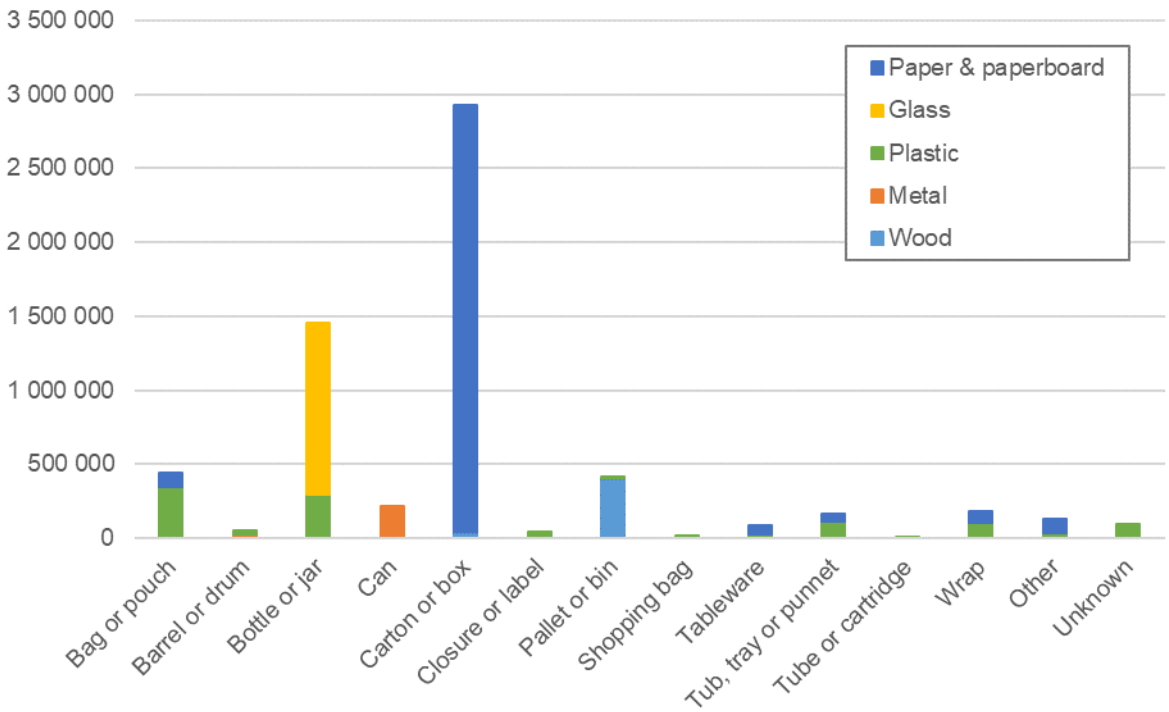

Figure 8 – Packaging POM in 2019–20, by material group and component group (tonnes)

2.4 Packaging count

In this section of the report, estimates are presented as packaging counts (number of units) of packaging POM by material group and packaging component group - across both B2C and B2B packaging applications. This is based on the packaging component group mass data presented in **Section 2.3** and extensive audits, mostly undertaken as part of the 2018–19 iteration of this project.

It is important to note that the packaging weight audits were not based on a sampling plan designed to statistically sample packaging format frequency POM. Instead, the sampling plan objective was to sample 5–10 packaging components POM in each of the 280 packaging component and material type combinations that were identified as having been POM in 2018–19. For this reason, the data in this section of the report should be considered indicative only.

There are two key terms used in this section of the report, which are:

- **Packaging component** – A part of a packaging assembly that can be separated by hand or by using simple physical means.
- **Packaging assembly** – A collection of packaging components that are intended to function as a single packaging unit. For example, a single-use glass soft-drink bottle is typically a packaging assembly consisting of: a glass bottle, a metal or plastic closure and a paper or plastic label.

Estimates for packaging counts POM by material group and component group, across all sectors of use (B2C and B2B), are provided in **Table 13** and **Figure 9**.

Table 13 – Packaging counts POM in 2019–20, by material group and component group – B2C and B2B

Component group	Paper & paperboard	Glass	Plastic	Metal	Wood	Total	
	(million units)	(million units)	(million units)	(million units)	(million units)	(million units)	(%)
Bag or pouch	5 770	0	50 400	0	0	56 170	33.7%
Barrel or drum	0	0	7	3	0	11	0.0%
Bottle or jar	0	4 590	7 280	0	0	11 880	7.1%
Can	0	0	0	7 680	0	7 680	4.6%
Carton or box	17 700	0	0	0	4	17 700	10.6%
Closure or label	0	0	4 090	450	0	4 540	2.7%
Pallet or bin	0	0	0	0	12	13	0.0%
Shopping bag	0	0	1 330	0	0	1 330	0.8%
Tableware	6 080	0	4 920	0	0	11 000	6.6%
Tub, tray or punnet	1 880	0	4 770	610	0	7 260	4.4%
Tube or cartridge	0	0	440	10	0	450	0.3%
Wrap	29 320	0	6 170	0	0	35 490	21.3%
Other	12 750	0	340	0	0	13 090	7.9%
Total (million units)	**73 500**	**4 590**	**79 750**	**8 760**	**17**	**166 620**	**-**
Total (%)	**44.1%**	**2.8%**	**47.9%**	**5.3%**	**0.0%**	**100.0%**	**100.0%**

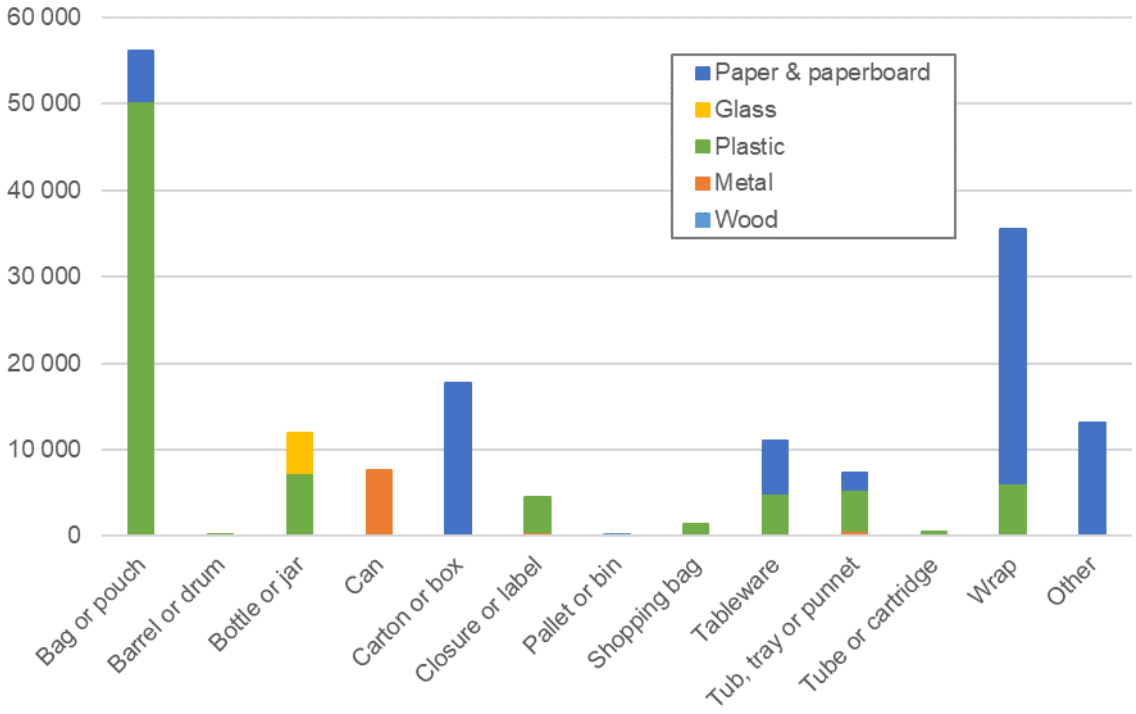

Figure 9 – Packaging counts POM in 2019–20, by material group and component group – B2C and B2B (million units)

Estimates for packaging counts POM by material group and component group, for the B2C (at home) sector of use, are provided on the following page in **Table 14** and **Figure 10**.

The Australian population was estimated at 25.7 million at June 2020 (ABS, 2021a), and the number of households estimated at 9.8 million for the same time (ABS, 2019), giving an average of 2.62 persons per household. From this and the data in **Table 14,** the following high-level B2C (at home) packaging count POM estimates can be calculated for 2019–20:

- There were 3,400 packaging components per person used in the B2C (at home) sector, or 9.3 packaging components per person per day.
- There were 2,000 packaging assemblies per person used in the B2C (at home) sector, or 5.5 packaging assemblies per person per day.
- There were 5,300 packaging assemblies per household used in the B2C (at home) sector, or 14.4 packaging assemblies per household per day.

Note that it was determined for the 2018–19 study (APCO, 2020a, p. 38) that there are approximately 1.7 components per assembly on average.

Table 14 – Packaging counts POM in 2019–20, by material group and component group – B2C (at home)

Component group	Paper & paperboard	Glass	Plastic	Metal	Wood	Total	
	(million units)	(million units)	(million units)	(million units)	(million units)	(million units)	(%)
Bag or pouch	1 470	0	38 900	0	0	40 370	46.0%
Barrel or drum	0	0	5	2	0	7	0.0%
Bottle or jar	0	3 260	6 440	0	0	9 690	11.0%
Can	0	0	0	4 890	0	4 890	5.6%
Carton or box	8 530	0	0	0	0	8 530	9.7%
Closure or label	0	0	3 110	390	0	3 490	4.0%
Pallet or bin	0	0	0	0	0	0	0.0%
Shopping bag	0	0	1 080	0	0	1 080	1.2%
Tableware	1 840	0	2 880	0	0	4 720	5.4%
Tub, tray or punnet	1 130	0	3 750	590	0	5 470	6.2%
Tube or cartridge	0	0	350	10	0	360	0.4%
Wrap	3 950	0	4 500	0	0	8 460	9.6%
Other	500	0	230	0	0	730	0.8%
Total (million units)	**17 420**	**3 260**	**61 250**	**5 880**	**0**	**87 810**	**-**
Total (%)	**19.8%**	**3.7%**	**69.8%**	**6.7%**	**0.0%**	**100.0%**	**100.0%**

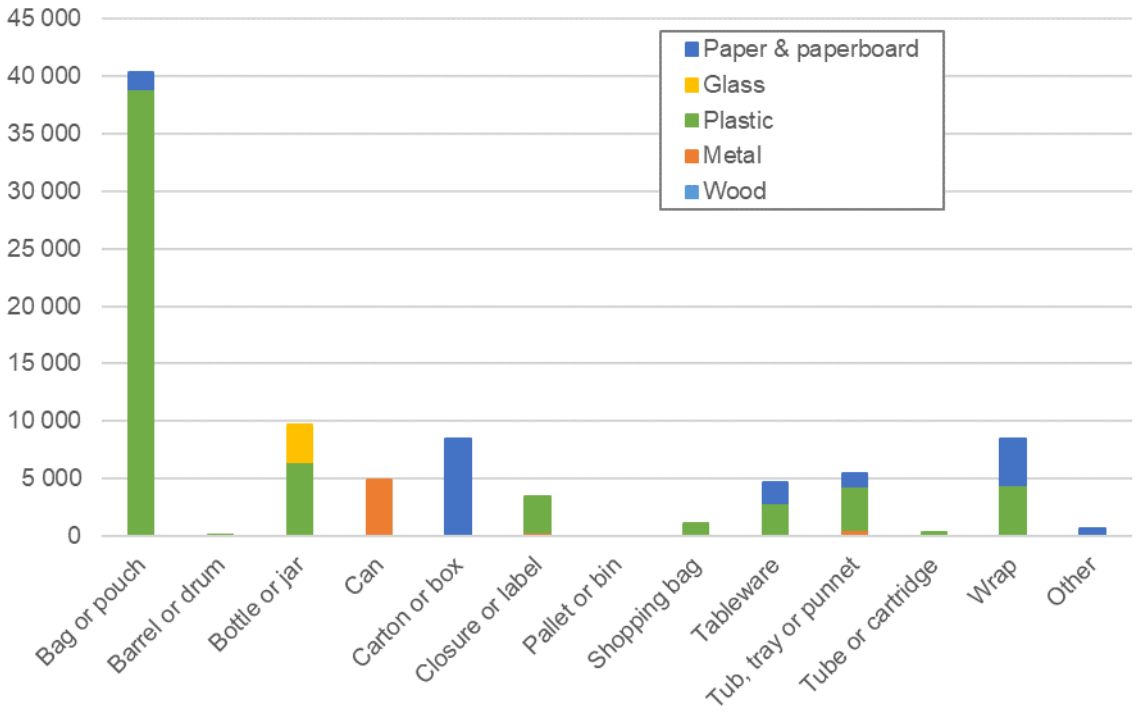

Figure 10 – Packaging counts POM in 2019–20, by material group and component group – B2C (at home) (million units)

Estimates for packaging counts POM by material group and component group, for the B2C (away-from-home) sector of use, are provided in **Table 15** and **Figure 11**.

From the available data the following high-level B2C (away-from-home) packaging count POM estimates can be calculated for 2019–20:

- There were 610 packaging components per person per year used in the B2C (away-from-home) sector, or 1.7 packaging components per person per day.
- There were 360 packaging assemblies per person per. year used in the B2C (away-from-home) sector, or 1.0 packaging assemblies per person per day.

Across both the B2C sectors of use (at home and away-from-home) the following packaging count POM estimates can be calculated for 2019–20:

- There were 4,000 packaging components per person per year used in the B2C sector, or 11.0 packaging components per person per day.
- There were 2,360 packaging assemblies per person per year used in the B2C sector, or 6.5 packaging assemblies per person per day.

Table 15 – Packaging counts POM in 2019–20, by material group and component group – B2C (away-from-home)

Component group	Paper & paperboard	Glass	Plastic	Metal	Wood	Total	
	(million units)	(million units)	(million units)	(million units)	(million units)	(million units)	(%)
Bag or pouch	1 040	0	1 370	0	0	2 410	15.4%
Barrel or drum	0	0	0	0	0	1	0.0%
Bottle or jar	0	1 340	190	0	0	1 530	9.7%
Can	0	0	0	2 630	0	2 630	16.8%
Carton or box	720	0	0	0	0	720	4.6%
Closure or label	0	0	130	30	0	160	1.0%
Pallet or bin	0	0	0	0	0	0	0.0%
Shopping bag	0	0	0	0	0	0	0.0%
Tableware	2 670	0	1 250	0	0	3 920	25.0%
Tub, tray or punnet	210	0	430	20	0	660	4.2%
Tube or cartridge	0	0	0	0	0	0	0.0%
Wrap	2 960	0	110	0	0	3 070	19.6%
Other	560	0	10	0	0	570	3.6%
Total (million units)	**8 160**	**1 340**	**3 490**	**2 680**	**0**	**15 670**	**-**
Total (%)	**52.1%**	**8.5%**	**22.3%**	**17.1%**	**0.0%**	**100.0%**	**100.0%**

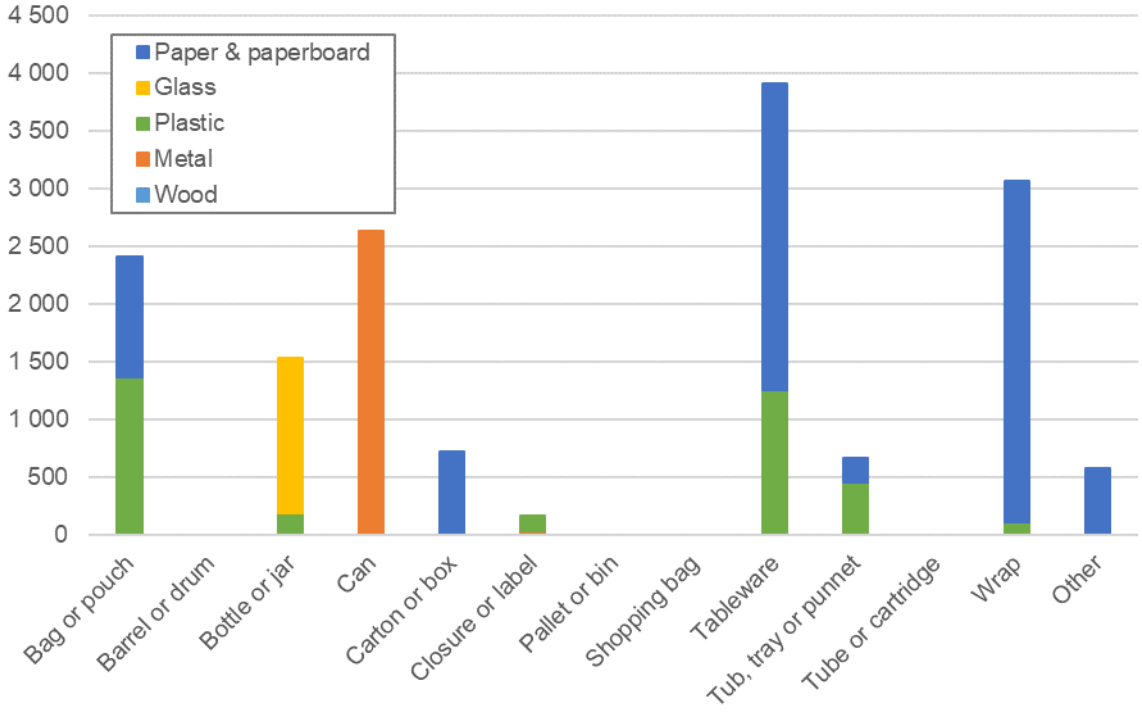

Figure 11 – Packaging counts POM in 2019–20, by material group and component group – B2C (away-from-home) (million units)

Estimates for packaging counts POM by material group and component group, for the B2B sector of use, are provided in **Table 16** and **Figure 12**.

Table 16 – Packaging counts POM in 2019–20, by material group and component group – B2B

Component group	Paper & paperboard	Glass	Plastic	Metal	Wood	Total	
	(million units)	(million units)	(million units)	(million units)	(million units)	(million units)	(%)
Bag or pouch	3 140	0	10 130	0	0	13 280	25.6%
Barrel or drum	0	0	1	2	0	3	0.0%
Bottle or jar	0	0	660	0	0	660	1.3%
Can	0	0	0	160	0	160	0.3%
Carton or box	7 790	0	0	0	0	7 800	15.0%
Closure or label	0	0	860	30	0	890	1.7%
Pallet or bin	0	0	0	0	12	12	0.0%
Shopping bag	0	0	240	0	0	240	0.5%
Tableware	1 160	0	780	0	0	1 940	3.7%
Tub, tray or punnet	510	0	590	0	0	1 100	2.1%
Tube or cartridge	0	0	90	0	0	90	0.2%
Wrap	16 670	0	1 560	0	0	18 230	35.1%
Other	7 440	0	100	0	0	7 540	14.5%
Total (million units)	**36 720**	**0**	**15 010**	**200**	**20**	**51 940**	**-**
Total (%)	**70.7%**	**0.0%**	**28.9%**	**0.4%**	**0.0%**	**100.0%**	**100.0%**

Note that the large number of paper & paperboard wraps is driven by reasonably significant quantities reported by the related manufacturers of kraft paper into wrap related packaging component types. However, the average kraft paper wrap weight is based on B2C packaging forms only (which are generally a relatively light form of packaging), and it appears likely that this is a significant understatement of the average B2B wrap weight, resulting in an overstatement of the number of B2B paper & paperboard wraps POM. As stated earlier, the estimates in this section of the report are indicative only.

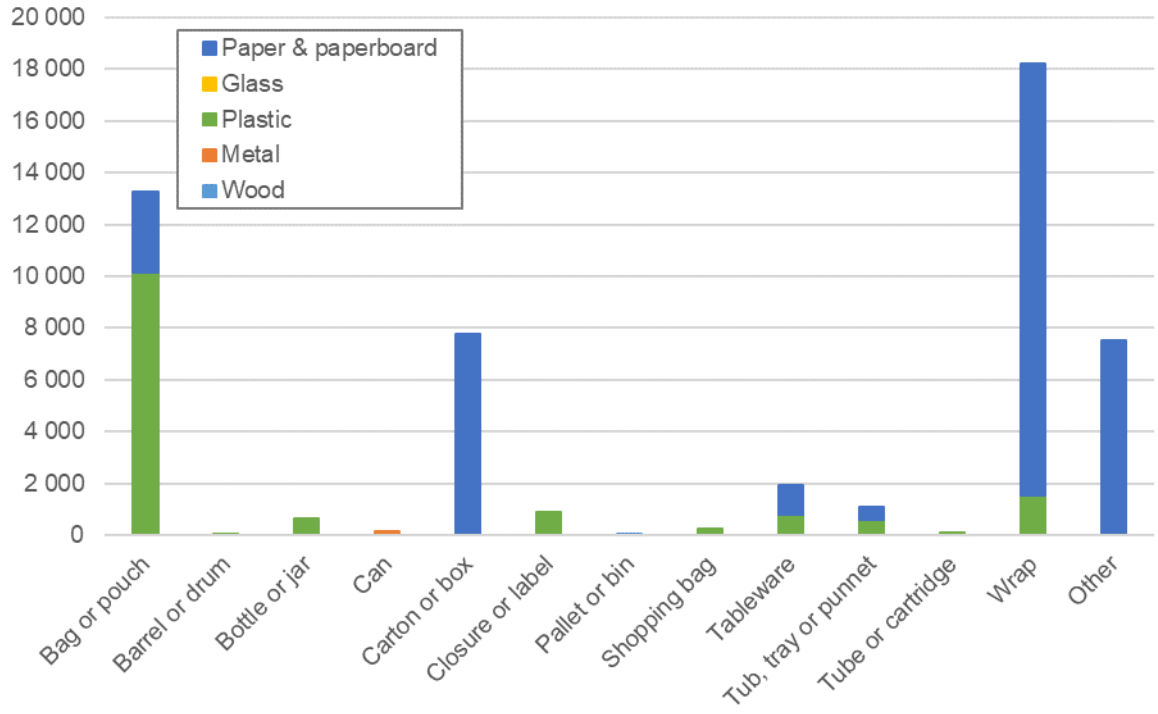

Figure 12 – Packaging counts POM in 2019–20, by material group and component group – B2B (million units)

2.5 Packaging material source location

Information on the packaging material source (local or overseas) is useful as it informs the evaluation of the capacity of local end-markets to absorb recovered packaging materials back into packaging. For example, to be made into new packaging or products post-use, imported packaging materials must be either remanufactured into packaging locally, remanufactured into non-packaging products, or exported for use overseas. If imported packaging is large relative to local packaging manufacturing (and thus local packaging material demand) then it may highlight a structural 'imbalance' to be considered.

Estimates of the location of packaging material source, by local or overseas origin, are provided in **Table 17** and **Figure 13**. In 2019–20 around 63% of packaging was manufactured locally and 37% was imported. Local packaging manufacturing is up from the 57% reported in 2018–19 (APCO, 2020a, p. 44).

The manufacturing of paper & paperboard and glass-based packaging is dominated by locally sourced materials (including recycled packaging inputs). The manufacturing of plastic and metal-based packaging is dominated by imported materials, which includes imported filled or unfilled packaging and semi-finished packaging material for local forming and filling.

Table 17 – Packaging POM in 2019–20, by material group, location of manufacturing, and material source location

Material group	Locally manufactured packaging		Overseas manufactured packaging		Total
	Local source	Overseas source	Filled packaging	Empty packaging	
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Paper & paperboard	1 540 000	437 000	1 183 000	117 000	3 277 000
Glass	840 000	0	152 000	164 000	1 156 000
Plastic	195 000	488 000	82 000	359 000	1 124 000
Metal	13 000	171 000	53 000	10 000	248 000
Wood	252 000	0	200 000	9 000	462 000
Total (tonnes)	**2 841 000**	**1 096 000**	**1 671 000**	**659 000**	**6 266 000**
Total (%)	**45.3%**	**17.5%**	**26.7%**	**10.5%**	**100.0%**

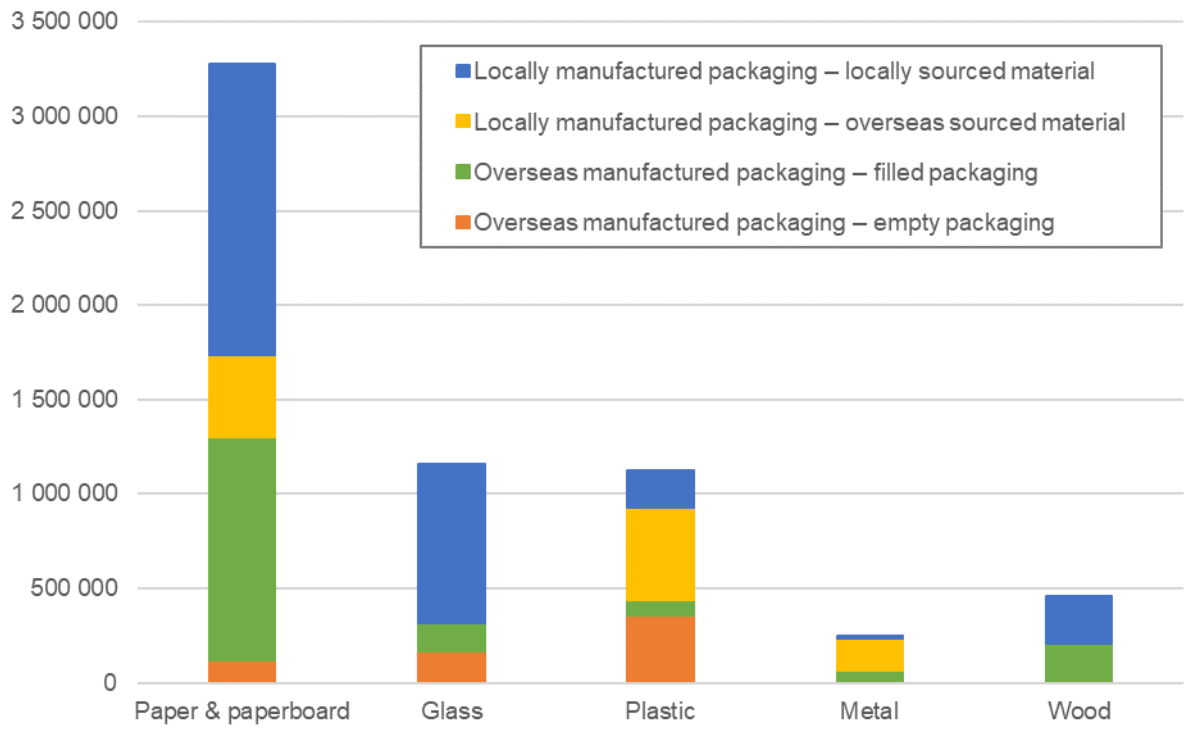

Figure 13 – Packaging POM in 2019–20, by material type, location of manufacturing, and location of packaging material source (tonnes)

2.6 Rigid/flexible plastic packaging

In this section of the report, estimates of plastic packaging POM by rigid/flexible classification are presented. Information on the rigidity of plastic packaging is useful as it is related to the recyclability and value of the material. Estimates for packaging POM by plastic material type and rigid/flexible classification are provided in **Table 18** and **Figure 14**.

The definitions of rigid and flexible plastic packaging adopted for this study are:

- Rigid plastic packaging is packaging such as bottles and tubs, which are (generally) moulded and hold their shape.
- Flexible (soft) plastic is packaging that can be scrunched into a ball.

Of the 1.1 million tonnes of plastic packaging used in 2019–20 an estimated 541,000 tonnes (48%) were identified as rigid plastic packaging, and 487,000 tonnes (43%) as flexible plastics. The format of the other 96,000 tonnes (9%) could not be identified in sufficient detail to classify this material as either rigid or flexible.

This represents a significant shift over the 12-month period, with the proportion of plastics classified as flexible increasing from 33% to 43% (an additional 159,000 tonnes) and the proportion classified as rigid falling from 59% to 48% (a reduction of 45,000 tonnes). This shift is related to solid growth in flexible plastic packaging formats, and some is related to improved detail in survey responses of the quantities of flexible plastic packaging (bags and wraps) onto the market.

Most flexible packaging was made from LDPE (54%), followed by PP (15%), HDPE (12%) and PET (7%).

Most rigid packaging was made from HDPE (36%), followed by PET (24%) and PP (21%).

Table 18 – Plastic packaging POM in 2019–20, by material type and rigid/flexible classification

Format	Rigid	Flexible	Unknown	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)
PET (1)	129 000	32 000	3 000	163 000
HDPE (2)	195 000	57 000	23 000	275 000
PVC (3)	NR[a]	NR[a]	NR[a]	17 000
LDPE (4)	10 000	261 000	4 000	276 000
PP (5)	115 000	71 000	32 000	218 000
PS (6)	17 000	0	0	17 000
EPS (6)	23 000	0	0	23 000
Bioplastic (7)	7 000	2 000	0	9 000
Other (7)	2 000	18 000	0	20 000
Unidentified	41 000	33 000	33 000	107 000
Total (tonnes)	**541 000**	**487 000**	**96 000**	**1 124 000**
Total (%)	**48.2%**	**43.3%**	**8.5%**	**100.0%**

a) NR – Not reported due to confidentiality considerations.

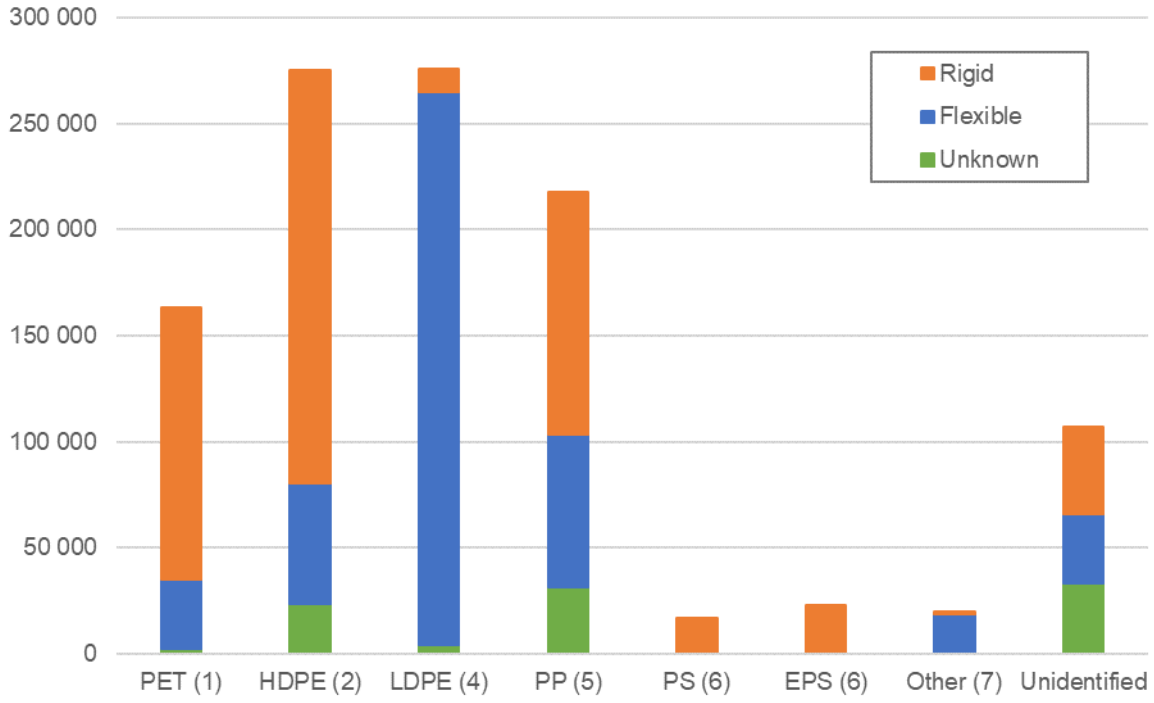

Figure 14 – Plastic packaging POM in 2019–20, by material type and rigid/flexible classification (tonnes)

2.7 Degradability rating

Estimates of packaging POM by degradability rating are provided in **Table 19** and **Figure 15**.

Due to the extensive use of wood-fibre based packaging, 3.5 million tonnes of packaging POM in 2019–20 (56.4% of packaging) is rated as certified compostable or non-certified but potentially biodegradable. Around 2.7 million tonnes (43.3%) were not considered degradable.

Table 19 – Packaging POM in 2019–20, by material group and degradability rating

Material group	Not considered degradable	Certified compostable plastics or fibre	Non-certified biodegradable fibre-based	Oxo or photo-degradable plastics	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Paper & paperboard	87 000[a]	10 000	3 180 000	0	3 277 000
Glass	1 156 000	0	0	0	1 156 000
Plastic	1 113 000	9 000	0	2 000	1 124 000
Metal	248 000	0	0		248 000
Wood	107 000	0	355 000	0	462 000
Total	**2 711 000**	**18 000**	**3 534 000**	**2 000**	**6 266 000**

a) The 'Not considered degradable' paper & paperboard packaging formats are almost entirely PCPB material types.

There were around 2,000 tonnes of fragmentable (oxo-degradable or photo-degradable) packaging POM in 2019–20, an increase from 1,000 tonnes in the previous year. This estimate is indicative only. This packaging group is typically HDPE or LDPE film with a degradant additive blended into the film at a rate of around 2–3% by mass.

All the identified oxo-degradable and photo-degradable packaging was imported, with no local manufacturer identified.

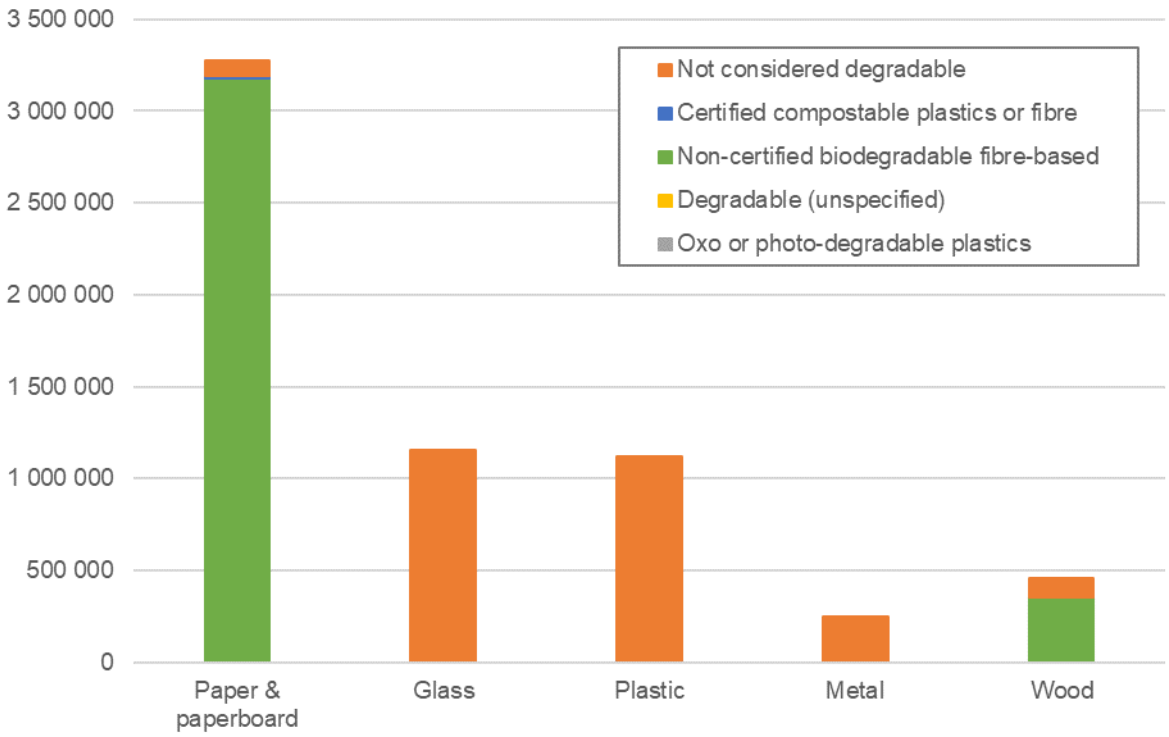

Figure 15 – Packaging POM in 2019–20, by material group and degradability rating (tonnes)

2.8 Recycled content

Material group

Estimates of the recycled content incorporated into packaging POM in 2019–20, by material group, are provided in **Table 20** and **Figure 16**. The post-consumer recycled (PCR) content across all packaging was 2.3 million tonnes, or 36% of total packaging POM; the pre-consumer recycled content was 0.7 million tonnes (11%); and 2.9 million tonnes (50%) was sourced from virgin (primary) feedstocks.

Table 20 – Packaging POM in 2019–20, by material group (excluding wood) and recycled content

Material group	Post-consumer source		Pre-consumer source		Virgin source		Total
	(tonnes)	%	(tonnes)	%	(tonnes)	%	(tonnes)
Paper & paperboard	1 768 000	54%	500 000	15%	1 009 000	31%	**3 277 000**
Glass	428 000	37%	73 000	6%	655 000	57%	**1 156 000**
Plastic	36 000	3%	16 000	1%	1 071 000	95%	**1 124 000**
Metal	28 000	11%	71 000	29%	149 000	60%	**248 000**
Total	**2 260 000**	**39%**	**660 000**	**11%**	**2 884 000**	**50%**	**5 805 000**

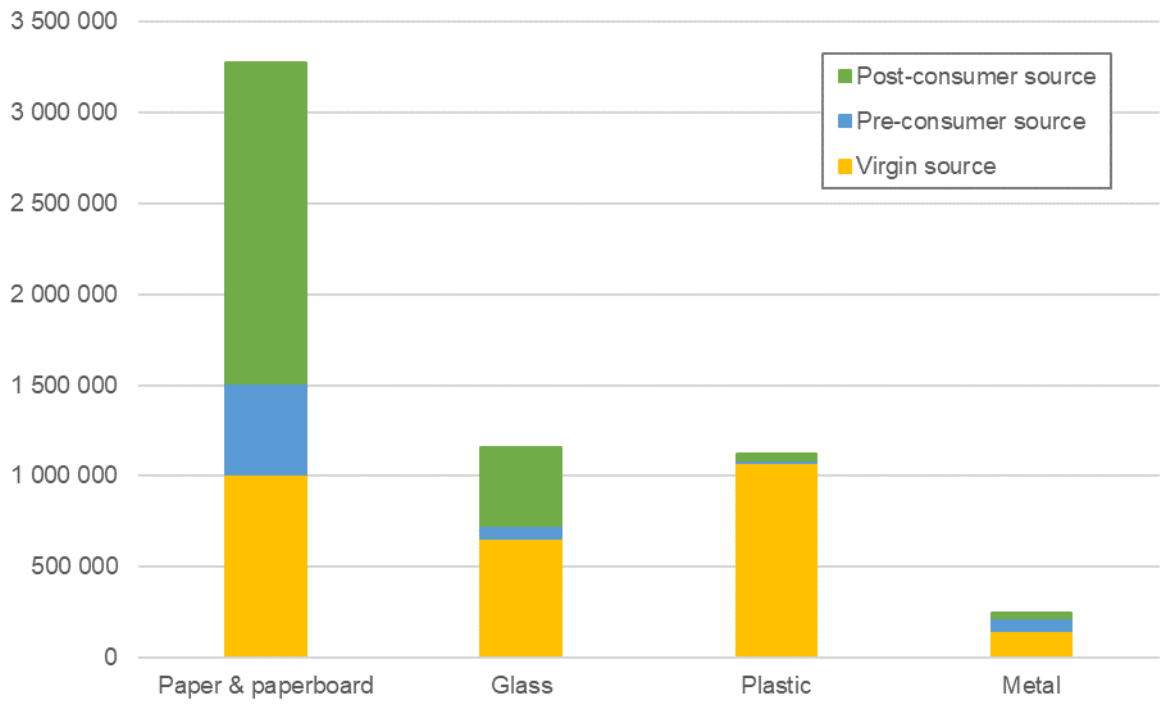

Figure 16 – Packaging POM in 2019–20, by material group (excluding wood) and recycled content (tonnes)

Table 21 and **Figure 17** compare the PCR content of packaging by material group from 2017–18 to 2019–20.

Table 21 – Packaging PCR content from 2017–18 to 2019–20, by material group (excluding wood)

Material group	2017–18		2018–19		2019–20	
	(tonnes)	(% of POM)	(tonnes)	(% of POM)	(tonnes)	(% of POM)
Paper & paperboard	1 421 000	49%	1 667 000	51%	1 768 000	54%
Glass	407 000	32%	474 000	37%	428 000	37%
Plastic	23 000	2%	37 000	4%	36 000	3%
Metal	64 000	30%	59 000	24%	28 000	11%
Total	**1 915 000**	**35%**	**2 237 000**	**38%**	**2 260 000**	**39%**

There was continued growth reported in the PCR content of paper & paperboard packaging from 2018–19 to 2019–20, underpinned by strong growth in the average PCR content of corrugated cardboard POM. The PCR content of the other material groups was steady except for metals, which fell notably.

The fall in the metals PCR content is due to more detailed and Australian specific survey information being provided by packaging manufacturers on the PCR content of the metal substrate received from suppliers, rather than an actual reduction in the PCR content between 2018–19 and 2019–20.

The PCR content of packaging (excluding wood packaging) increased slightly to an estimated 39% in 2019-20.

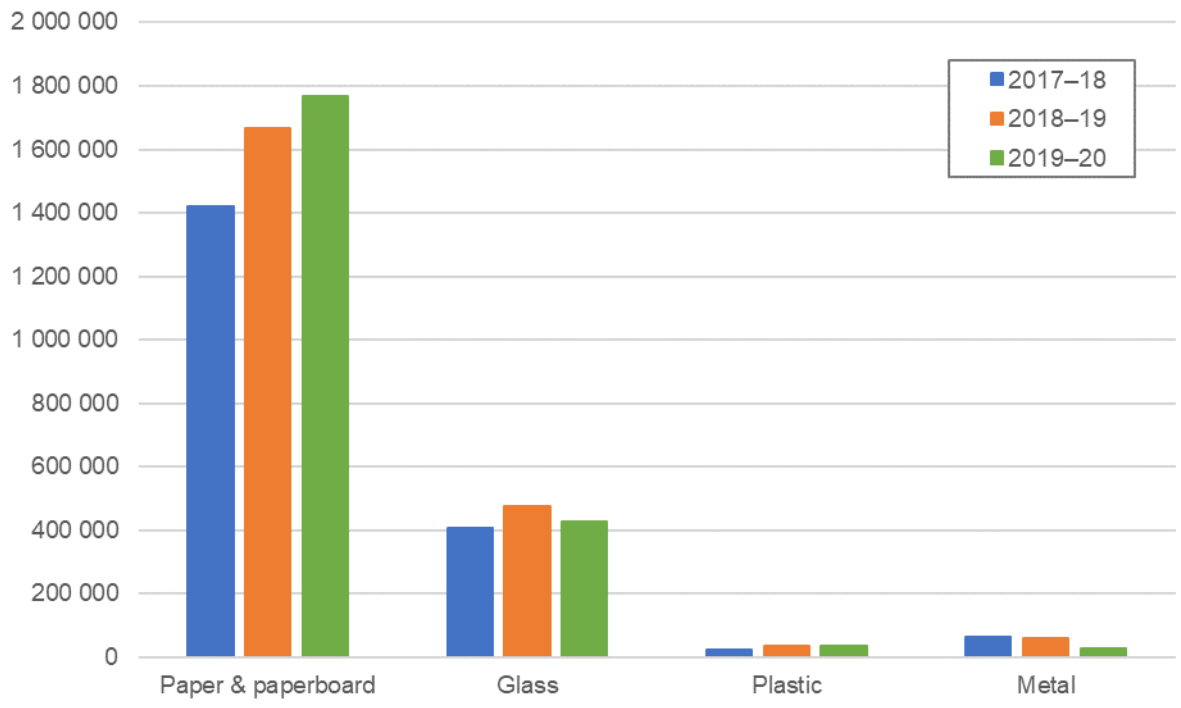

Figure 17 – Packaging PCR content from 2017–18 to 2019–20, by material group (tonnes)

Paper & paperboard packaging

Estimates of the recycled content incorporated into paper & paperboard packaging POM in 2019–20 and by material type are provided in **Table 22** and **Figure 18**.

The post-consumer recycled content of paper & paperboard packaging was 1.8 million tonnes, or 54% of total paper & paperboard packaging POM, an increase from 51% in the previous year (**Table 21**)**.** The pre-consumer recycled content was 0.5 million tonnes (15%), and a little over 1.0 million tonnes (31%) was sourced from virgin (primary) feedstocks.

