

March 2019

POLYMER COATED PAPERBOARD

WORKING GROUP 2018



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Executive Summary

APCO has been charged by Environmental Ministers in Australia to lead the 2025 National Packaging Targets. To progress towards these targets, the following areas will need to be addressed:

- **Packaging design** will need to ensure that it is suitable for recovery through either reuse, recycling or composting
- **Infrastructure** will need to be available for the collection and recovery of all packaging types through either reuse, recycling or composting
- **End markets** will need to be strengthened to support the recycling industry
- **Consumers** will need to be informed and educated about the correct recovery channel for all packaging.

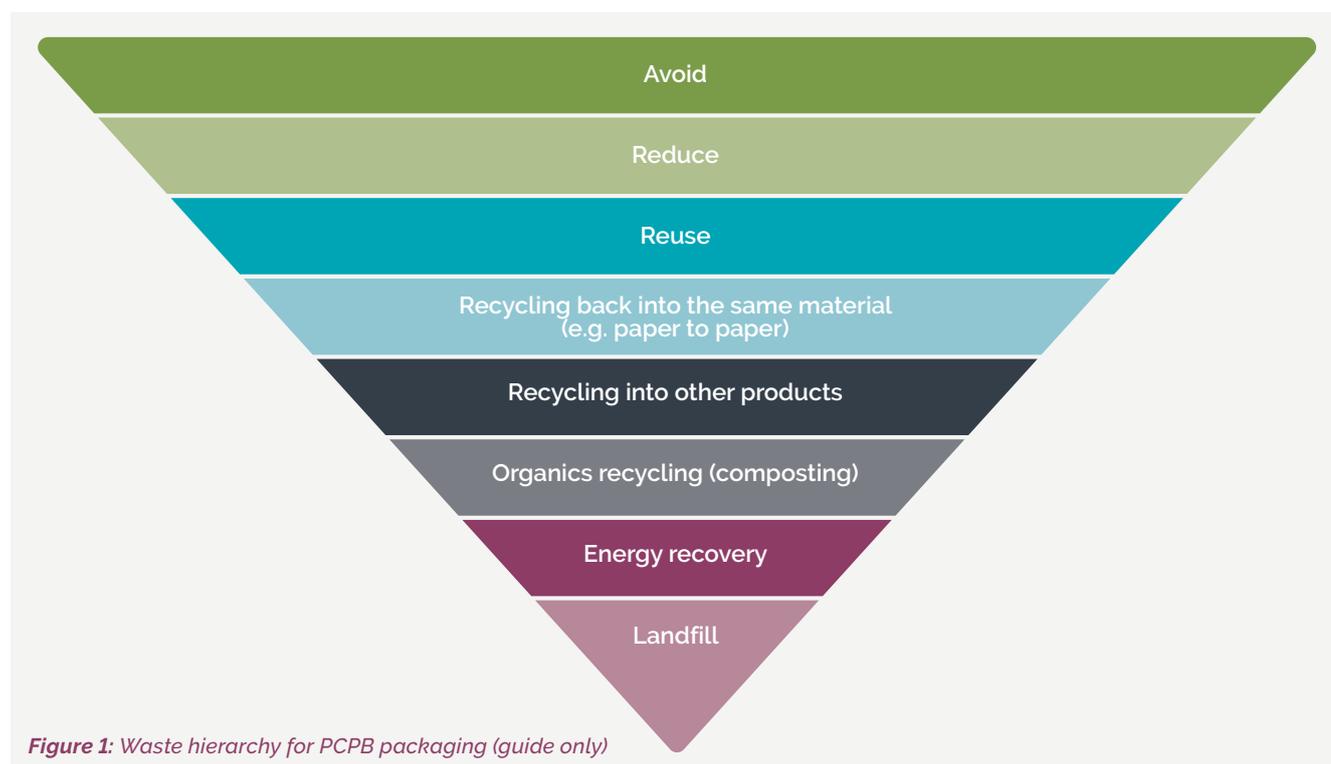
In 2018 APCO convened five working groups to investigate barriers and opportunities to improve the recovery of five 'problematic' packaging materials: glass, polymer coated paperboard (PCPB), soft plastics, biodegradable and compostable packaging, and expanded polystyrene (EPS). The groups worked to establish a shared understanding of the problem and to identify projects to be undertaken by stakeholders in the packaging value chain to support achievement of the 2025 National Packaging Targets for each material category.

The identified projects have been reviewed, prioritised and combined with other initiatives to develop projects for implementation in 2019. Priority projects for implementation in 2019 are summarised in Table 1. The individual projects aim to support the achievement of the 2025 National Packaging Targets by addressing packaging design, consumer engagement, recovery systems and end markets.

The PCPB Working Group (the Working Group) 2018 vision is for significant reduction in PCPB single use packaging, and for all PCPB packaging to be designed for recycling, with clear pathways for collection and recycling that keep it out of landfill.

In accordance with the waste hierarchy and circular economy principles, end markets for recycled PCPB need to achieve the highest potential environmental value (see Figure 1¹). The ultimate goal is to recycle as much as possible back into the same material, which is generally paper. As a general rule, at least 70% of a packaging item by weight needs to be recycled into another product for it to be classified as 'recyclable'. If recycling of the main material component (by weight) back into the same material is not possible (e.g. paper to paper or steel in composite cans back into steel), the next best alternative is for recycling into other products that can also be recycled at end of life.

