WASHINGTON | CORE

August 2026

Recycling of Films and Flexible Packaging Begins to Move

Building a Cycle of Design, Collection, Regeneration, and Demand

Films and flexible packaging—such as snack and food bags, shopping bags, and packaging film—are lightweight and durable, helping preserve food and improve transportation efficiency. Yet they are among the least recycled plastics in the U.S. and contribute significantly to waste and environmental pollution. This article examines the barriers to recycling these materials and emerging solutions that could support a more circular system

Collecting, Sorting, and Recycling Costs More Than Discarding and Landfilling

Currently, staggering amounts of film and flexible packaging are discarded rather than being recycled. In the U.S. alone, roughly 12 to 15 billion pounds of film and flexible packaging (equivalent to 3.6 to 4.5 million passenger cars) are consumed each year, yet only about 4% of polyethylene film—the mainstay—is recycled annually[1] (the EU recycled 17% in 2021).[2] Most of the rest goes to landfill or incineration, and because it is light and prone to scattering, it also contributes to leakage into rivers, oceans, and other parts of the environment. Only a very limited number of municipalities include film in curbside collection—just 2% of U.S. households.[1] Unlike PET bottles and cans, established sorting pathways for film remain limited.

Film is particularly prone to environmental leakage because of its physical properties. Being thin and light, it is easily lifted by the wind and scattered, escaping into streets, rivers, and the ocean. Once released into nature, it does not break down easily, and is fragmented by ultraviolet light and waves into tiny microplastics. Even products claiming to be compostable can, if the right conditions are not met, break apart into microplastics, so their acceptance by composting facilities is low[1]. Because film is not bulky and has low value, the economics of collection do not work well, and the structural problem—where "discarding and landfilling" is cheaper than "collecting, sorting, and recycling"—prolongs pollution.

A Troublemaker that Disrupts the Entire Recycling System

Film not only ends up "being discarded itself," but can also disrupt the broader recycling system. Thin, light film tangles around the rotors and belts of sorting machines and causes equipment shutdowns, and when mixed into bales of recovered paper, it even lowers the quality of paper recycling. For this reason, many municipalities have no choice but to exclude film from collection in the first place.

Image Created with generative AI ChatGPT

Multilayer/multi-material structures made by bonding several materials together, and paper labels, melt at different temperatures during the recycling process or scorch, producing black specks or off-odors in recycled plastic (postconsumer recycled content (PCR)) and resulting in defective recycled material.[1] In other words, film is not only a standalone source of pollution but also a "troublemaker" that hinders the recycling of other resources as well.

Target Institutional, Commercial, and Industrial (ICI) Film

About half of the film used in the U.S. is actually generated not by households but by institutional, commercial, and industrial (ICI) companies and businesses that use clear wrap for pallets, agricultural film, and factory shipping bags. Even though these are less contaminated than household waste and are made of uniform materials, making them suitable for recycling, only about 18% is recycled. Even when household and business sources are combined, only about 1.1 billion pounds of film was collected in the U.S. in 2022, which is just a small fraction of total consumption (about 12 to 15 billion pounds).[1] So, commercial and industrial film is the most accessible area where recycling rates could be raised significantly in a short period.