Table 22 – Paper & paperboard packaging POM in 2019–20, by material type and recycled content source

Material group	Post-consumer source		Pre-consumer source		Virgin source		Total
	(tonnes)	%	(tonnes)	%	(tonnes)	%	(tonnes)
Boxboard/Cartonboard	140 000	44%	70 000	22%	106 000	34%	316 000
Corrugated cardboard	1 556 000	62%	386 000	15%	570 000	23%	2 513 000
HWS carrierboard	3 000	10%	2 000	9%	20 000	81%	25 000
Kraft paper	0	0%	28 000	16%	152 000	84%	180 000
Moulded fibreboard	46 000	83%	3 000	5%	7 000	12%	56 000
PCPB – Aseptic	0	0%	0	0%	40 000	100%	40 000
PCPB – Gable top	0	0%	0	0%	12 000	100%	12 000
PCPB – Cold cup	0	0%	1 000	5%	12 000	95%	13 000
PCPB – Hot cup	0	0%	1 000	6%	21 000	94%	23 000
PCPB – Other	0	1%	0	1%	4 000	98%	4 000
Polymer coated paper	0	0%	0	0%	1 000	100%	1 000
Other fibre packaging	23 000	24%	10 000	10%	62 000	66%	95 000
Total	**1 768 000**	**54%**	**500 000**	**15%**	**1 009 000**	**31%**	**3 277 000**

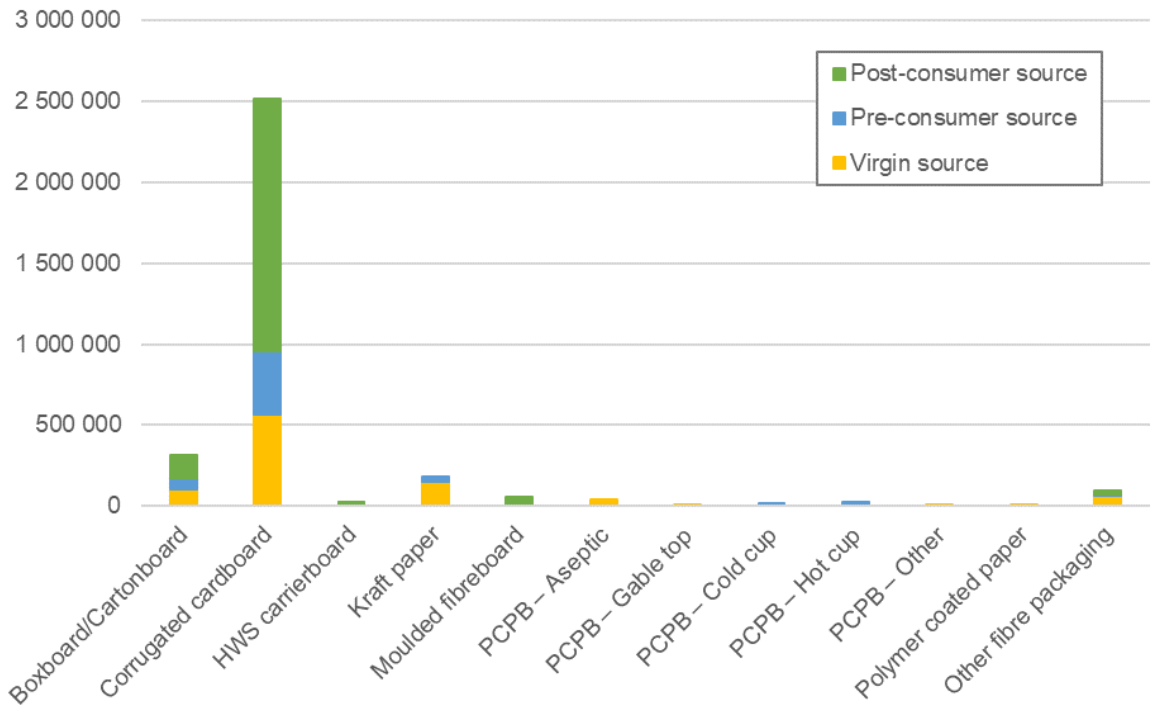

Figure 18 – Paper & paperboard packaging POM in 2019–20, by material type and recycled content (tonnes)

Glass packaging

Estimates of the recycled content incorporated into glass packaging POM in 2019–20 and by material type are provided in **Table 23** and **Figure 19**. The PCR content of glass packaging was 0.4 million tonnes, or 37% of total glass packaging POM. The pre-consumer recycled content was 0.10 million tonnes (6%) and 0.7 million tonnes (57%) was sourced from virgin (primary) feedstocks.

The proportion of post-consumer recycled content remained unchanged from the previous year (**Table 21**).

Table 23 – Glass packaging POM in 2019–20, by material type and recycled content source

Material group	Post-consumer source		Pre-consumer source		Virgin source		Total
	(tonnes)	%	(tonnes)	%	(tonnes)	%	(tonnes)
Amber glass	140 000	42%	14 000	4%	180 000	54%	334 000
Flint glass	208 000	34%	43 000	7%	355 000	59%	606 000
Green glass	80 000	37%	16 000	7%	120 000	56%	216 000
Total	**428 000**	**37%**	**73 000**	**6%**	**655 000**	**57%**	**1 156 000**

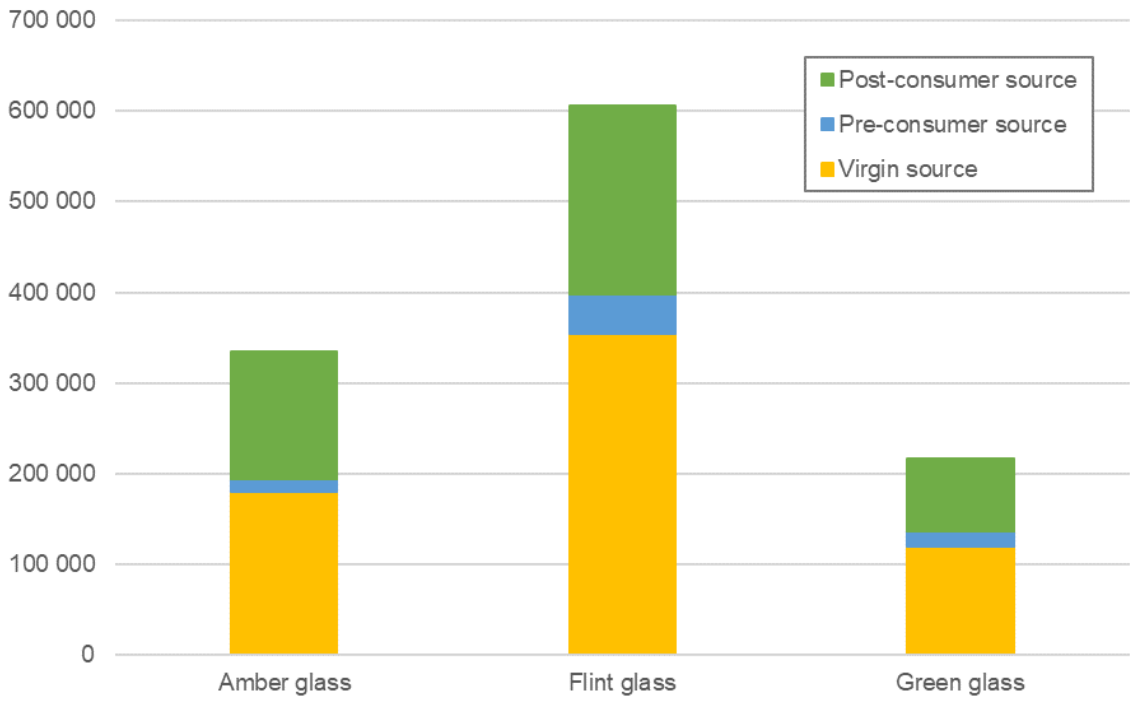

Figure 19 – Glass packaging POM in 2019–20, by material type and recycled content (tonnes)

Plastic packaging

Estimates of the recycled content incorporated into plastic packaging POM in 2019–20 and by material type are provided in **Table 24** and **Figure 20**. The PCR content of plastic packaging was 36,000 tonnes, or 3% of total plastic packaging POM. The pre-consumer recycled content was 16,000 tonnes (1%), and virgin (primary) resin feedstock dominated supply at 1.1 million tonnes or 95% of source material.

These figures are similar to those reported in 2018–19 (37,000 tonnes of PCR and 29,000 tonnes of pre-consumer resin) (APCO, 2020a, p. 52).

Table 24 – Plastic packaging POM in 2019–20, by material type and recycled content source

Material group	Post-consumer source		Pre-consumer source		Virgin source		Total
	(tonnes)	%	(tonnes)	%	(tonnes)	%	(tonnes)
PET (1)	20 000	13%	1 000	0%	142 000	87%	163 000
HDPE (2)	8 000	3%	4 000	1%	263 000	96%	275 000
PVC (3)	0	1%	0	0%	17 000	99%	17 000
LDPE (4)	4 000	2%	7 000	2%	264 000	96%	276 000
PP (5)	3 000	2%	4 000	2%	210 000	96%	218 000
PS (6)	0	1%	0	2%	17 000	98%	17 000
EPS (6)	0	0%	0	0%	23 000	100%	23 000
Bioplastic (7)	0	0%	0	0%	9 000	100%	9 000
Other (7)	0	0%	0	1%	20 000	99%	20 000
Unidentified	0	0%	0	0%	107 000	100%	107 000
Total	**36 000**	**3%**	**16 000**	**1%**	**1 071 000**	**95%**	**1 124 000**

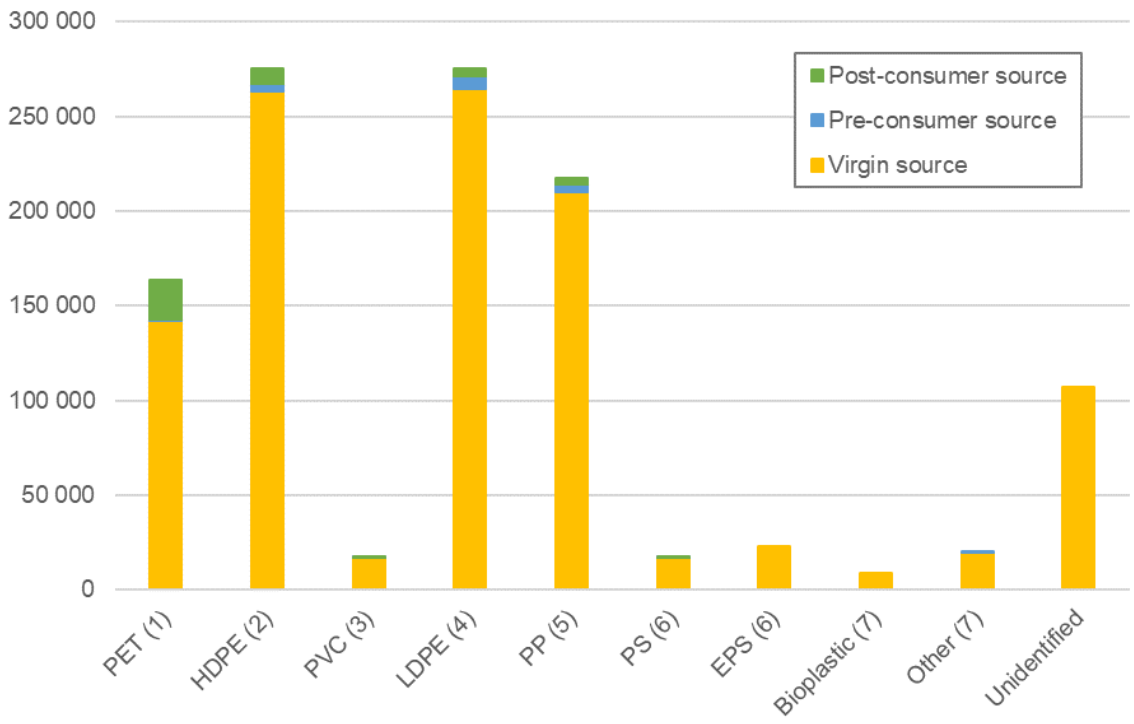

Figure 20 – Plastic packaging POM in 2019–20, by material type and recycled content (tonnes)

Metal packaging

Estimates of the recycled content incorporated into metal packaging POM in 2019–20 and by material type are provided in **Table 25** and **Figure 21**. The PCR content of metal packaging was 28,000 tonnes, or 11% of total metal packaging POM, the pre-consumer recycled content was 71,000 tonnes (29%), and 149,000 tonnes (60%) was sourced from virgin (primary) feedstocks.

Table 25 – Metal packaging POM in 2019–20, by material type and recycled content source

Material group	Post-consumer source		Pre-consumer source		Virgin source		Total
	(tonnes)	%	(tonnes)	%	(tonnes)	%	(tonnes)
Beverage aluminium	12 000	15%	41 000	50%	29 000	35%	82 000
Non-beverage aluminium	1 000	14%	3 000	48%	3 000	37%	7 000
Tin-plate steel	12 000	8%	25 000	18%	102 000	74%	139 000
Mild steel	3 000	15%	1 000	7%	15 000	78%	19 000
Stainless steel	0	7%	0	15%	1 000	78%	1 000
Total (tonnes)	**28 000**	**11%**	**71 000**	**29%**	**149 000**	**60%**	**248 000**

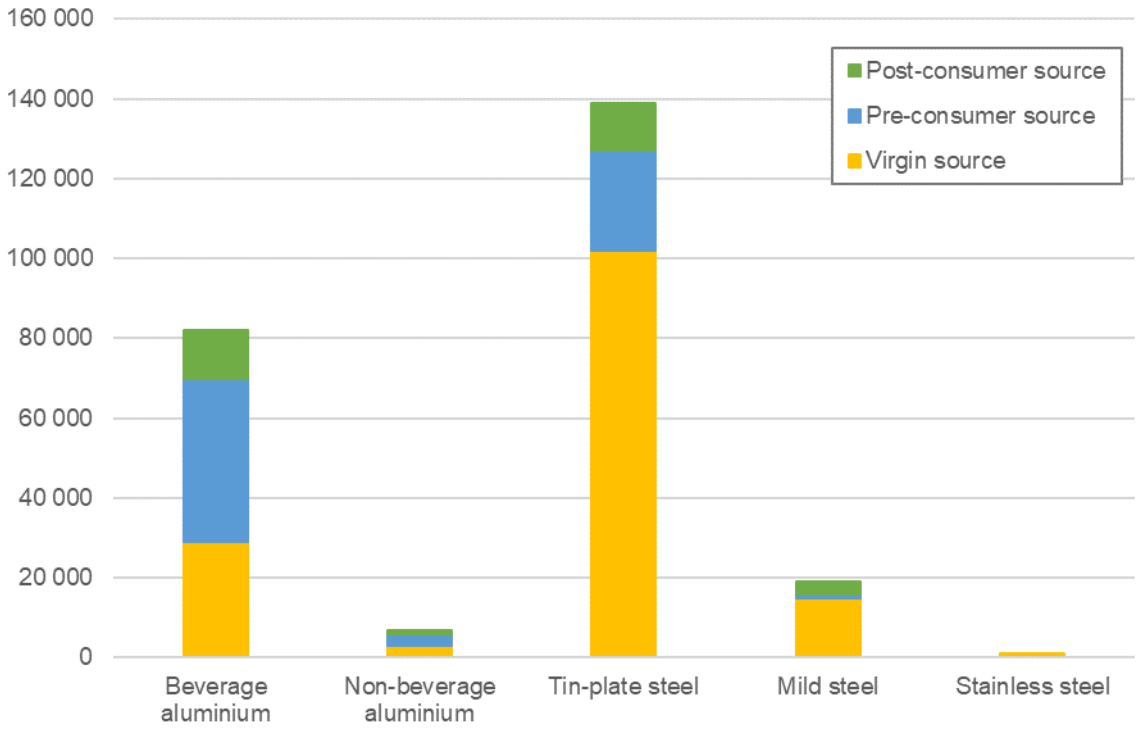

Figure 21 – Metal packaging POM in 2019–20, by material type and recycled content (tonnes)

The proportion of pre-consumer recycled content in aluminium based packaging is relatively high compared to other packaging material types due to the nature of aluminium goods manufacturing, which typically involves relatively large quantities of pre-consumer scrap generation.

Wood packaging

There was no post-consumer or pre-consumer recycled content identified as present in wood packaging, which was made from 100% virgin (primary) feedstocks.

2.9 ANZSIC division

Indicative estimates of packaging POM by ANZSIC division and material group are provided in **Table 26** and **Figure 22**.

Nearly 2.9 million tonnes (46%) of packaging were used by the 'S – Other services' division, into which packaging used by households has been allocated. This was followed by 'G – Retail trade' at 0.9 million tonnes (15%), 'F – Wholesale trade' division at 0.8 million tonnes (13%) and 'H – Accommodation and food services' at 0.8 million tonnes (12%).

Table 26 – Packaging POM in 2019–20, by material group and ANZSIC division

ANZSIC division	Paper & paperboard	Glass	Plastic	Metal	Wood	Total	
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)
A – Agriculture, forestry and fishing	0	0	42 000	1 000	76 000	119 000	1.9%
B – Mining	0	0	0	0	0	0	0.0%
C – Manufacturing	266 000	0	40 000	10 000	105 000	421 000	6.7%
D – Electricity, gas, water and waste services	0	0	0	0	0	0	0.0%
E – Construction	0	0	8 000	0	33 000	41 000	0.6%
F – Wholesale trade	670 000	0	88 000	20 000	52 000	829 000	13.2%
G – Retail trade	914 000	0	5 000	5 000	0	924 000	14.7%
H – Accommodation and food services	463 000	270 000	24 000	4 000	2 000	763 000	12.2%
I – Transport, postal and warehousing	16 000	0	5 000	5 000	143 000	169 000	2.7%
J – Information media and telecommunications	0	0	0	0	0	0	0.0%
K – Financial and insurance services	0	0	0	0	0	0	0.0%
L – Rental, hiring and real estate services	0	0	0	0	0	0	0.0%
M – Professional, scientific and technical services	0	0	0	0	0	0	0.0%
N – Administrative and support services	0	0	0	0	0	0	0.0%
O – Public administration and safety (private)	0	0	0	0	0	0	0.0%
P – Education and training (private)	0	0	0	0	0	0	0.0%
Q – Health care and social assistance (private)	4 000	0	0	0	0	4 000	0.1%
R – Arts and recreation services	0	0	0	0	0	0	0.0%
S – Other services	927 000	886 000	859 000	202 000	0	2 874 000	45.9%
X – Unknown	0	0	0	0	0	0	0.0%
Total	**3 277 000**	**1 156 000**	**1 124 000**	**248 000**	**462 000**	**6 266 000**	**100.0%**

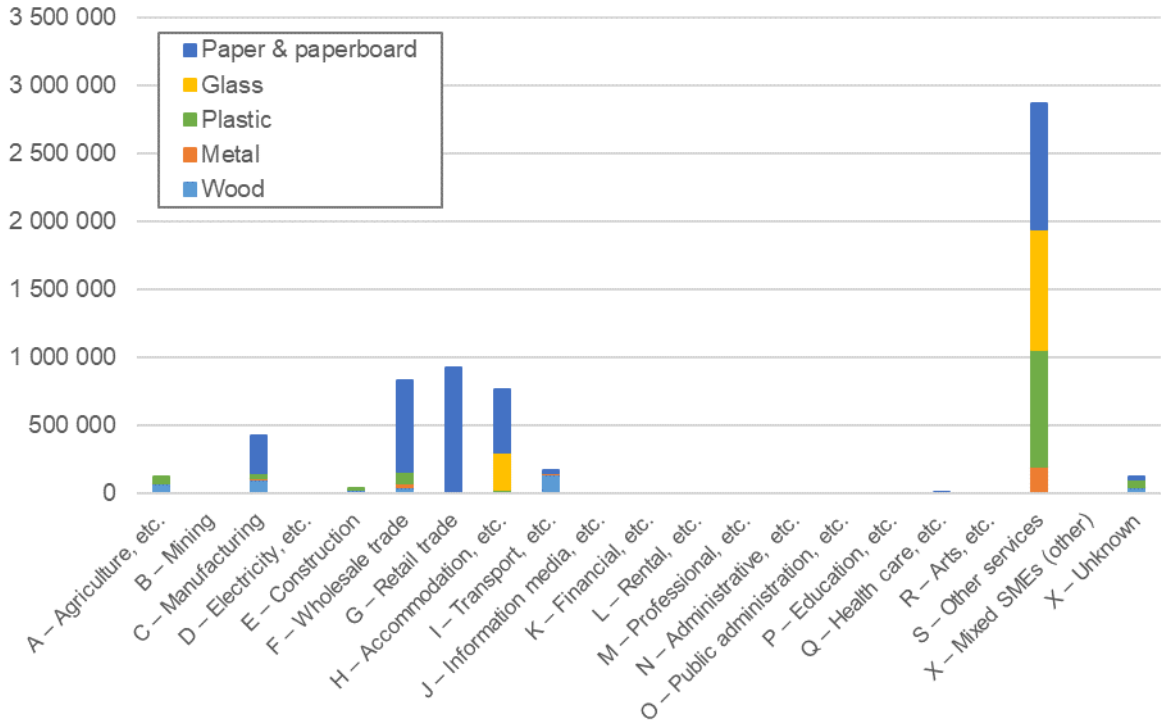

Figure 22 – Packaging POM in 2019–20, by material group and ANZSIC division (tonnes)

2.10 Problematic and unnecessary single-use plastics

APCO has identified a number of packaging materials or items as problematic and unnecessary single-use plastics (APCO, 2020b, p. 4). **Table 27** compares the available data for five of these priority items.

Single-use HDPE shopping bag consumption has fallen by 99% since 2016–17, largely driven by the WA and Queensland Government bans from 1 July 2018, and the Victorian Government ban from 1 November 2019. Woolworths and Coles also phased out free plastic shopping bags from their stores nationally from July 2018 (Envisage, 2021).

The reported increases in consumption of PS, EPS and PVC need to be treated with caution because of the low numbers and a large accuracy range and high year-on-year reporting volatility.

Table 27 – Priority single use plastics POM in 2016–17 to 2019–20

Priority item	2016–17	2017–18	2018–19	2019–20	% change 2018–19 to 2019–20
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	
Single-use HDPE shopping bags[a]	30 700	-	7 000	200	-98%
Rigid PS[b]	-	11 400	10 900	17 100	57%
EPS[b]	-	22 000	16 400	22 700	39%
PVC[b,c]	-	20 400	15 300	16 900	11%
Oxo-degradable plastics[b]	-	1 500	1 100	2 100	88%

a) Includes single-use HDPE bags (supermarket type) only. Single-use HDPE produce bags and single-use LDPE bags (boutique type) are not included. 2017–18 data not available for plastic bags. Source is Envisage (2021).

b) These estimates are subject to a large accuracy range and high year-on-year reporting volatility.

c) The current priority is to phase out rigid PVC only, but this data cannot be reported for confidentiality reasons.

3 PACKAGING RECOVERY IN 2019–20

This section of the report provides estimates of post-consumer packaging recovery in Australia in 2019–20, measured at the out-going gate of the secondary processing facility for the used packaging.

Examples of secondary processing facilities include paper mills, glass beneficiation facilities, plastics flaking and washing facilities, and metal smelting facilities.

Recovery data is reported at the following levels:

- Material group.
- Material type.
- Recovered material use application (packaging/non-packaging).
- Recovered material use destination (local/overseas).
- Rigid/flexible plastic packaging.
- ANZSIC division.
- Recovery rates by material group.
- Recovery rates by material type.
- Packaging recyclability.

A summary of the data for each state and territory is provided in **Appendix C.**

3.1 Material group

Total Australian post-consumer packaging recovery in 2019–20 is estimated at 3.42 million tonnes (±14%).

Of the packaging recovered in 2019–20, nearly two thirds were paper & paperboard packaging (65.2%), followed by glass packaging (20.5%), plastic packaging (5.2%), wood packaging (5.0%) and metal packaging (4.1%).

Estimates for post-consumer packaging recovery by material group are provided in **Table 28** and **Figure 23**. The aggregated accuracy range estimates for each of the material groups are also provided. The estimates include post-consumer packaging collected through municipal, C&I and CDS collection services, and are presented by collection service in **Table 29** and **Figure 24**.

Table 28 – Post-consumer packaging recovery in 2019–20, by material group

Material group	Recovery		Accuracy range
	(tonnes)	(%)[a]	(±%)
Paper & paperboard	2 229 000	65.2%	13%
Glass	699 000	20.5%	9%
Plastic	179 000	5.2%	11%
Metal	139 000	4.1%	17%
Wood	171 000	5.0%	50%
Total	**3 416 000**	**100.0%**	**14%**

a) Percent contribution to the total amount of packaging recovered, not the individual material recovery rate.

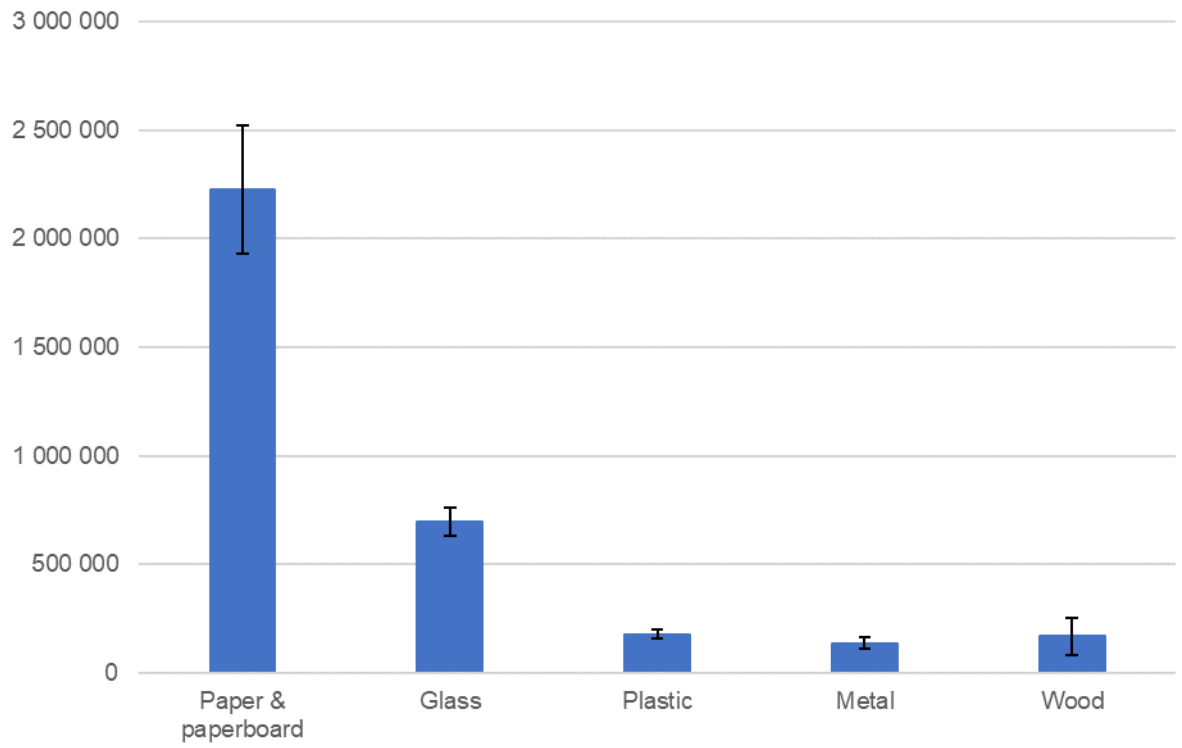

Figure 23 – Post-consumer packaging recovery in 2019–20, by material group (tonnes)

There was a notable increase in the quantity collected through CDS services in 2019-20, reflecting the continuing maturity of the schemes. The total amount collected through CDS increased from 171,000 tonnes in 2018–19 (5.7% of total collections) to 241,000 tonnes in 2019–20 (7.1% of the total). Most of this increase was for glass packaging.

Table 29 – Post-consumer packaging recovery in 2019–20, by material group and collection service

Material type	Collection service					Total
	MSW[a]	C&I[a]	C&D[a]	CDS[a]	Other	
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Paper & paperboard	957 000	1 246 000	0	1 000	24 000	2 229 000
Glass	502 000	3 000	0	195 000	0	699 000
Plastic	114 000	40 000	0	23 000	2 000	179 000
Metal	99 000	18 000	0	22 000	0	139 000
Wood	0	171 000	0	0	0	171 000
Total (tonnes)	**1 672 000**	**1 478 000**	**0**	**241 000**	**25 000**	**3 416 000**
Total (%)	**48.9%**	**43.3%**	**0.0%**	**7.1%**	**0.7%**	**100.0%**

a) MSW – municipal solid waste / C&I – commercial and industrial / C&D – construction and demolition / CDS – container deposit scheme.

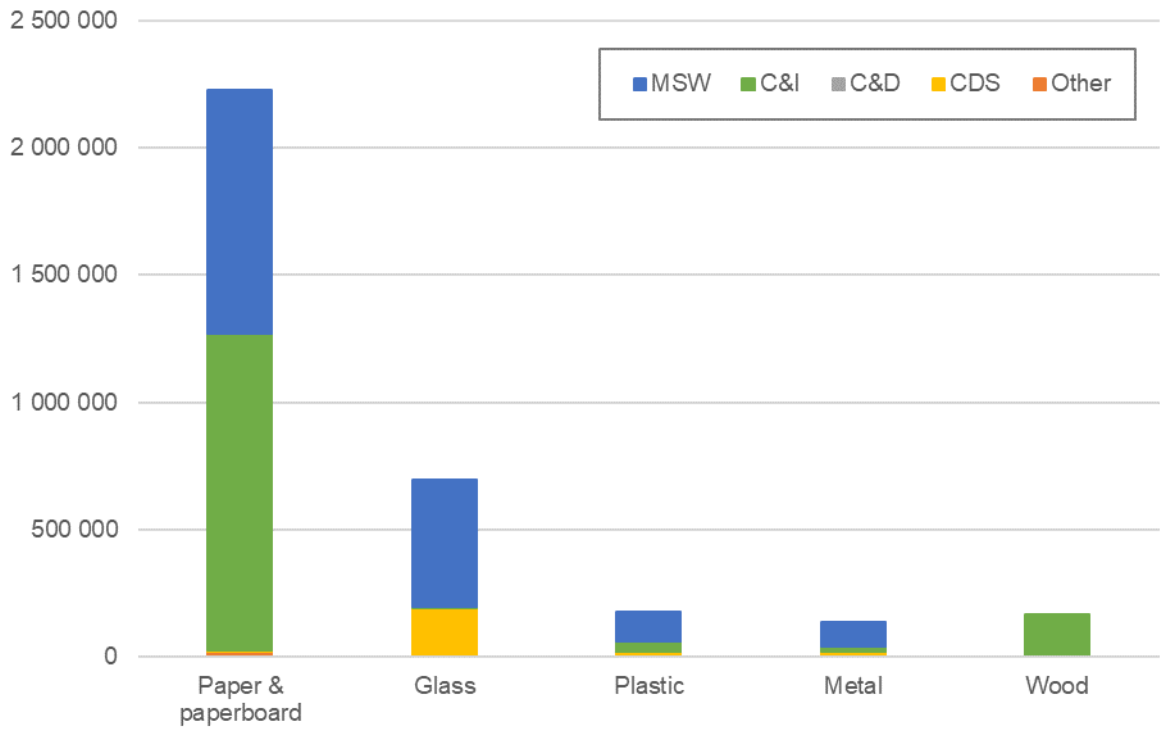

Figure 24 – Post-consumer packaging recovery in 2019–20, by material group and collection service (tonnes)

Table 30 and **Figure 25** compare recovery data by material group from 2017–18 to 2019–20. Packaging recovery in 2019–20 was 3.42 million tonnes, which was a 14.6% increase on the 2018–19 packaging recovery estimate of 2.98 million tonnes (APCO, 2020a, p. 57).

The increase in recovery is primarily due to solid growth in recovery for paper & cardboard and glass.

Paper & cardboard recovery growth was underpinned by strong exports over 2019–20 (but which then fell rapidly from May 2020). This growth was driven by generally increasing demand for recycled paper and paperboard products. Glass grew strongly off the back of maturing CDS collections nationally, and increased diversion of (primarily) lower quality MRF sourced glass into construction materials.

Excluding wood, the amount of packaging recovered was estimated to be 3.24 million tonnes in 2019-20, a 10.5% increase on the 2018–19 estimate of 2.94 million tonnes.

Table 30 – Post-consumer packaging recovery from 2017–18 to 2019–20, by material group

Material group	2017–18	2018–19	2019–20	Change 2018–19 to 2019–20
	(tonnes)	(tonnes)	(tonnes)	(%)
Paper & paperboard	1 817 000	2 045 000	2 229 000	9%
Glass	582 000	574 000	699 000	22%
Plastic	173 000	182 000	179 000	-2%
Metal	102 000	137 000	139 000	2%
Wood	NR[a]	44 000	171 000	284%
Total (tonnes)	**2 673 000**	**2 982 000**	**3 416 000**	**15%**
Total (kg/person)	**107**	**118**	**133**	**13%**

a) NR – Not reported.

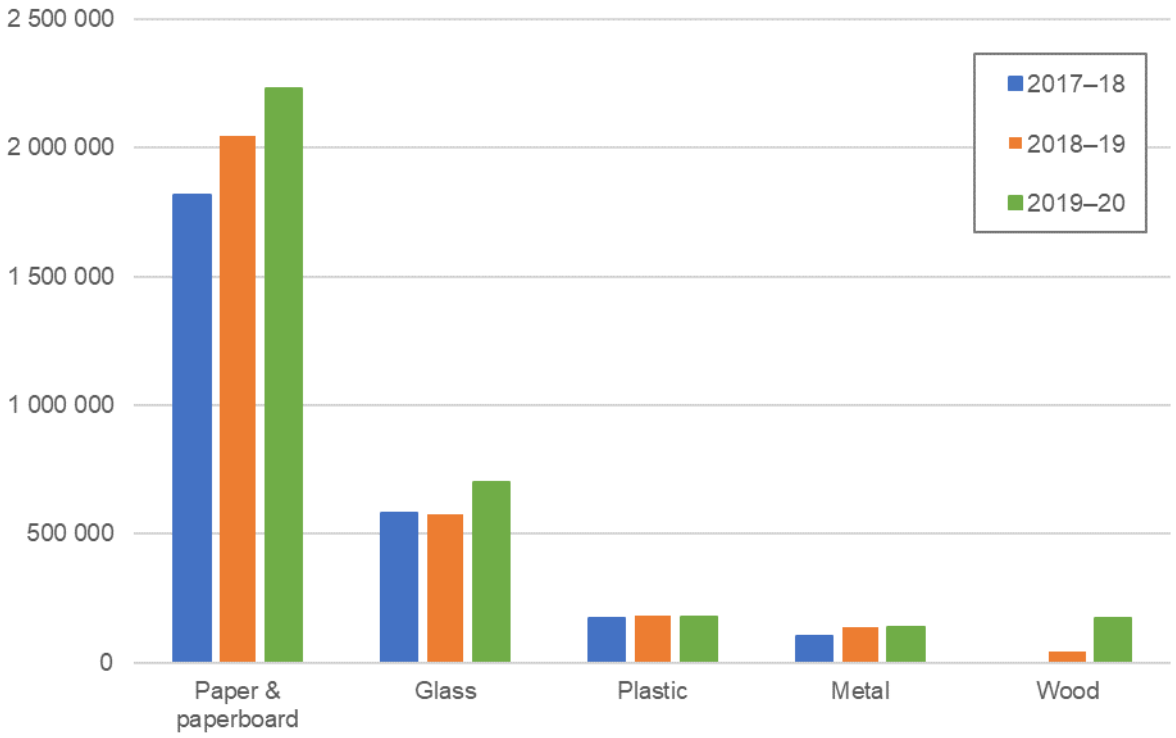

Figure 25 – Post-consumer packaging recovery from 2017–18 to 2019–20, by material group (tonnes)

3.2 Material type

Paper & paperboard packaging

Post-consumer paper & paperboard packaging recovery in Australia in 2019–20 is estimated at 2.2 million tonnes (±13%), which was 65.2% of all post-consumer packaging recovery. Estimates for paper & paperboard packaging recovery, by material type and collection service, are provided in **Table 31** and **Figure 26**.

Nearly 2.0 million tonnes (89%) of recovered paper & paperboard packaging were corrugated cardboard. It is estimated that around 1.1 million tonnes (56%) of this corrugated cardboard recovery were from C&I collections, and 1.0 million tonnes (43%) from municipal collections.

Table 31 – Paper & paperboard packaging recovery in 2019–20, by material type and collection service

Material type	Collection service				Total		Accuracy range
	MSW	C&I	CDS	Other			
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)	(±%)
Boxboard/Cartonboard	58 000	49 000	0	0	107 000	4.8%	15%
Corrugated cardboard	820 000	1 145 000	0	24 000	1 988 000	89.2%	13%
PCPB[a]	4 000	0	1 000	0	5 000	0.2%	20%
Other fibre packaging	76 000	52 000	0	0	128 000	5.8%	13%
Total (tonnes)	**957 000**	**1 246 000**	**1 000**	**24 000**	**2 229 000**	**-**	-
Total (%)	**42.9%**	**55.9%**	**0.1%**	**1.1%**	**100.0%**	**100.0%**	**13%**

a) PCPB – Polymer coated paperboard.

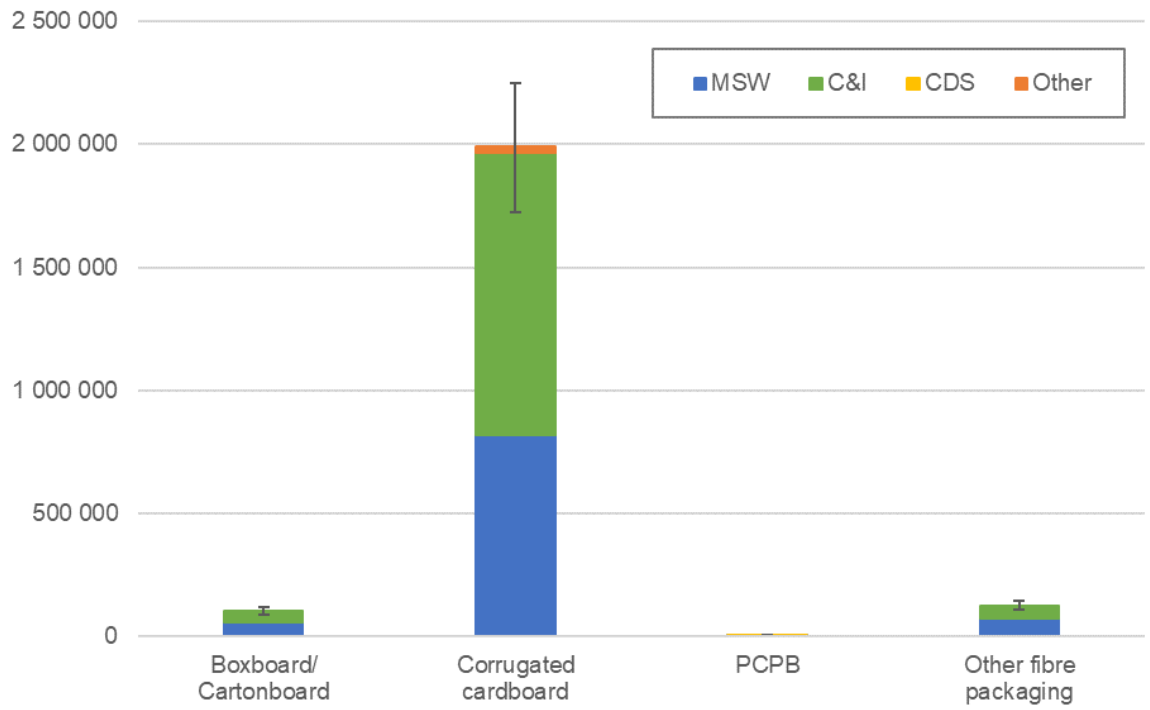

Figure 26 – Paper & paperboard packaging recovery in 2019–20, by material type and collection service (tonnes)

Glass packaging

Post-consumer glass packaging recovery in Australia in 2019–20 is estimated at around 0.70 million tonnes (±9%), which was 20.5% of all post-consumer packaging recovery. Estimates for glass packaging recovery, by material type and collection service, are provided in **Table 32** and **Figure 27**.

A significant proportion of recovered glass is not recycled back into packaging but is diverted into other applications (mainly in road construction), and this diversion has grown from 2018–19 to 2019–20. See **Section 3.3** for estimates of recovered packaging materials use applications.

An estimated 502,000 tonnes (71.8%) of glass packaging was recovered through kerbside collections, with another 195,000 tonnes (27.8%) recovered through CDS collections. Less than 1% was reported as recovered through C&I related collections.

Table 32 – Glass packaging recovery in 2019–20, by material type and collection service

Material type	Collection service				Total		Accuracy range
	MSW	C&I	CDS	Other			
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)	(±%)
Amber glass	130 000	1 000	71 000	0	202 000	28.9%	9%
Flint glass	292 000	1 000	73 000	0	366 000	52.4%	9%
Green glass	80 000	1 000	50 000	0	131 000	18.7%	9%
Total (tonnes)	**502 000**	**3 000**	**195 000**	**0**	**699 000**	**-**	-
Total (%)	**71.8%**	**0.4%**	**27.8%**	**0.0%**	**100.0%**	**100.0%**	**9%**

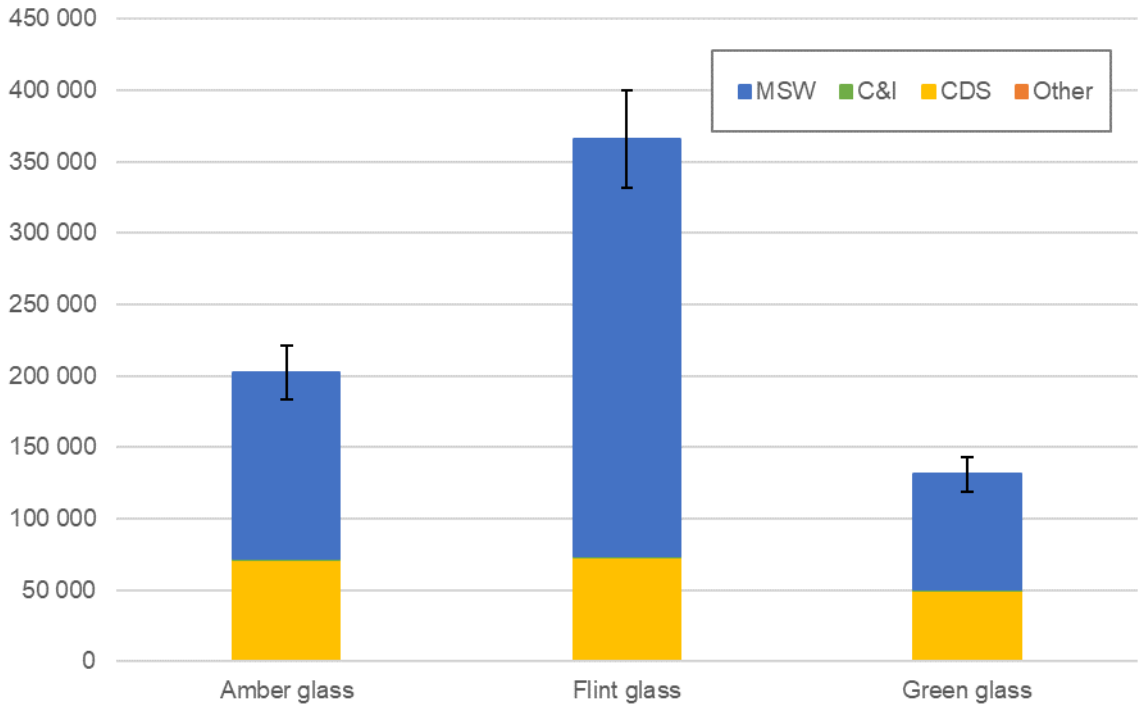

Figure 27 – Glass packaging recovery in 2019–20, by material type and collection service (tonnes)

Plastic packaging

Post-consumer plastic packaging recovery in Australia in 2019–20 is estimated at 179,000 tonnes (±11%), which was 5.2% of all post-consumer packaging recovery. Estimates for plastic packaging recovery, by material type and collection service, are provided in **Table 33** and **Figure 28**. A similar amount of plastic packaging was recovered in 2018–19 (APCO, 2020a, p. 63).

Around 114,000 tonnes (64%) of plastic packaging were recovered through kerbside collections, with another 40,000 tonnes (22%) recovered through C&I collections and 23,000 tonnes (13%) recovered through CDS related collections.

