

BUILDING MARKETS FOR RECYCLED HOUSEHOLD FLEXIBLE PLASTICS:

Identifying the
End Uses Needed
to Meet EPR Goals

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Foreword

Meeting recycling targets for flexible plastics will take more than collection. It will take new, viable end markets ready to put recovered material back to productive use – and the collaboration to prove they can work. This report is a first step in that direction, and it reflects the shared conviction of the partners who made it possible.



"A circular economy isn't created by collecting more material – it's created when recycled materials become valuable inputs for new products. Unless manufacturers create demand for the material coming out of recycling systems, we simply shift the bottleneck from collection and sorting to market demand. By identifying where recycled household flexible plastics can be successfully used, we hope this report helps shift the conversation from collection and sorting alone to include building the markets that will make higher recycling rates possible."

– Shannon Bouton, President & CEO, Delterra



"The hardest part of building markets for recycled materials isn't ambition – it's honestly assessing what's technically and economically feasible and being willing to follow the evidence where it leads. That rigor is what turns good intentions into real markets. Getting the analysis right on which end uses can actually work is the foundation everything else depends on."

– Sarah Edwards, North America Director and Private Lead, Eunomia



"As a leading packaging producer, Amcor wants to be at the front in thinking about how more flexible plastic packaging can be recycled. Industry has an important role to play in making EPR systems successful, and supporting efforts like this is how we act on that. It's central to the role a packaging producer should take in the circular economy."

– David Clark, Chief Sustainability Officer, Amcor



"Without strong demand for recycled household flexible plastics, there is little incentive to expand recycling at scale. That's why we chose to support this work. Building viable end markets requires collaboration across the value chain, and by working together to identify and validate new end uses for these materials, we can help create the demand needed to drive investment, grow recycling, and keep valuable materials in productive use."

– Linda Roman, Director of Packaging, R&D North American Fellow,
Kraft Heinz

Contributors

Delterra is an independent environmental non-profit working on the ground to build more circular material systems across the globe. Founded with McKinsey & Company as its founding partner, Delterra works with governments, residents, waste workers, waste management organizations and private companies on solutions that keep waste out of landfills and the environment and improve lives. The organization is currently reimagining and redesigning recycling systems in Indonesia, Argentina, Brazil and North America. In North America – its newest region – Delterra works with industry leaders through its Recycled Flexibles Demand Accelerator to co-develop responsible end-markets for flexible plastics, the initiative under which this report was produced.

Eunomia is a global, independent sustainability consultancy. For over 25 years, Eunomia has combined science and evidence-based insights, innovative thinking, and data-driven modelling to help businesses, policymakers, and the third sector drive positive change for people and planet. The consultancy offers an integrated set of services spanning the circular, natural, and low carbon economies, supporting clients from strategy through to implementation and enabling systems-level change. Eunomia is a certified B Corp and operates globally from offices in the UK, Europe, the US, and Aotearoa New Zealand. For more information, visit www.eunomia.eco

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Comprehensive, well-designed EPR programs can drive dramatic increases in the collection of recycled household flexible plastics. But collection alone will not achieve recycling targets. Without robust end-use markets for recycled material – supported by economics that extend beyond simple price parity with virgin resin – the recycling system cannot scale. This paper identifies the end-use applications with the greatest potential to build that demand and help translate ambitious recycling targets into functioning markets.

EPR sets an ambitious bar for recycling flexible plastics – beyond collection, robust demand will be needed to meet it

Ambitions for recycling flexible packaging in North America will only succeed if markets exist for the recovered material. Today, these markets remain limited: for example, while California's Senate Bill 54 establishes a 65% recycling rate target by 2032 for single-use plastics, less than 5% of flexible plastics in the state are recycled today.¹ Closing this gap over the coming five years will require not only expanded collection and sorting, but also robust demand to use the recycled material in new applications.



