Costs and incentives for a more circular packaging system

Final report

November 2021

accenture

Commissioned by

APCO

Acknowledgements

We are grateful to the following organisations that have been consulted in the development of this report:

Amcor
Australian Institute of Packaging
Australian Food & Grocery Council
Cleanaway
David Jones and Country Road Group
Department of Agriculture, Water and the Environment
Envisage Works
Institute for Sustainable Futures, UTS
MRA Consulting Group
PACT Group
Visy Industries

About Accenture

Accenture is a global professional services company with leading capabilities in digital, cloud and security. Combining unmatched experience and specialized skills across more than 40 industries, we offer Strategy and Consulting, Interactive, Technology and Operations services—all powered by the world's largest network of Advanced Technology and Intelligent Operations centers. Our 624,000 people deliver on the promise of technology and human ingenuity every day, serving clients in more than 120 countries. We embrace the power of change to create value and shared success for our clients, people, shareholders, partners and communities.

Visit us at www.accenture.com

About APCO

The Australian Packaging Covenant Organisation (APCO) is a not for profit organisation leading the development of a circular economy for packaging in Australia. Our vision is a packaging value chain that collaborates to keep packaging materials out of landfill and retains the maximum value of the materials, energy and labour within the local economy. We work with governments, businesses and other organisations from across Australia's large and complex packaging value chain to develop the insights, resources and programs that are needed to build a sustainable national packaging ecosystem. This includes facilitating the delivery of Australia's 2025 National Packaging Targets, an important step on the pathway to a circular economy.

Visit us at www apco org.au

Introduction

The Australian packaging system is undergoing a major transition to improve the circularity of the materials in the system and reduce the amount of waste generated. The National Packaging Targets, established in 2018, set specific goals to shift the system by 2025. This transition is part of a broader effort to build a circular economy in Australia – renewed government support and intervention along with commitments from business and new investments in recycling capacity all aim to achieve a substantial and lasting improvement in our recycling and recovery performance.

This shift to greater circularity is driven by the goal of reducing the environmental impacts of the packaging system. Fewer emissions from landfilling of packaging waste, reduced reliance on fossil fuels as virgin feedstocks for packaging and less environmental impacts from virgin material production are all important benefits of a circular packaging system.

Achieving increased circularity requires a shift in the economic model that underlies packaging. The purpose of this report is to analyse packaging as an economic system, to understand what changes in funding and incentives are needed for it to become more circular. This includes estimating the current system costs, how they are paid for and how those costs would likely need to change in order to meet the National Packaging Targets. The report also considers the financial incentives in the system, and whether each participant's incentives are aligned with circular objectives.

This report is focussed on the practical challenges of transition, not on understanding the economic and environmental benefits of circularity – there is a significant amount of work has already been undertaken on this topic both in Australia and internationally. For this reason, the environmental and social costs of a more linear packaging system are not discussed in the analysis.

The report builds on existing work that APCO has undertaken measuring packaging consumption and recycling in Australia and material flows in the Australian packaging system. Along with those studies, it supports APCO's latest report on progress towards the National Packaging Targets.

Executive summary

Australia consumes more than 6 million tonnes of packaging material annually, at a cost of $13-15 billion

Consumption of packaging is increasing each year. A large share of this packaging is still lost to landfill. In 2019-20, 45% of all packaging materials ended up in landfill.

Packaging is a complex system with money and material flowing through various steps in two stages: production of packaging, and its recovery after use.

Production costs around $10-$12 billion each year for all packaging materials consumed in Australia. Recovery, which includes the collection, disposal, sorting and reprocessing of materials, makes up the remainder of packaging system costs, around $2.6 billion each year.

Production is funded by the consumption of packaged goods. The funding for recovery comes from a range of sources, including local government and business waste collection fees. Only around 40% is from the sale of recovered materials themselves.

The National Packaging Targets aim to make the system more circular, increasing the cost by at least $1.7 billion

Achieving circularity in the packaging system will require changes to packaging design to maximise recyclability, increases in the collection and reprocessing of material, and changes to production processes to use more recycled content.

The recovery stage of the system is likely to bear the greatest cost of these changes, as increased volumes of material are collected, sorted and reprocessed. Recovery would likely cost at least $1.7 billion more than today.

However, the most recent data suggests that on the current trajectory, not all of the National Packaging Targets (the NPTs, or the Targets) are likely to be achieved by 2025. In particular, plastics recovery rates are currently sitting at 16%, well below the 70% target. Only paper and PET packaging are on track to meet their Targets for recycled content.

The major barrier to achieving the Targets is ensuring participants' financial incentives align with circular objectives

Participants in the system can be expected to act in their commercial interest, looking for opportunities to grow revenue or reduce cost. Progress toward the Targets will be strengthened if participants' incentives are aligned with circularity goals.

Consumers play a critical role in the system. Changing consumer preferences and increased willingness to pay for circular packaging would provide a strong financial incentive. But it is unclear to what extent consumers will be the drivers of change.

On the cost side, there is little incentive for circularity because it is usually more expensive for participants to act in a more circular way.

Policy should focus on improving incentives at the two points where the circularity of the system is currently weakest: consumers' disposal practices, and producers' sourcing of material for packaging.

A range of policies could assist to strengthen financial incentives towards achieving the Targets

Consumers need incentives to better separate recyclable packaging and reduce landfill. This could involve financial incentives through packaging recycling or return schemes, or cost-based mechanisms such as pay-as-you-throw that discourage the disposal of packaging material.

Producers could be incentivised to use more recycled content through various market-based mechanisms, such as taxes on virgin materials, eco-modulated fees in product stewardship schemes (eg, container deposit schemes) or subsidies for use of recycled content. By redirecting financial flows from virgin to secondary materials, these policies would also help to fund the increasing cost of recovery under the Targets.

Conclusions

1. The main gaps in achieving the NPTs are in plastics, but collection is likely a limiting factor to increased circularity across all material types
2. The increased cost of recovery to meet the NPTs should be primarily funded by increased sales of recovered materials to packaging producers
3. Aligning incentives in the system with circular objectives is critical to achieve lasting change, but interventions to change incentives will take time to implement
4. In the short term, the focus should be on reinforcing existing interventions, especially waste education, waste levies and capital investment subsidies
5. Further work is needed to understand the change in production costs from greater circularity, and the level of impact from different interventions

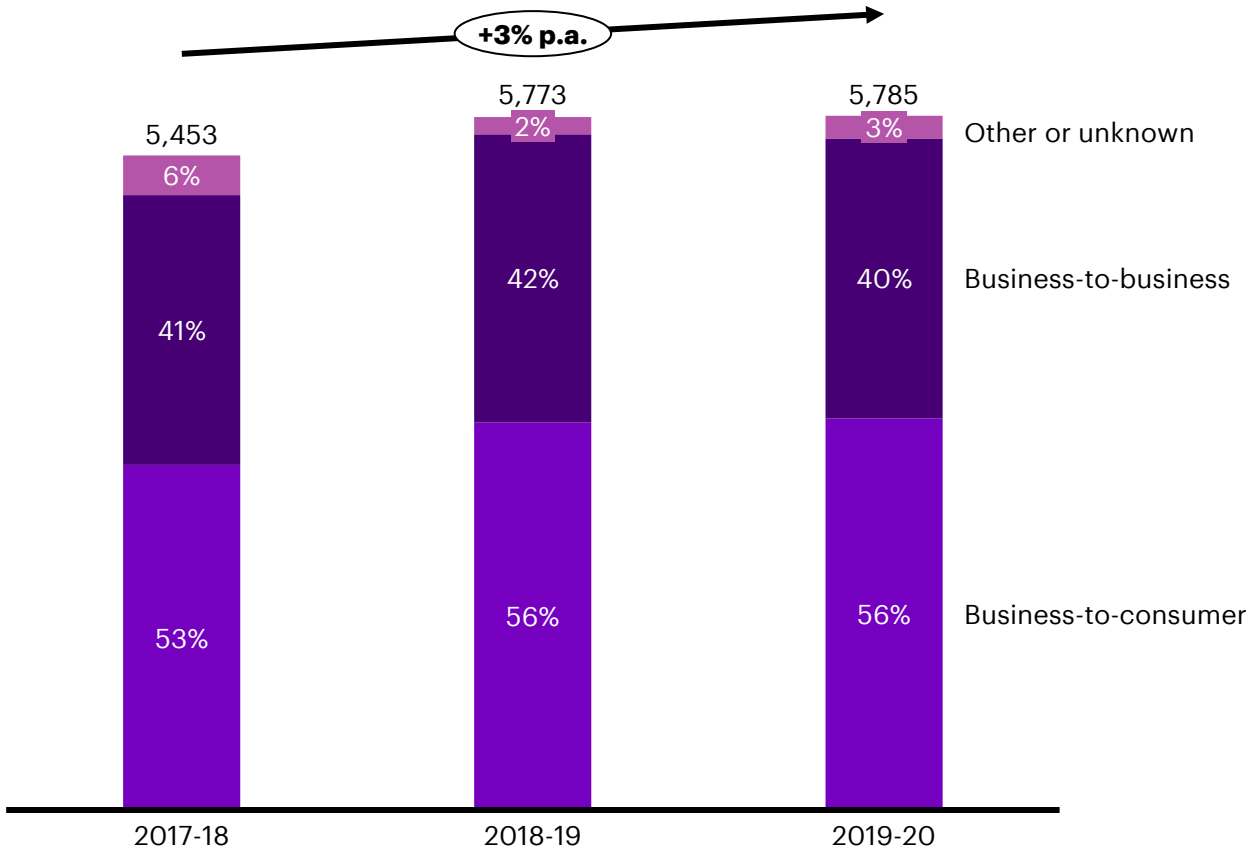
Contents

01

Australia consumes more than 6 million tonnes of packaging material annually, at a cost of $13-15 billion

More than 6 million tonnes of packaging were consumed in Australia in 2019-20

Exhibit 1: Total packaging consumption in Australia (excluding wood and some metals)[1]
Thousands of tonnes , 2017-18 to 2019-20



Note: 1. Wood and two metal types – mild and stainless steel – are excluded for comparison purposes as they have not been measured comprehensively in all 3 years. Business-to-consumer includes end uses both at home and away from home
Exhibit source: APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft); Accenture analysis

The total volume of packaging materials placed on the market in Australia reached 6.3m tonnes in 2019-20 (5.8m tonnes on a like-for-like basis with previous years, as shown in the exhibit). This includes packaging manufactured domestically, as well as imported packaging and packaging on imported goods.

The trend growth rate for packaging consumption over the three years of available data is 3% per annum (excluding wood and some metals).[1] This is faster than the growth in either population or gross domestic product (GDP) over the same period. However, growth may be stabilising: the increase in packaging consumption from 2018-19 to 2019-20 was smaller in absolute terms than the previous period and less than the rate of population growth.

Just over half of the packaging placed on the market by business is designed for use by consumers. This share has increased slightly since 2017-18. Most of the rest of the packaging consumed in Australia is for business-to-business use.

Consistent growth in the volume of packaging used in Australia has been driven by a range of factors, including the increase in online shopping and home deliveries. Smaller package and portion sizes for food and groceries are also a factor. With an ageing population and more people living alone, ready-made and pre-packaged meals are often a more convenient option. Individually packaged items are also more convenient for consumption away from home.

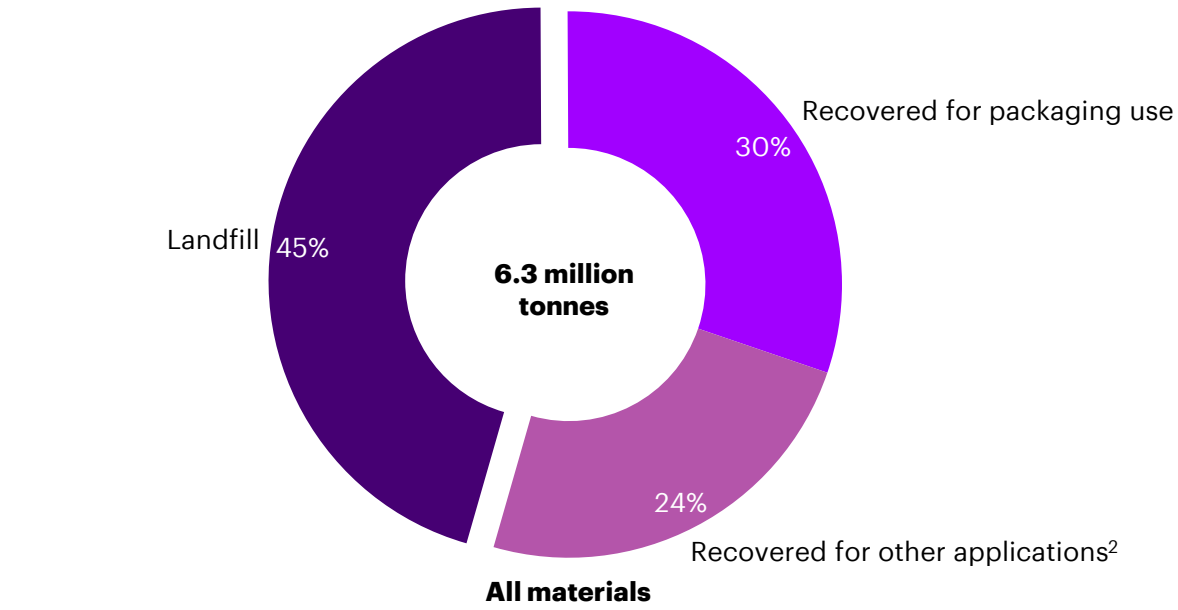
The increase in volume may also result in part from pressure to make packaging more circular. Plastics that are difficult to recycle are sometimes replaced by more recyclable but heavier materials, such as paper.

Available data covers the period until June 2020. As such, it only includes the first three months of the COVID-19 pandemic, which saw a surge in online shopping and home delivery through the lockdowns. The 2020-21 data will provide insight into the impact of these factors on packaging consumption.

Consistent growth in packaging volumes makes the transformation of the packaging system to a more circular model more challenging. This is because the scale of the system is increasing at the same time that investments are needed to improve capacity and quality in collection, sortation and reprocessing.

Around 45% of packaging material ended up in landfill, with the remainder reprocessed for packaging and other applications

Exhibit 2: Fate of packaging material placed on market by end use
% of packaging placed on market, 2019-20



Once consumed, packaging is either landfilled or recovered for further use.[1] Across all material types, around 45% of packaging placed on market in Australia was lost to landfill in 2019-20.

There are three main reasons that high volumes of packaging still go to landfill:

- not all packaging is recyclable, or is accepted for recycling in the recovery system
- not all recyclable packaging material is separated for recycling by consumers and businesses after its use
- some material is lost in the recovery process due to contamination, breakage etc.

Material that is recovered can be reprocessed into secondary materials for subsequent remanufacturing. In Australia, around 30% of packaging placed on the market goes back into use in packaging applications either in Australia or overseas. A further 24% is used in other applications, such as construction materials or to manufacture other recycled products.

Within this overall picture, there are stark differences in the fates of different groups of packaging materials. For example, only 32% of paper and paperboard packaging was sent to landfill, with almost half of paper recovered for packaging use. Glass also performs quite well, with only 40% landfilled and 30% recovered for packaging. The story is very different for plastics, with 84% of plastic packaging ending up in landfill and only 3% recovered for use in packaging – though within that there are also significant differences by resin and format.

A range of factors influence the divergent fates of different material types, including the technical potential for their recovery, the cost of recovery, the cost of virgin material substitutes and therefore the financial incentives of participants in the packaging system.

Notes: 1. A small amount of packaging is lost to litter, but there is not reliable data on the quantity. 2. Includes material reprocessed for unknown applications.
Exhibit source: APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft); Accenture analysis

The packaging system consists of two stages: production, which costs $10-12 billion, and recovery at around $2.6 billion

Exhibit 3: Packaging system in Australia

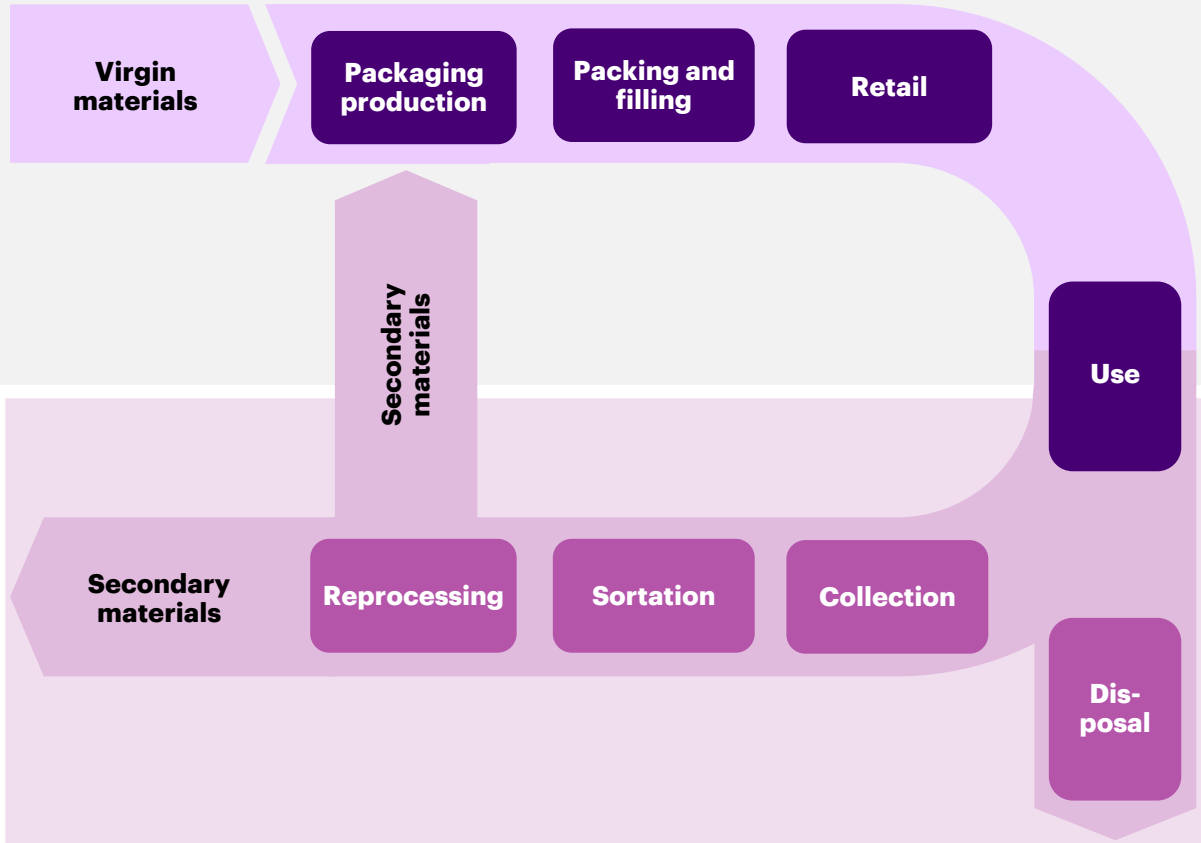
Production

The production stage of the packaging system in Australia has an estimated annual cost of **$10-12b.**

This stage includes the cost of producing packaging both overseas and domestically for use in Australia, but excludes the cost of the goods that are packaged.