Table 33 – Plastic packaging recovery in 2019–20, by material type and collection service

Material type	Collection service				Total		Accuracy range
	MSW	C&I[a]	CDS	Other			
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)	(±%)
PET (1)	33 000	1 000	22 000	0	55 000	31.0%	12%
HDPE (2)	49 000	8 000	2 000	0	60 000	33.4%	12%
PVC (3)	2 000	0	0	0	2 000	1.0%	13%
LDPE (4)	7 000	7 000	0	1 000	15 000	8.4%	9%
PP (5)	16 000	4 000	0	0	20 000	11.2%	13%
PS (6)	4 000	0	0	0	4 000	2.4%	21%
EPS (6)	0	4 000	0	0	4 000	2.4%	14%
Bioplastic (7)	0	0	0	0	0	0.1%	50%
Other (7)	1 000	0	0	0	1 000	0.7%	5%
Unidentified	1 000	16 000	0	0	17 000	9.4%	3%
Total (tonnes)	**114 000**	**40 000**	**23 000**	**2 000**	**179 000**	-	-
Total (%)	**63.9%**	**22.3%**	**12.9%**	**0.9%**	**100.0%**	**100.0%**	**11%**

a) Collections of packaging film, both from B2B related collections and householder drop-off of flexible plastic packaging at supermarkets, are included under the C&I collection service in the table above.

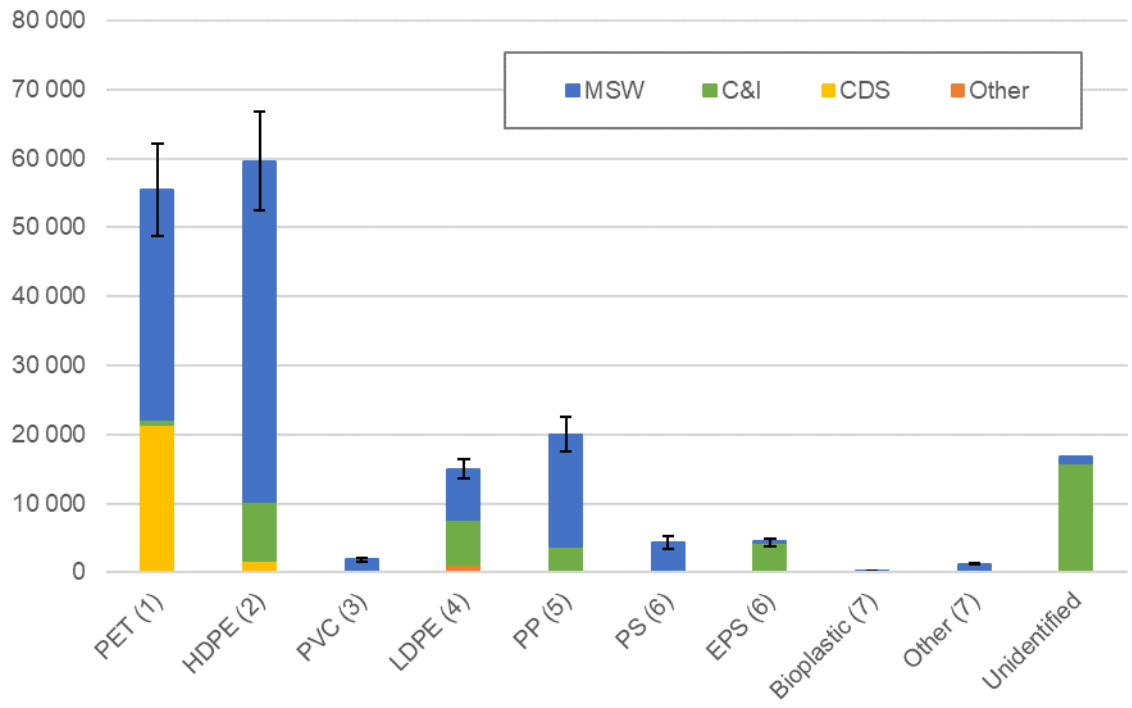

Figure 28 – Plastic packaging recovery in 2019–20, by material type and collection service (tonnes)

Metal packaging

Post-consumer metal packaging recovery in Australia in 2019–20 is estimated at around 139,000 tonnes (±17%), which was 4.1% of all post-consumer packaging recovery. Estimates for metal packaging recovery, by material type and collection service, are provided in **Table 34** and **Figure 29**. A similar amount of metal packaging was recycled in 2018–19 (APCO, 2020a, p. 64).

Around 99,000 tonnes (71.4%) of metal packaging were recovered through kerbside collections, with another 18,000 tonnes (12.7%) recovered through C&I collections, and 22,000 tonnes (15.8%) recovered through CDS related collections.

Table 34 – Metal packaging recovery in 2019–20, by material type and collection service

Material type	Collection service				Total		Accuracy range
	MSW	C&I	CDS	Other			
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)	(±%)
Beverage aluminium	44 000	0	22 000	0	66 000	47.4%	5%
Non-beverage aluminium	3 000	0	0	0	3 000	1.9%	5%
Tin-plate steel	52 000	0	0	0	53 000	37.9%	22%
Mild steel	0	17 000	0	0	17 000	12.4%	50%
Stainless steel	0	1 000	0	0	1 000	0.4%	50%
Total (tonnes)	**99 000**	**18 000**	**22 000**	**0**	**139 000**	-	-
Total (%)	**71.2%**	**13.1%**	**15.7%**	**0.0%**	**100.0%**	**100.0%**	**17%**

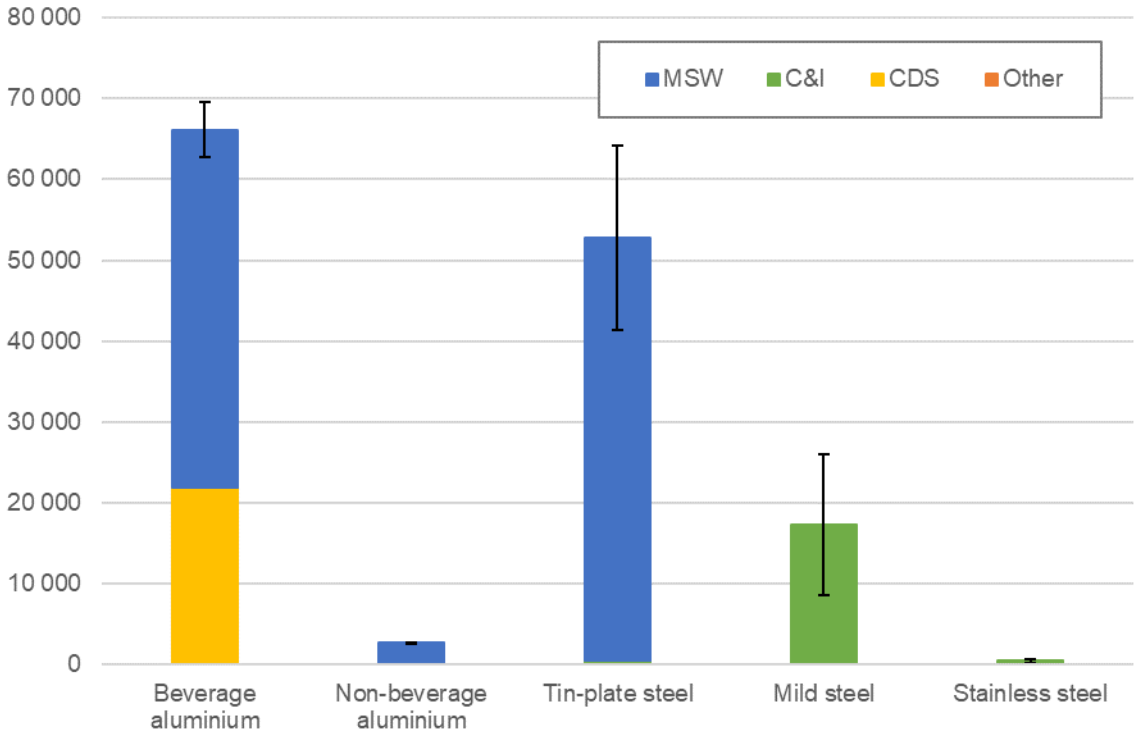

Figure 29 – Metal packaging recovery in 2019–20, by material type and collection service (tonnes)

Wood packaging

Post-consumer wood packaging recovery in Australia in 2019–20 is estimated at around 171,000 tonnes (±50%), which accounted for 5.0% of all post-consumer packaging recovery. Estimates for wood packaging recovery, by material type and collection service, are provided in **Table 35** and **Figure 30**. All identified recovery of wood packaging was through C&I collections.

Table 35 – Wood packaging recovery in 2019–20, by material type and collection service

Material type	Collection service				Total		Accuracy range
	MSW	C&I	CDS	Other			
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)	(±%)
Fibreboard	0	9 000	0	0	9 000	5.3%	50%
Hardwood	0	36 000	0	0	36 000	21.3%	50%
Softwood	0	125 000	0	0	125 000	73.4%	50%
Total (tonnes)	**0**	**171 000**	**0**	**0**	**171 000**	-	-
Total (%)	**0.0%**	**100.0%**	**0**	**0**	**100.0%**	**100.0%**	**50%**

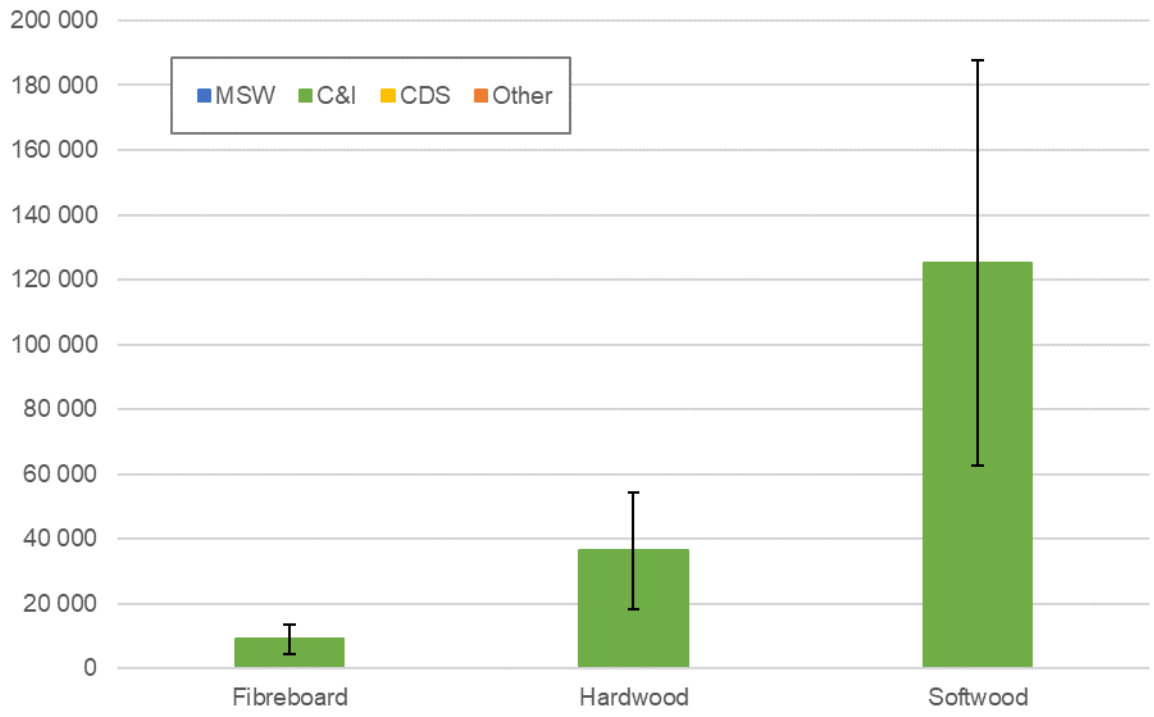

Figure 30 – Wood packaging recovery in 2019–20, by material type and collection service (tonnes)

3.3 Material use application

Estimates of recovered post-consumer packaging material use in 2019–20, by packaging or non-packaging end-use application, are provided in **Table 36** and **Figure 31**. An estimated 1.90 million tonnes (55.6%) were used to manufacture new packaging, compared to 1.56 million tonnes (52.5%) in 2018–19 (APCO, 2020a, p. 66).

Table 36 – Packaging recovery in 2019–20, by material group and material use application

Material group	Packaging applications	Non-packaging applications	Unknown applications	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Paper & paperboard	1 513 000	11 000	704 000	2 229 000
Glass	345 000	331 000	23 000	699 000
Plastic	31 000	120 000	28 000	179 000
Metal	10 000	107 000	23 000	139 000
Wood	0	171 000	0	171 000
Total (tonnes)	**1 899 000**	**739 000**	**778 000**	**3 416 000**
Total (%)	**55.6%**	**21.6%**	**22.8%**	**100.0%**

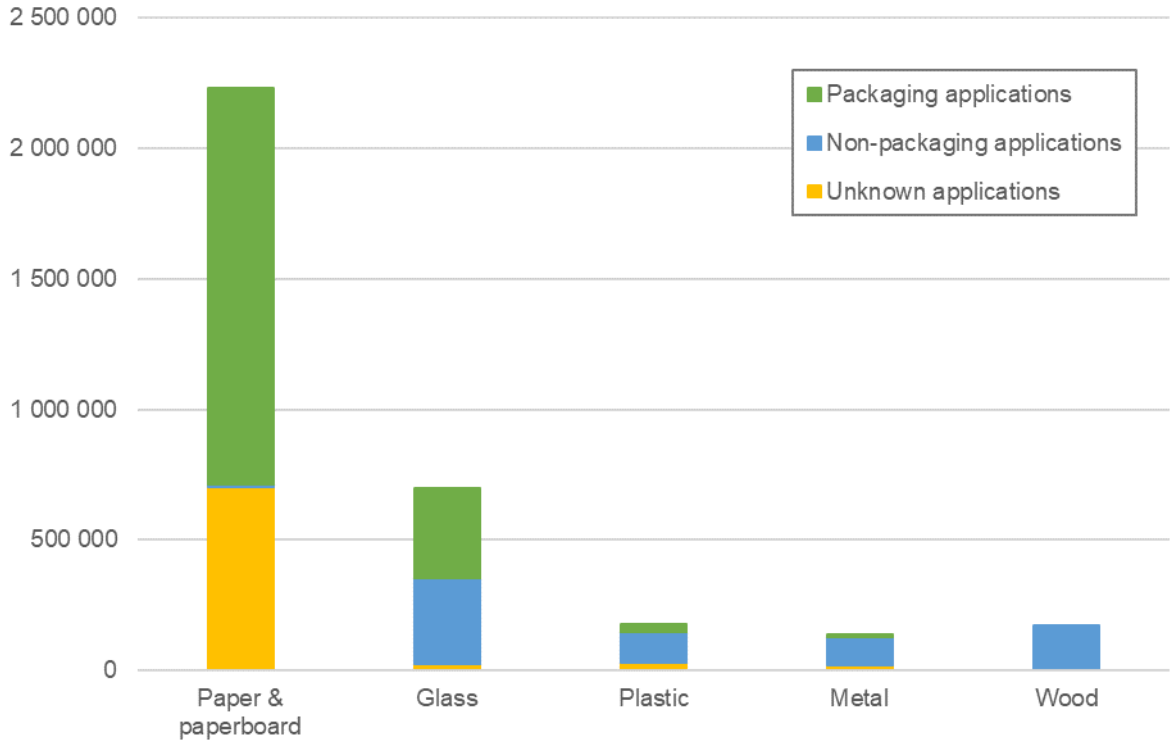

Figure 31 – Packaging recovery in 2019–20, by material group and material use application (tonnes)

Recovered paper & paperboard are largely used in packaging applications. The application of much of the exported scrap paper & paperboard could not be determined with any certainty (accounting for the large 'Unknown' quantity), however, much of this would be used as an input into packaging manufacture overseas, and corrugated cartons in particular.

The use of recovered glass packaging is mostly put back into packaging, however, large quantities of packaging glass are also crushed and used in civil construction. The major application of this crushed glass is as a substitute for virgin sand or aggregate in road construction - typically blended with virgin sand and aggregate and then mixed with cement to manufacture road-base products. Crushed glass sand and aggregate are also regularly used in non-structural concrete mixes. The use of glass into construction grew strongly from 2018–19 to 2019–20, with most of the increase in Victoria.

The use of recovered plastic packaging is dominated by non-packaging applications, with relatively little returned back into packaging. Many of the typical applications are summarised in the following table.

Table 37 – Typical uses of recycled plastics in Australia

Polymer	Major uses of recycled polymer	Minor uses of recycled polymer
PET	Beverage bottles	Timber substitutes, geo-textiles, pallets and fence posts.
HDPE	Milk bottles, films, pallets, wheelie bins, irrigation hose and pipes.	Cable covers, extruded sheet, moulded products, shopping and garbage bags, slip sheets, drip sheets for water, wood substitutes and mixed plastics products (e.g., fence posts, bollards, kerbing, marine structures and outdoor furniture), materials handling and roto-moulded water tanks.
PVC	Industrial and garden hose, profiles, pipes and conduit.	Gumboots, mats, resilient flooring, mudflaps and coving (decorative building mouldings).
LDPE / LLDPE	Film (incl. builders' and agricultural film, concrete lining, freight packaging, garbage bags, shopping bags), agricultural piping.	Binder additive to asphalt, trickle products, vineyard cover, pallets, shrink wrap, roto-moulding, slip sheets, irrigation tube, timber substitutes, cable covers, builders' film, garbage bags, carry bags, and other building industry applications.
PP	Crates, boxes and plant pots.	Electrical cable covers, building panels and concrete reinforcement stools (bar chairs and shims), furniture, irrigation fittings, agricultural and garden pipe, drainage products (such as drain gates) and tanks, builders' film, kerbing, bollards, concrete reinforcing and a wide variety of injection moulded products.
PS	Bar chairs and industrial spools.	Office accessories, coat hangers, glasses, building components, industrial packing trays, wire spools and a range of extrusion products.
EPS	Waffle pods for under slab construction of buildings.	Synthetic timber applications (including photo frames, decorative architraves, fence posts), XPS (extruded polystyrene) insulation sheeting, and lightweight concrete.

Only around 7% of recovered metal packaging is known to be put back into packaging applications. This is a consequence of the large international markets for aluminium and steel scrap, and the relatively small contribution of scrap metal packaging to these markets.

The major identified applications for recovered end-of-life wood packaging were wood chip products, mulches and soil conditioners. It is also understood that some recovered wood packaging was used in the manufacture of particle board products and animal bedding products.

There was also some recovery of wood packaging into energy recovery applications, which is discussed in the following section.

Packaging recovery through energy recovery

Packaging recovery includes quantities of post-consumer scrap plastic packaging sent to energy recovery in 2019–20. This is estimated to have been 16,000 tonnes in 2019–20, the same as 2018–19, also at 16,000 tonnes (APCO, 2020a, p. 68), and 2,000–4,000 tonnes in 2017–18 (APCO, 2019, p. 45).

In addition, it is indicatively estimated that around 10,000 tonnes of wood packaging were sent to energy recovery in 2019–20.

Note that the quantities estimated here are included in the data presented in **Section 3.1** and **Section 3.2**, and in **Table 36**.

Packaging recovery through composting

It is estimated that around 10,000 tonnes of fibre-based packaging (mostly cardboard) were disposed into organics collections in 2019–20. This estimate is based on a small survey of composters nationally and is indicative only.

It is estimated that around 100–200 tonnes of compostable plastic-based packaging were disposed into organics collections in 2019–20. This estimate is based on the composter survey and is indicative only.

As stated above, the major identified applications for recovered end-of-life wood packaging were wood chip products, mulches, and soil conditioners. Wood chip products and mulches usually compost in-situ during use, and soil conditioners are a blend of well-composted and finely ground organic materials. It is estimated that around 130,000 tonnes of wood packaging were recovered via this pathway in 2019–20.

Note that the quantities estimated here are included in the data presented in **Section 3.1** and **Section 3.2**, and in **Table 36**.

3.4 Material use destination

Estimates of recovered post-consumer packaging material use in 2019–20, by local or overseas destination, are provided in **Table 38** and **Figure 32**. In total an estimated 63% of recovered packaging was used locally in Australia and 37% exported.

The use of recovered paper & paperboard is almost evenly split between local manufacturers (54%) and export (46%). Recovered glass packaging is almost entirely used locally, with only 3% exported overseas during 2019–20. Recovered plastic packaging was mostly exported in 2019–20, with 57% sent offshore (excluding the unknown destination material). Aluminium beverage and tin-plate steel metal packaging was almost entirely exported, with local reprocessing mostly consisting of mild-steel drums from the B2B sector.

Table 38 – Packaging recovery in 2019–20, by material group and location of material use

Material group	Local	Overseas	Unknown	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Paper & paperboard	1 213 000	1 016 000	0	2 229 000
Glass	676 000	23 000	0	699 000
Plastic	72 000	96 000	11 000	179 000
Metal	18 000	121 000	0	139 000
Wood	171 000	0	0	171 000
Total (tonnes)	**2 149 000**	**1 256 000**	**11 000**	**3 416 000**
Total (%)	**62.9%**	**36.8%**	**0.3%**	**100.0%**

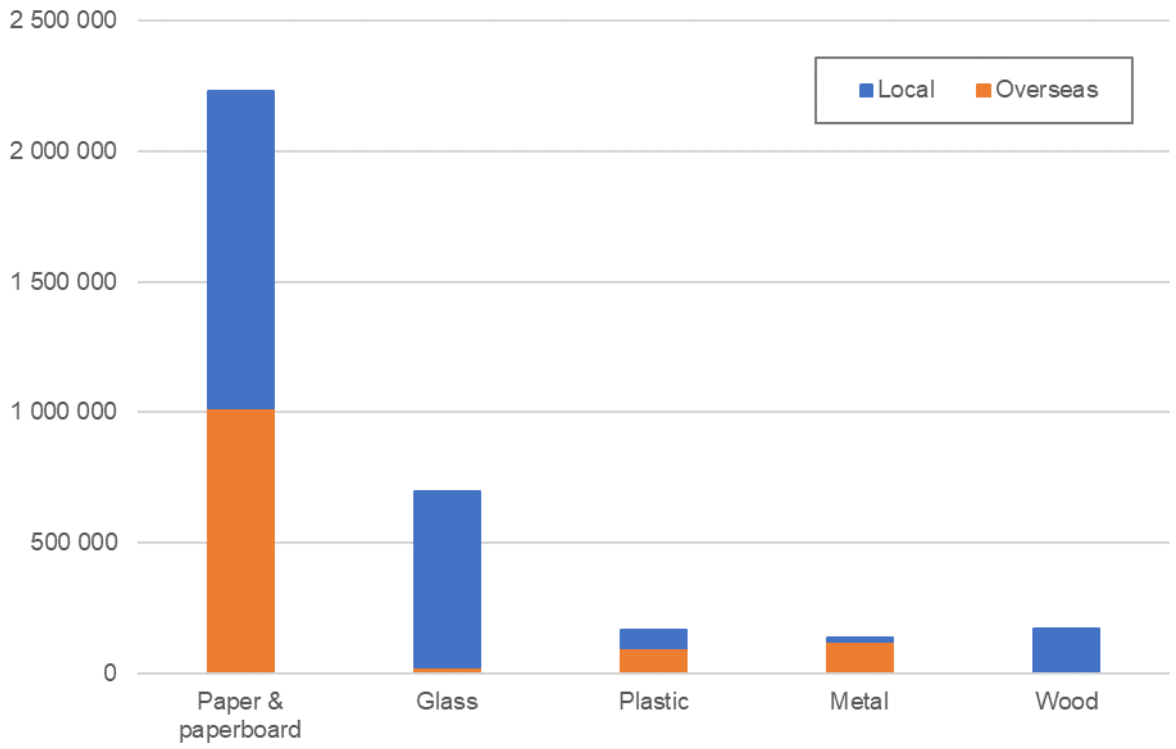

Figure 32 – Packaging recovery in 2019–20, by material group and location of material use (tonnes)

3.5 Rigid/flexible plastic packaging

Estimates of plastic packaging post-consumer recovery by rigid/flexible format are provided in **Table 39** and **Figure 33**.

The definitions of rigid and flexible plastic packaging adopted for this study are:

- Rigid plastic packaging is packaging such as bottles and tubs, which are (generally) moulded and hold their shape.
- Flexible (soft) plastics is packaging that can be scrunched into a ball.

Of the 179,000 tonnes of plastic packaging recovered in 2019–20 around 159,000 tonnes (89%) were rigid, and 20,000 tonnes (11%) were flexible. Recovery of flexible plastic packaging is dominated by LDPE film recovery from B2B applications.

The estimate for 2019–20 flexible plastic packaging recovery is a small increase on the 19,000 tonnes reported for 2018–19 (APCO, 2020a, p. 70).

Table 39 – Plastic packaging recovery in 2019–20, by material type and rigid/flexible classification

Material type	Rigid	Flexible	Total
	(tonnes)	(tonnes)	(tonnes)
PET (1)	55 000	0	55 000
HDPE (2)	57 000	3 000	60 000
PVC (3)	2 000	0	2 000
LDPE (4)	3 000	12 000	15 000
PP (5)	17 000	2 000	20 000
PS (6)	4 000	0	4 000
EPS (6)	4 000	0	4 000
Bioplastic (7)	<500	<500	<500
Other (7)	1 000	<500	1 000
Unidentified	14 000	3 000	17 000
Total (tonnes)	**159 000**	**20 000**	**179 000**
Total (%)	**88.9%**	**11.1%**	**100.0%**

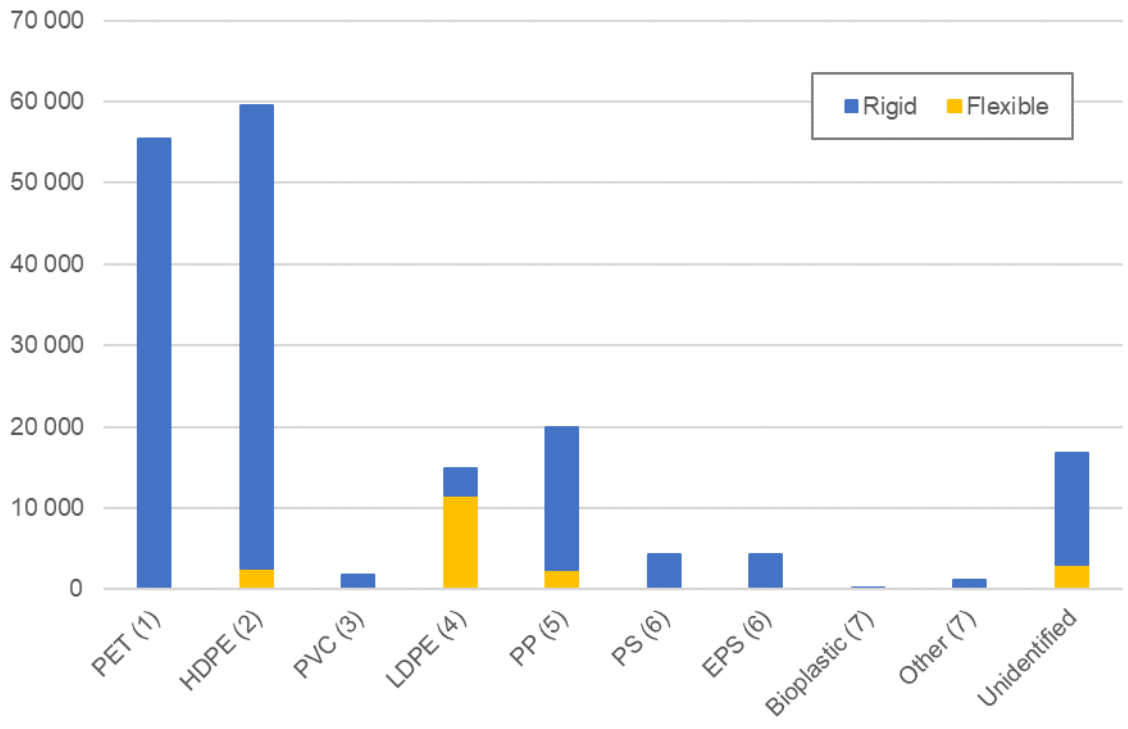

Figure 33 – Plastic packaging recovery in 2019–20, by material type and rigid/flexible classification (tonnes)

3.6 ANZSIC division

Table 40 and **Figure 34** present post-consumer packaging recovery by material group and ANZSIC division.

Nearly 1.9 million tonnes (54%) of used packaging were recovered from the 'S – Other services' division, into which packaging recovered from households has been allocated. This was followed by 'F – Wholesale trade' at 0.5 million tonnes (15%), 'G – Retail trade' at 0.5 million tonnes (15%), 'C – Manufacturing' at 0.3 million tonnes (10%), and the 'H – Accommodation and food services' division at 0.1 million tonnes (3%).

Table 40 – Packaging recovery in 2019–20, by material group and ANZSIC division

ANZSIC division	Paper & paperboard	Glass	Plastic	Metal	Wood	Total	
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%)
A – Agriculture, forestry and fishing	0	0	4 000	2 000	0	6 000	0.2%
B – Mining	0	0	0	0	0	0	0.0%
C – Manufacturing	282 000	0	2 000	10 000	49 000	343 000	10.0%
D – Electricity, gas, water and waste services	0	0	0	0	0	0	0.0%
E – Construction	0	0	0	0	17 000	17 000	0.5%
F – Wholesale trade	478 000	0	19 000	6 000	0	503 000	14.7%
G – Retail trade	481 000	0	18 000	0	0	499 000	14.6%
H – Accommodation and food services	1 000	88 000	1 000	1 000	0	90 000	2.6%
I – Transport, postal and warehousing	0	0	0	0	61 000	61 000	1.8%
J – Information media and telecommunications	0	0	0	0	0	0	0.0%
K – Financial and insurance services	0	0	0	0	0	0	0.0%
L – Rental, hiring and real estate services	0	0	0	0	0	0	0.0%
M – Professional, scientific and technical services	0	0	0	0	0	0	0.0%
N – Administrative and support services	0	0	0	0	0	0	0.0%
O – Public administration and safety (private)	0	0	0	0	0	0	0.0%
P – Education and training (private)	0	0	0	0	0	0	0.0%
Q – Health care and social assistance (private)	0	0	0	0	0	0	0.0%
R – Arts and recreation services	0	0	0	0	0	0	0.0%
S – Other services	987 000	611 000	134 000	121 000	0	1 853 000	54.2%
X – Unknown	0	0	0	0	0	0	0.0%
Total	**2 229 000**	**699 000**	**179 000**	**139 000**	**171 000**	**3 416 000**	**100.0%**

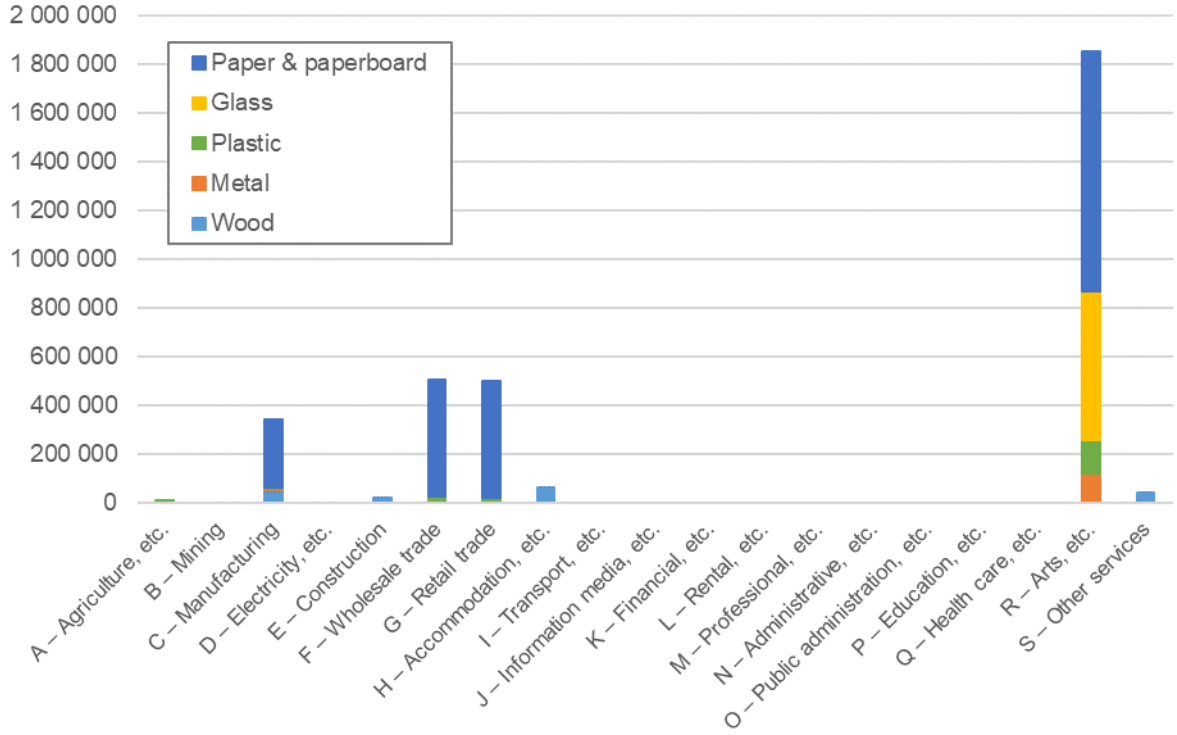

Figure 34 – Packaging recovery in 2019–20, by material group and ANZSIC division (tonnes)

3.7 Recovery rates by material group

Estimates for post-consumer packaging recovery rates by material group are provided in **Table 41** and **Figure 35**.

The post-consumer packaging recovery rate in 2019–20 is estimated to be 55%. This is based on the packaging POM by material group, and recovery as measured at the out-going gate of the secondary processing facility for the used packaging.

Paper & paperboard had the highest recovery rate at 68%, followed by glass packaging (60%), metal packaging (56%), wood packaging (36%), and plastic packaging (16%).

Table 41 – Post-consumer packaging recovery rates in 2019–20, by material group

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Paper & paperboard	3 277 000	2 229 000	68%
Glass	1 156 000	699 000	60%
Plastic	1 124 000	179 000	16%
Metal	248 000	139 000	56%
Wood	462 000	171 000	37%
Total	**6 266 000**	**3 416 000**	**55%**

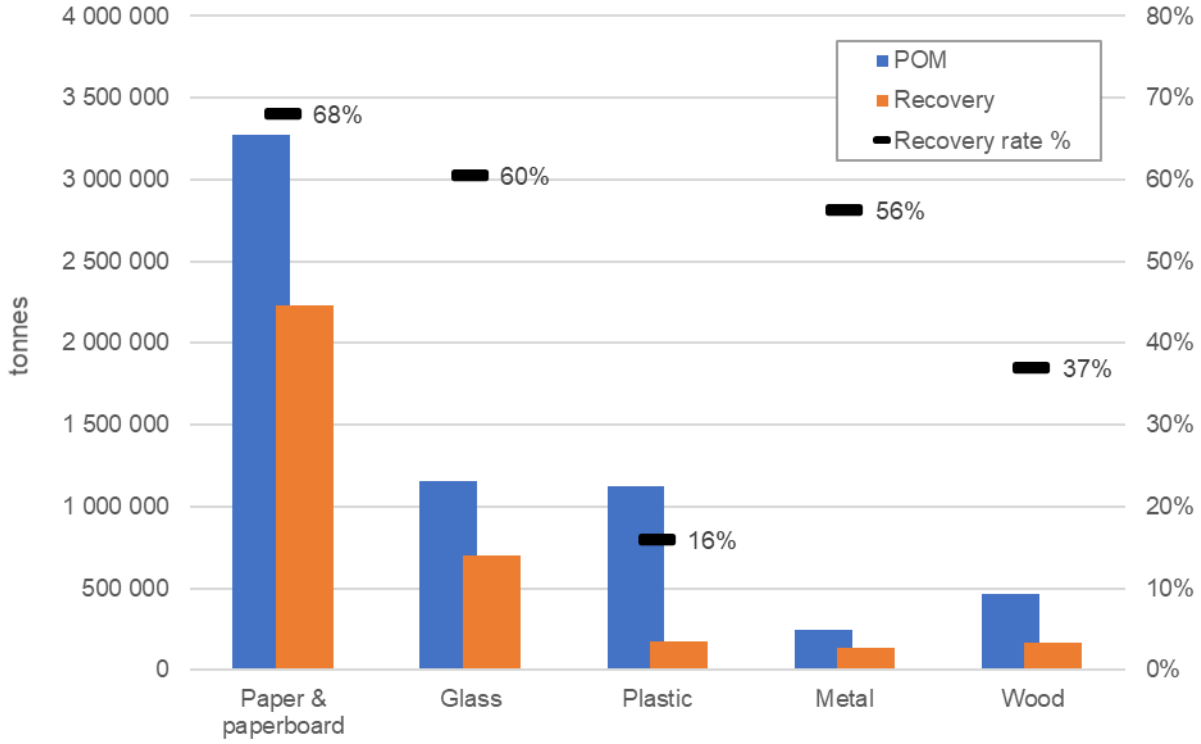

Figure 35 – Post-consumer packaging recovery rates in 2019–20, by material group

Table 42 and **Figure 36** compare recovery rates by material group from 2017–18 to 2019–20. There was a marked increase in the glass packaging recovery rate, underpinned by the increasing maturity of container deposit schemes in NSW and Queensland in 2019–20. In addition, the use of glass into construction applications grew strongly from 2018–19 to 2019–20, with the majority of the increase in Victoria.

While the recovery rate fell slightly for plastic, from 18% to 16%, and increased slightly for metals, the underlying accuracy ranges for the POM and recovery estimates mean that it is not possible to state whether a real change in recovery rates for plastic and metal packaging has occurred.

Table 42 – Post-consumer packaging recovery rates from 2017–18 to 2019–20, by material group

Material group	2017–18	2018–19	2019–20	% change[a] 2018–19 to 2019–20
	(%)	(%)	(%)	(%)
Paper & paperboard	63%	63%	68%	5%
Glass	46%	45%	60%	16%
Plastic	16%	18%	16%	-2%
Metal	48%	56%	56%	1%
Wood	NR[b]	36%	37%	1%
Total	**49%**	**50%**	**55%**	**4%**

a) % change values are calculated prior to rounding the annual values.
b) NR – Not reported.

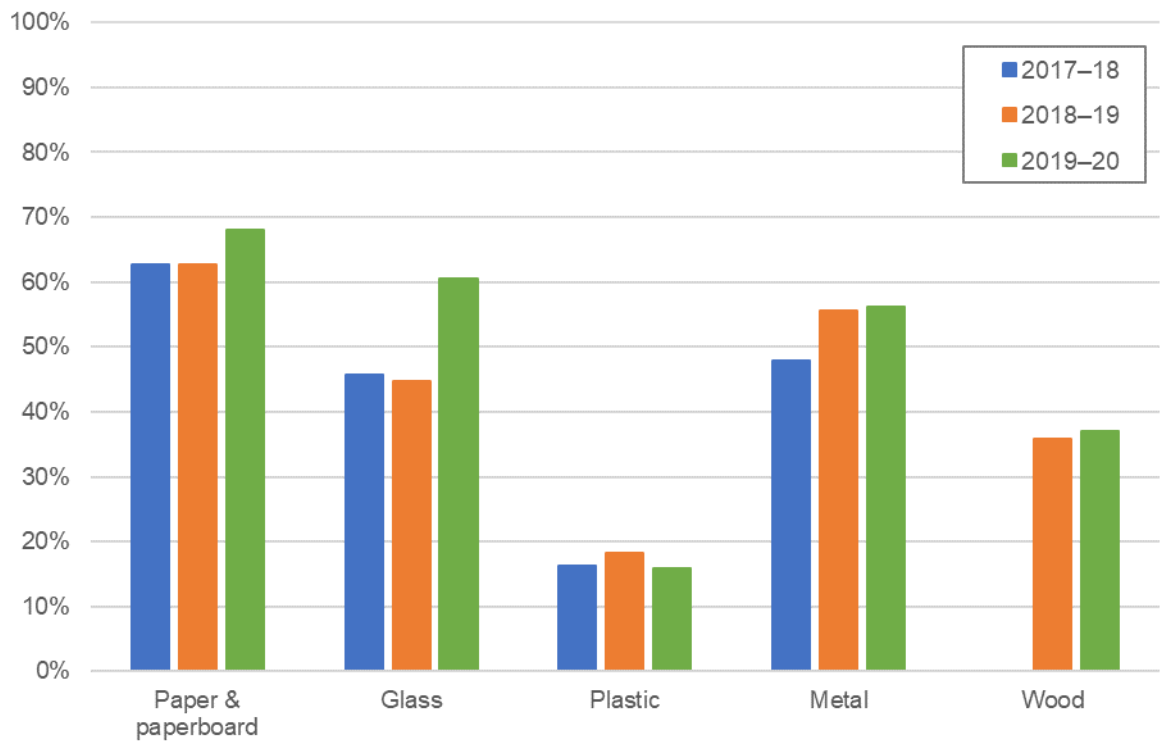

Figure 36 – Post-consumer packaging recovery rates from 2017–18 to 2019–20, by material group (tonnes)

3.8 Recovery rates by material type

Paper & paperboard packaging

Estimates for post-consumer paper & paperboard packaging recovery rates in 2019–20, by material type, are provided in **Table 43** and **Figure 37**.

The relatively high post-consumer paper & paperboard packaging recovery rate of 68% is underpinned by the recovery of corrugated cardboard (79% recovery rate), most of which is B2B material collected through C&I collections.

Table 43 – Post-consumer paper & paperboard packaging recovery rates in 2019–20, by material type

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Boxboard/Cartonboard	316 000	107 000	34%
Corrugated cardboard	2 513 000	1 988 000	79%
Polymer coated paperboard	93 000	5 000	5%
Other fibre packaging	356 000	128 000	36%
Total	**3 277 000**	**2 229 000**	**68%**

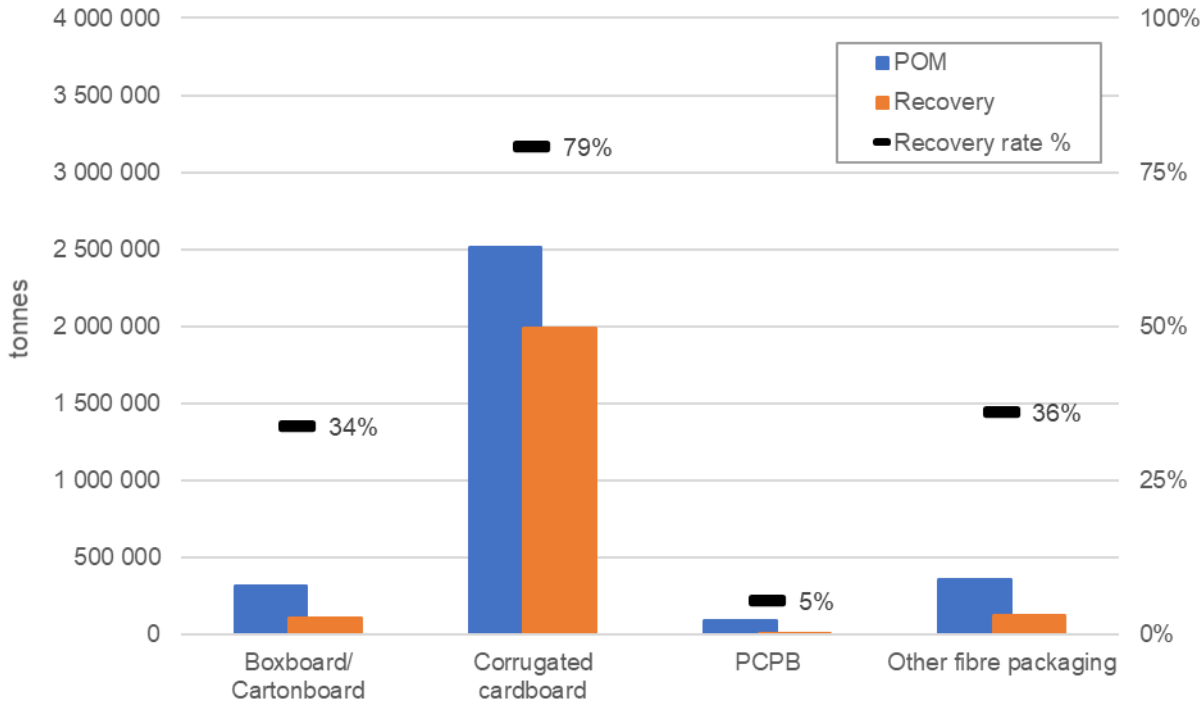

Figure 37 – Post-consumer paper & paperboard packaging recovery rates in 2019–20, by material type

Glass packaging

Estimates for post-consumer glass packaging recovery rates in 2019–20, by material type, are provided in **Table 44** and **Figure 38**. The average recovery rate for glass is 60%.