A significant fraction of flexible plastic waste is generated by households, but packaging and product manufacturers in North America have historically had little incentive to incorporate this recycled material into their products. From a technical standpoint, recycled household flexible plastics are difficult to recycle due to their mixed colors, variable resin composition, and possible contamination from food residue, labels, adhesives, paper, and other materials. These factors can require additional washing and sorting steps and make it more difficult for reclaimers to process this material into recycled resin that meets manufacturers' quality requirements. In addition, the availability of higher-quality alternative material – such as virgin plastic or post-consumer recycled (PCR) film from commercial or industrial sources – has also limited manufacturers' willingness to experiment with new feedstocks like recycled household flexible plastics.

¹ [CalRecycle: SB 54 Covered Material Categories List](#)

End-use demand for recycled household flexible plastics will need to significantly increase to support the recycling infrastructure needed to process this material, especially given the volume of new material that will enter the market as a result of EPR. Without consistent and reliable demand from manufacturers, reclaimers are unable to make capital and R&D investments needed to process this material at scale. Today, there are fewer than 30 reclaimers in North America that mechanically recycle polyethylene (PE) film, of which less than half have the ability to accept the lower-grade material sourced from households (e.g., Grade C or MRF film, as shown in **Exhibit 1**). For reclaimers that accept household flexible plastic, the material is often processed directly into end-use applications such as plastic lumber, asphalt additive, or roof coverboard. In limited cases, the material is sold in pellet form for consumer durable products (e.g., pails) and other molded products.

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RECLAIMERS THAT
MECHANICALLY RECYCLE
POLYETHYLENE (PE)

