AUSTRALIAN DAIRY SUSTAINABLE PACKAGING ROADMAP TO 2025

VERSION 1: OCTOBER 2021

APCO
AUSTRALIAN PACKAGING COVENANT ORGANISATION

ROADMAP ENDORSEMENT

The following companies have supported the development of and endorse the objectives described in the Dairy Packaging Roadmap 2021 – 2025.

ROADMAP DEVELOPER

Developers are the industry businesses and organisations that directly participated in the development of the Roadmap

Dairy Australia

ADPF
Australian Dairy Products Federation

BESTON GLOBAL FOOD COMPANY

Brownes dairy

Bulla FAMILY DAIRY SINCE 1910

BURRA FOODS AUSTRALIA

Chobani

Fonterra Dairy for life

Norco SINCE 1895

Woolworths The fresh food people

Bega

Saputo Dairy Australia

LACTALIS AUSTRALIA

ROADMAP SUPPORTER

Supporters are those who have endorsed and support the objectives and intentions outlined the Roadmap

ALDI

Ballantyne DAIRY INNOVATION

NUTRICIA LIFE-TRANSFORMING NUTRITION

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EXECUTIVE SUMMARY

The Australian Dairy Sustainable Packaging Roadmap to 2025 (The Roadmap) was developed by the Australian Packaging Covenant Organisation (APCO) in consultation with, and input from Australian dairy brands drawn from across the APCO Membership and Dairy Australia's industry-led Sustainable Packaging Working Group.[1]

The Australian dairy industry's Dairy Promise is "to provide nutritious food for a healthier world".[2] In continuing to deliver on this Promise, the industry is committed to achieving ambitious sustainability targets at every stage of the value chain - from the farm to the consumer. These targets are outlined in the *Australian Dairy Industry Council's (ADIC) Dairy Sustainability Framework (ADSF).*

Dairy manufacturers have already made significant progress on packaging sustainability, in areas such as reducing problematic and unnecessary single-use plastic packaging, designing for recycling at end-of-life and integrating recycled content into packaging, and there is much recent collaborative research driving progress in this space. The Roadmap builds on these achievements, supporting the industry's commitment to the *Australian Packaging Covenant*, the *2025 National Packaging Targets (2025 Targets),* the *ADIC Dairy Sustainability Framework,* the Australian Government's *National Waste Policy* and corresponding *Action Plan*, and the *National Plastics Plan.*

Through an action-oriented and evidence-based approach, the Roadmap crystallises a range of strategic actions that the dairy industry can voluntarily undertake to contribute to delivery of key national packaging targets and outcomes by 2025. The Roadmap also serves as a collective call to action, identifying external participants in the dairy packaging value chain – packaging manufacturers, plastic suppliers, retailers, waste and recycling companies and consumers – and the role they play in delivering the Roadmap objectives. The Roadmap offers a collaborative framework through which to deliver a more sustainable packaging system for the Australian dairy industry.

[1] *The Working Group is comprised primarily of members of the* ***Dairy Manufacturers Sustainability Council*** *(DMSC).*
[2] *Australian Dairy Sustainability Framework – Our Dairy Promise – Available at:* ***https://www.sustainabledairyoz.com.au/our-dairy-promise; retrieved 5 Aug 2021***

ROADMAP STRATEGIES AT A GLANCE

OUTCOMES BY 2025	OUTCOME 1: PACKAGING DESIGNED FOR CIRCULARITY	OUTCOME 2: IMPROVED COLLECTION & RECYCLING SYSTEMS	OUTCOME 3: EXPANDED MARKETS FOR USED PACKAGING
Targets	100% of packaging designed to be reusable, recyclable or compostable by 2025	Collection and recycling systems available for all packaging by 2025 80% of supermarket products to be labelled with the ARL by December 2023	50% average post-consumer recycled content across all packaging by 2025
Strategies	1. Eliminate problematic and unnecessary single-use plastic packaging. 2. Reduce packaging where feasible. 3. Use recycling and recycled content labels. 4. Reduce pigment in milk bottle caps. 5. Design soft plastics for recycling. 6. Introduce more business-to- business (B2B) packaging reuse systems where there is an environmental benefit. 7. Improve packaging data collection.	8. Support recovery systems for household soft plastics. 9. Introduce alternative collection systems for single stream dairy packaging. 10. Label all consumer packaging for recycling or disposal with the Australasian Recycling Label (ARL). 11. Advise consumers on optimal recycling of small items. 12. Support collection and recycling programs for hard-to-recycle packaging.	13. Increase post-consumer recycled content in packaging where safe to do so. 14. Purchase products made from recycled plastics to help build sustainable end markets. 15. Collaborate with supply chain partners to develop food grade recycled resins using advanced recycling technologies. 16. Undertake collaborative R&D to accelerate dairy industry progress in areas of technical complexity. 17. Implement the ARL for recycled content.
Key Packaging Value Chain Contributors	• Brand Owners / Packaging Technologists • Packaging Manufacturers / Convertors • Recyclers / Raw Material Suppliers • Retailers • Customers / Consumers	• Brand Owners • Waste Handlers • Resource Recovery / Sortation • Reuse Scheme Operators • Retailers • Government – National, State / Territory & Local • Customers / Consumers	• Brand Owners • Raw Material / Reprocessors / Recyclers • Suppliers • Resource Recovery / Sortation • Packaging Manufacturers / Converters • Government - National, State / Territory & Local • Customers / Consumers

Some of the strategic approaches outlined will be achievable by individual manufacturers working in collaboration with their packaging suppliers, while others will require support from groups outside their businesses - packaging suppliers, researchers, governments and recyclers. Circumstances of individual companies vary, and it may not be feasible, or environmentally beneficial, to apply every strategic approach identified in the Roadmap to every single product. Each dairy product has its own supply chain and specific technical, food safety and consumer requirements that will influence packaging design and company decision making.

As an initial step, industry is working together to collect and aggregate more detailed baseline data on dairy packaging to establish an accurate benchmark of current industry performance. This will enable Australian dairy manufacturers to develop more specific and measurable targets in the short term, for objectives such as increased recycled content in certain formats (e.g., milk bottles). Improved data collection will also enable industry to effectively monitor and report on progress against the objectives outlined in the Roadmap.

COLLECTIVE IMPACT – A call to action

APCO operates under the *Collective Impact Framework* (CIF), a powerful collaborative tool used globally to tackle complex social and environmental challenges (see Figure 1). The CIF provides a structured platform to deliver an inclusive, cross-disciplinary approach to the establishment of a circular economy for packaging in Australia.

Acknowledging the diversity of organisations that comprise the packaging value chain (see Figure 2), APCO's Collective Impact approach seeks to bring together that diversity to consolidate efforts and maximise opportunity to deliver packaging sustainability and meet the 2025 Targets.

Figure 1: *Collective impact framework*

Figure 2: *Packaging value chain in Australia*

The Roadmap was developed under the 5 key pillars of Collective Impact:

COLLECTIVE IMPACT FRAMEWORK PILLAR	DAIRY ROADMAP ACTION
Common Agenda	• Industry-led delivery of the 2025 Targets the National Waste Policy Action Plan and the National Plastics Plan.
Mutually Reinforcing Activities	• On-going collaborative activity to define and develop Roadmap. • Industry endorsement of Roadmap objectives. • On-going review / reporting against Roadmap.
Continuous Communication	• Continuous industry-engagement in Roadmap development. • Alignment of external communications with Roadmap to articulate strategy / progress.
Backbone organisation	• APCO supported / managed Roadmap development. • Roadmap aligned with APCO strategy & underpinned by 2025 Targets.
Measuring Results	• Industry commitment to capture and share non-competitive data on packaging use for improved reporting on Roadmap objectives.

Dairy manufacturers are committed to the objectives outlined within this Roadmap, including continuous review of all packaging to identify and implement opportunities for elimination, reduction, reuse, recyclability and increased rates of recycled content. It is, however, recognised that they will not be able to achieve them in isolation.

The success of the industry to achieve their goals will require the support from external stakeholders including:

- **Packaging manufacturers and researchers** – to innovate and increase the recyclability of dairy packaging formats.
- **Recyclers** – to meet demand for food-grade recycled resins, to allow manufacturers to meet recycled content targets without compromising product quality and safety.
- **National, state, territory and local governments** – to provide fit-for-purpose regulatory frameworks, to ensure safety standards and verification of end-to-end resource recovery and recycling systems, through inter alia:
  - *the National Environment Protection (Used Packaging Materials) Measure 2011* (NEPM)
  - Food Standards Australia and New Zealand (FSANZ)
  - Industry-based regulators
  - other instruments as required,

  – to support achievement of the 2025 Targets and ensure appropriate safety standards are in place.
- **Consumers** – to make sustainable packaging choices and correctly dispose of dairy packaging at end-of-life.

1 Introduction

1. Introduction

1.1 Background

The Australian dairy industry's Dairy Promise is "to provide nutritious food for a healthier world".[3] In continuing to deliver on this Promise, the industry is committed to achieving ambitious sustainability targets at every stage of the value chain - from the farm to the consumer. These targets are outlined in the *Australian Dairy Sustainability Framework*.

In 2020, the Australian Packaging Covenant Organisation (APCO) initiated a sectoral collaboration with Dairy Australia, through their Sustainable Packaging Working Group convened by the Dairy Manufacturers Sustainability Council. The two organisations and their members came together, mobilised by the common objective of developing a sustainability roadmap for dairy packaging to 2025.

1.2 Purpose

This Roadmap provides a collective vision and framework for sustainable dairy packaging, including the desired outcomes and the strategies that aim to achieve them. Some of these strategies will be achieved by individual manufacturers in collaboration with their packaging suppliers, while others will require support from others including suppliers, researchers, governments and recyclers.

It should be noted that individual circumstances vary, and it may not be feasible, nor environmentally beneficial, to implement every strategy for every product. This is because each dairy product has its own supply chain and specific technical, food safety and consumer requirements that will influence packaging design.

1.3 Objectives

The objectives of this Roadmap are to:

- Investigate and describe the current 'state-of-play' for dairy packaging sustainability in Australia and other relevant international jurisdictions.
- Evaluate the current circularity of the dairy packaging value chain in Australia including materials, recovery and reprocessing capacity, reuse models, infrastructure gaps and regulatory frameworks.
- Deliver an action-oriented, evidence-based and industry-endorsed roadmap addressing packaging sustainability challenges and providing recommendations for a phased, holistic, whole-of-industry approach to deliver the 2025 National Packaging Targets (2025 Targets).
- Align packaging sustainability for the dairy industry with APCO frameworks including *Our Packaging Future*, the *2025 Monitoring Program* and the *Sustainable Packaging Guidelines* to provide a common agenda and enable monitoring of the dairy industry's performance against the 2025 Targets.

1.4 Collective impact

Developed through the application of APCO's Collective Impact Framework, this Roadmap is a call to action for all industry stakeholders to work collaboratively to deliver the 2025 Targets and create a

[3] *Australian Dairy Sustainability Framework – Our Dairy Promise – Available at: https://www.sustainabledairyoz.com.au/our-dairy-promise; retrieved 5 Aug 2021*

circular economy for dairy packaging in Australia. Dairy manufacturers are committed to the outcomes and strategies outlined in this Roadmap but will not be able to achieve them in isolation.

Manufacturers have committed to review all of their packaging to identify and implement opportunities for elimination, reduction, reuse, recyclability and increased use of recycled content. They are seeking tangible support from other stakeholders in the Australian packaging value chain, to enable the delivery of these goals, including:

- **Packaging manufacturers and researchers** - to innovate and develop alternatives to non-recyclable packaging formats.
- **Recyclers and reprocessors** – to provide sufficient quantities of food-grade recycled resins to allow manufacturers to meet recycled content targets without compromising product quality and safety.
- **National, state, territory and local governments** – to provide fit-for-purpose regulatory frameworks, to ensure safety standards and verification of end-to-end resource recovery and recycling systems, through inter alia:
  - the *National Environment Protection (Used Packaging Materials) Measure 2011* (NEPM)
  - Food Standards Australia and New Zealand (FSANZ)
  - Industry-based regulators
  - other instruments as required,

  to support achievement of the 2025 Targets and ensure appropriate safety standards are in place.
- **Customers / consumers** – to make sustainable packaging choices and correctly dispose of dairy packaging at end-of-life.

2
Context

2. Context

2.1 Drivers for change in Australia

2.1.1 Dairy industry sustainability strategy

The *Australian Dairy Sustainability Framework* (Framework) establishes a comprehensive set of goals and targets for economic prosperity, nutrition, animal welfare and natural resource management. Originally launched in 2012, the goals were updated in 2018 in consultation with a wide range of stakeholders. The Framework is overseen by the Australian Dairy Industry Council with support from Dairy Australia.

The Framework includes a goal to 'reduce waste', with several targets relating to packaging:

- All dairy companies to join APCO or an equivalent scheme.
- 100% of Australian dairy packaging is to be recyclable, compostable or reusable by 2025 or earlier.
- Halve food waste by 2030.

2.1.2 Packaging regulatory framework

Brand Owner businesses in the Australian packaging supply chain with an annual turnover of $5 million (AUD) or more, may be required to meet obligations under the National Environment Protection (Used Packaging Materials) Measure 2011 (NEPM). To meet these regulatory obligations, your business may choose between two options:

- Become a Signatory to the Australian Packaging Covenant (the Covenant) and a Member of APCO; or
- Meet compliance obligations under the NEPM.

If becoming a Signatory to the Covenant, APCO provides a supported and guided pathway to comply with the obligations of the NEPM.

The Covenant is a national regulatory framework under the NEPM that sets out how governments and businesses across Australia share the responsibility for managing the environmental impacts of packaging. The Covenant aims to reduce the environmental impacts of Consumer Packaging by supporting two goals:

- Optimising resource recovery of Consumer Packaging through the supply chain by:
  - adopting approaches that make changes in the way we design, use and buy packaging and packaged products so that packaging uses less resources and is more easily recycled
  - enabling packaging materials to be returned to the economy thereby minimising waste associated with the generation and consumption of Consumer Packaging across the supply chain.
- Preventing the impacts of fugitive packaging on the environment by adopting approaches that support new innovations and find solutions to capture packaging materials or waste before it enters the environment, or support the adoption of new or alternative types of packaging.

If a business instead chooses to meet compliance obligations by submitting to direct regulation under the NEPM, they will be required to meet prescriptive

requirements for all consumer packaging materials, as set out by regulations in the jurisdictions in which their packaging is sold or distributed. These obligations cover:

- The recovery of used packaging materials;
- The re-use, recycling or energy recovery of packaging materials;
- Demonstrating that the recovered materials have been re-used or exported;
- Demonstrating that reasonable steps have been taken to advise consumers as to how the packaging is to be recovered; and
- Recording and reporting on the above obligations.

The NEPM and the Covenant are ***under review*** in 2021.

Regulatory instruments also exist in relation to beverage container packaging. A number of Container Deposit Schemes (CDS) currently operating or being implemented across all Australian state and territory jurisdictions regulate dairy beverage containers. Australian schemes typically include small, flavoured milks (less than 1 litre) within their lists of eligible products / containers. At the time of writing, the South Australian Government is investigating options to extend CDS to include additional beverage products, with a discussion paper due to be released in mid-2021.

2.1.3 2025 National Packaging Targets

The 2025 Targets were established in 2018 with the support of Australian industry and government, and are recognised in the Australian Government's *National Waste Policy Action Plan*. APCO is the organisation charged by government to facilitate the delivery of the 2025 Targets.

The 2025 Targets are:

- 100% reusable, recyclable or compostable packaging.
- 70% of plastic packaging being recycled or composted.
- 50% of average recycled content included in packaging.
- The phase out of problematic and unnecessary single-use plastic packaging.

Recycled content targets for individual packaging materials are shown in Table 1.

