



Journey to Film & Flex Circularity

A Framework for Necessary Design, Collection, and End-Market Levers

Table of Contents

- Executive Summary _____ 2
- Introduction _____ 5
- Recyclable Film Design _____ 8
 - Designing for Recyclability: Current State and Emerging Solutions _____ 9
 - Moving Forward: Overcoming Challenges in Transitioning _____ 10
- Collection Access and Acceptance _____ 13
- Collection of ICI Films _____ 16
- End Markets _____ 17
 - Policy _____ 19
 - Market-Driven Efforts _____ 19
- Considerations for Compostable Packaging _____ 21
- Conclusion and Summary of Key Recommendations _____ 22
- Appendix _____ 24
 - Definitions _____ 24
 - Sources _____ 25

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Executive Summary

Film and flexible plastic packaging is widely used across numerous applications due to its lightweight design and strong technical performance, including barrier properties that reduce product spoilage. Ongoing optimization has enabled lighter-weight structures, more efficient transportation, extended product shelf life, and increased consumer convenience. However, the material innovations that give the packaging these properties have created significant challenges for collection and recycling. Many films are made up of multiple polymers, which are difficult to separate in the recycling process. Additionally, the lightweight nature of these materials has resulted in reduced economic value for collection and sorting.

End-market demand for film-derived PCR is the most decisive lever for circularity.

Growing public concern about plastic waste, coupled with emerging legislative requirements—including the mandated recycling targets in [California’s SB 54](#)—has increased the urgency of improving circularity for film and flexible plastic packaging. Numerous initiatives are addressing specific barriers within the system, and these efforts are critical. However, achieving meaningful progress requires a holistic understanding of remaining gaps and a comprehensive framework that aligns design, collection, and end-market solutions. All efforts must work in tandem to make real progress. *Journey to Film & Flex Circularity: A Framework for Necessary Design, Collection, and End Market Levers* provides this integrated perspective and outlines an actionable path forward.

While this paper focuses primarily on increasing recycling rates for film and flexible plastic packaging, recycling is only one component of a circular system. Consistent with the [EPA’s Waste Management Hierarchy](#), reduction and reuse strategies should be prioritized first.

Key Takeaways

- **Film and flexible plastic packaging plays a critical role in modern supply chains**, enabling lightweight packaging, product protection, shelf-life extension, and transportation efficiency. These benefits can reduce material use and emissions, but also create challenges for collection and recycling.
- **Recycling rates for film remain very low due to systemic misalignment**, including incompatible multimaterial designs, limited collection access, contamination challenges, and insufficient end market demand. No single intervention can resolve these barriers alone.
- **End-market demand for film-derived postconsumer recycled content (PCR) is a primary driver for circularity.** Without reliable and profitable demand, investment in collection and recycling infrastructure is not viable, and collected material is likely to be landfilled in practice.
- **Design choices fundamentally shape recyclability outcomes.** Transitioning from multimaterial structures to monomaterial structures that comply with the APR Design® Guide is essential to improve yields and material quality.
- **Advancing film circularity requires coordinated action.** Progress depends on alignment across design, collection, policy, and end markets, supported by collaboration among brand owners, manufacturers, recyclers, policymakers, and other stakeholders across sectors.

Recommendations in this Framework include:

- End-market development and sustained demand for film-derived postconsumer recycled content (PCR) are the most critical levers for advancing film and flexible plastic packaging circularity. In a market-based economy, reliable demand at commercially viable prices drives investment in the infrastructure and technology needed to produce recycled material. Absent sufficient demand for film-derived PCR, there is little economic incentive to collect these materials, and film recyclers will struggle to maintain financial viability—resulting in closures of facilities instead of expansions.
 - Stable and growing demand for domestically sourced (North American) film-derived PCR will incentivize expanded collection and recycling in the U.S. Brand owner procurement teams can play a pivotal role by entering into long-term/multi-year contracts for domestic film-derived PCR, supporting infrastructure investment.
 - While film-to-film recycling is preferred, recycling film into products (such as durable goods) to displace the use of virgin plastic is an acceptable and necessary pathway, particularly in the near-term. Robust end-market demand across applications will spur investment and innovation in collection and recycling systems. Over time, advancements in processes and technologies may enable greater levels of film-to-film recycling.
 - Appropriate end markets include mechanical recycling, as well as physical and chemical recycling processes that generate feedstocks for new materials. See the U.S. Plastics Pact’s (USPP) [Position on the Role of Physical and Chemical Recycling in a Circular Economy for Plastic Packaging](#) for more information on appropriate parameters and safeguards for physical and chemical recycling.
- While significant advancements have been made in polyethylene and polypropylene film functionality, additional work is needed to accelerate circular redesign efforts. Areas for action include:
 - Continued progress on brand owner commitments to redesign packaging to be reusable, recyclable, or compostable.
 - Active engagement across the full supply chain—including material suppliers, converters, and equipment manufacturers—to overcome technical and operational challenges.
 - Targeted innovation for the most challenging packaging formats where current material and processing limitations continue to hinder circular outcomes. This Framework includes guidance on formats still needing innovation, as well as a technical resource guide for evaluating emerging monomaterial solutions.

Key Areas for Action

- **Strengthen end markets for film and flexible plastic packaging** by driving sustained demand for film-derived postconsumer recycled content (PCR) at commercially viable prices. Stable demand is essential to unlock investment in domestic collection, sorting, and recycling infrastructure.
- **Accelerate circular redesign progress** through harmonized design guidance, engagement across the supply chain to overcome technical and operational challenges in conversion efforts, and targeted innovation for challenging formats.
- **Expand and improve collection systems** through a mix of complementary approaches, recognizing that no single method will be sufficient nationwide. Collection strategies should reflect regional conditions, existing infrastructure, and funding available through policy mechanisms.
- **Invest in secondary sortation and processing technologies** to improve material quality and route collected film to its highest-value end markets, enabling mechanical, physical, and chemical recycling pathways.
- **Advance the recycling of commercial films** through transportation consolidation efforts and increasing the demand for commercial film-derived PCR, particularly for use in film applications.

