

Australian Recycling Infrastructure, Capacity and Readiness (Plastic and Paper)

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Prepared for
Australian Council of Recycling



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This report has been prepared for the sole use of the client stated above, the only intended beneficiaries of our work. No other party should rely on the information contained herein without the prior written consent of Equilibrium OMG Pty Ltd (Equilibrium).

The results and findings are based upon Equilibrium's professional judgment, experience and expertise, based upon the reliance of information used to prepare this report.

Equilibrium has limited its assessment to the scope agreed upon with its client.

Equilibrium believes that its findings are reasonably supported and that they have been developed according to the professional standard of care for the environmental and sustainability consulting profession in this area at this time.

Executive Summary

The Australian Council of Recycling (ACOR) engaged Equilibrium to research and document current Australian recycling industry capacity and readiness.

In particular ACOR seeks market intelligence, insight and information regarding existing and planned infrastructure and capacity for plastics and paper and the capacity to manage those materials in light of the regulations banning the export of certain plastic and paper materials.

Under the *Recycling and Waste Reduction Act 2020*, phase 2 of the plastic ban will commence on 1 July 2022 allowing only the export of waste plastic that has been sorted into a single resin and further processed. From 1 July 2024 the export of wastepaper and cardboard will be regulated; the specifications of which are yet to be released.

Equilibrium reviewed existing reports and datasets which informed a gap analysis so the best available published data could be identified. Fundamental market insight obtained through stakeholder consultation permitted the verification of the best available data. The market intelligence gathered helped to inform existing and planned plastic and paper recycling infrastructure in Australia.

This report finds that:

Published reports and data

- There are good quality published reports on recycling infrastructure and capacity
- Such reports are not published in a timely manner
- There are differences in methods, terminology and definitions across state and national reporting
- Published reports do not contain sufficient detail for finely tuned policy and investment considerations and decisions
- Reported infrastructure capacity for plastics in particular does not always reflect real-world actual processing as capacity may be taken up by one polymer (rather than the range of the different polymers the facility could recycle) as well as factors such as the availability of staff, infeed materials, plant uptime and end markets.

Infrastructure and capacity

Plastics

- Current publications that report that there is sufficient infrastructure and capacity to process all currently recovered plastic are reporting the notional capacity and are likely to be overestimating the actual capacity
- There is a lack of local capacity to recycle some particular polymers
- There is estimated to be a shortfall in recycling capacity in the FY22-23 for PET (6,000 tonne shortfall), LDPE (14,000 tonne shortfall), ABS/SAN (8,000 tonne shortfall), PA / nylon (10,000 tonne shortfall) and mixed / other / unknown (5000 tonne shortfall)
- New capacity coming online in 2022-2023 is forecast to make up for all these shortfalls in recycling capacity for current volumes of recovered plastics except for LDPE which will still have a shortfall in recycling capacity in FY23-34 of about 13,000 tonnes
- Plastic recycling facilities identify an inability to achieve their reported capacity due to issues including lack of feed stock, lack of skilled operators, general human resource shortages and end market constraints

Paper

- Australia's capacity to recycle paper is largely static with paper recycling facilities consuming 1.5 to 1.8 million tonnes of recovered material each year
- New capacity coming online prior to the next ban in 2024 will mainly change the types of paper recycled locally not the total quantity
- New capacity will enable more mixed grade paper to be used in local recycling in place of recovered cardboard (old, corrugated cardboard or OCC)
- New additional capacity is coming for recycling liquid paperboard and poly coated papers into a building product substitute and is estimated to consumer about 10,000 tonnes of recovered materials from FY23-24
- There is no current evidence that any significant additional paper recycling capacity is going to be coming on-line in Australia
- Following the paper ban rules coming into force in July 2024 it is estimated there will be between 750,000 and 1.1 million tonnes of recovered paper looking for an export market, however, whether such material will meet Government rules for being processed or sorted to specific requirements is unknown at this time on-going export

Future data gathering and reporting

A significant issue identified is that key recycling reports are based on data that can be two or more years old.

Improving the timeliness of key national reporting is essential for monitoring the overall impact of policy settings upon the recycling industry.

To improve this situation, and ensure that government, recyclers and markets have access to up-to-date reprocessing capacity data, the following suggestions are made:

- Undergo a process of reforming current research, including adjusting research scopes and timelines to work in with industry reporting and investment cycles. This may involve producing targeted reports throughout the year, for example an annual (or potentially bi-annual) report focussed solely on material recovery and reprocessing capacities.
- Develop an agreed set of terms for reporting, in particular for key terms such as they relate to industry capacity to reprocess.
- Consider a process of independent industry support during peak reporting periods. It should be acknowledged that companies volunteer time and resources to provide reporting data, and that further support and assistance may help enhance quality and timeliness of reporting.

1 Introduction

In March 2020 Australian governments that the export of waste glass, plastic, tyres, and paper be regulated by the Australian government. The export of waste is regulated under the *Recycling and Waste Reduction Act 2020*¹. For the purpose of this study, the current export guidelines for plastic and paper are:

- **Plastic Ban**² (2 phases)
 - Phase one: From 1 July 2021 only waste plastic can be exported that have been sorted into single resin or polymer type or processed with other material into processed engineered fuel.
 - Phase two: From 1 July 2022 allows only the export of waste plastic that have been; sorted into single resin or polymer type and further processed, for example flaked or pelletised or processed with other materials into processed engineered fuel.
- **Paper and Cardboard**
 - From 1 July 2024, only paper and cardboard that is processed or sorted to specific requirements will be eligible for export.

1.1 Scope

Equilibrium undertook desktop research and stakeholder consultation to document infrastructure, capacity and end markets. The information gathered includes post-consumer and post-industrial sources and outlets for both plastic and paper.

The initial project involved data collection by reviewing existing reports, datasets and publications that document and quantify infrastructure capacity and contacting relevant organisations and sites in order to check and update this data.

Further to Section 5, which provides a summary of key findings and observations, these are detailed and discussed throughout the report with relevance to each section.

1.2 Key definitions and terminology

Part of this project examines existing reports, publications and data in order to ascertain and make observations on the veracity and usefulness of such information, and how it may inform policy and investment considerations and decisions.

Research and analysis for this report found that while there is a lot of good data and reports of good quality published on recycling infrastructure and capacity, such reports are not

¹ Recycling and Waste Reduction Act 2020, Australian Government

² Recycling and Waste Reduction (Export-Waste Plastic) Rules 2021

published in a timely manner and there are differences in methods, terminology and definitions across state and national reporting.