Table 1. *2025 National Packaging Targets for Recycled Content*

MATERIAL TYPE	NATIONAL AVERAGE RECYCLED CONTENT PERCENTAGE - 2018-19[3]	2025 NATIONAL RECYCLED CONTENT TARGETS[4]
All packaging	38%	50%
Plastics	4%	20%
• PET	14%	30%
• HDPE	3%	20%
• PP	2%	20%
• Flexible plastics	0%	10%
Paper	51%	60%
Metals	24%	35%
Glass	37%	50%

2.1.4 National waste policy

The *National Waste Policy Action Plan* includes a series of targets and actions to drive waste reduction and recycling. Targets that are particularly relevant to packaging include:

- Progressive implementation of bans on the export of waste plastic, paper, glass and tyres by 2024.
- Reduction in total waste generated in Australia by 10% per person by 2030.
- 80% resource recovery rate from all waste streams, following the waste hierarchy, by 2030.
- Significant increase in the use of recycled content by governments and industry.
- The phase out of problematic and unnecessary plastics by 2025.

[3] *APCO (2021). Australian packaging consumption & recycling data 2018-19, available at:* ***https://documents.packagingcovenant.org.au/public-documents/Australian%20Packaging%20Consumption%20And%20Recycling%20Data%202018-19.***

[4] *APCO (2020). 2025 Recycled content targets, March, available at:* ***https://documents.packagingcovenant.org.au/public- documents/2025%20Recycled%20Content%20Target.***

2.1.5 Ban on waste exports

The export ban aims to improve the capacity within Australia to process our own waste, particularly for plastics.

The ***implementation of the ban*** is well underway. From July 2021, it will only be possible to export plastics that have been sorted into a single polymer, and from July 2022, it will only be possible to export plastics that have been sorted into a single polymer and processed into flake or pellets. The export of unprocessed paper and cardboard is banned from July 2024. These regulations are driving increased investment by government and industry in local sorting and processing facilities, particularly for plastics and paper.

2.1.6 Phase out of problematic and unnecessary single-use plastic packaging

The target to phase out problematic and unnecessary single-use plastic packaging is supported by the *National Plastics Plan*, which was released in early 2021. In addition to outlining a range of specific targets, including that at least 80% of supermarket products should carry the Australasian Recycling Label (ARL) by December 2023, the Plan also pledged government to 'work with industry to fast-track the phase out of polymer types in certain applications, and consider regulatory action should industry phase outs not be achieved, including:

- the phase out of plastic packaging products with additive fragmentable technology that do not meet relevant compostable standards (AS4736-2006, AS5810-2010 and EN13432) (July 2022),
- the phase out of expanded polystyrene (EPS) from loose packaging fill and moulded packaging in consumer packaging (July 2022), and EPS consumer food and beverage containers (December 2022), and
- the phase out of PVC packaging labels (December 2022).[5]

Under the National Waste Policy Action Plan, APCO has responsibility for the target to phase out problematic plastic packaging through design, innovation or introduction of alternatives. APCO has released the *Action Plan on Problematic and Unnecessary Single-Use Plastic Packaging* that provides detailed guidance for the packaging supply chain. It includes a longer list of materials and formats for either immediate phase out or 'on notice'.

Table 2. *Priority items in APCO's action plan for problematic and unnecessary single-use plastic packaging*

IDENTIFIED PROBLEMATIC AND UNNECESSARY SINGLE USE PLASTIC PACKAGING FOR IMMEDIATE ACTION	IDENTIFIED PROBLEMATIC AND UNNECESSARY SINGLE USE PLASTIC PACKAGING 'ON NOTICE' FOR FURTHER ACTION
• Lightweight plastic shopping bags • Fragmentable plastics • Expanded polystyrene (EPS) packaging for food and beverage service and retail fresh produce • EPS loose fill packaging • Moulded EPS packaging for white/brown goods and electronics • Rigid PVC packaging* • Rigid polystyrene (PS) packaging* • Opaque polyethylene terephthalate (PET) bottles* • Rigid plastic packaging with carbon black*	• Problematic multi-material laminate soft plastics* • Heavy weight plastic shopping bags • Pumps and trigger packs • Small caps and closures* • Coloured PET

**Packaging items used by the dairy industry*

[5] *Australian Government – National Plastics Plan 2021, p. 5 - https://www.environment.gov.au/system/files/resources/a327406c-79f5-47f1-b71b- 7388407c35a0/files/national-plastics-plan-2021.pdf - retrieved 1Jul2021*

The National Plastics Plan is also being implemented through regulatory action by state and territory governments (Table 3).

Table 3: *Government policies on single use plastics*

JURISDICTION	RELEVANT REGULATION OR CONSULTATION PAPER
All	The communique from the Environment Ministers Meeting on 15 April 2021 identified eight problematic and unnecessary plastic product types for industry to phase out nationally by 2025: • Lightweight plastic bags. • Plastic products misleadingly termed as 'degradable'. • Plastic straws. • Plastic utensils and stirrers. • EPS consumer food containers (e.g. cups and clamshells). • EPS consumer goods packaging (loose fill and moulded). • Microbeads in personal health care products.
Commonwealth	The ***National Plastics Plan*** includes actions to phase out: • Non-compostable plastic packaging products containing additive fragmentable technology that do not meet relevant compostable standards. • EPS in loose fill and moulded consumer packaging (July 2022), and food and beverage containers (December 2022). • PVC packaging labels (December 2022).
NSW	The ***NSW Plastics Action Plan*** was released in June 2021. This aims to phase out: • Lightweight plastic shopping bags within 6 months of passage of legislation (Date of legislation TBD) • Plastic straws, plastic stirrers, plastic cutlery and EPS food service items within 12 months.
QLD	Under the ***Waste Reduction and Recycling (Plastic Items) Amendment Act 2021*** the supply of single-use plastic straws, stirrers, plates, bowls, cutlery and EPS takeaway food containers and cups will be banned in Queensland from 1 September 2021. There is an ***exemption*** for straws and cutlery attached to shelf-ready, pre-packaged items. The ban follows the release of the ***Tackling plastic waste - Plastic Pollution Reduction Plan*** (2020).
SA	***Single-use and Other Plastic Products (Waste Avoidance) Act*** 2020 prohibits the manufacture, production, distribution, sale and supply of the following: • From 1 March 2021: single-use plastic straws, cutlery and stirrers including bioplastic alternatives. • From 1 March 2022: oxo-degradable plastic products. • There is an ***exemption*** for pre-packed and attached products.
ACT	The Plastic Reduction Act 2020 ***prohibits*** the sale, supply or distribution of the following from 1 July 2021: • Single-use plastic cutlery (including bioplastic cutlery). • Single-use plastic stirrers (including bioplastic stirrers). • EPS takeaway food and beverage containers. A second group of items are expected to be banned from 1 July 2022, including single-use straws.
VIC	Under the ***Environment Protection Amendment Act 2019*** single-use straws, cutlery, plates, drink-stirrers, EPS food and drink containers and cotton bud sticks will be ***banned from sale*** or supply in Victoria by February 2023.
WA	Under ***Western Australia's plan*** for plastics, plates, cutlery, stirrers, straws, thick plastic bags and EPS food containers will be phased out by 2023. A working group will be established to determine exemptions for the ban on straws.

2.1.7 Consumer expectations

Consumers increasingly expect brand owners to be socially and environmentally responsible, and packaging is a highly visible component of a company's brand.

PACT Group surveyed 1,000 consumers in 2020 about their attitudes to packaging and the environment. The ***research*** found that 53% of respondents avoid buying non-recyclable packaging and 60% actively look for product packaging with recycled content.

The environmental impacts of plastic packaging are attracting more attention from consumers and community groups, driven in part by a strong media focus (e.g., the ABC's 'War on Waste' series) and increasing awareness of the impact of plastics leaking into the marine environment. A recent example of packaging in the media was a report by the Worldwide Fund for Nature (WWF) entitled 'How recyclable are your favourite food products?'. The report highlighted for example, the non-recyclability of certain types of yoghurt and cheese packaging, as well as examples of perceived over-packaging.

2.2 Global context

2.2.1 The UK Dairy Roadmap

There are global examples of initiatives that have been considered in the development of this roadmap. The UK Dairy Roadmap, originally published in 2008, established ambitious targets for environmental improvement across the entire value chain.

Achievements ***reported in 2018*** for plastics and packaging since 2008 include:

- 85% of HDPE milk bottles recycled compared to 58% for plastic bottles as a whole,
- 31% peak recycled content in HDPE milk bottles,
- more than 95% tertiary packaging reused or recycled, and
- 80% Forest Stewardship Council (FSC) assured carton board.

The current targets for dairy processors are:

- 50% recycled material in HDPE milk bottles, or its carbon equivalent reduction by 2020,
- all tertiary packaging to be reusable or recyclable by 2020,
- 100% of paper-based cartons to be FSC labelled by 2020, and improve the design of dairy packaging to eliminate unnecessary single-use plastic, maximise recycled content and improve the recyclability as appropriate, while minimising carbon impact by 2025.

While UK dairy processors were able to achieve 31% recycled content for HDPE milk bottles in 2015, this has since fallen to an average of 25%. In their 2018 report the industry acknowledged that the 50% target would be a challenge to achieve by 2020.[6]

2.2.2 New plastics economy

The Ellen MacArthur Foundation's (EMF) ***New Plastics Economy initiative*** is working with governments and industries around the world to achieve a circular economy for plastics. Their ***report*** in 2019 established three key strategies:

1. Fundamental redesign and innovation to address the 30% of plastic packaging that would otherwise never be reused or recycled. This includes small format such as lids as well as material used in smaller volumes including PVC, PS and EPS.
2. Targeting at least 20% of plastic packaging for which reuse provides an economically attractive opportunity, including business-to-business packaging.
3. Redesign of packaging and the systems for managing it after use to make recovery economically attractive for the remaining 50% of plastic packaging.

Action is being driven through the New Plastics Economy Global Commitment, which in April 2021 had more than 500 signatories who ***report annually*** on progress against a series of metrics. The metric for recyclability provides a useful guide for the dairy industry:[7]

> *The signatories' commitment to 100% reusable, recyclable, or compostable plastic packaging by 2025 is based on definitions that ask signatories to go beyond designing packaging for the technical possibility of recycling or composting by asking that recycling or composting is proven to work 'in practice and at scale' for any given packaging design. The suggested thresholds to prove recycling or composting works 'in practice and at scale' are a 30% recycling/composting rate achieved across multiple regions, collectively representing at least 400 million inhabitants.*

[6] *Dairy UK, NHU and AHDB (2018), The UK Dairy Roadmap, p.13, available at:* ***https://www.dairyuk.org/publications/the- dairy-roadmap/.***
[7] *EMF (2021), The global commitment 2020 progress report, p. 40, available at:* ***https://www.newplasticseconomy.org/assets/doc/Global-Commitment-2020-Progress-Report.pdf.7 Lewis, H. (2016), Product stewardship in action, Greenleaf Publishing, UK.***

2.2.3 Product stewardship regulations

Product stewardship laws for packaging are widespread. The regulatory models include:

- Extended producer responsibility (EPR) laws that make producers partially or fully responsible for packaging recovery at end of life.
- Container deposit legislation.
- Design requirements including restrictions on heavy metals.
- Packaging bans or restrictions.
- Packaging taxes or levies.

EPR laws have been implemented in most member states in the European Union, Canada, Japan and South Korea. A smaller number of jurisdictions including Taiwan, Denmark and Norway have introduced packaging taxes designed to provide an economic incentive for reuse or recycling.[7]

The United Kingdom Government has recently introduced a ***tax on any plastic packaging*** that does not include at least 30% recycled content.

The Australian Packaging Covenant is a voluntary product stewardship program focused on building a circular economy for packaging in Australia. The co-regulatory model underpinning the Covenant – formed through the NEPM and reflected through complementary instruments in all Australian states and territories – is unique in the world.

3

The Australian dairy packaging landscape

3. The Australian dairy packaging landscape

3.1 Overview

A lack of good quality data on packaging usage in the dairy industry reflects an industry-level challenge common across the Australian marketplace. It is acknowledged that data gaps must be addressed to ensure that the industry can track material usage and progress towards the 2025 Targets.

The dairy industry uses a wide variety of packaging materials and formats. Indicative data for the milk category is that an estimated 67% of units are packed in HDPE, 25% in gable top liquid paperboard (LPB), 7% in aseptic LPB, 1% in polyethylene terephthalate (PET)[8].

Other commonly used materials for dairy products include:

- rigid polypropylene (PP) and polystyrene (PS),
- a small and reducing amount of rigid polyvinyl chloride (PVC),
- multi-layer flexible plastic pouches and flow wrap,
- low density polyethylene (LDPE) pallet wrap and bags,
- cardboard cartons, corrugated shippers and small quantities of coated or high wet strength (HWS) papers, and
- aluminium foil wrap, peel off lids and induction seals.

Each of the major packaging materials is discussed below, with dairy-specific information where available.

3.2 Paper and paperboard

Paper and paperboard are used for both business-to consumer (B2C) and business-to-business (B2B) dairy packaging. This includes:

- gable top LPB cartons for fresh milk,
- aseptic LPB cartons for long life milk,
- boxboard and cartonboard for shelf-ready cartons, snack boxes and over-wraps,
- corrugated cardboard for business-to-business (B2B) shippers,
- grease proof paper wraps for blocks of butter and peel off covers on butter in tubs, and
- paper sacks with a plastic liner for bulk products such as milk powder.

While there is no data available on paper and cardboard used specifically by the dairy industry, Table 4 provides data for all packaging on the Australian market.

Approximately 55% of all packaging placed on market (POM) in Australia in 2018-19 was paper and paperboard (3.3 million tonnes). While in general it includes a high proportion of recycled content – both post-consumer (51%) and pre-consumer (17%) – there are significant differences between formats. Aseptic and gable top beverage cartons, for example, did not include any recycled content.

Paper and paperboard achieved a high recovery rate in 2018-19 (63% in total) but with significant variations (Table 5). The highest recovery rate was for corrugated

[8] *GlobalData Packaging database AUS, data supplied by PACT*

cardboard (mainly shippers) at 73%, and the lowest was 7% for polymer coated paperboard (PCPB), which includes gable top and aseptic cartons as well as coffee cups.

The only relevant target is for post-consumer recycled content. This needs to increase from 51% (2018-19) to 60% by 2025. The biggest challenge is for aseptic and gable top cartons.

PCPB packaging formats are complex to recycle due to the mix of materials. Gable top cartons are primarily made from paperboard with an inner and outer layer of LDPE. Aseptic cartons also include a layer of aluminium foil. The Australasian Recycling Label (ARL) currently advises consumers to 'check locally' for available recycling services as less than 80% of local councils accept these types of packaging.[9]

When they are collected at kerbside, they are sorted into the mixed paper stream. Only the paper component is recovered, and pulp mills have difficulty extracting sufficient paper fibre to make recycling worthwhile. Plastic in fibre recycling is a significant contaminant and compromises the quality of recycled fibre due to impurities travelling through the pulping process.

Alternative end markets for PCPB include construction materials such as composite boards, but these are not currently available in Australia.[10] Recycling will be further impacted as waste export bans are enacted in coming years. There are plans to establish a new business to process LPB containers in Australia by mid-2022 (see Section 5.2.5).

It should be noted however, that LPB cartons, including gable top and aseptic formats, deliver ***significant environmental benefits*** over their full lifecycle compared to other packaging formats. Trade-offs between recyclability and other environmental benefits need to be carefully considered in any packaging procurement decision, while keeping an eye on innovation and capacity building into the future.