- Efficient and effective collection remains a challenge. In the review of existing and emerging collection methods, no single method emerged as an ideal solution. Advancing circularity will require the deployment of multiple, complementary collection strategies, with optimal solutions tailored to the local population based on factors such as population density, existing infrastructure, and current or emerging legislation. To overcome these barriers, stakeholders should prioritize the development of integrated collection systems and leverage data-driven pilot programs to identify the most effective regional mix of collection methods. A chart comparing the most common collection mechanisms and the settings in which they are most effective is included in this Framework.
- Institutional, commercial, and industrial (ICI) film, such as those used in a business setting or business-to-business transportation, represents [approximately half](#)¹ of the film used in the U.S. Although these materials are typically cleaner than film used by individual consumers, collection and end-market challenges persist. Strategies such as transportation consolidation and expanded demand for film-derived PCR could help improve collection economics and increase recycling rates for this material stream.
- Compostable film may be a circular solution for select applications, particularly for products with high levels of food contamination and in foodservice settings where materials are collected on site. However, composter acceptance remains a key barrier, driven in part by compliance requirements under the USDA's [National Organics Program \(NOP\)](#) which does [not allow for the acceptance of compostable plastic packaging](#). To address these challenges, industry stakeholders are supporting the advancement of compostable packaging through additional research, expanded engagement with composters, and the development of clear labeling standards to reduce contamination by helping consumers correctly differentiate compostable plastics from recyclable plastics.
- Coordination of film circularity efforts is critical to success. As the Framework will show, not only is progress needed in all areas, but progress in one area is often dependent on progress in another. Many different organizations are pulling together various stakeholders to address identified challenges. While each organization has unique expertise to focus their efforts on a specific challenge, it is critical that they work together to accelerate progress.

Introduction

Approximately [12 to 15 billion pounds](#)² of film and flexible plastic packaging are used in the U.S. each year. Optimized over decades, this lightweight material offers exceptional product protection while reducing costs.

Film and flexible plastic packaging enables companies to:

- Use lighter weight packaging materials, reducing the use of virgin plastic and enabling more product to be transported per truckload—reducing greenhouse gas emissions from transportation.
- Extend product shelf life, reduce food waste, and protect goods from contamination during transportation.
- Lower costs and improve product affordability for consumers.
- Design products for convenience (such as individual portions or on-the-go snacks).
- Increase manufacturing speed and efficiency.

These performance and efficiency benefits have driven steady growth in the use of film and flexible plastic packaging over the past several decades.

Despite these benefits, film and flexible plastic packaging faces significant challenges in achieving circularity. Only [4% of polyethylene films were recycled each year](#)³. These low rates stem from persistent challenges in package design, collection systems, and end market demand—issues that are explored throughout this Framework. Amid growing public concern about plastic waste and the implementation of new legislative requirements, the industry faces increasing pressure to dramatically and rapidly improve circularity outcomes for film and flexible plastic packaging.

Framework Overview

- **Provides a systems-based structure** for advancing circularity in film and flexible packaging by outlining how design, collection, and end market elements interact and influence one another.
- **Supports coordinated action** by clearly articulating system constraints, trade offs, and interdependencies that impact which circular solutions are technically and economically viable.
- **Reflects current system conditions** by acknowledging progress to date, identifying persistent gaps, and clarifying the barriers that must be addressed to achieve scalable and durable circularity outcomes.
- **Informs strategy, investment, collaboration, and policy development** by offering actionable guidance, recognizing that needs and opportunities vary across geographies, applications, and organizational roles.

Journey to Film & Flex Circularity outlines a framework to advance the circularity of film and flexible plastic packaging through coordinated design, collection, and end market levers. Developed by the Film & Flex Workstream—one of twelve circularity-focused working groups within the U.S. Plastics Pact (USPP)—this Framework documents progress to date, identifies remaining challenges, and proposes potential solutions to address them. It is designed to provide a holistic snapshot of the critical actions needed to catalyze innovation, investment, and policy necessary to advance circularity for film and flexible plastic packaging. The Workstream is comprised of a diverse set of stakeholders representing the full plastics value chain, enabling the integration of broad technical and market expertise in the development of this document. In addition, external subject matter experts were engaged to provide targeted insights on collection. The draft Framework was shared with all [USPP member companies and organizations](#) (called "Activators") for additional input and feedback prior to finalization and release.

Achieving meaningful progress requires a holistic understanding of remaining gaps and a comprehensive framework that aligns design, collection, and end-market solutions.

While this Framework primarily focuses on increasing recycling rates for film and flexible plastic packaging, it is important to recognize that reduction and reuse should be prioritized, consistent with the [EPA's Waste Management Hierarchy](#). Recommendations related to reduction and reusable packaging are being developed through other USPP Workstreams and are expected to be available in late 2026. In certain circumstances, transitioning to alternative substrates may also be appropriate.

When evaluating reduction, reuse, or alternative substrate options, packaging designers should carefully consider the following factors:

- Shifting to lower-barrier materials may increase food spoilage and food waste, a significant source of methane emissions in landfills.
- Replicating film-like technical performance in other substrates, such as paper, may compromise their recyclability and create unintended trade-offs.
- Alternate formats using more material or heavier-weight materials may increase overall environmental impact through additional extraction, deforestation, transportation emissions, etc.
- Chemicals of concern, such as [PFAS](#), should be avoided in all substrates.
- All applicable FDA and USDA regulatory requirements must be met for products subject to those regulations.

This Framework is divided into five sections: Recyclable Film Design; Consumer Film Collection; Industrial, Commercial, and Institutional (ICI) Film Collection; End Markets; and Compostable Packaging. Each section provides targeted recommendations for packaging manufacturers, packaging users, and policymakers. Each of these areas has unique challenges, which many companies and organizations are working to address through individual efforts, as well as coalition-based work. No one organization can address all the film recycling challenges, so collaboration across the different initiatives is imperative to support each other's efforts and accelerate progress. Examples of emerging cross-organizational collaboration include the Plastics Film & Flexibles Taskforce, led by Circular Action Alliance, and the Peer Collaborative, a representative group of several major organizations working to advance U.S. film recycling, with a current focus on California EPR compliance. The USPP participates in both collaborations.

Although this document opens with the Design section, end-market development is the most critical factor in advancing film circularity. Progress across all areas is necessary; however, without sustained increases in demand for film-derived PCR, collection and recycling efforts will remain economically unviable and material will continue to be landfilled.

Recyclable Film Design

Design is foundational to enabling the recyclability of film and flexible plastic packaging—whether that packaging is used in consumer products or ICI applications. There is not yet a standardized definition of a “recyclable film structure” in the United States due to the complexity of film design, various collection mechanisms, and differing feedstock requirements from the various end markets. For the purposes of this document, the term *monomaterial* structures will instead be used, which refers to films primarily composed of polyethylene or polypropylene (for applications requiring enhanced performance), with limited use of copolymers that do not hinder recyclability, as detailed in the [Association of Plastic Recyclers \(APR\) Design[®] Guide](#). In contrast, *multimaterial* structures contain incompatible polymers that disrupt the recycling process.