The raw materials for packaging production are either virgin materials, purchased from outside the packaging system, or secondary materials that have been reprocessed, typically (though not exclusively) from recovered packaging materials

Packaging production converts these materials into packaging materials ready for purchase and use by product manufacturers. Packaging is then used to pack and fill products either for business-to-business use or for retailers to place them on the market for purchase and use by consumers.

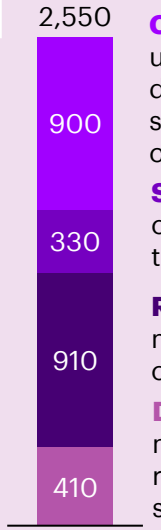


Recovery

Recovery of packaging materials in Australia packaging is estimated to cost around **$2.6b** per year.

This stage of the system includes the treatment of all packaging materials in Australia after their use, whether they are recycled or disposed to landfill. Treatment of materials outside of Australia after use is excluded.

Packaging recovery costs by step
$m, 2019-20



Collection involves gathering of used packaging materials through different waste streams, including specialised streams such as container deposit schemes (CDSs).

Sortation is the separation and cleaning of different material types to prepare them for further use.

Reprocessing tranforms recovered materials for use in either packaging or non-packaging applications.

Disposal is the landfilling of materials that have not been recovered, including losses from sortation and reprocessing.[1]

Notes: All values in this report are in Australian dollars. A detailed explanation of the definition of system and system cost used in this report can be found in the methodology appendix on p44. The costs of the system are estimates based on a simplified model of packaging in Australia, and should be used with caution and treated as estimates only. 1. Transport of material to disposal is included in collection, not disposal. Disposal is the cost of landfilling, including waste levies.
Exhibit source: APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft); APCO (2019) *Materials Flow Analysis 2018*; Expert interviews; Accenture analysis

Most of the cost of recovery at present is in paper because of the high volume placed on the market and strong domestic reprocessing

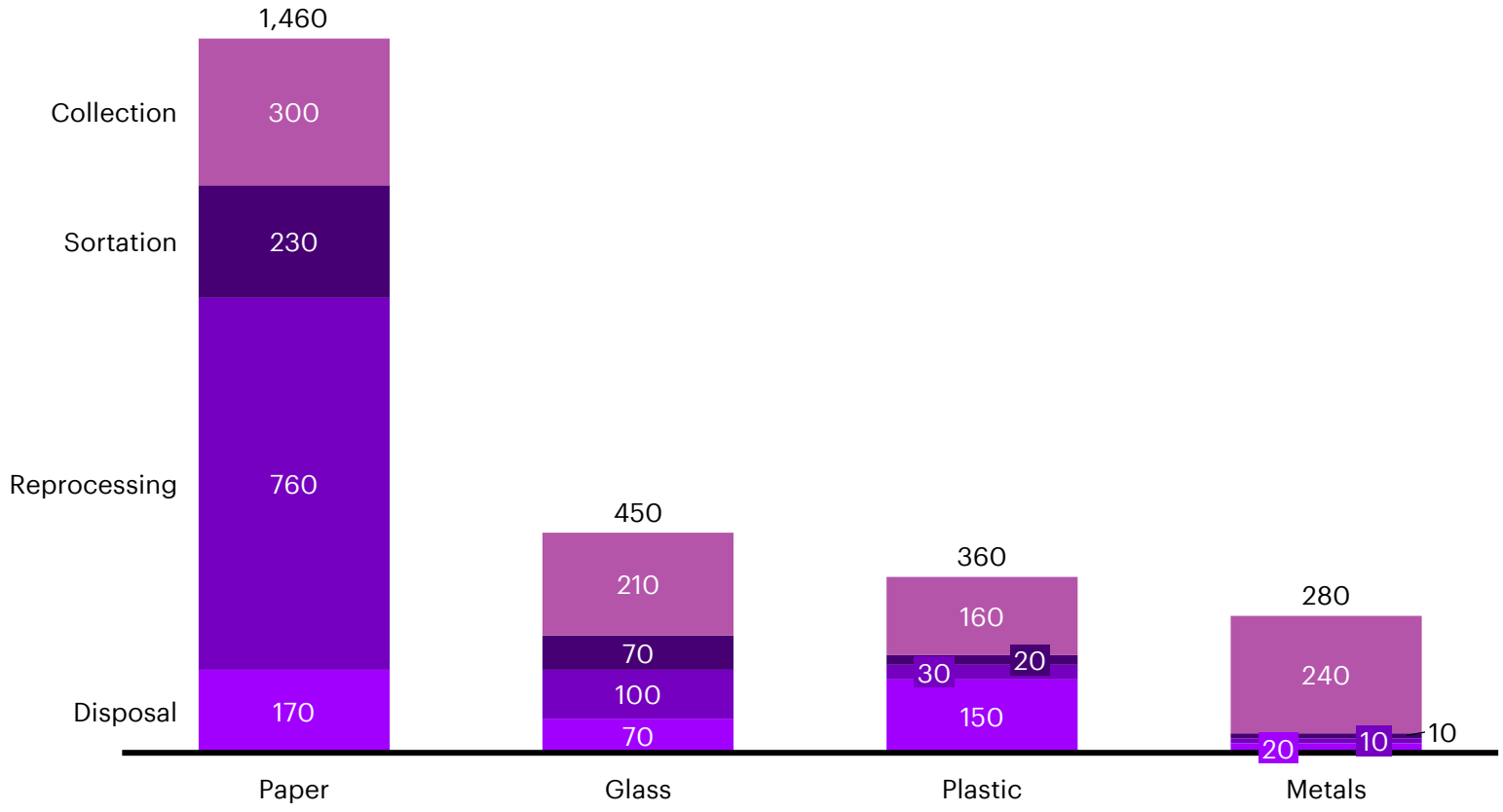
The cost of the recovery stage of the packaging system can also be broken down by the four main material groups for which detailed longitudinal data is available – paper and paperboard, glass, plastic and metals.

Most of the cost – almost 60% at present – is in the recovery of paper. This is because paper accounts for more than half of all packaging placed on the market, and it is recovered at high rates. Reprocessing of paper is the most significant cost at around $760m.

In contrast, for glass and plastic the most significant cost is collection. These materials are recovered at lower rates and reprocessed less or to lower quality, eg, glass is often crushed and used as sand in construction. Disposal is also a more significant share of the cost of these materials – over 40% of the total cost of plastic recovery is from disposal, only marginally less than the cost of collection.

Metals are unusual because almost all the local cost is in collection, largely driven by the cost of collecting aluminium cans through CDSs, with little cost in sortation or reprocessing. This is because metals are almost entirely reprocessed offshore.

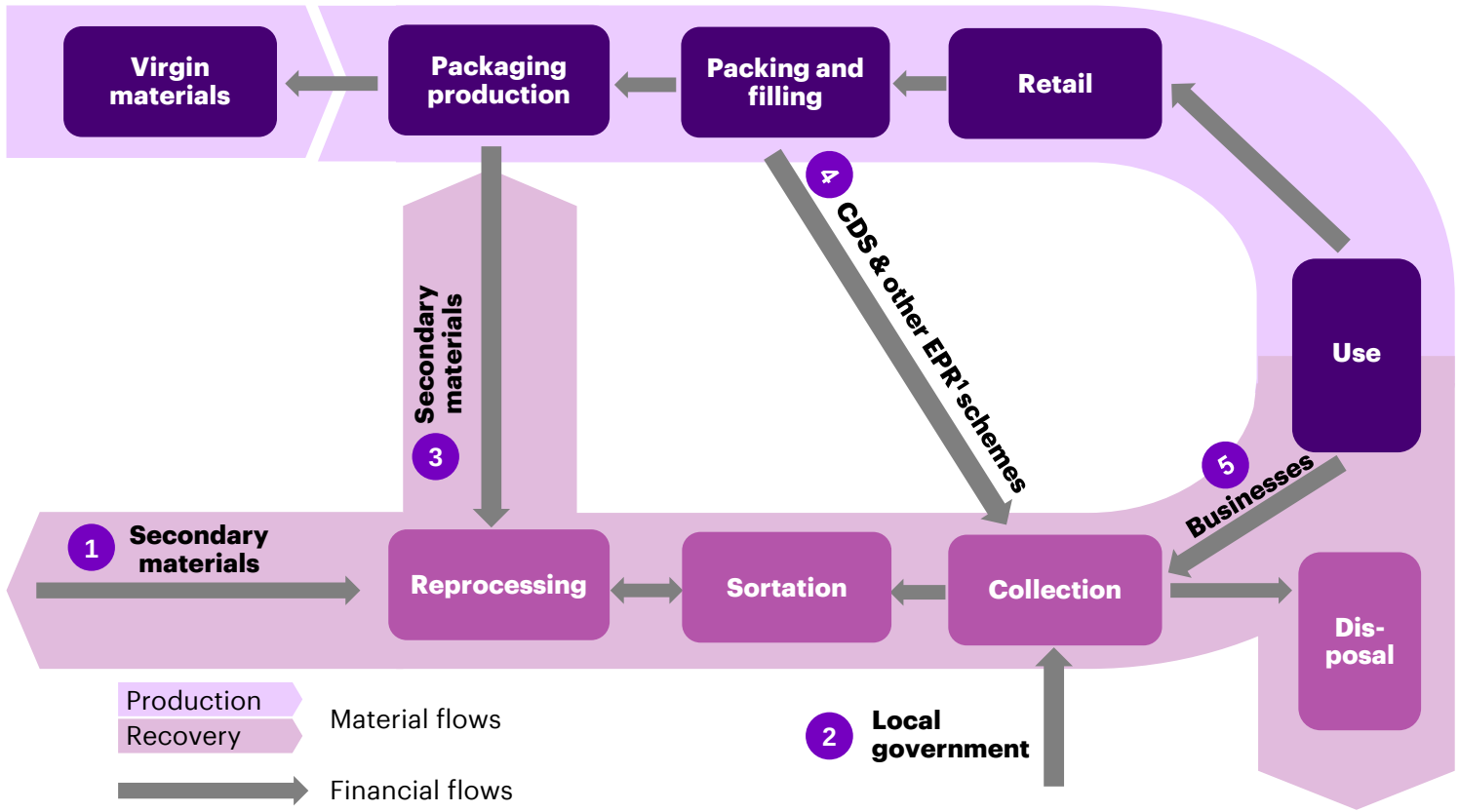
Exhibit 4: Cost of the recovery stage of the packaging system by material
$m, 2019-20



Notes: Wood is excluded due to data availability.
Exhibit source: APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft); APCO (2019) *Materials Flow Analysis 2018*; Expert interviews; Accenture analysis

The costs of packaging production are funded by consumption, but in the recovery stage the flows are more complex

Exhibit 5: Key financial and material flows in the packaging system



While packaging material flows through production then into recovery, the financial flows in the packaging system are more varied. Understanding these financial flows helps identify how the system is funded, and the incentives of the different participants.

The financial flows in production are relatively simple. Consumers fund production by purchasing goods that are – or were in the supply chain – packaged. This funding flows through retail and packing and filling to packaging production.

The flows in the recovery stage are complex, with external funding and transfers from the production stage. The two main external funding sources are:

1. Purchase of secondary materials for applications outside the packaging system – for example, the use of glass as construction sand
2. Local government waste collection fees

The other significant source of funding is transfers from the production stage of the system. These transfers are important because they link the two stages of the system and provide financial support for recovery, a set of activities that is critical to the system's circularity.

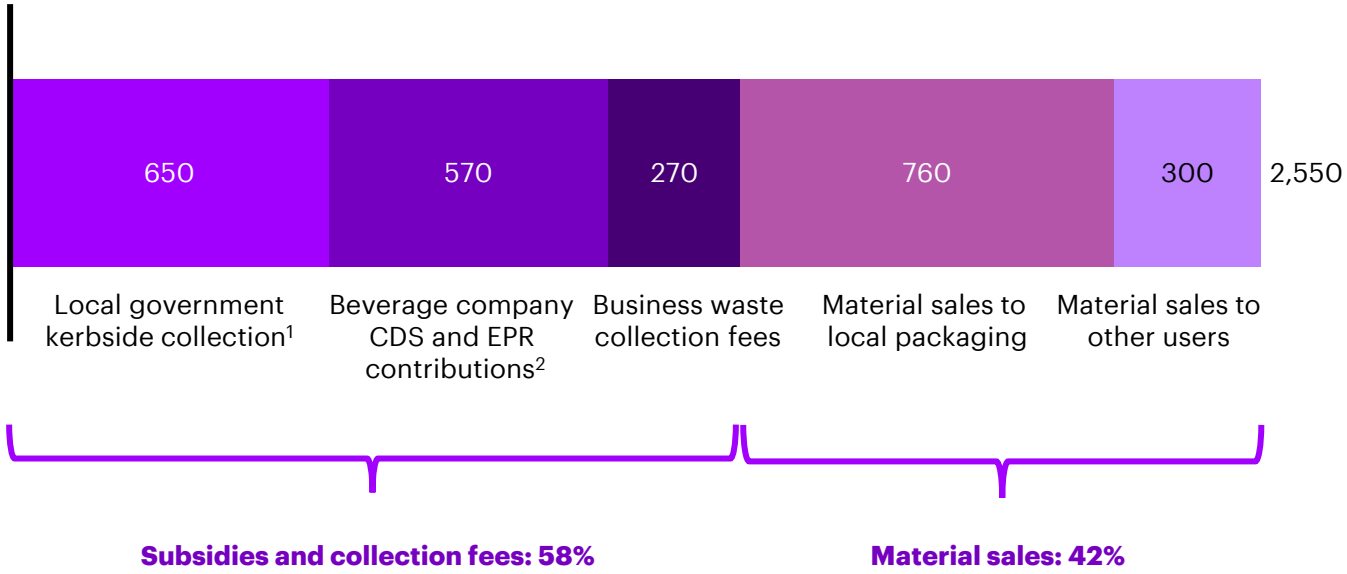
There are three main pathways for the transfer of funds between the production and recovery parts of the system:

3. Purchases of secondary materials by packaging producers
4. CDS and other EPR scheme fees paid by producers
5. Business (and other organisations) waste collection fees

Notes: 1. Extended Producer Responsibility
Exhibit source: APCO (2019) *Materials Flow Analysis 2018*; Expert interviews; Accenture analysis

The recovery system is reliant on subsidies and collection fees, with the sale of materials only providing around 40% of its funding

Exhibit 6: Sources of funding for the recovery stage of the packaging system
$m, 2019-20



Analysis of these financial flows shows who funds the $2.6b cost of the recovery stage of the packaging system.

Currently, more than half of the funding for recovery is from collection fees and subsidies. This contrasts with the economics of the production stage of the system, where sales and consumption directly fund operations, with little or no additional subsidies to cover costs.

Subsidies and collection fees come from three main sources:

- **Local governments either provide, or pay waste management companies to provide, kerbside waste services**. This includes kerbside collection of 'red-top' (waste) and 'yellow-top' (recycling) bins for households and public waste bins and the subsequent sorting and/or disposal of the collected material.
- **Beverage companies pay fees for CDSs**, based on the number of containers they place on market that are redeemed through the schemes. These fees go to the operators of the CDSs to fund the cost of collection and sorting, including the value of the deposit given to redeemers, and are passed on to consumers through higher beverage prices.[3] There are also contributions through some other EPR schemes.
- **Businesses and other organisations pay for their waste and recycling collection services** through contracts with waste management companies.

The sale of recovered packaging materials for secondary uses accounts for only 42% of funding for recovery. This includes the value of both sales to packaging manufacturers for re-use into recycled content packaging, and sales to other users of recovered materials, such as construction firms purchasing crushed glass as a sand substitute.

As the system transitions to a more circular economy, the sources of funding for increased recovery activities will be an important consideration.

Notes: 1. Cost per tonne of metropolitan waste services for yellow and red top bins from IPART (2020), and total packaging material flow through kerbside collection from APCO Materials Flow Analysis 2018-19. 2. Estimated from 2019-20 NSW, QLD, SA, ACT and NT scheme publications on total collected containers, and average weighted scheme cost per containers to beverage companies from Exchange for Change (NSW scheme) reporting. 3. In Australian CDSs, redeemers can typically be either consumers or material recovery facilities (MRFs) that retrieve eligible containers from kerbside co-mingled recycling. Wood is excluded due to limited data availability.
Exhibit source: APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft); APCO (2019) *Materials Flow Analysis 2018*; Expert interviews; Accenture analysis

02

The National Packaging Targets aim to make the system more circular, and are likely to increase the cost by at least $1.7 billion

The National Packaging Targets aim to shift the packaging system towards a more circular model by 2025

Exhibit 7: National Packaging Targets

Outcome	2025 Target
Outcome one **Packaging designed for circularity**	100% of Australia's packaging will be reusable, recyclable or compostable
	Problematic and unnecessary single-use plastic packaging will be phased out
Outcome two **Improved collection and recycling systems**	70% of Australia's plastic packaging will be recycled or composted
Outcome three **Expanded markets for used packaging**	50% average recycled content will be included across all packaging[1]

The National Packaging Targets (the NPTs, or the Targets) were established in 2018, following extensive consultation with industry and government. They are designed to require a 'complete and systemic change to the way Australia creates, collects and recovers product packaging' with the goal of moving closer to a circular economy for packaging in Australia.

The Targets are supported by the Federal Government and all state and territory governments, and were included in the 2019 National Waste Policy Action Plan and the 2021 National Plastics Plan.[2]

Progress towards the Targets is regularly monitored by APCO through the collection of benchmark data and the 2025 Monitoring Program.[3] APCO has developed several key initiatives and resources to help support action towards meeting each Target, such as the Sustainable Packaging Guidelines, Australasian Recycling Label, and APCO Action Plan for Problematic and Unnecessary Single-Use Plastic Packaging.

It is important to note that NPTs are not an end point for the packaging system, with further work to be done beyond 2025 to complete and sustain the transition to a circular economy. The Collective Impact Framework that APCO has adopted to deliver its work is a model for achieving long term and lasting change in the packaging system.[3]

Notes: 1. Recycled content targets are also in place for specific materials, including paper, glass, metals and plastics (including some resin specific targets). Currently the Target applies only to use of post-consumer recycled content and not pre-consumer. 2. Australian Government, state and territory governments and the Australian Local Government Association (2019) *National Waste Policy Action Plan*; Australian Government (2021) *National Plastics Plan* 3. APCO (2020) *The 2025 Monitoring Program*. 3. APCO (2021) *Driving Change with the Collective Impact Model*.
Exhibit source: APCO (2020) *The 2025 Monitoring Program*

Meeting the NPTs in 2025 will require increases in activity and cost in most parts of the system, but there will also be savings

Shifting the packaging system's operations to meet the NPTs will impact the types and levels of activity required across the system. Mostly this is likely to result in increased system cost, but there should be some savings.