Consequently, it is sporadic whether published reports do not contain sufficient detail for detailed policy and investment considerations and decisions.

There is further discussion on current published reports and data in Section 2.

In order to be clear in this report, the following definitions and terminology have been employed.

Waste material: means anything (including a substance or mixture of substances) that is:

- a. discarded, rejected or left over from an industrial, commercial, domestic or other activity; or
- b. surplus to or a by-product of an industrial, commercial, domestic or other activity; or
- c. prescribed by the rules. (Recycling and Waste Reduction Act, 2020)

Capacity (reprocessing): the industrial capacity available to reprocess waste materials per year, overall or by type. 'Current capacity' is the maximum quantity possible to be reprocessed at a facility per year. 'Spare capacity' is the unused or potential quantity of reprocessing ability at a facility per year, in excess of actual reprocessed quantity. 'Planned capacity' is the quantity per year, beyond the current capacity, that the reprocessor has committed (funded) plans to install or develop. (*Australian Plastics Flows and Fates Study, 2021*)

Export: means export from Australia. (Recycling and Waste Reduction Act 2020)

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). (*National Waste Report, 2020*)

Recycling rate: the proportion of generated waste that is recycled. (*National Waste Report, 2020*)

Resource recovery: for data collation purposes, this is the sum of materials sent to recycling and energy recovery net of contaminants and residual wastes sent to disposal. (*National Waste Report, 2020*)

Reprocess/reprocessing: to put a material that has been used through an industrial process to change it so that it can be used again. (*Australian Plastics Flows and Fates Study, 2021*)

Reprocessor: facility that uses an industrial process to change the physical structure and properties of a waste material so it can be used again. (*Australian Plastics Flows and Fates Study, 2021*)

2 Current reporting and gap analysis

A gap analysis of current reports, datasets and publications enabled the identification of the best available data for paper and plastic.

It has found that generally there is very good data on recycling capacity being gathered and reported by the States and Territories as well as at a national level.

All available current or recent State and Territory reports on material recovery and recycling rates, as well as infrastructure and capacity, were accessed and reviewed for this project.

In general, all States and Territories are gathering extensive and reasonably detailed information on resource recovery and recycling. While reports are published in all jurisdictions broadly reporting recycling performance, data is also being gathered for specific purposes (such as licensing) and not published in a consolidated form.

Of general note is that while there are good quality published reports on recycling infrastructure and capacity, such reports are not being published in a timely manner and with sufficient detail for finely tuned policy and investment decision making. As also noted, differences in methods, terminology and definitions across state and national reporting presents challenges for use of the reports.

It is also notable that with respect to recycling capacity, currently reported infrastructure capacity does not always reflect the real world as the reporting is based on surveying facilities, and facilities may be reporting their total technical capacity, not necessarily what the facility can actually recycle of any given recovered polymer.

The following details the gap analysis undertaken for this report that seeks to assess completeness, accuracy and reasonableness of the reports and the data being reported.

2.1 Plastic

A gap analysis, shown in Table 1, provides a summary review of key reports reviewed and the project relevancy. The Australian Plastics Flows and Fates Study 2019-20 (Envisage Works, 2021³) was found to be the best available data. Notably, the report provides an extensive analysis by polymer and provides the most up to date figures available (2019-2020).

³ *Australian Plastics Flows and Fates Study 2019-20*. 2021. National Report. Department of Agriculture, Water and the Environment

Table 1. Summary of key report reviewed for plastic polymers processing capacity.

Report Details	National Data Reporting			Jurisdictional Data Reporting			Specifications for Further Materials Use		Project Suitability
	Throughput	Capacity	By Polymer Type	Throughput	Capacity	By Polymer type	International Use	Domestic Use	
Australian Plastics Flows and Fate Study 2019-20, Envisage Works Data Analysis Period: 2019/2020	Yes	Yes	Yes	Yes	No	Yes	Some general commentary provided based on polymer types.		High
National Waste Report 2020, Blue Environment Data Analysis Period: 2018/2019	Yes	No	Yes	Yes	No	Partial	No	No	Medium
Plastics Infrastructure Analysis Update, Envisage Works Data Analysis Period: 2017/2018	Yes	No	Yes	Yes	Partial	Yes	Commentary related to export waste codes	Typical uses described	Medium
2018–19 Australian Plastics Recycling Survey – National Report, Envisage Works Data Analysis Period: 2018/2019	Yes	No	Yes	Yes	No	Yes	Limited market commentary	Typical uses described	Low
Australian Packaging Consumption and Recycling Data, APCO Data Analysis Period: 2018/2019	Limited data	Limited data	No	No	No	No	No	No	Low
Circular economy roadmap for plastics, glass, paper and tyres, CSIRO Data Analysis Period: 2018/2019	Limited data	Limited data	Limited	No	No	No	Discussion recognising the need for an increase in recycling capacity	Limited	Low

Table 2 below which is sourced from Envisage Works (2021) provides an estimate of the 2019-20 reprocessing capacity for all polymer types. As will be discussed in Section 3, the reprocessing capacity does not reflect actual throughput.

Table 2. National Re-processor capacity by polymer type⁴.

Polymer type	19-20 Capacity (tonnes)	Number of sites with reprocessing capability*
PET (1)	45,200	12
PE-HD (2)	109,100	45
PVC (3)	11,600	15
PE-LD/LLD (4)	87,900	30
PP (5)	60,200	34
PS (6)	10,600	10
PS-E (6)	14,500	22
ABS/SAN/ASA (7)	1,400	7
PUR/PIR (7)	4,400	2
PA (7)	600	-
Nylon (7)	n/a	3
Bioplastic (7)	100	1
Other (7)	1,800	4
Unknown polymer	17,400	3
Totals	364,800	188

2.2 Paper and Cardboard

A gap analysis is shown in Table 3 and identifies the *Assessment of Australian paper and paperboard recycling infrastructure and 2018-19 exports, including to China* (Industry Edge, 2019) as the most suitable for this project. The data analysis period for the report is 2018-2019.

⁴ Australian Plastics Flows and Fates Study 2019–20 – National report.