Monomaterial polyethylene structures have been widely used in a variety of applications without demanding performance requirements—such as shopping bags, secondary packaging, mailer bags, etc. Over time, more complex multimaterial structures were developed to handle more stringent performance requirements. By combining multiple polymer and nonpolymer layers (e.g., aluminum, paper), multimaterial structures have been optimized to enhance shelf life, reduce packaging weight, meet consumer functionality requirements, or improve manufacturing efficiency through increasing heat resistance or puncture resistance. While effective for product protection, these complex structures are incompatible with existing recycling systems. Like many manufacturing processes, recycling systems perform best with homogeneous inputs¹, which reduce yield loss and improve operational efficiency. Achieving cost-effective, scalable recycling therefore requires incoming materials to be compatible with existing or emerging infrastructure—necessitating circular redesign.

Key Takeaways

- **Packaging design is an important determinant of whether film can be recycled at scale.** Recycling systems perform best with homogeneous inputs, making compatibility with existing and emerging infrastructure essential to cost-effective, scalable recycling.
- **Multimaterial film structures enable performance but undermine recyclability.** Complex structures optimized for barrier, strength, or shelf life cannot be efficiently separated in today’s recycling systems, limiting circular outcomes.
- **There is no single U.S. standard for “recyclable film,” creating uncertainty for designers.** Variability in collection, sortation, processing, and end-market capabilities across regions complicates design decisions and slows progress.
- **Monomaterial polyethylene and polypropylene structures that comply with APR Design[®] Guides are the most viable pathway today.** When designed in alignment with the guidance—including compatible labels, inks, and additives—monomaterial films offer the strongest foundation for recyclability.
- **Advancing recyclable film design requires innovation and coordination across the value chain.** Progress depends on collaboration among material suppliers, converters, OEMs, reclaimers, and policymakers to address technical, operational, and economic barriers.

Designing for Recyclability: Current State and Emerging Solutions

Design for Recyclability guidelines are a critical tool for enabling packaging designs that can be effectively collected, sorted, and processed by existing recycling systems. Harmonized design guidance reduces uncertainty, provides regulatory clarity, and accelerates the packaging redesign progress needed to scale film recycling cost-effectively. However, alignment remains challenging due to the variability in end market capabilities, which can range from mechanical recyclers (some with limited washing capabilities) to chemical recyclers who depolymerize materials. This variability creates uncertainty for brand owners in their redesign efforts. The USPP aligns with the [APR Design® Guide](#) and advocates for its adoption across the industry and in emerging state regulatory frameworks. These living guidelines reflect current industry capabilities and evolve as technologies improve. They have been adopted by the Circular Action Alliance in Oregon and Colorado for flexible packaging and are referenced in California’s Truth in Labeling for Recyclable Materials law (SB 343).

Recyclability of film packaging requires starting with monomaterial structures. Incompatible polymers and non-polymer contaminants disrupt recycling by melting at different temperatures or causing mis-sorting, leading to defects such as gels or black specks in PCR. These impurities can negatively affect both the appearance and mechanical performance of new packaging or durable goods, which limits the potential applications of use. Additional design considerations include avoiding dark colorants, minimizing ink and metallization, and using attachments and fitments made of the same base resin. Replacing paper labels with compatible labels is crucial for proper design in ICI film as paper labels are difficult to remove and burn in the recycling process—leading to black specs and odor in the PCR. For comprehensive guidance, refer to the [USPP Design for Circularity Playbook](#).

Corporate commitments to circular redesign have catalyzed industry innovation, resulting in advanced monomaterial solutions capable of meeting demanding performance requirements. Recent developments include Machine-Direction Oriented Polyethylene (MDOPE), Biaxially Oriented Polyethylene (BOPE), and high-performance sealant films, which deliver enhanced functionality while remaining compatible with recycling systems.

The following chart, developed by USPP Workstream members, compares key functional properties of these options as a guide for packaging designers in redesign efforts:

Performance Rating: Low ●○○ Medium ●●○ High ●●●

FUNCTIONAL PROPERTY	PE COEXTRUSION	MDOPE/PE LAMINATE	BOPE/PE LAMINATE	OPP/OPP LAMINATE	NON-RECYCLABLE (VARIOUS STRUCTURES)
Sealing	●●●	●○○	●●○	●●○	●●●
Tear Propagation	●○○	●○○	●●●	●●●	●●●
Puncture Resistance / Toughness	●●○	●●○	●●●	●○○	●●●
Supply	●●●	●●○	●○○	●●●	●●●
Barrier: Oxygen Transmission Rate	●○○	●○○	●○○	●○○	●●●
Barrier: Moisture Vapor Transmission Rate	●●○	●●○	●●○	●○○	●●●
Heat Resistance	●○○	●●○	●●○	●●○	●●●
Stiffness	●○○	●●●	●●●	●●○	●●●
Printability	●○○	●●●	●●●	●●●	●●●
Drop Resistance	●●●	●●○	●●○	●●○	●●●
Recyclability Potential	Yes	Yes	Yes	Not Yet	No

This chart provides a high-level, directional comparison of common film structures to support design decision-making. Performance may vary by application and processing conditions.

For more detailed technical information on the functional properties of polymers and barriers found in film, see the Canada Plastics Pact’s [Pathways to Mono-Material Flexible Plastic Packaging](#) (Appendix A).

Moving Forward: Overcoming Challenges in Transitioning

Significant progress has been made in circular innovation and redesign, but key challenges remain. While the performance of monomaterial structures has improved substantially, monomaterial alternatives are still lacking for some high-performance applications, such as retort packaging. Operational compatibility also poses barriers; for example, transitioning from a multimaterial to a polyethylene-based monomaterial film can result in filling line disruptions, seal wrinkling, and misaligned printing or graphics when running at current speeds. In addition, material costs often remain higher than incumbent solutions as sufficient scale has not yet been achieved.

Brands, packaging suppliers, and OEMs must work together to overcome technical and operational challenges

Recognizing the importance of accelerating redesign efforts, the USPP led two efforts in 2024 focused on helping companies redesign to monomaterial film structures:

- [Problematic & Unnecessary Materials List](#) Update: Multimaterial films were added to the list with distinctions based on the availability of vetted alternate solutions:
 - **Elimination List:** Multimaterial film should be phased out of these categories by Activators by 2030.
 - **Evaluation List:** Additional innovation is required before these applications can be successfully converted to monomaterial formats.
- **Film & Flex Technical Workshop Series:** This year-long series connected brands and retailers with packaging suppliers and Original Equipment Manufacturers (OEMs) to explore recyclable solutions and address machinability/runability challenges.

From these efforts, the USPP developed an outline categorizing readiness levels across various applications in transitioning to monomaterial formats (see below).