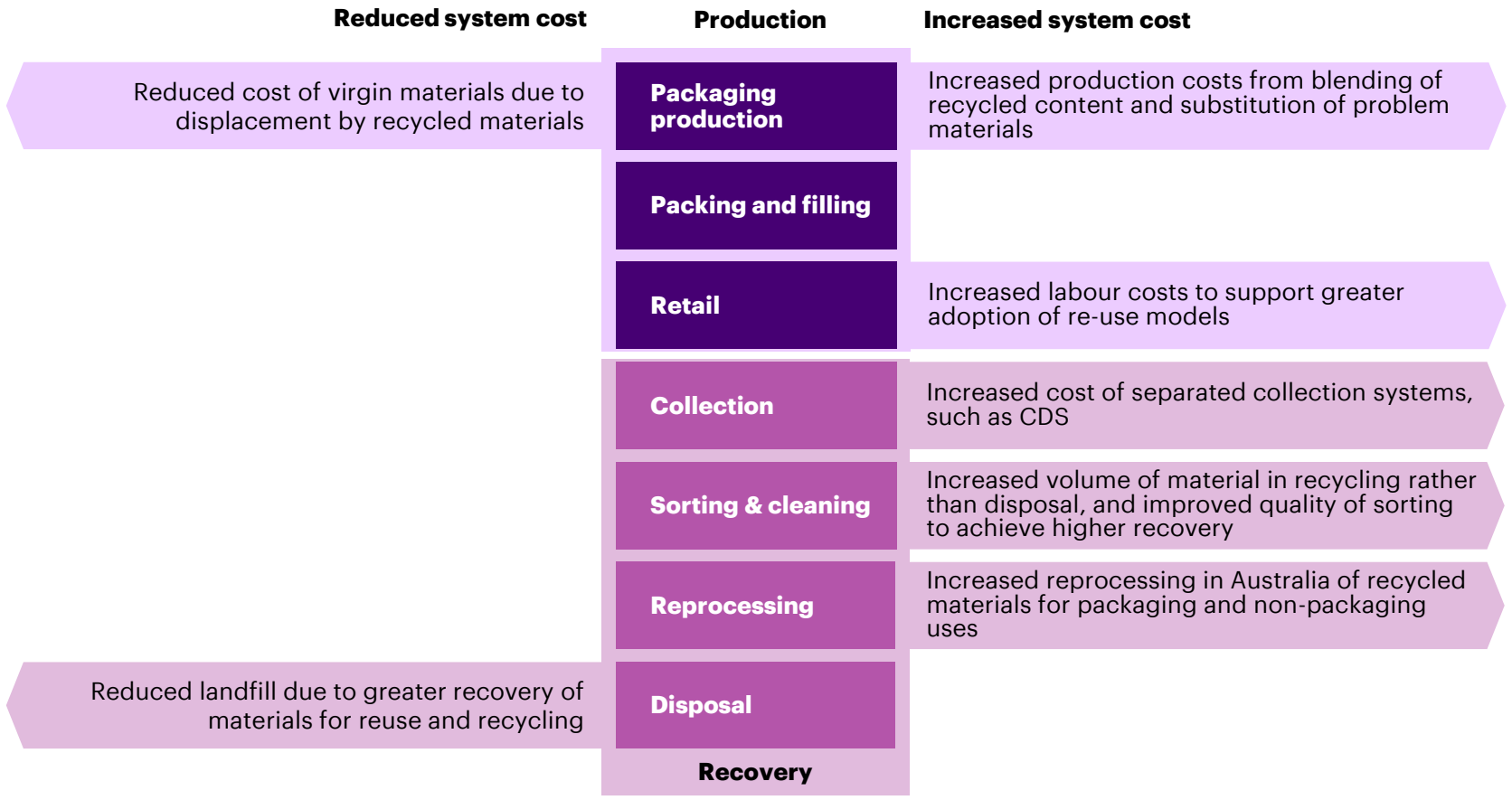
In the production stage of the system, there will be additional costs from blending more recycled content into packaging and substituting problem materials. There will be savings, though, from reduced use of virgin materials as the system shifts to become more circular and is able to meet its own material needs.[1]

In the recovery stage, costs are likely to increase at most steps along the process. Collection costs will increase, especially through the expansion of CDSs as additional states come online (Tasmania in 2022 and Victoria in 2023). While CDSs only cover a small share of all packaging, the cost per tonne collected and sorted through CDS is around nine times higher than through kerbside co-mingled recycling services.[2]

Sortation costs will also grow to meet increased quality requirements, and reprocessing will expand significantly to manufacture the recovered materials needed to meet the post-consumer recycled (PCR) content Targets. Disposal costs will be reduced, however, as more material is diverted from landfill.

Increasing adoption of reuse models is likely to be necessary to achieve the Targets, having a range of effects on system cost. In general, reuse is likely to increase labour costs but reduce material and production costs.

Exhibit 8: Impact of achieving the Targets on costs in the packaging system



Note: 1. While packaging production will have to pay for the increased secondary packaging material that it uses to replace virgin materials, the cost of that secondary material will be located in the recovery stage, not production, because that is where the activities of collecting, sorting and processing the material occur. See methodology appendix for further details. 2. Modelled estimate based on average CDS fees per container in existing schemes and average number of containers per tonne for different material types, weighted for material type composition of returned containers. This includes the cost of the refund paid to redeemers. Both cost of collection and sortation are included because the CDS fee covers both activities.
Exhibit source: Expert interviews; Accenture analysis

Increases in activity will likely lead to a more costly packaging system, especially in the recovery stage

To understand the cost of achieving the NPTs, a model of the system in 2024-25 that meets the Targets has been built.[1] It shows that while the cost of the production stage may not change substantially, the cost of recovery would likely need to increase by at least $1.7b (~60%).[2] To put this amount in context, the total value of retail sales in Australia each year is around $470b.[3]

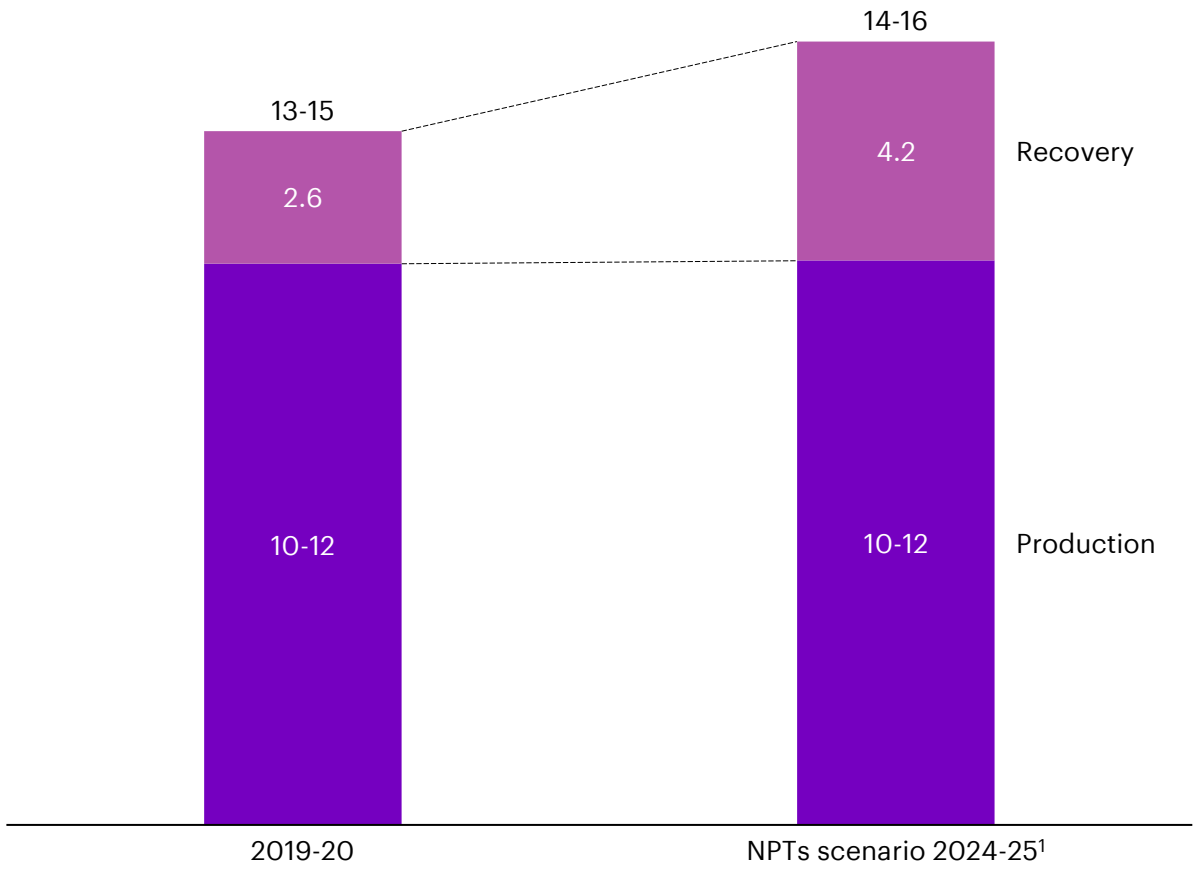
Production costs are expected to stay relatively consistent in an NPTs scenario, with decreased use of virgin materials balanced by increased cost of production with recycled materials.

In general, the cost of manufacturing packaging with recycled materials is expected to be higher than virgin material equivalent. This is due to capital investments required, and increased process complexity and risk, including the cost of blending with virgin materials and greater quality assurance given more variable quality of inputs. There are some exceptions to this. Manufacturing glass and metal packaging from recycled material is less energy intensive, and hence cheaper, than using virgin materials.

At the same time, the production stage would have lower costs for purchasing virgin materials as the share of PCR content increases to meet the NPTs. Production would instead receive a greater share of its materials from the recovery stage.

The cost to the system of collecting, sorting and preparing those materials for use back in packaging production sits in the recovery stage, which would need to increase significantly in size. Further details on the cost increases in recovery are explained on the next page.

Exhibit 9: Estimated packaging system annual costs by stage
$b, 2019-20 to 2024-25 (NPTs scenario)



Notes: 1. The NPTs scenario is based on the system meets the NPTs in 2024-25, and assumes that the CDSs in Victoria, Tasmania and Western Australia have commenced. See methodology appendix on pp44-45 for further details. Wood is excluded due to limited data availability. 2. Increase in recovery costs is $1.66b but appears as $1.6b due to rounding. See next page for details. 3. Total retail trade sector annual income, 2019-20. Sourced from ABS Australian Industry data
Exhibit source: APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft); APCO (2019) *Materials Flow Analysis 2018*; Expert interviews; Accenture analysis

The increase in the cost of the recovery stage is likely to be at least $1.7 billion, dominated by growth in collection and reprocessing

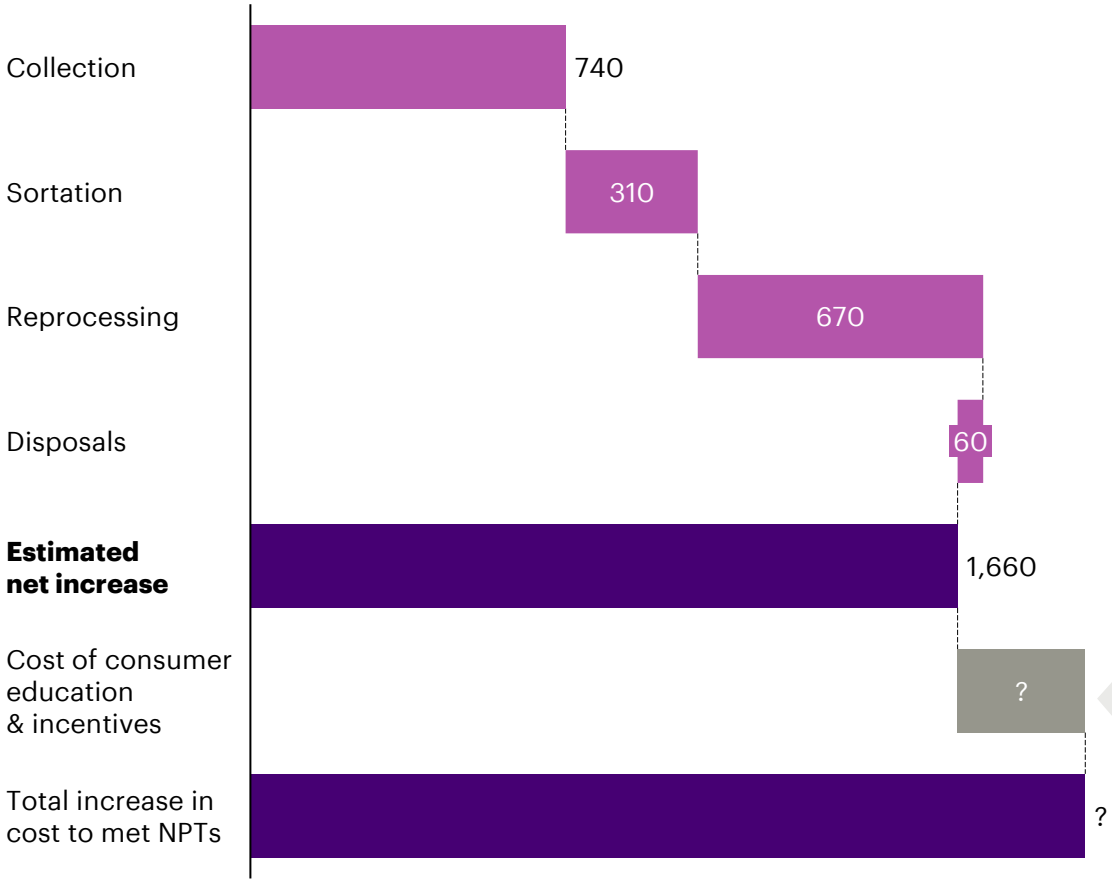
To meet the National Packaging Targets in 2025, the recovery stage of the system will need to collect, sort and reprocess greater volumes of packaging material. This is likely to cost at least $1.7b in total each year, or around $50 per person in Australia, with most of that from additional costs in collection and reprocessing.

Collection cost increases are largely driven by the commencement of CDSs in remaining Australian states. The total cost of collection through CDSs once the Victorian, Tasmanian, and Western Australian schemes are fully operational in 2024-25 is likely to be around $1b.[1] This is an increase of $500m from 2019-20 costs. The remaining $220m in collection costs comes from additional volumes of material collected through kerbside and commercial waste streams.

Reprocessing cost increases are driven by larger volumes of packaging materials undergoing domestic reprocessing. In the NPTs scenario, a greater share of packaging materials are reprocessed onshore to meet PCR Targets for packaging materials, and to account for export bans on unprocessed paper and plastic materials that will be in place from 2024-25.[2] The two largest increases are plastics reprocessing (~$260m annually) and paper (~$310m).

This estimate of the operational costs of meeting the Targets does not include some additional costs that are dependent on future policy settings. These are the costs associated with encouraging and educating consumers to separate more of their recyclables through, for example, expanding the scope of CDSs or investment in community waste education programs. Chapter 4 discusses some of these incentives and their potential impact on system costs.

Exhibit 10: Estimated difference in annual cost of recovery stage
$m, 2019-20 to 2024-25 (NPTs scenario)



Meeting the NPTs may involve **significant costs to educate and incentivise consumers to contribute to circularity.** These costs have not been estimated.

Notes: 1. This is the cost of collection and sortation of CDS-eligible containers through the CDS stream only. It does not collection and sortation of CDS-eligible containers through other waste streams.
2. The NPTs scenario assumes that metal continues to be exported for reprocessing as there is very limited metal remanufacturing capacity in Australia and metals are not subject to an export ban. Wood is excluded due to limited data availability.
Exhibit source: APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft); APCO (2019) *Materials Flow Analysis 2018*; Expert interviews; Accenture analysis

The current trajectory suggests that not all the NPTs are likely to be achieved by 2025 without further intervention

Based on current rate of change and business-as-usual (BAU) forecasts, not all the NPTs are likely to be achieved by 2025.

There does not appear to have been significant progress towards the Target for 100% recyclable, reusable or compostable packaging since 2017-18. However, current levels are still quite high, with only 14% of materials currently not recoverable, suggesting this Target may still be reached.

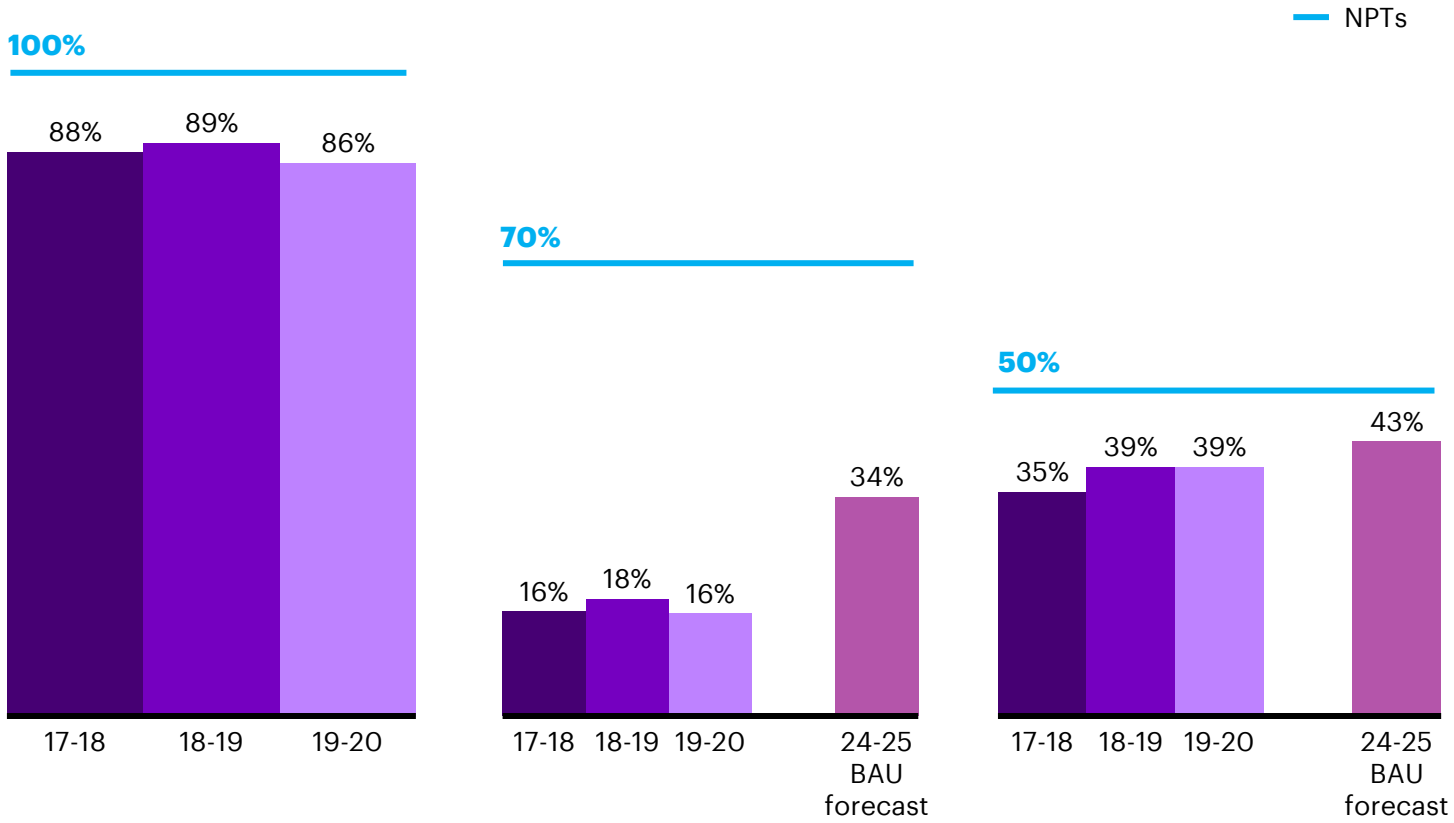
For plastics, there is likely to be a significant gap to meet the Target for 70% recovery. The most recent BAU forecasts for packaging placed on market and recycling capacity suggest a recovery rate of 34% in 2024-25.[1] These forecasts are based on existing under-utilised and committed new reprocessing capacity, and may increase as further commitments are announced. They also assume that collection and sortation will not limit greater recovery.