Table 4: *Paper and paperboard packaging placed on market and recycled content, Australia, 2018- 19*[11]

MATERIAL TYPE	PLACED ON MARKET (TONNES)	RECYCLED CONTENT POST-CONSUMER (%)	PRE- CONSUMER (%)
Boxboard/Cartonboard	287 500	55%	23%
Corrugated cardboard	2 543 500	57%	19%
HWS carrierboard	19 800	0%	10%
Kraft paper	195 350	0%	1%
Moulded fibreboard	51 350	91%	0%
PCPB* – Aseptic	38 419	0%	0%
PCPB* – Gable top	11 800	0%	0%
PCPB* – Cold cup	5 500	0%	10%
PCPB* – Hot cup	11 800	0%	10%
PCPB* – Other	3 500	1%	1%
Other fibre packaging	93 950	26%	11%
Total	**3 262 469**	**51%**	**17%**

**Polymer coated paperboard*

Table 5: *Paper and paperboard packaging recycling rate, Australia, 2018-19*[12]

MATERIAL TYPE	RECYCLING RATE
Boxboard/Cartonboard	45%
Corrugated cardboard	73%
Polymer coated paperboard	7%
Other fibre packaging	17%
Total	**63%**

[9] *One of the thresholds for a 'recyclable' classification for the ARL is that at least 80% of Councils will accept them in kerbside recycling services.*
[10] *Robertson, G. (2021), 'Recycling of aseptic beverage cartons: a review', Recycling, 6,20.*
[11] *APCO (2021), Australian packaging consumption & recycling data 2018-19,* ***https://documents.packagingcovenant.org.au/public- documents/Australian%20Packaging%20Consumption%20And%20Recycling%20Data%202018-19***
[12] *APCO (2021)*

3.3 Plastics

Plastics formats used in the dairy sector include:

- rigid polypropylene (PP) tubs and lids for ice cream, butter, margarine, yoghurt, cream and soft cheeses,
- rigid polystyrene (PS) cups for yoghurt, cream and desserts,
- rigid high-density polyethylene (HDPE) milk and cream bottles and HDPE and low density polyethylene (LDPE) bottle caps,
- a small and reducing amount of rigid polyvinyl chloride (PVC) for single serve butter, clamshells for cheese slices and trays for cheese snacks,
- multi-layer flexible plastic pouches and flow wrap for cheese and other products, made from LDPE and PP and smaller quantities of PVC, nylon and other resins, and
- rigid PP milk crates.

Table 6 provides data for plastic packaging for the Australian market as a whole.

Recycled content is low – only 4% was sourced from post-consumer waste and another 3% from pre-consumer waste. The only post-consumer recycled content was in PET (14%), HDPE (3%), PP (2%) and PS (1%) while soft plastics had none.

The recovery rate for plastic packaging as a whole was 18% in 2018-19 (Table 7), an increase from 16% the year before. Higher rates were achieved for PET (36%) and HDPE (23%).

Recovery data has been estimated for plastic milk bottles using Material Flow Analysis (MFA).[13] Approximately 48,000 tonnes of plastics were used to make milk bottles in 2019-20, comprising HDPE bottles (93%) and HDPE closures (5%) make up the greatest proportion of material followed by PET bottles (1%) and PP labels (<1%). The recovery rate for milk bottles is estimated to be 39%.

In order to meet the 2025 National Packaging Targets, industry should aim to:

- increase average post-consumer recycled content to 20% by 2025, where safe to do so.
- increase the recovery rate from 39% for milk bottles (2019-20) to 70% by 2025.
- eliminate problematic and unnecessary single use plastic packaging, including rigid PVC and PS and carbon black pigments.

***Table 6**: Plastic packaging placed on market and recycled content, Australia, 2018-19*[14]

MATERIAL TYPE	PLACED ON MARKET (TONNES)	RECYCLED CONTENT POST-CONSUMER (%)	PRE- CONSUMER (%)
PET (1)	154 135	14%	2%
HDPE (2)	316 349	3%	4%
PVC (3)	15 253	0%	3%
LDPE (4)	232 656	0%	3%
PP (5)	154 573	2%	4%
PS (6)	10 877	1%	0%
EPS (6)	16 380	0%	0%
Bioplastic (7)	6 387	0%	12%
Other (7)	15 502	0%	0%
Unidentified	78 374	0%	0%
Total	1 000 486	4%	3%

[13] *Madden, B., N. Florin and M. Jazbec, 2021. Material flow analysis for the Australian HDPE milk bottle supply chain (preliminary data). May 2021. Work undertaken by UTS as part of the Round 8 CRC project led by PEGRAS: Increased recycling of plastics by sensing and treating label contamination (project no. 000196)*

[14] *APCO (2021).Australian packaging consumption & recycling data 2018-19,* ***https://documents.packagingcovenant.org.au/public- documents/Australian%20Packaging%20Consumption%20And%20Recycling%20Data%202018-19***

***Table 7:** Plastic packaging recycling rate, Australia, 2018-19*[15]

MATERIAL TYPE	RECYCLING RATE
PET (1)	36%
HDPE (2)	23%
PVC (3)	7%
LDPE (4)	9%
PP (5)	13%
PS (6)	24%
EPS (6)	26%
Bioplastic (7)	0%
Other (7)	0%
Unidentified	4%
Total	**18%**

***Table 8:** Plastic milk bottles placed on market (POM), Australia, 2019-20*[16]

	POM	LANDFILL	RECOVERY	RECOVERY RATE
Natural HDPE	44 329	27 025	17 305	39%
Coloured HDPE	2 478	1,535	944	38%
PET	543	336	207	38%
LDPE	118	54	632	54%
PP	387	235	152	39%
Adhesives	130	109	22	17%
Total	**47 986**	**29 294**	**18 692**	**39%**

3.3.1 Polyethylene terephthalate (PET)

PET is used for 1.5 litre milk bottles and some jars, for example for marinated fetta. PET is also increasingly being used to replace PVC in thermoformed trays, clamshells and cups because of its superior recyclability. Collection and recycling services for PET are widely available, accounting for its relatively high recovery rate and post-consumer recycled content.

The increasing proportion of thermoforms in the PET stream means that there is a need to increase demand for recycled PET (rPET) in these applications. At present most demand is for bottle grade rPET to go back into bottles, and this can only include a small percentage of thermoform grade. This is expected to change in future as demand for both grades of rPET increases.

3.3.2 High density polyethylene (HPDE)

Approximately 50,000 tonnes of HDPE are used for fresh milk in Australia each year (Table 9). HDPE is the most effective plastic for storing milk because it is strong but lightweight, and provides goodshelf life because of its natural opaqueness and relatively low permeability to oxygen.[17] Coloured HDPE is used for bottle caps.

HDPE bottles are collected through most kerbside collection systems in Australia, and there is strong demand for recycled natural and coloured HDPE flake. Bottle caps have mixed recyclability as some councils and container deposit schemes advise consumers to recycle with 'caps off'. The estimated recycling rate for HDPE milk bottles is 39%, with 11,472 tonnes reprocessed locally in 2019-20. and 7,698 tonnes exported as baled bottles[18]

One of the limiting factors for recycling HDPE milk and cream bottles back into bottles is contamination with pressure sensitive labels, which is being addressed by suppliers and researchers (Section 4.1). A cleaner input stream will enable higher levels of recycled HDPE (rHDPE) content in packaging.

***Table 9:** HDPE in milk bottles, 2019-20*[19]

PRODUCTS	HDPE BOTTLES (TONNES)	HDPE CLOSURES (TONNES)	HDPE TOTAL (TONNES)
250mL	1	0*	1
300mL	801	81*	882
600mL	388	37*	424
1L	1,129	97	1,226
1.5L	0	40	40
2L	26 243	1 700	2 943
3L	15 767	642	16 409
Total	**44 863**	**2 596**	**47 459**

**LDPE closures*

[15] *APCO (2021)*
[16] *Madden, B., N. Florin and M. Jazbec, 2021. Material flow analysis for the Australian HDPE milk bottle supply chain (preliminary data). May 2021. Work undertaken by UTS as part of the Round 8 CRC project led by PEGRAS: Increased recycling of plastics by sensing and treating label contamination (project no. 000196)*
[17] *Hansen-Knarhoi, B. (2018), Maximising the recyclability of dairy product packaging, Report to Dairy Australia.*
[18] *Madden, B., N. Florin and M. Jazbec, 2021.*
[19] *Madden, B., N. Florin and M. Jazbec, 2021. Material flow analysis for the Australian HDPE milk bottle supply chain (preliminary data). May 2021. Work undertaken by UTS as part of the Round 8 CRC project led by PEGRAS: Increased recycling of plastics by sensing and treating label contamination (project no. 000196).*

3.3.3 Polypropylene (PP)

PP is used to make butter, yoghurt and ice-cream tubs and lids. The benefits of PP include its low permeability to oxygen and the fact that it is cheaper to thermoform than HDPE and PET.

Rigid PP is recyclable through most kerbside collection services and has good end markets but is generally not sorted into a separate stream. Instead, it ends up as part of the mixed plastics stream. There are some current innovations that are likely to support increased recovery of PP into a higher value single polymer stream.

3.3.4 Polystyrene (PS)

Polystyrene has traditionally been used for yoghurt tubs and cups but is gradually being phased out in favour of PP or PET. The primary advantage of PS in dairy packaging is that it can be easily snapped apart, which is why it has been a preferred material in applications such as yoghurt multi- packs.

Low volumes of PS on the Australian market make the economics of recycling very difficult and there is a global movement away from uncommon plastics including PS.[20] The ARL Program considers PS 'non-recyclable' because it is not widely collected for recycling and in line with Australian Government policy, APCO is supporting the phase out of PS from the Australian packaging landscape.

3.3.5 Polyvinyl chloride (PVC)

PVC is used in small quantities for items such as single serve butter, trays for cheese snack packs and induction seals on bottles.

Low volumes make the economics of recycling very difficult. PVC also contaminates PET recycling streams and there is a global movement away from uncommon plastics such as PVC.[21] The ARL Program classifies PVC as 'non-recyclable' because it is not widely collected for recycling and in line with Australian Government policy, APCO is supporting the phase out of PVC from the Australian packaging landscape.

The Australian Government's *National Plastics Plan* requires PVC labels to be phased out by December 2022.

3.3.6 Soft Plastics

Soft plastics are widely used as pallet wrap, bags, overwrap and pouches. They can be divided into two groups:

- Mono-layer that uses one polymer, most commonly LDPE (e.g., pallet wrap).
- Multi-layer that is composed on two or more materials bonded together through co- extrusion or lamination (e.g., cheese packaging).

Soft plastics packaging is traditionally made from polyolefins, which is a family of resins that include LDPE, linear low-density polyethylene (LLDPE), HDPE, PP and biaxially-oriented polypropylene (BOPP). Other potential materials used in soft plastics for the dairy industry include PET, PVC, polyvinylidene chloride (PVDC), ethylene-vinyl alcohol copolymer (EVOH), polylactic acid (PLA), bioplastics, aluminium, nylon and paper.[22]

Many soft plastics can be recycled through the *REDcycle program*, which provides collection points in Coles and Woolworths supermarkets, but only if they meet maximum thresholds for materials such as PET, nylon, EVOH and PVDC, which are regarded as contaminants in the recycling process. Some soft plastics can also potentially be recycled by asking consumers to convert them to a three-dimensional form before placing in their kerbside recycling bin. This is the idea behind the Roll n' Recycle program (see Section 4.4.3).

3.4 Metals

Metal is not a commonly used material for dairy packaging. The main applications are aluminium foil for block butter wrap, peel off lids for yoghurt, cream and butter, and induction seals for milk bottles.

Approximately 4% of all packaging placed on market (POM) in Australia in 2018-19 was aluminium or steel (Table 10). Recycled content included 24% from post-consumer waste and another 30% from pre-consumer waste.

The overall recovery rate for metal packaging was 56% in 2018-19 (Table 11), an increase from 48% the year before. The was attributed to more aluminium cans being collected as container deposit schemes (CDS) were rolled out in NSW and Queensland.

[20] *APCO (2020), Action Plan for Problematic and Unnecessary Single-use Plastic Packaging, Available at: **https://documents.packagingcovenant.org.au/public-documents/Action%20Plan%20for%20Problematic%20and%20Unnecessary%20Single-Use%20Plastic%20Packaging***

[21] *ibid*

[22] *Kelton, Nerida (2020), Follow the REDcycle road, What's new in food and manufacturing, 20 April, **https://www.foodprocessing.com.au/content/packaging-labelling-coding/article/soft-plastics-follow-the-red-recycled-road-1510745757***

Table 10: Metal packaging placed on market and recycled content, Australia, 2018-19[23]

MATERIAL TYPE	PLACED ON MARKET (TONNES)	RECYCLED CONTENT POST-CONSUMER (%)	PRE- CONSUMER (%)
Beverage aluminium	86 000	14%	47%
Non-beverage aluminium	14 000	15%	50%
Tin-plate steel	127 000	31%	20%
Mild steel	19 000	28%	7%
Total	246 000	24%	30%

Table 11: Metal packaging recycling rate, Australia, 2018-19[24]

MATERIAL TYPE	RECYCLING RATE
Beverage aluminium	75%
Non-beverage aluminium	19%
Tin-plate steel	41%
Mild steel	90%
Total	56%

3.5 Glass

Clear glass is used in small quantities for some milk and yoghurt products.

While there is no data on quantities of glass packaging used in the dairy sector, Table 11 provides data for glass packaging for the Australian market as a whole. Average recycled content included 37% from post-consumer waste (an increase from 32% the year before) and another 7% from pre- consumer waste.

The recovery rate for total glass packaging on the market was 45% in 2018-19 (Table 12), compared to 46% in the previous year. This was attributed to stockpiling in Victoria due to problems experienced by one large operator.

Table 12: Glass packaging placed on market and recycled content, Australia, 2018-19[25]

MATERIAL TYPE	PLACED ON MARKET (TONNES)	RECYCLED CONTENT POST-CONSUMER (%)	PRE- CONSUMER (%)
Amber glass	381 000	42%	5%
Flint glass	643 000	34%	7%
Green glass	258 000	37%	8%
Total	1 282 891	37%	7%

Table 13: glass packaging recycling rate, Australia, 2018-19[26]

MATERIAL TYPE	RECYCLING RATE
Amber glass	46%
Flint glass	44%
Green glass	45%
Total	45%

[23] APCO (2021).Australian packaging consumption & recycling data 2018-19, https://documents.packagingcovenant.org.au/public- documents/Australian%20Packaging%20Consumption%20And%20Recycling%20Data%202018-19.
[24] ibid
[25] APCO (2021).Australian packaging consumption & recycling data 2018-19, https://documents.packagingcovenant.org.au/public- documents/Australian%20Packaging%20Consumption%20And%20Recycling%20Data%202018-19.
[26] APCO (2021), Australian packaging consumption & recycling data 2018-19.

4

Innovation and opportunities for dairy packaging

4. Innovation and opportunities for dairy packaging

4.1 Renewable materials

Alternative packaging materials and formats are being developed in response to government and supply chain drivers (Section 2). These include biopolymers manufactured from renewable materials, certified compostable packaging and fibre-based packaging to replace plastics.

'Bioplastics' is a broad term for plastics that are bio-based (derived partly or wholly from plant-based feedstocks), biodegradable or both. Bioplastics fall into one of three groups: bio-based and biodegradable, bio-based (but not biodegradable) and biodegradable (but not bio-based).

Conventional polymers (e.g., PET and HDPE) can also be fully or partially bio-based. Not all bio-based plastics are compostable or will biodegrade (Figure 3).[27]

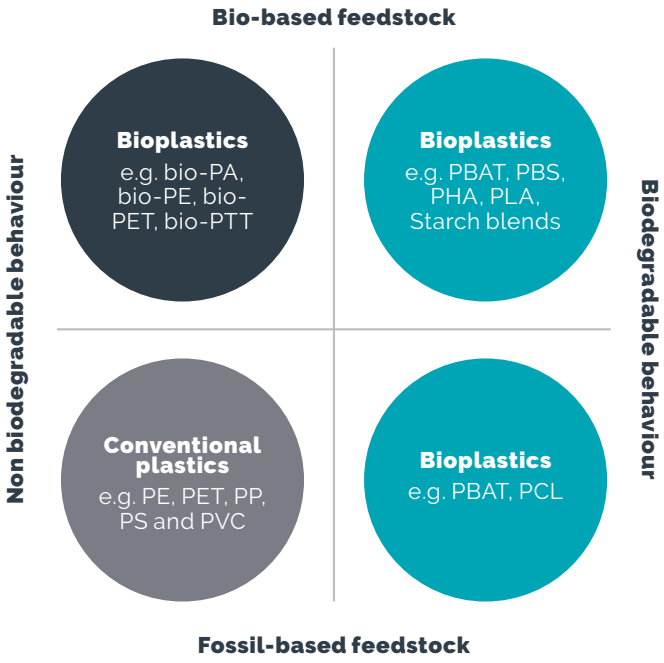


Figure 3: *Complexity of the term bioplastics*[28]

There are a number of companies using renewable materials in dairy packaging.