Monomaterial Readiness Levels

Ready to Transition	Transition Work in Progress	Innovation Needed
<p>Monomaterial solutions are readily available that generally meet performance requirements and can successfully run on filling lines:</p> <ul style="list-style-type: none"> • Film or bags for general merchandise (non-food items or dry goods that do not have a stated shelf life or best by date) • Secondary film or bags for individually wrapped items (such as shrink wrap or an outer bag) • Pallet stretch wrap • Bread bags • Cereal bags • Bags for fresh or frozen fruit • Bags for fresh or frozen vegetables (cook-in-bag products excluded) 	<p>For these applications, recyclable solutions may exist but additional testing, improvements, or machinability work is needed to scale their implementation. Many applications fall in this category, including:</p> <ul style="list-style-type: none"> • Sensitive shelf-life issues: Snack products (chips, crackers, nuts, granola bars, etc.), coffee, lunch meat, cheese, candy • Heat treatment (hot fill or retort cooking): Baby food, fruit purees, ready-to-eat meals, dairy products • Heavy fill weights: Dry pet food, soil, mulch • Moisture barrier: Wipes, dry detergent, personal care products 	<p>Recyclable structures that do not compromise the integrity of the product or consumer safety do not exist or are in early stages of development:</p> <ul style="list-style-type: none"> • Cook-in-bag products • Raw meat, poultry, and fish products (fresh or frozen) • Dry drink mix pouches • Products requiring child safety features, such as pouches for detergent pods

Enabling and Accelerating Transitions: Future Efforts Needed

Meaningful progress toward monomaterial film will require coordinated action across multiple stakeholder groups to develop the solutions still needed, including:

- Material manufacturers play a vital role in developing innovations such as high-performance resins and compatibilizers, which improve the reprocessability of barrier polymers (such as EVOH and nylon) and enhance the quality of PCR. These advancements may enable broader use of compatible copolymers, consistent with the [APR Design® Guide](#).
- Filling-line OEMs can accelerate the transition by developing retrofit solutions that allow monomaterial films to run on existing equipment at speeds comparable to conventional multimaterial structures. This preserves production efficiency and avoiding costly equipment replacement.

Labeling and Consumer Instructions as Key Enablers

In addition to technical design considerations, clear and accurate recycling instructions are essential so consumers know where and how to recycle film packaging. Food contamination is a particular challenge for end markets with limited washing capabilities—some processes cannot accept packaging with any residual food. This has contributed to confusion about which film packages can appropriately be labeled as recyclable.

To support clarity and reduce contamination, objective, consistent labeling criteria are needed, alongside expanded capabilities to process packaging with higher levels of food contamination (addressed in subsequent sections).

The U.S. Plastics Pact recommends the use of clear, standardized labeling protocols in place of vague claims such as “Please Recycle.” Recycling instructions should clearly indicate:

- Whether the package must be returned to a drop-off location.
- Any required preparation steps (e.g., rinsing).
- How to locate an appropriate drop-off site.
- When a package is *not* recyclable, to reduce confusion and contamination.

Existing tools that support clear labeling include the [How2Recycle® \(H2R\)](#) labeling system and drop-off location directories managed by organizations such as the [Flexible Film Recycling Alliance](#) and [Trex](#).

However, labeling decisions remain complicated by:

- Varying end-market design requirements.
- Differing tolerances for food contamination.
- Inconsistent state regulations.
- Outdated Federal Trade Commission (FTC) Green Guides.

Federal legislation establishing a single national recycling-labeling standard would significantly reduce these complexities and improve consumer clarity across markets.

Next Steps

Call to Action for Packaging Manufacturers:

- Continue innovating to develop cost-effective, high-performing monomaterial structures that can be scaled and widely adopted across the industry.
- Partner with equipment OEMs to create low-cost retrofit solutions that enable monomaterial films to run on existing filling lines without sacrificing production speed or efficiency.

Call to Action for Brand Owners:

- Advance redesign efforts, in collaboration with value chain partners, to transition all film structures to monomaterial formats.
- Work directly with material manufacturers to ensure materials meet recyclability guidelines and compatibility requirements.
- Provide clear recycling or disposal instructions on all packaging to support desired consumer behavior and reduce contamination.

Call to Action for Policy Makers:

- Implement effective ecomodulation in EPR programs, including fees and bonuses that incentivize circular redesign and ensure non-compliance is costlier than compliance. (See the [USPP Extended Producer Responsibility Position Paper](#) for details.)
- Standardize design guidelines—ideally using the [APR Design® Guide](#)—across state-level EPR programs and labeling laws to reduce complexity and support compliance.
- Create consistent national guidance for consumer recycling labels, or update the FTC’s Green Guides, to reduce contamination and ensure consistent communication across states.

Other Recommended Steps:

- Colleges: Integrate and require circular design training into packaging science curricula to prepare the next generation of designers and engineers.
- Reclaimers: Collaborate with convening organizations to establish clear, measurable standards for allowable levels of food contamination.

Collection Access and Acceptance

While collection is an important lever for advancing circularity for film and flexible plastic packaging, collection efforts alone are not enough. Circular redesign, end market development, and demand for PCR are all critical to ensure that collected films are recycled rather than landfilled. Robust collection infrastructure, likely encompassing a variety of collection methods, will be needed to achieve circularity for film and flexible plastic packaging. Unlike many other plastic items, film is rarely accepted in municipal curbside recycling programs due to contamination risks (e.g., paper bale disruption), equipment entanglement, and limited end-market demand for contaminated film.

MRF film is currently a tradable commodity per ReMA's [ISRI Specifications](#). However, according to The Recycling Partnership, only [2% of U.S. households](#)³ have access to curbside film collection. This figure includes municipalities that accept film through multiple methods, such as acceptance of loose film or bag-in-bag programs like the [Hefty Renew™ Program](#).

Store Drop-Off Programs

Store drop-off (SDO) is the most common collection method for postconsumer film packaging. Retailers provide bins for consumers to return bags and acceptable film packaging, which are then combined with back-of-house materials (e.g., pallet wrap) and sent to reclaimers. A recent study by the Sustainable Packaging Coalition found that [71% of U.S. consumers live within a 3-mile radius](#) of an SDO location, and over 97% are within 20 miles. However, access alone does not guarantee high collection rates—consumer participation remains a critical factor. A different study found that [70% of consumers](#) are aware of SDO programs, and 50% could correctly interpret SDO instructions on a label.