Levels of post-consumer recycled content are not far from the overall 50% Target for 2025, currently sitting at 39% for all packaging materials (excluding wood). A 2024-25 BAU forecast based on trends to 2018-19 suggests this could reach around 43%, still short of the Target.[2] While this is the most up-to-date estimate available at present, this may improve in future updates as brands strive to reach their recycled content targets and Australian secondary material production increases.

The Target for phase out of problematic and unnecessary single-use plastic packaging is in the preliminary stages of being measured. While this data has not been shown here due to data availability and volatility, there are positive trends in some specific items, such as a 98% reduction in single-use HDPE shopping bags since 2016-17, largely due to state government bans.

The following pages provide more detailed analysis of progress on recovery rates and PCR content, including material-specific PCR Targets.

Exhibit 11: Progress towards selected National Packaging Targets
% of packaging placed on market, 2017-18 to 2024-25 (forecast)



100% recyclable, reusable or compostable materials

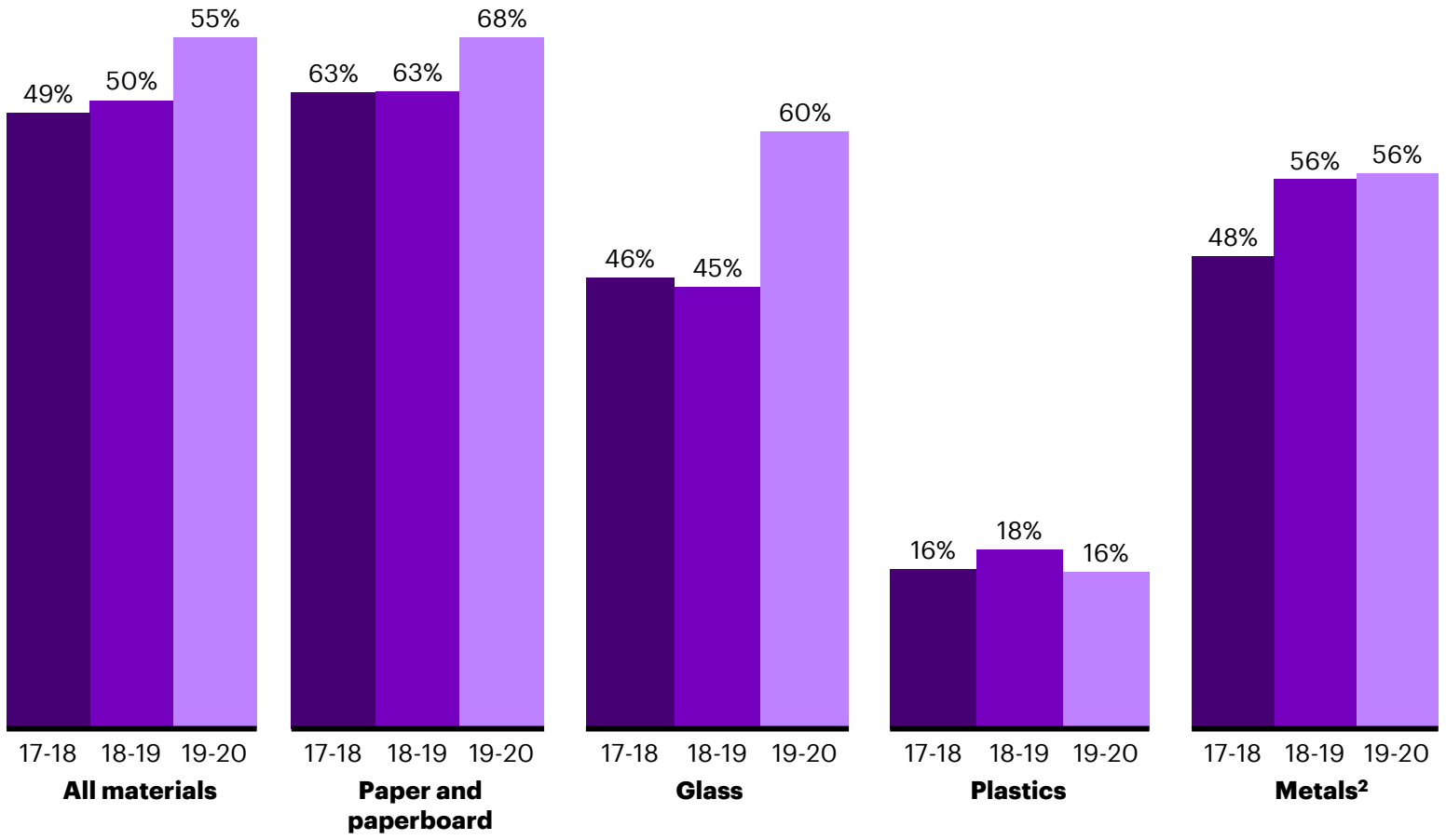
70% of plastic packaging recovered

50% average recycled content across all packaging materials

Notes: 1. APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft) 2. APCO (2019) Materials Flow Analysis 2018. Wood is excluded due to limited data availability.
Exhibit source: APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft); APCO (2019) Materials Flow Analysis 2018

Plastic recovery rates are not yet increasing towards the Target, but other materials are all showing signs of progress

Exhibit 12: Packaging recovery rate by material group
% of packaging placed on market, 2017-18 to 2019-20



Notes: 1. Recovery rate is measured at the outgoing gate of the secondary processing facility for the used packaging, so it accounts for losses of material in sortation and reprocessing. 2. The number of metal types included in the data increased over the years observed, and likely contributes to part of the increase in recovery rates.
Exhibit source: APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft)

Overall, the recovery rate for packaging in Australia reached 55% in 2019-20.[1] This is a marked increase from 50% in 2018-19.

Plastics currently have the lowest recovery rate of all packaging material groups, and there is as yet no sign of the rate increasing towards the 2025 Target of 70%. It grew to 18% in 2018-19 before dropping back to 16% in 2019-20. This decline is primarily due to an increase in plastics consumption, with actual recovered volumes only decreasing slightly. The combined effect of committed expansions in reprocessing capacity and growth in CDS suggest the rate will increase in coming years, but not fast enough to reach 70%.

Other key material groups are all showing signs of improving recovery rates, but do not have specific targets in the NPTs. **Paper**-based packaging has the highest recovery rate at 68%, growing from 63% in 2017-18. There are established financial incentives in paper recovery, which drive a particularly strong recovery rate for cardboard that is used for business-to-business packaging.

Glass has a reasonable recovery rate of 60%, though the large increase in 2019-20 is primarily related to a drop in consumption. Further gains are likely with the expansion of CDSs and commitments to build new beneficiation capacity. Substantial volumes of glass are still lost in the sortation and reprocessing process as glass is a major contaminant of other materials in co-mingled recycling.

The recovery rate for **metal** packaging increased from 48% in 2017-18 to 56% in 2019-20.[2] Given there are strong secondary markets for recovered metals, increasing this rate further is likely to depend on greater collection of metal packaging.

Almost 1 million tonnes of plastic packaging were lost to landfill in 2019-20

In 2019-20, almost 950,000 tonnes of plastic was lost to landfill. Some of this material was sent straight to landfill from collection, while other material was lost during sortation or reprocessing.

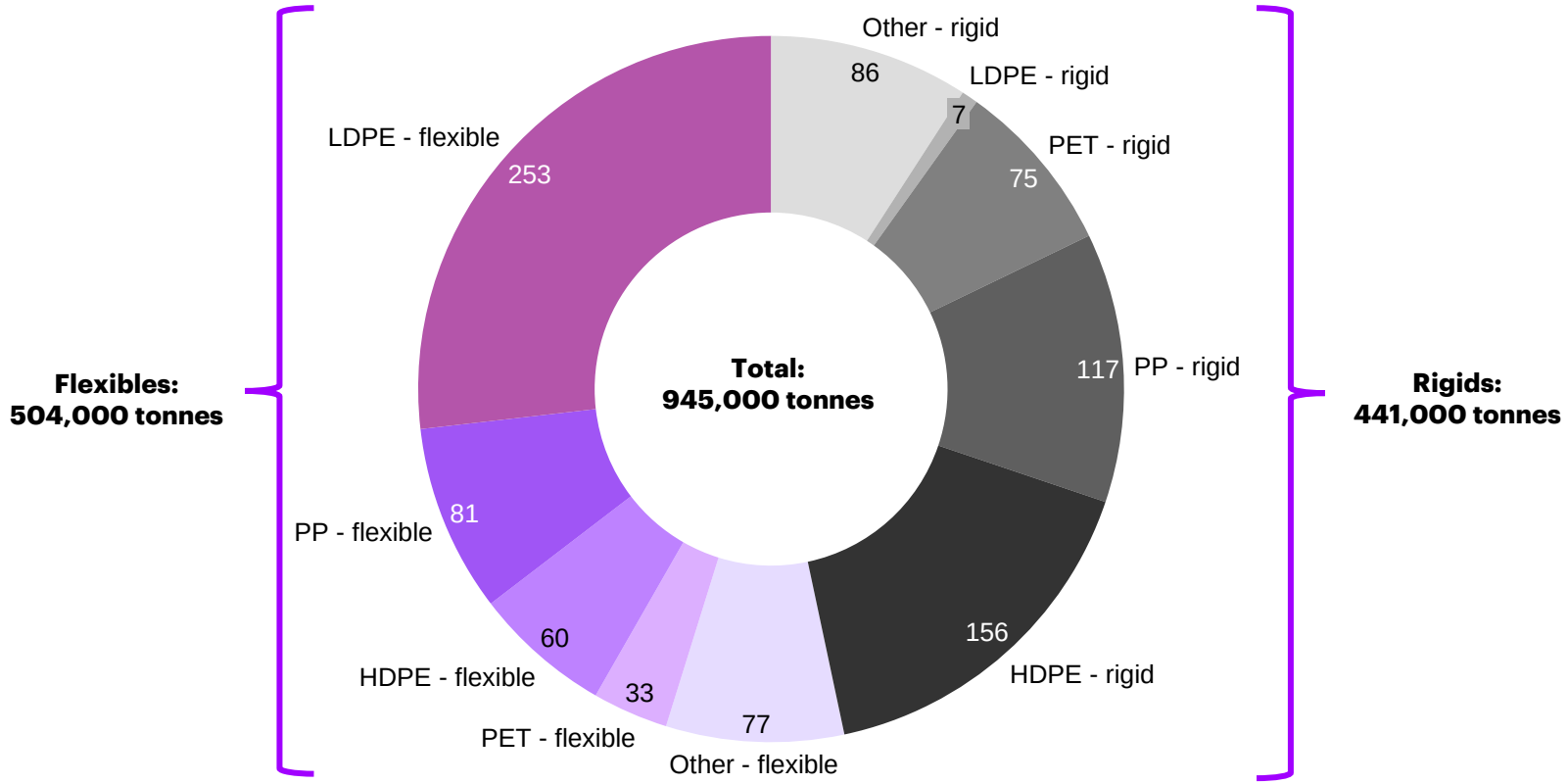
That total volume of plastic lost to landfill was relatively evenly split between flexible plastics, such as bags and wraps, and rigid plastics, including containers, bottles and tubs that hold their shape.

The largest quantity of lost material overall was flexible LDPE, with over 250,000 tonnes landfilled. Only around 12,000 tonnes were recovered. There are also significant quantities of flexible PP (81,000 tonnes) and HDPE (60,000 tonnes) not recovered.

In rigid plastics, the largest source of unrecovered material is HDPE, with over 150,000 tonnes landfilled. While around 27% (57,000 tonnes) was recovered in 2019-20, there is still substantial opportunity for improvement.

Rigid PP is another major contributor, with 117,000 tonnes lost to landfill. Its recovery rate is much lower at 13%. Rigid PET has the highest recovered rate of any flexible or rigid resin at 42%, but there was still 75,000 tonnes of material landfilled in 2019-20.

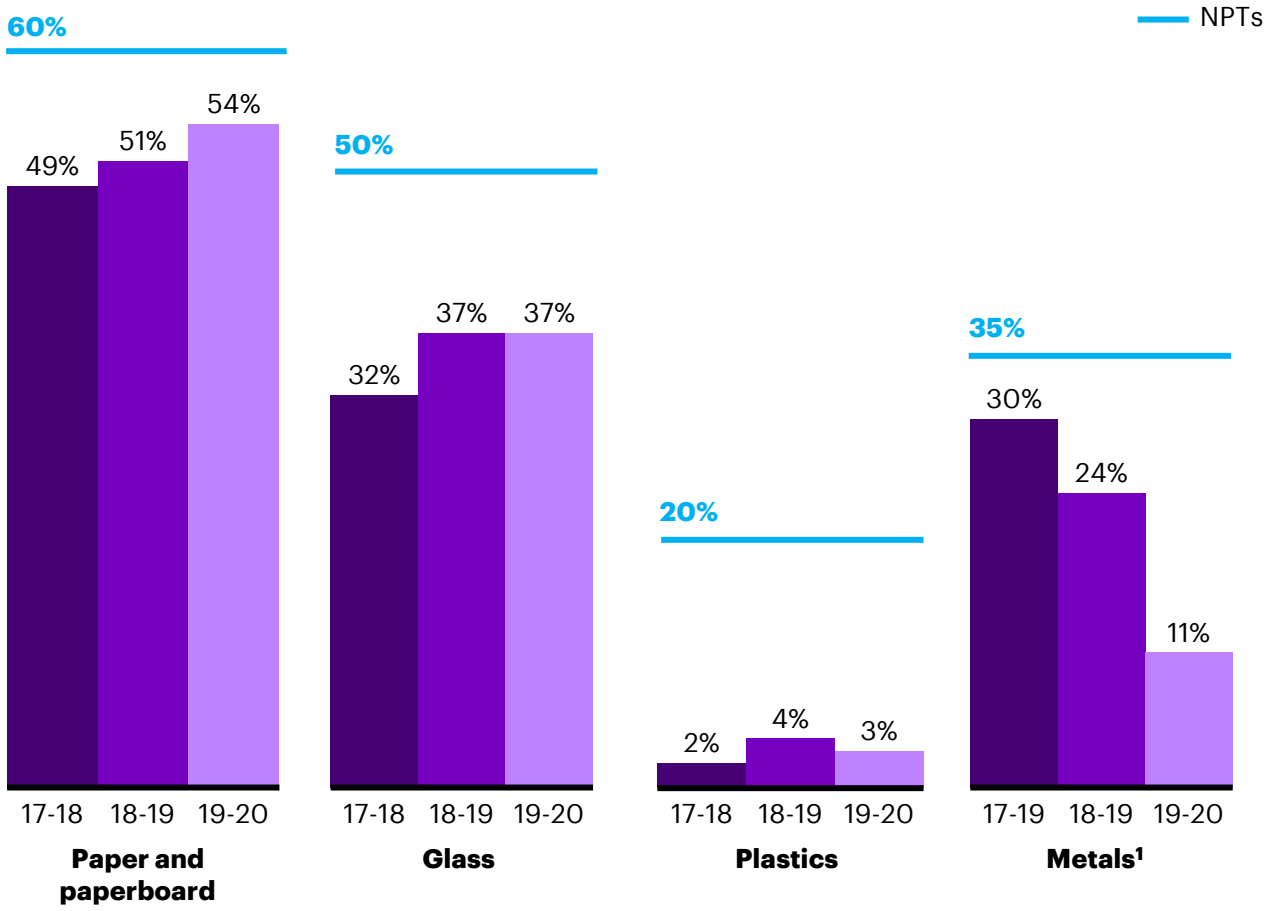
Exhibit 13: Plastic packaging lost to landfill by resin and rigidity
Thousands of tonnes, 2019-20



Notes: Other includes unidentified plastics.
Exhibit source: APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft); Accenture analysis

Levels of recycled content are not increasing fast enough, with only paper and PET likely to reach their Targets based on current pace

Exhibit 14: Recycled content levels by material group compared to NPTs
Post-consumer recycled content, % of packaging placed on market, 2017-18 to 2019-20



While the overall Target for PCR content is 50%, each material group also has its own Target level to reach to contribute to that overall average. Paper and paperboard is showing strong signs of progress, but most other material groups appear unlikely to reach their Targets.

Paper/paperboard is closest to its NPT level of 60%, with a PCR content rate in 2019-20 of 54%. That has increased steadily over the last two years, and is on track to reach the Target if that rate of progress can be sustained. Use of recycled content in paper-based packaging is well established, driven by the lower cost of using recycled content relative to virgin material. The main risk may be export demand for Australian secondary material, with robust global markets and the export ban on mixed paper only coming into effect in 2024.

In contrast, glass, plastic and metal all failed to increase their PCR levels between 2018-19 and 2019-20. **Plastic** remains furthest from its recycled content target, at just 3% compared to a Target of 20%. It has increased slightly from 2017-18 levels, but on current trajectory would not reach the 2025 target. At the resin level, the one area of strength is PET. The PCR rate is already 13% and commitments from brands and reprocessing capacity investments suggest it may reach its 30% Target.