Table 3. Summary review of key reports reviewed and project relevancy for paper and cardboard

Report Details	National Data Reporting			Jurisdictional Data Reporting			Specifications for Further Materials Use		Project Suitability
	Throughput	Capacity	By Grade	Throughput	Capacity	By Grade	International Use	Domestic Use	
Assessment of Australian paper & paperboard recycling infrastructure and 2018-19 exports, including to China. Industry Edge Data Analysis Period: 2018/2019	Yes	No	Yes Note: differs to National Waste Report	Yes	No	Yes Note: differs to National Waste Report	Yes	General comment by grade.	Medium
National Waste Report 2020, Blue Environment Data Analysis Period: 2018/2019	Yes	No	Yes	Yes	No	Partial	No	No	Medium
Australia and New Zealand 2022 Pulp and Paper Industry Guide, Industry Edge and Appita Data Analysis Period:	Yes	Yes		No	No	No			
Australian Packaging Consumption and Recycling Data, APCO Data Analysis Period: 2018/2019	Limited data	Limited data	No	No	No	No	No	No	Low

2.3 Observations of current data

For both plastic and paper, when comparing reports, there are observed discrepancies between national and state reporting. For example, between the national paper reports, there are discrepancies between the total volume of recovered paper. A factor contributing to this discrepancy is the lack of consistent and mandatory national reporting. Therefore, the source and geographic location of the data influences its quality.

Furthermore, the lack of clarification around terminology creates inconsistent reporting. In particular, the terminology around reprocessing, recycling and capacity is not consistent.

There is noticeably a lack of up to date publicly available reporting. For plastic, the data analysis period available is 2019-20 and for paper 2018-19. Due to the slow publishing of data, the data is dated. In turn, this creates implications, particularly in a fast-moving consumer goods market.

It is well documented that waste data has its complexities and data gaps. However, there are attempts to improve its quality and in the National Waste Report 2020, one target is to “make comprehensive, economy-wide and timely data publicly available to support better consumer, investment and policy decisions”.

Overall, there are gaps in knowledge to accurately quantify and understand the current capacity of Australia’s recycling infrastructure. Therefore, as outlined in *Section 3*, the importance of market insight and stakeholder consultation is essential to clarify figures and fill in the data gaps.

3 Current infrastructure and capacity

Section 3 quantifies the current capacity and infrastructure that exists to locally receive and process plastic and paper. Following the initial gap analysis, outlined in Section 1, the best available data was utilised. From this, market consultation verified the documented understanding of capacity. Insight into the current recycling market outlook included observing the amounts of each material available for processing, amounts processed domestically, and amounts exported.

3.1 Plastic

Plastic waste is complex, and the quality of data is limited. As discussed in Section 2, the Envisage Works 2019 estimates have been used as a baseline. Through stakeholder consultation, we have gained insight into these estimations.

According to Envisage Works (2021), a total of 3,461,700 tonnes of plastic was consumed in 2019-20. Of this, 2, 496,700 tonnes of plastics reached end-of-life (EoL) in Australia and 326,600 tonnes of plastic was recovered.

Table 4 shows the current and forecast recovery of plastics for recycling by polymer by tonnes by year. This is used as the baseline for assessing how much of each polymer and total plastics is being recovered and collected for recycling.

Table 4. Recovery and collection of plastics for recycling

Polymer type	20-21 Recovery	21-22 Recovery	22-23 Recovery	23-24 Recovery
PET (1)	70,262	73,824	77,386	80,948
PE-HD (2)	83,433	87,766	92,099	96,432
PVC (3)	6,904	7,408	7,912	8,415
PE-LD/LLD (4)	43,089	45,777	48,466	51,154
PP (5)	48,554	51,208	53,862	56,517
PS (6) & PS-E (6)	17,331	18,062	18,794	19,525
Other (7)	68,517	65,233	61,950	58,667
Total	338,089	349,279	360,468	371,658

Forecast recovery 2021 – 2025 Source: Australian Plastics Flows and Fates Study 2019–20, National report, 22 July 2021, Envisage Works

Analysis of the national waste plastic arisings compared to plant reprocessing capacity identifies a potential shortfall in reprocessing capacity for some plastic polymers, including significant streams: PE-LD/LLD, ABS/SAN/ASA (7), PA (7).

0 estimated projections for the period 2022 to 2025 by year, noting that a negative result indicates an overall shortfall in national capacity. It is important to note the key assumptions behind this modelling:

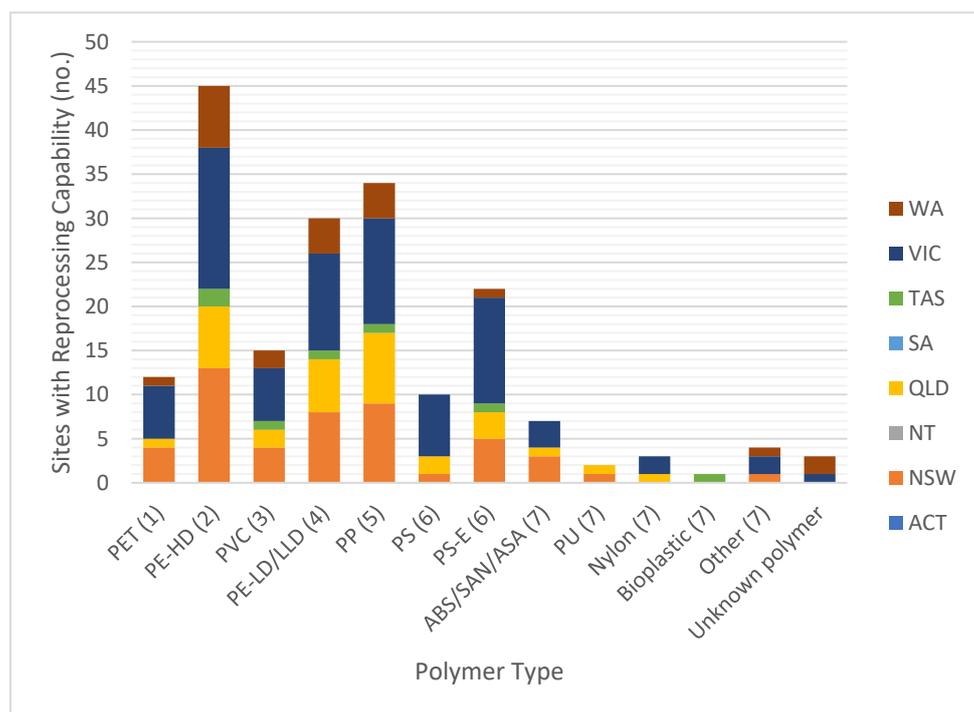
- Year on year End of Life (EoL) waste arisings have been calculated based on forecast data reported by Envisage Works (2021)
- National reprocessing capacities for individual polymers is based on Envisage Works (2021) data, with the exception of PE-LD/LLD (discussed in *Section 5* of this report)

Table 5. Equilibrium Calculation: Difference between reprocessing capacity and recovered material

Polymer type	22-23	23-24	24-25
PET (1)	-5,730	21,443	17,881
PE-HD (2)	49,466	65,083	60,750
PVC (3)	4,813	4,310	3,806
PE-LD/LLD (4)	-14,547	-14,086	-16,775
PP (5)	24,011	28,357	25,703
PS (6) & PS-E (6)	12,549	11,817	11,086
Other (7)	-17,476	-19,119	-20,949

Of note is that the current concentration of plastics recycling is largely in the eastern states of Australia, as highlighted in Figure 2 below.