¹ NSW Environment Protection Authority (2018), *Too good to waste: discussion paper on a circular economy approach for NSW*, October, p. 23



This Working Group proposes that packaging that cannot be collected for material recycling, e.g. because it is too contaminated with food or another organic nutrient, could be designed for organics recycling. Due to the composite structure of PCPB, energy recovery may also be a viable option for residual packaging that cannot be recovered in any other way.

The vision for PCPB packaging includes:

- **Avoidance:** Advocacy of reusable alternatives where possible.
- **Awareness:** Shared knowledge across all stakeholders, including councils, on what to recycle and how to recycle, supported by accurate consumer labelling. Consumers reusing where possible and recycling.
- **Design:** Clear guidelines on how to design PCPB packaging to optimise recyclability being followed by all manufacturers and brand owners. Non-recyclable PCPB replaced by alternative, recyclable materials. Use of recycled content where possible, with recycled content labelling.
- **Collection:** Collection systems in place to meet different markets, including households (kerbside), public places and food service (commingled or dedicated collections). All stakeholders including councils and shopping centres share responsibility.
- **Sorting:** PCPB able to be sorted in existing infrastructure (MRFs) for recycling as a potentially separate stream.

- **End markets:** Expanded markets for PCPB, particularly in the paper stream; and potentially to include a dedicated PCPB recycling facility.

Key themes that emerged from the Working Group include:

- The need for more accurate and detailed data on packaging consumption and recycling
- Suggestions for reduction or elimination of problematic and unnecessary packaging
- Additional resources to support sustainable packaging design and procurement
- Consumer education on packaging reduction and correct recycling
- The need for targeted industry education on packaging design, procurement and recycling
- Collection and recycling infrastructure gaps and lack of local end markets
- Government procurement to support end market development.

This report has been prepared by APCO in collaboration with the APCO PCPB Working Group 2018. The purpose of this document is to analyse the current status of PCPB packaging materials and propose projects to increase the recovery of these packaging materials.