There has been a significant decrease in the recorded recycled content in **metal** packaging, from 30% in 2017-18 to just 11% in 2019-20, but this is likely to be due to improved measurement rather than an actual decline in PCR levels.

Glass PCR levels jumped up in 2018-19 from 32% to 37% but were flat in 2019-20. Expansion of CDS into Tasmania and Victoria should improve the supply of quality glass for beneficiation and new capacity has been committed, suggesting glass may still be able to reach its 2025 Target of 50% on current trajectory.

Notes: 1. The decrease in recycled content for metal over 3 years of data is due to improved data collection methods, rather than a decline in actual recycled content for metal materials 2. Excludes wood packaging.
Exhibit source: APCO (2021) *Packaging consumption & data report 2019-20 and supporting data tool* (unpublished draft)

03

The major barrier to achieving the Targets is ensuring participants' financial incentives align with circular objectives

Transitioning to a more circular packaging system will require participants' commercial drivers to align with circularity objectives

The transition to a more circular model will require significant shifts in the financial flows within the packaging system, with a major increase in the amount of economic activity required in the recovery part of the system in particular.

Participants in the packaging system can be expected to operate in their own commercial interest, so such large shifts are only likely to occur and be sustained if participants' financial incentives are aligned with the circular objectives of the Targets. Those incentives are to either:

- **Increase their revenue** in existing or new markets, either through higher prices or greater volumes, or
- **Avoid costs or penalties** (eg, waste levies), or reduce the overall cost of their operations by using cheaper inputs

Of course, not all participants will always act only commercially. They may also be motivated by their values to act altruistically, or for other purposes. The focus of this report, however, is the economic structures and financial incentives in the system.

Governments – both state and territory and Federal – have already put in place a range of policies that aim to impact the incentives of participants in the packaging system. Some, like waste levies, have been in place for many decades, while others such as the waste export bans are new or have recently expanded. A CDS has been operating in SA since 1977, but only in other states and territories in the last decade.

However, the current trajectory on the NPTs suggests that these existing policies either are not sufficient to shift the system (eg, waste levies) or are yet to have substantial impact. This is not surprising considering the scale and complexity of the change required.

Exhibit 15: Existing policies impacting incentives in the packaging system

Policies	Description	Impact on incentives of participants
Waste levies	Most states and territories already have landfill or waste levies ranging from $65-150 per tonne, with Tasmania's commencing later this year	• Waste levies increase the cost of disposing of waste through landfill, which decreases the relative cost of recycling and resource recovery • Levies particularly impact incentives in collection and sorting parts of the system
Government capital investment subsidies	The Commonwealth and states and territories have programs to subsidise through grants new capital investment in resource recovery infrastructure, such as the Recycling Modernisation Fund	• These programs aim to mitigate the cost of expanding capacity in the recovery stage of the system • They are mostly targeted at sorting and reprocessing, though some also include collection
Waste export bans	The Commonwealth is progressively introducing bans on the export of waste materials – glass and mixed plastic are already in place, single resin plastic in 2022 and mixed paper and cardboard in 2024	• Waste export bans aim to make domestic reprocessing a relatively more attractive option for recovered materials by removing an alternative demand source in export markets • By removing export options and leaving only landfill as an alternative, which is expensive, they also reduce the relative cost of sorting recyclables to higher standards
Container deposit schemes	CDSs are already operating in SA, NSW, Queensland, ACT and NT, and Tasmania and Victoria are scheduled to commence in 2022 and 2023 respectively	• CDS rebates provide a clear revenue incentive for the collection of containers by consumers and through sorting (eg, MRFs) • The schemes also reduce the cost of sortation because the material is more separated at source

Exhibit source: Australian government websites, Accenture analysis

The main revenue incentive driving circularity at the moment is the expectation that this shift will affect consumers' buying decisions

The key driver of demand and therefore revenue in the packaging system at present is consumers. Consumption funds most of the packaging system, and all of the production stage of the system.

If consumers demand – and are willing to switch products or pay a premium to purchase – greater recycled content and recyclability in their packaging, then brands will have an incentive to meet that demand. Packaging producers will be driven by the brands, their customers, to become more circular in their practices. That will generate a demand signal that should flow through to the recovery stage of the system and provide an incentive for reprocessors to produce packaging grade secondary material.[1]

The attractiveness of meeting demand for more circular packaging will depend on exactly what price premium is possible and whether reprocessors, producers and the brands can profitably fulfil the demand.

The rapid flow of commitments in recent years from major global and local brands suggests they believe that consumer demand has or is shifting, and consumers are prepared to reward more circular packaging through a price premium. In Australia, a large number of brand owners and retailers have signed up to the ANZPAC Plastics Pact, which commits them to reach an average 25% recycled content in plastic packaging by 2025.

Most brands position their packaging targets and commitments as part of a broader portfolio of sustainability or environmental, social and governance (ESG) goals, and customer attitudes are not the sole driver. Brands are also concerned about investor attitudes towards less sustainable practices, and the potential for government regulation if they are not proactive about becoming more circular. But customers are still the main driver, and this shift is likely to only be sustained by brands if it is supported and rewarded by consumers.

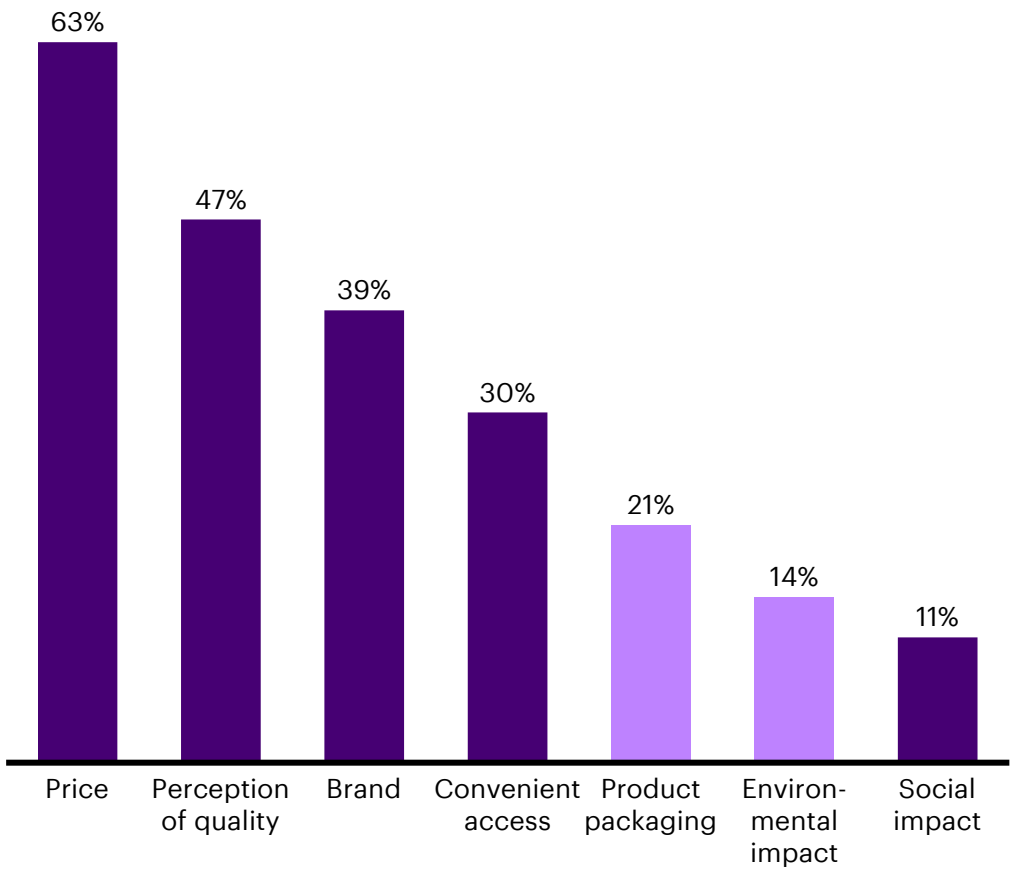
Exhibit 16: Brand commitments to increase recycled content

Brand	Commitment
ANZPAC Plastics Pact, including Arnotts Group, Coles, Woolworths and Nestle	• Reach an average 25% recycled content in plastic packaging
Coca Cola	• Reach 50% recycled content in its packaging globally by 2030 • Collect & recycle a bottle or can for each one sold by 2030
PepsiCo	• Reduce virgin plastic use across its beverage portfolio by 35% globally by 2025
Unilever	• Halve the amount of virgin plastic used in its packaging globally by 2025 • Increase recycled plastic content in its packaging to 25% by 2025
Visy	• Increase recycled glass content in new containers to 70% on average over time

Notes: 1. Packaging producers will also import secondary material as an alternative source of supply, and this is already occurring in plastics in particular because of limited quality supply in Australia.
Exhibit source: ANZ Plastics Pact (2021) *About Targets*; Coca-Cola (2021) *A World Without Waste: Tracking our progress on sustainable packaging*; Unilever (2021) *Waste-free world*; Danone (2021) *Circular economy model*; Asahi Beverages (2020) *Annual Report and Action Plan*; Smiths (2021) *Circular Future For Packaging*; Visy (2021) *Glass and Sustainability*; Coles (2021) *Together to Zero Waste*

It is not yet clear whether consumers' stated preference for sustainable packaging will lead to enduring changes in purchasing behaviour

Exhibit 17: Importance of factors in US consumers' purchasing decisions
% who indicated factor played an important role in purchasing decisions[1]



While consumers are increasingly expressing a preference for more circular packaging, there are reasons to question whether that preference will convert to a lasting change in consumer behaviour.

A large majority of Australian consumers say they prefer sustainable packaging, with 82% saying it is important products are packaged sustainably.[2] Consumers report growing concern, with 63% claiming sustainable packaging is more important to them now than in 2019. Nine in ten claim they are more likely to purchase ethical and sustainable products in general,[3] with 71% stating they would be willing to pay more for these products.[4]

However, a number of studies have shown an inconsistency between consumers' stated preference for sustainable products and actual purchasing behaviour, and the importance of circular packaging drops when ranked against other factors.[5] A study of US consumers found their willingness to pay for recyclable packaging dropped by 60% when this question was posed indirectly, and notes the impact of social desirability bias in surveys on recycling behaviour.[6] When asked to rank them against other purchasing factors, consumers place packaging and environmental impact quite low down the list, as in the exhibit showing a recent study of US consumers.

A range of factors may make it less likely that consumers will purchase – and pay a premium for – products with circular packaging, including:[7]

- **Significance of packaging:** packaging is less central to purchasing decisions than the value of the product itself, even in categories such as food where it is relatively more important
- **Availability and convenience:** consumers do not like to spend time searching for products with more sustainable and circular packaging
- **Concerns about quality:** consumers are less likely to buy products with more circular packaging if they perceive them to be of lower quality
- **Lack of trust in environmental claims:** consumers have a lack of trust in brands' sustainability claims and labelling
- **Consumption habits:** consumers tend to follow habitual patterns that are hard to change when making regular purchases such as food and groceries

It is too early to tell whether consumer behaviour and demand is shifting to expect and reward more circular packaging. Without that shift, incentives for circularity throughout the system would be weaker.

Notes: 1. Average across nine product categories; 2. Food Processing (2021), *Sustainability top concern among shoppers*; 3. The Fifth Estate (2020), *Ninety per cent of Australian consumers want sustainable products*; 4. HP & Planet Ark (2018), *HP Australia Environmental Sustainability Study*; 5. Joshi & Rahman (2015), "Factors Affecting Green Purchase Behaviour and Future Research Directions" in *International Strategic Management Review*; 6. Klaiman, Ortega & Garnache (2016), "Consumer preferences and demand for packaging material and recyclability" in *Resources, Conservation and Recycling*
7. Joshi & Rahman (2015) provides a good review of existing studies on factors affecting green purchasing intent and behaviour.
Exhibit source: McKinsey (2020) McKinsey Packaging Survey

For most participants in the packaging system, greater circularity comes at a greater economic cost

Exhibit 18: Cost drivers for increasing circularity for participants in packaging system

Participant	Cost driver?	Description
Packaging production	—	• Some recycled materials are cheaper to use and are already well used, in particular metal, paper and glass • However, plastic is often more expensive, and transition costs, quality issues and more complex production processes reduce incentive to use recycled materials
Retail	✘	• Where reuse models are introduced, higher cost of labour is likely to outweigh material savings
Use (consumers)	✘	• Goods with more recycled or recyclable packaging generally not cheaper to purchase • Consumers do not pay direct cost of their waste management practices
Use (businesses)	—	• Fees for collection of some recyclables, particularly cardboard, are usually lower or positive for some larger businesses • Benefit is usually marginal or non-existent for smaller businesses and some materials
Collection	✘	• Relative cost of recycled and residual collection services not that different because the cost of waste levy for residual is balanced by higher collection cost due to less compaction and more truck runs for recyclables[1]
Sorting & cleaning	✘	• Sorting & cleaning for more circular use of packaging materials is more expensive, only cost incentive is to sort to sufficient quality to avoid landfilling
Reprocessing	✘	• Greater circularity in reprocessing is almost always more costly, eg returning materials to food grade as opposed to other uses

Another reason that participants in the packaging system might shift towards more circular practices is to reduce their costs. However, there are very few cost drivers for participants to recover material and use more recycled content.

The two prices of substitutes that could create cost drivers are the price of virgin materials, and the price of landfill – which is made deliberately higher by the imposition of waste levies by governments. Both those prices do have some effect on incentives.

In packaging production, some recycled materials are cheaper than virgin alternatives and there are well developed materials markets as a result. The price of landfill does drive diversion from landfill in commercial & industrial (C&I) waste collection, with 69% of material separated and collected as recyclables at a lower costs (see p28 for analysis of landfill rates in C&I). However, these cost drivers are limited in their effect.

In production, other production costs (eg, costs of blending and quality assurance), capital requirements and risk of increased downtime from quality issues reduce the ability to cut costs by using recycled content (see next page for further details).

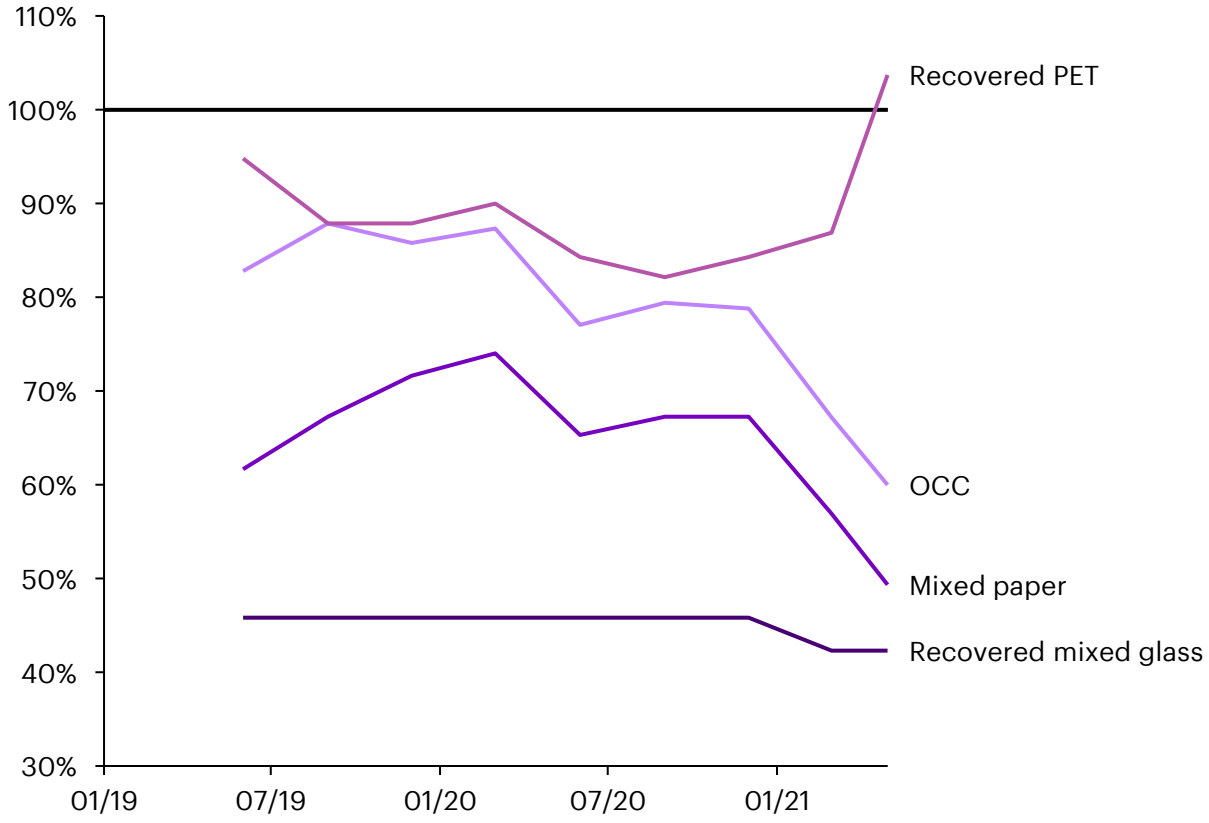
In use and collection, the effect of waste levies on incentives to recycle is mitigated by the higher cost of separating and collecting recyclables. In addition, consumers mostly do not directly bear any higher cost from placing recyclable packaging in their residual waste bins (see pp28-29 for further discussion).

Waste levies are also not usually high enough to give local governments a cost driver to prefer recycling collection over residual. To enable sortation, co-mingled recyclables are less compacted in the truck than residual waste, so each truck can carry less material. Analysis of the cost of waste services to metropolitan local governments in NSW in 2019 found that the total cost per tonne collected from yellow bins is comparable with red bin costs (slightly higher or slightly lower, depending on the red bin size).[1] Given this finding is in NSW, where waste levies are the highest in the country, local governments in other jurisdictions are even less likely to experience cost savings from shifting residual waste volumes into recycling collection.

Notes: 1. IPART (2020) *Discussion Paper: Local council domestic waste management charges* In NSW, the higher collection costs for recyclables ($196.38/tonne collected against $94.01/tonne collected for residual) are offset by the waste levy, with processing or disposal costs comparable across the two streams.
Exhibit source: Expert interview; Accenture analysis

Recycled materials are often cheaper than their virgin substitutes, but greater production complexity and transition costs limit their use

Exhibit 19: Prices of recovered materials as a share of prices of virgin substitutes
MRF out-gate price adjusted for reprocessing costs[2], % of comparable virgin material price[1]



The strongest cost driver towards circularity in the packaging system at present is that some recovered materials are cheaper than their virgin substitutes.