Figure 1. 2019-20 National reprocessing by jurisdiction⁵.



⁵ Australian Plastics Flows and Fates Study 2019–20 – National report.

As shown in 0, there is seemingly enough capacity to process some polymers but not others.

Notably there is insufficient capacity to locally recycle all currently recovered PET, LLDPE and PIC#7 and mixed plastics. PET recycling is undergoing significant investment and is expected to achieve sufficient capacity in the 2023-24 financial year. This will be discussed further in Section 4. LDPE and lower grade polymers have limited capacity available and further detail on LDPE is provided in Section 5.

It is important to note that the reprocessing capacity estimates should be interpreted with care. The estimates do not provide information on the availability of scrap plastics compatible with the reprocessing capacity, or provide an indication as to the level of reprocessing value-add that can be undertaken with any spare capacity, and so the ability to find an end-market. There is a clear disparity with the terminology surrounding capacity and it should not be mistaken for actual throughput. Subsequently, there is an apparent over-reporting of current capacity.

Through market insight, maximum capacity is not being utilised due to multiple factors. Firstly, the quality of feedstock is not suitable. Secondly, end markets are not well established so there is limited demand for recycled content. The price of virgin material remains significantly lower than recycled material. Additionally, labour shortages are reducing the operational abilities of facilities across Australia. Therefore, there is a misrepresentation of what the current operational capacity is.

These figures do not reflect how recovery rates will change. A change in policy settings will influence recovery rates. As outlined in the National Plastics Plan 2021⁶, there are ambitious plans, particularly for packaging. By 2025, 70% of plastic packaging goes on to be recycled or composted. The Australian Food and Grocery Council (AFGC) is currently developing the National Plastics Recycling Scheme (NPRS) which will be Australia's first industry-led, national recycling scheme for soft plastic packaging⁷. The scheme aims to collect 190,000 tonnes of soft plastic packaging per annum by 2025.

3.2 Paper and Cardboard

As outlined in Table 6 below, the current capacity for recycling paper in Australia is estimated to be 1,475,000 tonnes in 2021-2022 - which is spread across the facilities outlined in Table 5.

⁶ National Plastics Plan. 2021. Department of Agriculture, Water and the Environment

⁷ Australian Food & Grocery Council. 2022. News and Media Publication. Qenos and Cleanaway advanced plastics recycling study a welcome step towards packaging circular economy.

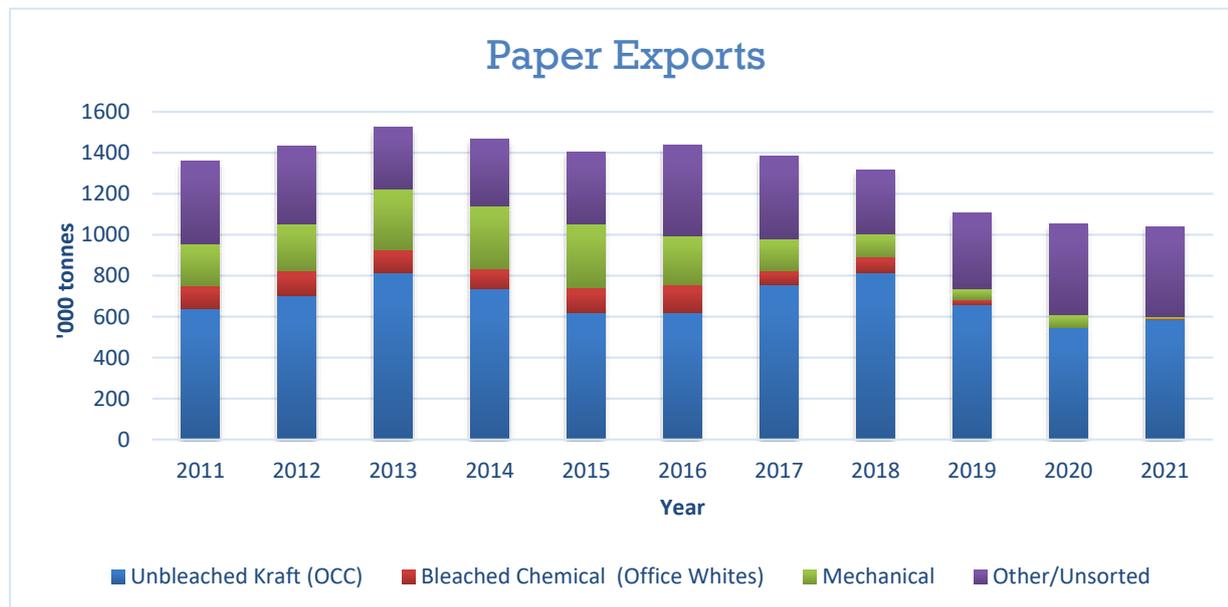
Equilibrium has applied an estimated range of local recovery and recycling of a total of 1.5 to 1.8 million tonnes of local recycling each year based on industry advice regarding usual fluctuations in production.

Table 6. Input of recovered tonnes of fibre

Facility	Input of recovered fibre (tonnes)
Paper recycling mills	1,367,000
Other (packaging)	150,000
Other (non packaging)	52,000
Total	1,570,000

In 2021, a total of 1,040,200 of recovered paper was exported. As shown in Figure 2 below, significantly less recovered paper continues to be exported as export markets diminish. Indonesia has replaced China as they have become a satellite manufacturer.