Depot Drop-Off Programs

Similar to SDO, depot drop-off locations offer consumers opportunities to return film (and often other recyclables). One example is [Recycle Here!](#) in Detroit, MI, which accepts film and multiple other recyclables, serves multifamily housing residents who lack curbside access, and partners with the City of Detroit and other organizations to provide recycling and environmental education. Depot programs exist nationwide and may be operated by municipalities or private organizations. Sites vary in staffing and accepted materials. This model presents an additional option for film collection and is included as a recognized pathway in Oregon's EPR program.

Key Takeaways

- **Collection efforts alone will not solve film circularity.** Without compatible design and viable end markets, collected film may still be landfilled.
- **Access to film collection varies widely** and remains limited nationally. Curbside acceptance is rare, and access to alternative models varies by geography.
- **Consumer participation is critical.** Awareness, clear instructions, and convenience strongly influence capture and contamination rates.
- **No single collection model can meet the needs of all communities.** Multiple complementary approaches are required and must be adapted to local infrastructure and policy contexts.
- **Secondary sortation is increasingly important.** Additional sorting capacity can boost diversion and help direct collected film to its highest-value end markets.

Collection infrastructure development is particularly needed in California, where their EPR law [Plastic Pollution Prevention and Packaging Producer Responsibility Act \(SB54\)](#) mandates aggressive recycling rate thresholds—ultimately 65% by 2032. Circular Action Alliance estimates that an additional [325,000 tons⁴](#) of film must be collected and recycled annually to meet SB54 compliance targets. The most recent figures show a [5% film recycling rate⁵](#) in the state of California. Additionally, [Environmental Advertising: Recycling Symbol: Recyclability: Products and Packaging \(SB343\)](#) does not allow packaging to be labeled as recyclable unless 60% of the population has access to curbside collection of the material. It is operationally difficult for national brands to create location-specific SKUs, so this law is likely to impact labeling decisions overall—creating challenges for communicating recycling instructions to consumers.

To explore viable solutions, the USPP Film & Flex Workstream evaluated the collection methods outlined above as well as mail back programs. No single method has emerged as universally ideal, so all should be considered to create the framework for adequate postconsumer film collection. Success will likely require robust EPR programs,

clear consumer communication and engagement, sufficient infrastructure, and fair reimbursement to all parties in the supply chain. Each collection method is further examined in the table below, outlining both opportunities and challenges, as well as factors necessary for success.

No single collection method is sufficient nationwide; success requires complementary approaches aligned with regional conditions.

In addition to primary collection mechanisms, secondary sortation infrastructure will be critical. Secondary sortation allows film to be further sorted and directed to the appropriate end markets, so materials reach their highest and best use. A [Circular Great Lakes study](#) with Titus MRF Services in the greater Chicago area demonstrated the impact: adding a secondary sortation facility supporting multiple MRFs increased landfill diversion from [86% to 94%⁶](#). Secondary sortation technologies may also be able to further process film collected through other mechanisms, routing feedstocks to the most appropriate end markets.

Comparing Film Collection Pathways

Low ●○○○○ Medium-Low ●●○○○ Medium ●●●○○ Medium-High ●●●●○ High ●●●●●

	RETURN FROM HOME			RETURN OUTSIDE THE HOME	
	Single Stream	Separate Stream (may avoid MRF)	Mail Back	Staffed Depot	Unstaffed Depot
Examples	<ul style="list-style-type: none"> Mascaro & Sons (Birdsboro, PA) Waste Management (Hickory Hills, IL) 	<ul style="list-style-type: none"> Subscription (e.g., Ridwell) Municipal separate bin (e.g., British Columbia) Bag-in-bag (e.g., GreenWaste, Hefty ReNew) 	<ul style="list-style-type: none"> Ridwell TerraCycle 	<ul style="list-style-type: none"> RecycleOn depots (Oregon) Recycle Here! (Detroit, MI) Municipal recycling drop-off programs 	<ul style="list-style-type: none"> Store drop-off Municipal recycling drop-off sites
Material Quality	●○○○○	●●●●●	●●●●●	●●●●●	●●●○○
Consumer Convenience	●●●●●	●●●●●	●●○○○	●○○○○	●○○○○
Potential Volumes	●●●●●	●○○○○	●○○○○	●●●○○	●●●○○
Relative Operational Cost	●●●●●	●●●●○	●●●○○	●●●○○	●○○○○
Capital Needed	●●●●●	●●●○○	●○○○○	●○○○○	●○○○○

Implementation Considerations

	RETURN FROM HOME			RETURN OUTSIDE THE HOME	
	Single Stream	Separate Stream (may avoid MRF)	Mail Back	Staffed Depot	Unstaffed Depot
Most ideal for the following settings	<ul style="list-style-type: none"> Scenarios where the most important criteria is collected volume. EPR states with adequate funding for collection and recycling. Urban or suburban settings. 	<ul style="list-style-type: none"> Situations that must balance collected volume with good quality material. EPR states with adequate funding for collection and recycling. Urban or suburban settings. 	<ul style="list-style-type: none"> An option for consumers who highly value recycling and have the means to pay for the program. May also be helpful for jurisdictions that have limited funds to pay for equipment but could subsidize ongoing rates for consumers. 	<ul style="list-style-type: none"> Situations where the quality of film collected is very important, creating high value material to sell to end markets. Locations with adequate funding – EPR funding or grant funding. Urban, suburban, or rural areas. 	<ul style="list-style-type: none"> Locations without significant funding for film collection. Municipalities or retailers who wish to provide an option for consumers with a high level of interest in recycling. Rural areas.
What is Needed to Advance	<ul style="list-style-type: none"> Comprehensive EPR legislation (capital investment, fair reimbursement, community education). Equipment to minimize contamination to paper bales. 	<ul style="list-style-type: none"> Consumer education on film identification and proper recycling. Standardized labeling and infrastructure. 	<ul style="list-style-type: none"> Funding from individual consumers with potential tax credits from state or federal governments to offset costs. 	<ul style="list-style-type: none"> Consumer education on film identification and proper recycling. Access for more consumers. Cost analysis as compared to standard curbside pickup. 	<ul style="list-style-type: none"> Consumer education on film identification and proper recycling. Access for more consumers Cost analysis as compared to standard curbside pickup

Next Steps

Call to Action for Packaging Manufacturers and Brand Owners:

- Financially support collection of the products you sell through mechanisms such as EPR and other effective policy levers, Store Drop-Off education and outreach, and contributions to private funding mechanisms (e.g., grants and loan programs).
- Advocate for and co-invest in secondary sortation infrastructure to increase the quality, value, and end-market readiness of collected film.

Call to Action for Retail and Municipal Collectors:

- Provide clear, consistent signage and easy access to bins at Store Drop-Off and depot locations.
- Offer feedback mechanisms to consumers to improve compliance with accepted materials and enhance the quality of collected film.