Examples of ICI film

Agricultural film

Shipping bags for manufacturing sites

Pallet wrap

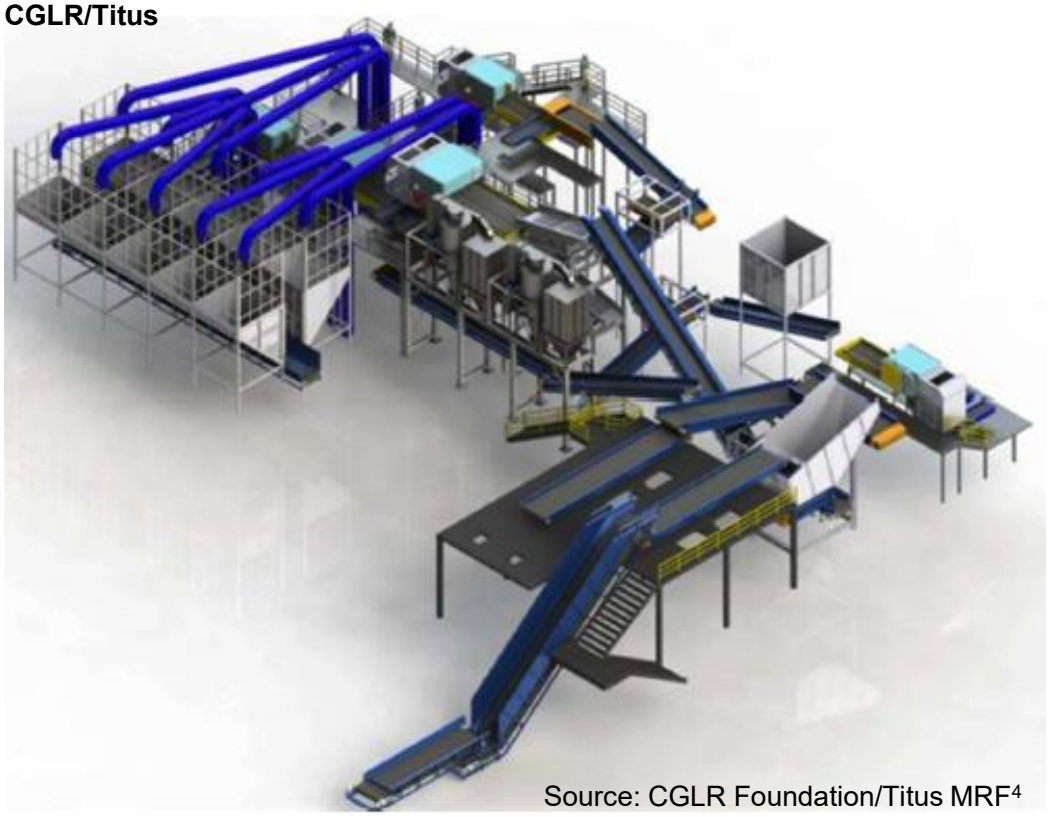
Image ／ Created with generative AI Gemini

Moving Toward Innovation in Reprocessing Equipment

Currently, the processing capacity of reprocessing equipment—such as converters that process film and reclaimers that handle recycling—has not kept up, and collected film ends up in landfills. In the United States, investment and innovation in reprocessing technologies are expanding. For example, research projects have demonstrated the positive impact of 'secondary sorting,' which involves an additional round of sorting of film and other materials missed in primary sorting to improve material quality. In a demonstration conducted in the Chicago metropolitan area by the Council of the Great Lakes Region (CGLR) Foundation 3 and the waste-sorting operator Titus, simply adding a "secondary sorting facility" to an existing sorting facility improved the landfill-avoidance rate from 86% to 94% (though this includes non-film materials such as paper). For this reason, CGLR/Titus proposes region-level investment in a full-scale secondary Materials Recovery Facility at an estimated cost of approximately $21 million.[4]

In addition, there are many types of equipment for processing and regenerating film—including facilities that wash and re-pelletize collected film, production facilities for "horizontal recycling" that turn film back into film, and optical sorters and AI-based sorting that make sorting more sophisticated—and putting these in place could help expand currently insufficient processing capacity.

Full-scale secondary sorting unit proposed by CGLR/Titus



Source: CGLR Foundation/Titus MRF[4]

Design Becomes the Starting Point of Circulation

Extended Producer Responsibility (EPR) laws are increasingly being adopted across the U.S. For example, California's SB 54 is an ambitious law that sets three requirements for single-use plastic packaging by 2032: ① a 25% reduction in single-use plastic packaging, ② a 65% recycling rate, and ③ a design that is 100% recyclable or compostable.[5] As of the end of 2025, such EPR laws had spread to seven states. What these regulations have in common is that they strongly urge producers to adopt packaging that is designed for recyclability. A key priority in packaging design is conversion to mono-material (single-material) packaging, which achieves high functionality without using multiple materials. Representative cases include MDOPE (machine-direction oriented polyethylene), which is stretched in the machine flow direction to enhance strength and heat resistance; BOPE (biaxially oriented polyethylene), which is stretched in both the vertical and horizontal directions to enhance rigidity, transparency, and printability; and high-performance sealant films, which enhance seal strength as well as resistance to puncturing and dropping. These technologies deliver high performance while keeping the packaging within a single polyethylene material stream, making it compatible with existing recycling systems.[1]