The materials where this cost advantage is most stable are paper and paperboard, glass and metals. This explains why there is a long history of using recycled content in all those types of packaging.

The price of recovered pulp, estimated based on ex-MRF prices for old corrugated cardboard (OCC) and mixed paper adjusted for reprocessing costs, hovers around 50-90% of the cost of virgin pulp. OCC is a highly traded international commodity. The reprocessing of paper does shorten its fibres, so it can only be recycled five to eight times, but this still permits high levels of PCR.

Glass and metal are even more attractive because use of recovered materials can lower manufacturing costs. Both glass and metals are highly energy intensive to produce from virgin materials, but use of secondary content requires substantially less energy.

The picture in plastics is more complex. In rPET, for example, the price of the recovered material adjusted for reprocessing costs is more comparable with virgin content. The price of virgin content can also drop rapidly with the oil price, leaving rPET uncompetitive on a cost basis. Recent demand for rPET has also driven up ex-MRF prices substantially.

However, the cost of the material itself hides additional costs and complexity in using recovered materials in packaging production:

- There are often significant capital costs to transition to production machinery that can blend and use recycled material
- Shallower markets than virgin substitutes makes it difficult to source material reliably
- Lack of consistent quality and contamination of recovered materials presents risks, eg, broken glass mixed in with recovered paper can damage mill machinery
- For glass in particular, because of its weight, transport costs can be prohibitive

These factors also explain why the prices of recovered materials are mostly not at parity with virgin materials, as they might be expected to be if they were perfect substitutes.

Notes: 1. Virgin materials and MRF out-gate prices based on indicative estimates sourced from Recovered Resources Market Bulletins June 2019 to August 2021
2. Reprocessing costs based on most recent estimates of reprocessing costs in December 2019 Recovered Resources Bulletin.
Exhibit source: Sustainability Victoria *Recovered Resources Market Bulletins June 2019 to March 2021*; Expert interviews; Accenture analysis

High rates of landfill at point of collection highlight the weak incentives for separating material for recycling

The weak incentives for both businesses and consumers to separate their recyclables for collection is evident in the high rates of packaging material that go straight to landfill.

For consumers, most of their packaging waste is collected through the Municipal Solid Waste (MSW) stream funded by local government, which includes kerbside collections and public bins. Overall, 58% of packaging placed into MSW goes straight to landfill, which means that it is not separated for co-mingled or other recycling. Over 80% of plastic is not separated for recycling, and almost 60% of paper and paperboard, despite its recyclability (see the next page for further discussion of consumer incentives in collection).

Lack of sufficient incentives is not the only reason why so much material is lost at this stage of the system. Not all packaging material is recyclable, and not all recyclable material is accepted for co-mingled recycling collection in all local government areas. Each has their own standards, which also creates confusion for consumers who are trying to separate accurately.

Most businesses pay for their own waste collection through the C&I waste stream. As a result, they might be expected to have more incentive than consumers to recycle if it costs less than landfilling. Overall, the C&I landfill rate at point of collection is much lower at 31%.

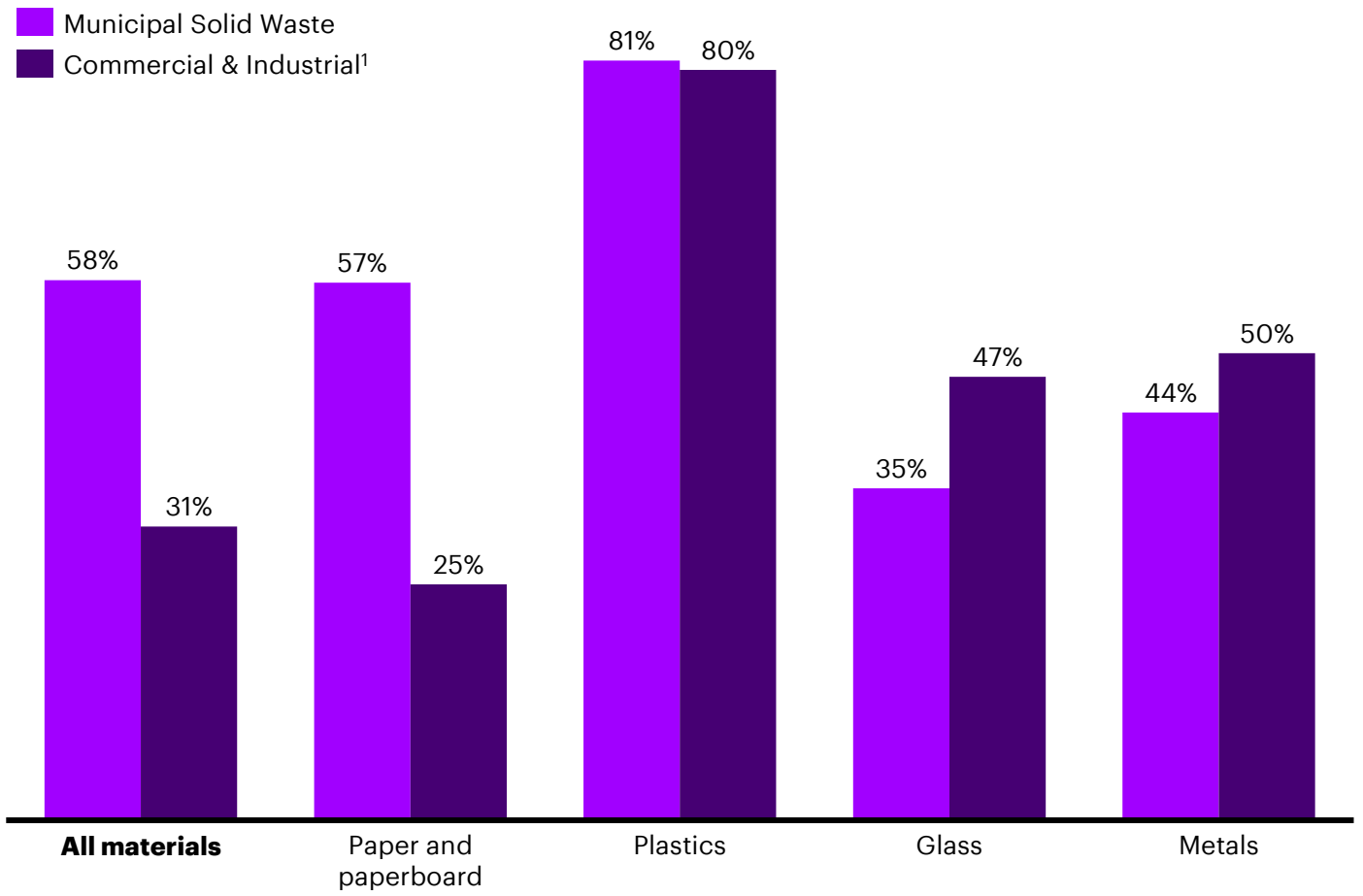
However, this is entirely due to paper and paperboard, which businesses separate for recycling at a much higher rate than consumers. Only 25% goes straight to landfill in the C&I stream. Cardboard is the material with strongest secondary markets and local reprocessing, and businesses usually pay a lower collection cost or receive a rebate for the cardboard's value.

In other materials, there is less difference between MSW and C&I landfill rates. The difference in glass is not significant because the volume of glass collected through the C&I stream is very low.

Note that this analysis is based on 2018-19 data and will be updated when the latest data is available.

Exhibit 20: Landfill rate at point of collection

%, material destined straight for landfill from collection by waste stream and material type, 2018-19



Notes: 1. Collected material includes material sent directly to reprocessing. Does not include packaging collection through CDS streams, or materials sent to energy recovery. Wood is excluded due to limited data availability.
Exhibit source: APCO (2019) *Materials Flow Analysis 2018*; Accenture analysis

The indirect funding of kerbside collection means that consumers mostly do not reduce their costs through recycling their packaging

Consumers play a dual role in the packaging system, at the end of the production stage but also at the beginning of the recovery stage. As consumers of packaged goods, their demand for more circular packaging will be critical in driving change through the system. As disposers, their practices in source separating recyclables for collection is essential in enabling recovery. But their financial incentives are not often considered.[1]

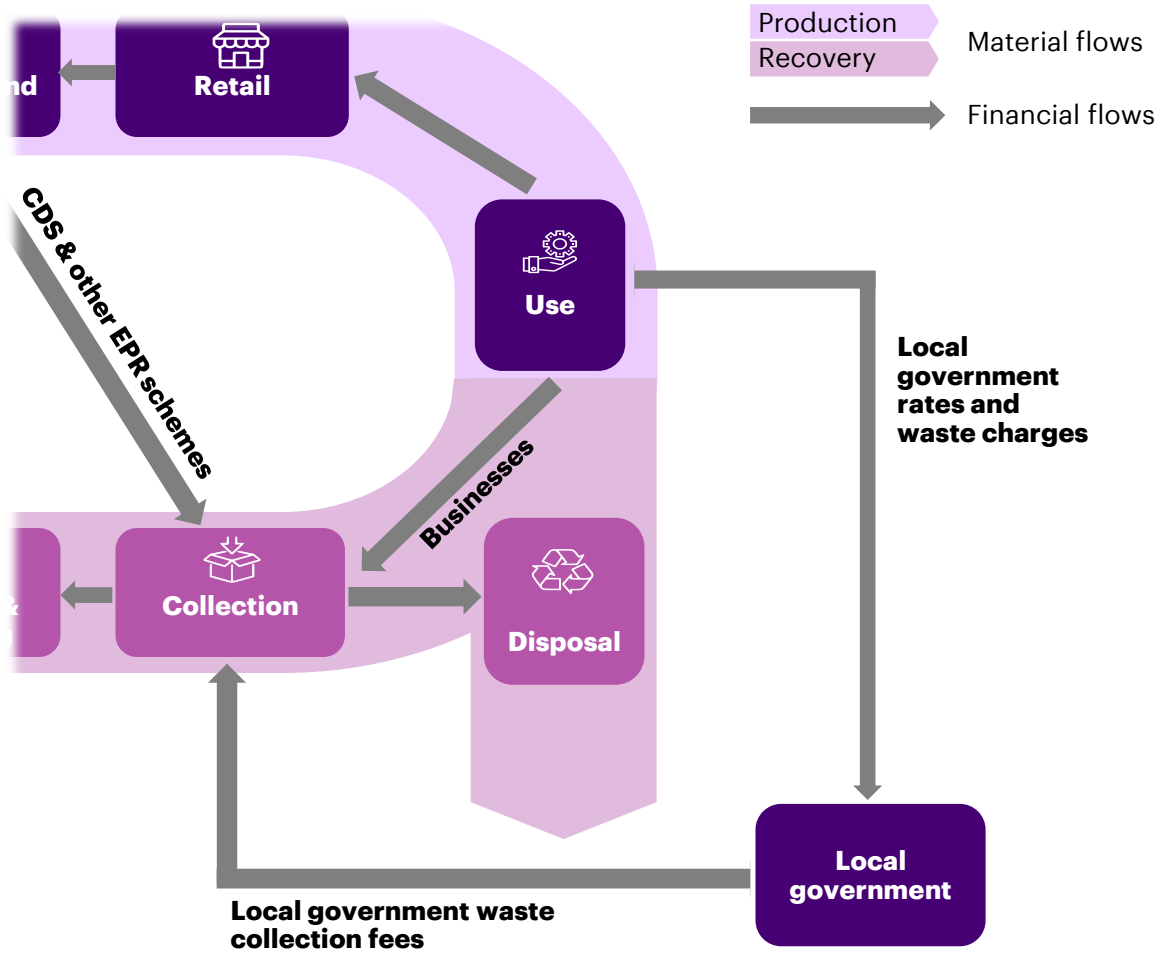
Currently, most consumers have no financial stake in their waste management practices. Local government, acting on their behalf, funds around one-quarter of the cost of recovery part of the system. Consumers fund local government through rates and, in some jurisdictions, specific waste management charges. However, these charges are rarely linked to the consumer's individual use of waste services, so these financial flows are indirect. This is in contrast to businesses, which pay directly for their waste collection based on weight and waste composition.

As a result, consumers have no cost incentive to separate more of their packaging material into the recycling stream, though neither do they have a financial incentive to not recycle.

Instead, consumers are financially disinterested in how they dispose of packaging and so other factors such as their own interest and values, convenience and access to information drive their recycling behaviours.

There have been some limited experiments by local governments in providing discounted rates to residents for selecting a greater share of bin volume dedicated to recycling. For example, the City of Casey in Victoria offers residents a small discount to reduce the size of their residual waste bin from 120L to 80L.[2] However, these approaches have not become widespread (see p34 for further discussion of 'pay-as-you-throw').

Exhibit 21: Financial flows from consumers into packaging recovery



Notes: 1. The exception to this lack of incentive is CDS-eligible containers in jurisdictions where CDS is operating. In that situation, consumers have a revenue incentive to return containers to return points to obtain the refund amount. 2. City of Casey (2021) *City of Casey Website*
Exhibit source: Accenture analysis

The focus should be on consumer and producer incentives for circularity because of their critical role as points of loss in the system

Better aligning the financial incentives of participants in the packaging system with circular objectives should promote progress towards the Targets.

While incentives could be altered at a number of different points in the system, the following incentive gaps discussed over the previous pages are the most significant and most limiting to circularity:

- Consumers' lack of incentive to separate recyclables for collection[1]
- Packaging producers' lack of incentive to use recycled materials in production

These points are particularly critical because they are the most substantial losses of material and funding respectively from the system. The largest single loss of material out of circulation is consumers disposing of packaging material directly to landfill. Financially, the largest outflow from the system – that could otherwise support system activities – is the purchase of virgin materials by producers. Improving incentives at these points should contribute most to greater circularity in the system.

The incentive gaps are not consistent across all materials. Consumers' actions in use and collection does affect all material types, though there are already some incentives for glass, plastic and metal in beverage containers through CDSs. For producers, the key gap is in plastics due to the higher cost of recovered materials, with existing cost drivers to use paper and glass (though glass faces some other challenges).

Exhibit 22: Relevance of incentive gaps by material type

Major incentive challenge ■ ■ ■ No incentive challenge

	Paper	Glass	Plastic	Metals
Consumers' actions in use and collection Consumers indirectly fund packaging recovery through local government, but individual consumers have little financial incentive to engage in more circular practices, with CDSs being the main exception.	• Lack of financial incentive to sort materials in household waste and recycling bins	• Lack of financial incentive to sort materials in household waste and recycling bins • Some incentives for glass bottles through CDSs	• Lack of financial incentive to sort materials in household waste and recycling bins • Some incentives for PET and HDPE bottles through CDSs	• Lack of financial incentive to sort materials in household waste and recycling bins • Some incentives for metal beverage cans through CDSs
Packaging producers' sourcing of materials There is still an incentive to use virgin materials over secondary materials in packaging production, especially in plastics. The PCR Targets in the NPTs provide a goal to greater use of secondary materials, but do not change the financial incentives of producers.	• Clear cost incentive to use recycled material • Industry has efficiently used recycled content for paper and cardboard packaging for decades	• Clear cost incentive to use recycled content due to energy savings in using recycled glass • Challenges with circularity of glass in Australia are likely a combination of transportation costs and market structure	• Production using recycled materials is not consistently cost competitive with virgin materials • Even if materials are cheaper, the transition costs means it is often cheaper overall to use virgin materials	• Clear cost benefit to use recycling material due to energy savings • Challenges with circularity in Australia are due to limited domestic reprocessing of packaging metals

Notes: 1. While the focus is on consumers' role in collection, this may also impact their incentives in consumption of packaging. They already have an incentive to consume less because they pay for packaging, but this incentive is limited because they are not directly responsible for the subsequent recovery costs.
Exhibit source: Expert interview; Accenture analysis

04

A range of policies could assist to strengthen the financial incentives towards achieving the Targets

Market-based mechanisms could alter the incentives of participants to align better with the circular objectives of the Targets

Government has a range of policy tools that it could use to address these incentive problems. One approach would be to mandate the desired outcome, for example ban disposal of recyclable material by consumers or mandate recycled content targets for packaging.

Mandates do play an important role in waste management in protecting the environment and preventing socially undesirable outcomes, such as littering or export of waste. However, they can be difficult to monitor and police, and are not always the most efficient approach to shifting practices.

The alternative approach is to use taxes, subsidies and other instruments to shift the financial incentives of participants towards the desired outcome. Market-based mechanisms attempt to correct an undesirable market outcome by pricing in externalities. Waste levies are an existing example of this approach.

Developing mechanisms to shift incentives towards greater circularity is an active area of policy at present, especially in Europe. A range of new interventions are being planned, such as the UK's plastics tax. There are trade-offs that need to be understood between the effectiveness, efficiency, attractiveness and feasibility of these potential policies.

Government also needs to consider the scope of any new interventions. Should they apply only to 'problem' materials that are unlikely to otherwise reach the NPTs? Or is broad based application across all materials a fairer approach, and a means to prevent any undesirable shift between materials?

Market-based mechanisms, while the focus of this report, are not the only intervention that government has available. Another long-standing approach is education, which is particularly important for consumer recycling behaviour. More than half of packaging material that is used by consumers never makes it into kerbside co-mingled recycling, and there is evidence of confusion about the recyclability of different materials.[1]

There are a wide range of education activities already undertaken in waste management. Most local governments have their own education and awareness programs, and state and territory governments also run their own programs and sometimes support local government with specific grant streams.

There are likely to be opportunities for greater investment and improved quality in education. For example, a review by the Victorian Auditor-General identified a lack of consistency, coordination and effectiveness in Victoria's waste education activities.[2]

Exhibit 23: Criteria for assessing policy interventions

Criteria	Key questions
Effectiveness 	▪ Is this intervention likely to be effective in helping achieve the Targets? ▪ Does it address the specific gaps that are emerging in progress towards the Targets?
Efficiency 	▪ How is this intervention likely to impact the cost of the packaging system? ▪ Is this a cost-effective way to meet the Targets?
Attractiveness 	▪ How will this be received by stakeholders in the system? ▪ Is this intervention likely to be politically acceptable?
Feasibility 	▪ Could this intervention be practically implemented in Australia? ▪ Are there any barriers preventing implementation of this measure?

Notes: 1. EPA (2015), *Waste Less, Recycle More Initiative: Community benchmark study* 2. Victorian Auditor-General's Office (2019), *Recovering and Reprocessing Resources from Waste*
Exhibit source: Accenture analysis

While consumers could be given additional rebates to encourage recycling, penalties to discourage disposal are also an option

Providing consumers with a financial incentive could increase circularity in their disposal and recycling practices. While consumers are not purely financially motivated, the experience of CDSs shows that revenue incentives can work. CDSs rewards consumers for returning beverage containers into a separate waste stream.