Recovery rates are similar for the standard glass colours. Rates for amber and green glass are slightly higher, possibly due to good coverage of amber glass under container deposit schemes nationally, and green being more sought after for wine bottle production to, in part, service the significant wine export market.

Nearly half of recovered glass (49%) was processed into sand and aggregate substitutes for use in the construction sector, up from 36% in 2018–19 (APCO, 2020a, p. 77).

Table 44 – Post-consumer glass packaging recovery rates in 2019–20, by material type

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Amber glass	334 000	202 000	61%
Flint glass	606 000	366 000	60%
Green glass	216 000	131 000	61%
Total	**1 156 000**	**699 000**	**60%**

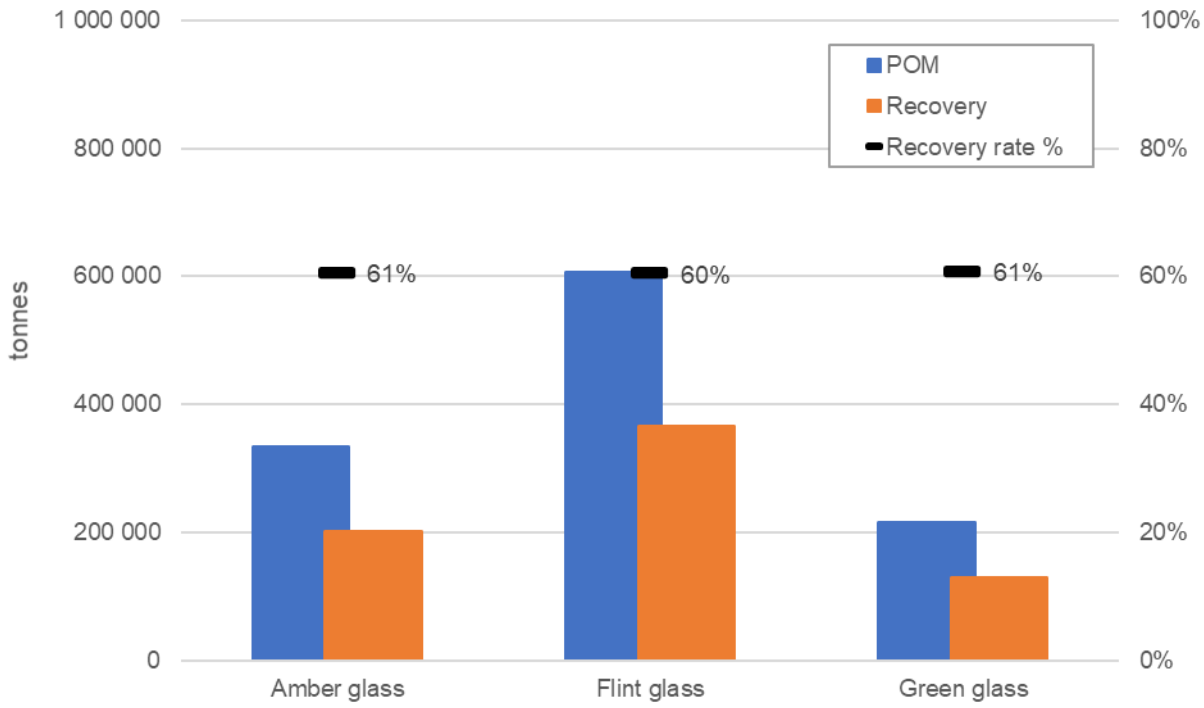

Figure 38 – Post-consumer glass packaging recovery rates in 2019–20, by material type

Plastic packaging

Estimates for post-consumer plastic packaging recovery rates in 2019–20, by material type, are provided in **Table 45** and **Figure 39.** The packaging material group recovery rate is estimated at 16%.

The post-consumer PET packaging recovery rate continues to be the highest by a large margin, reflecting the concentration of use in beverage packaging, with high levels of recovery through both kerbside and CDS collection systems. However, significant quantities of PET are also used in flexible packaging formats and non-beverage rigid packaging, both of which have significantly lower recovery rates than rigid PET beverage bottles. The recovery rate for PET fell slightly (34% compared to 36% in 2018–19 (APCO, 2020a, p. 78)) due to more PET POM, but without a corresponding increase in PET packaging recovery.

The HDPE packaging recovery rate is underpinned by the kerbside collection of milk bottles. However, its diverse range of packaging formats, including flexible formats, results in a relatively low recovery rate.

Table 45 – Post-consumer plastic packaging recovery rates in 2019–20, by material type

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
PET (1)	163 000	55 000	34%
HDPE (2)	275 000	60 000	22%
PVC (3)	17 000	2 000	11%
LDPE (4)	276 000	15 000	5%
PP (5)	218 000	20 000	9%
PS (6)	17 000	4 000	25%
EPS (6)	23 000	4 000	19%
Bioplastic (7)	9 000	0	1%
Other (7)	20 000	1 000	6%
Unidentified	107 000	17 000	16%
Total	**1 124 000**	**179 000**	**16%**

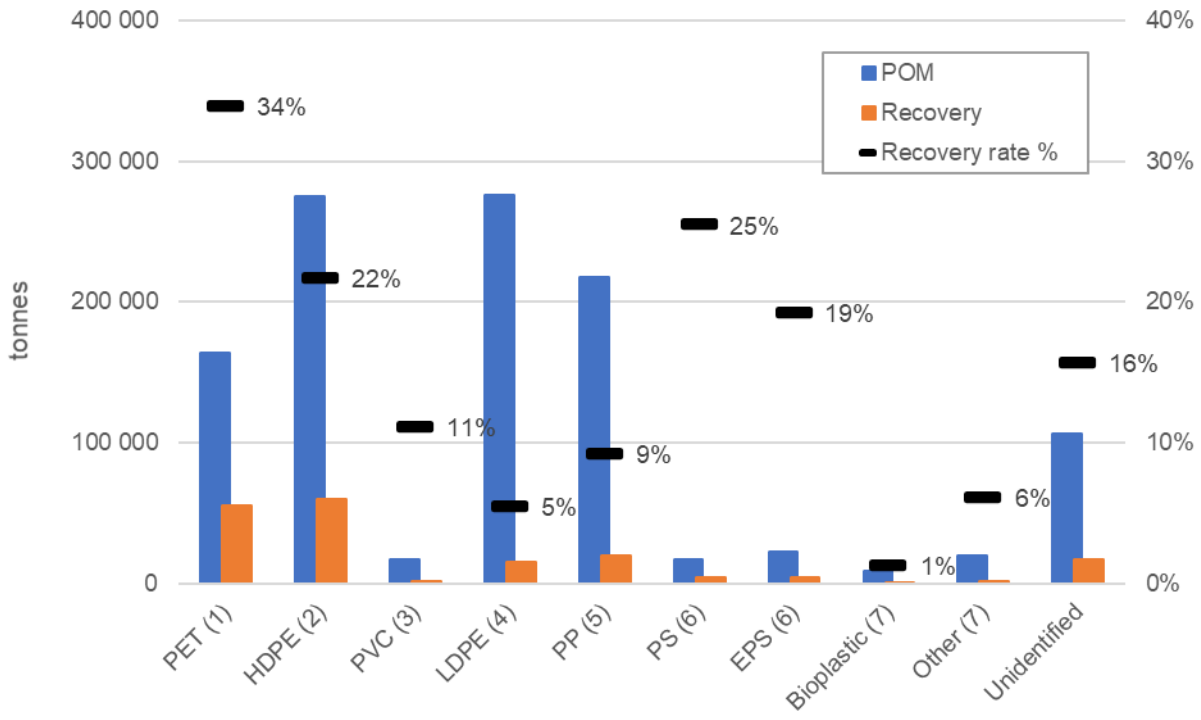

Figure 39 – Post-consumer plastic packaging recovery rates in 2019–20, by material type

Table 46 provides more detailed data on the recovery of plastic packaging at the rigid/flexible classification level.

Table 46 – Post-consumer plastic packaging recovery rates in 2019–20, by material type and rigid/flexible classification (tonnes)

Material group	Rigid plastics			Flexible plastics		
	POM	Recovery	Recovery rate	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)			
PET (1)	131 000	55 000	42%	33 000	0	0%
HDPE (2)	213 000	57 000	27%	62 000	3 000	4%
PVC (3)	NR[a]	NR[a]	40%	NR[a]	NR[a]	0%
LDPE (4)	11 000	3 000	32%	265 000	12 000	4%
PP (5)	134 000	17 000	13%	84 000	2 000	3%
PS (6)	17 000	4 000	25%	0	0	0%
EPS (6)	23 000	4 000	19%	0	0	0%
Bioplastic (7)	7 000	0	1%	2 000	0	3%
Other (7)	2 000	1 000	76%	18 000	0	0%
Unidentified	59 000	14 000	23%	48 000	3 000	7%
Total	**600 000**	**159 000**	**26%**	**524 000**	**20 000**	**4%**

a) NR – Not reported due to confidentiality considerations.

An estimated 42% (55,000 tonnes) of rigid PET packaging was recovered in 2019–20, followed most significantly by rigid HDPE packaging at 25% (57,000 tonnes). The overall rigid plastic packaging recovery rate is estimated at 26% (maintained from 2018–19 (APCO, 2020a, p. 80)).

The flexible plastic packaging recycling rate is estimated at only 4% across both the consumer and B2B sectors. Flexible plastic packaging recovery was dominated by LDPE recovery from the B2B sector (e.g., pallet wrap). The recovery rate for this material fell from 8% in 2018-19 to 4% in 2019–20 due to an increased amount POM as well as less material reported as recovered.

Metal packaging

Estimates for post-consumer metal packaging recovery rates in 2019–20, by material type, are provided in **Table 47** and **Figure 40**. The packaging material group recovery rate is 56%. This is the same recovery rate as 2018–19 (APCO, 2020a, p. 80).

Larger (mild) steel drums have the highest reported recovery rate, reflecting the reasonably concentrated generation of this form of packaging at manufacturing and other commercial and industrial facilities nationally, along with well-developed B2B collection systems for steel, and the relatively high value of each drum.

Following B2B steel packaging the post-consumer aluminium beverage can recovery rate is the next highest by a large margin, reflecting its high material value, and the concentration of use in beverage packaging that has high levels of recovery both through kerbside and CDS collection systems. The tin-plate steel can recovery rate is relatively low, even though this material is highly recyclable and easily separated from kerbside commingled recyclables.

Table 47 – Post-consumer metal packaging recovery rates in 2019–20, by material type

Material group	POM	Recovery	Recovery rate[a]
	(tonnes)	(tonnes)	(%)
Beverage aluminium	82 000	66 000	81%
Non-beverage aluminium	7 000	3 000	37%
Tin-plate steel	139 000	53 000	38%
Mild steel	19 000	17 000	90%
Stainless steel	1 000	1 000	70%
Total	**248 000**	**139 000**	**56%**

a) Percentage values are calculated prior to rounding contributing values.

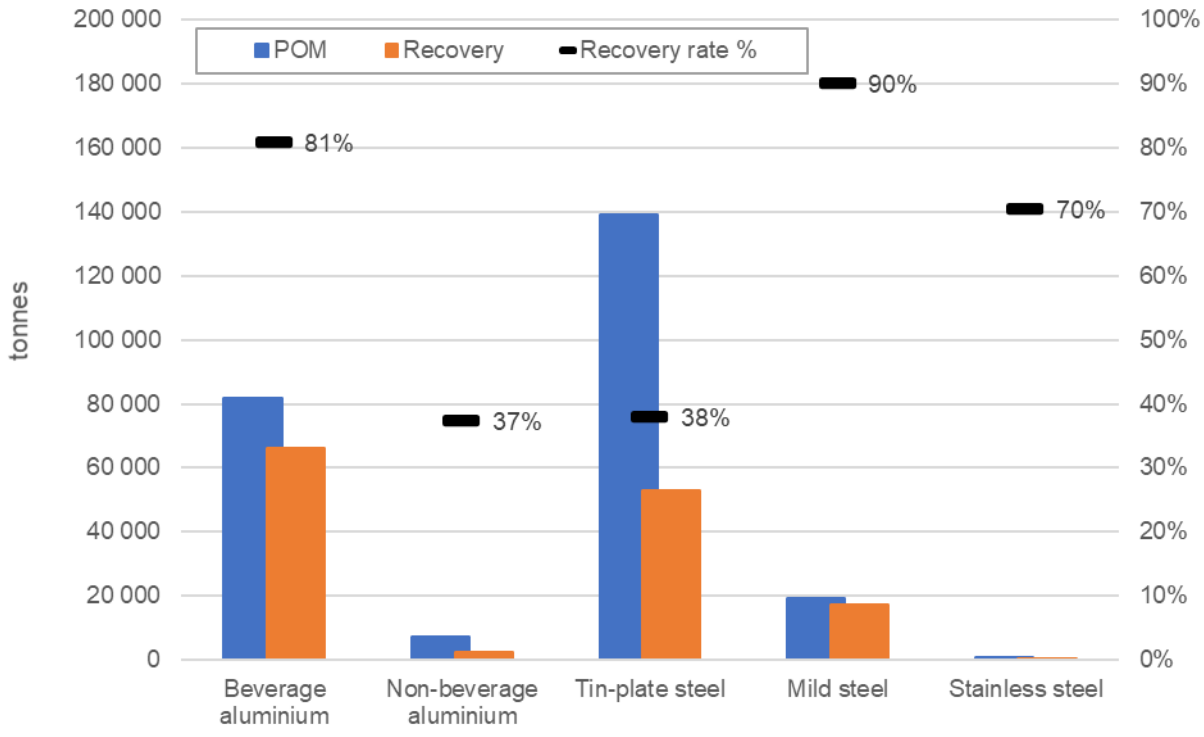

Figure 40 – Post-consumer metal packaging recovery rates in 2019–20, by material type

Wood packaging

Estimates for post-consumer single-use wood packaging recovery rates in 2019–20, by material type, are provided in **Table 48** and **Figure 41**. The packaging material group recovery rate is 37%.

The major identified end-markets for end-of-life hardwood and softwood packaging were wood chip products, mulches, and soil conditioners. It is also understood that some recovered wood packaging was used in the manufacture of particle board products and animal bedding products. The only identified end-market destination for fibreboard packaging is energy recovery.

Table 48 – Post-consumer wood packaging recovery rates in 2019–20, by material type

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Fibreboard	100 000	9 000	9%
Hardwood	81 000	36 000	45%
Softwood	281 000	125 000	45%
Total	**462 000**	**171 000**	**37%**

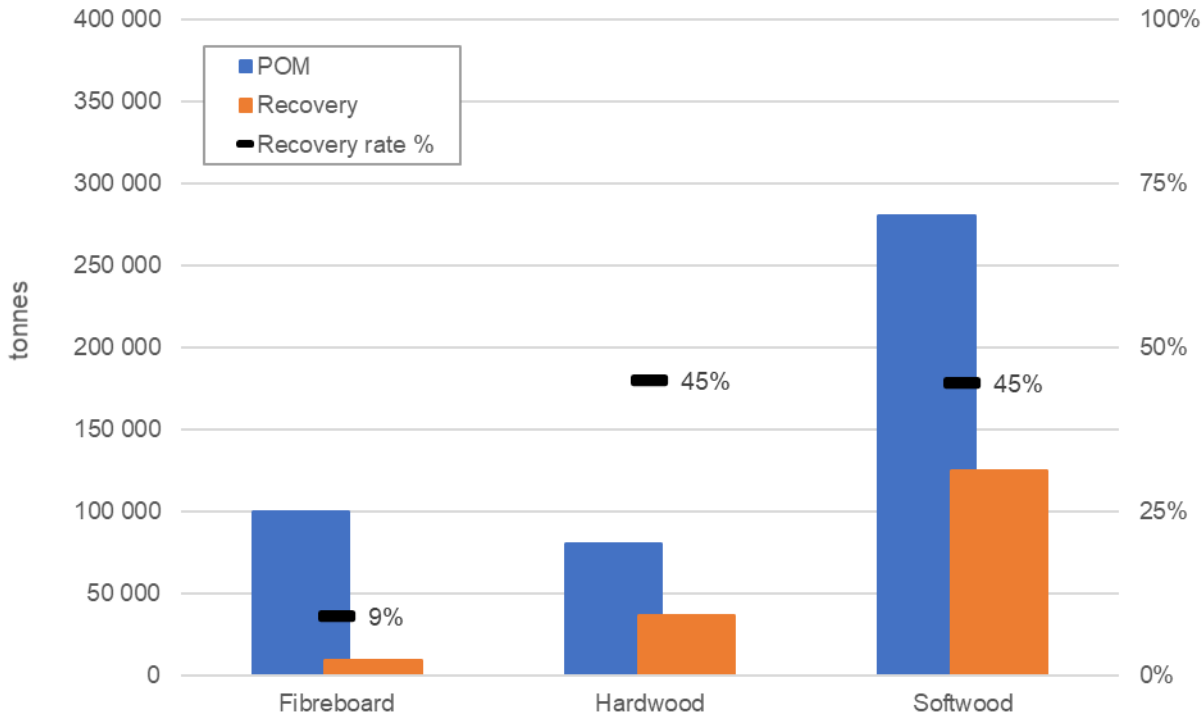

Figure 41 – Post-consumer wood packaging recovery rates in 2019–20, by material type

3.9 Recovery rates by ANZSIC division

Estimates for post-consumer packaging recovery rates by ANZSIC division are provided in **Table 49** and **Figure 42**. This data should be considered as indicative only. This 'indicative' qualification is mainly due to the challenges for packaging manufacturers and reprocessors accurately estimating the destination or source divisions (respectively) of packaging and doing so with a consistent interpretation of the coverage of each division.

'C - Manufacturing', 'F - Wholesale trade' and 'G - Retail trade' divisions all had relatively high recovery rates, underpinned by high recovery levels of segregated corrugated cardboard collections out of these sectors. 'S - Other services', which includes municipal collections, had a recovery rate of 64%, which was well above the overall national post-consumer packaging recovery rate of 55%.

Table 49 – Post-consumer packaging recovery rates in 2019–20, by ANZSIC division

ANZSIC division	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
A – Agriculture, forestry and fishing	119 000	6 000	5%
B – Mining	0	0	0%
C – Manufacturing	421 000	343 000	81%
D – Electricity, gas, water and waste services	0	0	0%
E – Construction	41 000	17 000	42%
F – Wholesale trade	829 000	503 000	61%
G – Retail trade	924 000	499 000	54%
H – Accommodation and food services	763 000	90 000	12%
I – Transport, postal and warehousing	169 000	61 000	36%
J – Information media and telecommunications	0	0	0%
K – Financial and insurance services	0	0	0%
L – Rental, hiring and real estate services	0	0	0%
M – Professional, scientific and technical services	0	0	0%
N – Administrative and support services	0	0	0%
O – Public administration and safety (private)	0	0	0%
P – Education and training (private)	0	0	0%
Q – Health care and social assistance (private)	4 000	0	0%
R – Arts and recreation services	0	0	0%
S – Other services	2 874 000	1 853 000	64%
X – Unknown	0	0	0%
Total	**6 266 000**	**3 416 000**	**55%**

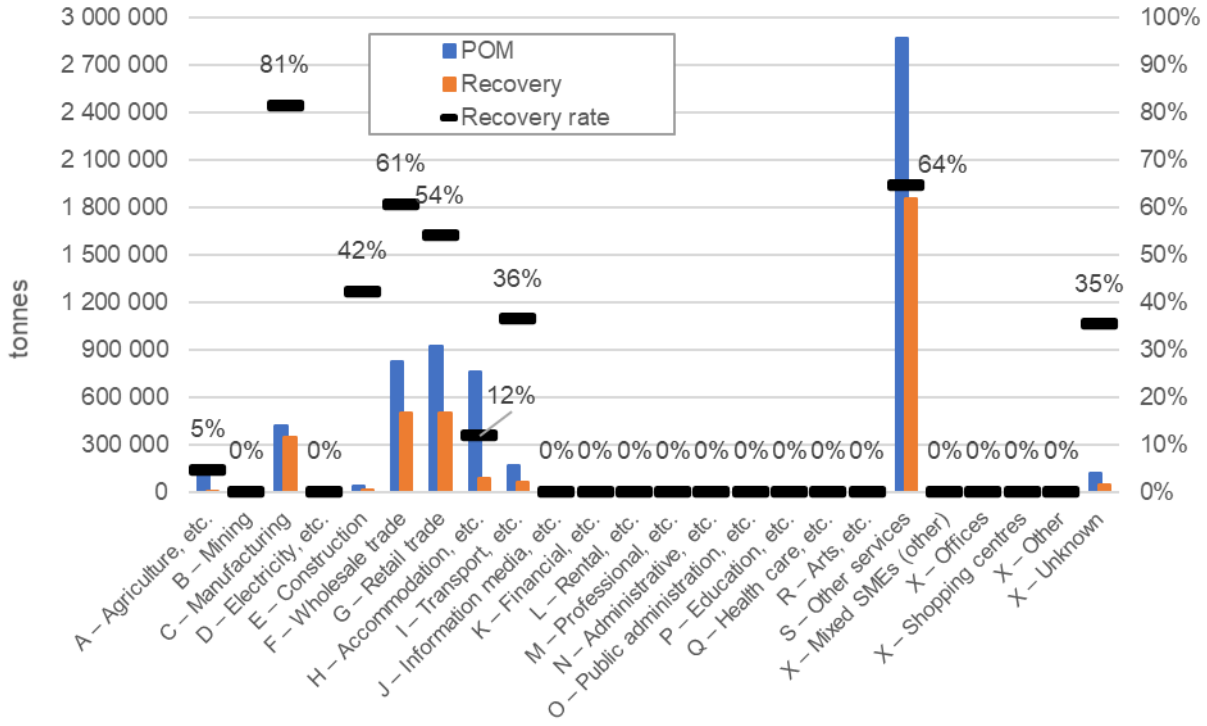

Figure 42 – Post-consumer packaging recovery rates in 2019–20, by ANZSIC division

3.10 Packaging recyclability

In this section of the report packaging POM in 2019–20 is classified according to recyclability. The detailed method for determining recyclability is outlined in **Section 1.2**. Throughout the report the term *packaging recyclability* is used as an umbrella term for reusable, recyclable or compostable packaging.

Packaging recyclability by material group is provided in **Table 50** and **Figure 43**. It is estimated that 5.4 million tonnes (86%) of packaging POM in 2019–20 had good recyclability. This was dominated by paper & paperboard (of which 90% had good recyclability) and glass (of which 100% had good recyclability). Almost all (97%) of metal packaging was classified as having good recyclability, but only 60% of plastic packaging was classified as having good recyclability. Wood packaging had 78% classified as having good recyclability.

Around 0.7 million tonnes (11%) of packaging were classified as having poor (limited) recyclability or not being recyclable. Around 40% of this was plastic packaging, and another 44% was paper & paperboard packaging.

Table 50 – Recyclable or compostable packaging POM in 2019–20, by recyclability classification

Material group	Good recyclability	Poor recyclability	Not recyclable	Unknown	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Paper & paperboard	90.3%	7.7%	2.0%	0.0%	100.0%
Glass	100.0%	0.0%	0.0%	0.0%	100.0%
Plastic	60.2%	17.0%	8.7%	14.2%	100.0%
Metal	96.9%	3.1%	0.0%	0.0%	100.0%
Wood	77.8%	0.0%	22.2%	0.0%	100.0%
Total (%)	**86.0%**	**7.2%**	**4.2%**	**2.5%**	**100.0%**
Total (tonnes)	**5 392 000**	**450 000**	**265 000**	**160 000**	**6 266 000**

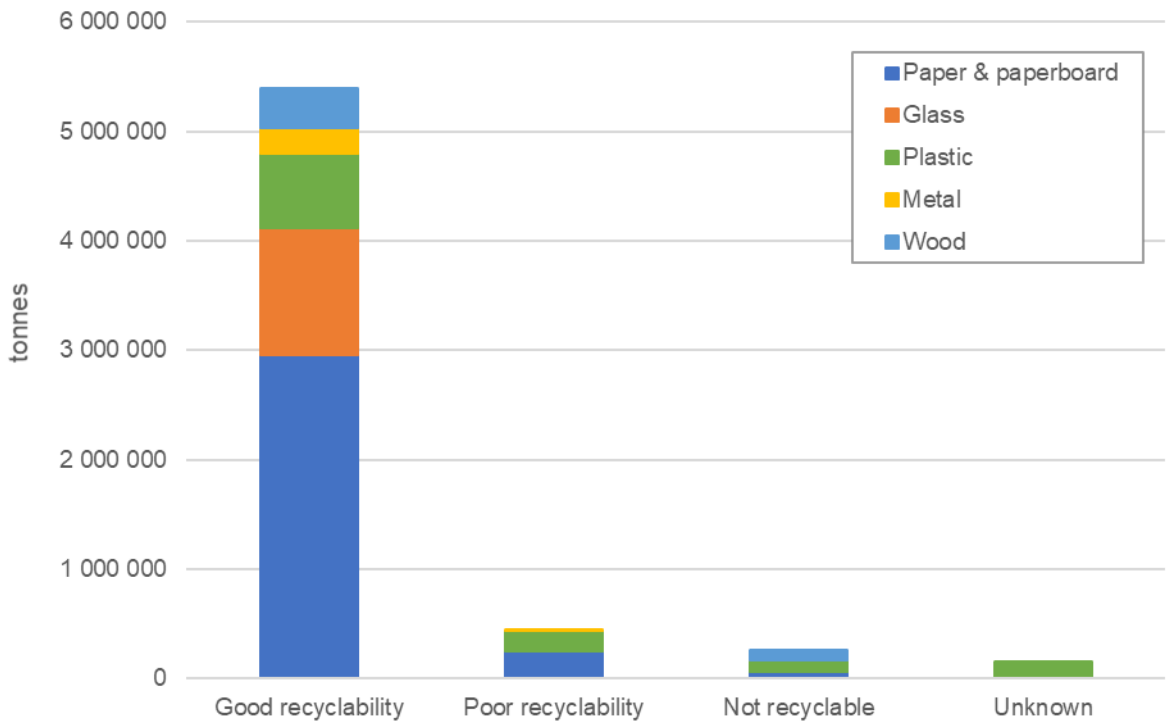

Figure 43 – Recyclable or compostable packaging POM in 2019–20, by recyclability classification

Table 51 and **Figure 44** compare the 2017–18 to 2019–20 quantities of packaging with a 'Good recyclability' classification.

The quantity of packaging POM that has been classified as having ‘good recyclability’ is almost equal to 2018-19 (around 5.3 million tonnes). The reduced proportion of packaging with ‘good recyclability’ (86% compared to 89% in 2018-19) is due to the increased quantity of packaging POM, particularly the additional wood packaging (fibreboard-based) captured in the latest survey, and additional plastics POM. There was also less glass packaging, which is classified as 100% recyclable, on the market.

Table 51 – Packaging with a 'Good recyclability' classification from 2017–18 to 2019–20, by material group

Material group	2017–18		2018–19		2019–20	
	(tonnes)	(%)	(tonnes)	(%)	(tonnes)	(%)
Paper & paperboard	2 682 000	92%	2 962 000	91%	2 961 000	90%
Glass	1 273 000	100%	1 283 000	100%	1 156 000	100%
Plastic	627 000	59%	663 000	66%	676 000	60%
Metal	201 000	95%	243 000	99%	240 000	97%
Wood	NR[a]	NR[a]	121 000	98%	359 000	78%
Total	**4 783 000**	**88%**	**5 273 000**	**89%**	**5 392 000**	**86%**

a) NR – Not reported.

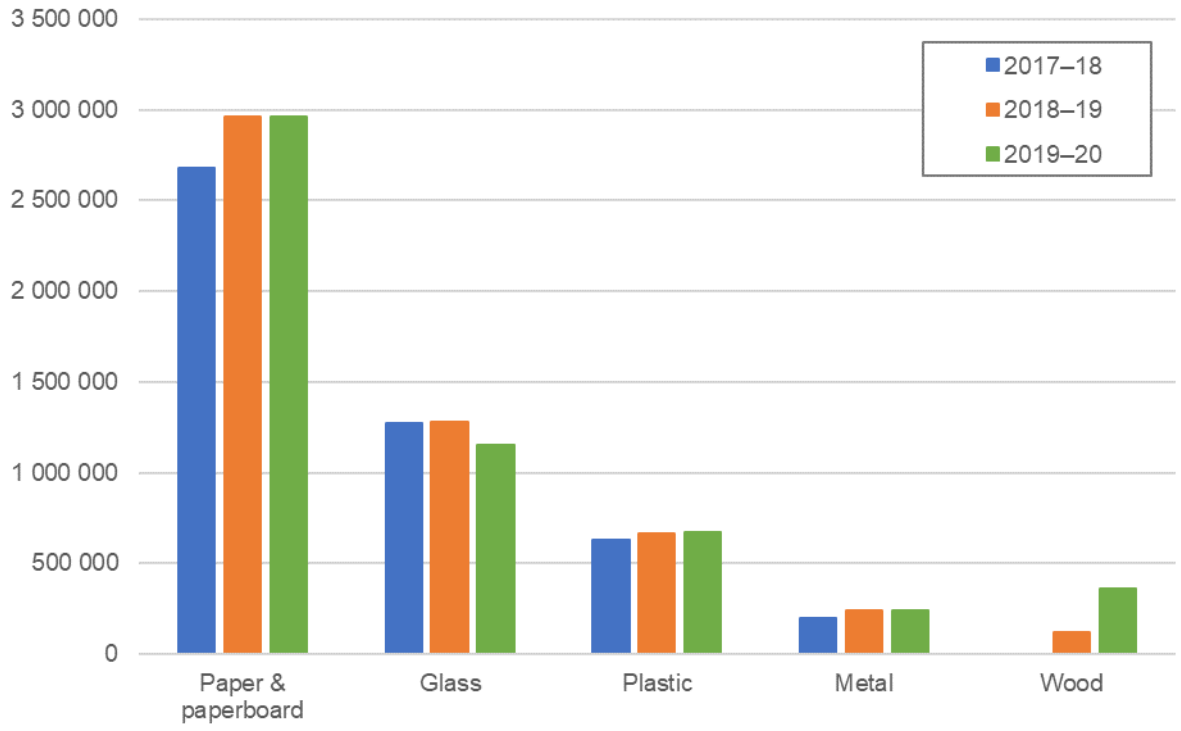

Figure 44 – Packaging with a 'Good recyclability' classification from 2017–18 to 2019–20, by material group (tonnes)

4 PACKAGING LOSSES AND IMPACTS IN 2019–20

4.1 Packaging losses to landfill

Estimates of post-consumer packaging to landfill by material group are provided in **Table 52** and **Figure 45**. In total there were almost 2.9 million tonnes of post-consumer packaging disposed to landfill, which was 45% of packaging POM. This compares to just over 2.9 million tonnes (50% of the packaging POM) in 2018–19 (APCO, 2020a, p. 87).

This packaging to landfill consisted of 1.1 million tonnes (37%) paper & paperboard-based packaging, 0.9 million tonnes of plastic packaging (33%), 0.5 million tonnes of glass packaging (16%), 0.1 million tonnes of metal packaging (4%) and 0.3 million tonnes of wood-based single-use packaging (10%).

Table 52 – Post-consumer packaging to landfill in 2019–20, by material group

Material group	POM	Landfill		Landfill rate
	(tonnes)	(tonnes)	(%)	(%)
Paper & paperboard	3 277 000	1 049 000	37%	32%
Glass	1 156 000	457 000	16%	40%
Plastic	1 124 000	945 000	33%	84%
Metal	248 000	108 000	4%	44%
Wood	462 000	291 000	10%	63%
Total	**6 266 000**	**2 850 000**	**100%**	**45%**

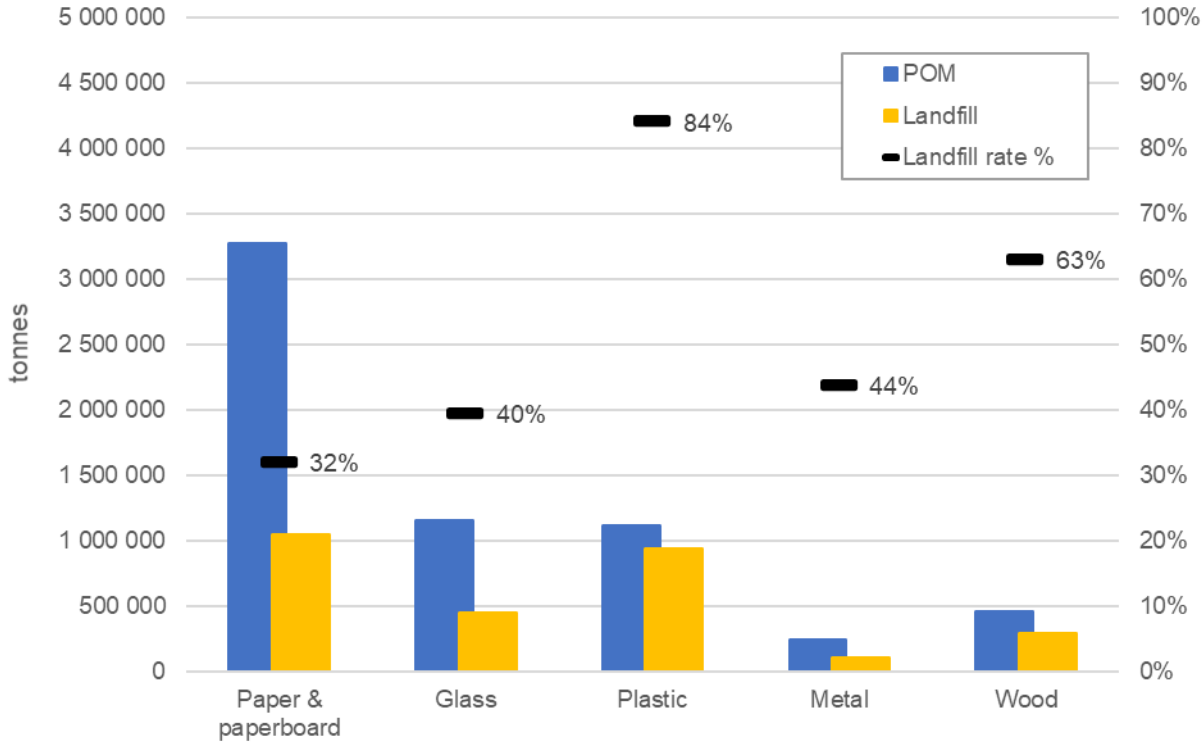

Figure 45 – Post-consumer packaging to landfill in 2019–20, by material group

4.2 Lost value of landfilled packaging

This section provides indicative estimates of the value (AUD) of packaging material sent to landfill in 2019–20. These are theoretical estimates that are based on the following attributes and assumptions:

- Commodity values have been estimated at 30 June 2020.
- Value was based on packaging being sorted into the most common saleable commodity grade for the packaging material type but was otherwise unprocessed.
- Packaging materials that are not currently sorted into discrete commodity grades have still been allocated an existing commodity price that is considered the best proxy price for the theoretical sorted value. This was usually a low price.

  As packaging design, sorting/processing technologies and end-markets improve, the quantities of unsortable (whether that be for technical or economic reasons) and/or unsaleable sorted packaging should decrease, and the average value of used packaging should also increase. For this reason, allocating all packaging a value, even if low, better reflects the theoretical value of used packaging diverted from landfill at some future time.
- Packaging commodity values are typically estimated at a municipal or C&I MRF out-going gate value. The main exception to this is glass packaging, which is assigned commodity values assuming that half was recovered through MRFs and half via source segregated collections.
- Packaging to composting is allocated a value of $0 per tonne.
- Transport costs are excluded. Note that transport costs are typically somewhat higher for packaging materials that are sent to recovery, relative to packaging to landfill.

- MRF processing costs, additional post-MRF sorting processing, or the costs associated with operating source separation-based systems (e.g., dedicated CDS collections) are excluded.
- Avoided landfill gate fees are excluded. It is worth noting that landfill gate fees and MRF processing costs (see point above) can vary widely but are of a similar magnitude.
- It is an implicit assumption with the use of fixed commodity prices by material type that end-market demand for the sorted packaging is not restricted.

Table 53 presents the indicative estimates of the lost value (AUD) of packaging landfilled in 2019–20. The national sorted value is estimated at $360 million, at a weighted average value of $125 per tonne. This was a significant fall on the 2018–19 weighted average value of $176 per tonne (APCO, 2020a, p. 88), reflecting low commodity prices occurring in June 2020.

Table 53 – Quantity and lost value of landfilled packaging in 2019–20, by material group

Material group	Landfill	Value of landfilled packaging	
	(tonnes)	(AUD/tonne)	(AUD million)
Paper & paperboard	1 049 000	$107	$110
Glass	457 000	$75	$30
Plastic	945 000	$193	$180
Metal	108 000	$257	$30
Wood	291 000	$0	$0
Total	**2 850 000**	**$125**	**$360**

4.3 Climate change impact of packaging to landfill

This section estimates the climate change impact (in terms of tonnes $CO_{2\text{-}e}$ emissions) of packaging disposal to landfill. This is the reduction in greenhouse gas (GHG) emissions that could be achieved nationally if packaging that is currently landfilled was recycled.

An extensive body of life cycle assessment (LCA) literature going back to the 1970s has established that reusing packaging or recycling single-use packaging almost invariably reduces greenhouse gas emissions when compared to landfilling single-use packaging. This is due to the following:

- Reusable packaging typically requires far lower manufacturing related energy inputs per cycle, compared with single-use packaging that is either recycled or disposed to landfill.
- Recycled single-use packaging very often requires less manufacturing energy inputs, compared with single-use packaging that is disposed to landfill.
- Methane emissions from landfills from the decomposition of biodegradable packaging materials (e.g., paper & paperboard).

Reviews of recent LCA studies and other literature sources were undertaken to identify the required emission factors. The two main sources drawn on for the emission factors used in this report were:

- LCA of Kerbside Recycling in Victoria (RMIT, 2015, p. 7).
- South Australia's Recycling Activity Survey 2017–18 Report (Green Industries SA, 2019, p. 108).

Table 54 presents the indicative estimates of the reduction in GHG emissions if all landfilled packaging had been recycled in 2019–20.

The national reduction that could have been achieved is estimated at 1.9 million tonnes of CO_2 emissions, at a weighted average of 0.7 tonnes CO_2 per tonne diverted to recycling. This compares with the 2018–19 estimate of 2.0 million tonnes of CO_2 of emissions (APCO, 2020a, p. 90).

Assuming the average car emits 2.9 tonnes CO_2/year[1], these 2019–20 emissions, if avoided, would be equivalent to removing 680,000 cars from the road for a year.

Table 54 – GHG emission reduction through diverting landfilled packaging to recycling in 2019–20, by material group

Material group	Landfill	Emission factor	Avoided emissions
	(tonnes)	(t CO2-e /t)	(t CO2-e)
Paper & paperboard	1 049 000	0.169	177 240
Glass	457 000	0.528	241 100
Plastic	945 000	0.672	635 490
Metal	108 000	4.547	493 280
Wood	291 000	1.350	392 950
Total	**2 850 000**	**0.681**	**1 940 060**

[1] Average passenger vehicle emissions based on a travel distance in 2019–20 of 11 100 km, with an average fuel consumption of 11.1 L/100 km (ABS, 2020). Assumed petrol vehicle. Petrol emission factor of 2.32 kg $CO_{2\text{-}e}$/L adopted (DISER, 2020, p. 14). This gives fuel consumption of 1 232 L/vehicle.yr, and emissions of 2 860 kg $CO_{2\text{-}e}$/vehicle.yr.

5 PACKAGING PROJECTIONS TO 2024–25

5.1 Introduction

Provided in this section of the report are baseline projections of:

- **Annual estimates of packaging POM from 2019–20 to 2024–25 by material type** – These projections are generally based on manufacturer reported market growth estimates by packaging material type and component group. Population growth estimates have been adopted where survey data was not available.
- **Annual recovery estimates from 2019–20 to 2024–25 by material type** – These projections are based on reprocessor reported (spare) capacity and committed new capacity.

These baseline packaging POM and recovery projections quantify the impact of planned infrastructure changes reported by packaging manufacturers and reprocessors during the surveys undertaken for this project.

It is important to note that there are other potential system changes that are not incorporated into the data provided in this section of the report, these include:

- Improvements in packaging design with respect to packaging recyclability and end-market demand.
- Deselection of packaging material types with poor recyclability, or that are not recyclable.
- Improvements in packaging labelling and consumer education, increasing packaging diversion to recovery pathways.
- Additional new sorting and reprocessing infrastructure (beyond that reported by surveyed reprocessors).
- The Council of Australian Governments (COAG) bans on the exports of targeted forms of waste plastic, paper and glass.
- Kerbside system changes (e.g., four bin system in Victoria, including a separate glass bin)
- Expansion of CDS scope.
- Expansion of other source segregated collections (e.g., the REDcycle program).
- Updates/improvements in standards and specifications.
- End-market growth in demand for recycled content in packaging and other applications (e.g., construction).

5.2 Packaging POM projections to 2024–25

Packaging POM from 2019–20 to 2024–25 has been estimated by multiplying 2019–20 survey data by packaging POM market growth percentage estimates (% per year). These percentage values have been determined by material type and packaging component combination, and are drawn from the following sources in order of preference:

1. Manufacturer reported growth estimates by material type and packaging component group. These market growth estimates have been calculated where reported by manufacturers representing >10% of packaging POM by material type/component group combination.
2. Manufacturer reported growth estimates by material type (aggregated estimate for the material type).
3. Average forecast annual Australian population growth (per capita growth) over the three years from 30-06-2020 to 30-06-2023 (ABS, 2018).

Presented in **Table 55** and **Figure 46** are annual packaging POM estimates from 2019–20 to 2024–25 by material group. The compound annual growth rate (CAGR) for packaging POM over this period is 2.4% per year. Growth per capita is lower with a CAGR of 0.7%.

Table 55 – Annual packaging POM from 2019–20 to 2024–25, by material group

Material group	2019–20[a]	2020–21	2021–22	2022–23	2023–24	2024–25	5-year CAGR[b]
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%/yr)
Paper & paperboard	3 277 000	3 378 000	3 481 000	3 588 000	3 698 000	3 811 000	3.1%
Glass	1 156 000	1 172 000	1 189 000	1 207 000	1 224 000	1 242 000	1.4%
Plastic	1 124 000	1 143 000	1 164 000	1 184 000	1 206 000	1 228 000	1.8%
Metal	248 000	252 000	255 000	259 000	263 000	267 000	1.5%
Wood	462 000	470 000	479 000	488 000	497 000	506 000	1.8%
Total (tonnes)	**6 266 000**	**6 415 000**	**6 568 000**	**6 726 000**	**6 888 000**	**7 055 000**	**2.4%**
Total (kg/person)[c]	**244**	**244**	**246**	**248**	**250**	**252**	**0.7%**

a) 2019–20 data is actual year data. Data for 2020–21 to 2024–25 are projections.

b) CAGR – Compound annual growth rate.

c) Population data for 2019–20 sourced from ABS (2021a). Population data for 2020–21 to 2024–25 sourced from ABS (2018).

Between 2019–20 and 2024–25 there is projected to be 789 kt (12.6%) growth in packaging POM, based largely on packaging manufacturer estimates of prospective market growth. Of this, 534 kt (68%) is projected to be paper & paperboard packaging, 86 kt (11%) glass packaging, 104 kt (13%) plastic packaging, 19 kt (2%) metal packaging and 44 kt (6%) wood packaging.