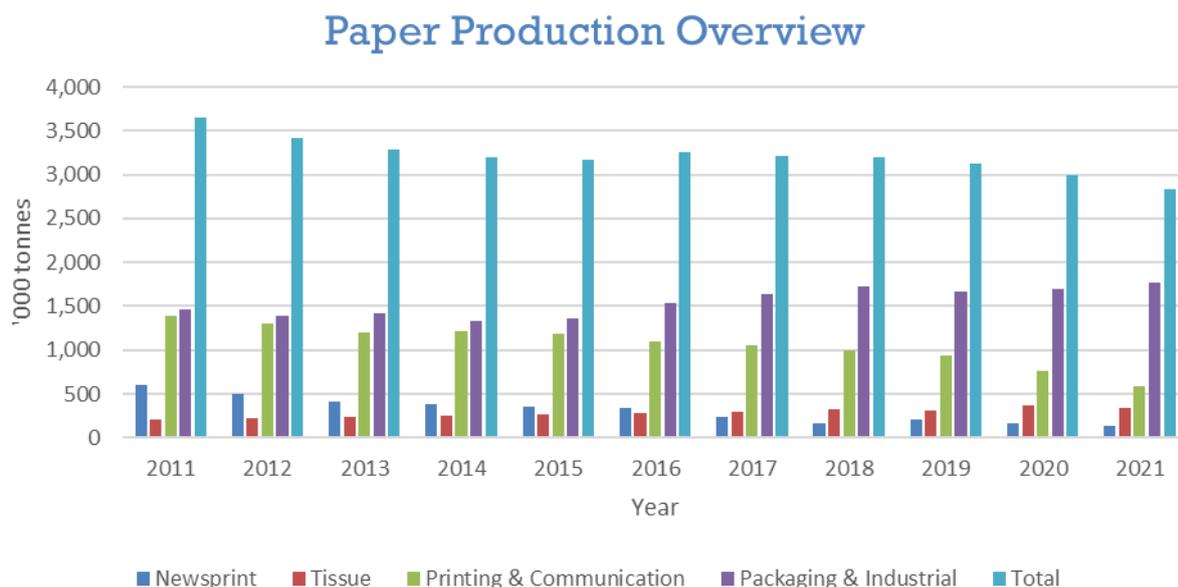
Figure 2. Recovered paper exports by grade 2011-21. Source: Industry Edge Research and Estimates



In 10 years between 2011 and 2021, paper production has declined 815,000 tonnes. This is largely due to the decreased demand for newsprint. However, packaging production has increased and is expected to continue to grow⁸.

⁸ Australian Plastics Flows and Fates Study 2019–20 – National report

Figure 3. Paper production by grades 2011-21. Source: Industry Edge Research and Estimates



4 New and additional recycling capacity

Section 4 outlines the planned and additional capacity that is expected to come online over the next couple of years.

4.1 Recycling Modernisation Fund

The Recycling Modernisation Fund (RMF) is an Australian Government initiative, developed as part of the National Waste Policy Action Plan 2019⁹, that is investing over \$190 million to expand Australia’s capacity to sort, process and remanufacture recycled materials¹⁰.

The fund is leveraging over \$800 million of recycling infrastructure investment from states and territories and industry.

In addition, the federal government has announced \$60 million in additional funding for the RMF, specifically targeting the advanced recycling of plastics.

⁹ National Waste Policy Action Plan 2019

¹⁰ Investing in Australia’s waste and recycling infrastructure. Department of Agriculture, Water and the Environment. 2022.

4.1.1 Plastic

Table 7 below outlines the timeframes and capacity for new plant and equipment that is planned, under development and will come online from government investment. It is estimated an additional 257,479 tonnes per annum will be operational by 2024. As shown, this additional capacity is focussed on polymer grades 1-6, notably HDPE and PET polymers.

It should be noted that when analysing additional capacity, some projects were excluded as they did not provide further new reprocessing capacity, and were focussed on improvements to current infrastructure.

Table 7. Additional capacity (tonnes per annum) coming online each year by polymer

Polymer	Additional capacity (tonnes per annum) from RMF projects				
	Dec-21	Dec-22	Dec-23	Dec-24	Total
PET (1)	1,455	25,000	60,735		87,190
PE-HD (2)	1,455	31,010	19,950	0	52,416
PVC (3)		1,125		0	1,125
PE-LD/LLD (4)	2,950	15,968	3,150		22,068
PP (5)	205	17,468	7,000	0	24,674
PS (6) & PS-E (6)	62	6,180			6,242
Other (7) & Mixed or Unknown polymer	2,504	11,018	36,642	7,200	57,364
Total	8,632	107,770	127,477	7,200	251,079
Total RMF additional capacity					251,079

As discussed in Section 2, capacity and actual throughput are not the same. It is unlikely that maximum capacity will become operational in the timeframes provided. Firstly, there is a time lag involved in new operating lines as operational errors are resolved. Secondly, market insight has indicated that there are significant labour shortages which are minimising the operating capacity. Additionally, end markets for the finished products are not well established, so the demand for recycled materials is unclear.

Phase 2 of the waste plastic ban is due to commence 1 July 2022. Recently, exemptions have become available for facilities that have projects under-development.

4.1.2 Paper and Cardboard

In light of the waste paper and cardboard ban coming into effect from 1 July 2024, the government recognises the challenges and high costs associated with paper and cardboard recycling infrastructure. 0 outlines the paper infrastructure projects that have received funding,

which is estimated to increase additional capacity by 433, 951 tonnes per annum. However, market insight has indicated that there will be no additional capacity.

Table 8. Additional capacity coming online from RMFs

State	Detail				
	Project name	Location	Project Status	Completion date	Additional capacity
ACT	1. Re.Group RMF upgrade	Hume	MRF upgrades	Jun-23	23,000
NSW	1. Elouera MRF upgrade	Cootamundra	MRF Upgrade	Oct-21	200
	2. Suez fibre beneficiation facility	Chullora	Process recycled P&C for use by local paper mills	Nov-23	100,000
	3. Save Board facility	Wetherill Park	Reprocess liquid paperboard into plaster board	Jun-23	4,000
	4. City of Newcastle MRF	Wallsend	MRF	Nov-22	56,175
	5. Gilgandra MRF	Gilgandra	MRF upgrade - improve quality of bales	May-22	338
	6. Kurrajong Waratah MRF upgrade	Wagga	Improve quality of bales	Dec-22	238
SA	1. Northern Adelaide new beneficiation facility	Adelaide	Process fibre from P&C	Jun-24	40,000
VIC	2. Project Zepplin - Colaroo Paper Mill	Coolaroo	Drum pulper technology	Apr-24	95,000
WA	1. Suez Paper Mill	Kwinana	Pulp mill - EOI re-opened	Jun-24	115,000
Total RMF additional capacity					433,951

There are three infrastructure projects expected to increase capacity by 235,000 tonnes per annum; the pulp mill in Perth, drum pulper at the Coolaroo Paper Mill and the fibre polishing plant in South Australia.

As noted however this increase in capacity is not all additional recycling capacity, as the drum pulper and fibre polishing projects will not increase overall.

It is also noted that the pulp mill project in Perth has not proceeded as planned and it is clear at this stage whether it will proceed or not.