One approach would be to increase revenue incentives for consumers. This could include expanding the scope of existing CDSs in Australia to include beverage containers typically consumed at home, such as milk, wine and spirit bottles. The level of the CDS refund could also be increased to further drive redemption rates above their current levels (73% in NSW and 77% in SA, for example).[1]

The CDS model could also be extended to other types of packaging. This intervention does not appear to have been adopted much by governments, likely because of the variation in packaging types outside of beverage containers, but at least one company globally is adopting a paid take back scheme.[2]

The alternative approach is to provide consumers with cost incentives to discourage disposal of packaging waste. Typically these 'pay-as-you-throw' schemes charge or limit consumers' residual waste, but do not penalise recycling (see next page for further details).

Exhibit 24: Policies to change incentives of consumers in use and collection

Approach	Interventions	Example
Providing revenue incentives for improved collection / sortation	**CDS scope expansion:** broadening existing CDSs by expanding the range of containers included	Finland: • The Finnish deposit return scheme (DRS, the more commonly used term internationally for CDSs)[3] includes all soft drinks, water, beer, cider, sports drinks, juice, wine, liquor and spirits • Only milk is excluded
	Increase in CDS refund: offering a greater incentive to encourage consumers to return containers	Scotland's DRS • Scotland is preparing to launch its DRS in 2022, covering all drinks sold in PET, metal and glass • The deposit amount has been set at GB£0.20, around A$0.38 – almost 4 times the current standard in Australia
	Develop other paid take back schemes: offering incentives for households to collect and return packaging materials other than containers	Lush UK's plastic take back • In the UK, the cosmetic brand Lush is allowing consumers to return any Lush plastic packaging item back to Lush shops • Consumers are given a 50p discount on their Lush shopping per item they return
Using cost penalties to discourage disposal of packaging waste	**'Pay-as-you-throw' schemes:** charging consumers different collection fees depending on the amount of waste they produce	Auckland's bin tag system • In most parts of Auckland, household residual waste bins have to display a tag on the handle to be collected • The tags must be purchased from retailers at around NZ$3-6 per tag depending on bin size • Recyclable collection cost is included in property rates

Notes: 1. Exchange for Change (2021), *NSW CDS Performance Dashboard*; SA EPA (2021), *Container deposits*. 2. Lush (2021) *Bring It Back Packaging Recycling Scheme Terms & Conditions* 3. DRS is the general term internationally, while CDS is the term used in Australia. Australian CDSs do vary slightly from most DRSs around the world because the deposit is not explicitly added to the price of every eligible container and paid by the beverage companies to the operator. See Reloop (2020), *Global Deposit Book 2020* for further details.
Exhibit source: Reloop (2020), *Global Deposit Book 2020*; Lush (2021) *Bring It Back Packaging Recycling Scheme Terms & Conditions*; Auckland Council (2021) *Rubbish and recycling bin options and charges*; Accenture analysis

Pay-as-you-throw schemes provide an incentive for consumers to reduce their residual waste through a cost penalty

'Pay-as-you-throw' (PAYT) schemes operate by charging consumers differentiated collection fees depending on the amount of residual waste they produce or are able to dispose of, usually with discounted or free collection of recyclables. These schemes create direct economic incentives for households to sort more recyclables into the correct bin and reduce their residual waste.

There are a range of different types of PAYT schemes, with three broad types summarised in the exhibit below. Technology is providing new options that reduce the friction in scheme design, such as use of microchips in bins combined with weighing arms on trucks.

PAYT has often been tabled as a reform option in Australia, but has rarely progressed beyond small experiments with bin volume pricing, the most limited form of PAYT.[1] It is, though, widely adopted in other jurisdictions. PAYT is relatively common in Europe and East Asia, but has also gained significant traction in the US. By 2011 almost two-thirds of the 100 largest cities in the US had PAYT schemes in place, and in the western US schemes cover most of the population.[2]

The long history of PAYT – first implemented in Austria in 1945 – means there is good evidence for its effectiveness in changing disposal practices. A study in New Hampshire found that it cut residual waste disposal volumes by around half compared to towns without PAYT.[3] However, there is less evidence of any impact on consumers' consumption of packaging.

PAYT could increase availability of recyclables to recovery in Australia, but would need to be supported by greater incentives for sortation and reprocessing of those materials.

Exhibit 25: Types of 'pay-as-you-throw' schemes

Lower complexity → **Higher complexity**

Pricing different volumes of bins	Pre-paid bags, tags or stickers	Weighing waste in bins
▪ Consumers are charged different fees depending on the size of their bin. For instance, households which accept a smaller residual waste bin are charged a lower fee ▪ Consumers have an incentive to reduce their residual waste so they can use a smaller bin	▪ Consumers must purchase pre-paid bags in which to dispose residual waste (or attach pre-paid tags or stickers to existing bags) ▪ Consumers are incentivised to reduce residual waste and increase recycling to minimise the cost of purchasing bags	▪ Waste generated by consumers is weighed upon collection ▪ Consumers are charged depending on the amount of waste produced, similar to other utilities charged on a usage basis such as water and electricity
Case study ▪ Several Australian councils (eg City of Casey in Victoria, City of Wollongong in NSW) already use variable pricing for different bin volumes, with reductions in rates to adopt a smaller residual bin[4]	**Case study** ▪ Operates in South Korea, where it is regarded as successful in reducing waste and increasing recycling[5]	**Case study** ▪ In Belgium, a scale on the lifting arm of the collection vehicle combines with electronic chips in each bin to weigh each resident's waste and bill them accordingly[6]

Notes: 1. For example, in 2015 the South Australian EPA floated "save as you throw (variable rate pricing)" as a reform idea in a discussion paper: EPA South Australia (2015), *Reforming waste management – creating certainty for an industry to grow* 2. EPA (2014) *Pay-as-you-throw / Variable rates for trash collection: 2014 Update* 3. Wright, Halstead and Huang (2018), "Estimating Treatment Effects of Unit-Based Pricing of Household Solid Waste Disposal" in *Agricultural and Resource Economics Review 4*. City of Casey (2021) *City of Casey Website*; City of Wollongong (2021) *Household Recycling and Waste* 5. AlphaBeta & UTS (2019) *Recycling and resource recovery infrastructure in Victoria: International and Australian comparisons* 6. EPA South Australia (2015), *Reforming waste management – creating certainty for an industry to grow*

Exhibit source: AlphaBeta & UTS (2019) *Recycling and resource recovery infrastructure in Victoria: International and Australian comparisons*; EPA South Australia (2015).

Expanding CDS is both feasible and likely to be broadly popular, but may have less impact than PAYT

Assessment of the different consumer-focused policies that could be adopted highlights some of the trade-offs that government would need to consider.

Expanding the scope of CDSs into containers not currently included, such as wine, spirts and milk bottles, would be likely to be highly effective at increasing return rates and producing clean source separated streams within those formats. It is also likely to be attractive to consumers, given the reception for CDSs in Australia. However, it is not an efficient approach – CDSs are very expensive per tonne of material collected.

PAYT, international evidence suggests, is both effective at improving recycling rates and is efficient because it does not add cost – it simply distributes existing usage costs that local governments pay to their residents. It may be challenging to implement though, given lack of local experience. It is likely to be unpopular with residents, at least initially, and each local government would have to develop and implement an approach, which may include renegotiating existing waste management contracts.

Exhibit 26: Assessment of consumer-focussed policy interventions

Positive / Negative

	Effectiveness	Efficiency	Attractiveness	Feasibility
CDS scope expansion • Additional beverage container formats	• Likely to be highly effective in those formats added to scope, return rates usually approach 80% when schemes mature	• Very expensive per tonne of material collected compared to kerbside collection	• Likely to be broadly popular, though not with beverage industries that are brought into scope	• Quite simple given existing schemes – though widening the scope may result in need for some additional infrastructure
Increase in CDS refund • Beverage container materials	• Would be likely to increase return rates but not substantially given they are already quite high	• Very expensive if applied to all containers, but it could be applied differentially to formats with lower recovery rates	• Likely to be popular with consumers and recycling industry, but not with beverage industry	• Simple to increase given current infrastructure
Develop other paid take back schemes • Other plastic packaging?	• Limited evidence but likely to be effective considering the CDS experience	• Like CDSs, expensive because it is an additional cost and applies broadly	• Likely to be popular with consumers, but may be seen as too complex if additional to CDSs	• May be difficult to clearly scope given the range of different packaging formats outside of containers
'Pay-as-you-throw' schemes • All materials	• Strong evidence internationally of impact in both increasing recycling and reducing residual waste to disposal	• Highly efficient, usually redistributes current waste fees rather than adds new cost	• Likely to be unpopular with residents initially • International evidence suggests popularity will increase over time	• Breadth of international experience demonstrates feasibility • Some transition costs, depending on approach

Exhibit source: Expert interviews; Accenture analysis

Market-based mechanisms could help to remove the remaining incentive to use virgin materials

Exhibit 27: Policies to encourage use of recycled materials

Approach	Interventions	Examples
Using cost drivers to discourage use of virgin / problematic materials	**Materials taxes:** a direct tax is imposed on virgin and problematic packaging at the point of manufacture	UK is introducing a virgin plastic packaging tax[1] ▪ From April 2022, a tax will apply to plastic packaging with less than 30% recycled content which is manufactured or imported into the UK
	Eco-modulated fees: fees paid by packaging producers under EPR systems, including CDS/DRS, are adjusted based on share of recycled content	France modulates EPR fees based on recycled content in packaging[2] ▪ Paper-based packaging with at least 50% recycled content is eligible for a 10% reduction in EPR fees ▪ Use of recycled plastic resins attracts bonuses per kg used, with different rates for each resin and source of recycled material Quebec (Canada) gives credits for use of post-consumer recycled content[3] ▪ Producers who put some packaging materials on the market that reach threshold PCR levels are eligible for a 20% credit of their EPR contributions
	Tradeable offset schemes: a recycled content target is set, and producers which exceed it are issued credits which can be sold to other producers	France's ORPLAST project proposes a 'recycling certificates' scheme[2] ▪ Proposed pan-European system of tradeable 'recycling certificates' issued by European recyclers to their customers, which would be redeemable for a value linked to the marginal cost of using recycled content
Using subsidies to encourage use of recycled materials	**Subsidies or tax exemptions:** a subsidy or tax exemption is offered to producers who use recycled content[4]	Brazil provides tax credits for use of recycled content[5] ▪ Tax credit has been offered since 2011 for the purchase of recycled materials for use in production Kentucky (USA) gives a tax credit for recycling equipment[6] ▪ Purchase of recycling or composting equipment to be used with post-consumer waste materials is eligible for a 50% tax credit
Reducing cost of purchasing of recycled packaging	**GST exemption for products with circular packaging:** consumers are exempt or pay less GST on items which use recycled packaging	Several countries discount value added tax (VAT) for recycled-related products ▪ Belgium applies 0% VAT on certain recovered materials and by-products ▪ India charges a discounted 5% VAT (normally 18%) on goods made from recycled products

While policies for encouraging consumer recycling behaviours have been in place in many countries for decades, producer-side measures for driving use of recycled materials are relatively new.

Europe is leading the way with introduction of cost drivers to discourage the use of virgin materials in packaging. Alongside widespread and long-term use of EPR schemes (see the next page for further discussion of the role of EPR), many European countries have introduced mechanisms that directly impact producer and supplier cost drivers, including materials taxes on virgin materials or eco-modulated EPR fees based on recyclability or recycled content.

In 2018, the EU introduced a requirement for producer responsibility schemes to have modulated fees under the revised Waste Framework Directive. Some collection streams in France have already put in place modulation, and other countries are expected to follow suit in the coming years in line with the EU directive.

Notes: 1. UK Government (2021) *Introduction of Plastic Packaging Tax from April 2022*; 2. Hogg et al (2018) *Demand Recycled: Policy Options for Increasing the Demand for Post-Consumer Recycled Materials*; CITEO (2021) *The 2021 rate for recycling household packaging* 3. Eco Entreprises Quebec (2021) *Reporting and Schedule of Contributions* 4. Carbon credits are a similar type of subsidy that could be considered. However, credits usually apply to one business changing its practices to reduce carbon intensity and are harder to apply across a system where the structure of the value chain may be changing. 5. KPMG (2017) *Green Tax Index* 6. Kentucky Dept of Revenue (2021) *Recycling or Composting Equipment Tax Credit*
Exhibit source: Crone (2020) *Policy incentives to support recycling markets in Australia*; Katten (2021) *UK plastic packaging tax: a new measure to reduce plastic waste*

EPR is sometimes proposed as a cost driver to promote circularity, but in practice it operates more as a funding mechanism

EPR schemes are a common policy to tackle the environmental impacts of packaging. EPR schemes require producers to assume responsibility for the post-consumer stage of a product's life. For packaging, this generally requires businesses that place packaging on the market to pay fees to cover either in part or in full the net costs of its collection, recovery and other after-use management.

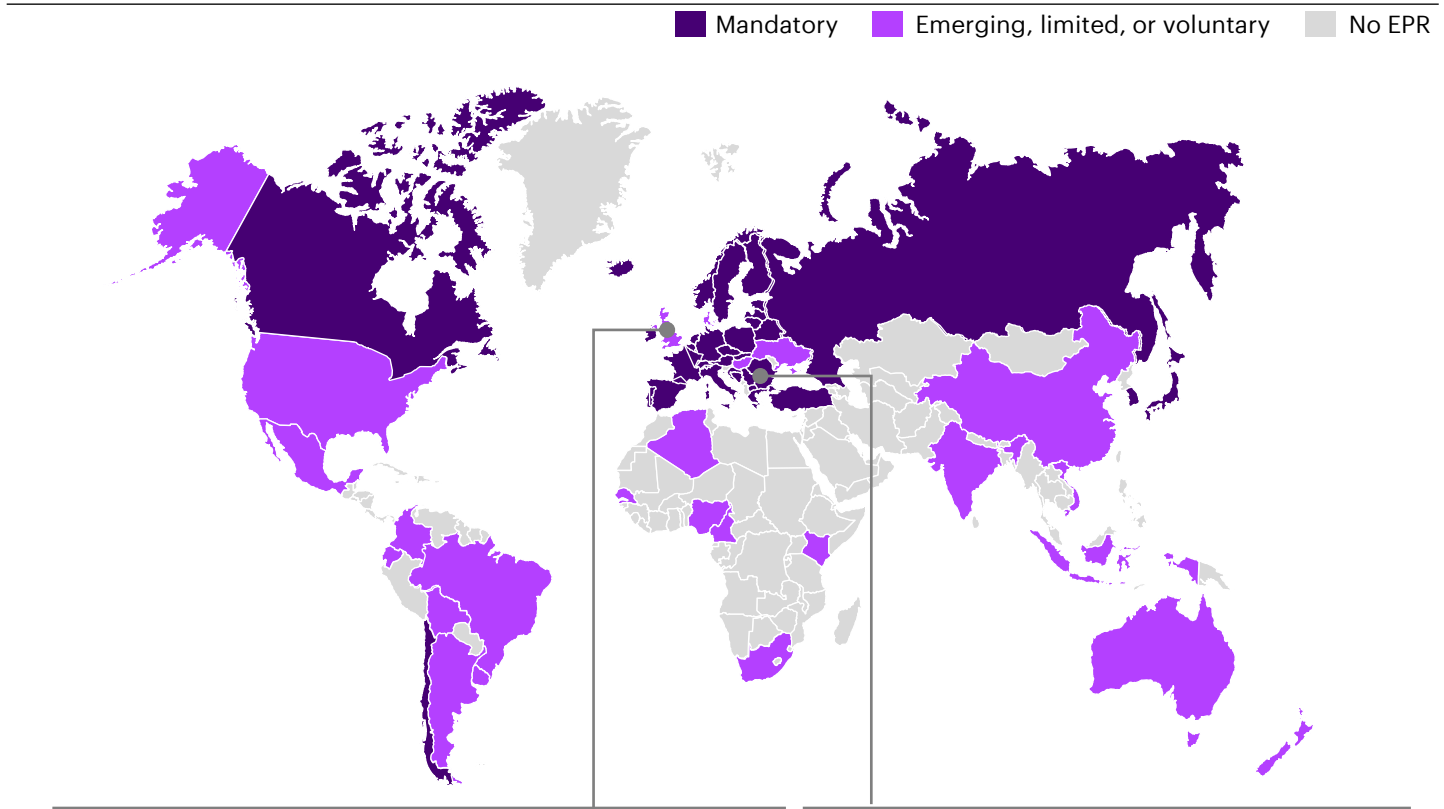
EPR schemes have been established in Europe, Japan and South Korea for 20-30 years.[1] Today, there are a range of mandatory and voluntary schemes around the world, including Australia.

EPR itself has not necessarily shifted the incentives needed for circular use of packaging materials. Up until now, EPR has primarily functioned as a funding mechanism for the recovery of materials, including collection, sorting and recycling. It provides a reliable source of funding to scale recycling systems, but there are limited financial incentives for producers to make their operations and commercial models more circular.

Increasingly, countries are reforming their EPR systems to add specific incentives to strengthen circular objectives and upstream innovation for circularity, including modulation of fees and reusable packaging targets.

As long as the costs of recovering some materials remains higher than the revenues made from the sale of recycled materials, mandatory EPR schemes will continue to be an essential source of funding for recycling systems worldwide. This is particularly important for materials that are currently difficult to recover for use in packaging, such as flexible plastics.

Exhibit 28: Overview of global packaging EPR systems in 2020[1]



Notes: 1. Ellen MacArthur Foundation (2021) *Extended Producer Responsibility – Statement and Position Paper*. Mandatory indicated countries where there is specific legislation in place for packaging EPR schemes. 'Emerging, limited, or voluntary' refers to countries where EPR schemes are being planned, or existing EPR schemes is limited in scope or geography, or where only some businesses take part in the scheme 2.Footprint - Sustainable Responsible Business (2021) *New 'Refill' Labels Launched* 3. Hogg et al (2018) *Demand Recycled: Policy Options for Increasing the Demand for Post-Consumer Recycled Materials*
Exhibit source: Ellen MacArthur Foundation (2021) *Extended Producer Responsibility – Statement and Position Paper*

A range of different interventions could be effective in increasing recycled content, but there are practical challenges in implementation

Exhibit 29: Assessment of producer-focussed policy interventions

Positive ■ ■ ■ Negative

	Effectiveness	Efficiency	Attractiveness	Feasibility
Materials taxes	• Provides clear financial incentives for producers to use less virgin materials, changes relative attractiveness	• Should be quite efficient as would only apply where recycled content cannot be used, and tax revenue could be used to support system transition	• May be harder to build support because it is a new tax	• Somewhat complex to identify point of taxation and establish mechanics, as well as setting level of tax
Subsidies/tax exemptions	• Provides clear financial inventive to use more recycled content	• May be costly to government and result in subsidies for activities that do not require them	• Likely to be publicly attractive and gain support from recycling and packaging industries	• May be complex to trace and monitor use of the subsidy / exemption
Eco-modulated fees	• Provides clear commercial benefit but only able to be implemented within an EPR scheme	• Highly efficient as does not change overall fees, simply distributes cost more appropriately	• May be more acceptable to packaging industry than mandated recycled content targets due to flexibility of the scheme	• Easier to implement because it modulates existing fee structure of EPR schemes (eg CDSs)
Tradeable offset schemes	• Provides financial incentives for using recycled content to meet PCR targets	• Theoretically highly economically efficient in driving lowest cost shift to recycled content	• May be more acceptable to packaging industry than mandated recycled content targets due to flexibility of the scheme	• Requires expertise and high administrative costs to set up and operate
GST exemptions	• Only provides incentives for consumer behaviour, doesn't directly discourage the use of virgin materials for producers	• Could be quite costly as would likely apply to the whole value of the good, not just the packaging	• May be broadly popular, but would need very high levels of support because of the complexity of GST governance in Australia	• Difficult to implement as GST exemptions impact all retailers and require substantial systems changes

The international experience in most of these interventions is limited. It seems likely, however, that most could be effective in driving use of recycled content because of their impact on producers' incentives.