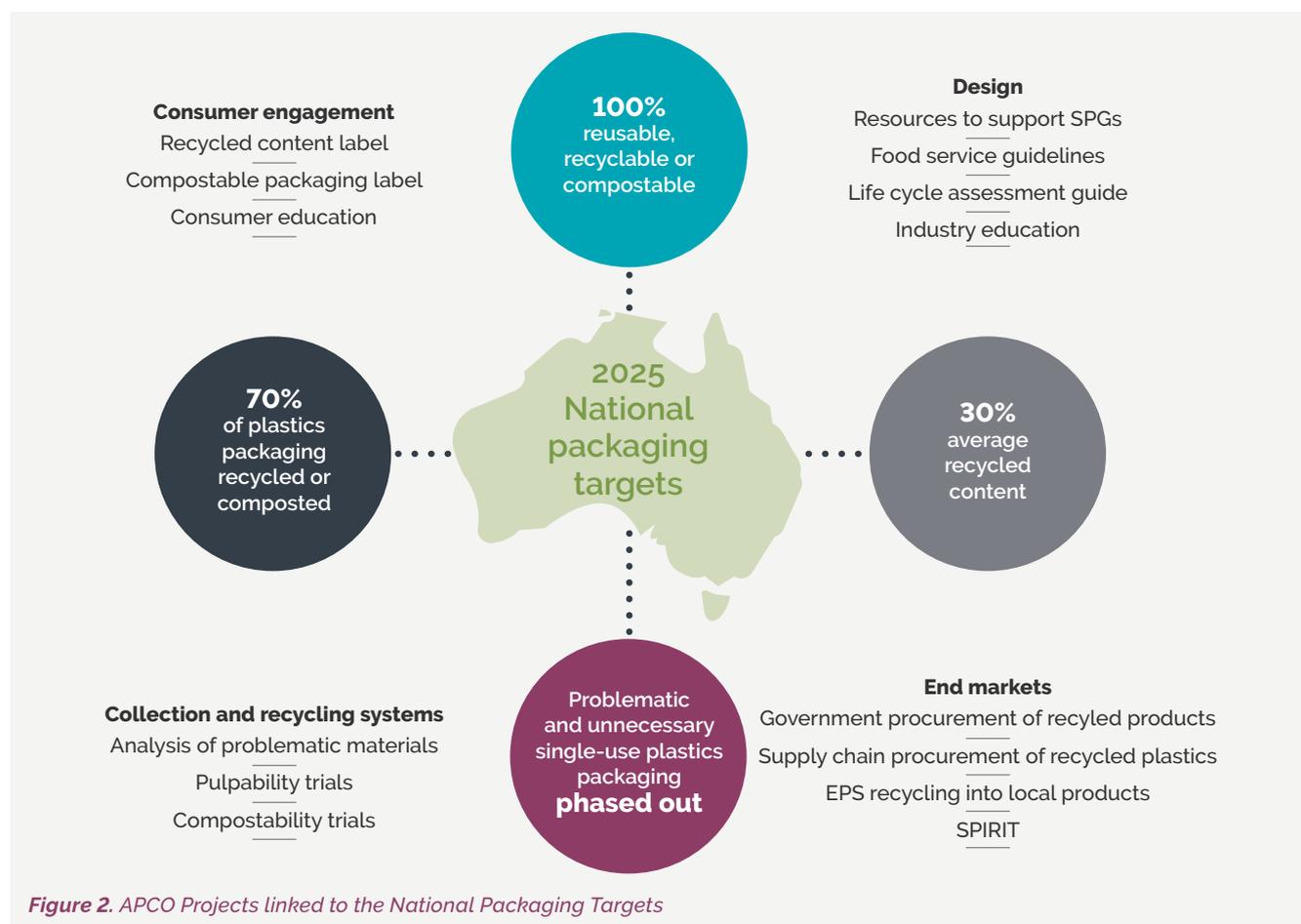


Table 1. APCO's priority projects 2019

PROJECT NAME	DESCRIPTION	APCO 2019 WORKING GROUP	
1. Packaging baseline data	1.1 Packaging consumption and recycling	National Packaging Targets Implementation (NPTI)	
	1.2 Infrastructure mapping		
	1.3 Economic analysis of alternative collection systems and end markets		
	2. Public statements on specific materials		
3. White paper on problematic and unnecessary packaging	Paper to identify target products/materials and build the case for phase- out		
4. Options to standardise recycling systems	Modelling strategic options to facilitate achievement of the 2025 NPT		
5. Resources to support the Sustainable Packaging Guidelines	5.1 Quickstarts: (i) recovery pathways, (ii) glass, (iii) PCPB, (iv) EPS, (vi) PET, (vii) labelling		Design
	5.2 Design for soft plastics packaging (build on CEFLEX)		
	5.3 Design for compostable packaging		
	5.4 Wine packaging guidelines		
6. Food service packaging guidelines	Engagement workshops, guidelines & case studies		
7. Compostable packaging label	New label to align with the Australasian Recycling Label (ARL)		
8. Recycled content label	New label to align with the ARL		

PROJECT NAME	DESCRIPTION	APCO 2019 WORKING GROUP
9. Life cycle assessment (LCA) guide	Database and guidelines	Design
10. Consumer education	How to recycle – including the ARL	Systems & Education
11. Analysis of problematic packaging materials	Trials to investigate specific issues	
12. Pulpability trials	Trials to investigate pulpability of polymer coatings, non- wood fibres etc	
13. Packaging supply chain training	Training in collaboration with AIP on PSF – including SPGs, PREP/ARL	
14. Models for phase out of single use plastics	Working with Boomerang Alliance on council / community case studies to reduce/replace plastics	
15. Composting trials	Research to analyse compostability of different certified materials	
16. Regional model for soft plastics recycling	Working with Plastic Police to evaluate and document a regional collection and market development model	
17. Remote/regional waste collection partnerships	Workshop on potential partnership- based solutions to packaging waste collection in remote and regional Australia	Materials Circularity
18. Government procurement of recycled products	Guide on buying recycled including case studies and technical information	
19. Supply chain procurement of recycled plastic products	Case studies with APCO Members to identify end market opportunities for soft plastics	
20. EPS collection and end market pilot	Working with EPSA to document and share a model to collect and reuse EPS in waffle pods	
21. Sustainable Packaging Information and Resource Interactive Terminus (SPIRIT)	Resource to help industry and government make sustainable purchasing choices	
22. Innovation Hub	Driving innovation in Australia to address the future of sustainable packaging	

Definitions

Table 2. Definitions relevant to polymer coated paper board packaging

ITEM	DESCRIPTION
Polymer coated paperboard (PCPB)	Refers to 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.
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; excluding energy recovery and the use of the product as a fuel. ²
Recycled packaging	Packaging is recycled if at least 70% of its weight is recycled (see material recycling definition) into a product, a component incorporated into a product, or a secondary (recycled) raw material; excluding energy recovery. ³
Outthrows	The material contained in recovered paper that is (in part or in whole) made of fibre, but is treated as a contaminant in re- processing, because it is unsuitable for the specific grade of recovered paper and its intended end- use. ⁴
Materials Recycling Facility (MRF)	Facilities where mixed recyclables are sorted into marketable streams. ⁵
Compostable	Aerobic process designed to produce compost, whereby a product undergoes degradation by biological processes to yield CO ₂ , water, inorganic compounds and biomass at a rate consistent with other known compostable materials and leave no visible, distinguishable or toxic residue. ⁶
Design	Includes choice of materials, additives, colours, labels, glues, inks, caps and closures, format, dimensions, etc.
Highest potential environmental value	Recovery is occurring at the optimal level of the waste hierarchy, based on available recovery systems and sustainability impacts of alternative recovery options (e.g. composting vs. recycling, or recycling vs. energy recovery). Reuse is encouraged prior to recovery when there is evidence that it extends the life of the packaging and achieves positive sustainability outcomes.
Labelling	Can be in the form of a statement, symbol or graphic on a purchased product at any point in the supply chain, but most commonly used at the final point of sale (e.g. retail).
Packaging Recyclability Evaluation Portal (PREP)	An online tool that provides clear, consistent and validated information about the recyclability of specific packaging formats
Recyclable	In a particular geographical area, at least 80% of the overall population has convenient access to a service that collects the packaging or packaging component, and that this item can be recovered and sorted in a stream where at least 70% of its weight can be recycled into another product. This should consider its design, manufacturing process and most likely way of using, disposing and collecting it.
Recycled content	The proportion, by mass, of pre- consumer and post- consumer recycled 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	Includes both material recycling (maintaining material structure) and chemical recycling (e.g. breaking materials down into more basic building blocks). It explicitly excludes technologies that do not reprocess materials back into materials but into fuels or energy.
Waste hierarchy	Places the highest priority on avoidance (action to reduce the amount of waste generated) followed by resource recovery (reuse) followed by recycling, reprocessing and then energy recovery, consistent with the most efficient use of the recovered resources; and finally, disposal in the most environmentally responsible manner.