Industry stakeholders report that the only cause of a significant increase in local recycling capacity for paper will be if new paper recycling mills are built in Australia. Stakeholders

commented further that it is highly unlikely that any new paper mills will be built in Australia as the economic environment is not favourable for such investments.

Although there is no additional capacity coming online, the RMF will improve sorting which in turn will improve the quality of grades coming out of MRFs. However, it remains unclear as to whether the 2% contamination requirement can be met.

Market insight has indicated that whilst the Norske Skog Albury site could represent new capacity. Whilst it is currently set up for newsprint, it may be possible to change this to packaging.

4.2 Other projects

Many of the projects that will become operational in the near future have pursued the RMF grant. However, it is worth noting projects that are in the pipeline, external to the RMF.

It is also of note that the Australian Government Modern Manufacturing Initiative (MMI) and National Manufacturing Priorities is specifically supporting recycling infrastructure.

The MMI is currently supporting projects including plastic alternatives and expanding markets using recycled content.

The other projects here should be considered with some care because some are in the early stages of development. 0 shows various projects that are under development, and it is clear that advanced recycling is receiving significant attention.

Table 9. Additional projects

Operator	Location	Additional Capacity	Timeline	Comments
Brightmark, Parks Recycling Plant	Parkes, NSW Central Coast	200,000	2025	Advanced recycling
Genos and Cleanaway	Melbourne and Sydney	90,000	2025	Advanced recycling. Feasibility study completed by 2022
Licella Amcor, Coles, iQ Renew, Licella, LyondellBasell and Nestle	Altona, VIC	120,000	2025	Operate initially at 20,000 tpa.
Plasrefine Recycling Pty Ltd	Moss Vale, Wingecarribee Shire, NSW	120,000		

5 LDPE

As discussed in Section 3.1, LDPE was highlighted as a polymer of concern. Thus, in-depth market analysis was undertaken for LDPE and the findings are documented below.

5.1 Key data

- **Recovery** (being the LDPE collected for recycling)
 - 40,400 tonnes in 2019-20 (*Envisage Works, 2021*)
 - 43,100 tonnes in 2020-21 (*Equilibrium estimate*)
- **Reprocessed** (being the LDPE recycled in some way, so it is ready to be used to make another product)
 - 38,300 (*Envisage Works, 2021*)
- **Reported current capacity:** 87,900 tonnes (*Envisage Works, 2021*)
- **2022 industry intelligence on capacity:** between 10,000-40,000 tonnes per annum
- **Export:**
 - 21,578 tonnes 1 July to 31 December 2021 *ABS Data*,
 - 4,000 tonnes in 2019-2020 (*Envisage Works report 2021*)
- **Reported RMF capacity coming online by Dec-23:** 22,086 (see Table 8)

5.2 Interim Findings

- About 40,000 tonnes of LDPE is being collected and recovered for recycling in Australia
- In the last six months of 2021 calendar year 21,000 tonnes of sorted and unprocessed LDPE was exported
- It is reported that Australia has about 88,000 tonnes of processing / recycling capacity for LDPE, however, that reported capacity is theoretical and does not seem to actually be available or accessible
- Based on current market research, Equilibrium estimates that about 15,000 tonnes of LDPE is actually being reprocessed and recycled in Australia, the remaining collected and recovered LDPE is being exported as unprocessed, sorted and baled loads

Table 10. Additional capacity from RMF projects for LDPE

LDPE	Additional capacity (tonnes per annum) coming online from RMFs			
	Dec-21	Dec-22	Dec-23	Dec-24
NSW	2,950	1,955		0
SA			3,150	0
VIC		14,014		0
Total	2,950	15,968	3,150	0
Total: 22,086				

5.3 Current LDPE reprocessors

The following companies have self-reported or been reported by others as being currently recycling recovered LDPE into either a flake, pellet or a new product.

- Polymer Processors
- Olympic Polymers
- GT Recycling
- Resitec
- Environex (however under administration as of April 2022)
- Integrated Recycling
- Plastic Forests
- Martogg
- Chairay
- 4Recycling
- IQRenew
- Vinrec

5.4 Observations and notes

Reprocessing capacity

- Reported reprocessing capacity sees includes sorting, sorting capacity, and companies doing advanced waste treatment (that is, making refuse derived fuels and not doing mechanical recycling)
- Maximum capacity cannot be achieved by the facilities due to factors such as lack of access to feedstock, labour shortages or unavailability and skills shortages
- Takes at least 12 months to resolve operational challenges
- Significant discrepancies in capacity, both in data and market insight
- Some industry has reported significant new recycling volume coming on line in the short term, however there is no available evidence that that will occur

Costs

- Labour shortages and skills gap – greater level of expertise required to operate equipment
- European equipment required as opposed to Chinese manufactured machines
- Facilities will seek clean sorted materials (such as CDS material) and drive prices down for MRFs

End markets

- There are not developed or appropriate domestic end markets available to handle the material, this will drive the price of resin down
- For example, one local processor is offering to charge \$9/kg for recycled material which can currently be purchased overseas for \$3.50/kg

Mechanical recycling of post-consumer flexibles is problematic. The material is dirty and contaminated with other materials.

End use applications for rLDPE would be limited to non-food contact products and most likely not for the manufacture of flexible film applications.

6 Findings and observations

These findings and observations have drawn upon existing reports and datasets and gathered market intelligence to inform existing and planned plastic and paper recycling infrastructure.

6.1 Current published reports and data

- There are good quality published reports on recycling infrastructure and capacity
- Such reports are not published in a timely manner
- There are differences in methods, terminology and definitions across state and national reporting
- Published reports do not contain sufficient detail for finely tuned policy and investment considerations and decisions
- Reported infrastructure capacity does not always reflect real-world actual processing capacity (for example, a facility may report a capacity of X tonnes of X, Y and Z recovered polymers, but the actual processing capacity may be taken up by one polymer and factors such as the availability of staff, infeed materials, plant uptime and end markets will impact the actual tonnes that can and are recycled