The challenge is more likely to be in the attractiveness and feasibility of the intervention. Most have feasibility questions, either through the costs associated with implementing and regulating a new scheme or tax regime, or technical considerations of appropriate material-level requirements.

Eco-modulated fees would likely be the easiest intervention to implement because it works within an existing EPR structure, though this limits the scope of its effectiveness. In Australia, that would likely mean application in CDSs or the proposed National Plastics Recycling Scheme.[1]

Notes: 1. Australian Food & Grocery Council (2020) *Food and grocery manufacturers step up with national plan to tackle plastic*. The Australian Packaging Covenant also has fees but they are based on turnover of the enterprise, so it would be more difficult to apply eco-modulation.
Exhibit source: Expert interviews; Accenture analysis

One of the main benefits of producer incentives is creating more circular demand, reducing outflows to virgin materials

The primary purpose of policies to encourage producers to use recycled content is to meet the system's environmental objectives of greater circularity. However, they have the added benefit of changing the funding structure and providing a long term economic model for the system that is sustainable.

The largest outflow of funding from the system is the purchase of virgin materials for use in packaging production. The value of virgin materials used in packaging placed on the market in Australia each year is estimated to be $3-4b.

If producers can be given financial incentives to use more secondary materials, some of this outflow would be redirected back within the packaging system and would increase the funding available for recovery.

Just as a circular system aims to keep materials circulating within the system, it should also aim to maximise the funding available for activities within the system and reduce its outflows to purchase virgin materials or fund disposal.

Exhibit 30: Impact of producer incentives on packaging system funding

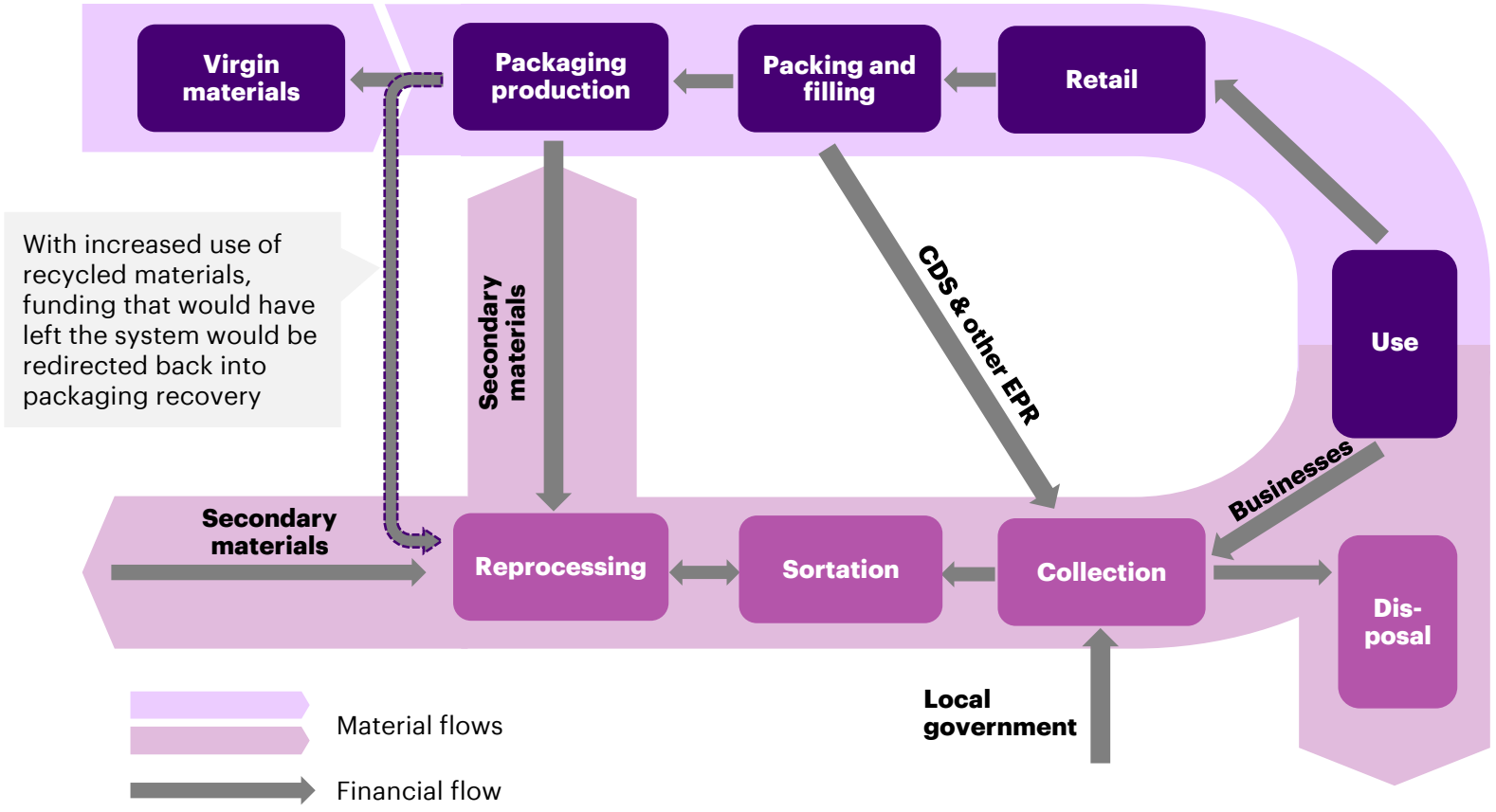


Exhibit source: Accenture analysis

05

Conclusion

Conclusion

1. The main gaps in achieving the NPTs are in plastics, but collection is likely a limiting factor to increased circularity across all material types

The most significant gaps that are emerging in the NPTs relate to plastics. The plastic recovery rate Target is ambitious and current forecasts indicate that a change in trajectory is needed to achieve it.

In PCR content, paper is likely to meet its Target, and glass may also meet its Target with new CDSs coming online, packaging company targets and expanded beneficiation capacity. Metals are well below their target level but this appears to be because of difficulty accessing higher PCR metals on international markets given our lack of domestic reprocessing. Plastics is also well off its Target, and only rigid PET looks likely to meet the resin-specific PCR Targets.

While plastics needs to be the focus of interventions to achieve the NPTs, the overall quality of the collection process should not be overlooked. Collection does not have an explicit target but it is a critical enabler of improved recovery. Collection efficiency is poor across all materials, especially for consumer packaging, and the lack of available materials for reprocessing is already becoming a limiting factor for improving circularity.

2. The increased cost of recovery to meet the NPTs should be primarily funded by increased sales of recovered materials to packaging producers

The estimated annual cost of meeting the NPTs will be at least $1.7b. Some of this additional cost will be funded through higher CDS fees as schemes commence in remaining Australian states. However, it is unlikely that business or local government waste collection fees will be sufficient to cover the remainder.

Government could provide some or all of this funding, but a more sustainable – and circular – solution is for packaging production to purchase more secondary materials and reduce the financial outflows on purchases of virgin materials. At present material sales back to production provides less than 30% of the funding for the recovery stage of the system.

Increasing this financial flow can provide much of the additional funding needed for improved collection and sortation, and greater domestic reprocessing. However, it relies on producers having financial incentives for greater use of recovered materials.

EPR will still be necessary to fund the recovery of some problematic materials where material sales can't fill the gap. For example, soft plastics and polymer-coated paperboard currently have very limited end markets in Australia due to recyclability constraints. Value from sale of these recovered materials is likely to remain lower than recovery costs and so dedicated EPR schemes will be required to fund the difference.

3. Aligning incentives in the system with circular objectives is critical to achieve lasting change, but interventions to change incentives will take time to implement

The key challenge to drive the system to greater circularity is better alignment of financial incentives with circular objectives. This should focus in particular on the incentives of consumers to recycle effectively, and the incentives of producers to use recovered materials – the two points where the system currently loses most material and funding. Without the right incentives, changes won't be sustainable.

Interventions to address this challenge are complex and unlikely to be able to be implemented in time to impact the NPTs by 2025. But the long term policy discussion needs to start now. The example of mandatory renewable electricity targets in Australia shows how important incentives are for shifting the economics of a market over the long term.

On the producer side, the focus should be on uptake of recycled materials in plastic packaging. This could be achieved through virgin materials taxes, or introducing eco-modulation of fees for existing CDSs and new EPR schemes.

For consumers, PAYT schemes are most likely to support improved recovery rates across all materials. Expanding scope of CDSs or introducing other return schemes that provide financial incentives for recycling are also options but will be less broadly impactful and more costly.

4. In the short term, the focus should be on reinforcing existing interventions, especially waste education, waste levies and capital investment subsidies

While shifting the incentives to ensure sustainable change is likely to take 5-10 years, there are interventions that could be more rapidly deployed to support the progress towards NPTs. These interventions, principally expanding existing waste management policies, are unlikely to push the system towards full circularity, but should at least improve recovery. These include education, increasing waste levies and capital investment subsidies.

Waste education is already a widespread practice, but there are concerns about the level of investment and coordination between levels of government in delivery. Additional investment in education could be implemented rapidly and is likely to improve consumer recycling behaviour and reduce landfill rates.

Waste levies already exist in most states and territories, but are usually not sufficiently high to change incentives given the additional costs of recycling collection. Increasing waste levies would be a quick way to shift incentives in the recovery part of the system and make greater sortation of waste commercially attractive, especially for plastic.

Governments have established a range of capital investment subsidies such as the Recycling Modernisation Fund. While they typically focus on capacity rather than demand for recycled materials, they do shift incentives and are able to be deployed relatively quickly. They can also be funded from waste levies.

5. Further work is needed to understand the change in production costs from greater circularity, and the level of impact from different interventions

This report provides an evidence base for ongoing discussion of the economic changes required in the packaging system to achieve the NPTs and progress towards greater circularity.

However, more research is required in two main areas to support more detailed policy development. Firstly, the changes in the cost of packaging production from transition to a more circular system are not as well understood as the changes in recovery. Further work with packaging producers to understand the changes by material type would improve understanding of their specific incentives and any barriers.

Secondly, the magnitude of impact of different market-based mechanisms needs to be modelled. This report provides only high-level qualitative assessment of the impact of the possible interventions. More detailed review of experiences in other jurisdictions would help estimate the likely potential of different interventions in Australia.

Appendix: Methodology

Methodology: packaging system and system cost

System and system costs

This report uses concepts of system and system cost for its modelling and analysis.

The **packaging system** is defined as the activities related to the use of packaging in Australia that can be influenced by domestic policy. It is comprised of two stages: production and recovery.

Production includes production of packaging using virgin and secondary materials both domestically and internationally – packaging manufactured offshore has to be imported to Australia so is subject to local regulation. Production of virgin materials themselves is not part of the packaging system because those materials have other uses, but they are an input into the system.

Recovery is the treatment of packaging after its use, whether it is reprocessed and used again in packaging or for other purposes or disposed to landfill. However, after recovered material is exported, either baled after sorting or partly reprocessed, it is considered to have left the Australian packaging system because it is largely beyond the influence of Australian policy.

To make this concept measurable, some artificial lines have been drawn:

- Firstly, there is not always a clear distinction between reprocessing of material in the recovery stage and the subsequent use of that material in the production of packaging itself. As far as possible, the definition adopted is that recovery involves returning material to a comparable state to virgin substitutes, and any subsequent processing is considered part of production not recovery.
- Secondly, where material is recovered but then used to make recycled products outside of packaging, it is not straightforward how much of that recovery process should be considered part of the packaging system. The assumption has been that sorting or reprocessing that is general in nature, such as shredding and grinding of plastic, is still considered part of the packaging system, but when the treatment of the material becomes specific to the process of production of a non-packaging product the material is considered to have left the packaging system.

The report uses this definition of the packaging system to estimate the **system cost**. The concept of system cost as used in this report describes the full annual cost of the activities in system, including capital and operational costs and a reasonable level of profit. It does not include external costs and benefits, such as cost of environmental externalities or any consumer surplus from packaging.

Cost is estimated where the cost is incurred in the system, regardless of who funds that cost through transfers, purchases or external subsidies. For example, while packaging production pays for the secondary packaging material that it uses, the cost of producing that secondary material is located in the recovery stage, not production, because that is where the activities of collecting, sorting and processing the material occur. In contrast, the cost of purchasing virgin materials occurs in packaging production because the material is purchased there from outside the packaging system.

Estimating the system cost poses both methodological and data availability challenges. It requires reducing a complex and diverse set of activities to a simplified model. For these reasons, the estimates should be used with caution and treated as estimates only.

Methodology: modelling approach

Applying the definitions of system and system cost on the previous page, the report models the costs of the packaging system in 2019-20 and compares that to the costs of the system in 2024-25 if the NPTs are achieved (the NPTs scenario). The three steps of the process are described below.

Step 1: Volume flows

The first step was to estimate the volumes of material flowing through the system in 2019-20 and under the NPTs scenario.

For the **current system**, volumes of packaging placed on market (POM), recovered and disposed are from the 2019-20 *Packaging consumption & recovery data report*.[1] Assumptions about collection efficiencies, sortation efficiencies, the relative proportion of recovered material sold as unprocessed bales and processed secondary materials, and other transitional efficiencies are taken from the 2018-19 Materials Flow Analysis (2018-19).[2]

For the **NPTs scenario**, estimates of total packaging POM are taken from 2024-25 projections in the *Packaging consumption & recovery data report*, excluding wood. The following assumptions were made about the flow of materials in the NPTs scenario system:

- Recovery rate of each plastic packaging type is set to 70%.
- The proportion of material POM from post-consumer sources is set to the PCR Targets for each material.
- The same amount of material POM from post-consumer sources is collected, sorted and then reprocessed locally in the packaging system, ie the system is effectively self-sufficient in secondary materials. This assumption is based on the export bans, which drive greater local reprocessing of most packaging materials, as well as the overall desire underlying the NPTs for the system to be more circular. The only exception is metals, which continue to be mostly reprocessed offshore due to lack of local capacity.
- Materials are assumed to be reprocessed to different states depending on their expected fate or location of use, eg food or non-food grade, domestic or international use.
- Any recovered materials not required for meeting the PCR Targets are split evenly between sold unprocessed for non-packaging use and processed partly in the system for non-packaging applications, except for glass where all excess material is sold from MRFs unprocessed for use in construction.
- The proportion of CDS-eligible materials collected and sorted through the CDS stream is increased to account for the addition of Victorian, Western Australian and Tasmanian schemes.

The resulting flow of materials for the NPTs scenario is shown in the chart on the right.

Step 2: System costs

The second step was to apply costs per tonne for each step of the system to the volumes.

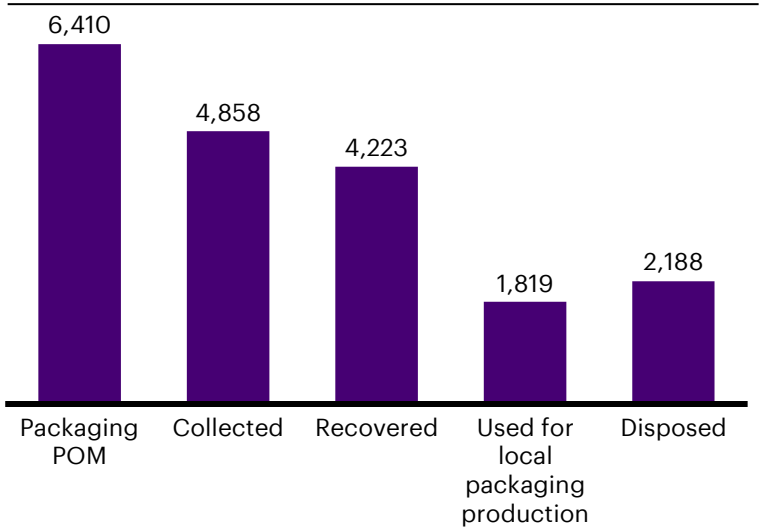
Estimates for the costs per tonne by material type were collated from a range of sources, including expert interviews, existing data and Sustainability Victoria's *Recovered Materials Bulletins*.[3] Where multiple estimates were available, a weighted or simple average was used. In the NPTs scenario, an upper estimate of cost per tonne was applied for collection and sortation to account for higher quality standards required to meet reprocessing needs.

Step 3: System funding

The third step was to estimate how the recovery stage of the system was funded. This estimate was only undertaken for 2019-20, not the NPTs scenario.

Total packaging recovery system funding inputs were estimated for CDS contributions, local government waste collection fees, recovered material sales and commercial waste contracts. Beverage company contributions to CDS were estimated from 2019-20 NSW, QLD, SA, ACT and NT scheme publications on total collected containers, and average weighted scheme cost per containers to beverage companies.[4] Cost per tonne of metropolitan waste services for yellow and red top bins was based on data from IPART, [5] and total packaging material flow through kerbside collection was taken from the 2018-19 *Materials Flow Analysis*. Value of sold materials were estimated using packaging volumes from APCO's *Packaging consumption & recovery data report* and price estimates from expert interviews.

Material flows for NPTs scenario
'000 tonnes, 2024-25 projection



Notes: 1. APCO (2021) *Packaging consumption & recovery data report 2019-20 and supporting data tool* (unpublished draft) 2. APCO (2019) *Materials Flow Analysis 2018* 3. Sustainability Victoria *Recovered Resources Market Bulletins June 2019 to March 2021* 4. Exchange for Change (2020) *Return and Earn: Annual Statutory Report 2019-20*; Container Exchange (2020) *Annual Report 2019-20*; ACT Government & Exchange for Change (2020) *ACT Container Deposit Scheme Annual Statutory Report 2019-20*; EPA South Australia (2021) *Container deposits*; NT EPA (2020) *Environment Protection (Beverage Containers and Plastic Bags) Act 2011 Annual Report 2019-20* 5. IPART (2020) *Discussion Paper: Local council domestic waste management charges*