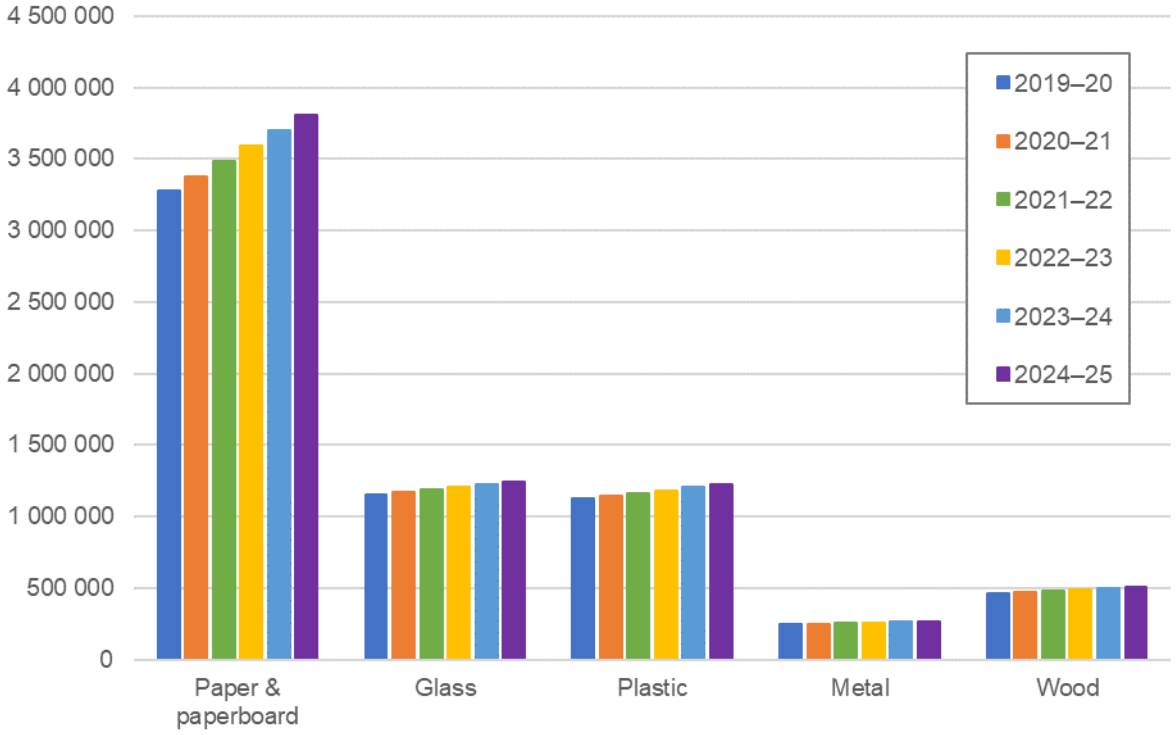

Figure 46 – Annual packaging POM from 2019–20 to 2024–25, by material group (tonnes)

Presented in **Table 56** are annual packaging POM estimates from 2019–20 to 2024–25 by material type.

Table 56 – Annual packaging POM from 2019–20 to 2024–25, by material type

Material group	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25	5-year CAGR[a]
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%/yr)
Boxboard/Cartonboard	316 000	326 000	336 000	346 000	357 000	368 000	3.1%
Corrugated cardboard	2 513 000	2 590 000	2 669 000	2 751 000	2 836 000	2 923 000	3.1%
HWS carrierboard	25 000	26 000	27 000	28 000	29 000	30 000	3.7%
Kraft paper	180 000	185 000	190 000	194 000	199 000	204 000	2.5%
Moulded fibreboard	56 000	58 000	61 000	63 000	66 000	69 000	4.3%
PCPB – Aseptic	40 000	41 000	43 000	44 000	46 000	48 000	3.5%
PCPB – Gable top	12 000	12 000	13 000	13 000	13 000	14 000	2.5%
PCPB – Cold cup	13 000	13 000	13 000	13 000	13 000	14 000	1.5%
PCPB – Hot cup	23 000	23 000	24 000	25 000	26 000	27 000	3.5%
PCPB – Other	4 000	4 000	4 000	4 000	5 000	5 000	1.9%
Polymer coated paper	1 000	1 000	1 000	1 000	1 000	1 000	1.8%
Other fibre packaging	95 000	98 000	101 000	104 000	107 000	110 000	2.9%
Amber glass	334 000	337 000	341 000	344 000	348 000	351 000	1.0%
Flint glass	606 000	617 000	629 000	640 000	652 000	664 000	1.8%
Green glass	216 000	218 000	220 000	222 000	224 000	227 000	1.0%
PET (1)	163 000	167 000	170 000	174 000	177 000	181 000	2.1%
HDPE (2)	275 000	278 000	282 000	285 000	288 000	292 000	1.2%
PVC (3)	17 000	16 000	16 000	16 000	16 000	16 000	-1.5%
LDPE (4)	276 000	281 000	286 000	291 000	296 000	302 000	1.8%
PP (5)	218 000	223 000	227 000	233 000	238 000	243 000	2.2%
PS (6)	17 000	17 000	18 000	18 000	18 000	19 000	1.8%
EPS (6)	23 000	23 000	23 000	23 000	23 000	24 000	0.8%
Bioplastic (7)	9 000	9 000	10 000	11 000	13 000	14 000	10.0%
Other (7)	20 000	20 000	21 000	21 000	22 000	22 000	1.9%
Unidentified plastic	107 000	109 000	111 000	113 000	115 000	117 000	1.8%
Beverage aluminium	82 000	83 000	83 000	84 000	85 000	86 000	1.0%
Non-bev. aluminium	7 000	7 000	7 000	8 000	8 000	8 000	1.8%
Tin-plate steel	139 000	141 000	144 000	146 000	149 000	152 000	1.8%
Mild steel	19 000	20 000	20 000	20 000	21 000	21 000	1.8%
Stainless steel	1 000	1 000	1 000	1 000	1 000	1 000	1.8%
Low-density fibreboard	50 000	51 000	52 000	53 000	54 000	55 000	1.8%
Oriented strand board	50 000	51 000	52 000	53 000	54 000	55 000	1.8%
Hardwood	81 000	82 000	84 000	85 000	87 000	88 000	1.8%
Softwood	281 000	286 000	291 000	296 000	302 000	307 000	1.8%
Plywood	0	0	0	0	0	0	1.8%
Total	**6 266 000**	**6 415 000**	**6 568 000**	**6 726 000**	**6 888 000**	**7 055 000**	**2.4%**

a) CAGR – Compound annual growth rate.

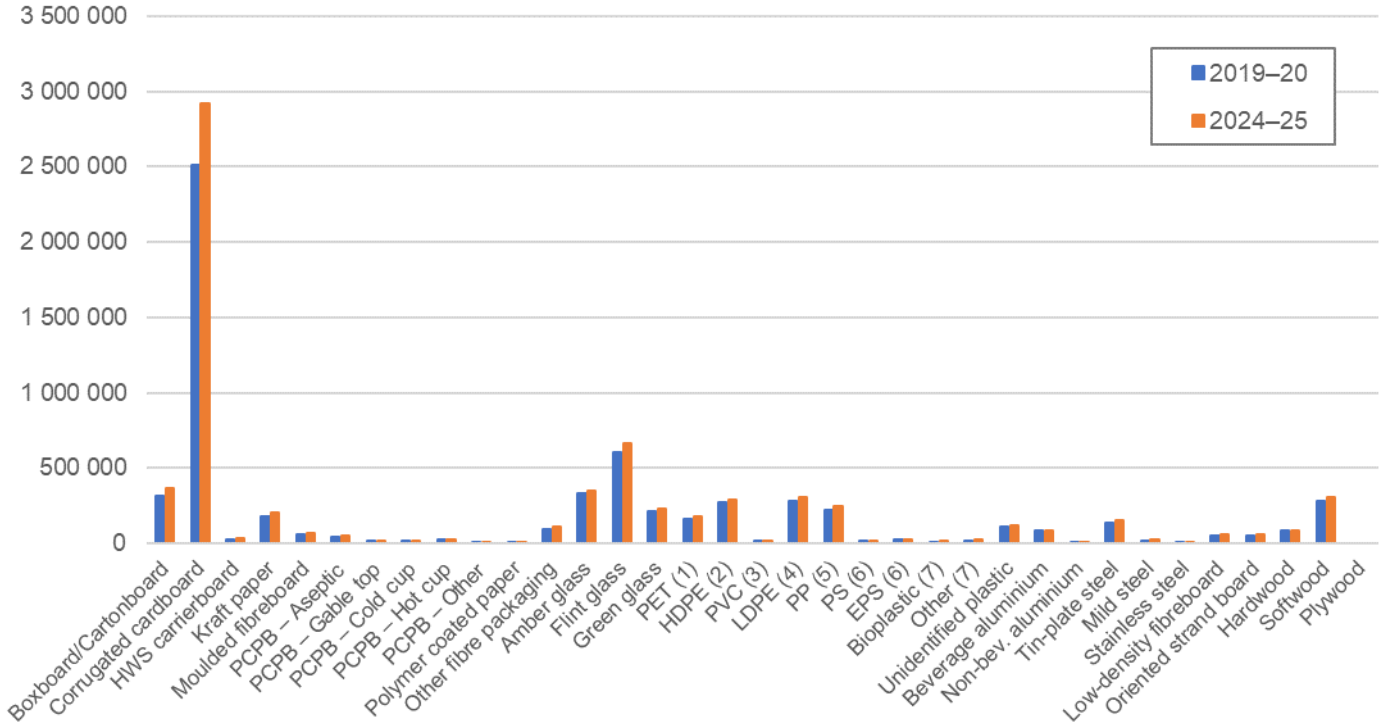

Figure 47 – Packaging POM in 2019–20 and 2024–25, by material type (tonnes)

5.3 Packaging reprocessing capacity projections to 2024–25

Baseline packaging reprocessing capacity projections from 2019–20 to 2024–25 have been estimated at the material type level, based on reprocessor reported existing (spare) capacity (Appendix D 2.2) and committed new capacity (Appendix D 2.3). No other system changes or interventions have been assumed. The following modelling conditions have been adopted:

- Baseline reprocessing projections for 2024–25 are assumed to be 2019–20 reprocessing figures, plus spare capacity in 2019–20 (assuming an optimal outcome in which this capacity can be fully utilised by 2024–25) and reported new capacity by 2024–25.
- Baseline reprocessing projections between 2019–20 and 2024–25 are simple straight-line interpolations of estimated reprocessing and reprocessing capacity between those two years.

Presented in **Table 57** and **Figure 48** are baseline capacity projections from 2019–20 to 2024–25 by material group. The 5-year compound annual growth rate (CAGR) for baseline reprocessing growth over this period is 2.8% per year, which is marginally higher than that for packaging POM.

This means that the baseline reprocessing growth (without any further interventions) will only just exceed packaging POM growth. Additional local reprocessing capacity growth required to support increased overall packaging reprocessing, including the ability to reprocess materials locally that are currently exported, are not visible under these projections.

Table 57 – Annual packaging reprocessing capacity projections from 2019–20 to 2024–25, by material group

Material group	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25	5-year CAGR[a]
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%/yr)
Paper & paperboard	2 229 000	2 238 000	2 248 000	2 258 000	2 267 000	2 277 000	0.4%
Glass	699 000	741 000	783 000	825 000	867 000	909 000	5.4%
Plastic	179 000	227 000	275 000	323 000	371 000	419 000	18.6%
Metal	139 000	140 000	141 000	142 000	144 000	145 000	0.9%
Wood	171 000	171 000	171 000	171 000	171 000	171 000	0.0%
Total	**3 416 000**	**3 517 000**	**3 618 000**	**3 719 000**	**3 819 000**	**3 920 000**	**2.8%**

a) CAGR – Compound Annual Growth Rate.

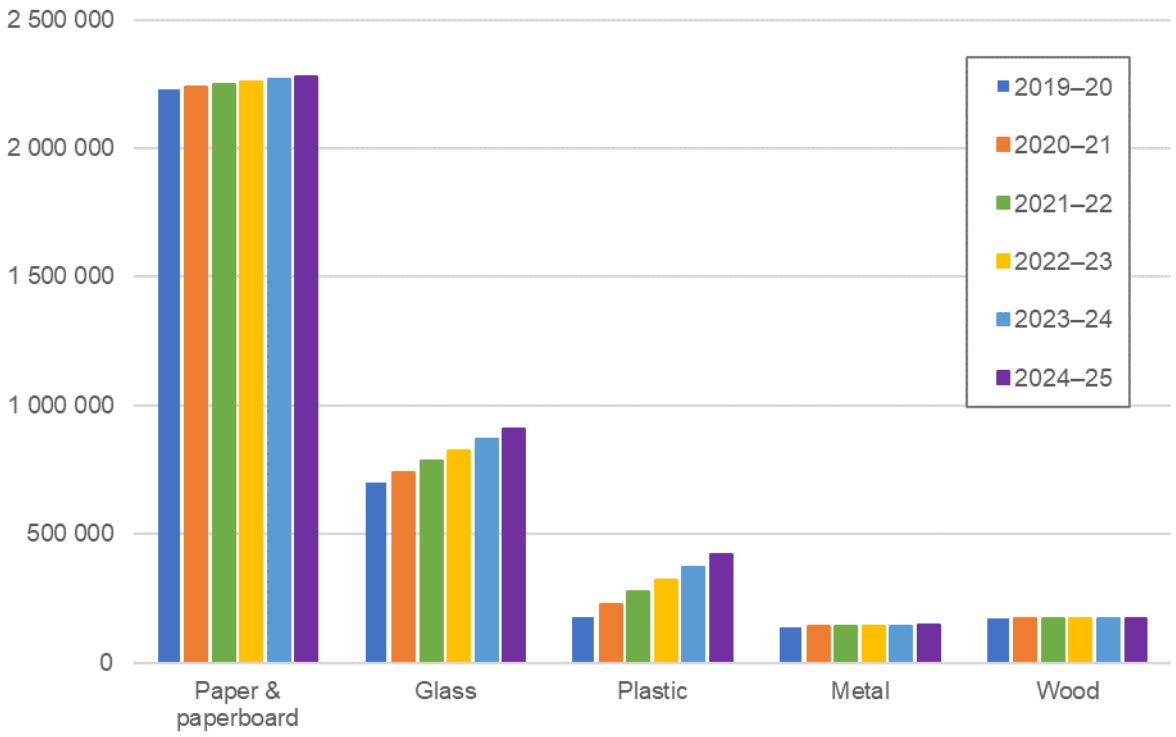

Figure 48 – Annual packaging reprocessing capacity projections from 2019–20 to 2024–25, by material group (tonnes)

Presented in **Table 58** are annual packaging reprocessing capacity projections from 2019–20 to 2024–25 by material type.

Table 58 – Annual packaging reprocessing capacity projections from 2019–20 to 2024–25, by material type

Material group	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25	5-year CAGR[a]
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(%/yr)
Boxboard/Cartonboard	107 000	107 000	107 000	107 000	107 000	107 000	0.0%
Corrugated cardboard	1 988 000	1 997 000	2 005 000	2 013 000	2 022 000	2 030 000	0.4%
PCPB	5 000	5 000	5 000	5 000	5 000	5 000	0.0%
Polymer coated paper	0	0	0	0	0	0	0.0%
Other fibre pkg.	128 000	130 000	131 000	132 000	134 000	135 000	1.0%
Amber glass	202 000	214 000	226 000	239 000	251 000	263 000	5.4%
Flint glass	366 000	388 000	410 000	432 000	454 000	476 000	5.4%
Green glass	131 000	139 000	146 000	154 000	162 000	170 000	5.4%
PET (1)	55 000	69 000	83 000	96 000	110 000	123 000	17.4%
HDPE (2)	60 000	75 000	90 000	105 000	120 000	135 000	17.7%
PVC (3)	2 000	4 000	6 000	8 000	11 000	13 000	46.8%
LDPE (4)	15 000	23 000	30 000	38 000	45 000	53 000	28.6%
PP (5)	20 000	26 000	31 000	37 000	42 000	48 000	19.2%
PS (6)	4 000	7 000	10 000	13 000	15 000	18 000	33.1%
EPS (6)	4 000	6 000	7 000	8 000	9 000	11 000	19.3%
Compostable plastic (7)	0	0	0	0	0	0	0.0%
Other (7)	1 000	1 000	2 000	2 000	2 000	2 000	13.1%
Unidentified plastic	17 000	17 000	17 000	17 000	17 000	17 000	0.0%
Beverage aluminium	66 000	67 000	67 000	68 000	68 000	69 000	0.7%
Non-bev. aluminium	3 000	3 000	3 000	3 000	3 000	3 000	0.0%
Tin-plate steel	53 000	53 000	54 000	55 000	56 000	56 000	1.3%
Mild steel	17 000	17 000	17 000	17 000	17 000	17 000	0.0%
Fibreboard	9 000	9 000	9 000	9 000	9 000	9 000	0.0%
Hardwood	36 000	36 000	36 000	36 000	36 000	36 000	0.0%
Softwood	125 000	125 000	125 000	125 000	125 000	125 000	0.0%
Plywood	0	0	0	0	0	0	0.0%
Total	**3 416 000**	**3 517 000**	**3 618 000**	**3 719 000**	**3 819 000**	**3 920 000**	**2.8%**

a) CAGR – Compound annual growth rate.

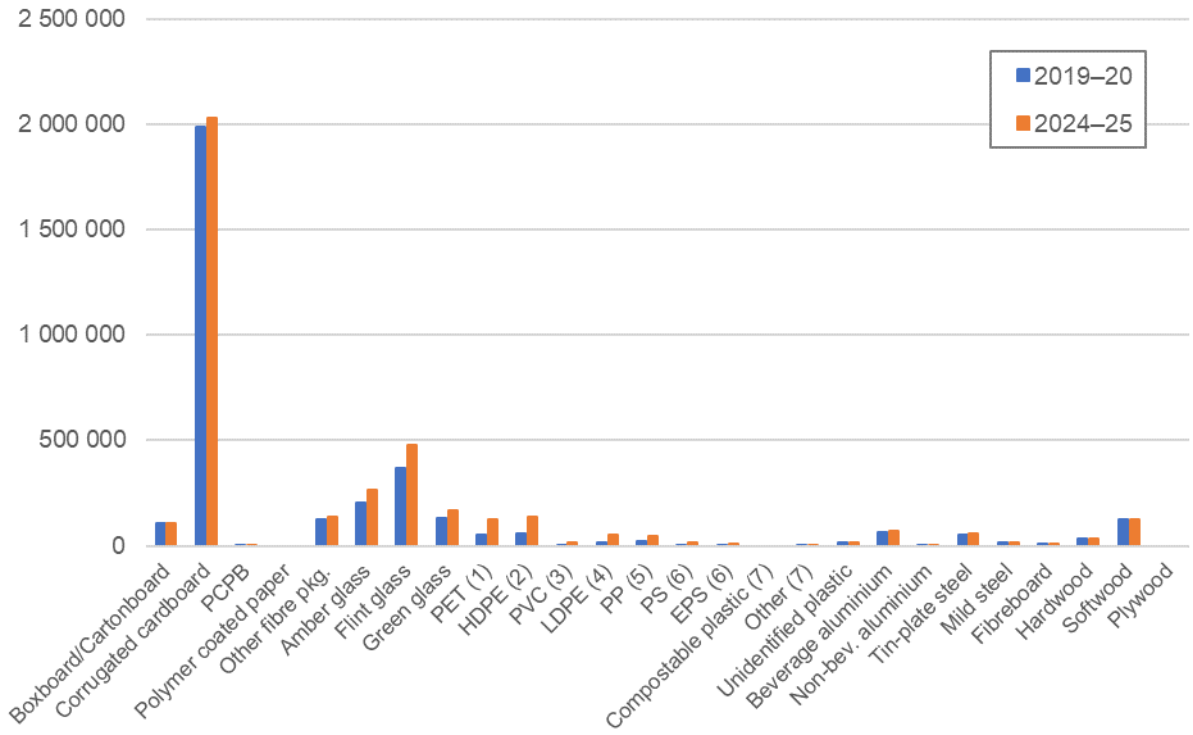

Figure 49 – Annual packaging reprocessing capacity projections from 2019–20 to 2024–25, by material type (tonnes)

6 PACKAGING REUSE IN 2019–20

6.1 Introduction

This year flows of eight reusable packaging systems have been quantified; with three new categories added to the five that were quantified in 2018-19. This is an expansion of the 2018–19 pilot exercise, working towards fully incorporating reusable packaging flows into the core consumption and recovery dataset, along with the appropriate metrics to measure comparative flows of reusable and single-use packaging systems.

This quantification has been framed by the following ISO standard:

- **ISO 18603:2013 Packaging and the environment – Reuse (ISO, 2013c).**

In ISO (2013c, p. 1) **reusable packaging** is defined as:

> *Packaging or packaging component which has been designed to accomplish or proves its ability to accomplish a minimum number of trips or rotations in a system for reuse.*

ISO (2013c, p. 3) requires that the following conditions are met in order for a claim of 'reusable' to be appropriate:

a) that the design of the packaging enables the principal components to accomplish a number of trips or rotations in normally predictable conditions of use;

b) that the packaging is capable of being successfully reconditioned in accordance with the requirements of Annex B (including removal/replacement of damaged components, appropriate cleaning or washing, inspection and inspection of fitness-for-purpose, and re-entry into the reuse system) and,

c) that a system, necessary to support reuse, is available in markets in which the packaging is placed, as appropriate.

The established Australian reusable packaging systems that fit the criteria above (with some minor exceptions) and have been quantification this year are:

- **NEW – Drums (200–205 litre)** – All reusable steel and plastic drums in the 200–205 litre volumetric capacity range (44 gallon UK or 55 gallon US).
- **NEW – Intermediate bulk containers (IBCs)** – All rigid IBCs are assumed to be reusable (rather than single-use) packaging.
- **NEW – Reusable coffee cups** – Reusable coffee cups with a sealable lid, that are used in an away-from-home (AfH) setting, and that can be reasonably expected to have avoided the use of a single-use coffee cup.
- **Kegs** – Beer kegs only.
- **Milk crates** – Non-collapsible plastic crates. Limited to dairy product applications only.
- **Pallets** – Reusable timber and plastic pallets only, including display pallets. Single-use pallets are excluded.
- **Returnable plastic crates (RPCs)** – Collapsible plastic crates. Limited to major supermarket systems only.
- **Reusable shopping bags** – Reusable non-woven PP (NWPP) bags, and reusable LDPE bags (supermarket type).

Due to circular flows and often long lifespans, quantification of reusable packaging systems requires metrics that measure mass flows, the same as single-use packaging flow quantifications, but extended to measure the service delivered by reusable packaging per cycle.

Strictly speaking single-use packaging systems should also require this determination of the service delivered per (single-use) cycle, to enable the monitoring of changes in packaging system product to packaging ratio efficiencies (e.g., quantify the impact of single-use packaging light-weighting). It has not been considered necessary to track this metric in the past.

However, this changes once it is of interest to quantify and track single-use and reusable packaging systems flows in an integrated manner. The common denominator becomes the service provided by packaging systems, which then supports the following mass-based comparisons:

- Service performance between single-use and reusable packaging systems based on mass flows of packaging standardised to product flows.
- Single-use and reusable packaging system inputs and outputs standardised to product flows.
- Service performance efficiency changes for packaging systems, standardised to product flows, between different time periods.

A purpose of this quantification of eight reusable packaging systems is to advance the consideration of this system performance measurement aspect.

The data collection plan adopted for the reusable packaging quantifications is outlined in the following table.

Table 59 – Data plan for packaging reuse quantification (2019–20 target year)

Data requirement	Data purposes	Data sources
General reusable packaging system description.	General overview of the system.	Surveys of major pool operators and/or users, including: Major breweries (2). Major supermarkets (3). Major dairy-processing related organisations (3). Major pool operators (4). Major reusable plastic bag suppliers (3). Reusable packaging manufacturers (4).
Quantity of new reusable packaging POM in 2019–20.	Reusable packaging pool inputs in 2019–20.	
Quantity of reusable packaging leaving the reusable packaging pool (stocks) to end-of-life (EoL) fate in 2019–20.	Reusable packaging pool outputs in 2019–20 and fate.	
Average lifespan of reusable packaging.	Support estimation of pool size and service delivered by packaging.	
Average number of reuse cycles prior to reaching EoL or otherwise leaving the pool.	Support estimation of pool size and service delivered by packaging.	
Reusable packaging cycle time.	Support estimation of pool size and service delivered by packaging.	
Total pool size in 2019–20.	Support estimation of pool size.	
Other details.	Reusable packaging materials, packaging weights, and product weights. Competing single-use packaging types. System reconditioning descriptions including: removal/replacement of damaged components, appropriate cleaning or washing, inspection of fitness-for-purpose, and re-entry into the reuse system.	

The metrics that have been quantified in this section of the report are:

- Pool (stocks) size in 2019–20 (tonnes and number).
- New reusable packaging entering service (inputs) in 2019–20 (tonnes and number).
- Old reusable packaging exiting service (outputs) in 2019–20 (tonnes and number) and fate.
- Reusable packaging cycle time, cycle number and average service life.
- Indicative estimates of avoided single-use packaging consumption through use of the assessed reusable packaging systems.

6.2 Reusable packaging system flows

Estimates of reusable packaging system flows in 2019–20 are provided in **Table 60** and **Figure 50**. Reusable timber pallets dominated the material flows for the quantified systems, across inputs (new pallets into use), pool size and outputs (end-of-life pallets leaving the pool).

After timber pallets, plastic pallets and drums had the largest pool sizes, followed by IBCs and beer kegs.

Table 60 – Reusable packaging system flows in 2019–20

Packaging system	Input flow		Pool size[a]		Output flow	
	(tonnes)	('000 units)	(tonnes)	('000 units)	(tonnes)	('000 units)
Beer kegs	400	30	16 100	1 240	600	40
Drums (200–205 L)	22 000	1 170	58 300	2 910	29 100	1 460
Rigid IBCs	7 900	190	39 400	960	19 700	480
Reusable plastic pallets	8 700	250	87 400	2 500	4 400	120
Reusable timber pallets	102 000	2 910	1 020 100	29 150	51 000	1 460
Dairy crates	1 100	1 020	11 200	10 230	1 100	1 020
RPCs	900	600	8 900	5 950	300	180
Reusable LDPE bags	15 900	547 240	900	31 570	15 900	547 240
Reusable PP bags	7 300	74 560	4 300	149 130	2 200	74 560
Cups/mugs	400	2 640	1 000	11 250	200	2 640
Total	**166 600**	**630 610**	**1 247 600**	**244 890**	**124 500**	**629 200**

a) Estimated pool size at 30 June 2020.

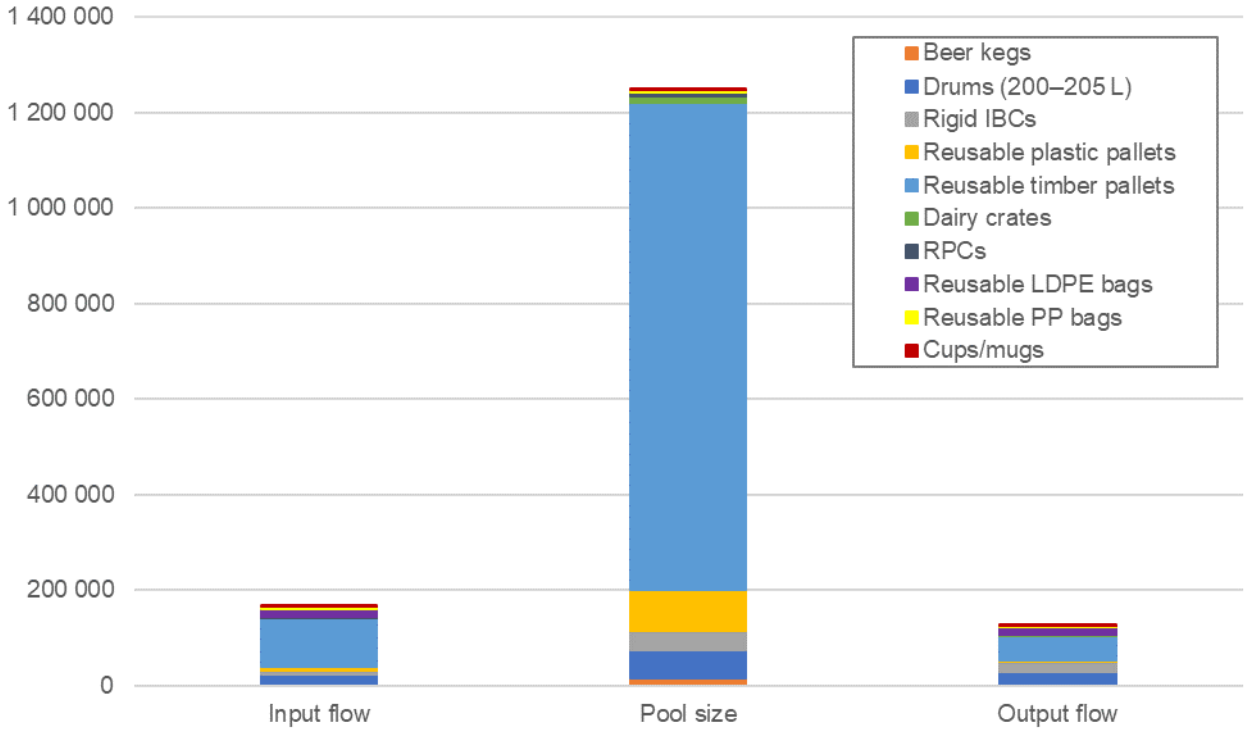

Figure 50 – Reusable packaging system flows in 2019–20 (tonnes)

Reusable packaging system inputs in 2019–20, by material group, are provided in **Table 61** and **Figure 51**. Wood was the most significant material input into the quantified systems, making up 100 kt or 60% of total inputs. Plastic made up 37 kt (22%) and metal contributed 30 kt (18%).

Table 61 – Reusable packaging input flows in 2019–20, by material group

Packaging system	Paper & paperboard	Glass	Plastic	Metal	Wood	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Beer kegs	0	0	0	400	0	400
Drums (200–205 L)	0	0	1 000	21 000	0	22 000
Rigid IBCs	0	0	1 600	6 300	0	7 900
Reusable plastic pallets	0	0	8 700	0	0	8 700
Reusable timber pallets	0	0	0	2 600	99 500	102 000
Dairy crates	0	0	1 100	0	0	1 100
RPCs	0	0	900	0	0	900
Reusable LDPE bags	0	0	15 900	0	0	15 900
Reusable PP bags	0	0	7 300	0	0	7 300
Cups/mugs	0	200	200	0	0	400
Total (tonnes)	**0**	**200**	**36 700**	**30 300**	**99 500**	**166 600**
Total (%)	**0.0%**	**0.1%**	**22.0%**	**18.2%**	**59.7%**	**100.0%**

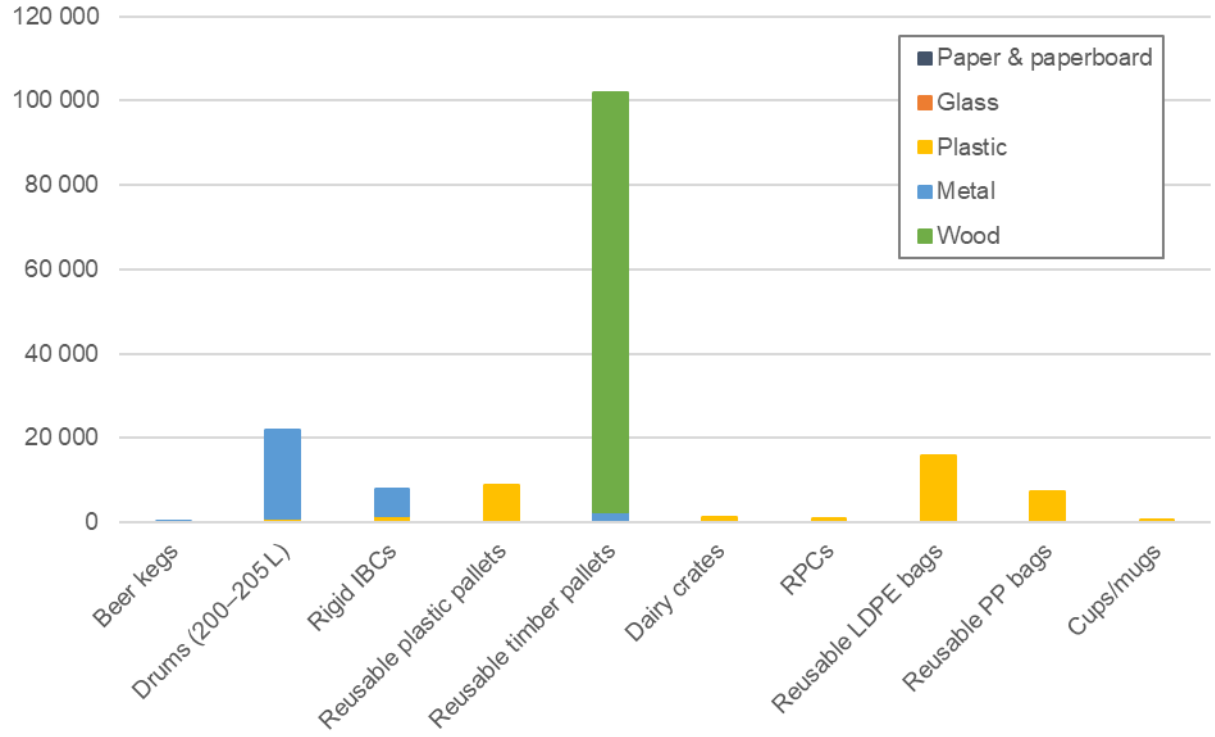

Figure 51 – Reusable packaging input flows in 2019–20, by material group (tonnes)

Reusable packaging system outputs in 2019–20, by end-of-life destination, are provided in **Table 62** and **Figure 52**. The most significant destination was 48,000 tonnes of timber pallets to mulching or composting, which was 39% of total output flows. Overall diversion of outputs to recovery fates was 79%, reflecting the high rates of recovery that are achievable with (mostly) closed system reusable packaging flows.

Table 62 – Reusable packaging system end-of-life destinations in 2019–20

Packaging system	Recycling	Composting	Landfill	System leakage	Other	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Beer kegs	500	0	0	50	0	**540**
Drums (200–205 L)	21 800	0	0	1 460	5 800	**29 130**
Rigid IBCs	19 300	0	400	0	0	**19 700**
Reusable plastic pallets	4 200	0	0	110	100	**4 370**
Reusable timber pallets	0	48 450	0	1 280	1 300	**51 000**
Dairy crates	1 000	0	0	110	0	**1 120**
RPCs	300	0	0	10	0	**270**
Reusable LDPE bags	1 900	0	14 000	0	0	**15 920**
Reusable PP bags	200	0	1 900	0	0	**2 170**
Cups/mugs	0	0	200	0	0	**240**
Total (tonnes)	**49 200**	**48 450**	**16 500**	**3 030**	**7 200**	**124 500**
Total (%)	**40%**	**39%**	**13%**	**2.4%**	**6%**	**100%**

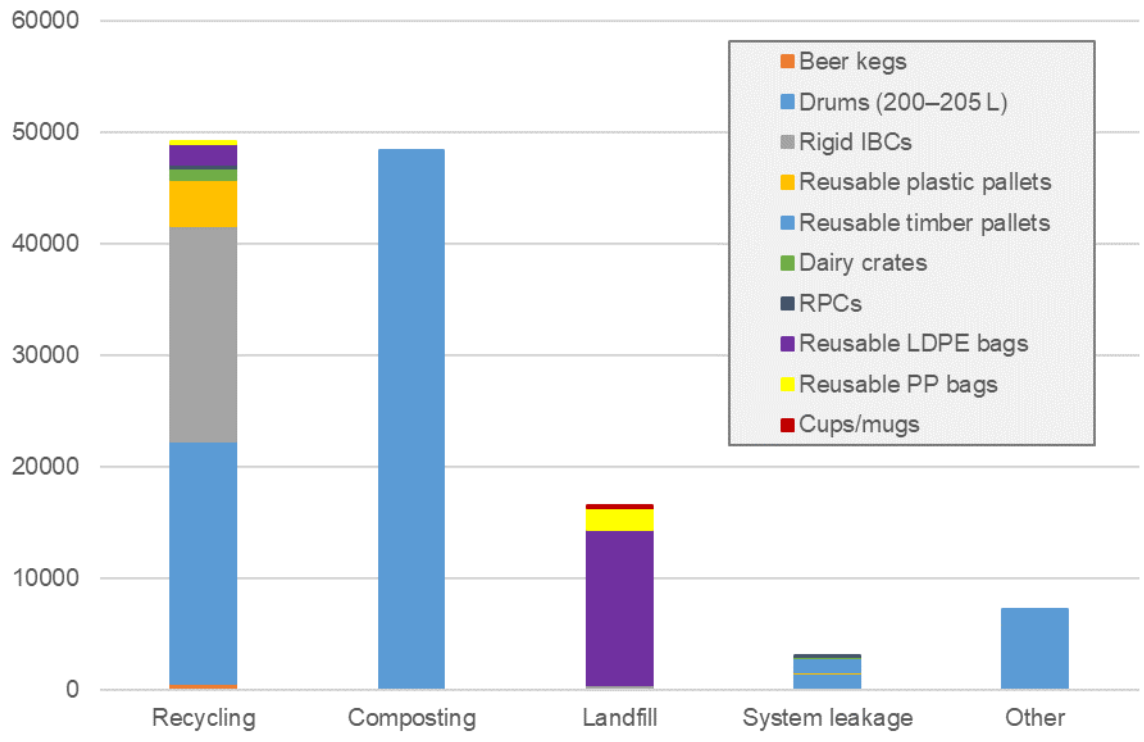

Figure 52 – Reusable packaging system end-of-life destinations in 2019–20 (tonnes)

6.3 Reusable packaging system use phase parameters

Provided in **Table 63** is a summary of significant use phase parameters for the quantified reusable packaging systems. Beer kegs, dairy crates, and RPCs in particular, have long lifespans coupled with relatively high rotations (use cycles) per year.

Table 63 – Reusable packaging system use phase parameters

Packaging system	Average mass	Average lifespan	Rotations	Rotation time	Average deliverable volume
	(kg/unit)	(yr)	(rotations /life cycle)	(rotations/yr)	(litres/rotation)
Beer kegs	13.0	15	180	12	50
Drums (200–205 L)	14.3	3	3	1	200
Rigid IBCs	41.0	5	3	1	1 000
Reusable plastic pallets	35.0	5–15	5–200	2–10	1 000
Reusable timber pallets	35.0	5–15	5–200	2–10	1 000
Dairy crates	1.1	10.0	120	12	18
RPCs	1.5	10.0	120	12	15
Reusable LDPE bags	0.0	0.1	3	52	14
Reusable PP bags	0.1	2.0	104	52	17
Cups/mugs	0.2	4.0	1 000	250	0.3
Simple average (unweighted)	**13.6**	**7**	**162**	**40**	**331**

6.4 Avoided single-use packaging

This section provides indicative estimates of the quantities of single-use packaging that are avoided by using the quantified reusable packaging systems.

The reusable packaging systems have differing levels of competition with the alternative single-use packaging systems. However, this substitutability aspect has been ignored for the purposes of this exercise, which was to determine the theoretical performance of reusable packaging systems relative to single-use packaging systems, in terms of the comparative material flows.

Provided in **Table 64** and **Figure 53** are estimates of the single-use packaging avoided by each reusable packaging rotation, by material group. IBCs avoided the most single-use packaging (the competing product was a single-use IBC), reflecting the importance of reusing IBCs wherever possible.

Table 64 – Single-use packaging avoided per reusable packaging rotation, by material group

Packaging system	Paper & paperboard	Glass	Plastic	Metal	Wood	Total
	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)
Beer kegs	3.2	14.4	0.0	1.6	0.0	19.3
Drums (200–205 L)	0.0	0.0	0.9	7.2	0.0	8.1
Rigid IBCs	0.0	0.0	15.5	18.5	0.0	34.0
Reusable plastic pallets	0.0	0.0	0.0	0.0	20.0	20.0
Reusable timber pallets	0.0	0.0	0.0	0.0	20.0	20.0
Dairy crates	0.5	0.0	0.0	0.0	0.0	0.5
RPCs	0.7	0.0	0.0	0.0	0.0	0.7
Reusable LDPE bags	0.000	0.000	0.007	0.000	0.000	0.007
Reusable PP bags	0.000	0.000	0.009	0.000	0.000	0.009
Cups/mugs	0.010	0.000	0.003	0.000	0.000	0.013

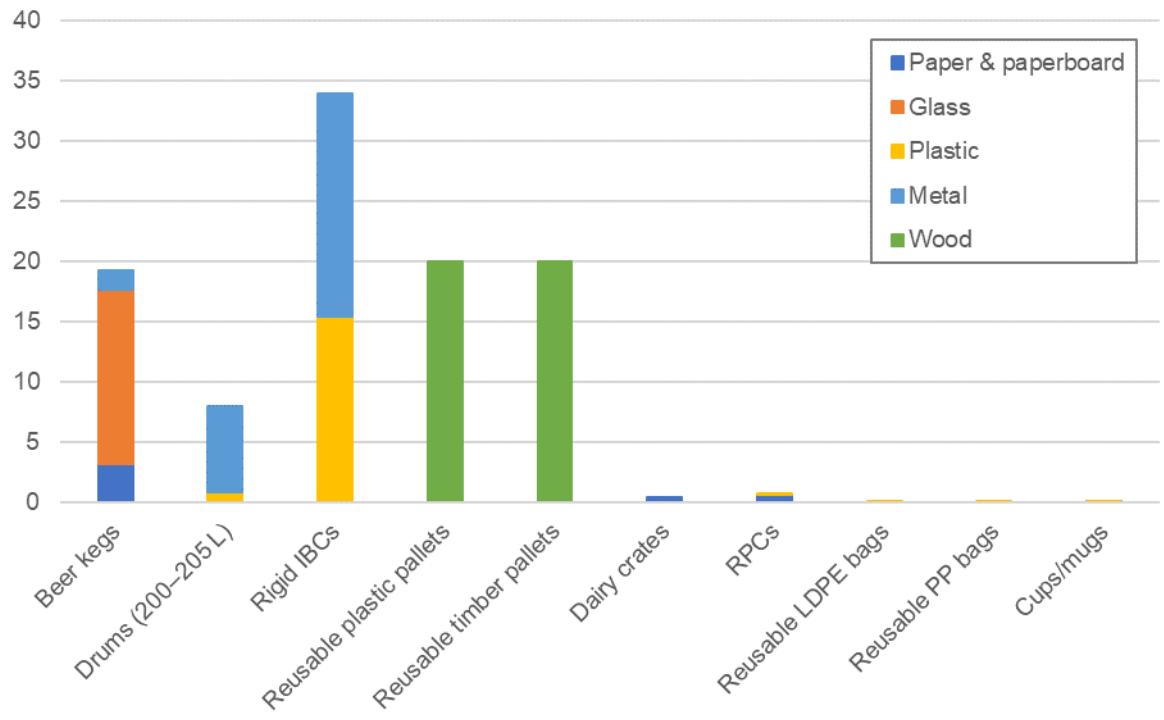

Figure 53 – Single-use packaging avoided per reusable packaging rotation, by material group (kg)

Provided in **Table 65** and **Figure 54** are estimates of the total quantities of single-use packaging avoided in 2019–20, through the use of the eight quantified reusable packaging systems.

The quantified reusable packaging systems avoided the use of 2.9 million tonnes of single-use packaging. Approximately 91% of the avoided single-use packaging consumption benefit is provided by reusable pallets and beer kegs. The net theoretical reduction in packaging use was 2.7 million tonnes, as there were 0.2 million tonnes of reusable packaging inputs in 2019–20 (**Table 60**).

Table 65 – Total single-use packaging avoided in 2019–20 through use of the quantified reusable packaging systems

Packaging system	Paper & paperboard	Glass	Plastic	Metal	Wood	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Beer kegs	48 200	214 000	0	24 200	0	286 400
Drums (200–205 L)	0	0	2 500	21 000	0	23 500
Rigid IBCs	0	0	8 900	10 700	0	19 600
Reusable plastic pallets	0	0	0	0	249 800	249 800
Reusable timber pallets	0	0	0	0	2 127 600	2 127 600
Dairy crates	61 400	0	0	0	0	61 400
RPCs	46 600	0	900	0	0	47 500
Reusable LDPE bags	0	0	12 000	0	0	12 000
Reusable PP bags	0	0	68 600	0	0	68 600
Cups/mugs	27 400	0	8 200	0	0	35 600
Total (tonnes)	**183 600**	**214 000**	**101 000**	**55 900**	**2 377 400**	**2 931 900**
Total (%)	**6.3%**	**7.3%**	**3.4%**	**1.9%**	**81.1%**	**100.0%**

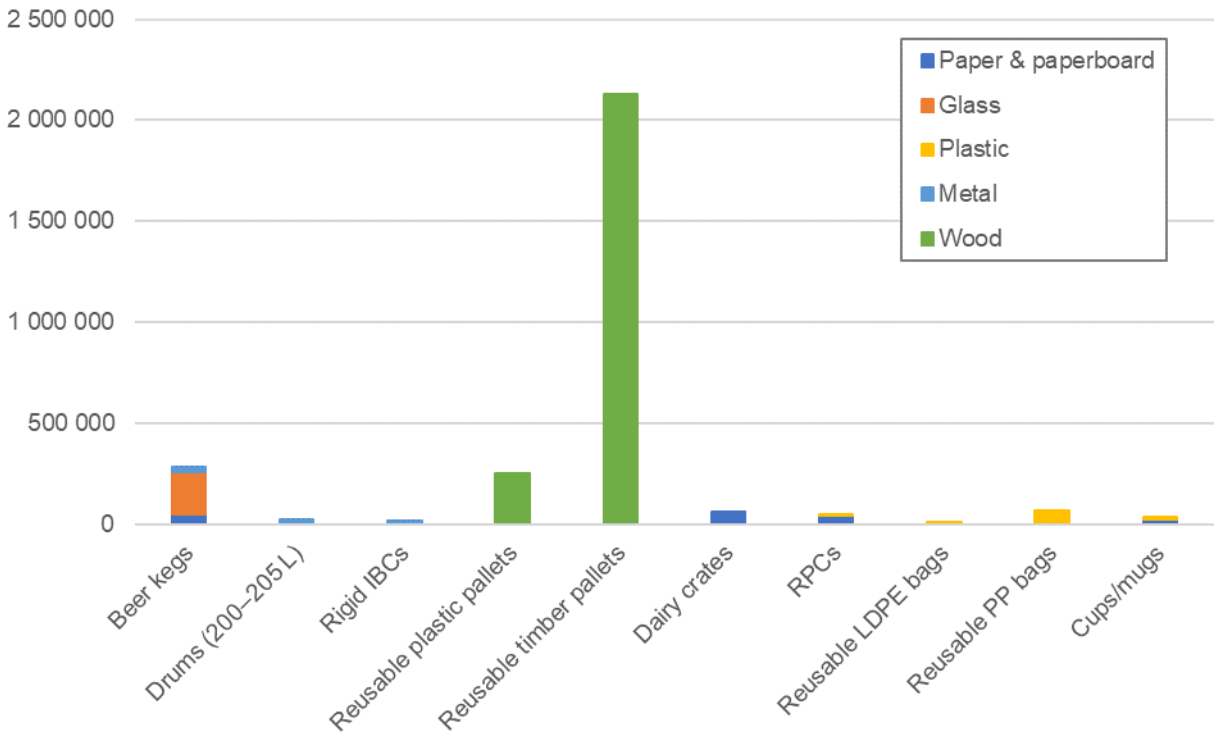

Figure 54 – Total single-use packaging avoided in 2019–20 through use of the quantified reusable packaging systems (tonnes)

In 2019–20 packaging POM was 6.3 million tonnes (**Table 5**), so reusable packaging POM of 167,000 tonnes made up less than 3% of total packaging POM. However, it avoided the theoretical use of 2.9 million tonnes of single-use packaging, or the equivalent of 47% of total packaging POM in 2019–20.