6.2 Plastics

- Current publications that report that there is sufficient infrastructure and capacity to process all currently recovered plastic are reporting the theoretical capacity and are overestimating the actual capacity
- There is a lack of local capacity to recycle some particular polymers
- There is estimated to be a shortfall in recycling capacity in the FY22-23 for PET (6,000 tonne shortfall), LDPE (14,000 tonne shortfall), ABS/SAN (8,000 tonne shortfall), PA / nylon (10,000 tonne shortfall) and mixed / other / unknown (5000 tonne shortfall)
- New capacity coming online in 2022-2023 is forecast to make up for all these shortfalls in recycling capacity for current volumes of recovered plastics except for LDPE which will still have a shortfall in recycling capacity in FY23-34 of about 13,000 tonnes
- Plastic recycling facilities identify an inability to achieve their reported capacity due to issues including lack of feed stock, skills and human resource shortages and end market constraints
- For polymers where reprocessing capacity is unavailable, there are a couple of options including storage – if legal requirements are met, landfill and export permissions and exemptions
- Container deposit material will become more desirable, export competition will be removed, MRF prices forecast to be down and under continued pressure
- Regional MRFs will be under sustained price and quality pressure
- Price of virgin materials is often lower than recycled – creates an end market problem
- Cost of transport of material remains high
- End markets need development to ensure there is demand for recycled material

6.3 Paper

- Australia's capacity to recycle paper is largely static with paper recycling facilities consuming 1.5 to 1.8 million tonnes of recovered material each year
- New capacity coming online prior to the next ban in 2024 will mainly change the types of paper recycled locally not the total quantity
- New capacity will enable more mixed grade paper to be used in local recycling in place of recovered cardboard (old, corrugated cardboard or OCC)
- New additional capacity is coming for recycling liquid paperboard and poly coated papers into a building product substitute and is estimated to consumer about 10,000 tonnes of recovered materials from FY23-24
- There is no current evidence that any significant additional paper recycling capacity is going to be coming on-line in Australia

- Following the paper ban rules coming into force in July 2024 it is estimated there will be between 750,000 and 1.1 million tonnes of recovered paper looking for an export market, however, whether such material will meet Government rules for being processed or sorted to specific requirements is unknown at this time on-going export
- Oversupply of fibre in the Australian market due to a number of factors but imported packaging is expected to continue

6.4 Future data gathering and reporting

- A significant issue identified is that key recycling reports are based on data that can be two or more years old.
- Improving the timeliness of key national reporting is essential for monitoring the overall impact of policy settings upon the recycling industry.
- To improve this situation, and ensure that government, recyclers and markets have access to up-to-date reprocessing capacity data, the following suggestions are made:
 - Undergo a process of reforming current research, including adjusting research scopes and timelines to work in with industry reporting and investment cycles. This may involve producing targeted reports throughout the year, for example an annual (or potentially bi-annual) report focussed solely on material recovery and reprocessing capacities.
 - Develop an agreed set of terms for reporting, in particular for key terms such as they relate to industry capacity to reprocess.
 - Consider a process of independent industry support during peak reporting periods. It should be acknowledged that companies volunteer time and resources to provide reporting data, and that further support and assistance may help enhance quality and timeliness of reporting.

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Appendix

Plastic

Table 1: Detailed list of Australian Plastic Recyclers and Reprocessors¹¹.

State	Location	State total	Facility	Owner
NSW	Albury	12	Iplex Pipelines	Iplex Pipelines
	Botany		Visypak	Visypak
	Eastern Creek		QLS Logistics	QLD Logistics
	Minto		Martogg LCM NSW	Martogg Group of Companies
	Moama		The Green Pipe	Circle P Pty Ltd
	Moorebank		MPE Plastic Extrusion	MPE Plastic Extrusion
	North Albury		Plastic Forests Pty Ltd	Plastic Forests Pty Ltd
	Seven Hills		Astron Sustainability	Astron Sustainability
	Silverwater		RBM Plastics	RBM Plastic Extrusions Pty Ltd
	Smithfield		Visy Recycling	Visy Recycling
	Thornton		Hunter Pods Pty Ltd	Hunter Pods Pty Ltd
	Wetherill Park		IS Recycling Pty Ltd	IS Recycling Pty Ltd
	QLD		Carole Park	5
Molendinar		Replas Recycling Molendinar	Repeat Plastics Australia Pty Ltd	
Tingalpa		Polyfoam Tingalpa	Polyfoam (Brisbane) Pty Ltd	
Wacol		Resitech Wacol	Resitech (Aust) Pty Ltd	
Wacol		Astron Sustainability	Astron Sustainability	
SA	Edinburgh North	10	Foamex SA	Foamex Group Pty Ltd
	Edinburgh North		Coolfoam	Coolfoam Pty Ltd
	Kilburn		Plastics Granulating	Plastics Granulating Services (PGS)
	Kilburn		Lokan Nominees	Lokan Nominees Pty Ltd
	Kilburn		Advanced Plastics Recycling	Advanced Plastics Recycling
	Kilburn		Recycling Plastics Australia	Recycling Plastics Australia Pty Ltd
	Lonsdale		Adelaide Granulation Industries	Adelaide Granulation Industries
	Pooraka		Bill Caire Cases	Bill Caire Cases
	Port Pirie		Plastic Recyclers	Plastic Recyclers Australia/International
	Wingfield		YCA Recycling	YCA Recycling
TAS	George Town	1	Environex	Environex

¹¹ Introduction to the Australian waste and resource recovery infrastructure database, National Waste Data Cycle 2019-22, Department of Agriculture, Water and the Environment

State	Location	State total	Facility	Owner
VIC	Altona North	36	Cleanaway Altona	Cleanaway
	Ballarat		Repeat Plastics Australia	Repeat Plastics Australia
	Bayswater		Foamex Vic	Foamex Group Pty Ltd
	Bayswater		Megara	Megara
	Braeside		Viscount Plastics	Viscount Plastics
	Campbellfield		MAP Precision Plastics	MAP Precision Plastics
	Campbellfield		Global Industrial Group	Global Industrial Group
	Cheltenham		Astron Sustainability	Astron Sustainability
	Coolaroo		Vicfoam	Foamex Group Pty Ltd
	Dandenong South		Garden City Plastics	Garden City Plastics
	Dandenong South		EQ Plastics	EQ Plastics
	Dandenong South		Martogg LCM Victoria	Martogg Group of Companies
	Dandenong South		Polyfoam	Polyfoam
	Deer Park		Welvic	Welvic
	Derrimut		Unipod	Unipod
	Irymple		Andpak	Andpak
	Kew		Envirostream	Envirostream
	Lancaster		RPM Pipe	Recycled Plastic Pipe Manuf.
	Laverton		PCP Global Recycling	PCP Global Recycling
	Laverton		Cleanaway Laverton MRF	Cleanaway
	Lilydale		Repeat Plastics Australia	Repeat Plastics Australia
	Maribyrnong		RMAX Rigid Cellular Plastics	RMAX Rigid Cellular
	Mildura		Integrated Recycling	Integrated Recycling
	Moolap		Cryogrind	Cryogrind Pty Ltd
	Moorabbin		Olympic Plastics	Olympic Polymers Pty Ltd
	Mordialloc		Polymer Processors	Polymer Processors
	Reservoir		Carrington Plastics	Carrington Plastics
	Reservoir		Emmans Granulators	Emmans Granulators
	Shepparton East		Elite Manufacturing	Elite Manufacturing
	Somerton		Complete Pod Solutions	Complete Pod Solutions
	Somerton		Foamex North	Foamex Group Pty Ltd
	Somerton		Close the Loop	Close the Loop
	Strathmerton		Plastic Forests Pty Ltd	Plastic Forests Pty Ltd
	Sunshine		National Polystyrene Systems	National Polystyrene Systems
	Sunshine		Styro Polymers	Styro Polymers
	Wendouree		Ballarat Regional Industries	Ballarat Regional Industries
WA	Bellevue	8	Poly Pipe Recycling	Poly Pipe Recycling
	Broome		Broome Waste Management	Broome Shire Council
	Como		South Perth Recycling Centre	South Perth City Council
	Forrestdale		Astron Sustainability	Astron Sustainability
	Maddington		M8 Sustainable	M8 Sustainable Ltd
	Maddington		Green Machines Lab	Green Machines Lab
	Picton East		Hastie Waste Pty Ltd	Hastie Waste Pty Ltd
	Welshpool		Claw Environmental	Claw Environmental