Call to Action for Policymakers within EPR Programs:

- Include and support all realistic vehicles for collection.
- Prioritize secondary sortation and provide incentives for adoption.
- Provide funding for consumer education to improve participation rates.
- Create financial incentives for Material Recovery Facilities (MRFs) and recyclers to collect, accept, and process/recycle flexible films.

Additional Policy Actions:

- Provide tax credits for consumers who use opt-in collection programs.
- Offer tax credits and grants to companies (at the local, state, or federal level) to establish local collection systems.

Collection of ICI Film

Film is used in a variety of non-residential settings to protect products during transportation. Although this material never enters an individual household, it is considered postconsumer material because it has reached its final intended use under the [ISO 14021 definition](#), which the USPP follows for defining PCR. Examples of ICI film include pallet wrap, agricultural film, boat wrap, and bags for products or ingredients being transported to manufacturing facilities. It is estimated that ICI film makes up [40% to 60%](#)¹ of the film and flexible plastic packaging sold in the U.S.

Commercial and industrial film represents one of the most significant near-term opportunities to increase film recycling due to higher material quality and volume.

Due to the nature of how it is used, this material tends to be collected in higher quantities, be more homogeneous in nature, and have less contamination than film collected from residential sources. This makes it prime material for recycling back into film. Despite these opportunities, it is estimated that only about [18% of this type of film is recycled](#)⁷.

Scaling the collection and recycling of ICI film presents a major opportunity to advance film circularity, given the large volumes available, its suitability for film-to-film recycling, and its strong potential for use in PCR applications. The following chart outlines common challenges to increasing recycling rates and corresponding potential solutions. As ICI film is typically not part of EPR legislation and is not collected through municipal streams, these efforts currently fall largely to the companies making, receiving, or recycling the film. While many coalition efforts are focused on collecting and recycling consumer film, coalition efforts are needed for ICI film as well.

CHALLENGE	POTENTIAL SOLUTION(S)
Lack of Storage, Densification Equipment, and Transportation	<ul style="list-style-type: none"> Aggregate film across multiple sites by having trucks pick up baled film from more than one location (requires each site to have a baler). Send loose film to a larger hub for baling and aggregation before shipment to a reclaimer (noting that loose film is challenging to handle). Utilize backhaul opportunities by filling empty return-trip trailers; trucking companies may offer reduced rates. Establish closed-loop recycling arrangements with film suppliers so pallet wrap is returned, recycled, and made into new wrap—an increasingly common practice among USPP suppliers.
ICI Film Is Overlooked in Film-Related Efforts	<ul style="list-style-type: none"> Ensure corporate procurement and sustainability teams include secondary and tertiary packaging films purchased by sites, which often bypass central review. Address poor design choices (e.g., paper labels on pallet wrap) that create contamination and hinder recyclability. Capture and recycle inbound pallet wrap at manufacturing sites — even smaller sites with limited resale incentives — by adjusting processes and expectations. Use newly developed tracking systems to measure and monitor incoming ICI film volumes that are currently invisible in most reporting systems.
Need for Employee Training and Engagement	<ul style="list-style-type: none"> Provide training on proper collection practices and the importance of preventing contamination (e.g., pallet strapping, broken pallet pieces, other debris). Assign management or administrative staff to monitor the program, coordinate trailer pickups, and track volumes. Integrate film-recycling performance into plant-wide metrics and individual employee goals to incentivize correct behaviors and support long-term program success.

End Markets

End markets are the most critical step in advancing circularity. Recycling only happens when materials are reprocessed into new products. While design and collection are critical components, recycling requires end markets—businesses that purchase used packaging and convert it into postconsumer recycled (PCR) content—as well as demand for the products made by recyclers. In a free-market economy, recycling depends on supply, demand, and profitability. Without consistent demand at a viable price, there is no incentive to process collected materials, and recycling stalls. Simply put, without consistent demand pull for recycled materials at a price that is profitable for the entire supply chain, the recycling process will not occur.

[Recent closures](#) of major film recycling facilities underscore the urgency of building sustainable demand. Previous media coverage of collected film being exported and later burned highlights the unfortunate possibilities of what can happen when material is collected without adequate end market demand. Scaling film recycling requires investment across the value chain, but these investments depend on a clear return. The USPP report, [Overcoming Barriers to Increasing the Use of PCR in the U.S.](#), outlines key financial and policy levers to address supply, demand, and infrastructure challenges.

Despite the challenges, film recycling is happening, showing that the process can work. According to Stina Inc.'s 2022 [U.S. Post-consumer Plastic Recycling Study](#), over 1.1 billion pounds of film were recovered in the U.S. in 2022⁸, representing 22.1% of all post-consumer plastic recovered. Recycling methods include mechanical, physical, and chemical recycling, all of which may be needed to handle the diversity of film structures and expand PCR applications. (Note: incineration and waste-to-energy are not considered recycling. For more on this distinction, see the [USPP Position on the Role of Physical and Chemical Recycling in a Circular Economy for Plastic Packaging](#)).

Key Takeaways

- **End markets are the linchpin of circularity for film and flexible plastic packaging.** Recycling only occurs when collected materials are reprocessed into new products, which requires a demand pull for the PCR.
- **Film recycling is fundamentally governed by market dynamics.** In the absence of sustained demand at commercially viable prices, investment in collection, processing, and recycling infrastructure stalls, regardless of collection volumes.
- **Collecting film without secure end markets carries significant risk.** Facility closures and historical examples of exported or discarded material demonstrate that collection alone does not guarantee circular outcomes.
- **Multiple recycling pathways are currently necessary to support film circularity.** Mechanical, physical, and chemical recycling processes all play a role in managing diverse film structures and expanding PCR applications, including plastic-to-plastic and plastic-to-product applications.
- **Policy and voluntary market signals jointly shape end market viability.** Regulatory frameworks, procurement practices, and infrastructure investments influence where and how recycled film is processed.

While plastic-to-plastic is preferred, plastic-to-product end markets that displace the use of virgin plastic are still an important part of film circularity. End markets have varying tolerances for contamination and different thresholds for materials near the upper limits of the [APR Design® Guide](#). Secondary sortation technologies can sort and send the material to the most appropriate end markets.

Without a consistent demand pull for recycled materials at a price that is profitable for the entire supply chain, the recycling process will not occur.