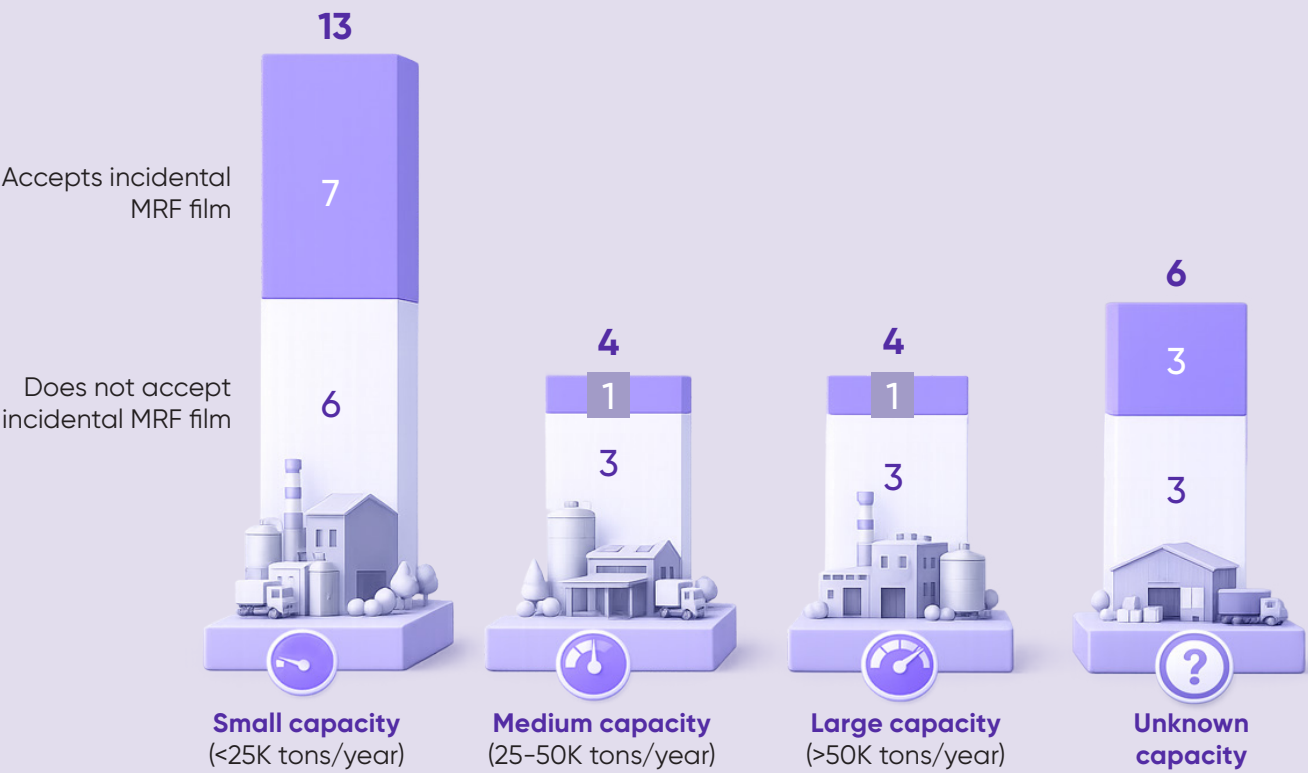
LESS THAN HALF

have the ability to accept
the lower-grade material
sourced from households
(Grade C or MRF film)



It is clear that beyond collection and sorting, building demand through new end-use applications is critical to creating a strong recycling system for household flexible plastics. The remainder of this paper presents insights into the economics required to support the recycling of household flexible plastics, a framework for identifying the most viable end-use applications for this material, and the eight end uses that emerged as most promising when we applied this framework to North America.

EXHIBIT 1 | **Currently operating mechanical flexible PE recyclers in North America**
Count of plants



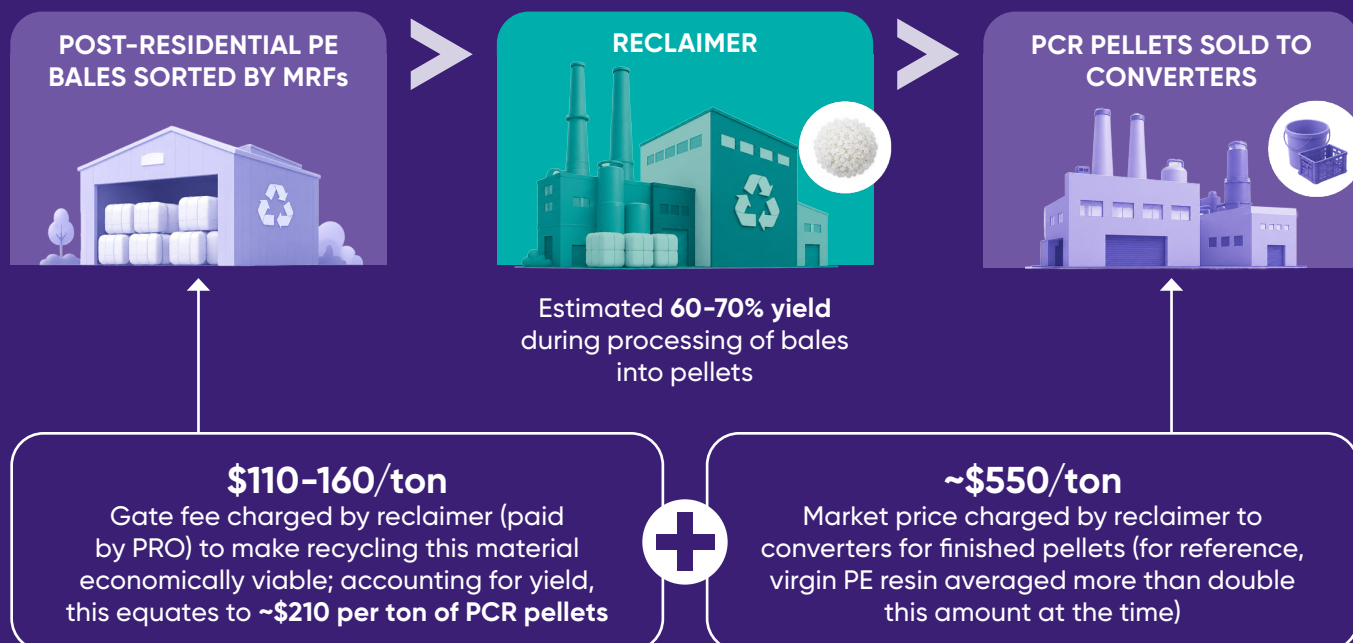
Source: Expert interviews

Demand for recycled household flexible plastics must be economically viable, which will likely require going beyond price parity with virgin resin