- In 2014, *Tetra Pak launched* the first LPB carton manufactured from 100% bio-based materials, with the LDPE film and HDPE caps made from sugarcane. Browes Dairy was the first company to use this product in Australia (p.28).
- Fonterra uses HDPE manufactured from sugarcane for its *Anchor* milk packaging in New Zealand. Polyethylene derived from sugarcane is recyclable.
- *Stonyfield Farm* replaced PS with polylactic acid (PLA) for their yoghurt cups. PLA is manufactured from corn and achieve some significant lifecycle benefits compared to PS but is not currently recyclable.

[27] *APCO (2020), Considerations for compostable packaging, p.5, available at:* ***https://documents.packagingcovenant.org.au/public-documents/Considerations%20for%20Compostable%20Packaging.***
[28] *Ibid.*

It meets European and Australian Standards for compostability in industrial composting facilities, but most Australians do not currently have access to a collection and recycling service for compostable packaging. PLA packaging currently ends up in landfill as it doesn't have a recovery route through either material or organics recycling.

Other companies are using innovative paper-based formats to replace plastics altogether. Finnish company Arla Foods is using paper yoghurt cups.

Brownes Dairy milk cartons

In 2019, Brownes Dairy launched Australia's first 100% renewable milk carton. The renewable milk cartons are made from wood fibres and sugarcane – both renewable resources.

Arla Foods paper yoghurt cup

Arla Foods introduced cardboard yogurt cups in 2019 for its Luonto+ product range in Finland. The innovative packaging was developed by Arla in collaboration with Pyroll, who helped create the fibre-based lids. The pack can be recycled in the cardboard stream.

4.2 Packaging reduction

The global focus on reducing single-use plastics is driving many changes to packaging design including eliminating problematic and unnecessary materials or components. Reduction generally achieves multiple environmental benefits including material savings, reduced energy consumption and reduced waste and emissions across the product lifecycle.

In 2019, UK retailer Tesco *announced* they were aiming to remove one billion pieces of plastic by the end of 2020 from its own-label products. This included a plan to remove all plastic secondary lids on cream and yoghurt packaging.

There have also been ongoing efforts in the dairy industry to lightweight packaging. Lactalis reported in their *2019 Sustainability Report* that they had completed several projects to reduce the weight of HDPE and PET plastics, reducing plastic content by more than 1200 tonnes per year. Bega Cheese has reduced the amount of plastic in transport packaging.

Proof points

Bega Cheese lightweighting initiative[29]

In March 2020, Bega implemented a Continuous Improvement Initiative to improve the packaging efficiency of Vegemite pallet wrapping. By using a thinner wrap that provided greater stretch the initiative resulted in a saving of 3.38 tonnes of plastic pallet wrap annually.

4.3 Reusable packaging

There are limited examples of reusable packaging for food and beverages in Australia at present, but interest is growing. *Woolworths* is collaborating with Terracycle to introduce the LOOP reusable packaging system in Australia.

[29] *Bega Cheese Limited, 2021. 2020 Sustainability Report, p. 62, Available at:* ***https://www.begacheese.com.au/wp-content/uploads/2020/10/243919-Bega_Sustainability-2020-v13.pdf.***

While milk was traditionally sold in refillable milk bottles, this model is now rarely used. There are some niche examples, for example *Schulz Organic Dairy* in Timboon, Victoria is trialling a refillable glass milk bottle. These are sold through markets and selected retailers. An online retailer in Melbourne, *Your Grocer,* is also offering milk in refillable glass bottles.

Refillable milk bottles can be provided in combination with milk vending machines, such as those provided by the *UK Milk Station Company*. In Australia, *Harris Farm* sells single origin milk 'on tap' and while there is no system to take bottles back for cleaning and resale, consumers are able to bring their own bottles back for refilling.

Proof points

DANONE YOGHURT IN REUSABLE PACKAGING

Danone partnered with Terracycle's LOOP reusable packaging program to provide UK consumers with a reusable option for yoghurt. The durable packaging is designed to be refilled many times. Used containers are stored ina LOOP tote and either returned to a store drop-off point or collected at no charge.

HÄAGEN DAZS ICE-CREAM IN REUSABLE PACKAGING

In 2019 the Häagen Dazs brand became a founding partner of the LOOP reusable packaging system through a pilot project in New York City. Ice-cream is home delivered in an insulated stainless steel container.

4.4 Design for recycling

There has been a strong shift within packaging supply chains globally towards more recyclable packaging. This includes:

- replacing polymers that are non-recyclable or that have limited end markets (such as PS and PVC) with recyclable polymers,
- shifting to more recyclable soft plastic formats, i.e., manufactured from one polymer or a mix of materials that are compatible in recycling,
- reducing the amount and type of pigments used in containers and lids, and
- changing label format or material composition.

4.4.1 Recyclable polymers

Companies are shifting away from the less recyclable polymers – particularly PS and PVC – towards PET, HDPE and PP.

Phasing out polystyrene

One of the desirable features of PS for yoghurt cups is that it can be used for multi-packs that are easy to 'snap apart'. Typically, other polymers have not offered the same characteristic.

Innovation is seeking to address this challenge and in 2018 Greiner Packaging became the first company in the UK to create a functional yoghurt multi-pack made from PP, with the new packs launched by Tesco. After further development the company successfully ***recreated the 'snap'*** feature that consumers are used to.

Outside the dairy industry, ***Carlsberg*** is using adhesive dots to hold multi-packs of beer together.

Using more PET

PET is widely used globally for beverage packaging because of its recyclability. Opaque and transparent coloured PET are less recyclable because they contaminate clear recycled PET intended to be used for new beverage containers. The Japanese beverage industry made a ***voluntary commitment to phase out coloured PET*** from 2001.

Innovation in PET packaging is continuing to extend its use into new applications and formats. Danone launched a PET yoghurt jar in Argentina in early 2019 and a ***100% recycled PET yoghurt cup*** was launched by Starlinger viscotec, PETMAN and dairy producer Biohof Zauner in Austria in 2020.

DANONE PET YOGHURT JAR

Danone collaborated with Amcor to develop a PET yoghurt jar for the Argentinian market. The transparent 200ml PET jar has a wide-mouth opening and an aluminium-PET barrier seal and a clear PP cap.

4.4.2 Opacifiers and pigments

Opacifiers and pigments can inhibit recycling in different ways. Opaque polymers and carbon black pigments prevent plastic packaging from being identified and sorted at a Materials Recovery Facility (MRF), while all dark pigments contaminate natural or clear recycled plastics and reduce their value in end markets.

Opaque packaging

APCO's ***Action Plan for Problematic and Unnecessary Single-Use Plastic Packaging*** (SUPs Action Plan) identified opaque PET as one of the formats that needs to be phased out immediately. Rigid PET bottles that are opaque due to the use of additives such as titanium dioxide are used to package some light sensitive beverages, including dairy products.

Additives such as opacifiers are a major contaminant of reprocessed natural (clear) bottle PET. If included in PET reprocessing, they cause cloudiness in natural PET packaging and product. Opaque PET results in a significant reduction in the quality of the material, reducing value and therefore causing high material losses. Alternatives to provide a light barrier include a different polymer such as HDPE or PP or tinted glass.[30]

Carbon black pigment

APCO's SUPs Action Plan also identified carbon black master batch as one of the key inputs that should be phased out to improve packaging recovery. Carbon black is used in the dairy industry in lids and trays.

Carbon black renders packaging 'undetectable' when it moves through a MRF because the Near Infrared (NIR) technology cannot detect the packaging material to be accurately separated. The plastics are therefore rejected as waste and lost to landfill. There are some alternatives emerging including less pigmented colours and new NIR detectable black master batches.[31]

In 2019, Unilever adopted a new detectable black pigment for HDPE bottles – used for the TRESemmé and Lynx (Axe) brands – enabling the materials to be effectively sorted for recycling through existing automated systems.

Dark pigments

Black plastics and heavily coloured plastics should be avoided where possible as they have a lower value in comparison to natural polymers, due to limited end market demand.[32]

Many companies are starting to phase out dark pigments to improve recyclability. Nestlé, for example, has identified dark, transparent and all opaque coloured PET on their ***'Negative list'*** of materials to be removed globally.

Research by WRAP in the UK ***recommended*** tinted rather than pigmented caps on HDPE dairy bottles to eliminate the green hue and allow a higher percentage of recycled HDPE in milk bottles. The report recommended the use of a 'tinted cap' with a range of lighter colour tones that would maintain identification of the milk variant (skimmed, semi-skimmed, whole) by colour.

[30] *APCO (2020), Action Plan for Problematic and Unnecessary Single-use Plastic Packaging, p. 46. Available at:* ***https://documents.packagingcovenant.org.au/public-documents/Action%20Plan%20for%20Problematic%20and%20Unnecessary%20Single-Use%20Plastic%20Packaging***
[31] *APCO (2020), Action Plan for Problematic and Unnecessary Single-use Plastic Packaging, p. 49.*
[32] *Ibid.*

The tinted caps would significantly reduce the impact on the colour of the final rHDPE pellet and could enable bottles with more than 30% rHDPE to be acceptable from a colour perspective.

The report stated that tests at reprocessors and in a dairy confirmed that the tinted caps can be recognised by colour recognition/sorting equipment as effectively as the coloured caps.

Unpigmented caps, however, would be problematic as it would then be difficult to separate the different grades of HDPE used for the bottle and the cap. In WRAP's view, the solution would be cost neutral to implement and consumer research indicated that the lighter cap is generally not a barrier to consumers recognising the type of milk.

4.4.3 Tethered caps

The European Union's ***directive on single use plastics*** requires all plastic bottles up to 3 litres to have tethered caps by 2025. The new rules are intended to reduce marine litter. Single-use bottles will only be allowed on the market if their caps remain attached.

4.4.4 Labelling

The materials and adhesives used for bottle labels can contaminate the recycled resin and reduce its value.

Removable labels

One solution is to design a label that can be easily removed by consumers. This approach has been adopted by ***Nestlé*** for their yoghurt pot in Chile. The label can be pulled off the pot without leaving any residue.

Recyclable labels

Labelmakers Group has a number of innovations designed to remove contamination:

- A new alkali-washable adhesive that enables pressure sensitive labels to be removed in the caustic washing process.
- A PET label that can be separated from HDPE bottle flake in the washing process because it sinks while the HDPE floats. The label uses washable inks and coatings and can be made from up to 70% post-consumer material.
- A HDPE label (in development) that will be made from up to 100% Australian recycled milk bottles. HDPE labels can be separated from PET bottle flake during the washing process. They can also be used on HDPE bottles for recycling compatibility.

Using labels for identification and sorting

Labelmakers is one of the partners in a ***multi-stakeholder research project*** to develop novel solutions for sensing and treating residual contaminants on HDPE plastic chips. The project is being coordinated by the NSW Smart Sensing Network (NSSN) and led by PEGRAS Asia Pacific, with other partners including researchers at the University of New South Wales, the University of Sydney and the University of Technology Sydney (UTS).

At present most MRFs only identify and sort PET, HDPE and a 'mixed' stream comprising PP, PS, PVC and other small volume polymers. Innovative technologies are being developed to allow packaging to be automatically sorted into more high value streams, for example food-grade resins.

This is particularly important for PP, which is a widely used polymer with strong end markets. The range of applications, polymer grades, additives and colours mean that recovered PP is currently not suitable for recycling into food packaging.

A collaborative R&D project called ***NextLOOPP*** is seeking to develop a closed-loop system for recovering food grade PP. The system uses a number of technologies including:

- 'Plastic Packaging Recycling using Intelligent Separation technologies for Materials' (Polyprism) which applies luminescent materials to labels and provides an ***invisible barcode for plastics recycling***.
- high speed identification and sorting of food grade PP at MRFs using ultra-violet light, and
- reprocessing and decontaminating the PP to meet EU and US food standards.

The global multi-participant project is being led by Nextek and ***currently has 29 partners***. Danone and Saputo Dairy UK will use the reprocessed PP in their packaging to close the loop.

Another pilot project called ***HolyGrail 2.0*** is being led by the European Brands Association (AIM) with more than 85 organisations including major brands and other partners such as GS1 and Tomra Sorting. The project builds on the HolyGrail initiative led by Ellen MacArthur Foundation (2016-2019). It will explore the feasibility of using 'digital watermarks' that allow waste packaging to be sorted into additional high value materials streams. Based on global and open standards for product identification, the ***labels, which are invisible to the naked eye, can encode attributes*** such as manufacturer, SKU,

type of plastics used and composition for multilayer objects and food vs. non- food usage. In a MRF the watermark can be detected and read by a standard high-resolution camera on the sorting line to separate materials into the appropriate stream.

The digital watermark may have potential to add further value to brands by collecting and reporting specific information back to brands on the amount of material recycled. These technologies may also improve the collection of industry-specific material flow data, providing greater transparency and traceability of packaging flowing through the circular system.

4.4.5 Soft plastics

Soft plastics are challenging to recycle because of the wide range of polymers and other materials utilised, particularly in multi-laminate structures. Design for recycling is therefore critical to achieving a circular economy for these materials. Within Australia there are two guidelines available to assist: the recyclability thresholds for the REDcycle program, already being utilised by many dairy manufacturers and their suppliers, and APCO's ***Quickstart Guide*** for household soft plastics.

There are several global supply chain initiatives underway to improve the design and recovery of soft plastics and these will become increasingly important. Initiatives include:

- ***CEFLEX*** design guidelines developed through a collaboration of European companies, associations and organisations representing the entire value chain of flexible packaging. They are intended to give clarity to brand owners, retailers, converters, film producers and others in the value chain on what structures they should be innovating to support a circular economy for flexible packaging.
- ***Project Barrier***, which was led by Amcor and facilitated by the Ellen MacArthur Foundation's New Plastic Economy initiative. The project developed design principles for recyclability of plastic-based flexible barrier packaging. The next steps to further develop, test and refine the guidelines are being taken by the CEFLEX initiative.
- Design guidelines being developed by the ***Consumer Goods Forum*** (CGF). While building on the CEFLEX and Project Barrier guidelines these will be highly influential because the CGF represents all global brand owners. Members have already agreed to adopt the CGF's 'golden rules' for improving PET recycling and eliminating problematic elements from packaging.

Packaging manufacturers such as Amcor and Sealed Air are working with customers in the dairy industry to provide more recyclable packaging in alignment with the CEFLEX guidelines.

These guidelines will support recovery of soft plastics through both mechanical and advanced recycling processes (Section 4.5.4).

4.5 Recovering household soft plastics

4.5.1 National Plastics Recycling Scheme

The Australian Food and Grocery Council (AFGC) recently received a grant under the Australian Government's Product Stewardship Investment Fund to develop a ***National Plastics Recycling Scheme***. The project will initially target the high volume of soft plastics flowing through the fast-moving consumer goods channel. The aim is to build on existing soft plastics recycling initiatives including REDcycle and the soft plastic kerbside collection trial run by Nestlé on the NSW Central Coast (see below).

4.5.2 Curbcycle collection and recycling trial

A collaborative supply chain partnership is testing the feasibility of collecting and recycling household soft plastics at scale. The project has several components looking at different stages in the recovery process:

- Collection – a ***kerbside collection trial*** on the NSW Central Coast is collecting soft plastics from 2,000 households with support from MRF operator, iQ Renew, feedstock recycler Licella and Nestlé.
- Sorting – the bags are being manually separated from commingled recyclables at the iQ Renew MRF.
- Processing – as part of the pilot, soft plastics from the trial were reprocessed into PP to make a ***protoype 100% recycled KitKat wrapper***.