² APCO (2019) Sustainable Packaging Guidelines

³ APCO (2019) Sustainable Packaging Guidelines

⁴ Industry Edge (2015). Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities.

⁵ Industry Edge (2015). Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities

⁶ ISO 472:2013, Plastics – Vocabulary; ISO 17088:2012. Specifications for compostable plastics.

Scope

Table 3 provides an overview of the PCPB packaging that the Working Group focused on in 2018. Table 4 depicts the general material composition and estimated proportion of different materials for

some of the key PCPB packaging types. Whilst we draw learnings from international technologies and approaches, the scope of this Working Group is concentrated on the Australian market.

Table 3. Scope of PCPB packaging types

PACKAGING FORMAT	DESCRIPTION	EXAMPLES
Gable top containers (poly-laminate)	Contain a small quantity of high wet-strength virgin fibre, protecting them from failure associated with prolonged contact with moisture. Often, high-wet strength content makes gable top containers less attractive for re-processing, especially into paperboard.	Milk and juice cartons
Aseptic containers (multi-laminate)	Intended to maintain the sterility of products (generally food and pharmaceuticals) and is therefore itself sterile. The most complex, typically including three layers of polyethylene and a player of foil, in addition to fibre content.	Shelf stable products such as long-life milks, long-life juices, etc.
Hot cups	Do not have an outer polyethylene lining but can be constructed of multiple fibre walls and encased in other heat barriers, such as corrugated fibre. Greater permeability to fluid increases recyclability. Printing directly onto fibre however reduces fibre recovery in recycling and increases the reprocessing required to de-ink the fibre.	Take-away coffee cups
Cold cups	Similar to hot cups, however generally contain an outer layer of polyethylene in addition to the inner layer, to protect the fibre from the ingress of moisture arising from condensation.	Take-away soft-drink and juice cups
Other take-away food containers	Similar to hot cups.	Clamshell packaging, ice cream cups, catering boxes, paper trays, boards, boxes, wrappers
Packaging for refrigerated storage at home	The coating provides added strength and/or increased water resistance, meaning produce can be packaged and stored in a cool room or transported in a refrigerated truck.	Frozen food cartons and tubs (e.g. pizzas, ice cream)
Composite cans	Carton board with polymer coating on the outside and aluminium liner, with steel or aluminium ends.	Contains dry goods with high salt content e.g. stock powder
Other PCPB packaging consumed at home	The coating provides added strength and/or increased water resistance.	Washing detergent boxes, polymer-paper pouches, noodle boxes, backing board, etc.
Fresh produce boxes	Boxes used to distribute fresh produce often have a polymer or wax coating. Wax is typically used for strengthening boxes that tend to be drenched in water.	Fruit and vegetable boxes
Glassine	Glassine is a fibre-based paper with a silicon coating applied to enable the release of the labels.	Fresh produce boxes, label backing

Table 4. Material composition by PCPB type and estimated proportion⁷

PCPB TYPE	MATERIAL COMPOSITION OUTSIDE- TO- INSIDE (%)				
	POLYETHYLENE	PAPERBOARD	POLYETHYLENE	FOIL	POLYETHYLENE
Gable Top	9	78	13	-	-
Aseptic	7	75	7	4	7
Hot cups	-	93	7	-	-
Cold cups	5	88	7	-	-

Other: E.g. Label backing

- Paper label backing with a silicone coating to help labels release easily ('glassine')
- Example weight: Usually between 55gsm and 80gsm
- Liner caliper: Usually between 0.05mm and 0.07mm
- Silicone coat weight can vary from between 0.5gsm and 2.0gsm.

Other: E.g. Washing detergent box

- Carton board with a low density polyethylene (LDPE) coating – inside only
- Lining thickness: 25µm to 35µm (weight: 25 to 35gsm)
- Proportion between 5% and 8.5% of total thickness.

⁷ Industry Edge (2015). Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities.

Stakeholder Identification

Table 5 depicts the key groups across the packaging value chain that will need to be engaged in the design or implementation of the identified projects.

Table 5. Key groups across the PCPB packaging value chain

STAKEHOLDER	DRIVERS	CHALLENGES
Packaging manufacturers	<ul style="list-style-type: none"> - Meet sustainability / recyclability targets in corporate social responsibility strategies - Search for more sustainable materials e.g. renewable / recyclable 	<ul style="list-style-type: none"> - Maintain product quality - Cost of recycled materials - Recycled materials not meeting food contact standards - Capability of existing production machinery
Brand owners packaging in PCPB e.g. FMCG manufacturers, quick service restaurants, events, hotels, cafes etc.	<ul style="list-style-type: none"> - Consumer interest in recycling - Meeting sustainability / recycled content targets in corporate social responsibility strategies - Quality / performance specifications for packaging - Political pressure to improve recycling 	<ul style="list-style-type: none"> - 'Greenwashing' by suppliers e.g. 'biodegradable' and 'compostable' marketing that is not substantiated. - Knowledge / awareness - No clear guidelines on recyclability - Availability of recyclable alternatives - Costs of collection / recycling
Consumers in different locations e.g. home vs away from home	<ul style="list-style-type: none"> - Generally, want to 'recycle right' - Ease of use / functionality 	<ul style="list-style-type: none"> - Confusion about what is recyclable in kerbside and what is not - Lack of collection facilities for recycling away from home - Knowledge and motivation
Facility managers and cleaners	<ul style="list-style-type: none"> - Efficiency - Clean and uncontaminated material streams 	<ul style="list-style-type: none"> - Awareness / knowledge on how to segregate for recycling - Cost of recycling
Waste & recycling e.g. collection services, MRF operators	<ul style="list-style-type: none"> - Service meets client needs - Efficiency - Profit margin - Quality materials that meet end market requirements 	<ul style="list-style-type: none"> - PCPB not a targeted material by paper mills - Meeting low contamination limits in end markets e.g. China
Councils	<ul style="list-style-type: none"> - Want to maintain viable recycling systems / meet residents' expectations - Litter reduction 	<ul style="list-style-type: none"> - Lack of consistent information on recyclability across council areas and/or from different contractors
Paper mills	<ul style="list-style-type: none"> - Quality of raw materials to match processing technology and end markets - Pulpability 	<ul style="list-style-type: none"> - Impacts on machinery and efficiency - Costs of disposing of contaminants (plastic, aluminium) - Landfill costs
State and Federal government	<ul style="list-style-type: none"> - Increasing prevalence as we shift away from single- use plastics into single- use paper - Container Deposit Scheme (CDS) 	<ul style="list-style-type: none"> - Lack of knowledge of costs and benefits of different markets