While the lack of manufacturer demand for recycled flexible plastics has created a market with few reclaimers able to process this material, EPR introduces new mechanisms that could help break this cycle. Using Europe's EPR markets as a case study, where household flexible plastics have been collected, sorted, and recycled for many years, we find useful examples of how Producer Responsibility Organizations (PRO) can help sustain and grow recycling markets for this material. The case study below (**Exhibit 2**) draws on several data sources to illustrate the monetary exchanges involved for reclaimers in this context. The key features include:

- Reclaimers took in recycled household flexible plastics from sorting centers – nominally sorted to a “PE-rich” grade – and used this material to produce an LDPE-rich pellet with around 10% polypropylene (PP).
- Converters purchased this resin for **~\$550/ton**, less than half the value of virgin PE at the time, where it was then used in injection molding processes for non-packaging rigid items. For context, these are early 2026 data that reflect a period when virgin resin prices were relatively low.
- To achieve economic viability at this price point, reclaimers also charged sorting centers a gate fee to process the bales they received. These fees averaged **\$110-160/ton** at the time of this analysis. The PRO, which was incentivized to achieve high recycling rates for household flexible plastics, reimbursed sorting centers for this gate fee paid to reclaimers – effectively subsidizing the cost of processing this material.

EXHIBIT 2 | European example: Reclaimer economics are viable for post-residential PE film due to revenue from converters and the PRO



This case study illustrates that price parity between PCR and virgin resin is unlikely to be a sufficient incentive on its own. Without a significant price advantage for manufacturers to proactively adopt recycled materials of lower quality than virgin resin, recycled content mandates or other regulation often dictate material selection. In Europe, sorter and reclaimer economics are also not fully viable without economic inputs and other solutions. This suggests that North America will likely require similar economic mechanisms if demand for recycled household flexible plastics is to scale.

Where could recycled household flexible plastic be used? Eight promising end-use applications in North America

To help boost demand for recycled household flexible plastics, in the context of the technical and economic realities described thus far, we sought to identify a set of new end-use applications that could use this material in North America but which are not doing so in a meaningful way today. To evaluate potential end uses, we developed four criteria (**Exhibit 3**): 1) additionality from past trials, 2) technical feasibility for converters, 3) technical feasibility for reclaimers, and 4) potential to absorb household flexible PCR.

EXHIBIT 3



ADDITIONALITY FROM PAST TRIALS. Is post-residential PCR currently being used in North America for the specified product, and would a trial (if successful) demonstrate new technical findings?



TECHNICAL FEASIBILITY FOR RECLAIMERS. To what extent will a reclaimer need to adapt processes and recipes to produce suitable PCR?



TECHNICAL FEASIBILITY FOR CONVERTERS. To what extent will a converter need to adapt processes and modify product specifications to produce a suitable product using post-residential PCR?



POTENTIAL TO ABSORB HOUSEHOLD FLEXIBLE PCR. What volume of household flexible PCR could the end market absorb? (expected 2032 PE absorbed by end market * percentage range of PCR that could be incorporated)

We applied this framework across a list of over 40 potential end-use applications, shown in the full list below (Exhibit 4). We excluded several end-use applications such as plastic lumber, asphalt additive, and roof coverboard because they are already commercially viable in North America, represent a significant market for PE film, and do not require testing to prove out.