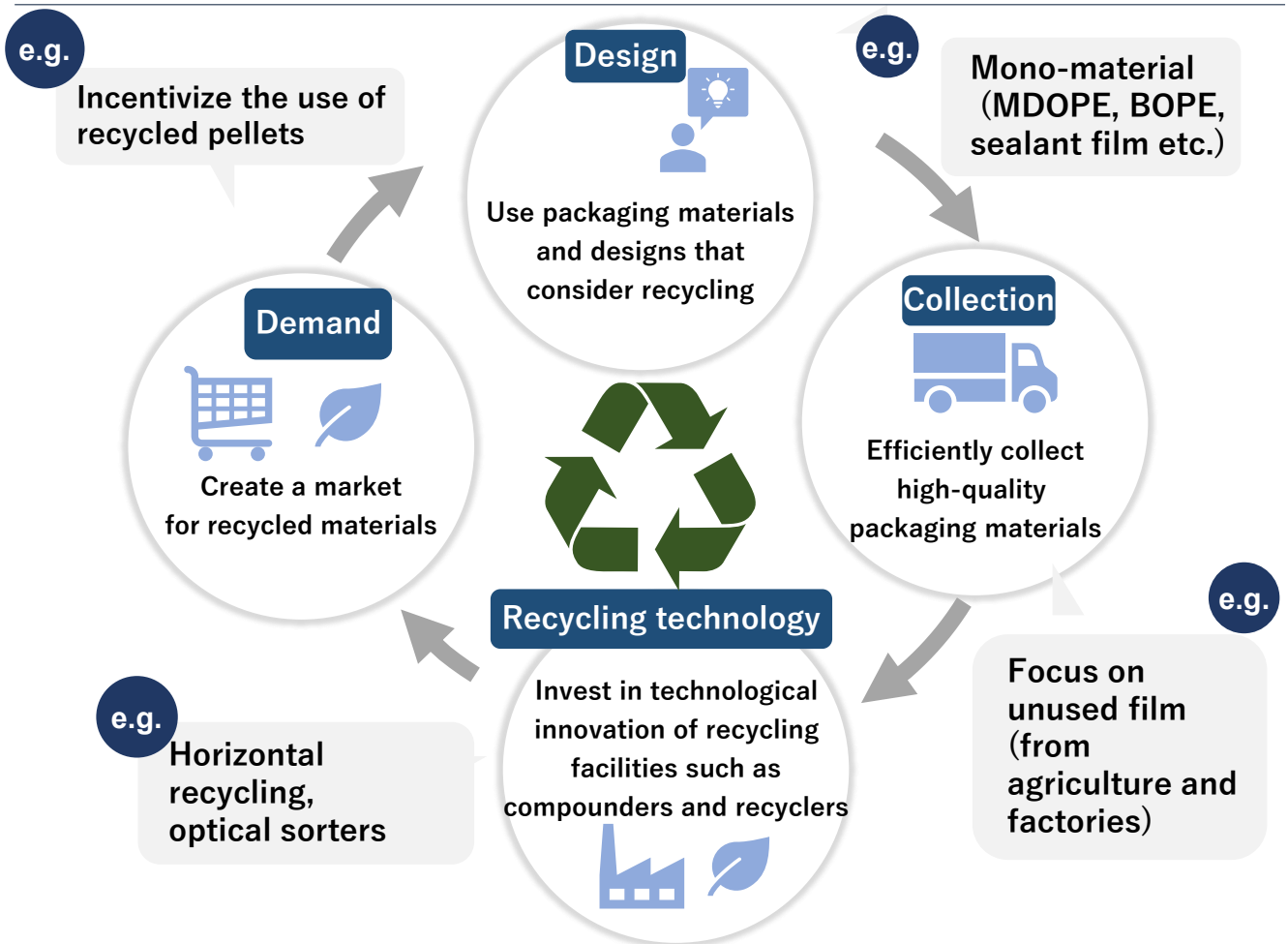
The Lack of End-Market Demand to Sustain Recycled-Material Purchases Is the Biggest Barrier