Materiality Statement

In line with optimising environmental outcomes based on the waste hierarchy, a significant proportion of PCPB single-use packaging could be reduced through substitution with reusable alternatives, particularly hot and cold cups.

While some categories of PCPB are classified as 'widely recycled' in the kerbside collection system, their composite structure and the use of wet strength additives can affect the cost effectiveness of recovery through MRFs and subsequent paper mills, locally or internationally.

The main challenges for PCPB recycling include:

- **Market trends:** Consumption of PCPB is increasing, driven in part by a global move to replace plastics with more recyclable materials. There is a perception that paper-based is more recyclable or sustainable than plastics, but this is not always the case.
- **Materials:** PCPB packaging includes at least two materials (paper and a polymer coating) and sometimes three (paper, polymer and aluminium foil). Heavy polymer coatings and the presence of wet strength additives cause a reduction in fibre recovery and operational inefficiencies in paper mills, which operate continuously and therefore have limited flexibility to extend pulping times or change screens to accommodate for different materials. Australian paper mills currently have no financial incentive to invest in technologies to improve recovery without the assurance of a regular supply of high-quality PCPB formats and viable end markets.
- **Format:** The rigid three-dimensional shape of some PCPB formats makes them potentially difficult to sort at MRFs to ensure they end up in the paper stream.
- **End markets:** There is currently no dedicated recycling facility in Australia for PCPB making paper mills the primary market, along with landfill. This means that polymer and aluminium components are not recycled, and fibre is lost along with contaminants. Some paper mills would be interested in a regular, large supply of high quality (long fibre) paper from PCPB.
- **Recycled content:** While technically possible, food contact standards for packaging restrict 'closed loop' recycling back into some packaging.
- **Away from home consumption:** Most coffee cups and food service packaging are consumed away from home, making kerbside recycling ineffective for these applications.

Key Priority Areas

The key priority areas to be addressed include:

- 1. Improved knowledge:** Collect detailed data on consumption and recycling to inform decision-making.
- 2. Stakeholder engagement:** Engage with key stakeholders in the recovery chain to identify actions that can be taken to improve technical recyclability and commercial viability of recycling, and solutions that are cost effective for all stakeholders.
- 3. Packaging design:** Facilitate design for recycling by providing packaging suppliers and brand owners with clear guidelines that are accepted by MRF operators, paper mills and other end markets.
- 4. Collection and recycling systems:** Facilitate an expanded infrastructure based on evidence of environmental and financial viability of alternative collection and recycling systems.
- 5. Market development:** Support new or expanded end markets for recycled PCPB packaging.
- 6. Supply chain knowledge:** Increase supply chain knowledge and awareness of PCPB recyclability and best practices, particularly amongst brand owners and packaging suppliers.
- 7. Brand owner responsibility:** Encourage corporate social responsibility by promoting the business case for brand owners to become involved in recycling programs.
- 8. Consumer education:** Encourage consumers to reduce consumption and dispose of their used PCPB packaging correctly.

Baseline Data

a. Consumption of Packaging in Australia

In 2015, Australians consumed an estimated 56,492 tonnes of PCPB each year⁸, although the data excluded some categories of PCPB within scope of this project. Table 6 shows this consumption broken down into the four main types of PCPB by annual consumption.

Table 6. Australian consumption of PCPB by type (2013- 14)

	GABLE TOP	ASEPTIC	HOT CUP	COLD CUP	TOTAL
Consumption (tonnes)	13,852	22,815	12,955	6,870	56,492
Proportion of total (%)	24.5	40.4	22.9	12.2	100

Of the 56,494 tonnes consumed in Australia, 2,293 tonnes is estimated to be imported pre- filled.⁹ Consumption of PCPB is entirely from imported substrates, much of which is imported pre-converted in 'ready to fill' or at least 'ready to run' formats¹⁰.

PCPB packaging is used primarily in the food and beverage sector, as well as in pharmaceutical and personal care, cleaning products, and fresh produce (business-to-business). Refer to Table 3 for application examples. Data is not currently available for the 'other' category.

⁸ Industry Edge (2015). Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities.

⁹ Industry Edge (2015). Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities.