The processing trial was a collaboration involving Nestlé (the program lead), CurbCycle, iQ Renew, Licella, Viva Energy Australia, LyondellBasell, REDcycle, Taghleef Industries and Amcor. The soft plastics were sorted and cleaned by iQ Renew, converted by Licella into liquid Plasticrude – a synthetic crude oil consisting of 100% recycled plastic. The Plasticrude was processed at Viva Energy's Geelong Refinery to turn it into the basic building blocks for polymerisation by LyondellBasell. The food-grade PP created by LyondellBasell was used by Taghleef Industries to create a metallised film, which was then used by Amcor Flexibles to create the prototype for a 100% recycled soft plastic KitKat wrapper.

Looking to the future, in 2020 iQ Renew, Licella and the University of Sydney ***received a grant*** through the Australian Government's CRC-P program to develop a template for upgrading existing MRFs to Smart Material Recovery Facilities by introducing 'Internet of Things' automation and trialling it in an existing MRF, aiming to increase post-consumer soft plastics recycling.

4.5.3 Roll 'n' Recycle

Soft plastics are unable to be sorted using current MRF technologies because they only have two dimensions (flat) and are therefore sorted into the paper stream, where they become a contaminant. Plastic packaging needs to have three dimensions to enable identification and sorting into the appropriate polymer stream.

A new initiative called ***Roll 'n' Recycle*** encourages consumers to roll up their plastic pouches (monopolymer formats only), secure them with the supplied sticker, and put them into their household recycling bin. At a MRF, the rolled-up pouch is expected to behave like a plastic bottle and be recovered with the polyethylene or polypropylene stream. This potentially opens up many more end markets for the packaging at end-of-life. The Roll 'n' Recycle initiative is still at the trial stage and yet to be tested at scale.

4.5.4 Advanced recycling technologies

Most recovered soft plastics are currently processed using mechanical recycling technologies that produce moulded products such as outdoor furniture or fence posts, or as an asphalt additive. Dairy manufacturers and other brand owners would prefer to see packaging recycled back into packaging, which is challenging for soft plastics.

This goal is driving a significant amount of R&D globally to develop advanced recycling facilities that would recover waste plastics using chemical rather than mechanical processes. The benefit of these technologies is that they can effectively deconstruct recovered plastics back to their constituent building blocks, eliminating contamination and enabling their conversion into new plastics equivalent to those produced using virgin resin. Reflective of the global landscape emerging around advanced recycling technology, Australia's CSIRO has recently released a study entitled ***Advanced recycling technologies to address Australia's plastic waste***, which provides a detailed analysis of the range of advanced recycling technologies emerging globally and their potential role in Australia's emerging circular economy. The report references an Australian pilot project led by Nestlé and a consortium of businesses, which successfully collected, processed and converted flexible plastics recovered via existing household collection bins, into new, 100% recycled wrappers for Nestlé's iconic Kit Kat bars.[33]

In the UK, Sealed Air worked in partnership with Tesco, Plastic Energy, SABIC, and Bradburys Cheese to develop a process for recycling soft plastic into safe, food-grade packaging. The plastics are collected in Tesco stores and then converted by ***Plastic Energy*** into oil through a pyrolysis process. The oil is used by ***SABIC*** as an alternative to traditional fossil fuel to make plastic resin, which Sealed Air uses to create new packaging film with the same performance and food-grade characteristics as virgin plastic. Seven different ***Bradburys Cheese*** products are packaged with the recycled plastic design and stocked in Tesco's stores.

Sealed Air, Plastic Energy and LyondellBasell are currently working towards a feasibility study into the development of a similar program in Australia, although the infrastructure is a minimum 36 months away from delivering full circularity in Australia.

Another project is investigating the feasibility of a commercial scale advanced recycling facility using Cat-HTR™ (Catalytic Hydrothermal Reactor), a form of hydrothermal liquefaction technology developed by Licella. In March 2021 Licella along with partners iQ Renew, Coles, LyondellBasell and Nestlé ***announced a joint feasibility study*** to determine the technical, economic, and environmental benefits of a local advanced recycling industry. The study will look at potential sites in Victoria.

Qenos is also investigating a commercial scale advanced recycling facility on its site in Altona, Victoria, using a catalytic pyrolysis process. An extensive study in the first half of 2021 will underpin the business case and investment decisions.[34]

4.6 Recycling infrastructure

4.6.1 Investments in mechanical plastics recycling

The Australian Government's ***Recycling Modernisation Fund***, combined with investments by state and territory governments and the recycling industry, is likely to have significant impacts on recycling capacity in coming years. These investments have a particular focus on materials impacted by the China Sword policy

[33] King, S, Hutchinson, SA and Boxall, NJ (2021) - Advanced recycling technologies to address Australia's plastic waste. CSIRO, Australia. p. 42 (https://www.csiro.au/-/media/News-releases/2021/Advanced-recycling-report/21-00312_REPORT_AdvancedRecycling_WEB.pdf)
[34] David Francis (Qenos), Presentation to Society of Plastics Engineers webinar, Plastics and the Circular Economy – Virtual Edition, 16-20 November 2020.

and the incoming bans on the export of unprocessed waste materials from Australia (Section 2.1). Some examples of recent or planned developments are listed in Table 14.

With these and other investments, Australian capacity for food grade resin is estimated to be at least 60,000 tonnes of rPET and 20,000 tonnes of rHDPE, depending on availability of supply and quality.[35] Key suppliers of these two resins include *Visy*, *PACT* and *Martogg*.

Table 14: *Recently announced investments in new plastics recycling infrastructure*

ORGANISATION	PROJECT	TIMING	ADDITIONAL CAPACITY
PACT, Cleanaway, Asahi	PET plastic pelletising plant, Albury NSW	*Operational* 12/21	28,000t
PACT, Cleanaway	PET, HDPE & PP flake for food and non- food grade applications, WA	*Announced* 2/21	17,000t
Visy	New HDPE plastic extrusion and sorting line to produce rHDPE for the Australian dairy industry, Smithfield NSW	*Announced* 12/19	12,000t
Martogg	Expanded capacity to produce food grade recycled PET & HDPE	*Fully operational* 12/21	23,000t rPET 4,500t rHDPE
PACT, Cleanaway	Plant in Laverton, VIC includes additional capacity of 10,000 t natural food grade rHDPE as well as 10,000 t non-food grade rHDPE and rPP	Operational December 2022	20,000 rHDPE, rPP

4.6.2 Improving the quality of recycled plastics

Increased use of the ARL to educate consumers on correct behaviour at the point of disposal, will aid with reducing contamination of commingled recyclable bins, improving the quality of material for sortation. Additional research and development is also being undertaken to improve the efficiency of reprocessing facilities and remove contaminants.

A research project coordinated by the NSW Smart Sensing Network and led by PEGRAS aims to develop scalable technologies that accurately sense and remove contaminants such as label adhesives from HDPE plastic flake. It will also investigate material flows for HDPE milk bottles and their complete lifecycle.

Advanced Circular Polymers in Somerton ***received a grant*** from the Australian Government in 2020 through the CRC-P program to develop and commercialise an artificial intelligence (AI)-enabled autonomous sorting system and automated plant, and polymer technology to upcycle residual plastics. The proposed system is expected to increase Australia's recycling capacity by 42,000 tonnes per year.

APCO has developed voluntary ***recovered polymer specifications*** to assist companies involved in the sorting and processing of recovered plastic packaging to meet market requirements. These specifications were developed with support from the National Waste and Recycling Industry Council (NWRIC) in consultation with industry experts along the supply chain from manufacturers, processors and sorters.

Separate specifications have been developed for two key stages in the recovery process:

- sorting (i.e., Material Recovery Facilities (MRFs) and other sorters) to supply baled plastics, and
- processors (i.e., plastic recycling facilities) to supply flake to converters.

Two of the specifications are particularly relevant to the dairy industry: clear recycled PET flake and natural HDPE flake for food contact applications.

4.6.3 Liquid paperboard

Gable top and aseptic cartons are difficult to recycle because of the multi-material structure. There are various technologies available to process these materials into sheet products such as construction panels but there is currently no facility available in Australia.[36] TetraPak however, has publicly articulated plans to build reprocessing capacity in both Australia and New Zealand by 2023.[37]

[35] *Industry estimates gathered through stakeholder interviews undertaken during research for this publication.*
[36] *Robertson, Gordon L, 'Recycling of Aseptic Beverage Cartons – A Review (2021). Available at:* ***https://www.mdpi.com/2313-4321/6/1/20/pdf****; retrieved 5 Aug 2021*
[37] *Thinkstep ANZ Webinar Series – 'The proof is in the data: Packaging LCA study', available at:* ***https://www.thinkstep- anz.com/resrc/webinars/the-proof-is-in-the-data/****; retrieved 1Jul2021.*

A new venture called ***SaveBoard*** is planning to make building panels from LPB cartons, coffee cups and soft plastics. The business, which is expected to start production in Hamilton, New Zealand in late-2021, is supported by Tetra Pak, Freightways and Closed Loop (p.50).

4.6.4 Glassine liner

In early 2021, Labelmakers Group announced an Australian ***recycling program*** for glassine liner. An estimated 10,000 tonnes of liner from pressure sensitive labels are disposed to landfill in Australia each year. The technology allows the conversion of glassine liner into insulation products for the commercial and residential building industry. The liner will be collected by Labelmakers and converted to insulation by their industry partner, Enviroflex Commercial.

4.7 Recycled content in packaging

The 2025 National Packaging Target of 50% average post-consumer recycled content in packaging, and similar targets overseas, are driving research and development and new product development, particularly for plastic packaging.

Conventional plastics recycling technologies include granulation into flake and then extrusion into pellets for manufacturing into new products. The availability of food-grade resin is limited, particularly for PP and soft plastics, because of the need for advanced sorting and decontamination.

The Dairy industry has identified that guidance for industry is needed to ensure the safety of recycled materials to meet the FSANZ requirement that there is to be no contamination of food from food contact materials[38]. An independent verification body and process is also needed in Australasia. There are also two international standards that regulate the use of recycled materials for packaging in contact with food. Used packaging can be processed into packaging when it is reprocessed by companies using specialised equipment and following strict processes that have either the assurance of the ***United States Food and Drug Administration*** (US FDA) through a 'letter of no objection' (LNO) or if they meet the requirements of the ***European Commission Regulation (EC) No. 1935/2004*** for all Food Contact Materials (FCMs). In both frameworks, the onus and responsibility for demonstrating that contaminants are removed sits with the reprocessor and packaging manufacturer.

Recycled PET has been widely used for beverage bottles in Australia and other markets for over 30 years. The use of recycled HDPE in food packaging is less common, in part because of difficulties gaining European Food Safety Authority (EFSA) approval. It is, however, already being used in milk bottles in the UK. In March 2021, Biffa announced a £13 million investment that will allow them to recycle a further 14,000 tonnes of HDPE, growing its total annual capacity to 39,000 tonnes. There is a strong driver for brand owners in that market, who, from April 2022, will need to use 30% PCR to avoid paying the ***new tax*** on virgin plastic packaging. An example is ***Arla Foods*** UK, who already use up to 30% rHDPE in their milk bottles.

The European Union's ***directive on Single-Use Plastics*** includes a target to incorporate 25% of recycled plastic in PET bottles by 2025 and 30% in all plastic bottles by 2030.

Dairy Australia and Food and Agribusiness Growth Centre (FIAL) co-funded a project led by Bega Dairy and Drinks to develop a pathway for increasing the rHDPE content of milk bottles (p.36).

Labelmakers has also developed a label made from 100% post-consumer recycled HDPE, which will soon be available in Australia.

A likely solution to increase the availability of food grade recycled material is advanced or chemical recycling, which processes plastics into their basic hydrocarbon constituents for remanufacture back into polymers (Section 4.4). While only a 'proof of concept', the recent pilot project to produce recycled PP for Nestlé's KitKat chocolate bar demonstrated a potential closed-loop solution for soft plastics and other polymers in Australia. Several feasibility studies are underway, with the establishment of a commercial scale facility in Australia at least three years away.[39] Widely accessible recovery systems may take longer.

[38] *Australia New Zealand Food Standards Code - Standard 3.2.2 - Food Safety Practices and General Requirements (Australia Only) – Division 3, Section 9 – Food Packaging. (**https://www.legislation.gov.au/Details/F2014C01204**)*
[39] *Industry estimate gathered through stakeholder interviews undertaken during research for this publication.*

Research into recycled plastic in milk bottles[40]

A Dairy Australia Technology Assessment (DATA) project aimed to develop a pathway for Bega Dairy and Drinks to increase the rHDPE content of their 2 litre and 3 litre milk bottles to 50% or greater. It did so by assessing the functional impact of using increased levels of food grade rHDPE in 2 litre milk bottles.

While up to 20% recycled resin has been previously used in milk bottles in Australia, it was uncertain if this percentage could be increased, especially using locally sourced recycled resin. This is largely because there is a lack of evidence both locally and globally as to the impacts of using rHDPE addition rates higher than 40% in milk bottles – particularly with respect to the thermal degradation of rHDPE resin during repeated re-processing in available recycling systems and the subsequent mechanical, chemical and sensory aspects of the finished bottle.

The results showed that a blend of 50% rHDPE with virgin resin had comparable material properties during blow moulding and comparable finished bottle properties, such as top load, drop tolerance, taint and aesthetics.

Addition of rHDPE was found to slightly impact the colour of the bottle but this was only apparent in unfilled bottles. There was no chemical or heavy metal migration or leaching from the 50% rHDPE blend bottles into white milk.

[40] *Dairy Australia and Bega Dairy and Drinks, 2021. Developing a pathway for increased recycled plastic in milk bottles* ***https://cdn-prod.dairyaustralia.com.au/-/media/project/dairy-australia-sites/national-home/resources/2021/08/05/increasing-recycled-plastic-in-milk-bottles-fact-sheet/increasing-recycled-plastic-in-milk-bottles-fact-sheet.pdf?rev=809565a4f4cc4639894424fa32f2c691***

5

The Roadmap

5. The Roadmap

In developing this Roadmap, the dairy industry has identified strategies for sustainable packaging to support achievement of the 2025 Targets. These are linked to the outcomes and targets in Table 15.

Dairy manufacturers will develop additional industry targets for packaging sustainability for specific dairy packaging formats.

At present there is insufficient baseline data to determine industry-wide targets for many of these outcomes. Dairy manufacturers will collect more detailed baseline data on dairy packaging to enable them to develop additional targets, including for recycled content in specific packaging formats, and to monitor and report on progress. Targets could be predicated on the 2025 Targets (Table 1) and/or the UK Dairy Roadmap (Section 2.2.1) and will build on data collected through APCO Members' APCO Annual Reports.

Table 15: *Roadmap outcomes and targets*

DESIRED OUTCOME	TARGETS
1. Packaging designed for circularity	100% of packaging designed to be reusable, recyclable or compostable by 2025.
2. Improved collection and recycling systems	Collection and recycling systems available for all packaging by 2025. 80% of supermarket products to be labelled with the ARL by December 2023.
3. Expanded markets for used packaging	50% average post-consumer recycled content across all packaging by 2025, where safe to do so.