Table 66 provides estimates of the material inputs reduction ratios in 2019–20 through the use of the quantified reusable packaging systems. Beer kegs have an excellent reduction ratio of 688. That is, every kilogram of beer keg avoids the use of 688 kg of single-use packaging over the lifespan of the beer keg. On average, every kilogram of the quantified reusable packaging systems avoided the use of 18 kg of single-use packaging.

Table 66 – Material inputs reduction ratio in 2019–20 through use of the quantified reusable packaging systems

Packaging system	Paper & paperboard	Glass	Plastic	Metal	Wood	Overall
	(ratio)	(ratio)	(ratio)	(ratio)	(ratio)	(ratio)
Beer kegs	RNC	RNC	N/A	58.2	N/A	688
Drums (200–205 L)	N/A	N/A	2.5	1.0	N/A	1.1
Rigid IBCs	N/A	N/A	5.7	1.7	N/A	2.5
Reusable plastic pallets	N/A	N/A	RNC	N/A	RNC	28.6
Reusable timber pallets	N/A	N/A	N/A	RNC	21.4	20.9
Dairy crates	RNC	N/A	RNC	N/A	N/A	54.5
RPCs	RNC	N/A	1.0	N/A	N/A	53.2
Reusable LDPE bags	N/A	N/A	0.8	N/A	N/A	0.8
Reusable PP bags	N/A	N/A	9.4	N/A	N/A	9.4
Cups/mugs	RNC	RNC	42.0	RNC	N/A	93.5
Overall	**RNC**	**1 384**	**2.7**	**1.8**	**23.9**	**18**

RNC – Ratio not calculable, as either the denominator or numerator is zero.

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APPENDIX A – GLOSSARY OF TERMS AND ABBREVIATIONS

Term	Definition
Beneficiation (of glass)	Processing of used glass packaging. The beneficiation process includes sorting (including colour sorting), cleaning, crushing and sizing. Beneficiated glass is considered “furnace-ready” for sale to glass product manufacturers.
Biodegradable	A generic term that indicates a polymer is biologically available for microbial decomposition, with no detail on breakdown products, time or extent of degradation or end environments.
Bioplastics	Plastics that are biobased, biodegradable or both. Bioplastics fall into three broad groupings, which are: biobased (but not biodegradable); biodegradable (but not biobased); or biobased and biodegradable. Conventional polymers (e.g., PET and HDPE) can also be fully or partially ‘biobased’.
Business-to-business (B2B) packaging	Packaging used for the containment, protection, or handling of product where the end-customer, prior to the packaging reaching end-of-life, is a business or institution. Typically includes the secondary and tertiary packaging that is used to move products between businesses prior to sale to end-consumers but can also include primary packaging if the business is the end-user. Same meaning as 'Commercial packaging'. Also see 'Packaging' and 'Business-to-consumer (B2C) packaging'.
Business-to-consumer (B2C) packaging	Packaging used for the containment, protection, marketing, or handling of product where the end-customer, prior to the packaging reaching end-of-life, is a consumer (i.e., a person). Includes the primary packaging that is sold to end-consumer, and possibly some secondary packaging, but excludes any B2B packaging that is part of the packaging system. Same meaning as 'Consumer packaging'. Also see 'Packaging' and 'Business-to-business (B2B) packaging'.
Certified compostable	Means that claims of compliance with Australian Standard 4736-2006, compostable and biodegradable plastics – “Biodegradable plastics suitable for composting and other microbial treatment” and Australian Standard AS 5810-2010 Home Composting – “Biodegradable plastics suitable for home composting” have been verified.
Circular economy	The circular economy concept is a systems approach to material/energy flows that extends significantly on the ‘waste hierarchy’, with the objective being to decouple economic growth/development from the use of non-renewable resources (including energy). It is a concept that extends to cover the entire life cycle of products and services, including design. It assumes that the current approach of incremental and fractured improvements in materials and energy efficiency are not sufficient to achieve the potential (much larger) economic and environmental gains that are available.
Closed-loop recycling	Material from a product system is recycled in the same product system and is of the same quality and functionality as the original material. In terms of end-of-life fates, closed-loop recycling will typically provide greatest environmental benefits, with the key attribute being the displacement (competition with) virgin resource extraction. Also see 'Open-loop recycling' and 'Downcycling'.
Collection	Packaging materials collected for recycling.
Collection efficiency	Materials collected for recycling divided by total packaging waste entering the collection system.

Term	Definition
Commercial and industrial (C&I) waste	Solid inert waste generated from trade, commercial and industrial activities including the government sector. It includes waste from offices, manufacturing, factories, schools, universities, state and government operations and small to medium enterprises e.g., food waste.
Commercial packaging	The same meaning as 'Business-to-business' (B2B) packaging.
Commingled recyclables	Materials combined generally for the purposes of collection, mainly through municipal collection services. Includes plastic bottles, other plastics, paper, glass and metal containers. Commingled recyclable materials require sorting after collection before they can be reprocessed. Can also be called commingled materials.
Compostable packaging	A packaging or packaging component (1) is compostable if it is certified to AS4736 or a similar standard for commercial composting, and if its successful post-consumer (2) collection, (sorting), and composting is proven to work in practice and at scale (3). Also see the related 'Recyclable packaging' and 'Reusable packaging' definitions. Supporting notes: 1. ISO 18601:2013: A packaging component is a part of packaging that can be separated by hand or by using simple physical means (e.g., a cap, a lid and (non in-mould) labels). 2. ISO 14021 clarifies post-consumer material as 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. 3. 'At scale' implies that there are significant and relevant geographical areas, as measured by population size, where the packaging is actually composted in practice.
Composted (packaging)	Packaging that underwent degradation by biological processes during composting to yield CO2, water, inorganic compounds and biomass at a rate consistent with other known compostable materials and leaves no visible, distinguishable or toxic residue, in accordance with accepted industry standards (1). Supporting notes: 1. Accepted industry standards include standards referred in the above definitions 'Compostable packaging – industrial' and 'Compostable packaging – home'. Reference to accepted industry standards is to ensure packaging can fully degrade within specified periods of time in the conditions of standard composting system and does not alter the quality of compost.
Compound annual growth rate (CAGR)	The CAGR is a term for the ratio that provides a constant rate of growth, each year, over a defined time period of two or more years. CAGR is equivalent to the more generic exponential growth rate when the exponential growth interval is one year. The CAGR is useful as it provides a smoothed rate of growth over a number of years, reducing the impact of year-on-year growth data volatility.
Construction and demolition (C&D) waste	Solid inert waste generated from residential and commercial construction and demolition activities e.g., bricks and concrete.
Consumer packaging	Packaging used for the containment, protection, marketing, or handling of product where the end-customer, prior to the packaging reaching end-of-life, is a consumer (i.e., a person). Includes the primary packaging that is sold to end-consumer, and possibly some secondary packaging, but excludes any B2B packaging that is part of the packaging system. Same meaning as Business-to-consumer' (B2C) packaging. Also see 'Packaging' and 'Business-to-business (B2B) packaging'.

Term	Definition
	It is worth noting that the *National Environment Protection (Used Packaging Materials) Measure 2011* defines *consumer packaging* to mean all packaging products made of any material, or combination of materials, for the containment, protection, marketing, or handling of consumer products. This includes: • Primary packaging – materials directly containing the product. • Secondary packaging – materials used to contain single or multiple primary packed products. • Tertiary packaging – materials used to distribute packaged and unpackaged products. This NEPM definition for consumer packaging is different from that adopted for consumer packaging (and B2C packaging) in this study in that the adopted definition excludes all tertiary packaging, even if it is part of the (upstream) consumer packaging system.
Consumption	Total use of product by Australian industry and consumers. Includes locally made and used product, imported product and locally utilised recyclate. Does not include locally made product that is exported.
Consumption of packaging	Packaging put onto the market in Australia from local and imported sources. Because most packaging is single-use, it is assumed that packaging consumed equates to packaging waste generated. Does not include locally made product that is exported for sale.
Container deposit scheme (CDS) collection	Separate collection system for paper, plastic and metal containers.
Contaminants – Out throws	A sorted scrap (bale) related term. Recyclable materials that are unsuitable for inclusion in the sorted grade (product) in which they are present, but can be sorted, separated and/ or removed easily during the recycling process. Out throws generally have significantly higher allowable thresholds, compared to prohibited materials, in bale specifications for sorted recycled material commodities. Also see ‘Contaminants – Prohibited materials’ entry.
Contaminants – Prohibited materials	A sorted scrap (bale) related term. Unrecyclable materials that are unsuitable for inclusion in the sorted grade (product) in which they are present, and cannot be sorted, separated and/or removed during the recycling process. Prohibited materials cause adverse impacts on end-products and may damage the recycling facilities. Prohibited materials generally have significantly lower allowable thresholds, compared to out throws, in bale specifications for sorted recycled material commodities. Also see ‘Contaminants – Out throws’ entry.
Converter	Company which converts material inputs into a finished packaging product (whether filled or unfilled).
Cullet	Sorted glass feedstock resulting from the beneficiation process of mixed container glass. Generally consists of sorted streams of amber, flint and green glass of particle size greater that 5–10 mm depending on the capacity of the beneficiation plant.
Delamination	The process of splitting a composite material into its component parts e.g., laminated glass.
Disposal	Discarding solid waste to landfill or incineration (without energy recovery).
Diversion rate	Recovery (at a defined point) as a percentage of end-of-life disposal. Also see 'Recovery rate' and 'Recycling rate'.
Domestic	Material from domestic (household) sources.

Term	Definition
Downcycling	Recycled material is of lower quality and functionality than the original material(s). Materials are recycled into different applications with less stringent performance specifications, and where the recycled materials are typically substituting for (competing with) materials other than the original high quality virgin materials. Examples of this include the recycling of mixed polymer rigid plastics, e.g. a mixture of HDPE, low-density polyethylene (LDPE) and polypropylene (PP) into timber substitute products (e.g. outdoor furniture, pallets and fencing), where the recovered plastics are competing primarily with timber as the alternative material. Down-cycled materials are potentially more difficult to recycle at end-of-life (although they often have long functional lifespans), and are more likely to be disposed to landfill at end-of-life. Also see 'Closed-loop recycling' and 'Open-loop recycling'.
Drop off centre/site	A facility where households can drop off selected materials and household items for recycling and reuse. Also called drop off facilities.
End user (of recycled content raw materials)	A user of raw materials that have a recycled content. Examples of end users include plastic product manufacturers that use recycled polymer in their products, or agricultural producers that purchased composted organics as a soil conditioner/fertiliser.
Energy from waste (EfW)	The terms ‘energy recovery from waste’, ‘waste to energy’ or ‘energy from waste’ can be used interchangeably to describe a number of treatment processes and technologies used to generate a usable form of energy from waste materials. Examples of usable forms of energy include electricity, heat and transport fuels.
Energy recovery	A waste fate in which a substantial portion of energy value in a waste is recovered.
Energy recovery facility	A facility that captures, on average, more than 20% of the embodied energy in the waste it receives for beneficial use.
Export for reprocessing	Material sent for reprocessing overseas.
Feedstock	Raw material used to manufacture products. Material varies depending on what is being produced.
Feedstock (chemical) recycling	The use of chemical processes such as pyrolysis to convert scrap plastics into a hydrocarbon gas or liquid (often a polymer to monomer conversion) that is usable as a fuel or as an input for manufacturing plastics resins.
Fines (glass)	Unsorted sub-5–10 mm glass material left over from the glass beneficiation process. It can contain contamination including plastics and small pieces of metals. These fines can be further processed to produce a glass sand product which has a number of uses.
Flexible packaging	Soft (flexible) plastics are generally defined as plastics that can be scrunched into a ball, unlike ‘rigid’ plastics such as bottles and tubs, which are moulded and hold their shape. Also refer to the 'Rigid packaging' entry.
Foam packaging	Foam plastic packaging is in a lightweight cellular form resulting from introduction of gas bubbles during manufacture. Foam packaging is typically used to reduce shock and vibration or abrasion. The most common example used in packaging is expanded polystyrene (EPS).
Food organics	Food waste from households or industry, including food processing waste, out- of-date or off-specification food, meat, fruit and vegetable scraps. Excludes liquid wastes.
Garden organics	Organics derived from garden sources e.g. grass clippings, tree prunings. Also known as green organics.
Generated material/waste	Materials or waste originating from a point source or source of origin.
Green organics	See garden organics.

Term	Definition
Greenhouse gases	Gases, including carbon dioxide and methane, that trap heat in the earth's atmosphere, affecting weather and climate patterns.
Hard waste	The term applied to household garbage that is not usually accepted in kerbside garbage bins by local councils e.g. old fridges and mattresses.
Hazardous waste	Waste with potentially adverse impacts on human health and the environment.
Household	Material from domestic (household) sources.
In the gate	Material entering a facility for reprocessing. This may include material that is unusable due to contamination. In the gate material that is subsequently sent to landfill is generally either a combination of gross contamination (i.e. materials that should not have been presented and are not recyclable at the receiving facility) and/or designated scrap plastics that were not recovered into product due to cross contamination with unrecyclable materials or losses due to other types of production inefficiencies (e.g. losses to trade waste). Also see 'Out the gate'.
Incinerator	A site and/or process that facilitates disposal of waste streams through burning, without producing another useful end product or capturing value from the waste material.
Internal use	Recyclate processed and used within the one company.
In-vessel composting	Composting technology involving the use of a fully enclosed chamber or vessel in which the composting process is controlled by regulating the rate of mechanical aeration. Aeration assists in heat removal, temperature control and oxygenation of the mass. Aeration is provided to the chamber by a blower fan which can work in a positive (blowing) and/or negative (sucking) mode. Rate of aeration can be controlled with temperature, oxygen or carbon dioxide feedback signals.
Kerbside waste/ collection	Waste collected by local councils from residential properties, including garbage, commingled recyclables and garden organics, but excluding hard waste.
Kraft paper	Kraft paper is paper, or paperboard (cardboard) produced from chemical pulp produced in the kraft process. It is commonly used in paper sacks, food and other paper-based wraps (including burger wraps and similar). Kraft pulp is normally darker than other wood pulps, but it can be bleached to make white papers.
Landfill	Discharge or deposit of solid wastes onto land that cannot be practically removed from the waste stream.
Liquid paperboard (LPB)	Liquid paperboard (LPB) is a fibre-based packaging board that is designed to hold a liquid. It commonly comes in two main types, which are gable-topped LPB (plastic polymer layer / paperboard layer / plastic polymer layer), and aseptic LPB (plastic polymer layer / paperboard layer / aluminium foil layer / plastic polymer layer). Also see Polymer-coated paperboard (PCPB).
Local material utilisation	Materials recovered and reprocessed (recyclate) for use within Australia for the manufacture of new products.
Local material utilisation rate	Materials recovered for local manufacturing of new product divided by total packaging waste entering the system.
Local use	Recyclate used within Australia by an Australian company in the manufacture of a new product.
Local/Locally	In Australia.
Material flow analysis (MFA)	Material flow analysis (MFA) is a mass balanced based analytical method to quantify flows and stocks of materials or substances for a well-defined system and time period. MFA is also referred to as substance flow analysis (SFA).

Term	Definition
Material recycling	Reprocessing, by means of a manufacturing process, of a used packaging material into a product, a component incorporated into a product, or a secondary (recycled) raw material
Materials recovered	Materials diverted from landfill for use or reprocessing irrespective of where the recovery or reprocessing takes place.
Materials recovery facility (MRF)	A centre for the receipt, sorting and transfer of materials recovered from the waste stream prior to transport to another facility for recovery and management. At a MRF materials may undergo mechanical treatment for sorting by characteristics such as density, size, magnetism and optical characteristics, and may include cleaning and compression. Materials may be received as mixed streams such as commingled recyclables from households and businesses or single streams such as metals.
Mechanical recycling	The use of physical processes such as sorting, chipping, grinding, washing and extruding to convert scrap plastics to a usable input for the manufacture of new products.
Mild steel	Mild steel is defined as having no more than 2% carbon and no other functional alloying elements. Mild steel is also referred to as ‘carbon steel’.
Mixed paper	Post-consumer kerbside mix of fibre based packaging and non-packaging papers. Includes materials such as magazine, newspaper, marketing, some OCC and others fibre-based formats. Typically has high levels of contamination, of which broken glass is a particular issue.
Mixed plastics	Post-consumer kerbside mix of plastics based packaging and non-packaging plastic items. Includes materials such as bottles, containers and other packaging formats consisting of all the major polymer groups. Often undergoes a polymer sort at MRFs or post-MRFs to positively recover a limited range of polymer types, typically PET and HDPE. Often has moderate to high levels of contamination.
MRF	Material Recovery Facility – a facility for the sorting of recyclables (typically packaging) into various product streams.
Municipal solid waste (MSW)	Solid waste generated from municipal and residential activities, and including waste collected by, or on behalf of, a municipal council. Excludes dedicated container deposit scheme (CDS) collections or drop-off by consumers or businesses.
Non-packaging / durable	Long-term use item; not designed to be single use or disposable within a 12-month period.
OCC	Old, corrugated cardboard (unbleached kraft).
ONP	Old newsprint.
Open-loop recycling	Material from a product system is recycled into a different product system and may be of lower quality and functionality than the original material. Importantly, the recycled materials substitute for, and avoid the use of virgin materials in the new applications. Examples of this in Australia include the recycling of PET bottles into fibre for use in clothing and other textiles, and high-density polyethylene (HDPE) milk bottles into mobile garbage bins and milk crates. Open-loop recycling can be as environmental beneficial as closed-loop recycling. Also see 'Closed-loop recycling' and 'Downcycling'.
Optical sorting	Technologies used to sort glass by colour type, and plastics by polymer type.
Organic material	Plant or animal matter, e.g., grass clippings, tree prunings and food waste, originating from domestic or industrial sources.
Organics recycling	The treatment of separately collected organics waste by anaerobic digestion, composting or vermiculture.

Term	Definition
Out the gate	Material leaving a facility following reprocessing and excluding most contamination. Also see ‘In the gate’.
Oxo-degradable or photo-degradable	Conventional fossil-based polymers (usually polyethylene or polypropylene) that have additives incorporated into the polymer at low rates (2-3%) to provide highly accelerated fragmentation of the plastic in sunlight or in the presence of oxygen or in an anaerobic environment.
Packaging	Material used for the containment, protection, marketing or handling of product. Includes primary, secondary and tertiary/freight packaging in both consumer and industrial packaging applications.
Packaging assembly	A collection of packaging components that are intended to function as a single packaging unit. For example, a single-use glass soft-drink bottle is typically a packaging assembly consisting of; a glass bottle, a metal or plastic closure and a paper or plastic label. Also see 'Packaging component'.
Packaging component	A part of a packaging assembly that can be separated by hand or by using simple physical means. Also see 'Packaging assembly'.
Packaging constituent	A part from which a packaging assembly or its components are made and which cannot be separated by hand or by using simple physical means.
Packaging level	Identifies the hierarchical level of the packaging assembly, i.e. primary, secondary or tertiary. **Primary packaging**, also known as consumer or retail packaging, refers to the layer/s that contain and protect individual product units up to the point of sale (e.g. bag, bottle, jar, box etc.) and that are removed for use. Primary packaging also includes any packaging given to consumers at the point of retail sales (e.g. retail bag, tissue paper etc.) as well as packaging delivered to consumers with online sales (e.g. bag, cushioning, box etc.). **Secondary packaging** is additional to the primary packaging and is used to protect and collate individual product units during storage, transport and distribution. This may include shelf-ready packaging (SRP), also known as retail-ready packaging (RRP) or counter- top display units (CDUs), containing multiple product units and used for retail display. **Tertiary packaging** is used in the protection and shipping of a product. This type of packaging is also known as distribution packaging, transport packaging and business-to-business (B2B packaging). It consists of packaging and components such as cardboard cartons, pallets, slip sheets, stretch wrap, strapping and any labels.
Packaging system	Complete set of packaging for a packaged good, encompassing one or more of the following that are applicable (depending on the packaged goods): Primary packaging, Secondary packaging, Tertiary (distribution or transport) packaging.
Paper & paperboard	Paperboard is a group term related to papers (including multi-ply papers) that have been manufactured specifically for packaging purposes. Paper is both an input into paperboard manufacturing and can be a packaging product in its own right.
PE-HD or HDPE	High-density polyethylene (PIC 2). Typically referred to as HDPE.
PE-LD or LDPE	Low-density polyethylene (PIC 4). Typically referred to as LDPE.
PE-LLD or LLDPE	Linear low-density polyethylene (PIC 4). Typically referred to as LLDPE.
PET	Polyethylene terephthalate (PIC 1).
PIC	Plastic identification code. Also referred to as the resin identification code (RIC) in some other countries.

Term	Definition
Placed on market (POM)	Packaging is defined as being 'placed on market' (POM) when it is first made available to the end-consumer, and disposal is following the intended full use of the packaging and can be considered 'post-consumer'. Packaging losses prior to the point of POM are considered pre-consumer losses.
Polymer coated paperboard (PCPB)	Paper-based packaging with a polymer coating for water resistance and structural integrity, generally, polyethylene (PE) or polylactic acid (PLA). Aseptic PCPB containers also contain a foil/metallised film layer.
Post-consumer domestic	Used material from household sources. Mostly packaging material from kerbside recycling collections.
Post-consumer industrial	Used material from non-household sources.
Post-consumer recycled content (PCR)	The post-consumer recycled content of packaging placed on market is sourced from end-of-life materials generated by households or by commercial, industrial and institutional facilities.
Post-consumer used packaging	ISO 14021 defines post-consumer material as 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. It excludes pre-consumer material (e.g. production scrap).
PP	Polypropylene (PIC 5).
Pre-consumer recycled content	The pre-consumer recycled content of packaging placed on market is sourced from scrap materials generated during manufacturing (excluding rework). The compositional profile of the pre-consumer recycled content of the material is typically the same as that of the packaging material POM, and reflects the composition of the incoming material into the packaging manufacturing. That is, it can have a proportion of virgin, pre-consumer and post-consumer content. If manufacturing processes, including scrap reprocessing processes, are considered a single black box, then the sources of pre-consumer materials upstream from manufacturing processes are either virgin or post-consumer sourced materials only.
Pre-consumer scrap packaging	Scrap off-cuts and off-specification materials in the manufacturing industry which are collected for reprocessing at a different facility. Does not include material that is recycled directly back into manufacturing processes at the same facility. Does not include material that has reached the end-consumer, whether domestic, commercial or industrial.
PREP	Packaging Recyclability Evaluation Portal (PREP) is an online platform used to verify if packaging is or is not recyclable in Australian and New Zealand kerbside collections.
Primary material	See ‘Virgin material’.
Problematic	Can be considered a ‘contaminant’ in the recycling facility because it is either 1) not one of the requested materials 2) causes problems e.g. getting entangled in machinery 3) reduces the quality of the recyclate or some other reason.
Process derived fuels	Also called process engineered fuel (PEF) or refuse derived fuel (RDF), is a fuel produced after basic processing in a MRF or MBT to increase the calorific value and remove recyclable materials and contaminants of municipal solid waste, commercial and industrial waste and construction and demolition waste.
Processing facilities	Facilities which either receive materials directly from collection systems or from recovery facilities for further sorting and/or processing to provide material for use in the generation of new products.

Term	Definition
Product stewardship	A concept of shared responsibility by all sectors involved in the manufacture, distribution, use and disposal of products, which seeks to ensure value is recovered from products at the end of life.
PS-E or EPS	Expanded polystyrene (PIC 6). Typically referred to as EPS.
Public place recycling	Recycling facilities found in public areas, such as parks, reserves, transport hubs, shopping centres and sport and entertainment venues, that allow the community to recycle when away from home.
Putrescible waste	Waste that readily decomposes, including food waste and organic waste from gardens.
PVC	Polyvinyl chloride (PIC 3).
Pyrolysis	Thermal breakdown of waste in the absence of air, to produce char, pyrolysis oil and syngas e.g., the conversion of wood into charcoal.
Recover / recovery / resource recovery	The process of recovering resources from waste for reuse or reprocessing. This includes collection, sorting and aggregation of materials. To convert waste into a reusable material.
Recovery rate	Recovery (at a defined point) as a percentage of end-of-life disposal. Similar meaning to 'Recycling rate' but can include material into composting and energy recovery. Excludes reused products. Also see 'Diversion rate' and 'Recycling rate'.
Recyclable packaging	A packaging (1) or packaging component (2,3) is recyclable if its successful post-consumer (4) collection, sorting, and recycling is proven to work in practice and at scale. Also see the related ‘Compostable packaging’ and ‘Reusable packaging’ definitions. Supporting notes: 1. A package can be considered recyclable if its main packaging components, are recyclable according to the above definition, and if the remaining minor components are compatible with the recycling process and do not hinder the recyclability of the main components. The PREP design tool provides information on recyclability of packaging through kerbside collection services. 2. A packaging component is a part of packaging that can be separated by hand or by using simple physical means (ISO 18601), e.g. a cap, a lid and (non in-mould) labels. 3. A packaging component can only be considered recyclable if that entire component, excluding minor incidental constituents (5), is recyclable according to the definition above. If just one material of a multi-material component is recyclable, one can only claim recyclability of that material, not of the component as a whole (in line with ISO 14021). 4. ISO 14021 defines post-consumer material as 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. It excludes pre-consumer material (e.g. production scrap). 5. ISO 18601:2013: A packaging constituent is a part from which packaging or its components are made and which cannot be separated by hand or by using simple physical means (e.g. a layer of a multi-layered pack or an in-mould label).
Recyclability	See the 'Recyclable packaging' entry.
Recyclate	Scrap material either before or after reprocessing.
Recycle/Recyclables/Recycling	In common practice the term is used to cover a wide range of activities, including collection, sorting, reprocessing and reuse.

Term	Definition
Recycled (packaging)	Packaging is recycled if at least 70% of its weight is recycled into a product, a component incorporated into a product, or a secondary (recycled) raw material.
Recycled content	Is the proportion, by mass, of pre-consumer and post-consumer recycled (PCR) material in packaging (AS/ISO 14021). 'Pre-consumer' material is material diverted from the waste stream during manufacturing (excluding rework). 'Post-consumer' material is material waste generated by households or by commercial, industrial and institutional facilities. The amount of renewable or recycled material is expressed as a percentage of the quantity of packaging material put onto the market.
Recycling	Activities in which solid wastes are collected, sorted, processed (including through composting), and converted into raw materials to be used in the production of new products (the amount of solid waste recycled is net of any residuals disposed). Excludes energy recovery and stockpiles.
Recycling rate	Recovery (at a defined point) as a percentage of end-of-life disposal. Similar meaning to 'Recovery rate' but excludes material into energy recovery and reused products. Also see 'Diversion rate' and 'Reprocessing rate'.
Refuse derived fuels	Refer to 'Process derived fuels'.
Reprocess / reprocessing	To put a material that has been used through an industrial process to change it so that it can be used again.
Reprocessor / reprocessing facility / reprocessing infrastructure	Facility that uses an industrial process to change the physical structure and properties of a waste material so it can be used again. This can include facilities that dismantle products, such as tyres, e-waste and mattresses, and energy from waste facilities that use materials to generate energy.
Resale centre / shop	A centre/shop that enables the sale and subsequent reuse of good quality, saleable products and materials that were disposed of by their previous owner.
Residual waste	Residual material that remains after any source separation or reprocessing activities of recyclable materials or garden organics. Waste that is left over after suitable materials have been recovered for reuse and recycling. This generally means the environmental or economic costs of further separating and cleaning the waste are greater than any potential benefit of doing so.
Resin	Raw plastic polymer material.
Resource recovery	Total materials recovered including materials sent to recycling and energy recovery, including export and stockpiling, net of contaminants and residual wastes sent to disposal.
Resource recovery infrastructure	Facility that receives and manages materials to enable them to be reused or reprocessed. This includes drop off points, resale centres, resource recovery centres, transfer stations and materials recovery facilities.
Resource recovery rate	The proportion calculated by dividing resource recovery by waste generation (also referred to as the 'recovery rate').
Reusable packaging	Packaging or packaging component which has been designed to accomplish or proves its ability to accomplish a minimum number of trips or rotations in a system for reuse. Also see the related 'Compostable packaging' and 'Recyclable packaging' definitions. Supporting notes: 1. A trip is defined as transfer of packaging, from filling/loading to emptying/unloading. A rotation is defined as a cycle undergone by reusable packaging from filling/loading to filling/loading (ISO 18603).

Term	Definition
	2. The minimum number of trips or rotations refers to the fact that the ‘system for reuse’ in place should be proven to work in practice, i.e. that a significant share of the package is actually reused (measured e.g. by an average reuse rate or an average number of use-cycles per package). 3. A system for reuse is defined as established arrangements (organisational, technical or financial) which ensure the possibility of reuse, in closed-loop, open-loop or in a hybrid system (ISO 18603). 4. Reuse is an operation by which packaging is refilled or used for the same purpose for which it was conceived, enabling the packaging to be refilled (ISO 18603). Also refer to the 'Single-use packaging' entry.
Reuse	Recovering value from a discarded resource without processing or remanufacture e.g. garments sold though opportunity shops.
Rigid packaging	Rigid plastic packaging such as bottles and tubs, which are (generally) moulded and hold their shape. Also refer to the 'Flexible packaging' entry.
Scrap packaging	Used packaging that has been recovered for reprocessing but has not yet been reprocessed.
Secondary processing	A process undertaken after sorting in which a recovered material is put through an industrial process to change it so that it can be used as an input for the manufacture of new products. Also see ‘Reprocessor’.
Sectors / industry sectors	Groupings of industries used to generalise patterns in waste generation and disposal e.g. construction and demolition, food services including food retail and food manufacturing, small to medium enterprises.
Single-use packaging	Single-use packaging is defined as a packaging system or packaging component which has been principally designed to accomplish a single trip, even if some form of reuse is possible. Single-use packaging does not meet the definitional requirements of ISO 18603:2013 (Packaging and the environment – Reuse) as reusable packaging. Also refer to the 'Reusable packaging' entry.
Soft plastics packaging	Soft (flexible) plastics are generally defined as plastics that can be scrunched into a ball, unlike ‘rigid’ plastics such as bottles and tubs, which are moulded and hold their shape.
Solid industrial waste (SIW)	Solid waste generated from commercial, industrial or trade activities, including waste from factories, offices, schools, universities, state and federal government operations and commercial construction and demolition work. Excludes MSW and hazardous wastes.
Solid inert waste	Solid inert waste is hard waste that has a negligible activity or effect on the environment. The waste may be either a municipal or industrial waste.
Solid waste	Non-hazardous, non-prescribed, solid waste materials, ranging from municipal garbage to industrial waste.
Sorting / primary sorting	A process typically between collection (recovery) and reprocessing in which collected end-of-life materials are sorted (or disassembled) into more usable and economically valuable material fractions. Material recovery facilities (MRFs) are sorting facilities.
Sorting efficiency	Material processed at MRF or CDS divided by total packaging waste entering the system.
Source separation	The practice of segregating materials into discrete material streams prior to collection by, or delivery to, processing facilities.
Source stream	Either MSW, C&I, C&D or CDS.

Term	Definition
Stockpile	Unprocessed or processed material where 500 tonnes or more of the same material has been held for more than six months.
Stockpiling	Storage of materials in line with the 'stockpile' definition.
Transfer coefficient	A derived factor that defines the partitioning of an input entering a process into a transformed material stream (e.g., the separation of PET from kerbside recycling materials at MRF).
Transfer station	Facility which receives materials from the waste stream for possible segregation, consolidation, or compaction for bulk transport for resource recovery, treatment or disposal facilities.
Unprocessed material	Material that is unrefined and has not been through any process of recycling.
Virgin material	Material that has been sourced through primary resource extraction. Virgin materials are often referred to as primary materials. Virgin materials are not sourced from recycled materials (sometimes called secondary materials). For example, ‘virgin’ steel is manufactured from iron ore, and ‘virgin’ paper is manufactured from plantation sourced wood fibre.
Waste	Any discarded, rejected, unwanted, surplus, or abandoned matter, including where intended for recycling, reprocessing, recovery, purification or sale. Anything that is no longer valued by its owner for use or sale, and which is, or will be, discarded. In this document, the term 'solid waste' refers to non-hazardous, solid waste materials ranging from municipal garbage to industrial waste.
Waste packaging export	Export of (typically baled) scrap packaging materials sent offshore for reprocessing.
Waste to energy	Refer to ‘Energy from waste’.

APPENDIX B – PACKAGING MATERIAL AND COMPONENT LISTS

The lists of packaging material (type) labels applied during data collection, analysis and reporting are provided in the following table.

Two separate lists are provided for the consumption and recovery/disposal life cycle stages. These are as consistent as possible, while reflecting the difficulties of disaggregating data collection, particularly at the recovery/disposal stage.

A separate more highly aggregated list is provided for the MFA modelling, reflecting the difficulty of forecasting consumption and recycling at a more disaggregated level.

Table B-1 – Packaging types lists

Material types – Consumption related	Material type list – Collection or sorting output related	Material types – MFA related	Material group
Boxboard/Cartonboard	Boxboard/Cartonboard	Boxboard/Cartonboard	Paper & paperboard
Corrugated cardboard	Corrugated cardboard	Corrugated cardboard	Paper & paperboard
High wet strength carrier board	Other fibre packaging	Other fibre packaging	Paper & paperboard
Kraft paper	Other fibre packaging	Other fibre packaging	Paper & paperboard
Moulded fibreboard	Other fibre packaging	Other fibre packaging	Paper & paperboard
Polymer coated paperboard – Aseptic	Polymer coated paperboard	Polymer coated paperboard	Paper & paperboard
Polymer coated paperboard – Gable top	Polymer coated paperboard	Polymer coated paperboard	Paper & paperboard
Polymer coated paperboard – Cold cup	Polymer coated paperboard	Polymer coated paperboard	Paper & paperboard
Polymer coated paperboard – Hot cup	Polymer coated paperboard	Polymer coated paperboard	Paper & paperboard
Polymer coated paperboard – Other	Polymer coated paperboard	Polymer coated paperboard	Paper & paperboard
Polymer coated paper	Polymer coated paperboard	Polymer coated paperboard	Paper & paperboard
Other fibre packaging	Other fibre packaging	Other fibre packaging	Paper & paperboard
N/A	Mixed paper & paperboard	Mixed paper & paperboard	Paper & paperboard
Newsprint and magazine	Newsprint and magazine	Newsprint and magazine	Paper & paperboard
Other fibre non-packaging	Other fibre non-packaging	Other fibre non-packaging	Paper & paperboard
Glass – Amber	Glass – Amber	Glass	Glass
Glass – Flint	Glass – Flint	Glass	Glass
Glass – Green	Glass – Green	Glass	Glass
N/A	Glass – Mixed	Glass	Glass
Glass – Other	Glass – Other	Glass	Glass
Plastic – PET (1)	Plastic – PET (1)	Plastic – PET (1)	Plastic
Plastic – HDPE (2)	Plastic – HDPE (2)	Plastic – HDPE (2)	Plastic

Material types – Consumption related	Material type list – Collection or sorting output related	Material types – MFA related	Material group
Plastic – PVC (3)	Plastic – PVC (3)	Plastic – Other plastic packaging	Plastic
Plastic – LDPE (4)	Plastic – LDPE (4)	Plastic – Other plastic packaging	Plastic
Plastic – PP (5)	Plastic – PP (5)	Plastic – Other plastic packaging	Plastic
Plastic – PS (6)	Plastic – PS (6)	Plastic – Other plastic packaging	Plastic
Plastic – EPS (6)	Plastic – EPS (6)	Plastic – Other plastic packaging	Plastic
Plastic – Bioplastic – Compostable (7)	Plastic – Bioplastic – Compostable (7)	Plastic – Other plastic packaging	Plastic
Plastic – Other (7)	Plastic – Other (7)	Plastic – Other plastic packaging	Plastic
N/A	Plastic – Mixed (1–7)	Plastic – Other plastic packaging	Plastic
N/A	Plastic – Mixed (3–7)	Plastic – Other plastic packaging	Plastic
N/A	Plastic – Mixed	Plastic – Other plastic packaging	Plastic
Plastic – Unidentified	Plastic – Unidentified	Plastic – Other plastic packaging	Plastic
Plastic – Non-packaging	Plastic – Non-packaging	Plastic non-packaging	Plastic
Aluminium – Beverage	Aluminium – Beverage	Aluminium	Metal
Aluminium – Non-beverage	Aluminium – Non-beverage	Aluminium	Metal
Aluminium – Other	Aluminium – Other	Aluminium	Metal
Steel – Tin-plate	Steel – Tin-plate	Steel	Metal
Steel – Mild steel	Steel – Mild steel	Steel	Metal
Steel – Stainless steel	Steel – Stainless steel	Steel	Metal
Steel – Other	Steel – Other	Steel	Metal
Metal – Other	Metal – Other	Steel	Metal
Fibreboard – Low-density	Fibreboard	Wood	Wood
Fibreboard – Medium-density	Fibreboard	Wood	Wood
Fibreboard – High-density	Fibreboard	Wood	Wood
Fibreboard – Oriented strand board	Fibreboard	Wood	Wood
Wood – Hard	Wood – Hard	Wood	Wood
Wood – Soft	Wood – Soft	Wood	Wood
Wood – Plywood	Wood – Plywood	Wood	Wood
Wood – Other	Wood – Other	Wood	Wood
Ceramic	Ceramic	Other material into packaging	Other

Material types – Consumption related	Material type list – Collection or sorting output related	Material types – MFA related	Material group
Cloth or fabric	Cloth or fabric	Other material into packaging	Other
Composite	Composite	Other material into packaging	Other
Other packaging	Other packaging	Other packaging	Other
Other non-packaging	Other non-packaging	Other non-packaging	Other
N/A	Commingled recyclables	Commingled recyclables	Commingled recyclables
Contamination	Contamination	Contamination	Other
Waste to landfill	Waste to landfill	Waste to landfill	Mixed wastes
Unknown	Unknown	Unknown	Unknown

Table B-2 – Packaging component groups

Packaging component groups	In scope?	Comments
Bag or pouch	Yes	Includes bags, bladders, envelopes, liners, nets, pouches (including peel pouches) and sachets
Barrel or drum	Yes	Barrels includes barrels, casks and kegs. Drums are plastic and steel containers of >20 L. Note that barrels, casks and kegs are not classified as drums. This group includes rigid intermediate bulk container (RIBC) and flexible intermediate bulk containers (FIBC).
Bottle or jar	Yes	See Table B-3 entries for more details.
Can	Yes	A metallic and generally cylindrical container of unspecified size. Includes aerosol containers.
Carton or box	Yes	See Table B-3 entries for more details.
Closure or label	Yes	See Table B-3 entries for more details.
Pallet or bin	Yes	Group for larger format packaging types not covered elsewhere.
Returnable plastic crate (RPC)	Yes	Returnable plastic crate (RPC).
Shopping bag	Yes	See Table B-3 entries for more details.
Tableware	Yes	Includes plates, bowls, straws, stirrers, cups, cup lids and cutlery, all intended for single-use.
Tub, tray or punnet	Yes	See Table B-3 entries for more details.
Tube or cartridge	Yes	See Table B-3 entries for more details.
Wrap	Yes	See Table B-3 entries for more details. Note that 'Film seals' have been moved to the 'Closure or label' group.
Other packaging component	No	See Table B-3 entries for more details.

Provided in the following table is the proposed list of packaging components, and the related groups (as summarised in Table B-2), to be adopted this year. Note that project reporting is generally not at the component level, but rather at the component group level summarised in Table B-2, except as identified elsewhere in this report.

