



# Introduction to Flexible Packaging Recovery

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RECOVERY

*GreenBlue is an environmental nonprofit dedicated to the sustainable use of materials in society. We bring together a diversity of stakeholders to encourage innovation and best practices to promote the creation of a more sustainable materials economy.*

*The Sustainable Packaging Coalition (SPC) is a membership-based collaborative that believes in the power of industry to make packaging more sustainable. We are the leading voice on sustainable packaging and we are passionate about the creation of packaging that is good for people + the environment. Our mission is to bring packaging sustainability stakeholders together to catalyze actionable improvements to packaging systems and lend an authoritative voice on issues related to packaging sustainability. The Sustainable Packaging Coalition is a trademark project of GreenBlue Org.*

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**SUSTAINABLE PACKAGING**  
COALITION®

# Introduction

## **FLEXIBLE PACKAGING—SUCH AS BAGS, FILMS, AND POUCHES—**

plays an important role in packaging sustainability. In general, flexible packaging uses less material per package than rigid packaging, and its lightweight nature means that transporting it is less carbon-intensive than heavier packaging types. Flexible packaging plays a critical role in preventing food waste, as it represents a high percentage of food packaging. Flexible pouches or packets can also enable refill models.

Despite its sustainability benefits, however, recovering flexible packaging at its end-of-life is a major challenge. Today most flexible packaging ends up in the very lowest tiers of the waste management hierarchy: it's incinerated, landfilled, or leaked into the environment. More and better recovery of flexible packaging is key to closing the loop for this material.



### **DESIGN**

Design for recyclability encompasses package shape and size, base material, and additives.



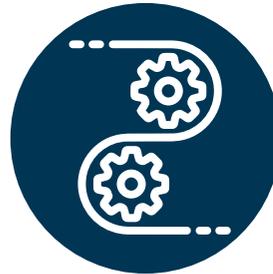
### **COLLECTION**

The primary collection mechanism for flexible packaging is store drop-off. Store drop-off is limited to clean, dry polyethylene film and flexibles.



### **SORTATION**

Flexible packaging can be sorted manually, using robotics and artificial intelligence, or using digital watermarking.



### **REPROCESSING**

Both mechanical and chemical recycling technologies exist for reprocessing flexible packaging, each with their own feedstock specifications and output qualities.



### **END MARKETS**

Demand for recycled material is greatest for high-quality mechanically or chemically recycled streams. Few end markets exist for mixed or low-quality material streams.





# What Does Circularity Mean for Flexible Packaging?



## DESIGN

Circularity begins with design. Designing flexible packaging “with the end in mind” includes using non-hazardous base materials and additives, minimizing the number of unique materials in a package, and avoiding materials or components that could interfere with recycling (or composting). A package’s likelihood of successfully passing through local/typical collection and sortation infrastructure should also be considered in the design phase.



## COLLECTION

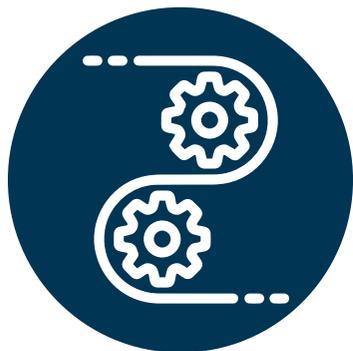
Aside from a few pilot programs, flexible packaging is not currently collected in curbside recycling in the United States. Collection is primarily available via store drop-off, a decentralized network of collection bins in grocery stores and other retail locations. Plastic bags and films are also accepted at some local recycling centers. Flexible packaging made of anything other than polyethylene (such as polypropylene or multi-material flexible packaging) is not accepted in the store drop-off system. Outstanding/ongoing needs in flexible packaging collection include increased consumer awareness of the store drop-off system, additional options and access points for collection, and collection mechanisms for flexible packaging that is not eligible for store drop-off.