5.1 OUTCOME 1 – Packaging design for circularity

Target: 100% of packaging designed to be reusable, recyclable or compostable

STRATEGY	RESPONSIBILITY
1. Eliminate problematic and unnecessary single-use plastic packaging	Dairy manufacturers Packaging suppliers
2. Reduce packaging where feasible	Dairy manufacturers Packaging suppliers Retailers
3. Use recycling and recycled content labels	Dairy manufacturers Label suppliers Research organisations
4. Reduce pigment in milk bottle caps	Dairy manufacturers Packaging suppliers
5. Design soft plastics for recycling	Dairy manufacturers Packaging suppliers Research organisations
6. Introduce more B2B packaging reuse systems where there is an environmental benefit	Dairy manufacturers Packaging suppliers
7. Improve packaging data collection	Dairy manufacturers Packaging suppliers Recycling organisations APCO

5.1.1 Eliminate problematic and unnecessary single-use plastic packaging

One of the four 2025 Targets is to phase out problematic and unnecessary single-use plastic packaging. APCO released its ***SUPs Action Plan*** in late 2020 which identified a list of items for immediate action and others that were being placed 'on notice' for further consideration (Table 2). In addition, the ***National Plastics Plan*** requires PVC labels to be phased out by December 2022.

Significant progress is already being achieved within the dairy industry, for example Chobani has replaced carbon black with an alternative pigment in their yoghurt lids (p.41) and Fonterra changed from black to clear trays for its cheese snack trays.

PVC is also being phased out of thermoformed packaging, for example cheese snack trays and clamshells for cheese slices. For some other problematic materials there is currently no viable alternative, including some barrier soft plastics, but research and development is continuing to achieve the desired outcome.

Dairy manufacturers will:

- work to eliminate problematic and unnecessary materials and formats from their product range by 2025 (Table 16), and
- continue to rationalise the polymers used to make rigid plastic packaging (bottles, tubs and pots) to those that are most recyclable, i.e., PET, HDPE and PP.

Table 16: *Problematic and unnecessary single use plastic dairy packaging*

PROBLEMATIC ITEM	APPLICATIONS AND WHY USED	WHY PROBLEMATIC	STRATEGY
Opaque polyethylene terephthalate (PET)	Limited applications e.g., to protect shelf life for light-sensitive products such as kefir yoghurt	Opacifiers such as titanium dioxide contaminate clear food grade recycled PET.	Replace with clear PET with sleeve labels for colour if necessary.
Polyvinyl chloride (PVC)	Trays for cheese snack packs – PVC was traditionally used for thermoforms. Single serve butter (food service). Tamper bands on 1L ice-cream tubs. Induction seals for milk.	Volumes are so low that separation in a MRF is costly. Considered 'non- recyclable' by many local councils due to limited end markets.	Replace cheese clamshells with clear PET and support increased recovery for thermoform PET to improve recycled content rates Explore alternative formats for single serve butter, e.g., foil wrap.
Polystyrene (PS)	Yoghurt tubs and lids. Yoghurt multi-packs – PS allows packs to snap apart. Sour cream cups	Volumes are so low that separation in a MRF is costly. Considered 'non- recyclable' by many local councils due to limited end markets.	Eliminate secondary yoghurt lids where feasible or replace with PET lids. Replace PS with alternatives e.g., PET or PP.
Multi laminate cheese packaging	Cheese pouches and flow wrap, ice-cream wrappers, lidding films – every layer has a function e.g., to extend shelf life.	Multi-laminates that contain PVC, PS or bioplastics are non-recyclable through the REDcycle program. Polymers of minor concern that must be kept to a minimum are nylon, PVDC, EVOH and PET.	Collaborate with suppliers to source soft plastics that meet REDcycle and *CEFLEX* guidelines.
Carbon black	Yoghurt and dip lids – marketing benefit. Cheese snack trays.	MRF sensors unable to detect the polymer.	Change to clear/ unpigmented plastic, or if that's not possible replace with alternative black pigments.
Plastic straws	Attached to small drink cartons.	Unable to be sorted in a MRF. May be covered by bans on single use plastic products in some Jurisdictions.	Remove where feasible or if that's not possible, replace with paper straw.
Plastic spoons	Attached to some yoghurts and desserts.	Unable to be sorted in a MRF. May be covered by bans on single use plastic products in some Jurisdictions.	Remove where feasible.
Induction seals	Bonded to caps to extend shelf life. Allows for lighter weight bottles and caps.	May contaminate recycling of the cap.	Investigate to see if there is an alternative solution that doesn't require a heavier bottle or cap.
Butter wrap (laminated foil or greaseproof paper)	Blocks of butter, butter pats.	Multi-material or too contaminated with residue to recycle.	Explore alternative packaging options.
Rigid PVC butter mini packs	Food service, e.g., in hotels.	PVC is non-recyclable, and the pack is too small to be sorted in a MRF.	Change from PVC to PET or develop a compostable pack that can be collected with the organics (food waste) stream.

Proof points

CHOBANI REMOVED CARBON BLACK FROM YOGHURT LIDS

Food and beverage manufacturer Chobani is taking its commitment to the 2025 Targets very seriously, embracing the collective national challenge to make all packaging recyclable, reusable or compostable by 2025. In 2018, Chobani embarked on a company-wide initiative to review product packaging across its brand portfolio. The objectives of the review were to eliminate unrecyclable materials from its packaging and to educate consumers about correct disposal, by incorporating the ARL across the range.

A cross-functional team developed a bespoke packaging roadmap, based on APCO's Packaging Sustainability Framework, demonstrating its commitment to continually reviewing and improving packaging sustainability and waste management practices. Utilising the Packaging Recyclability Evaluation Portal (PREP), available exclusively to APCO Members, the team uncovered a particular problem with their use of carbon black, which was widely used in lids of its Gippsland Dairy products.

Chobani worked with its plastics supplier to find a solution. By making changes to the plastic master batch, a new colourant was identified and incorporated into the lids, with a virtually imperceptible change to the look of the packaging. A successful product testing phase identified a positive response from consumers and Chobani rolled out the new lids across the Gippsland Dairy products in February 2020.

This update also coincided with the company's on-pack implementation of the ARL, to assist consumers to make the right choice at the point of disposal and to reduce contamination through household collection systems. At the time of writing, more than 90% of Chobani's packaging is now 100% recyclable, with work continuing to address the outstanding formats, so they're well on the way to achieving their recyclability objectives.

FONTERRA PHASING OUT PVC[41]

Fonterra is currently working on removing PVC from all Australian packaging,with one recent milestone reached for the clamshell packaging found on Bega Cheese slices. Every year, Fonterra sells over 25 million packs of Bega, Mainland and private label natural cheese slices in clamshells, some of the most popular cheese products in Australian households. Previously made from non-recyclable frosted PVC, in early 2020 Fonterra approved the change of these clamshell units to clear PET to improve recyclability.

There were several technical and cost challenges needed to be overcome tomake this switch viable. PET generates more static electricity compared to PVC, making the empty clamshell packs stick together in the magazine priorto filling. Many production trials were required to find the right de-nesting solution.

BULLA PHASING OUT NON-RECYCLABLE MATERIALS

Bulla has replaced PS with PP for all cream and yoghurt cups. This means that customers are able to recycle the cups in their kerbside recycling bin. More recently the non-recyclable PS lids used on the cups were replaced with clear PET lids, which are recyclable.

The ARL is being added to all products to advise consumers on recyclability.

Bulla also originally received ingredients from one of its suppliers in non- recyclable plastic trays. Recyclability and the use of renewable resources was improved by collaborating with the supplier to switch from a non-recyclable lightweight PP tray to a cardboard insert.

[41] *APCO, 2020. The Australian Packaging Covenant Organisation 2019-2020 Annual Report, p. 36. Available at:* ***https://documents.packagingcovenant.org.au/public-documents/APCO%202019-20%20Annual%20Report.***

5.1.2 Reduce packaging where feasible

Where packaging cannot be eliminated, manufacturers will seek to reduce and optimise its weight. This has a range of benefits – it saves resources, reduces energy consumption and reduces transport costs.

Most companies have reduced packaging weights for at least some items (e.g. see p.43) and are actively looking for more opportunities.

While the average weight of a 2 litre HDPE milk bottle is 46g, the lightest possible weight is 38g. If every company shifted to the lightest weight available, there would be potential to save around 17% or approximately 7,500 tonnes of HDPE per year. An even lighter bottle is in use in the UK (32g) but handling in the supply network would need to be adjusted to accommodate this in the Australian market.

There is also potential to reduce the weight of milk bottle caps. A comparative lifecycle assessment of packaging in Australia and New Zealand identified a range in weights for 2 litre HDPE milk bottle caps from 1.6g – common in New Zealand – to up to 2.6g in Australia.[42] Caps on 1 litre bottles are even heavier, weighing in at up to 3.1g.

Quantities of shelf ready packaging (SRP) are increasing as retailers seek to improve efficiencies and reduce product waste. Major retailers claim that SRP promotes more efficient product rotation by increasing sales through better consumer visibility and increased speed of replenishment. This means less likelihood of product exceeding 'best before' or 'use by' dates. Opportunities to achieve these benefits with less packaging need to be explored.

For food service businesses there is an opportunity to replace HDPE milk bottles with 10 litre milk 'bladders' (p.43), recyclable through existing soft plastics reprocessing pathways.

Dairy manufacturers will explore opportunities to further reduce packaging where it does not compromise food safety, integrity, or shelf life, including by:

- reviewing all packaging against the Sustainable Packaging Guidelines or equivalent, to identify opportunities to eliminate unnecessary components and lightweight materials where this does not compromise functionality,
- reducing the weight of plastic milk and cream bottles and caps to meet best practice,
- engaging large retailers to identify opportunities to reduce shelf ready packaging, and
- implementing packaging systems which reduce production waste (e.g. see p.43).

[42] *Thinkstep (2021), LCA of beverage and food packaging in Australia and New Zealand, Report to Tetra Pak, pp. 104-10, available at:* ***https://www.thinkstep-anz.com/resrc/reports/lca-of-beverage-and-food-packaging-in-australia- and-new-zealand-tetra-pak/.***

Proof points

LION LIGHTWEIGHT MILK BOTTLE

In 2017, *Lion Dairy and Drinks* (now Bega) reduced the weight of their HDPE milk bottles. The 2 litre bottle was reduced from 42 to 38 grams,and the 3 litre from 72 to 63 grams. These initiatives have reduced consumption of HDPE by approximately 2,000 tonnes per year.

FONTERRA CHEESE AND CRACKER SNACKS

Fonterra is planning to remove the cardboard sleeves on their cheese snack products from September 2021. The cardboard sleeve is considered unnecessary, and because the product is sold as an on-the-go snack there is more potential for components to end up in the litter stream compared to products sold solely for home consumption.

The current pack includes a plastic tray, plastic overwrap and a cardboard sleeve with all of the branding and other essential information. The redesigned packaging will remove the cardboard sleeve. Branding will be added to the top film and an additional label to the back. This change is expected to reduce cardboard consumption by around 75 tonnes per year.

SAPUTO DESIGN FOR EFFICIENCY

In 2020, Saputo announced new global sustainability targets for 2025 including a commitment to reduce carbon dioxide by 20%, water intensity by 10% and energy intensity by 10%. It also has specific packaging targets including to reduce material use by 15%, use packaging that is 100% reusable, recyclable or compostable and ensure that its packaging includes at least 15% recycled or renewable content.

The implementation of more efficient packaging for Saputo's Devondale 250g and 750g cheese blocks is a recent example of a local initiative. In 2019 the resealable zip was removed, and the size of the packaging reduced to optimise the carton and fit more product on each pallet.

MILK BLADDERS

Milk bladders are used to dispense fresh milk in cafes. One equipment supplier – *Six Simple Machines* – estimates that its customers use 80% less plastic in their packaging using bladders in a chilled dispensing unit rather than the traditional 2 litre milk bottle.

Milk bladders are being used by companies such as *Inglenook Dairy* to supply bulk milk to cafes. Inglenook Dairy has estimated that it can reduce packaging from three tonnes of 2 litre plastic bottles down to about 750-800 kilograms of bladders in 12 months.

LINERLESS LABELS

Bulla has reduced on-site waste production by converting from traditional die cut barcode label application to liner free barcode label application.

The new label printer applicator has no silicon backing paper, therefore simultaneously eliminating waste and waste handling within the factory.

5.1.3 Use recycling and recycled content labels

Labels can contaminate recycled plastics in three ways: with adhesives that remain attached to the polymer throughout the recycling process, with label materials that are different to the main polymer (e.g., a PVC label on a PET bottle) and with inks and pigments that bleed into the recycled resin and add colour to natural HDPE or PET.

There is significant innovation and product development underway to assist brand owners in designing more recyclable labels, i.e., made from compatible polymers or with washable adhesives (see Section 4.4.4). Washable labels may be the preferred option to avoid ink contamination.

Pressure sensitive adhesives are a significant contaminant in recycled HDPE and can also cause ink contamination. A hot caustic wash removes most ink, but some ink can become re-attached to adhesive during the washing process.

The size of labels can also prevent bottles being effectively sorted in a MRF. Full shrink sleeves and overly large labels stop a packaging from being identified by polymer and sorted into the correct stream. This issue is typically identified when packaging specifications are entered into PREP.

Dairy manufacturers will continue to improve recyclability by designing or using labels that optimise recycling outcomes. This may include labels that:

- can either able to be readily removed during re-processing, or made of the same material so they can be processed together,
- use adhesives that can be easily removed in the caustic washing process,
- are designed in such a way that the packaging that they are attached to is better sorted, i.e., avoiding full shrink or other large format labels, and
- include some post-consumer recycled content to provide a circular solution for rHDPE from milk and cream bottles.

5.1.4 Reduce pigment in milk bottle caps

The recyclability of milk bottle caps is affected by pigment colour and whether the milk bottle is put into the recycling bin with the cap on or off.

Coloured caps on HDPE milk and cream bottles ***contaminate the natural HDPE*** recycling stream. Most recyclers can identify and remove coloured flake during the recycling process, but this is rarely 100% effective and only a small percentage of pigment can affect the colour of the recycled resin and restrict its ability to be processed back into milk and cream bottles. Tamper-evident rings, which generally remain on the bottle when it enters the recycling stream, are a particular problem. After granulation the pieces are so small that they are not always able to be identified and removed by the sorting equipment.

Masterbatch manufacturer and recycler Martogg has provided the following information to support a reduction in pigment:[43]

> *The type of colourants used for making the masterbatches that cap manufacturers use to colour milk bottle caps has a significant effect on the colour of milk bottle flake. For the dark blue caps found typically on full cream milk bottles, highly active organic blue dyes are generally used in the masterbatch formulation because only a small amount is needed for the masterbatch to impart the colour and opacity required by the milk companies. Since a little of these blue organic dyes goes along way … they are largely responsible for the green/blue hue of milk bottle flake and, ultimately food grade rHDPE. Using a less 'active' pigment system in the masterbatch may help improve the colour of the milk bottle flake, while moving to unpigmented, natural caps would be even more beneficial.*

This view is supported by research in the UK (See Section 4.4.2), which found that tints can still allow for product differentiation in the refrigerator and colour sorting of recovered plastic flake at the recycling facility. Reducing pigment in caps will lead to less contamination in the natural rHDPE stream and support higher levels of recycled resin in milk and cream bottles.

The placement of milk in the well of supermarket refrigerator cabinets means the labels cannot be fully seen, hence the consumers' reliance on the cap colour. This is a barrier to removing all multi- colour caps which if addressed, would encourage all dairy companies to move into one natural resin cap, with savings in material, storage, and freight costs. Retailers will need to be engaged ahead of the change to discuss the potential need to modify display on shelves.

[43] *David Finlayson, Martogg, pers. Comm.*

Dairy manufacturers will take action to increase the recyclability of both milk bottle caps and HDPE bottles by:

- transitioning to tinted milk and cream bottle caps to support recovery of a higher grade, natural uncoloured HDPE stream.
- considering the feasibility of tethered closures to ensure that caps are recovered with the bottle and to improve material compatibility.
- investigating complementary in-store display models to support reduced reliance on pigmented caps for consumer product identification.

5.1.5 Design soft plastics for recycling

Dairy manufacturers are working with their suppliers to source recyclable soft plastics that also deliver the functional properties of more complex multi-layer structures. This work is being guided by REDcycle thresholds in PREP, as well as the international CEFLEX guidelines (see Section 4.4.5).