Table B-3 – Packaging components

Component	Component group	In scope?	Comments
Bag	Bag or pouch	Yes	A preformed, flexible container, generally enclosed on all but one side, which forms an opening that may or may not be sealed after filling.
Liner	Bag or pouch	Yes	A liner is any layer of material that is not acting as a bag or wrapper, but is being used to protect or separate contents from outer packaging. Can be found as inner linings of liquid or pressurised containers (B2C), or as lining cartons in B2B use. Note, bags or wrappers may also be used, where liners are present.
Net	Bag or pouch	Yes	A container of meshwork material made from threads or strips twisted or woven to form a regular pattern with spaces between the threads that is used for holding, carrying, trapping, or confining something.
Pouch	Bag or pouch	Yes	A preformed, flexible container, typically enclosed with a gusset seal at the bottom of the pack can be shaped/arranged to allow the pack to stand on shelf. Pouches are currently used in a wide range of packaging. Specifically, pouches can be for single-serve food item and as such may have integrated mouthpiece, which is not detachable. 'Pouch' also includes 'Envelopes', which are a predominantly flat container of flexible material having only two faces, and joined at three edges to form an enclosure. The non-joined edge provides a filling opening, which may later be closed by a gummed or adhesive flap, heat seal, tie string, metal clasp, or other methods. Also includes packages used for sterile products which may be torn open without touching the product inside (peel pouches).
Sachet	Bag or pouch	Yes	A small, sealed bag or packet containing a small quantity of a product, usually food related.
Barrel, cask or keg	Barrel or drum	Yes	This packaging component includes barrels, casks and kegs. Packaging of circular cross-section, with greater length than breadth, with convex sides and two ends of equal diameter. A barrel is normally made of wooden staves bound together with hoops. Note that barrels, casks and kegs are not classified as drums.
Drum	Barrel or drum	Yes	Plastic and steel containers of ≥20 L. Cylindrical packaging whose bottom end is permanently fixed to the body and top end (head) is either removable or non-removable. Note that barrels, casks and kegs are not classified as drums.
IBC – flexible	Barrel or drum	Yes	A non-rigid container used for transport and storage of fluids and other bulk materials. The construction of the IBC container and the materials used are chosen depending on the application, but is typically woven polypropylene fabric reinforced with nylon or polyester strapping.
IBC – rigid	Barrel or drum	Yes	A rigid intermediate bulk container (RIBC) that is attached to a pallet or has the pallet integrated into the RIBC. The container is used for the transport and storage of fluids and other bulk materials. The construction of the IBC container and the materials used are chosen depending on the application. There are various types available in the market place: Foldable (collapsible) IBC Container, Plastic composite IBC Container, Wire Cage IBC Container, Steel IBC Container, and Stainless steel IBC Container.
Pail	Barrel or drum	Yes	Plastic or tin-plate steel containers of ≤20 L. Cylindrical packaging whose bottom end is permanently fixed to the body and top end (lid), if present, is removable.
Bottle	Bottle or jar	Yes	A container having a round neck of relatively smaller diameter than the body and an opening capable of holding a closure for retention of the contents. Specifically, a narrow-necked container as compared with a jug, jar or wide-mouth container. The cross section of the bottle may be round, oval, square, oblong, or a combination of these. The bottle may also have an integrated handle. Bottles generally are made of glass or plastics, but can also be earthenware or metal. Bottle may be disposable,

Component	Component group	In scope?	Comments
			recyclable, returnable, or reusable.
Jar	Bottle or jar	Yes	A rigid container made of glass, stone, earthenware, plastic or other appropriate material with a large opening, which is used to store products, (e.g., jams, cosmetics). Usually with a secure closure
Jug	Bottle or jar	Yes	A rigid container with a handle, and large opening or spout for holding and pouring liquids, generally with no secure closure. They can be cylindrical, round, oval, square, oblong, or a combination of these.
Aerosol	Can	Yes	A gas-tight, pressure-resistant container with a valve and propellant. When the valve is opened, propellant forces the product from the container in a fine or coarse spray pattern or stream. (e.g., a spray can dispensing paint, furniture polish, etc, under pressure). It does not include atomizers, because atomizers do not rely on a pressurised container to propel product from the container.
Can	Can	Yes	A metallic and generally cylindrical container of unspecified size. Generally unpressurised.
Box	Carton or box	Yes	A non-specific term used to refer to a rigid, three-dimensional container with closed faces that completely enclose its contents and may be made out of any material.
Carton	Carton or box	Yes	A non-specific term for an open or re-closable container used mostly for perishable foods (e.g. eggs, or fruit). Includes aseptic PCPB packs or 'bricks', which are defined as rectangular-shaped, stackable packages designed primarily for liquids such as juice or milk. Includes gable top PCPB cartons, which are rectangular-shaped, non-stackable packages designed primarily for liquids such as juice or milk.
Crate (single-use)	Carton or box	Yes	A non-specific term usually referring to a rigid three-dimensional container with semi-closed faces that enclose its contents for shipment or storage. Crates could have an open or closed top and may have internal dividers.
Wrap or basket	Carton or box	Yes	Cardboard (typically) wraps and baskets for beer, soft drink, ready to drink pre-mix beverages, and multi-packs of single-serve food containers or tins. Note that non-beverage 'wrappers' are defined as a separate packaging component, and in a different component group.
Closure	Closure or label	Yes	Lids, caps, stoppers and all other closures.
Hook, kimble, affixing item	Closure or label	Yes	Includes: hooks for hanging clothing or displays; plastic kimbles that attach tags, accessories, and similar to clothing; string or other methods of attaching tags and accessories to clothing; and any other item that is used to link, attach or fix something temporarily to a product prior to sale.
Label	Closure or label	Yes	Separately affixed labels, that is, labels that are a separate component and are not printed directly onto packaging components with other major functions. Can include stickers,
Seal	Closure or label	Yes	Containment, freshness or safety seals on rigid containers. Usually plastic, polymer coated paper/paperboard, or aluminium foil.
Bin	Pallet or bin	Yes	A three-dimensional container which either has a pallet platform permanently attached at its base or alternatively requires a platform for its handling and storage as due to its constitution it cannot be handled without it. Also referred to as a 'pallet box'.
Cage	Pallet or bin	Yes	Includes containers enclosed on at least one side by a grating of wires or bars that lets in air and light.
Pallet	Pallet or bin	Yes	A platform used to hold or transport unit loads.
Skid	Pallet or bin	Yes	A group of parallel runners (usually made from timber) attached to a single top-desk or the undersides of boxes, crates, and machines to allow entry of platform trucks or

Component	Component group	In scope?	Comments
			fork lift tines. Unlike a pallet, a skid has no bottom deck.
Stillage	Pallet or bin	Yes	Includes containers enclosed on at least one side by a grating of wires or bars that lets in air and light.
Milk crate	Returnable plastic crate (RPC)	Yes	Non-collapsible RPCs typically used as B2B shelf ready packaging for transporting milk bottles from dairy-processing companies to supermarkets.
RPC	Returnable plastic crate (RPC)	Yes	Collapsible RPCs typically used as B2B shelf ready packaging for transporting fruit and vegetables from farms to supermarkets. Also known as 'Reusable plastic crates'.
Produce bag	Shopping bag	Yes	A bag intended for single-use, without handles, for holding fresh produce.
Reusable bag	Shopping bag	Yes	A bag with handles, intended for carrying shopping, multiple uses are possible.
Single-use bag	Shopping bag	Yes	A bag with handles, intended for carrying shopping and for single-use.
Other shopping bag	Shopping bag	Yes	Any other shopping bag, not already described in other categories.
Bowl	Tableware	Yes	Any size bowl, intended for single-use for takeaway food.
Cup	Tableware	Yes	Any size cup, intended for single-use for takeaway drinks. Can be made from polymer-coated paperboard (PCPB), polystyrene (PS) or expanded polystyrene (EPS).
Cup lid	Tableware	Yes	A closure for single-use cup, commonly made from polystyrene. Can also be from polypropylene (PP) or bioplastic (PLA).
Cutlery	Tableware	Yes	Any type of utensil, usually fork, knife, or spoon, or combination of two, intended for single-use. Can be part of a shelf product, or accompany take-away food. Usually made from plastic or wood(other stuff…?).
Plate	Tableware	Yes	Any size plate, intended for single-use for takeaway food.
Stirrer	Tableware	Yes	Intended for single-use, to stir drinks. Usually made of plastic.
Straw	Tableware	Yes	Any size straw, intended for single-use. Usually plastic or waxed paper.
Blister pack	Tub, tray or punnet	Yes	A type of packaging in which the item is secured between a thermoformed dome or “bubble” (usually transparent plastic) and a paperboard surface or “carrier.” This packaging component relates to the plastic bubble component only, not any non-plastic carrier. Attachment to the carrier may be by stapling, heat- sealing, gluing, or other means. In other instances, the blister folds over the product in clam-shell fashion to form an enclosing container. Blisters are often thermoformed from polyvinyl chloride. However, almost any thermoplastic can be thermoformed into a blister. Where a blister pack is made from a plastic polymer the packaging is usually thermoformed (sheet plastic is heated to soften and then placed into a mould).
Carrier	Tub, tray or punnet	Yes	The base of a blister pack. The base is what the preformed shape attaches to, by stapling, heat- sealing, gluing, or other means. The carrier is usually made of boxboard/cartonboard and often has labelling printed on it.
Pot	Tub, tray or punnet	Yes	A flat-bottomed container that has a base of any shape and which may or not be closed with a lid. Pots are usually made of cardboard, plastic, ceramic, metal or other materials and may be used for a wide array of products such as cosmetics, food/liquids, dairy products, plants.
Punnet or clamshell	Tub, tray or punnet	Yes	A punnet is a small box or square basket for the transport and sale of fruit and vegetables, typically for small fruits such as berries. Punnets can consist of a base only, a separable base and lid, or be a one-piece container consisting of a base and lid joined by a hinge area which allows the pack to come together to close. A clamshell is

Component	Component group	In scope?	Comments
			typically a one-piece container consisting of a base and lid joined by a hinge area which allows the pack to come together to close. The clamshell format is often also used in takeaway food packaging. NOTE: Punnets have base and closure of same material, so they are considered to be same component and weighed together. This is consistent with how the clamshell format is weighed. Where a punnet or clamshell is made from a plastic polymer the packaging is usually thermoformed (sheet plastic is heated to soften and then placed into a mould).
Tray	Tub, tray or punnet	Yes	A shallow container, usually rectangular, which may or may not have a cover, and is used for displaying or carrying items. The base is bigger than the height. It may have moulded pockets or forms for holding contents. Where a tray is made from a plastic polymer the packaging is usually thermoformed (sheet plastic is heated to soften and then placed into a mould).
Tub	Tub, tray or punnet	Yes	A flat-bottomed container that has a base of any shape and which may or not be closed with a lid. The height is usually greater than the base. Usually made of paper, plastic or other materials, these containers are typically used to contain mostly (but not exclusively) foods such as ice cream, margarine, yoghurt, sour cream, confections, etc. Includes 'cups', usually for smaller volume product.
Cartridge	Tube or cartridge	Yes	A rigid cylindrical container holding an item or substance, typically designed for insertion into a delivery mechanism.
Tube – flexible	Tube or cartridge	Yes	A flexible cylindrical container sealed on one end that could be closed with a cap or dispenser on the other end.
Tube – rigid	Tube or cartridge	Yes	A rigid cylindrical component for holding product around the outside, typically designed for holding and dispensing yarn, string or flexible films. Includes consumer packaging 'Reels' and 'Rolls'.
Fodder film or net wrap	Wrap	Yes	A plastic film or netting around a round or rectangular bale of agricultural fodder (e.g. hay) to protect the fodder from weather, maintain the bale integrity, and/or generally protect the fodder. Often referred to as silage wrap.
Pallet wrap	Wrap	Yes	A high-tensile plastic film, stretched and wrapped repeatedly around a pallet item or group of items to secure and maintain unit integrity. The use of stretch film to tightly wrap the pallet load is to bind, protect and immobilise it for further handling or shipping. This is specifically B2B use.
Shrink wrap	Wrap	Yes	A plastic film around an item or group of items which is heated causing the film to shrink, securing the film. The use of shrunken film to tightly wrap a package or a unit load in order to bind, protect and immobilise it for further handling or shipping.
Sleeve	Wrap	Yes	A non-rigid container usually made of paper, cardboard or plastic, that is open-ended and is slid over the contents for protection or presentation.
Strapping or banding	Wrap	Yes	Something used to bind, tie, or encircle the item or its packaging to secure and maintain unit integrity. Includes packaging tape. Includes baling twine, and other forms of packaging twines.
Stretch wrap	Wrap	Yes	A high-tensile plastic film, stretched and wrapped around an item or group of items to secure and maintain unit integrity. The use of stretch film to tightly wrap a package or a unit load in order to bind, protect and immobilise it for further storage, handling or shipping. This mainly includes B2C use.
Wrapper	Wrap	Yes	The process of enclosing all or part of an item with layers of flexible wrapping material (e.g. chocolate blocks). Does not include items which are shrink-wrapped or vacuum-packed. Note that cardboard beverage 'wraps' are defined as a separate packaging component, and in a different

Component	Component group	In scope?	Comments
			component group.
Absorbent	Other component group	Yes	Pouches, sachets or similar filled with an absorbent material or chemical for absorbing liquids or gases. Often used to extend the shelf-life of fresh foods but also used with clothing, electronic items, papergoods and other products.
Applicator	Other component group	Yes	Includes balls for roll-on deodorants, pump dispensers from sprays and atomizers, and the tubing and springs that accompany such, and any other fitting that is used to apply a product. Also includes plastic components used to present goods at point of sale, such as plastic components used to present and hold disposable razors and razor blades.
Basket	Other component group	No	A semi rigid container usually open at the top traditionally used for gathering, shipping and marketing agricultural products.
Coat hanger	Other component group	Yes	Coat hangers for clothes.
Dunnage	Other component group	No	Loose wood, matting, or similar material used to keep a cargo in position during sea, road or air transport.
Rack	Other component group	No	A nonspecific term identifying a framework or stand for carrying, holding, or storing items. Commonly on wheels and primarily used in the logistical functions to deliver items such as hanging garments, or items on shelves such as dairy products and bakery items and flowers.
Reel	Other component group	Yes	A B2B spool on which thread, wire, film, etc, is wound. Any device on which a material may be wound. Usually has flanged ends and is used for shipping or processing purposes.
Slip sheet	Other component group	Yes	A strong sheet of plastic, cardboard or other material which may be grabbed, hooked or attached to a forklift or other transportation equipment. The slip sheet is used to pull the products stacked on top of it, i.e. to remove all products from a pallet in one action.
Void fill	Other component group	Yes	Materials use to prevent goods from moving around and being damaged within secondary freight packaging (typically corrugated cardboard boxes). Types of void fill include bubble wrap, creased kraft paper and EPS foam.
Other component	Other component group	Yes	Packaging components not currently specified on the list.

Table B-4 – Reusable packaging systems

System	Packaging level	Sector of use	Profiled in 2019–20 (Section 6)	Comments
Kegs – Beer & cider	Primary	B2B	Yes	-
Plastic crates – Collapsible – RPCs	Secondary	B2B	Yes	-
Plastic crates – Non-collapsible – Dairy	Secondary	B2B	Yes	-
Reusable pallets – Plastic	Tertiary	B2B	Yes	Includes display pallets.
Reusable pallets – Timber	Tertiary	B2B	Yes	Includes display pallets.
Reusable shopping bags – LDPE bags (supermarket type)	Secondary	B2C	Yes	-
Reusable shopping bags – Non-woven PP (NWPP) bags	Secondary	B2C	Yes	-
Barrels and drums	Primary	B2B	Yes	Excludes beer kegs (and kegs for other beverages) and IBCs.
Beverage bottles	Primary	B2C	No	-
Coat hangers	Primary	B2C	No	-

System	Packaging level	Sector of use	Profiled in 2019–20 (Section 6)	Comments
Cups/mugs	Primary	B2C	Yes	-
Gas cylinders – BBQ gas bottles	Primary	B2C	No	-
Gas cylinders – Compressed CO2 cylinders for home beverage carbonation	Primary	B2C	No	For example Sodastream.
Intermediate bulk containers	Tertiary	B2B	Yes	-
Kegs – Other beverages	Primary	B2B	No	-
Metal stillages	Tertiary	B2B	No	-
Pallet slip sheets, wrapping and strapping	Tertiary	B2B	No	-
Plastic crates – Non-collapsible – Non-dairy	Secondary	B2B	No	For example the AusPost fluted polypropylene crate system.
Plastic crates – Trays	Secondary	B2B	No	For example bread trays.
Produce bins	Tertiary	B2B	No	-
Reusable consumer packaging	Primary	B2C	No	For example the Loop/TerraCycle refillable food and personal care packaging system.
Tableware	Primary	B2C	No	-
Toner cartridges	Primary	B2C + B2B	No	-

APPENDIX C – JURISDICTIONAL DATA

The state/territory level data reported here, covering all packaging materials, was primarily captured through the two main surveys, on packaging manufacturers (POM data), and packaging reprocessing facility operators (recovery data). As part of both surveys, respondents were surveyed on the destination (for POM) and source (for recovery), by jurisdiction. Refer to Section 1.2 (Table 1 and Table 2) for more detail on the surveys and the survey coverage respectively.

For many of the packaging manufacturers, particularly the larger manufacturers, they could not provide accurate data on the destination jurisdictions for their packaging. For these surveys, packaging POM was allocated to state/territories on a per capita basis.

Imports of packaging POM (both empty and filled) were allocated to states/territories on a per capita basis.

Australian Customs data on scrap packaging exports was also obtained and analysed at the state/territory source level to provide information on the source jurisdiction for exported scrap packaging.

Table C-1 – Australian packaging consumption and recovery data in 2019–20, by material group

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Paper & paperboard	3 277 000	2 229 000	68%
Glass	1 156 000	699 000	60%
Plastic	1 124 000	179 000	16%
Metal	248 000	139 000	56%
Wood	462 000	171 000	37%
Total	**6 266 000**	**3 416 000**	**55%**

Table C-2 – ACT packaging consumption and recovery data in 2019–20, by material group

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Paper & paperboard	60 000	49 000	81%
Glass	19 000	12 000	64%
Plastic	18 000	2 000	13%
Metal	4 000	2 000	60%
Wood	8 000	4 000	56%
Paper & paperboard	**110 000**	**71 000**	**64%**

Table C-3 – NSW packaging consumption and recovery data in 2019–20, by material group

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Paper & paperboard	1 116 000	847 000	76%
Glass	367 000	304 000	83%
Plastic	352 000	50 000	14%
Metal	76 000	44 000	58%
Wood	147 000	59 000	40%
Total	**2 058 000**	**1 306 000**	**63%**

Table C-4 – NT packaging consumption and recovery data in 2019–20, by material group

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Paper & paperboard	31 000	4 000	13%
Glass	11 000	6 000	51%
Plastic	10 000	1 000	7%
Metal	2 000	1 000	60%
Wood	4 000	0	0%
Total	**59 000**	**12 000**	**20%**

Table C-5 – QLD packaging consumption and recovery data in 2019–20, by material group

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Paper & paperboard	654 000	375 000	57%
Glass	233 000	63 000	27%
Plastic	223 000	18 000	8%
Metal	49 000	29 000	60%
Wood	93 000	21 000	23%
Total	**1 252 000**	**507 000**	**41%**

Table C-6 – SA packaging consumption and recovery data in 2019–20, by material group

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Paper & paperboard	215 000	129 000	60%
Glass	80 000	51 000	64%
Plastic	77 000	27 000	35%
Metal	18 000	9 000	53%
Wood	32 000	14 000	44%
Total	**421 000**	**230 000**	**55%**

Table C-7 – TAS packaging consumption and recovery data in 2019–20, by material group

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Paper & paperboard	65 000	35 000	54%
Glass	24 000	0	0%
Plastic	23 000	3 000	14%
Metal	5 000	3 000	58%
Wood	10 000	0	0%
Total	**127 000**	**41 000**	**33%**

Table C-8 – VIC packaging consumption and recovery data in 2019–20, by material group

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Paper & paperboard	813 000	675 000	83%
Glass	301 000	202 000	67%
Plastic	303 000	68 000	22%
Metal	70 000	36 000	52%
Wood	120 000	59 000	49%
Total	**1 608 000**	**1 039 000**	**65%**

Table C-9 – WA packaging consumption and recovery data in 2019–20, by material group

Material group	POM	Recovery	Recovery rate
	(tonnes)	(tonnes)	(%)
Paper & paperboard	322 000	114 000	35%
Glass	120 000	61 000	51%
Plastic	118 000	9 000	8%
Metal	24 000	14 000	59%
Wood	48 000	13 000	26%
Total	**632 000**	**211 000**	**33%**

APPENDIX D – EMPLOYMENT AND CAPACITY DATA

This year the project included an expanded scope to quantify 2019–20 packaging industry employment and facility capacity (existing and planned). This included:

- Packaging related employment by companies undertaking packaging manufacturing or reprocessing. A national survey of MRF operators was not undertaken for the project, so the employment data does not include MRF related employment.
- Packaging related facility capacity (existing and planned). Planned capacity increases are those that relate to increased use of post-consumer packaging in manufacturing or post-consumer packaging reprocessing, and where capital works are approved and funded.

D.1 Packaging industry employment

Estimates of 2019–20 packaging related employment in terms of equivalent full-time employees (EFTE) are provided in **Table D-1** and **Table D-2**, by organisation type, for packaging manufacturers and reprocessors respectively. Employment is also normalised to 10 kt of throughput to provide a standard basis for comparisons.

Table D-1 – Number of employees involved in packaging manufacturing related activities

Organisation type	Employment	Normalised employment
	(EFTE)	(EFTE/10 kt)
Manufacturer – fibre	3 600	18.4
Manufacturer – glass	2 500	30.0
Manufacturer – metals	1 400	74.3
Manufacturer – plastics	6 600	95.9
Manufacturer – wood	500	20.0
Total	**14 600**	**37.1**

Table D-2 – Number of employees involved in packaging reprocessing related activities

Organisation type	Employment	Normalised employment
	(EFTE)	(EFTE/10 kt)
Reprocessor – fibre	1 500	12.7
Reprocessor – glass	700	10.9
Reprocessor – metals	0	24.3
Reprocessor – plastics	800	111.5
Total	**3 000**	**14.0**

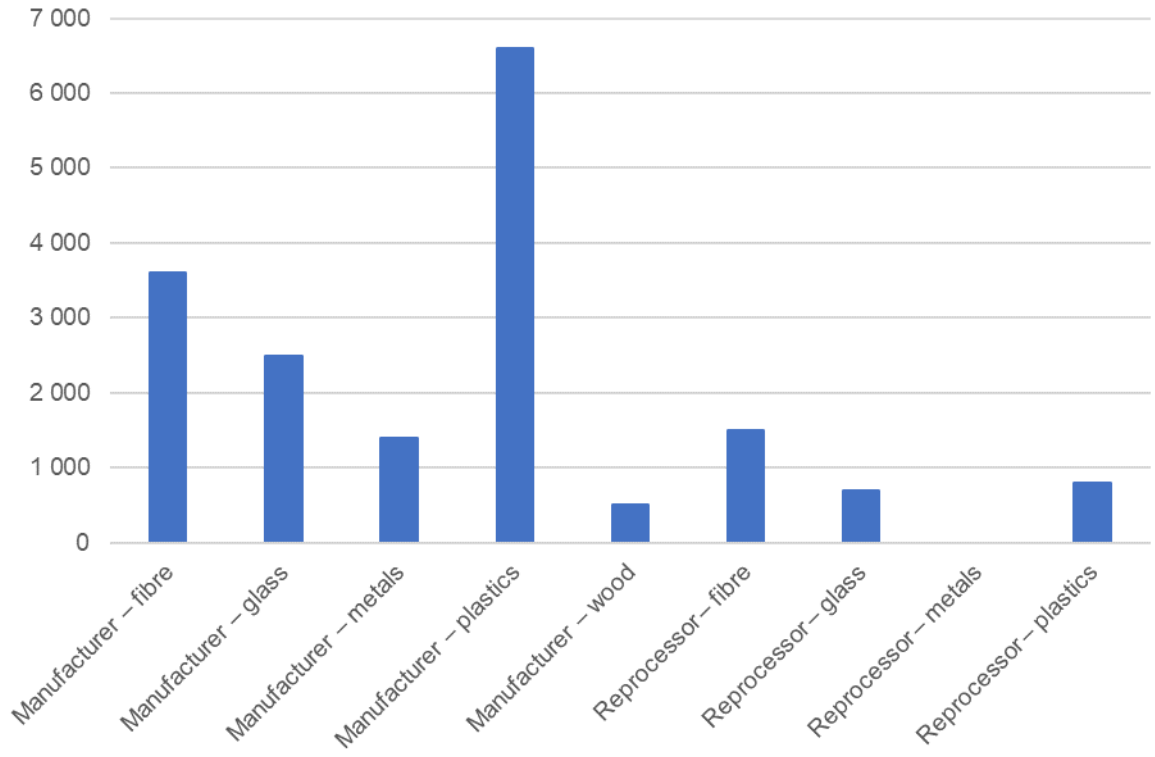


Figure D-1 – Number of employees involved in packaging related activities (EFTE)

D.2 Facility capacities

D.2.1 Packaging manufacturers

Packaging manufacturers were surveyed to collect data on facilities (by count and quantity) with funded and approved plans to increase the use of post-consumer recycled content in packaging over the next few years. The summary results by facility count are provided in **Table D-3**, and by quantity of increased use of post-consumer packaging (tonnes) in **Table D-4**.

Table D-3 – Manufacturing facilities with funded and approved plans to increase use of post-consumer recycled content in packaging over the next few years, by material group

Material group	Yes	No	Maybe	No response	Total
	(count)	(count)	(count)	(count)	(count)
Paper & paperboard	1	3	0	38	**42**
Glass	5	0	0	0	**5**
Plastic	13	28	4	33	**78**
Metal	0	5	2	5	**12**
Total	**19**	**36**	**6**	**79**	**140**

Table D-4 – Manufacturing facilities with funded and approved plans to increase use of post-consumer recycled content in packaging over the next few years, by material group

Material group	Yes	No	Maybe	No response	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Paper & paperboard	0	N/A	0	N/A	**0**
Glass	168 775	N/A	0	N/A	**168 775**
Plastic	14 415	N/A	0	N/A	**14 415**
Metal	0	N/A	0	N/A	**0**
Total	**183 190**	**N/A**	**0**	**N/A**	**183 190**

D.2.2 Packaging reprocessors – Existing capacity

Packaging reprocessors were surveyed to collect data on their average reprocessing capacity utilisation in 2019–20, by material type and capacity utilisation category. The summary results by utilisation category are provided in **Table D-5** and **Figure D-2**. The tonnages reported are the reprocessing throughput for the facilities that reported under each capacity utilisation category. These quantities are then converted to estimated 'spare' capacities in **Table D-5** and **Figure D-5**.

Table D-5 – Average reprocessing capacity utilisation in 2019–20, by material group and capacity utilisation category

Material group	At <25% capacity	At <50% capacity	At 50% capacity	At 75% capacity	At 90% capacity	At capacity	No response	Not applicable[a]	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Paper & paperboard	0	0	0	0	435 500	1 078 900	0	714 100	**2 228 500**
Glass	0	17 500	0	32 500	235 800	5 000	385 300	23 100	**699 200**
Plastic	3 600	16 000	2 200	39 900	2 200	2 500	2 700	109 500	**178 600**
Metal	500	0	0	0	0	0	22 300	116 600	**139 400**
Wood	0	0	0	0	0	0	0	170 600	**170 600**
Total	**4 100**	**33 500**	**2 200**	**72 400**	**673 500**	**1 086 400**	**410 300**	**1 133 900**	**3 416 200**

a) The 'Not applicable' quantity is mostly exported material. For wood packaging it refers to mulching and composting facilities.

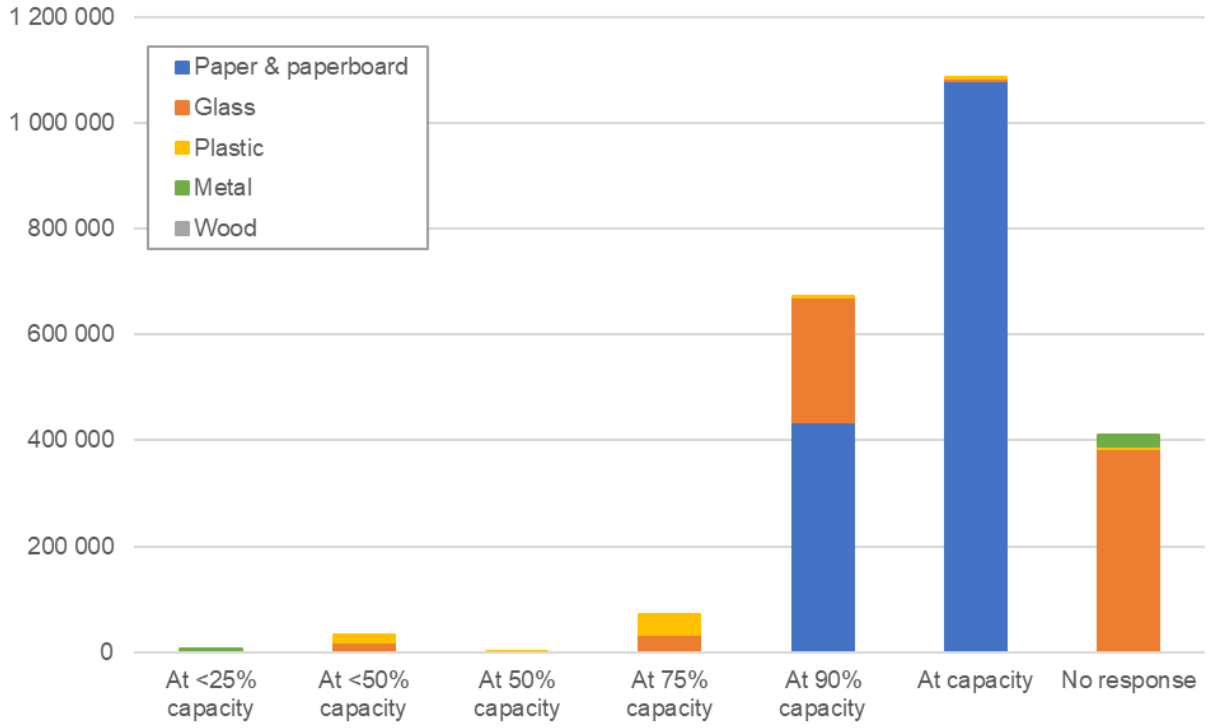


Figure D-2 – Average reprocessing capacity utilisation in 2019–20, by material group and capacity utilisation category (tonnes)

Table D-6 and **Figure D-3** present the estimated quantities of spare reprocessing capacity nationally in 2019–20. Total reported spare capacity was 239 kt, which is 10% of local reprocessing. There would also have been some additional spare capacity at those reprocessors that did not report their capacity utilisation. These reprocessors made up 18% of local reprocessing.

Table D-6 – Spare reprocessing capacity utilisation in 2019–20, by material group and capacity utilisation category

Material group	At <25% capacity[a]	At <50% capacity[a]	At 50% capacity	At 75% capacity	At 90% capacity	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Paper & paperboard	0	0	0	0	48 400	**48 400**
Glass	0	52 500	0	10 800	26 200	**89 500**
Plastic	32 800	47 900	2 200	13 300	200	**96 400**
Metal	4 200	0	0	0	0	**4 200**
Wood	0	0	0	0	0	0
Total	**37 000**	**100 400**	**2 200**	**24 100**	**74 800**	**238 500**

a) Reprocessors that reported being at less than 25% capacity were assumed to be at 10% capacity utilisation, and at less than 50% capacity were assumed to be at 25% capacity utilisation, in calculating spare capacity.

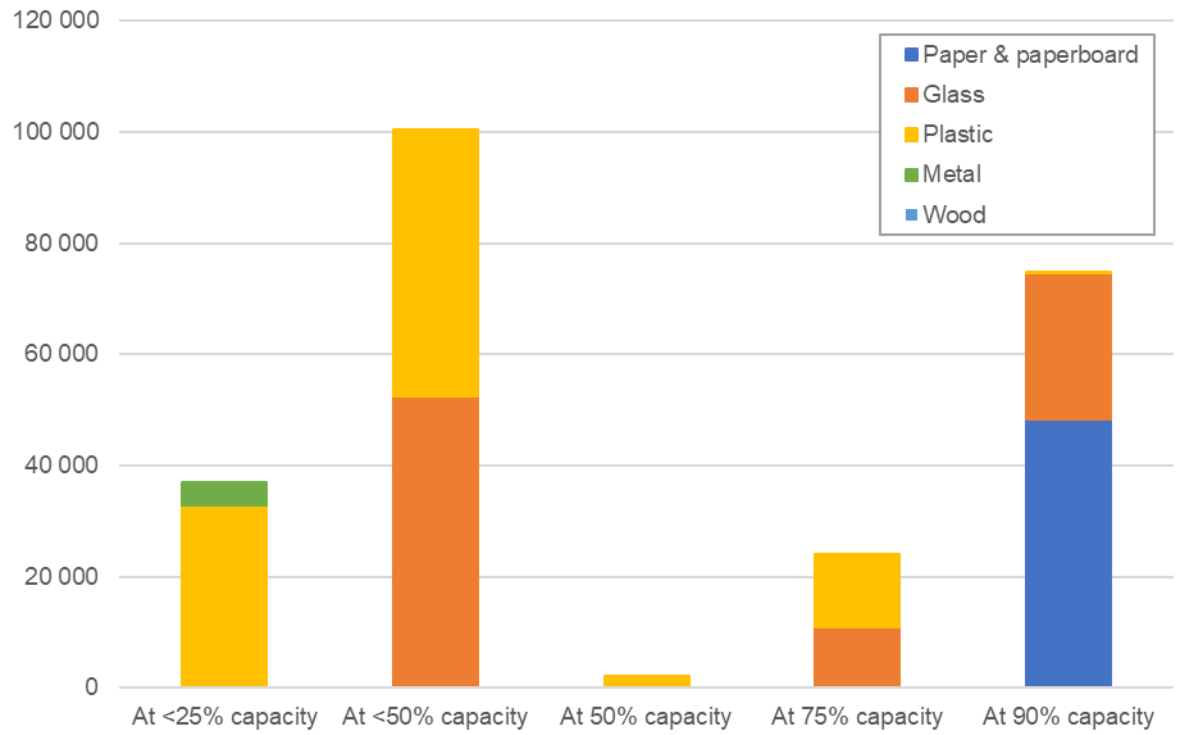


Figure D-3 – Spare reprocessing capacity utilisation in 2019–20, by material group and capacity utilisation category (tonnes)

D.2.3 Packaging reprocessors – Planned new capacity

Packaging reprocessors were surveyed to collect data on their funded and approved plans to increase reprocessing capacity over the next few years, by material type. The summary results by material group are provided in **Table D-7** and **Figure D-4**.

There was 266 kt of new reprocessing capacity reported to be in the pipeline, 45% of which was related to glass packaging and 54% to plastic packaging reprocessing. This is a 135% increase on the planned new capacity (113 kt) reported for the 2018–19 packaging quantification study (APCO, 2020a, p. 130).

Table D-7 – Expected increase in reprocessing capacity over the next few years, by material group

Material group	Quantity (tonnes)
Paper & paperboard	0
Glass	120 000
Plastic	144 000
Metal	2 000
Total	**266 000**

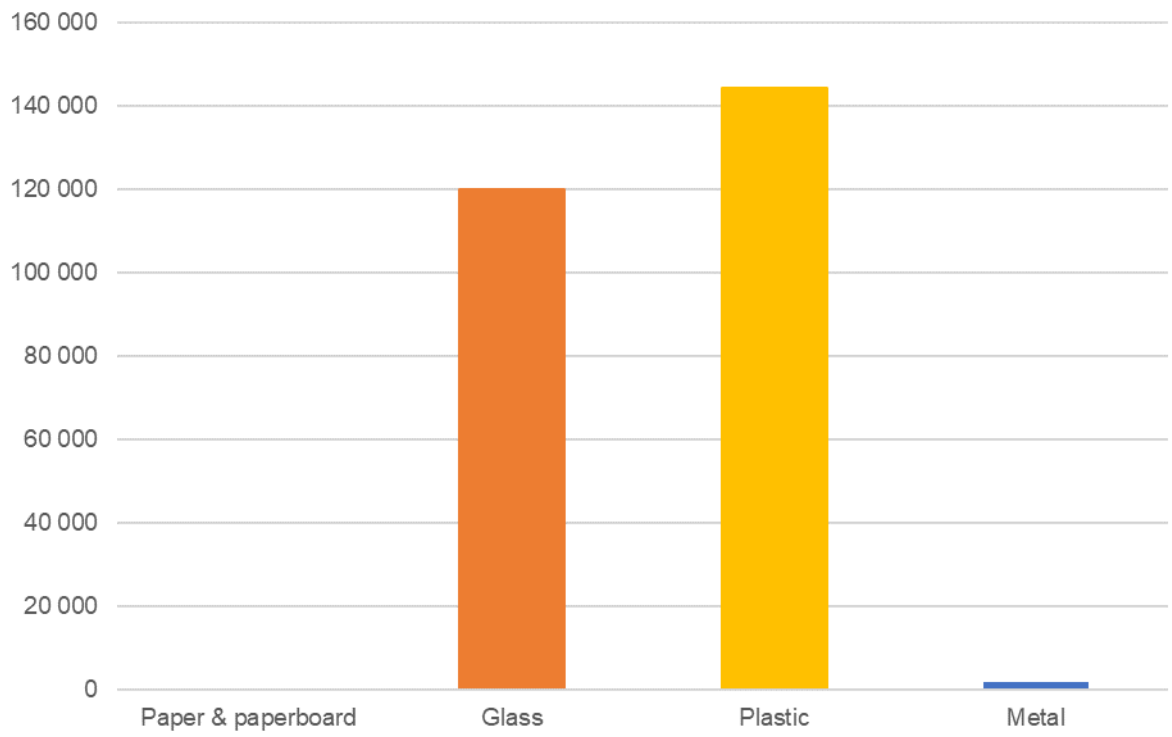


Figure D-4 – Expected increase in reprocessing capacity over the next few years, by material group (tonnes)

APPENDIX E – CONTAINER DEPOSIT ELIGIBLE PACKAGING DATA

Provided in this appendix is a quantification of 2019–20 flows of container deposit (CD) eligible packaging, both POM and recovered by collection pathway.

It is important to note that the redemption and recovery rates provided here have been calculated utilising a standardised calculation method across all jurisdictions, therefore the data provided here may differ from those reported by each state or territory due to differences in calculation methods.

In this appendix, redemption means CD-eligible containers returned with a refund earned, through dedicated CDS collection such as drop-off facilities and reverse vending machines and kerbside packaging redeemed via MRF sorting. Recovery rate in the context of CD-eligible containers, refers to the sorting rate. Recovery encompasses the total amount of CD-eligible containers recovered, including redeemed and unredeemed (but recovered) containers. The recovery rate can be equal to but is usually higher than the redemption rate.

See Section E.2.3 for further details on the possible unredeemed recovery pathways.

The CD scheme operational dates covered by the data in this appendix are:

- ACT is full year 2019–20 (launched 30 June 2018).
- NSW is full year 2019–20 (launched 1 December 2017).
- NT is full year 2019–20 (launched 3 January 2012).
- QLD is full year 2019–20 (launched 1 November 2018).
- SA is full year 2019–20 (launched in 1977).
- TAS scheme to commence in 2022 (no data in this appendix).
- VIC scheme to commence in 2022 or 2023 (no data in this appendix).
- WA scheme to commence 1 October 2020 (no data in this appendix).

E.1 CD eligible packaging POM

Table E-1 – CD eligible packaging POM in 2019–20 by jurisdiction (tonnes)

Material group	ACT	NSW	NT	QLD	SA	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Beverage aluminium	670	15 960	860	15 710	4 860	38 060
Tin-plate steel	10	110	0	120	0	240
Amber glass	2 780	63 880	1 430	53 490	13 450	135 030
Flint glass	2 810	64 570	2 890	54 070	13 270	137 620
Green glass	1 950	44 660	1 520	37 400	9 330	94 860
PET (1)	910	21 120	640	19 180	4 990	46 850
HDPE (2)	150	1 660	90	2 480	400	4 780
Other plastic (7)	0	10	0	0	0	10
PCPB – Aseptic	80	1 520	10	1 470	760	3 830
PCPB – Gable top	40	890	90	860	220	2 110
Other material	0	10	0	0	0	20
Total	**9 390**	**214 390**	**7 540**	**184 780**	**47 290**	**463 400**

Figure E-1 – CD eligible packaging POM in 2019–20 by jurisdiction (tonnes)

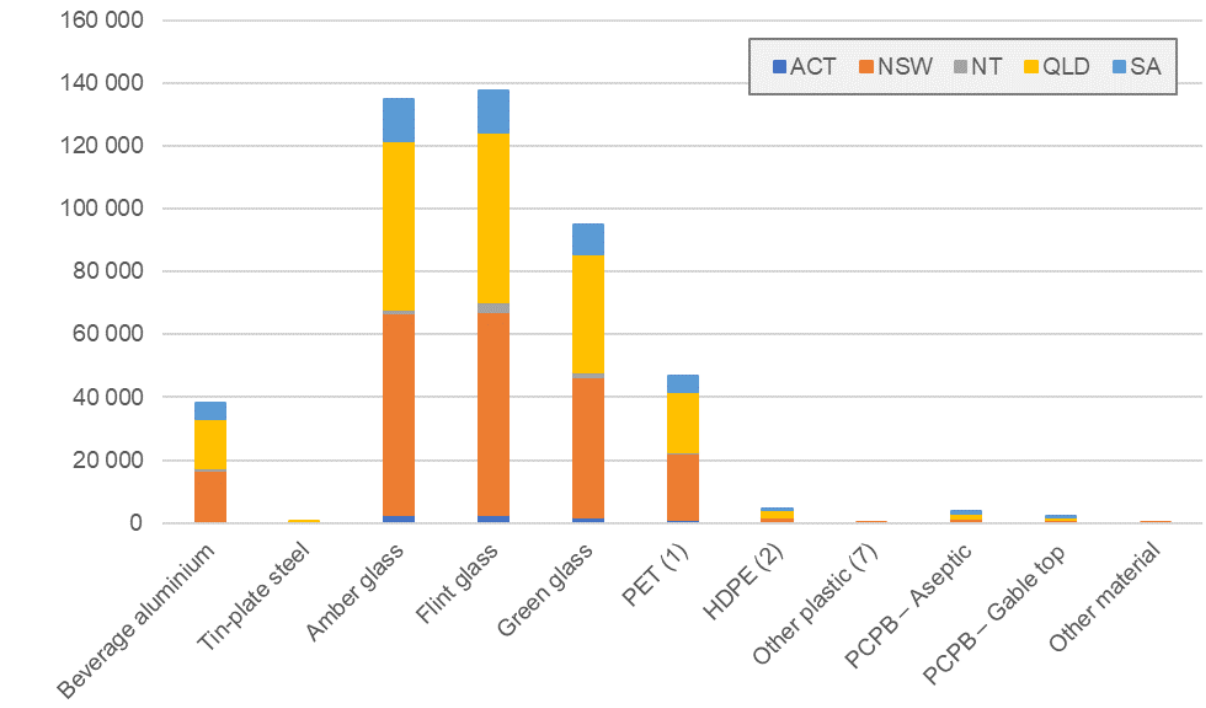
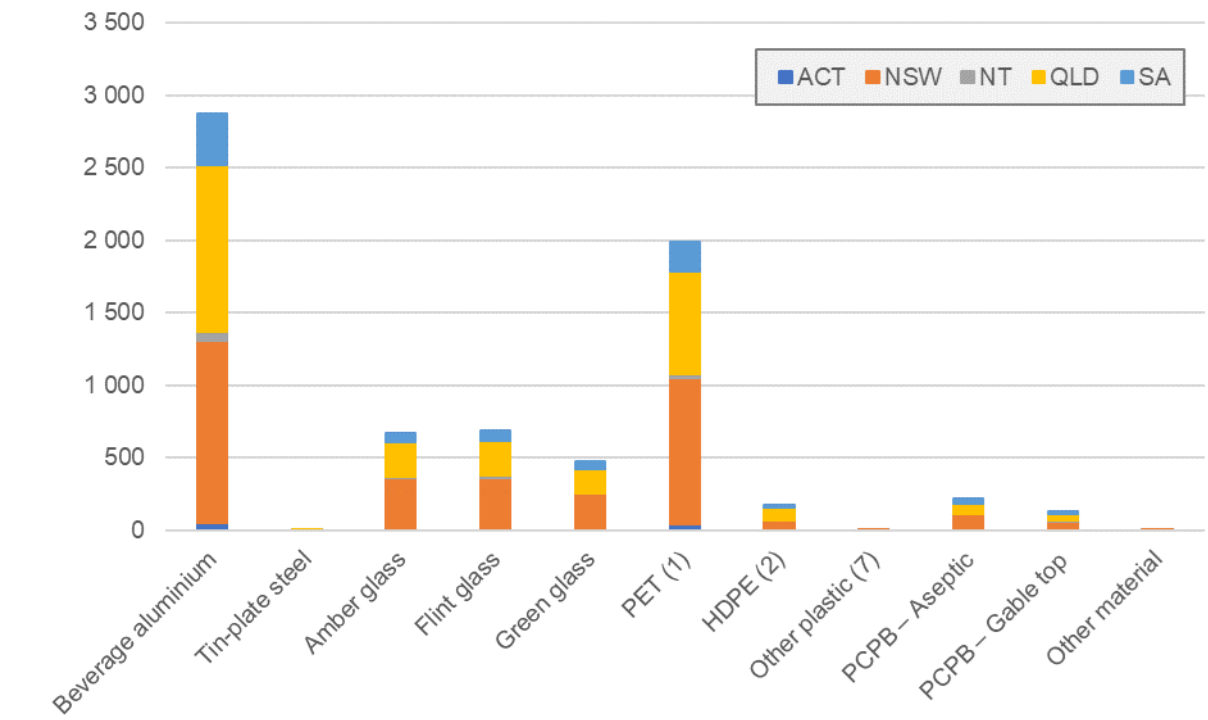


Table E-2 – CD eligible packaging POM in 2019–20 by jurisdiction (million packs)

Material group	ACT	NSW	NT	QLD	SA	Total
	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)
Beverage aluminium	52.553	1 256.819	61.670	1 146.841	357.717	2 875.599
Tin-plate steel	0.142	2.835	0.049	1.562	0.000	4.588
Amber glass	15.059	345.662	7.060	240.724	65.888	674.394
Flint glass	15.223	349.409	14.707	243.334	66.603	689.276
Green glass	10.529	241.683	7.648	168.311	46.068	474.239
PET (1)	43.284	1 005.785	26.631	710.508	199.728	1 985.935
HDPE (2)	5.797	65.161	3.194	81.755	20.219	176.126
Other plastic (7)	0.054	0.557	0.000	0.000	0.000	0.610
PCPB – Aseptic	5.324	107.476	0.421	75.102	31.829	220.153
PCPB – Gable top	3.127	63.121	4.844	44.108	18.693	133.892
Other material	0.127	0.973	0.000	0.000	0.000	1.101
Total	**151.221**	**3 439.479**	**126.223**	**2 712.245**	**806.747**	**7 235.915**

Figure E-2 – CD eligible packaging POM in 2019–20 by jurisdiction (million packs)



E.2 CD eligible packaging recovery

E.2.1 Redeemed recovery via container refund points

Table E-3 – CD eligible packaging recovery in 2019–20 by jurisdiction – Redeemed recovery via container refund points[1] (tonnes)

Material group	ACT	NSW	NT	QLD	SA	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Beverage aluminium	270	9 580	660	8 610	3 760	22 880
Tin-plate steel	0	40	0	20	0	60
Amber glass	830	36 410	1 300	26 930	11 810	77 280
Flint glass	840	36 810	2 620	27 230	11 650	79 150
Green glass	580	25 460	1 380	18 830	8 190	54 440
PET (1)	210	10 350	540	8 180	3 080	22 360
HDPE (2)	20	560	30	770	250	1 640
Other plastic (7)	0	0	0	0	0	0
PCPB – Aseptic	10	270	0	350	400	1 040
PCPB – Gable top	10	160	50	210	120	540
Other material	0	0	0	0	0	0
Total	**2 780**	**119 640**	**6 580**	**91 130**	**39 270**	**259 400**
Redemption (%)	**29.6%**	**55.8%**	**87.3%**	**49.3%**	**83.0%**	**56.0%**

1. Container refund points include depots, reverse vending machines, container bag drops, and CDS specific home and business collections.