Paper and Cardboard

 Table 2: Detailed list of Australian Paper and Cardboard Recyclers and Reprocessors¹².

State	Location	State Total	Facility	Owner
ACT	Fyshwick	3	Shred-X ACT	Shred-X
	Hume		JJ's Hume	JJ's Waste & Recycling
	Hume		Waste Away	Kaleja Pty Ltd
NSW	Botany	14	Visy Botany	Visy Paper Pty Ltd
	Brookvale		Cozens Paper Recycling Pty Ltd	Cozens Paper Recycling Pty Ltd
	Kembla Grange		Visy Recycling Wollongong	Visy Paper Pty Ltd
	Matraville		Orora Botany Mill	Orora Ltd
	Mona Vale		CellMark Recycling	CellMark Recycling Pty Ltd
	Moorebank		Paper Trade Processing (Aust) Pty Ltd	Paper Trade Processing (Aust) Pty Ltd
	Smithfield		Smithfield Paper Recycling Facility	
	Somersby		Earthcare Recyclers	ASD Paper Recyclers Pty Ltd
	St Peters		Visy Paper Pty Ltd	Visy Paper Pty Ltd
	Thurgoona		Visy Paper Mill	Visy Paper Pty Ltd
	Tumut		Visy Pulp & Paper Pty Ltd	Visy Pulp & Paper Pty Ltd
	Wagga Wagga		Kurrajong Recycling	Kurrajong Recycling
	Wetherill Park		Suez Sydney Baling Services	Suez Australia Pty Ltd
	Wetherill Park		Shred-X NSW	Shred-X
QLD	Archerfield	7	Security Shred Australia	Security Shred Australia
	Banyo		Queensland Document Destruction	Queensland Document Destruction
	Bundaberg		Bundaberg Paper & Cardboard	Toowoomba Paper Recyclers
	Carole Park		Queensland Tissue Products	Queensland Tissue Products
	Helensvale		FibreCycle	FibreCycle Pty Ltd
	Hemmant		Cleanaway Hemmant Recycling	Cleanaway
	Toowoomba		Toowoomba Paper Recyclers	Toowoomba Paper Recyclers
SA	Lonsdale	6	Suez	Suez Australia Pty Ltd
	Lonsdale		FibreCycle	FibreCycle Pty Ltd
	Ottoway		Recall Information Management	Recall Information Management
	Pooraka		Green Team	Green Team
	Wingfield		YCA Recycling	YCA Recycling
	Wingfield		Shred-X SA	Shred-X
TAS	Derwent Park	1	Shred-X Tas	Shred-X
VIC	Altona North	18	Cleanaway Altona	Cleanaway
	Altona North		Orora Recycling	Orora Recycling
	Coolaroo		Visy Coolaroo	Visy

¹² Introduction to the Australian waste and resource recovery infrastructure database, National Waste Data Cycle 2019-22, Department of Agriculture, Water and the Environment

State	Location	State Total	Facility	Owner
	Dandenong South		Insulfluf	Insulfluf
	Dandenong South		Australian Paper Recovery	Australian Paper Recovery
	Knoxfield		Enviroflex	Enviroflex
	Laverton North		Shred-X Vic	Shred-X
	Laverton North		Encore Tissues	Encore Tissues
	Laverton North		Visy Laverton	Visy
	Maffra		Maffra Waste Disposal	Maffra Waste Disposal
	Maryvale		Australian Paper	Opal
	Moolap		GT Recycling	GT Recycling
	Morwell		Lifeline Gippsland	Lifeline Gippsland
	Preston		Huhtamaki	Huhtamaki
	Shepparton		Foott Waste & Recycling	Foott Waste & Recycling
	Wendouree		Paper Freight Australia	Paper Freight Australia
	Wendouree		Ballarat Regional Industries	Ballarat Regional Industries
	Wodonga		Visy Wodonga	Visy Board Pty Ltd
	WA		Balcatta	16
Baldivis		Millar Road Landfill Facility	Rockingham City Council	
Broome		Broome Waste Management Facility	Broome Shire Council	
Como		South Perth Recycling Centre	South Perth City Council	
Landsdale		Suez Landsdale Resource Recovery Park	Suez Australia Pty Ltd	
Landsdale		Encore Recycling & Resource Recovery	A1 Waste Management Pty Ltd	
Middle Swan		Earthcare Recycling Middle Swan	Earthcare Recycling Pty Ltd	
Morawa		Morawa Refuse & Transfer Station	Morawa Shire Council	
Narrogin		Narrogin Waste Management Facility	Narrogin Shire Council	
Picton East		Hastie Waste Pty Ltd	Hastie Waste Pty Ltd	
Red Hill		Red Hill Waste Management Facility	Eastern Metropolitan Regional Council	
Tammin		Tammin Refuse Facility	Tammin Shire Council	
Wattleup		Earthcare Recycling Wattleup	Earthcare Recycling Pty Ltd	
Welshpool		Suez Welshpool RRC	Suez Australia Pty Ltd	
Welshpool		Shred-X WA	Shred-X	
Witchcliffe		Davis Road Recycling & Waste Management Facility	Augusta Margaret River Shire Council	