Dairy manufacturers that are members of the REDcycle program are being guided by the maximum thresholds for problematic materials such as nylon, EVOH, PVO Hand PET. One of the challenges they face is trying to get information from suppliers on the exact percentages of each material to check for REDcycle compliance. Another challenge is finding recyclable alternatives for all product applications. While plastic pouches tend to be compatible with REDcycle it is more difficult to find recyclable films for vacuum sealed structures (e.g., for Gouda) and packaging for some of the soft cheeses that require very specific film structures to deliver a longer shelf life.

The CEFLEX guidelines have more stringent requirements than REDcycle, for example specifying at least 80% mixed polyolefin content and preferably 90% mono PP or PE to improve recyclability.

The thresholds in PREP will evolve over time to reflect more stringent design requirements in end markets. Dairy manufacturers will continue to collaborate with suppliers to source soft plastic packaging that meets both REDcycle and CEFLEX guidelines. This will ensure that the packaging is 'future proof', i.e., is compatible with both mechanical and advanced recycling technologies.

Proof points

FONTERRA REDESIGN OF CHEESE OVERWRAP

Fonterra and Bega have redesigned, trialled and implemented a structure change to the 'Stringers' String Cheese overwrap to comply with REDcycle guidelines. The structure was moved from a PET/PP based film to a BOPP/PP. This change in material ensures it will not impact the recyclability of the film in REDcycle partner processing systems. The packaging can now carry the REDcycle label and the ARL 'store drop off' instruction.

5.1.6 Introduce more B2B packaging reuse systems where there is an environmental benefit

B2B packaging offers the most scope for reusable packaging systems. Reusable plastic crates that have long been used for fresh milk deliveries provide both environmental and efficiency benefits. APCO's *Australian Packaging Consumption and Recycling Data 2018-19 report* identified that existing reusable dairy crate systems had helped to avoid more than 62 tonnes of single-use paper and paperboard packaging in a year.[44] Manufactured from HDPE, the crates are estimated to be reused up to 50 times before they need to be replaced, at which point they are fully recyclable.[45]

Dairy manufacturers will investigate other opportunities to replace single-use packaging with reusable packaging systems, beginning with the distribution packaging used to deliver empty packaging such as caps, to dairy manufacturers.

Care needs to be taken to ensure that any reuse system delivers an overall reduction in environmental impact. Fonterra, for example, utilise an alternative one-way packaging system in the form of shrink-wrapped bundles for their milk bottles. This system improves pallet utilisation (reducing transport impacts) and both the PE shrink film and the cardboard base pad can be recycled by the retailer. A lifecycle assessment (LCA) found that this method of delivery has a lower carbon footprint than a reusable plastic crate.[46]

[44] *APCO, 2021. Australian Packaging Consumption and Recycling Data 2018 -19, p. 98,* ***https://documents.packagingcovenant.org.au/public- documents/Australian%20Packaging%20Consumption%20And%20Recycling%20Data%202018-19*** *– retrieved 1Jul2021.*
[45] *Thinkstep (2021), p. 46.*
[46] *Fonterra (nd), Life cycle analysis of crates vs one way packaging, unpublished*

5.1.7 Improve packaging data collection

With the notable exception of the Material Flow Analysis (MFA) for HDPE milk bottle uses, there is currently limited data available on packaging use and recovery specific to the dairy industry.

The dairy industry will develop a more comprehensive system to track material use in the industry and performance against the Roadmap and the 2025 Targets.

5.2 OUTCOME 2 – Improved collection and recycling systems

Target: Collection and recycling systems available for all dairy packaging

STRATEGY	RESPONSIBILITY
1. Support recovery systems for household soft plastics	Dairy manufacturers REDcycle Australian Food and Grocery Council (AFGC) Recycling companies Government
2. Introduce alternative collection systems for single stream dairy packaging	Dairy manufacturers Recycling companies Government
3. Label all consumer packaging with the Australasian Recycling Label	Dairy manufacturers APCO
4. Advise consumers on optimal recycling of small items	Dairy manufacturers APCO
5. Support collection and recycling programs for hard-to-recycle packaging	Dairy manufacturers Recycling companies Government

Most forms of dairy packaging are recyclable at scale through kerbside collection services (e.g., cardboard cartons and wraps, glass and plastic milk and cream bottles and other rigid plastic containers), container deposit schemes (e.g.,plastic bottles for flavoured milk) and commercial services (e.g., corrugated boxes and pallet wrap). Problematic materials for recycling include LPB cartons, household soft plastics, rigid polystyrene, PVC, and coated or wet strength papers (Table 17). Priority strategies to address these are summarised and outlined in more detail in Table 18.

Table 17: *Dairy packaging classified as non-recyclable or with limited recyclability*

PACKAGING ITEM	NATIONAL RECYCLING RATE 2018-19 (%)	WHY PROBLEMATIC
LPB aseptic and gable top cartons	7%	Technically recyclable but not collected through kerbside in many councils as it contaminates the paper stream (Note: this scenario may change as increased domestic reprocessing capacity comes online in 2022).
Household soft plastics e.g., cheese wrap, pouches	6% (all soft plastics)	Not collected in kerbside due to difficulties sorting in MRFs. REDcycle drop-off is not convenient for all consumers.
Small items – bottle caps, coffee creamers, single service butter etc.	Not available	Too small to be sorted at MRFs. No collection and recycling services for B2B packaging (food service).
Rigid polypropylene	13% (all PP)	Not separated in MRFs – ends up with low value mixed plastics – down-cycling / landfill.
Rigid polystyrene	24% (all PS)	Not separated in MRFs – ends up with low value mixed plastics – down-cycling / landfill.
Foil (peel off lids)	Not available	2D foil ends up in the paper stream at MRFs. Needs to be scrunched into a ball to be sorted Correctly.
Laminated foil-paper wrap (butter)	Not available	Not recyclable due to mix of materials.

[46] *Fonterra (nd), Life cycle analysis of crates vs one way packaging, unpublished*

Coated or high wet strength paper	Not available	Not recyclable due to coating and oily residue.
B2B soft plastics e.g., pallet wrap, 10L milk bladders, intermediate bulk container bladders, food service bags	Not available	Not widely collected for recycling due to cost, limited end markets.
B2B HDPE milk bottles e.g., quick service restaurants, cafes	23% (all HDPE)	Limited collection services.

5.2.1 Support recovery systems for household soft plastics

Soft plastics are currently not collected through kerbside recycling systems. An alternative collection program called REDcycle is operating through supermarkets, and most large dairy manufacturers are already members. While REDcycle fills an important gap in Australia's recycling infrastructure, it relies on consumers to bring their recyclable soft plastics back to a participating store. End markets for soft plastics recovered through mechanical recycling processes are currently limited.

Meeting the 70% recycling targets for soft plastics by 2025 will require multiple solutions, and work on these needs to occur simultaneously through:

- design for recycling (Outcome 1),
- increased access to collection; preferable through kerbside systems, and
- investment in advanced recycling technologies to produce food-grade recycled resins.

There are many initiatives underway to address all three strategies, both in Australia and internationally (Section 4).

Dairy manufacturers will continue to support efforts to increase collection and recycling by:

- designing for recycling,
- helping to fund the REDcycle program,
- participating in AFGC's plans for a ***National Plastics Recycling Scheme for Soft Plastics***, and
- supporting new recycling technologies (e.g., advanced recycling for problematic materials) to build demand and drive investment and capacity building for viable technologies.

Proof point

REDCYCLE SOFT PLASTICS RECYCLING PROGRAM

REDcycle collects household soft plastics through Coles and Woolworths supermarkets. The plastics are recycled into a range of products includingoutdoor furniture, bollards, signage, wheel stops and asphalt additive.

The REDcycle program is funded by retailers, packaging manufacturers and brand owners. Dairy manufacturers *participating in the REDcycle program* include Bega, Browns Dairy, Bulla, Coles, Lactalis, Chobani, Fonterra, Saputo and Woolworths.

5.2.2 Introduce alternative collection systems for single-stream dairy packaging

Some high value dairy packaging is currently going to landfill due to the limited availability of collection services. One of the biggest opportunities is for HDPE milk and cream bottles delivered to food service business because these are already technically recyclable, provide a homogenous and relatively clean material stream and have good end markets. A number of options are already being explored, including a collection trial by Bega in collaboration with two large customers (p.48).

Other gaps include:

- soft plastics such as 10 litre milk bladders, intermediate bulk container bladders, food service bags etc.,

- small single service items provided in restaurants and cafes, such as coffee creamers and single butter portions, and
- B2B packaging such as cheese films and plastic liners in milk powder bags.

These items are not widely recycled and require tailored product stewardship solutions. Dairy manufacturers will collaborate with customers to explore the feasibility of take-back and recycling systems.

Proof points

BEGA PILOT COLLECTION FOR MILK BOTTLES

Bega is undertaking a 6 month trial in Queensland in collaboration with McDonald's and 7-Eleven to collect and recycle used HDPE milk bottles. Staff rinse bottles and replace the caps to ensure that they can be transported hygienically back to an aggregation point. The bottles are then delivered to a plastics recycler producing food grade rHDPE.

SEALED AIR

Sealed Air recycles soft plastics into products such as the New Zealand Post mail satchel. They are also expanding projects to collect and recycle soft plastics packaging from dairy manufacturers in New Zealand.

The project has three stages:

- The initial focus has been on recovering pre-consumer waste from Sealed Air's own operations, which is now successfully operating and recovering close to 200 tonnes of material annually.
- The second stage is to recover B2B materials such as cheese films and liners in milk powder bags, for which initial trials have begun.
- The third stage is to investigate processing the plastics back into food contact packaging, which will require investment in new infrastructure.

5.2.3 Label all consumer packaging for recycling or disposal with the ARL

The *ARL Program* is designed to help consumers recycle correctly and support brand owners to design packaging that is recyclable at end-of-life. The Program has two key components:

- the Packaging Recyclability Evaluation Portal (PREP) - an online tool that assesses that assesses packaging recyclability through the lens of kerbside collection systems within the Australian and New Zealand markets, and
- the Australasian Recycling Label – an on-pack label that provides clear and simple instructions at the point of disposal, about how to recycle each of the separable packaging components.

Each packaging component is evaluated as either recyclable, conditionally recyclable (i.e., it can only be recycled if the instructions below the label are followed, e.g., 'return to store' or 'check locally'), or not recyclable. These evaluations translate into a simple, yet instructive set of consumer labels for each packaging component, to be applied on pack.

PREP and the ARL are currently used for consumer packaging, based on recyclability through kerbside collection systems and REDcycle. APCO is planning to undertake a pilot project to test the feasibility of adding B2B packaging to PREP, which would allow use of the ARL on this type of packaging.

The Australian Government's *National Plastics Plan* includes a target for at least 80% of supermarket products to display the ARL, including recycled content, by December 2023.

Dairy manufacturers will:

- label all consumer products with the ARL by December 2023, and
- add the ARL to relevant B2B packaging when available in PREP.

5.2.4 Advise consumers on optimal recycling of small items

Small items such as bottle caps and attached straws and cutlery are often lost to landfill, recycled incorrectly or end up in the litter stream. More consistent advice to consumers on how to dispose of these items will help to reduce litter and waste, as well as minimising contamination in recycling bins.

The material in milk and cream bottle caps is lost to landfill if consumers remove it before recycling the bottle. After kerbside collection commingled recyclables are sorted in a MRF. Incoming materials are initially sorted by size by passing them through a trommel, which is a perforated, rotating, cylindrical drum. When small items such as loose caps enter the trommel they can fall through the holes, ending up as contamination in the glass stream and ultimately directed to landfill.

Milk and cream bottle caps that remain on the bottle are sorted into the HDPE stream, baled, and sent to a plastics recycling facility. The bottles are granulated, and the different resin types are often separated based on their ability to float or sink in a large tank of water. Recyclers then use optical sorting to separate coloured from natural HDPE and to remove any contaminants such as induction seals.

The Australian Beverages Council has recently undertaken research into the fate of beverage caps at end of life. They identified a lack of clear messaging on how to recycle bottle caps, high litter rates and a lost opportunity to collect and recycle the material.[47]

A satin bower bird's bower surrounded by milk bottle caps and straws *(Photo Helen Lewis)*

Milk bottle caps alone currently use over 2,500 tonnes of plastic each year. There is no available data on milk bottle caps in the litter stream, although one Queensland litter survey found that caps from containers not covered by the Container Deposit Scheme were the third most commonly littered item.[48] Blue caps are often collected by the satin bower bird, and the tamper-evident ring is a hazard to the bird if still attached to the cap.[49]

Dairy manufacturers will educate consumers, including through the ARL, to replace the cap on the milk and cream bottles before recycling to ensure that they can be recovered in a MRF.

Consumers also need to be advised to dispose of attached straws and cutlery in their rubbish bin as these are unable to be sorted at a MRF.

5.2.5 Support collection and recycling programs for hard-to-recycle packaging

Dairy manufacturers and their suppliers have an important role to play in supporting new or expanded recycling programs for hard-to-recycle packaging. One of the packaging materials that needs to be addressed as a matter of urgency is LPB.

LPB gable top and aseptic cartons are widely used in the dairy industry for fresh and shelf stable milk and have a lower carbon footprint than many other packaging formats.[50] These formats are currently classified as 'conditionally recyclable' in PREP because less than 80% of local councils accept these types of packaging. This means that the ARL needs to instruct consumers to 'check locally' for recyclability.

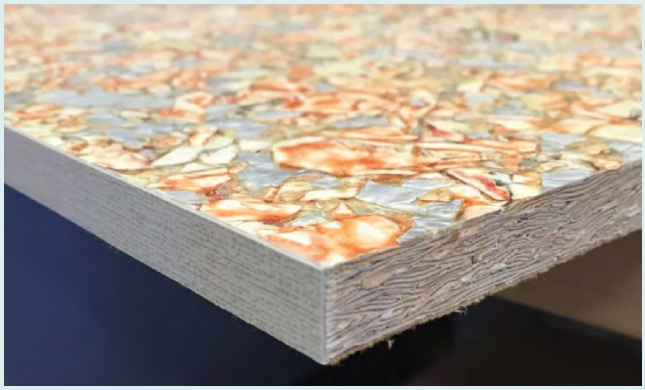
Tetra Pak is supporting a new manufacturing enterprise in New Zealand, which is expected to be able to accept post-consumer LPB packaging in future (p.50). Tetra Pak has advised that they are finalising an agreement with partners in Australia to introduce the same technology here, with the new plant expected to be operational by June 2022.[51]

[47] *Research undertaken by A. Prince Consulting for the Australian Beverages Council, 2021.Unpublished.*
[48] *Research undertaken by A. Prince Consulting for the Australian Beverages Council, 2021.Unpublished.*
[49] *ABC Online, 2018. Satin bowerbirds fall victim to plastic waste. 6 October 2018. Available at:* ***https://www.abc.net.au/news/2018-10-06/satin-bower-birds-falling-victim-to-plastic-waste/10215078***
[50] *Thinkstep, 2021. LCA of Tetra Pak cartons, available at:* ***https://www.thinkstep-anz.com/resrc/case-studies/lca-of-tetra- pak-cartons/.***
[51] *Vikas Ahuja and Jaymie Pagdato, Tetra Pak, Presentations to Thinkstep webinar, 'The proof is in the data: packaging LCA study', April 2021, available at:* ***https://www.thinkstep-anz.com/resrc/webinars/the-proof-is-in-the-data/.***

Proof points

NEW MARKET FOR RECYCLED LPB IN NEW ZEALAND

Tetra Pak, Freightways and Closed Loop are supporting a new venture called SaveBoard in Hamilton, New Zealand that will start operating in late 2021. The manufacturing business will make building panels from LPB cartons, coffee cups and soft plastics. The product will be similar to chipboard, with the polymer working as a binder. It will initially target pre- consumer waste from packaging plants and post-consumer waste from Auckland, with other councils to be added over time.[52]



5.3 OUTCOME 3 – Expanded markets for used packaging

Target: 50% average post-consumer recycled content across all dairy packaging by 2025

STRATEGY	RESPONSIBILITY
1. Increase post-consumer recycled content in packaging where safe to do so	Dairy manufacturers Packaging suppliers Recycled resin suppliers
2. Purchase products made from recycled plastics to help build sustainable end markets	Dairy manufacturers Recycled product manufacturers Government
3. Collaborate with supply chain partners to develop food grade recycled resins using advanced recycling technologies	Dairy manufacturers Resin suppliers Recyclers Technology providers Research organisations
4. Undertake collaborative R&D to accelerate dairy industry progress in areas of technical complexity	Dairy manufacturers Packaging suppliers Research organisations Government
5. Implement APCO's recycled content labelling program	Dairy manufacturers Packaging suppliers APCO

5.3.1 Increase post-consumer recycled content in packaging where safe to do so

The 2025 Targets include an average of 50% recycled content across all packaging, 30% for PET, and 20% for HDPE and PP, by 2025. Dairy manufacturers are committed to achieving these targets, but there are several challenges that need to be addressed collectively.