Figure E-3 – CD eligible packaging recovery in 2019–20 by jurisdiction – Redeemed recovery via container refund points (tonnes)

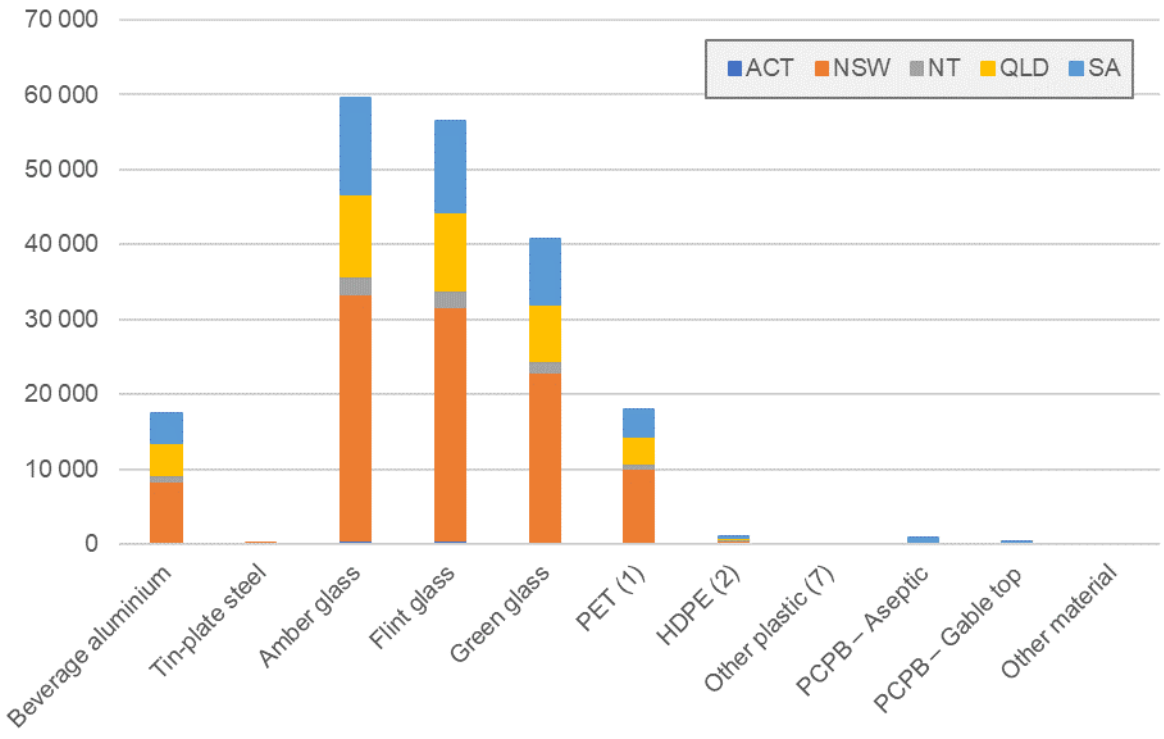
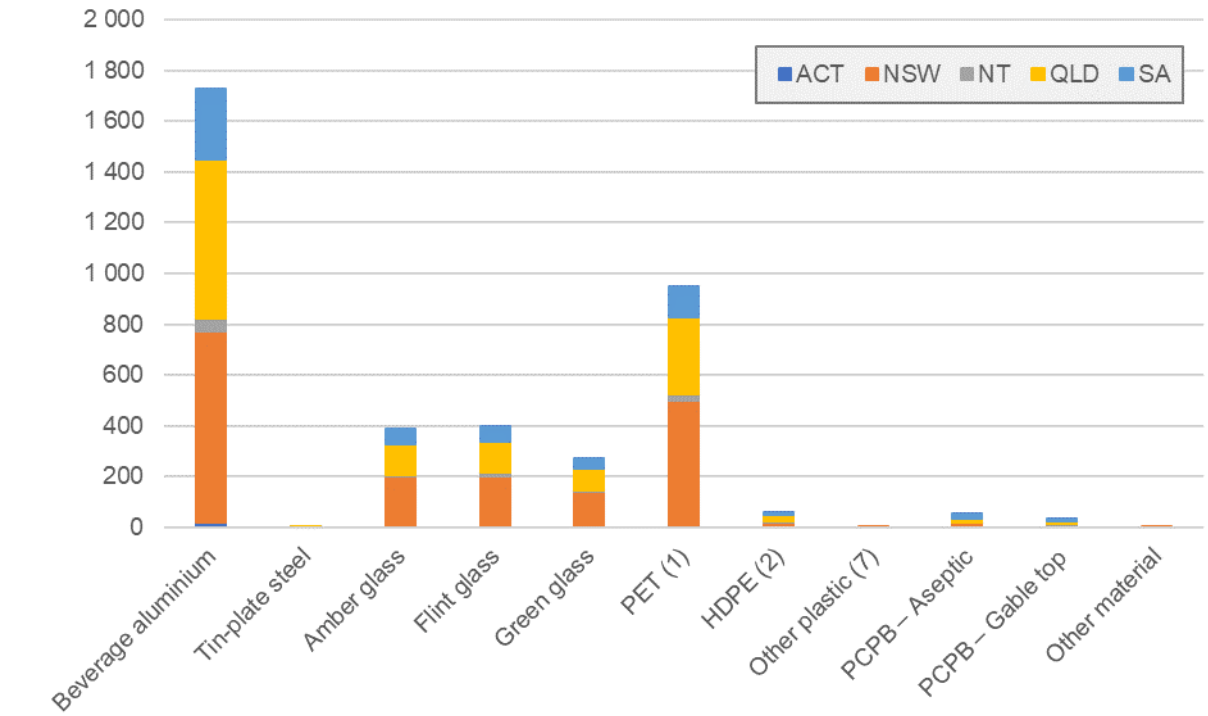


Table E-4 – CD eligible packaging POM in 2019–20 by jurisdiction – Redeemed recovery via container refund points (million packs)

Material group	ACT	NSW	NT	QLD	SA	Total
	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)
Beverage aluminium	21.021	754.091	47.629	628.660	277.313	1 728.714
Tin-plate steel	0.033	0.907	0.024	0.287	0.000	1.251
Amber glass	4.518	197.027	6.383	121.214	57.850	386.992
Flint glass	4.567	199.163	13.298	122.528	58.477	398.033
Green glass	3.159	137.759	6.915	84.751	40.448	273.032
PET (1)	9.955	492.834	22.362	303.075	123.182	951.408
HDPE (2)	0.754	22.155	1.075	25.355	12.669	62.006
Other plastic (7)	0.000	0.039	0.000	0.000	0.000	0.039
PCPB – Aseptic	0.799	19.346	0.253	17.876	16.841	55.115
PCPB – Gable top	0.469	11.362	2.910	10.499	9.891	35.131
Other material	0.000	0.302	0.000	0.000	0.000	0.302
Total	**45.274**	**1 834.985**	**100.848**	**1 314.245**	**596.670**	**3 892.023**
Redemption (%)	**29.9%**	**53.4%**	**79.9%**	**48.5%**	**74.0%**	**53.8%**

Figure E-4 – CD eligible packaging POM in 2019–20 by jurisdiction – Redeemed recovery via container refund points (million packs)



E.2.2 Redeemed recovery via MRFs

Table E-5 – CD eligible packaging recovery in 2019–20 by jurisdiction – Redeemed recovery via MRFs (tonnes)

Material group	ACT	NSW	NT	QLD	SA	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Beverage aluminium	190	1 600	0	1 250	90	3 120
Tin-plate steel	0	0	0	0	0	0
Amber glass	610	13 410	0	11 920	70	26 020
Flint glass	620	13 560	0	12 050	70	26 300
Green glass	430	9 380	0	8 340	50	18 190
PET (1)	120	2 750	0	2 110	200	5 170
HDPE (2)	20	220	0	20	0	250
Other plastic (7)	0	0	0	0	0	0
PCPB – Aseptic	0	0	0	0	0	0
PCPB – Gable top	0	0	0	0	0	0
Other material	0	0	0	0	0	0
Total	**1 980**	**40 910**	**0**	**35 690**	**460**	**79 050**
Redemption (%)	**21.1%**	**19.1%**	**0.0%**	**19.3%**	**1.0%**	**17.1%**

Figure E-5 – CD eligible packaging recovery in 2019–20 by jurisdiction – Redeemed recovery via MRFs (tonnes)

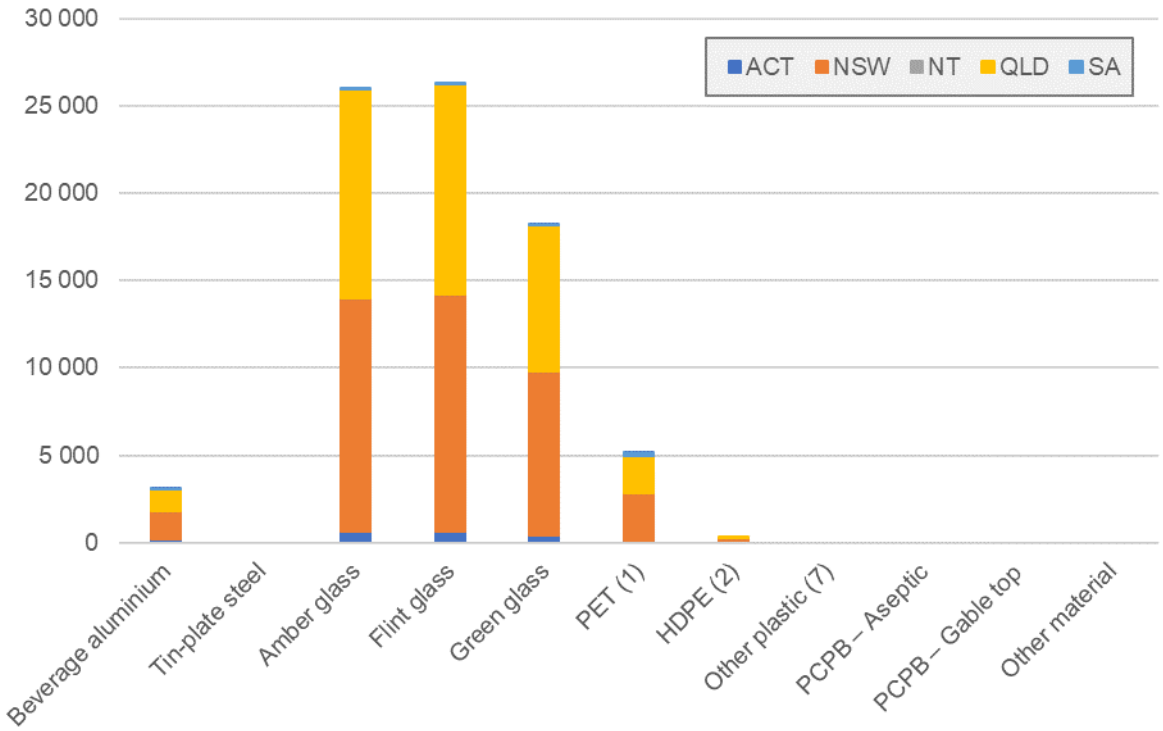
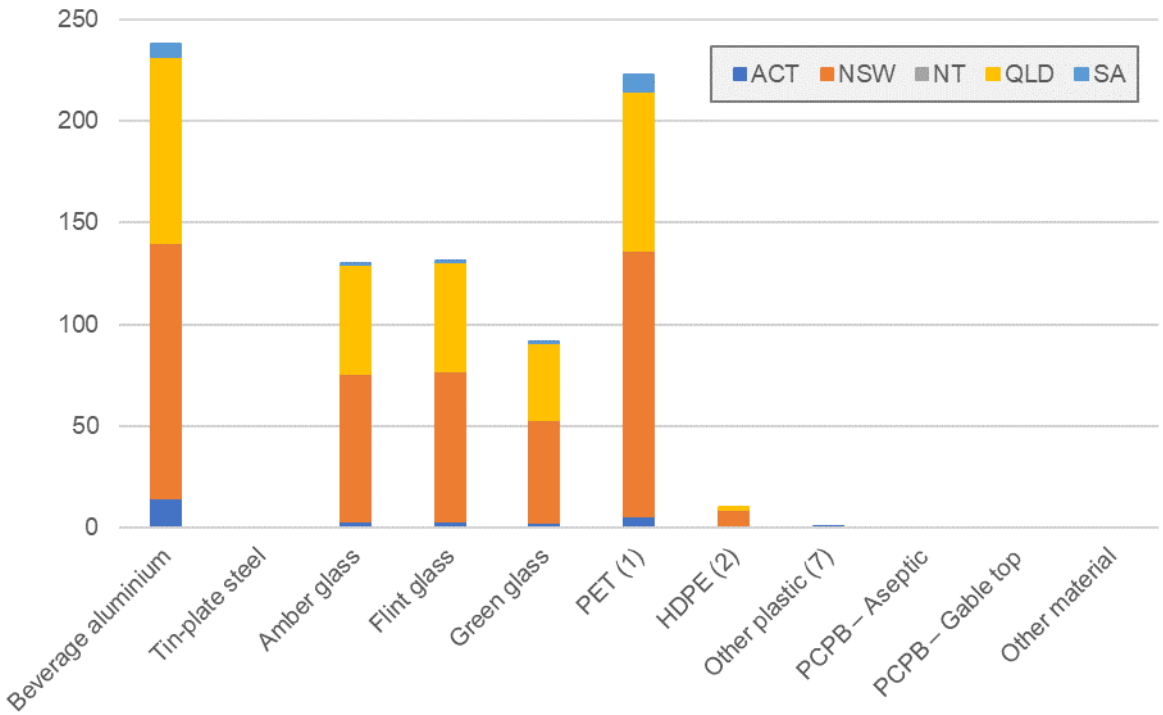


Table E-6 – CD eligible packaging POM in 2019–20 by jurisdiction – Redeemed recovery via MRFs (million packs)

Material group	ACT	NSW	NT	QLD	SA	Total
	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)
Beverage aluminium	14.715	125.682	0.000	91.243	6.371	238.011
Tin-plate steel	0.000	0.000	0.000	0.000	0.000	0.000
Amber glass	3.313	72.589	0.000	53.653	0.329	129.885
Flint glass	3.349	73.376	0.000	54.235	0.333	131.293
Green glass	2.316	50.753	0.000	37.514	0.230	90.814
PET (1)	5.627	130.752	0.000	78.276	7.863	222.517
HDPE (2)	0.638	8.471	0.000	0.720	0.000	9.829
Other plastic (7)	0.001	0.000	0.000	0.000	0.000	0.001
PCPB – Aseptic	0.000	0.000	0.000	0.000	0.000	0.000
PCPB – Gable top	0.000	0.000	0.000	0.000	0.000	0.000
Other material	0.000	0.000	0.000	0.000	0.000	0.000
Total	**29.959**	**461.623**	**0.000**	**315.641**	**15.126**	**822.348**
Redemption (%)	**19.8%**	**13.4%**	**0.0%**	**11.6%**	**1.9%**	**11.4%**

Figure E-6 – CD eligible packaging POM in 2019–20 by jurisdiction – Redeemed recovery via MRFs (million packs)



E.2.3 Unredeemed recovery via MRFs and other pathways

While most CD eligible packaging recovery in 2019–20 was via pathways that triggered the payment of a redeemed deposit, this was not always the case. There were a number of unredeemed recovery pathways that existed, with differing levels of applicability to different jurisdictions. These unredeemed recovery pathways included:

- MRF recovery where the MRF operators may have not claimed the deposits for internal operational or administrative reasons.
- MRF recovery where the published methods for claiming deposits in mixed CD eligible / CD ineligible streams did not cover all material types (e.g. LPB packaging), or otherwise had particular exceptions.
- MRF diversion to recovery of CD eligible packaging recovered from C&I sources, in some circumstances.
- CD eligible packaging recovered through away-from-home recycling bins or events related recycling, in some circumstances.
- Alternative Waste Treatment (AWT) or Mechanical Biological Treatment (MBT) facility recovery of CD eligible packaging.

Provided here are estimates of the recovery of unredeemed but CD eligible packaging during 2019–20. It is important to note that the earlier estimates of CD eligible packaging POM and redeemed CD eligible packaging are highly accurate as they are based on detailed regulated monthly or quarterly reporting. However, the recovery estimates of unredeemed CD eligible packaging are based estimates derived from industry surveys and are less precise.

Table E-7 – CD eligible packaging recovery in 2019–20 by jurisdiction – Unredeemed recovery via MRFs and other pathways (tonnes)

Material group	ACT	NSW	NT	QLD	SA	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Beverage aluminium	80	1 640	30	2 750	150	4 650
Tin-plate steel	0	10	0	20	0	30
Amber glass	170	3 830	90	3 210	810	8 100
Flint glass	170	3 870	170	3 240	800	8 260
Green glass	120	2 680	90	2 240	560	5 690
PET (1)	50	1 270	40	1 150	0	2 510
HDPE (2)	10	100	10	150	0	260
Other plastic (7)	0	0	0	0	0	0
PCPB – Aseptic	0	0	0	0	0	0
PCPB – Gable top	0	0	0	0	0	0
Other material	0	0	0	0	0	0
Total	**600**	**13 400**	**420**	**12 770**	**2 310**	**29 510**
Redemption (%)	**6.4%**	**6.3%**	**5.6%**	**6.9%**	**4.9%**	**6.4%**

Figure E-7 – CD eligible packaging recovery in 2019–20 by jurisdiction – Unredeemed recovery via MRFs and other pathways (tonnes)

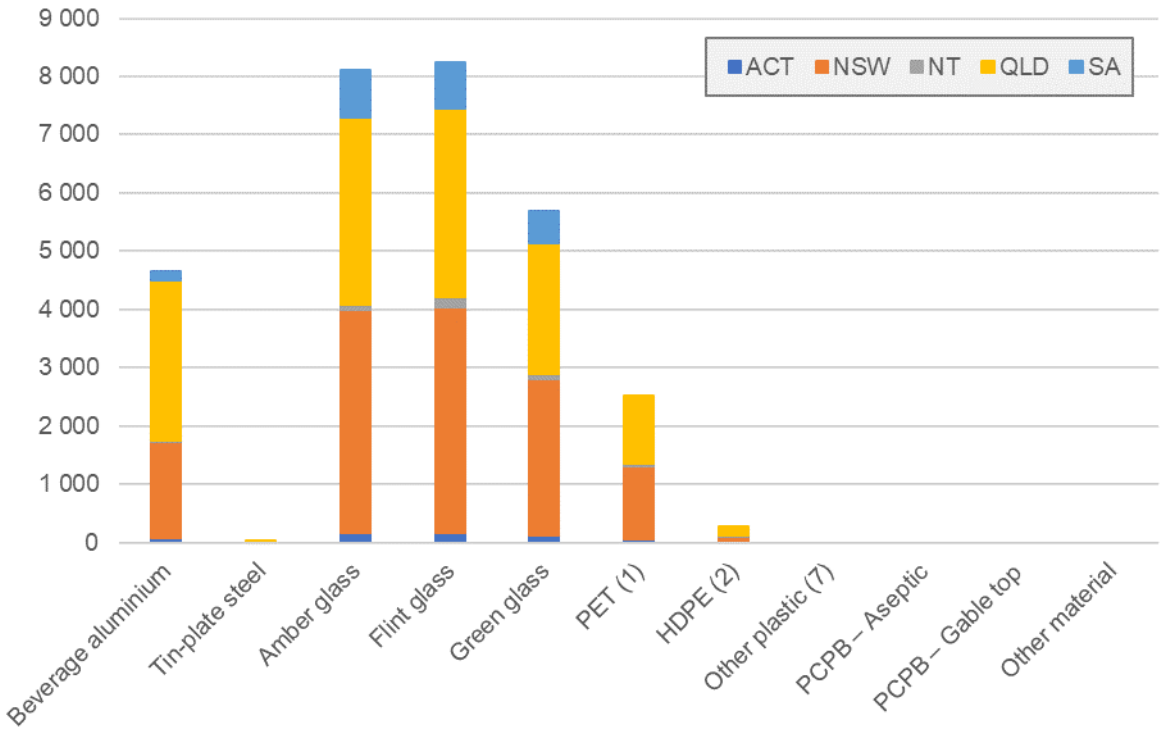
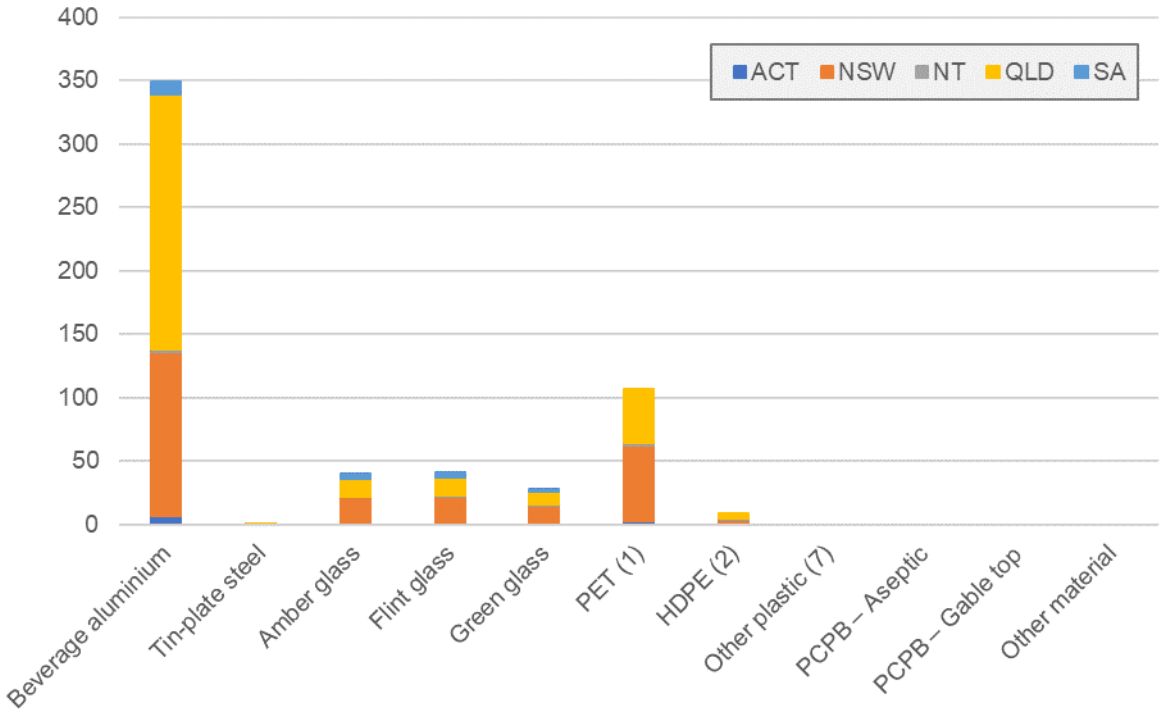


Table E-8 – CD eligible packaging POM in 2019–20 by jurisdiction – Unredeemed recovery via MRFs and other pathways (million packs)

Material group	ACT	NSW	NT	QLD	SA	Total
	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)
Beverage aluminium	6.464	129.452	1.892	201.010	10.732	349.550
Tin-plate steel	0.020	0.150	0.000	0.295	0.000	0.466
Amber glass	0.904	20.740	0.424	14.443	3.953	40.464
Flint glass	0.913	20.965	0.882	14.600	3.996	41.357
Green glass	0.632	14.501	0.459	10.099	2.764	28.454
PET (1)	2.597	60.347	1.598	42.630	0.000	107.172
HDPE (2)	0.348	3.910	0.192	4.905	0.000	9.354
Other plastic (7)	0.000	0.000	0.000	0.000	0.000	0.000
PCPB – Aseptic	0.000	0.000	0.000	0.000	0.000	0.000
PCPB – Gable top	0.000	0.000	0.000	0.000	0.000	0.000
Other material	0.000	0.000	0.000	0.000	0.000	0.000
Total	**11.878**	**250.065**	**5.446**	**287.983**	**21.445**	**576.817**
Redemption (%)	**7.9%**	**7.3%**	**4.3%**	**10.6%**	**2.7%**	**8.0%**

Figure E-8 – CD eligible packaging POM in 2018–19 by jurisdiction – Unredeemed recovery via MRFs and other pathways (million packs)



E.2.4 Total recovery via all collection routes

In this section of the appendix total recovery of CD eligible packaging is provided. This includes recovery of both redeemed and unredeemed CD eligible packaging.

Table E-9 – CD eligible packaging recovery in 2019–20 by jurisdiction (tonnes)

Material group	ACT	NSW	NT	QLD	SA	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Beverage aluminium	540	12 820	690	12 620	4 000	30 660
Tin-plate steel	0	40	0	40	0	90
Amber glass	1 610	53 660	1 380	42 060	12 680	111 400
Flint glass	1 630	54 240	2 790	42 520	12 520	113 700
Green glass	1 130	37 520	1 470	29 410	8 800	78 320
PET (1)	380	14 360	580	11 450	3 280	30 050
HDPE (2)	40	880	40	940	250	2 150
Other plastic (7)	0	0	0	0	0	0
PCPB – Aseptic	10	270	0	350	400	1 040
PCPB – Gable top	10	160	50	210	120	540
Other material	0	0	0	0	0	0
Total	**5 360**	**173 950**	**7 000**	**139 600**	**42 040**	**367 960**
Redemption (%)	**57.0%**	**81.1%**	**92.9%**	**75.5%**	**88.9%**	**79.4%**

Figure E-9 – CD eligible packaging recovery in 2019–20 by jurisdiction (tonnes)

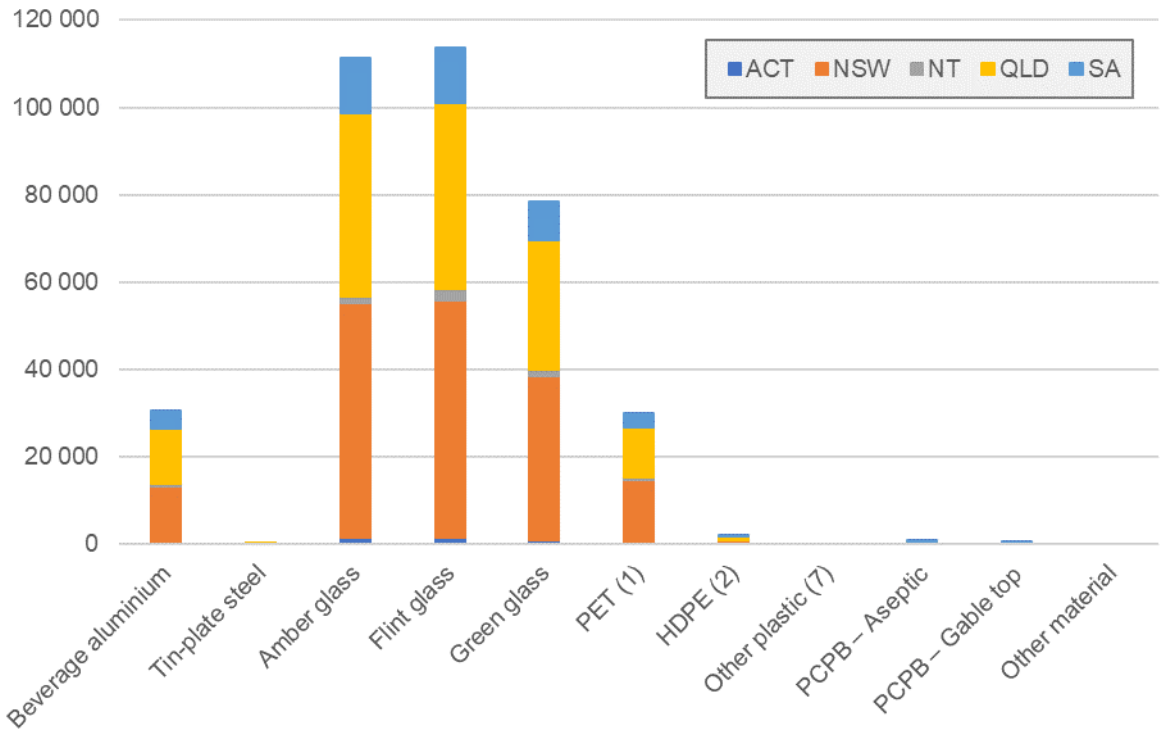
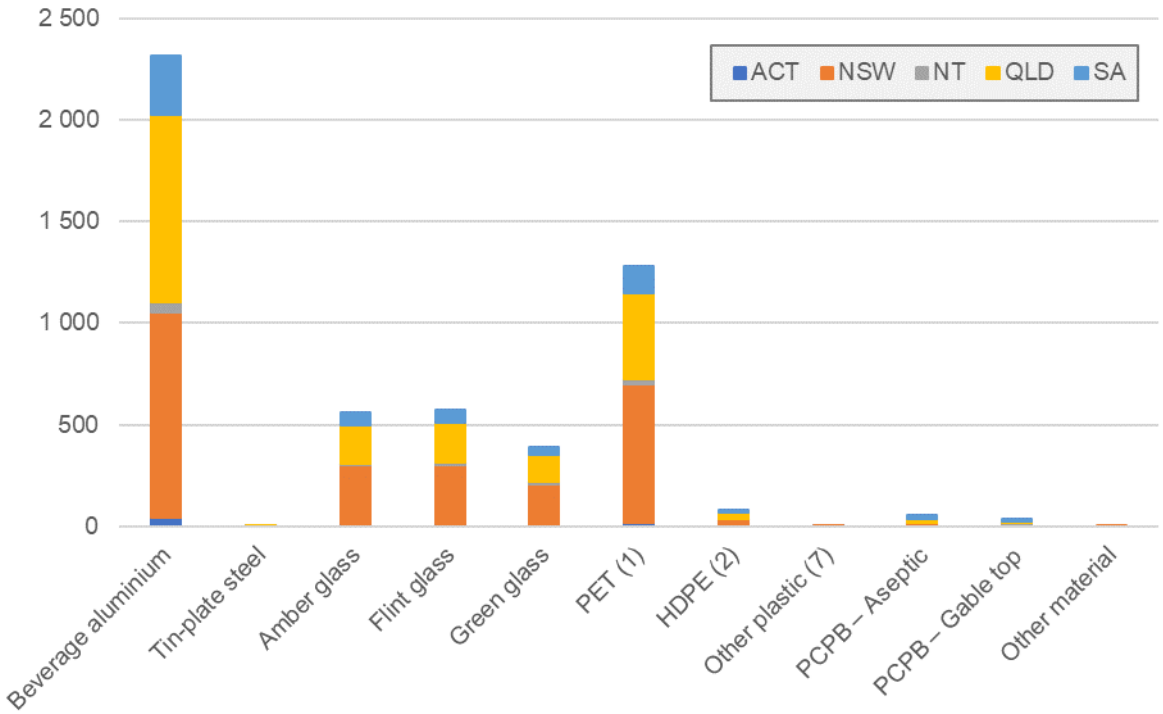


Table E-10 – CD eligible packaging recovery in 2019–20 by jurisdiction (million packs)

Material group	ACT	NSW	NT	QLD	SA	Total
	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)
Beverage aluminium	42.200	1 009.225	49.521	920.913	294.415	2 316.274
Tin-plate steel	0.053	1.057	0.024	0.582	0.000	1.717
Amber glass	8.734	290.356	6.806	189.311	62.133	557.341
Flint glass	8.829	293.504	14.180	191.363	62.806	570.682
Green glass	6.107	203.013	7.374	132.364	43.442	392.300
PET (1)	18.179	683.934	23.960	423.981	131.044	1 281.098
HDPE (2)	1.739	34.535	1.266	30.980	12.669	81.189
Other plastic (7)	0.001	0.039	0.000	0.000	0.000	0.040
PCPB – Aseptic	0.799	19.346	0.253	17.876	16.841	55.115
PCPB – Gable top	0.469	11.362	2.910	10.499	9.891	35.131
Other material	0.000	0.302	0.000	0.000	0.000	0.302
Total	**87.111**	**2 546.673**	**106.294**	**1 917.869**	**633.241**	**5 291.188**
Redemption (%)	**57.6%**	**74.0%**	**84.2%**	**70.7%**	**78.5%**	**73.1%**

Note: These recovery rates may differ from published figures available elsewhere as they included estimates for non-redeemed CD eligible packaging that is collected through MRFs.

Figure E-10 – CD eligible packaging recovery in 2019–20 by jurisdiction (million packs)

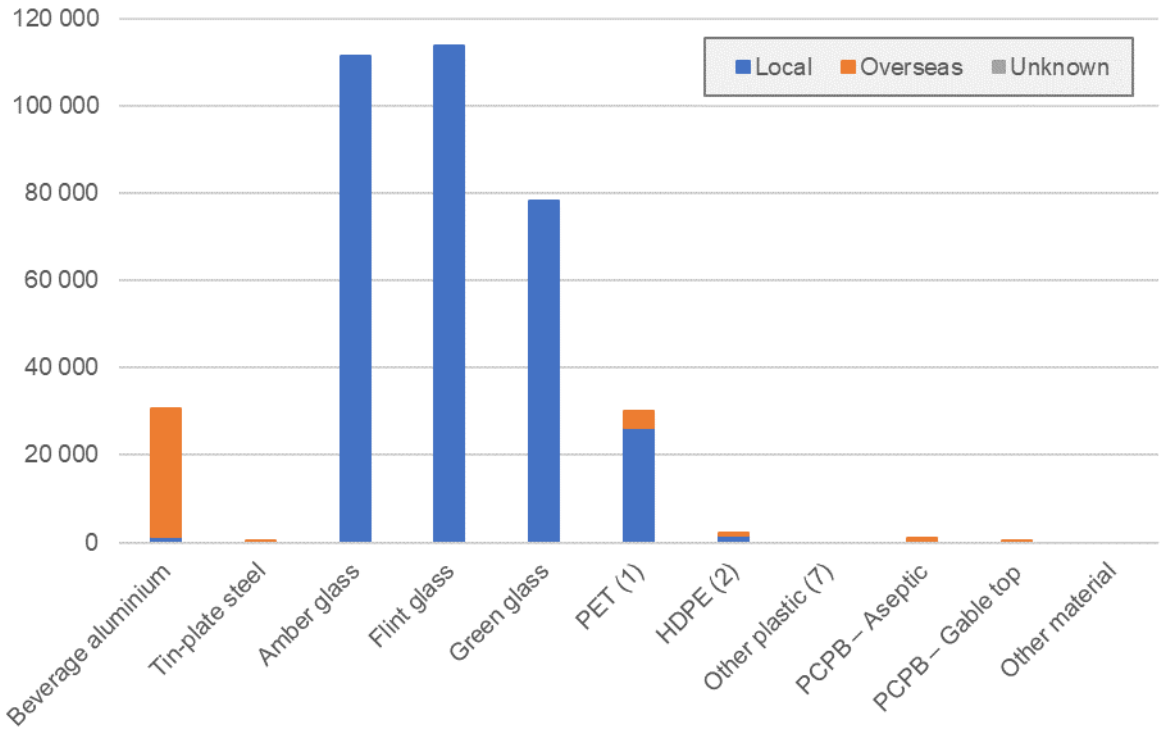


E.2.5 Reprocessing destination

Table E-11 – CD eligible packaging reprocessing destination in 2019–20 by material type (tonnes)

Material group	Local	Overseas	Unknown	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Beverage aluminium	1 270	29 390	0	30 660
Tin-plate steel	40	50	0	90
Amber glass	111 400	0	0	111 400
Flint glass	113 700	0	0	113 700
Green glass	78 320	0	0	78 320
PET (1)	26 360	3 690	0	30 050
HDPE (2)	1 520	630	0	2 150
Other plastic (7)	0	0	0	0
PCPB – Aseptic	0	1 040	0	1 040
PCPB – Gable top	0	540	0	540
Other material	0	0	0	0
Total	**332 620**	**35 340**	**0**	**367 960**

Figure E-11 – CD eligible packaging reprocessing destination in 2019–20 by material type (tonnes)



E.3 CD eligible packaging to landfill

Provided in the following tables are estimates of CD eligible packaging to landfill. These quantities are almost entirely based on estimates of CD eligible packaging disposal to landfill at the household level, and public place disposal where recycling systems are not available.

Table E-12 – CD eligible packaging to landfill in 2019–20 by jurisdiction (tonnes)

Material group	ACT	NSW	NT	QLD	SA	Total
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)
Beverage aluminium	130	3 140	170	3 100	860	7 400
Tin-plate steel	0	70	0	70	0	150
Amber glass	1 170	10 220	50	11 420	770	23 630
Flint glass	1 180	10 330	100	11 550	760	23 920
Green glass	820	7 150	50	7 990	530	16 540
PET (1)	530	6 760	60	7 740	1 720	16 800
HDPE (2)	100	780	50	1 540	150	2 630
Other plastic (7)	0	10	0	0	0	10
PCPB – Aseptic	60	1 240	0	1 120	360	2 790
PCPB – Gable top	40	730	30	660	110	1 570
Other material	0	10	0	0	0	10
Total	**4 040**	**40 440**	**540**	**45 180**	**5 250**	**95 450**

Figure E-12 – CD eligible packaging to landfill in 2019–20 by jurisdiction (tonnes)

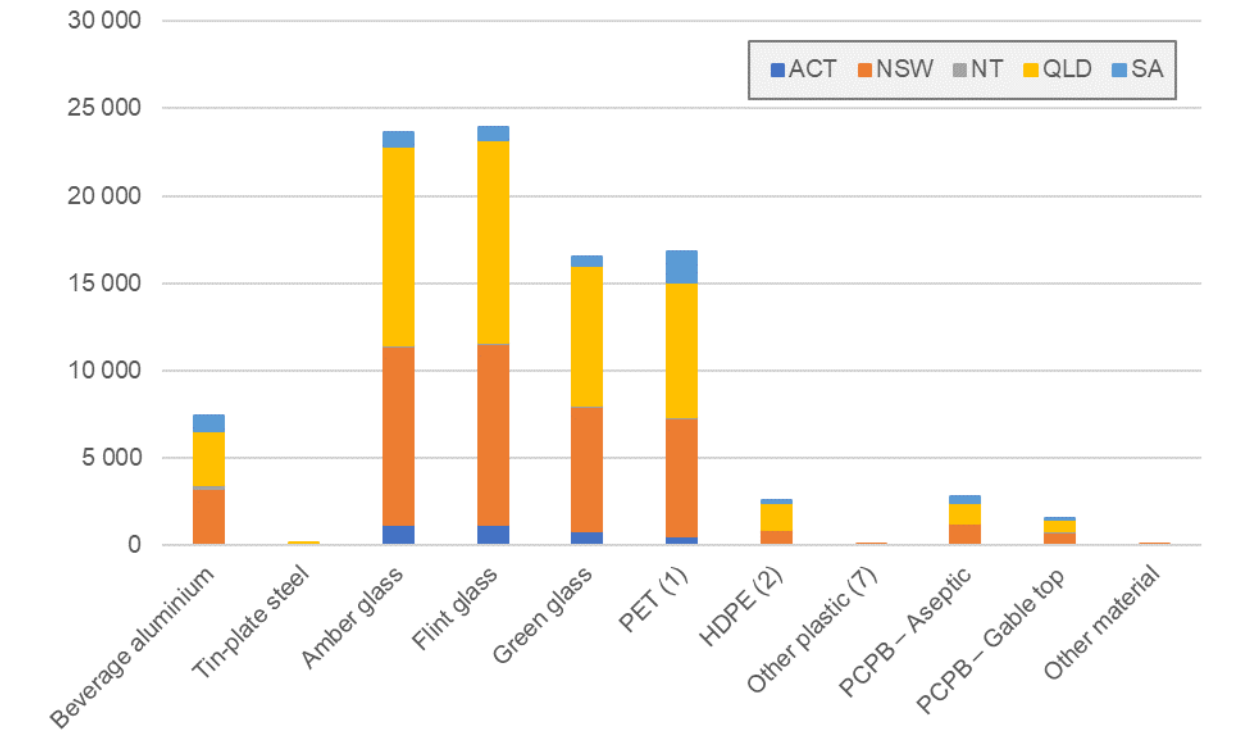
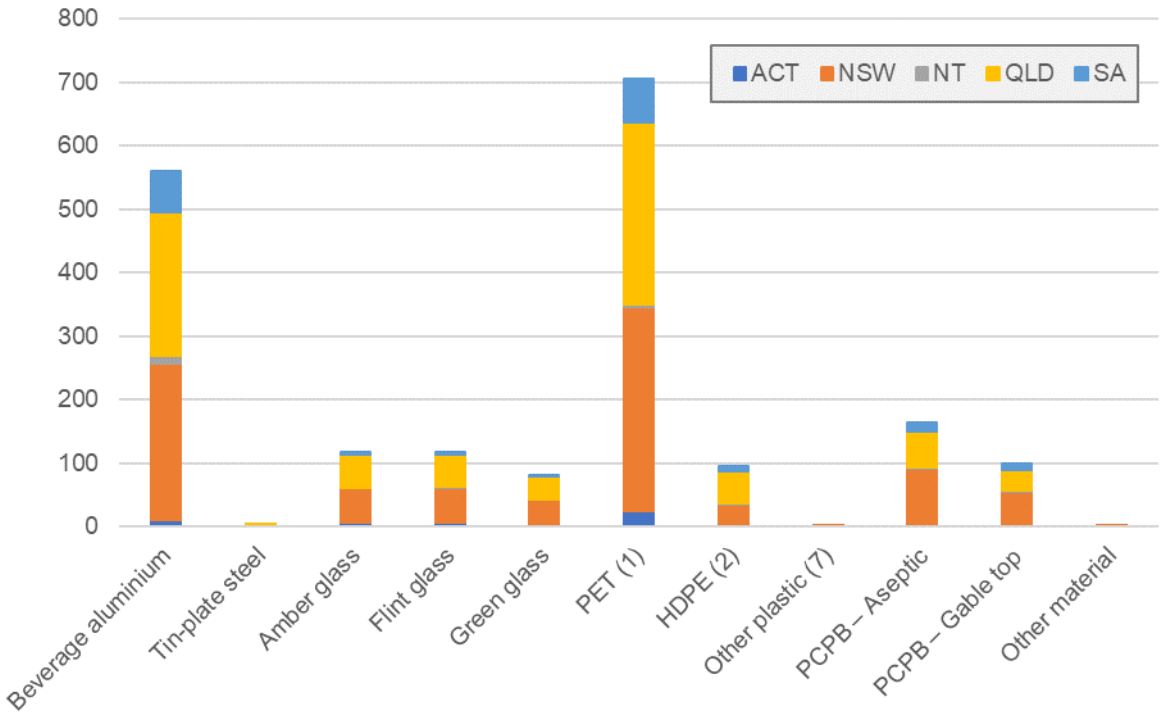


Table E-13 – CD eligible packaging to landfill in 2019–20 by jurisdiction (million packs)

Material group	ACT	NSW	NT	QLD	SA	Total
	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)	(million packs)
Beverage aluminium	10.353	247.593	12.149	225.928	63.302	559.325
Tin-plate steel	0.089	1.777	0.025	0.979	0.000	2.871
Amber glass	6.325	55.306	0.253	51.414	3.756	117.053
Flint glass	6.394	55.905	0.527	51.971	3.796	118.593
Green glass	4.422	38.669	0.274	35.948	2.626	81.939
PET (1)	25.105	321.851	2.671	286.527	68.684	704.837
HDPE (2)	4.058	30.626	1.927	50.775	7.551	94.937
Other plastic (7)	0.053	0.518	0.000	0.000	0.000	0.571
PCPB – Aseptic	4.526	88.130	0.168	57.226	14.988	165.038
PCPB – Gable top	2.658	51.759	1.933	33.609	8.802	98.762
Other material	0.127	0.672	0.000	0.000	0.000	0.799
Total	**64.110**	**892.806**	**19.928**	**794.376**	**173.505**	**1 944.726**

Figure E-13 – CD eligible packaging to landfill in 2019–20 by jurisdiction (million packs)



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