¹⁰ Industry Edge (2015). Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities.

b. Recovery and Recycling

Table 7 depicts the calculated consumption and recovery/recycling of PCPB by weight. In 2013- 14, an estimated 28% of PCPB (gable top, aseptic, hot cups and cold cups) consumed in Australia was collected for recycling. Most gable top and aseptic containers are consumed at home and therefore were most likely to be collected through kerbside. Of the collected 15,900 tonnes of PCPB in 2015, 95% of this was calculated to be diverted from landfill via recycling, waste- to- energy, compost or other alternatives. In 2017- 2018, it was estimated that less than 1000 tonnes of liquid paper board was collected through CDS¹¹. The recycling rate (including export) is estimated to be 21.1%.

Table 7. Consumption, recovery, recycling and landfill by type (volume and percentage). Note: includes imported pre- filled beverage, liquid food containers and food cups, etc.¹²

2013- 14		GABLE TOP	ASEPTIC	HOT CUP	COLD CUP	TOTAL
Consumption	(t)	13,852	22,815	12,955	6,870	56,492
Recovery (collection)	(t)	5,507	8,473	1,057	863	15,900
	(%)	39.8	37.1	8.2	12.6	28.1
Recycling (inc. export)	(t)	4,209	5,876	1,019	825	11,929
	(%)	30.4	25.8	7.9	12.0	21.1
Energy	(t)	584	1,168	0	0	1,753
	(%)	4.2	5.1	-	-	3.1
Compost	(t)	454	909	0	0	1,363
	(%)	3.3	4.0	-	-	2.4
Other	(t)	65	130	0	0	195
	(%)	0.5	0.6	-	-	0.3
Implied landfill	(t)	8,540	14,732	11,936	6,045	41,253
	(%)	61.6	64.6	92.1	88.0	73.0

Similar to Table 7, Tetra Pak reports that the 2016 global recycling rate of their product packaging is 24.9%, equating to a total of 47 billion packages annually¹³. This suggests that PCPB formats are 'problematic' materials to recycle internationally.

i. Reuse systems

The composition of PCPB packaging means that it is relatively strong and durable compared to uncoated cardboard. This could see reuse opportunities introduced in future years, primarily for business- to- business applications such as produce boxes.

¹¹ Institute for Sustainable Futures, 2019. Final Report: APCO Packaging Material Flow Analysis 2018.

¹² Industry Edge (2015). Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities

¹³ Tetrapak (2018). Available at: <https://www.tetrapak.com/au/sustainability/environmental-impact/a-value-chain-approach/sustainability-measuring-and-reporting/performance-data>

ii. Collection and sorting systems for recycling

Kerbside recycling: gable top and aseptic containers are widely accepted in Australian kerbside recycling bins. This has been advertised by many councils and manufacturers for some time¹⁴. These are invariably commingled with other recyclables. The majority of PCPB from kerbside collections are separated at MRFs and baled with other paper and cardboard streams. It has been estimated that collected gable top and aseptic cartons make up around 0.6% of Mixed Paper bales, 0.3% of Old Corrugated Containers (OCC) and 0.1% of bleached (mainly office) paper.¹⁵

Alternative destinations:

- Some organisations are starting to collect coffee cups through dedicated collection programs, for example, *Simply Cups* - Closed Loop in partnership with 7- Eleven¹⁶, *RecycleMe* - Detmold in partnership with Shred- X and Australian Paper¹⁷ and Cleanaway in partnership with Grinders Coffee¹⁸, Biopak partnerships with composters and cafes¹⁹.
- Some PCPB beverage containers are eligible for collection through state/territory container deposit schemes, e.g. some fruit juices and flavoured milks.²⁰

iii. Reprocessing

According to the 2015 Industry Edge research report, no recovery or recycling facility willingly receives PCPB in Australia²¹. Largely commingled streams and high compaction practices mean PCPB is collected incidentally with other fibre packaging and paper. Where PCPB is recovered, these volumes are generally recorded in the Mixed Paper stream, and in some cases the OCC stream. These bales are either sent directly to the domestic paperboard processing facilities, or exported. In 2013, Mixed Paper accounted for 42.2% of paper and paperboard recovered in Australia.

Due to the absence of specific sorting, bale audits must be conducted to measure the amount of PCPB contamination. Kerbside collected bales have been routinely recorded with contamination levels above 10% and as high as 14%²². Both the Australian Council of Recycling (ACOR) and the international Institute of Scrap Recycling Industries (ISRI) standards for Mixed Paper allow for up to 3% out- throws. The recent import restrictions imposed by the Chinese Government require no more than 0.5% contamination in certain categories of waste imports, including Mixed Paper and OCC²³.

¹⁴ Planet Ark – Recycling Near You (2018). Available at: <https://recyclingnearyou.com.au/milk-juice-cartons/SydneyNSW>

¹⁵ Industry Edge (2015). *Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities*.