Some key opportunities to use PCR from polyethylene films include ICI film, secondary and tertiary films (e.g., shrink wrap), shopping bags, and pallets. The USPP Roadmap 2.0 has a goal for Activators to use a minimum of 15% PCR in commercial secondary or tertiary films by 2028 and 30% by 2030. The complexities of film make it more challenging to use PCR in food contact films than in food contact rigid packaging. There are a limited number of mechanical recyclers that have received an [FDA No Objection Letter](#), which is often required by brands putting PCR into packaging for FDA-regulated products, such as food. However, most PCR used in food-contact films comes from physical or chemical recycling. PCR from polypropylene (PP) films may be suitable for physical or chemical recycling streams, or it can enter mechanical recycling streams for rigid PP applications. Ultimately, creating stable markets for this material across all acceptable recycling pathways will financially incentivize investment in collection and reprocessing infrastructure, enabling further improvement and scaling over time.

Multiple policy and non-policy levers can support the development of financially sustainable end markets for recycled film, which is critical for a true path to circularity for film and flexible plastic packaging.

Policy

By the end of 2025, seven U.S. states had passed EPR legislation. This type of legislation shifts the financial responsibility of end-of-life management for packaging materials from municipalities to producers. At its core, EPR determines the true cost of recycling and assesses fees to producers based on the materials they introduce into the market. Most EPR programs focus on supply-side factors, such as infrastructure and logistics, and typically lack direct mandates for PCR content. Requirements for responsible end markets and recycling rate targets in EPR laws are not the equivalent to PCR mandates or a guarantee of demand for PCR.

There are several ways in which policy mechanisms can support financially secure end markets for recycled film, including:

- PCR mandates for categories that have proven ability to use PCR, including those that can incorporate film-derived PCR, create stable demand for PCR. Mandates that require or prioritize PCR originating in North America are more likely to build demand for material recycled in North America—thereby incentivizing investment in domestic collection and processing.
- EPR legislation and regulations:
 - Requiring chain of custody protocols or certification for collected materials to ensure that materials go to designated responsible end markets that achieve the criteria required by law.
 - Reducing EPR fees through ecomodulation bonuses for the inclusion of PCR, particularly material recycled in North America and materials with chain of custody certification. See the [USPP EPR Policy Position Paper](#) for more details.
 - Including in EPR Needs Assessments and subsequent system funding the need for secondary sortation equipment and hot-wash systems to enable the production of more high-quality PCR that can be used in food packaging.

Market-Driven Efforts

Independent of policy, voluntary commitments from companies and organizations can play an important role in strengthening end-market demand. When companies require PCR originating in North America in the materials or packaging they purchase, they create demand for North American PCR, incentivizing investment in innovation and domestic infrastructure. Companies making or using film should commit to using film-derived PCR in the materials they produce or procure. Government agencies can also support demand by requiring PCR in items they purchase, such as plastic pallets or trash bags.

In addition to incorporating as much PCR as possible into the packaging and relevant durable products they purchase, the industry can invest or participate in additional efforts to identify new end markets or further scale existing ones, including:

- Innovating and investing in secondary sortation equipment to recover more film, supporting both mechanical and chemical recycling end markets.
- Supporting investment in hot-wash systems, enabling higher quality mechanically recycled PCR. This can be done through longer-term contractual arrangements with reclaimers or through private investment funds.
- Identifying and developing new end markets, particularly for durable products.
- Purchasing domestically sourced, certified PCR to reinforce market demand and strengthen domestic recycling economics.
- The [USPP Roadmap 2.0](#) includes PCR goals for commercial secondary films of 15% by 2028 and 30% by 2030. Additional guidance for PCR goals by packaging format will be released later in 2026.

Next Steps

Call to Action for Packaging Manufacturers

- Qualify and source domestically produced (North American) PCR.
- Continue innovation efforts to qualify increased amounts of PCR, including partnering with equipment manufacturers to overcome machinability challenges with PCR incorporation.
- Explore longer-term contracts (e.g., at least three years) with reclaimers to support investment in improved technologies.
- Commit to increasing PCR usage over time through programs such as [APR's Recycling Demand Champions](#).

Call to Action for Brand Owners

- Use domestically sourced (North American) PCR in packaging and durable products.
- Start somewhere—even a small percentage of PCR can meaningfully increase demand and be scaled over time.
- Commit to increasing PCR usage over time through programs such as [APR's Recycling Demand Champions](#).

Call to Action for Producer Responsibility Organizations (PROs)

- Establish monitoring and verification systems to ensure films reach end markets, and communicate findings to appropriate end users, consumers, and policymakers.
- Create incentives for film-derived PCR inclusion in products (films or durables).

Call to Action for Policy Makers and Governments

- Implement PCR mandates for proven packaging categories and goods. Mandates should prioritize domestically sourced material that has chain of custody certification. Fees for noncompliance should outweigh the cost of compliance. Additional information can be found in [USPP Overcoming Barriers to Increasing the Use of PCR in the U.S.](#)
- Update the [Resource Conservation and Recovery Act \(RCRA\)](#) to expand the list of plastic products and add plastic packaging for procured materials as items that may include recovered materials. These items would then be added to the EPA's [Comprehensive Procurement Guideline Program](#) so that federal agencies must include the highest amount of recovered material that is practicable.
- Utilize EPR programs to:
 - Create ecomodulation incentives in EPR for recyclable film designs that also include domestically sourced PCR. Incentivize or require chain of custody certification, in alignment with the [USPP PCR Certification Principles](#).
 - Include requirements for infrastructure enhancements such as secondary sortation, hot-wash systems, etc. in EPR Needs Assessments.
 - The standardization of film collection and processing technologies and infrastructure will lead to clearer parameters for what film is recyclable, reducing confusion in acceptable design guidelines.
- Allow for physical and chemical recycling technologies that create feedstock for new materials, consistent with the [USPP Position on the Role of Physical and Chemical Recycling in a Circular Economy for Plastic Packaging](#), to qualify as responsible end markets.

Considerations for Compostable Packaging

Compostable film innovations have emerged in recent years as an alternative to recyclable film structures. Compostable plastic is sometimes confused with biobased plastic, but the terms are not interchangeable. Biobased refers to the raw material source (in this case, plastic made from renewable biomass sources such as seaweed or sugarcane), whereas compostable refers to the end-of-life outcome. Compostable plastic structures could be comprised of biobased or fossil-based materials.

In addition to offering a circular outcome for packaging, compostable structures may also support keeping food waste out of landfills. Approximately [one third of food](#) produced in the U.S. is wasted and often ends up in landfills, where it contributes to methane emissions. Food remnants are typically a contaminant in the recycling process, but they are a useful material in the composting process. Despite the opportunities, there are multiple challenges to work through such as access to industrial composting, composter acceptance of compostable plastic packaging, and the need for widespread adoption of existing certification and labeling protocols. Additional information can be found in the [USPP Design for Compostability Playbook](#).