One reason film is still not sufficiently collected and recycled is the lack of sufficient end-market demand for the collected film. A viable recycling business model has yet to be established. Without stable demand at a profitable price, collected film ultimately ends up in landfills.[1] For example, citing declining demand for recycled pellets, in the fall of 2025, major U.S. film recycler Waste Management closed its recycling facility "Natura" in Texas.[6] The film problem needs to be addressed across the entire value chain. If the three elements—collection systems, recycling technology, and end-market demand—come together, the amount going to landfill could be significantly reduced. The key is to consider design, collection, recycling technology, and demand as an integrated system rather than in isolation.

Steadily Continuing to Connect Design, Collection, Recycling, and Demand

The path toward circularity is not smooth. The U.S. Plastics Pact itself, which leads the framework, has seen its membership decline as several major consumer goods and retail companies such as Walmart and Nestlé withdrew in 2025.[7] These departures appear to reflect the difficulty of achieving targets and uncertainty over cost-effectiveness. In addition, many challenges remain in both regulatory and voluntary efforts. On the other hand, participation in the Ellen MacArthur Foundation's network, in which the U.S. Plastics Pact takes part, is increasing,[8] and the global trend toward a circular economy is expected to continue. In Japan, several companies in the chemical, printing, and packaging fields are working on developing pilot equipment for horizontal recycling production processes for film, an area in which Japanese companies could play a growing role.[9] The circularity of film and flexible packaging is a global environmental challenge, and addressing it will require sustained efforts that connect design, collection, recycling, and demand.

Circular Economy for Recycling Film and Flexible Packaging



Source: Prepared by Washington CORE
(based on information from the U.S. Plastics Pact framework)

Footnotes

1. https://usplasticspact.org/uspp-journey-to-film-flex-circularity-framework/
2. https://ceflex.eu/ceflex-launches-plan-for-next-generation-recycling-plant-by-2023/
3. A nonprofit organization working to promote the circular economy, centered on the U.S. Great Lakes region
4. CGLR Foundation/Titus MRF Services. "Chicago Secondary Sort Demonstration Project." p. 11, https://static1.squarespace.com/static/604fb702fe7a5e5180587522/t/67aa77012de9ea2e22e2095f/1739224838749/CGLR+Secondary+Sorting+Study_FINAL.pdf
5. California SB 54, https://calrecycle.ca.gov/packaging/packaging-epr/
6. https://resource-recycling.com/plastics/2025/10/22/wm-closes-natura-pcr-film-operation-in-texas/
7. https://www.packagingdive.com/news/us-plastics-pact-member-departures-walmart-mondelez-mars-nestle/748630/
8. https://www.ellenmacarthurfoundation.org/global-commitment-2024/overview, https://www.ellenmacarthurfoundation.org/global-commitment-2025/overview
9. https://www.mcgc.com/news_release/01627.html, https://p-prom.com/material/?p=64661

About the Author

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Since 2012, Sawako has worked as a research analyst at Washington CORE, handling numerous projects. She has managed research projects commissioned by government and public agencies, major electronics manufacturers, financial institutions, think tanks, and information security firms. In recent years, in addition to energy and environmental policy, she has handled projects on circular economy policies such as EPR (Extended Producer Responsibility) programs and California's zero-waste plan. She also works on cybersecurity, generative AI, digital health, and economic security engagements. Based on U.S. primary-source research and expert interviews, she prepares reports, proposals, and presentation materials for Japanese clients. Graduate of Waseda University.

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