EXHIBIT 4 | Full list of end-use applications

FLEXIBLE



Agricultural film

Agricultural stretch film; greenhouse film; mulch film; feed bags; clamp bay covers/heavy duty covers



Transit packaging

Consumer facing shrink film; non-consumer facing shrink film; transit stretch film



Other bags and sacks

Pouches; household bags and wrap; t-shirt bags; laundry, dry cleaning, and garment bags; paper and personal care overwrap; merchandise bags; e-commerce, envelopes, and mailers



Industrial

Industrial liners; bubble packing



Trash sacks

Trash bags (white/light colors); trash bags (dark colors)



Building and construction

Impermeable membranes; permeable membranes



Heavy duty sacks

Consumer facing heavy duty sacks, non-consumer facing heavy duty sacks

RIGID



Consumables

Houseware (injection molded)



Horticulture

Plastic pots; liners and trays



Buckets and cases

Pails; tubs and containers; paint cans



Bottles and closures

Caps and closures



Pipes

Corrugated pipes; non-corrugated pipes (water and gas)



Transit packaging

Crates, trays, and totes; pallets



Automotive components

Transportation



Rotational molded items

Garden storage tanks and animal feeders; waste bins; consumer goods; large containers; other rotational molded items



Building and construction

Roof coverboard, roof subflooring, wallboard, and tuffile; asphalt; timber substitute

Drawing on over 20 interviews with industry experts, we found that promising end-use applications share a common set of technical characteristics. These applications tend to be:

- **Not food-contact-sensitive**, as household-sourced material includes a higher level of contamination that may be more difficult to qualify under regulatory standards for food packaging
- **Tolerant of color variation**, ruling out applications that require transparency or white/light colors
- **Tolerant of imperfections like gels and carbon**, favoring thicker-gauge applications over those requiring significant stretching and/or consumer-facing print quality standards
- **Tolerant of variable, uncertain resin composition** including mixed LDPE and LLDPE, and potentially HDPE

Applying our selection criteria against the full list of potential end uses, eight applications emerged as potentially promising outlets for household PE film (**Exhibit 5**). These applications, a combination of injection-molded rigids and thicker-gauge mixed color films, scored highest on the criteria we identified: the inclusion of household flexible PCR in these applications is largely untested in North America, our interviews indicated that it is likely feasible to incorporate some amount of this material, and they represent a meaningful market for PE film today.

EXHIBIT 5 | End-use applications shortlisted for potential trial

INJECTION-MOLDED RIGIDS



Horticulture liners, trays and plastic pots



Rigid consumables (e.g., houseware)

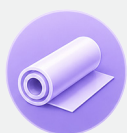


Transit packaging pallets

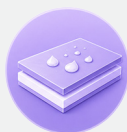


Rotational-molded items (e.g., consumer goods, large containers, waste bins)

THICKER-GAUGE MIXED COLOR FILMS



Industrial liners (e.g., pond liners, landfill liners)



Impermeable construction membranes (e.g., geomembranes, temporary construction protection films, wall and envelope protection barriers, roofing membranes)



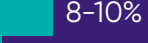
Agricultural heavy-duty covers (e.g., silage covers)



Dark-colored trash bags

Furthermore, we found that these eight applications could incorporate recycled household PE film at ranges from 5% to 70%, depending on each application and its technical characteristics. The table below shows the estimated range of household flexible PCR incorporation for each application (Exhibit 6):

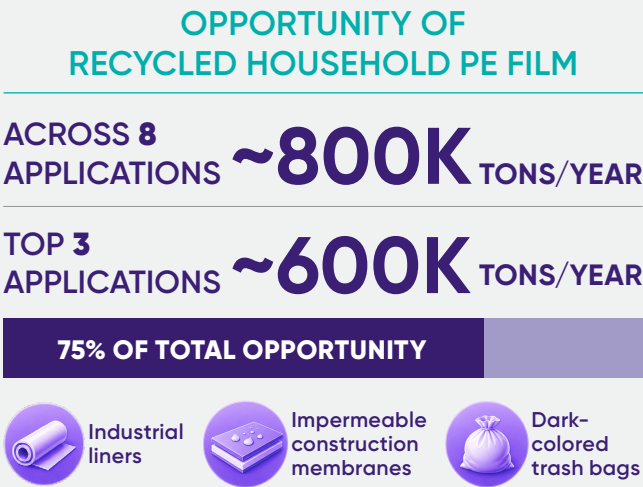
EXHIBIT 6 | PCR potential of shortlisted end-use applications