## SORTATION

Technology exists today to sort flexible packaging successfully. Aside from manual sorting, the two main approaches to flexible packaging sortation are 1) robotic sorting equipment paired with artificial intelligence, and 2) digital watermarking. Artificial intelligence uses pattern recognition based on package features such as shape and branding to identify which items should be accepted or rejected, whereas digital watermarking uses unique barcodes printed on packaging but invisible to the naked eye. While these technologies have each demonstrated their capabilities in pilot projects and individual material recovery facilities, there is not yet widespread investment in making this type of sorting equipment the norm.

## REPROCESSING



Approaches to reprocessing flexible packaging vary by incoming material composition and intended end market. For instance, mechanically reprocessing polyethylene flexibles back into film requires a high degree of sorting and very low levels of additives or contaminants that would be detrimental to recycling. Durable products such as decking are often thought of as less demanding applications for recycled flexible packaging materials; however, additives or contaminants that would interfere with product longevity in an outdoor environment must be avoided. Reprocessing flexible packaging materials to food grade or virgin-like quality is most feasible with chemical recycling technologies. For example, purification technologies can remove additives and contaminants and separate the various components from multi-material packages, whereas conversion technologies can often process polyolefin mixtures, with varying degrees of tolerance for other materials.



## END MARKETS

End markets for material from recycled flexible packaging depend on material's composition and quality. Markets can range from stretch wrap to construction products to pallets to trash bags to new food contact flexible packaging in some cases. Clean material with consistent, known composition has more available end markets than contaminated, mixed, or variable material.

### RESOURCES & GUIDES



[How2Recycle Store Drop-Off Label](#)

[Association of Plastic Recyclers \(APR\) PE Film Design Guidance](#)

[Circular Economy for Flexible Packaging \(CEFLEX\) "Designing for a Circular Economy"](#)

[Flexible Packaging Association \(FPA\) Circular Economy Roadmaps](#)

[Ellen MacArthur Foundation \(EMF\) "Key Actions for Tackling Flexible Packaging in a Circular Economy"](#)

# Notable Projects in Flexible Packaging Recovery

## CIRCULAR PLASTICS TASKFORCE

- Based in Canada, the [Circular Plastics Taskforce](#) is running a flexible sortation pilot project employing digital watermarking technology which enables sorting by attribute, including brand, material, and food grade/non-food grade. The Taskforce is also working to develop end markets for non-PE flexibles.



## THE RECYCLING PARTNERSHIP'S FILM & FLEXIBLES RECYCLING COALITION

- The [Recycling Partnership's Film & Flexibles Recycling Coalition](#) seeks to expand curbside collection of plastic films and flexible packaging. The Coalition uses member dues to provide grants to materials recovery facilities for installing or upgrading film sorting equipment.



## HEALTHCARE PLASTICS RECYCLING COUNCIL

- The [Healthcare Plastics Recycling Council's](#) work on flexible packaging spans healthcare plastic design guidance, evaluation of mechanical and chemical recycling technologies' applicability to healthcare plastics, and resources for hospitals to segregate and collect non-contaminated flexible plastics.



## MATERIALS RECOVERY FOR THE FUTURE (MRFF)

- [Materials Recovery for the Future](#) was a series of proof of concept studies conducted at a state-of-the-art materials recovery facility in Pennsylvania. The studies assessed the capture rate of flexibles, how well flexibles could be removed from fiber lines, and the economic feasibility of sorting flexibles at a single-stream materials recovery facility.



## ROLL 'N' RECYCLE

- [Roll 'n' Recycle](#) is an initiative in Australia that instructs consumers to roll up their flexible PE packaging and secure it with an on-pack PE sticker. These rolled up packages can be placed in curbside recycling and will sort like a 3D or rigid plastic container.



## MBOLD FLEXIBLE FILM INITIATIVE

- [MBOLD](#), a food and agriculture sector coalition in Minnesota, has assembled numerous partners to collect, supply, recycle, and offtake polyethylene film. The partnership's dedicated flexible film recycling facility is expected to open in 2023.





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