Compostable Film: Opportunities, challenges, and recommended actions

	PRODUCT
Identified High-Potential Opportunities	Packages likely to be heavily contaminated with food residue: Both the packaging and the food contamination become a nutrient in the composting process.
	Products used in foodservice venues with onsite composting collection: Consumer confusion is reduced when food waste, packaging, and service ware can all go into the same bin.
	Food products with high spoilage rates in the supply chain: Depackaging is not required to compost spoiling food.
	Food products requiring low barrier packaging: Some certified compostable packaging may be able to be home composted, in addition to industrially composted.
	CONSTRAINTS
Key Challenges	Products with high oxygen or moisture barrier requirements: Compostable packaging typically can't achieve the same level of barrier properties as conventional plastic packaging.
	Low consumer access rates: Approximately 18% of Americans have access to industrial composting programs that accept some forms of compostable packaging.
	Low acceptance rates from commercial composters: Composters are concerned about contamination from non-compostable structures, which may break down into microplastics . Additionally, the USDA's National Organics Program does not allow compostable plastic packaging – limiting end markets and impacting labeling for products sold in the state of California.
	Contamination: Compostable plastic packaging contaminates the plastics recycling stream. Recyclable plastic packaging contaminates the composting stream. Consumer confusion could create additional challenges for both recyclers and composters.
	POTENTIAL SOLUTIONS
Recommendations to Advance Compostable Film Efforts	Support additional research on how compostable film affects the composting process and common contamination challenges .
	Inclusion of composting in circularity policies such as EPR may result in increased access for consumers as financial incentives for composters to accept compostable plastic packaging.
	Support alternate collection opportunities such as drop off locations or subscription pick up services. These could be directly funded by grants, government funds, or consumer payment.
	Widespread adoption of certification and clear labeling practices will reduce consumer confusion and resulting contamination of recycling and composting streams.

Conclusion and Summary of Key Recommendations

Film and flexible plastic packaging deliver substantial environmental, functional, and economic benefits, such as lightweighting, product protection, and reduced food waste. However, these same attributes have contributed to persistent challenges in collection and recycling, resulting in low recycling rates and continued landfilling. Growing public concern and new regulatory requirements—such as California’s SB54 recycling targets—have created an urgent need for coordinated action to improve circularity outcomes.

While progress is being made, challenges remain in all areas. It is critical that stakeholders from across the value chain work together to address these issues, with the development of end markets and building demand for domestically sourced, film-derived PCR as the most urgent levers to prioritize. Multiple organizations are pulling together key stakeholders to focus efforts in their area of expertise. These efforts are essential, and it is also important that these organizations work together. Circularity can’t be advanced without progress in all areas, and efforts must align and support each other so that progress in one area accelerates progress in another. The USPP participates in the Film & Flex Taskforce, led by Circular Action Alliance, as well as the Peer Collaborative, led by the Film & Flex Recycling Alliance to support thoughtful coordination of efforts in all areas to transform current systems to be more circular. Within these broader initiatives, individual stakeholder actions continue to be essential.

Most Urgent Actions to Prioritize by Sector

Brand Owners

- Commit to and progress in efforts to incorporate domestically sourced, film-derived PCR in packaging or products (such as durables). Programs such as [APR's Recycling Demand Champions](#) can help guide and track progress.
- Include ICI films in circularity goals – meeting the design guidelines, ensuring film is collected and sent to a reclaimer, and using PCR from ICI sources.
- Advance redesign efforts to ensure film packaging is designed to be reusable, recyclable, or compostable. Packaging designed for recyclability should follow [APR's Design® Guide](#).
- Support the development of collection mechanisms for film packaging such as public support of EPR or other policy levers or participation in coalition efforts.

Packaging Manufacturers

- Continue technical efforts to increase domestically sourced PCR in packaging and pursue opportunities—such as longer-term contracts—to support investments in improved technologies and capacity.
- Further innovate monomaterial solutions for challenging formats.
- Partner with material suppliers and OEMs to accelerate additional innovation that is needed in material performance and overcoming machinability challenges in converting to monomaterial formats or increasing the amount of PCR in packaging.
- Support the development of collection mechanisms for film packaging such as public support of EPR or other policy levers or participation in coalition efforts.

Policy Makers and Governments

- In EPR states:
 - Utilize ecomodulation bonuses to offset incremental costs and incentivize the use of domestically sourced PCR with chain of custody certification.
 - Include infrastructure enhancements such as secondary sortation capabilities and hot-wash systems in EPR Needs Assessments.
 - Allow for mechanical, physical, and chemical recycling end markets aligned with guidelines such as the [USPP Position on the Role of Physical and Chemical Recycling in a Circular Economy for Plastic Packaging](#).
 - Include and support all realistic vehicles for collection.
 - Implement adequate ecomodulation fees to incentivize circular redesign. Standardize recyclability guidelines across state laws.
- In non-EPR states:
 - Explore alternate policy measures such as PCR mandates, grants, or tax credits as outlined in the [USPP Overcoming Barriers to Increasing the Use of PCR in the U.S.](#)
 - Include PCR requirements for products or the packaging of products purchased by municipalities and agencies.
 - Create clear rules for labeling recycling instructions through federal legislation, updating the FTC's Green Guides, or ensuring consistency across individual state laws.

The urgency to address film and flexible plastic packaging circularity has never been higher. Real progress can be made by bringing key stakeholders across the value chain together to solve these identified challenges, and by ensuring that the necessary steps are happening in all areas in tandem.

Appendix

Definitions

Monomaterial Structures: films primarily composed of polyethylene or polypropylene (for applications requiring enhanced performance), with limited use of copolymers that do not hinder recyclability, as detailed in the [Association of Plastic Recyclers \(APR\) Design® Guide](#).

Multimaterial Structures: films comprised of incompatible polymers that disrupt the recycling process.

End Markets: The recyclers, also called reclaimers, who process collected materials into postconsumer recycled content (PCR).

Mechanical Recycling: The traditional recycling process involving washing, shredding, and extruding materials. The wash process is used to remove surface contaminants, and the polymer structure of the plastic is not changed.

Physical Recycling: The recycling process that uses solvents to separate the contaminants from the plastic polymers. The polymer structure of the plastic is not changed.

Chemical Recycling: Recycling processes that use heat and/or chemicals to break down the plastic polymers into their molecular building blocks.

Postconsumer Recycled Content (PCR): Proportion, by mass, of postconsumer (1) recycled material in a product or packaging. Note 1. ISO14021's usage of the term clarifies postconsumer material as material generated by households or by commercial, industrial and institutional facilities in their role as end users of the product which can no longer be used for its intended purpose. This includes returns of material from the distribution chain. (ISO 14021)

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