The first challenge is local availability of food grade rHDPE and rPET. This is being addressed through current and planned investments in mechanical recycling facilities (Section 4.5) and is unlikely to be a constraint in future. There appears to be sufficient manufacturing capacity for both of these resins coming on stream over the next few years to allow manufacturers to meet their recycled content targets.

The second challenge is ensuring that recycled resins meet the relevant standards for recycled materials in contact with food. There are several companies reprocessing packaging in Australia that have a letter of no objection (LNO) from the US FDA and comply with EC Regulations.[53] While EFSA has not approved any recycled HDPE plastics for food contact, the dairy

[52] *Vikas Ahuja and Jaymie Pagdato, 2021.*
[53] *APCO (2021), Recycled content guidelines, available at: https://documents.packagingcovenant.org.au/public-documents/Recycled%20Content%20Guide.*

industry in the UK has been using post-consumer recycled material for many years. This has included up to 40% recycled content in HDPE milk bottles.

APCO is developing a traceability standard for recycled materials to give industry and governments more confidence in recycled content products and packaging, whether produced in Australia or imported. The standard is expected to be launched in late 2021 to support APCO's new recycled content labelling program.

APCO has also developed a ***Recycled Content Guide*** for its Members on recycled content in packaging, including information on relevant regulations and standards.

The third challenge is the current cost premium on recycled resins. This is predicated on the relatively low cost of fossil fuel feedstocks and subsequently of virgin resin, coupled the additional costs of collecting, sorting and recycling packaging at end of life. It should be acknowledged however, that the costs of recycling or disposing of packaging are externalities that are currently borne by others (e.g., local councils) or the natural environment. Globally, many companies are committing to ***Science Based Targets*** which seek to address such externalities along their supply chains.

The opportunities for recycled content in consumer packaging include HDPE milk and cream bottles, PET bottles and PET thermoforms. Several dairy brands have made public commitments to increase the level of post-consumer recycled content, including Bega, The Collective (p.52) and Woolworths (p.52). There are still concerns among some other dairy brand owners that mechanically recycled post-consumer rHDPE available in Australia will not meet relevant food safety standards.

Dairy Australia and Bega Dairy and Drinks collaborated on a research project to develop a pathway for increased recycled plastic in milk bottles. The project tested the performance of milk bottles containing various levels of post-consumer recycled content and concluded that up to 50% rHDPE is technically feasible (p.36).

R&D is also underway, for example within ***Amcor***, to add post-consumer or pre-consumer recycled content to plastic films.

There are significant drivers for companies to increase their use of recycled resins to support a circular economy for packaging materials. While consumer packaging is receiving a lot of focus at present there may also be opportunities in B2B packaging, for example in HDPE milk crates. Lactalis has ***reported*** that their milk crates already use approximately 30% recycled content.

Dairy manufacturers will:

- make public commitments to increase recycled content in packaging to send strong signals to the reprocessing sector of robust demand and to drive further investment to meet the articulated demand.
- review all packaging, including B2B packaging, to drive increased recycled content demand across all formats and materials.
- include the highest possible proportion of recycled content with the objective of delivering an average of 50% recycled content rate across all packaging formats used by the dairy products industry, in accordance with the 2025 Targets. It is anticipated that recycled content in PET and HDPE packaging will increase gradually as the availability of local, food- grade resin increases with new and expanded recycling capacity coming on stream.

Proof points

WOOLWORTHS RECYCLED CONTENT TARGETS

Woolworths has a target to achieve an average of 60% recycled content in its Own Brand packaging by the end of 2025. They have committed to reducing virgin plastic by half, which is supported by their milk packaging – this is on track to achieve 100% for 1 litre PET milk bottles and 50% rHDPE for 2 litre & 3 litre milk bottles. In 2018 Woolworths reduced the weight of packaging used in its own brand 2L and 3L milk bottles, saving 400 tonnes of plastic yearly.

[54] *Bega Cheese Limited, 2021, 2020 Sustainability Report, p. 62, Available at:* ***https://www.begacheese.com.au/wp-content/uploads/2020/10/243919-Bega_Sustainability-2020- v13.pdf.***

BEGA RECYCLED CONTENT IN CLAMSHELLS[54]

As part of its CSR commitments, ***Bega Cheese Limited*** has committed to arange of packaging sustainability strategies.

A key area of focus has been to increase the use of recycled content. In their2020 Sustainability Report, Bega reported that they were actively collaborating on two closed-loop initiatives with packaging suppliers to trial using post-consumer plastic for food grade packaging. While still in development they had successfully trialled a packaging item with greater than 30% post-consumer rPET.

In FY2021 they were aiming to launch new packaging for one of their spreadsproducts in a bottle manufactured from at least 30% post-consumer rPET. They were also on track to transition up to 20% of their cheese slice clamshell packaging to incorporate up to 50% post-consumer rPET by the end of this year.

THE COLLECTIVE YOGHURT BOTTLE WITH RECYCLED PET[55]

In 2019, PACT Group and The Collective launched the first yoghurt bottle in New Zealand that incorporates recycled plastic (rPET) in its packaging. This bottle change aims to reduce the use of virgin plastic by over 35 tonnes a year.

5.3.2 Purchase products made from recycled plastics to help build sustainable markets

While a 'closed-loop' for recycled packaging is challenging for some materials, dairy retailers and manufacturers can support recycling by buying other products made from recycled materials.

Dairy packaging is already being recycled into a wide variety of products. Some are niche projects, such as the conversion of milk and cream bottle tops into prosthetic limbs. Many others are commercially available. REDcycle is working with recyclers to convert household soft plastics and other packaging waste into products, including:

- ***REPLAS*** manufacture indoor and outdoor furniture, bollards and signage.
- ***Plastic Forests*** manufacture wheel stops and other products.
- ***Close the Loop*** manufacture a high-performance recycled asphalt additive for road infrastructure known as Tonerplas.

Recycled HDPE is used in a wide variety of products including supermarket trolleys, ***sound barriers***, ***children's toys*** and mobile garbage bins. PACT Group has been ***recognised for its innovative design*** and manufacture of mobile garbage bins made from 60% recycled milk and cream bottles.

Dairy manufacturers will:

- purchase products made from recycled soft plastic packaging to help to build sustainable end markets for collected packaging materials, including those manufactured by REDcycle's recycling partners.
- identify other opportunities to support end markets for recycled plastics through their procurement.

[55] *PACT Group, 2020. 2020 sustainability review, p. 69. Available at:* ***https://pactgroup.com.au/wp-content/uploads/2020/10/Pact-Sustainability-Report-2020_V5_FINAL_Spreads2.pdf.***

Proof points

COLES RECYCLED SUPERMARKET TROLLEYS

Coles *new flagship store* at Moonee Ponds uses trolley baskets made from 90% recycled milk and cream bottles and 10% REDcycle soft plastics.

5.3.3 Collaborate with supply chain partners to develop food grade recycled resins using advanced recycling technologies

Dairy manufacturers are aiming for post-consumer recycled content in all of their packaging where feasible. At present it is not possible to source food grade recycled PP for inclusion in tubs and pots; nor is it technically possible to include post-consumer resin in soft plastics.

A potential solution is advanced recycling, which produces resin that is indistinguishable from virgin, and there are several feasibility studies into this technology currently underway in Australia (Section 4.4). Nestlé has demonstrated the power of a collaborative supply chain approach to produce recycled PP packaging.

Dairy manufacturers will seek to collaborate with their packaging suppliers, resin producers and other brand owners to support the establishment of advanced recycling facilities in Australia.

Proof point

NESTLÉ'S SUPPLY CHAIN COLLABORATION FOR RECYCLED WRAPPERS[56]

Nestlé, together with other companies, has collaborated to develop Australia's first soft plastic food wrapper made with recycled content.

The prototype *KitKat* wrapper, which aims at closing the loop on recycling soft plastics, has been created by a coalition of companies in Australia with ashared vision. Between them, Nestlé, CurbCycle, iQ Renew, Licella, Viva Energy Australia, LyondellBasell, REDcycle, Taghleef Industries and Amcor brought their individual expertise together to collect and process waste soft plastic, turn it back into oil, and create a food-grade prototype wrapper.

This innovation is driven by Nestlé's pledge to reduce its use of virgin plasticsby one-third by 2025.

5.3.4 Undertake collaborative R&D to accelerate dairy industry progress in areas of technical complexity

Dairy manufacturers share many common challenges to achieve increased circularity for packaging while also achieving the demanding performance requirements for many forms of dairy packaging. These include:

- sourcing 'recycle ready' soft plastics for certain products including soft cheeses,
- integrating high levels of post-consumer recycled resins into plastic milk and cream bottles without affecting appearance or taste,
- eliminating or redesigning components that affect recyclability, such as induction seals, and
- accessing food-grade recycled resin for the full range of dairy packaging applications.

Addressing these challenges requires collaboration across the packaging value chain. Depending on the specific issue, it may need to involve raw material suppliers, packaging manufacturers, brands, retailers, customers, researchers and/or recyclers.

Dairy manufacturers will engage with packaging suppliers to identify shared challenges that would be best addressed through collaborative R&D.

5.3.5 Implement APCO's recycled content labelling program

In 2021 APCO will launch a new voluntary labelling program for recycled content in packaging. This will have two elements:

- an on-pack label based on the ARL, and
- a recycled content traceability system to ensure that brand owners can track and verify recycled materials along their supply chain.

Dairy manufacturers will seek to use the APCO's recycled content labelling system on packaging where feasible, particularly for corrugated boxes and cartons. Over time it could be added to plastics, for example PET and HDPE milk and cream bottles.

[56] *Nestlé Australia (2021), **https://www.nestle.com/media/news/nestle-australia-co-develops-recycled-plastic- wrapper-kitkat***

6
Conclusion

6 Conclusion

This Roadmap provides a framework for dairy manufacturers to achieve more sustainable packaging through collaboration and coordinated effort. It addresses the need for action at three critical stages in the packaging lifecycle: design, collection and recycling, and remanufacturing back into packaging or other products.

The dairy industry will collaborate to develop an improved data collection system within 12 months of publication of this Roadmap. This will support the development of industry-specific targets and the monitoring and reporting of progress against the actions articulated in this Roadmap. Industry data will also be utilised to track material use in the industry and performance against the Roadmap and the 2025 National Packaging Targets.

ROADMAP DEVELOPER

ROADMAP SUPPORTER

Glossary and acronyms

Advanced recycling	Conversion to monomer or production of new raw materials by changing the chemical structure of a material or substance through cracking, gasification, or depolymerisation, excluding energy recovery and incineration. Advanced recycling technologies deconstruct material inputs back to basic chemical components suitable for rebuilding into new hydrocarbon products, such as synthetic oils and plastics. Also called chemical recycling or feedstock recycling.
ARL	Australasian Recycling Label.
Bioplastics	A broad term for plastics that are biobased, biodegradable or both. Bioplastics fall into one of three groups: Bio-based and biodegradable, Bio-based (but not biodegradable) and Biodegradable (but not bio- based). Conventional polymers (e.g., PET and HDPE) can also be fully or partially bio-based.
B2B	Business-to-Business.
Biodegradable	A generic term that indicates a plastic is biologically available for microbial decomposition, with no detail on its breakdown outputs, time or extent of degradation or end environments.
Certified compostable plastic	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. Source: APCO (2019), Biodegradable and compostable packaging working group 2018, p. 7
Chemical recycling	See Advanced Recycling
Compostable packaging	A packaging or packaging component (1) is compostable if it is certified to AS4736, AS5810 or a similar compostability standard, and if its successful post-consumer (2) collection, (sorting), and composting is proven to work in practice and at scale (3). 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.[57]
Compostable plastic packaging	Packaging or item made to compost down through approved processes. It can be called compostable if it is certified to AS 4736 and if it is successfully collected, sorted, and composted in practice and at scale.[59]
Fragmentable plastic	A material (however described) made of plastic which includes additives to accelerate the fragmentation of the material into smaller pieces, triggered by ultraviolet radiation or heat exposure, whether or not this is, or may be, followed by partial or complete breakdown of the material by microbial action.[60]
Feedstock Recycling	See Advanced Recycling

[57] *Based on Ellen MacArthur Foundation (2019), The new plastics economy: global commitment reporting guidelines, 16th July 2019, p. 49. Available at: https://www.newplasticseconomy.org/assets/doc/GC-Reporting-guidance-16.07.19.pdf, retrieved 5 Aug 2021*

[58] *Based on South Australian Single-use and Other Plastic Products (Waste Avoidance) Bill 2020, Available at: https://www.legislation.sa.gov.au/LZ/B/CURRENT/SINGLE-USE%20AND%20OTHER%20PLASTIC%20PRODUCTS%20(WASTE%20AVOIDANCE)%20BILL%202020.aspx.*

[59] *Australian Packaging Covenant Organisation, 2020. Considerations for Compostable Plastic Packaging. Available at: https://documents.packaging-covenant.org.au/public-documents/Considerations%20for%20Compostable%20Packaging*

[56] *Based on South Australian Single-use and Other Plastic Products (Waste Avoidance) Bill 2020, Available at: https://www.legislation.sa.gov.au/LZ/B/CURRENT/SINGLE-USE%20AND%20OTHER%20PLASTIC%20PRODUCTS%20(WASTE%20AVOIDANCE)%20BILL%202020.aspx.*

Mechanical 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.
Organics collection service	Collection service for waste organics which could include kerbside collection of food organics and garden organics (FOGO), food organics only (FO), or a commercial organics collection.
Oxo-degradable plastic	See 'Fragmentable plastic'.
Packaging	Packaging is defined in the National Environment Protection (Used Packaging Materials) Measure 2011 to mean all packaging products made of any material, or combination of materials, for the containment, protection, marketing or handling of consumer products.
PE	Polyethylene polymer.
Polyolefins	A family of polymers that includes LDPE, LLDPE, HDPE and PP.
PP	Polypropylene polymer.
PVC	Polyvinyl chloride polymer.
PVDC	Polyvinylidene chloride polymer.
Problematic plastic packaging	Packaging that, in Australia, is currently: • Difficult to collect/recover for reuse, recycling or composting purposes; or • A material that hinders, disrupts or obstructs opportunities to recover other materials or resources; or • A significant contribution to the plastic litter problem; or • Manufactured with, contains or has contained hazardous chemicals or materials (e.g., PFAS, BPA) that pose a significant risk to human health or the environment. This type of packaging may not be considered problematic should emerging technologies result in effective collection/recovery for reuse, recycling or composting purposes, provided it can be removed from the environment.
Single-use plastic packaging	Packaging that is likely to be designed to be discarded after a single use and is routinely disposed of after its contents have been unpacked or exhausted.
Unnecessary plastic packaging	Packaging that can currently be reduced or substituted with non-plastic fit-for-purpose alternatives and/or can be eliminated entirely without compromising the consumer's access to the product or causing undesirable environmental outcomes. Note: There may be necessary case-by-case exemptions for packaging required for occupational, health and safety standards, including packaging regulated for specific industry use such as therapeutic and hazardous goods.

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