¹⁶ *Simply Cups* (2018). Available at: <https://www.simplycups.com.au/how-it-works>

¹⁷ *Packaging News* (2017). Available at: <http://www.packagingnews.com.au/news/australia-s-first-recyclable-coffee-cup-under-trial>

¹⁸ *News.com.au* (2018). Available at: <https://www.news.com.au/national/western-australia/grinders-coffee-cleanaway-recycling-trial-puts-squeeze-on-singlecup-waste/news-story/312f1c8921ed09abb480e50c6a67ed6>

¹⁹ *BioPak*(2018) *Compost Service* <https://www.biopak.com.au/compost-service>

²⁰ SA EPA (2018). Available at: https://www.epa.sa.gov.au/environmental_info/container_deposit

²¹ Industry Edge (2015). *Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities*

²² Industry Edge (2015). *Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities*

²³ APCO (2018) 'Market impact assessment report: Chinese import restrictions for packaging in Australia'. Available at: <https://www.packagingcovenant.org.au/documents/item/1224>

iv. Recycling technologies

Some current and emerging technologies to recycle PCPB formats are listed in Table 8

Table 8. Summary of PCPB recycling technologies and suitable feedstock

RECYCLING TECHNOLOGY	SUITABLE FEEDSTOCK	DESCRIPTION
Recycling at paper mills as part of a Mixed Paper or OCC stream	PCPB not sought due to fibre losses during pulping and other contaminants (plastic, aluminium).	Papers are broken down to fibres in a wet pulping process and contaminants removed. Between 45- 87% of PCPB product can be recovered as fibre ²⁴ . Contaminants, such as plastics and aluminium, are generally landfilled unless used for energy generation or composting. The current equipment and continuous- line style processes at paper mills do not allow for processing of PCPB as a separate stream (PCPB would require longer pulping to more effectively remove the fibres from the polymer).
Dedicated PCPB processing: coffee cups into plastic or paper e.g. Simply Cups (By Closed Loop and 7-eleven) ²⁵	Hot cups	Simply Cups – is working with local innovators to trial alternative processes to recover the cups. Currently, Newtecpoly recycle the cups together with other plastic wastes to make moulded plastic products such as kerbing, with the paper component acting as a filler to increase rigidity. Another company has developed technology to separate the plastic lining from the paper. Other recycling opportunities are also being investigated, such as rCUP. ²⁷
e.g. RecycleMe (by Detpak and Shred- X) ²⁶		RecycleMe - Recycling coffee cups through segregated collection at source and utilising an existing collection infrastructure for transport (Shred- X), recycling back into 100% recycled copy paper (Australian Paper). ²⁸
E.g. Cleanaway/Grinder Coffee trial in Perth, WA.		Cleanaway/Grinder - The trial is a collaboration between the waste and coffee industries to determine if behaviour changes at disposal (squeeze and squash) will ensure recycling through existing co-mingled systems. This trial will review the effectiveness of recycling disposable coffee cups as paper and make recommendations for future action. ²⁹

²⁴ Industry Edge (2015). Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities.

²⁵ Simply cups (2018). Available at: <https://www.simplycups.com.au/>

²⁶ Detpak – RecycleMe (2018). Available at: <https://www.detpak.com/recycleme/>

²⁷ Simply Cups – rCup (2018). Available at: <https://www.simplycups.com.au/rcup>

²⁸ Detpak – RecycleMe (2018). Available at: <https://www.detpak.com/recycleme/>

²⁹ News.com.au (2018). Available at: <https://www.news.com.au/national/western-australia/grinders-coffee-cleanaway-recycling-trial-puts-squeeze-on-singlecup-waste/news-story/312f1c8921ed0gabb480e50c6a67ed6>

RECYCLING TECHNOLOGY	SUITABLE FEEDSTOCK	DESCRIPTION
<p>Dedicated PCPB processing:</p> <p>PVC/Separation</p> <p>(Paper Freight – in development) ³⁰</p>	All PCPB	<p>Chemical process – product is soaked in chemical for a short period of time then the chemical is drained off and a catalyst is added, causing a reaction that separates the paper from the plastic.</p> <p>All products, once separated, can then be diverted into specific recycling streams to be made into other products.</p> <p>The same process works on all products, but the plant model could be different as some will need other machinery to start and finish the process.</p>
Dedicated PCPB processing: paper	All PCPB	<p>PCPB formats contain long, strong virgin bleached softwood fibres that are valuable if effectively separated. Currently, pre- shredding is used to help with the separation of polymers from paper, before entering the pulping processes. An international example is Meri Solutions (a Voith Company)³¹, who manufacture a high quality printable top- liner for corrugated boxes and possibly cartons.³² In Australia, Avery Dennison have partnered with Wasteflex to develop a technology to recycle Pressure Sensitive Glassine Liner Waste into tissue paper.</p>
Dedicated PCPB processing: mixed board products	Gable top and aseptic cartons	In overseas markets (EU and India) Tetra Pak recycle cartons without chemicals into roofing sheets, classroom furniture, recycling bins, playground equipment and schoolbooks. ³³
Alternatives: Composting	Compostable polymer lining e.g. PLA	Where food and drink contamination is an issue, alternatives to recycling become increasingly attractive. For example, BioPak ³⁴ compostable coffee cups and compost service. Since December 2017, the initiative has signed up over 150 businesses to the service and have diverted more than 350 tons of organic waste including compostable cups from landfill.

³⁰ The Courier (2017). Available at: <https://www.thecourier.com.au/story/4888058/ballarats-breakthrough-in-recycling/?cs=62>

³¹ Meri Environmental Solutions (2018). Available at: <https://www.meri.de/>

³² Industry Edge (2015). Research into Australian Polymer Coated Fibre Packaging (PCP) Material Flows and Collection, Recovery & Recycling Opportunities.