Application	Manufacturing process	Potential incorporation of household PE film
 Horticulture liners, trays, plastic pots		 30-70%
 Rigid houseware	Injection-molded	 10-30%
 Transit packaging pallets		 8-10%
 Rotational-molded consumer goods, large containers	Rotational-molded	 8-10%
 Industrial liners		 30-50%
 Impermeable construction membranes	Blown/cast	 30-50%
 Agricultural heavy-duty covers		 20-40%
 Dark-colored trash bags		 10-20%

Source: Expert interviews

With these assumptions, we estimate that these eight applications could collectively absorb an estimated ~800K tons/year of recycled household PE film. Notably, three applications – industrial liners, impermeable construction membranes, and dark-colored trash bags – account for ~600K tons/year, or roughly 75% of this total. This suggests the largest opportunity for recycling household flexible plastics lies in film applications, even though incorporating this material into film applications also represents a greater technical challenge than rigid applications.

Together, these applications represent the largest practical opportunity to begin using the expanded supply of recycled household flexible plastics expected to be collected under EPR – and a concrete starting point for the innovation, partnership, and real-world testing that will be needed to make these end uses a reality.



Next steps and why this matters – from insight to action

While this paper identifies eight promising end-use applications that could boost demand for recycled flexible plastics, this is only a starting point. Now is the time for manufacturers to begin testing how recycled materials perform in real products through production trials that assess technical performance, product quality, and the economic implications of using PCR in place of virgin resin. These trials will surface the key roadblocks to scaling up and identify where additional economic inputs and other solutions could help create incentives for companies to increase their use of PCR. In today's rapidly shifting economy, a "wait and see" approach to emerging materials often leaves companies lagging behind. Organizations that engage early – before pathways to scale are fully proven or commercially viable – not only reduce their own risk but also help shape the conditions that define how these markets develop.

Delterra and Eunomia developed the Recycled Flexibles Demand Accelerator to support this work, with funding from Amcor and Kraft Heinz. The project aims to unlock demand for recycled household flexible plastics by providing technical demonstrations of how this material can be incorporated into new, viable end-use applications, and by quantifying the economic inputs and other solutions needed to overcome the cost differential of using PCR. Trial participants will gain firsthand operational knowledge with this emerging feedstock, early relationships with reclaimers supplying the material, and help shape how this market evolves.

Meeting California's recycling targets for flexible plastics will require more than expanded collection – it will require new, viable end-use markets ready to return recycled material to productive use at scale. Today, less than 5% of California's flexible plastics are recycled, and North America's current recycling infrastructure is not yet equipped to bridge that gap. EPR can help create the economic conditions needed to make recycled household flexible plastics an attractive manufacturing feedstock, but success will ultimately depend on manufacturers, reclaimers, and PROs working together to prove new applications and build confidence in this material. The eight end-use applications identified in this paper provide a practical roadmap for where to begin. Turning that roadmap into a functioning market is the next challenge – and the opportunity.

Appendix

Glossary of terms

Term	Description
EPR	Extended Producer Responsibility
HDPE	High-density polyethylene
LDPE	Low-density polyethylene
LLDPE	Linear low-density polyethylene
MRF	Materials recovery facility
PCR	Post-consumer recycled
PE	Polyethylene
PP	Polypropylene
PRO	Producer Responsibility Organization



If your organization is interested in joining the Recycled Flexibles Demand Accelerator, please reach out to Jeremy Douglas (jeremy@delterra.org) to explore opportunities and next steps.