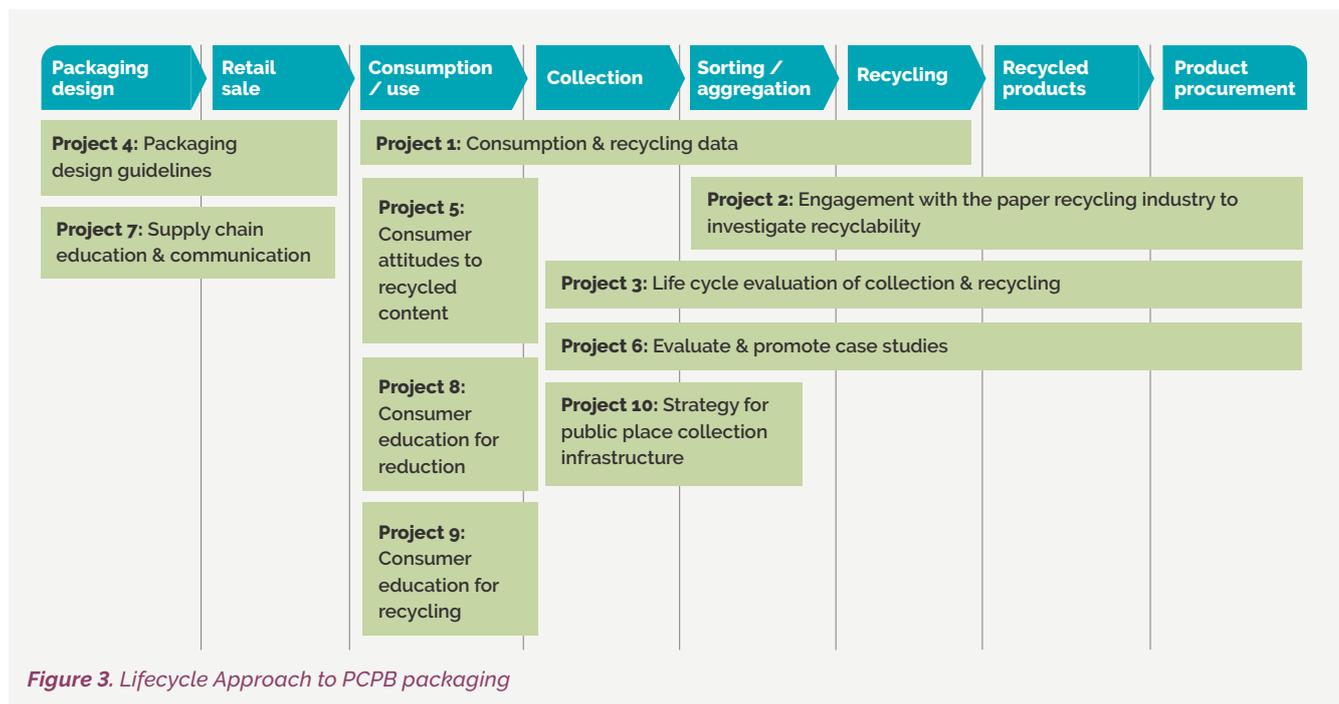
³³ Tetra Pak (2018). Available at: <https://assets.tetrapak.com/static/documents/sustainability/five-products-recycled-cartons.pdf>

³⁴ BioPak (2018). Available at: <https://www.biopak.com.au/>

Lifecycle Approach

In analysing the lifecycle approach, the Working Group discussed ten potential project opportunities. The proposed projects address issues across the PCPB packaging life cycle and value chain to ensure system-wide engagement and collaboration (Figure 3). The

identified projects have been reviewed, prioritised and combined with other priority initiatives to develop projects for implementation in 2019. Priority projects for implementation in 2019 are summarised in Table 1.



Conclusion

a. Conclusions

1. PCPB packaging collected at kerbside is generally sorted at MRFs into one of the paper streams, and either ends up at a paper mill in Australia or overseas. The remaining PCBP may be sorted into the plastics streams or lost to landfill.
2. Currently the equipment and processes at MRFs and paper mills do not allow for sorting PCPB as a separate stream.
3. Paper mills do not want PCPB as polymer coatings reduce pulpability and can hinder their processes, and therefore fibre recovery. Nevertheless, some PCPB formats such as coffee cups, contain a smaller percentage of plastic than for example gable top and aseptic cartons, which are currently considered recycle through the kerbside system.
4. There is a lack of consensus amongst stakeholders (industry, councils, MRF operators, etc.) on the correct way for consumers to dispose of PCPB at home, i.e. to recycling, composting or landfill, resulting in inconsistent or contradictory messaging.
5. Programs that source- separate coffee cups from commercial & industrial (C&I) venues, such as cafes and office buildings, for recycling are in the process of expanding after successful pilot / trial scale programs and may provide the most effective solution for hot cups consumed away from home. There is no similar solution currently available for cold cups, or other takeaway PCPB containers.
6. Australia does not have a dedicated PCPB recycling facility, however a number of alternative technologies to recover source- separated PCPB are being investigated or trialled. These include recycling into high quality paper, moulding into mixed plastic products, chemical recycling to separate plastic and paper and moulding into structural boards.
7. Source separation of PCPB would improve the quality of other paper streams and this may warrant further investment in sorting and reprocessing technologies.
8. There are many coated paper problematic packaging items that require further investigation and investment for recovery (e.g. polymer and silica combinations).

b. Knowledge and data gaps

- Material flows for PCPB including consumption volumes and sources; and recovery and recycling data by format type and location
- What happens to PCPB in MRFs
- The financial (cost/benefit) and environmental impacts (life cycle assessment) of different collection and recycling systems for PCPB (e.g. composting vs recycling; plastic vs paper recovery)
- The lifecycle impacts of alternative polymer linings, e.g. PE vs PLA and the impacts, if any, these materials have on the existing recycling stream
- Clear evidence of composition thresholds that affect recyclability.



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