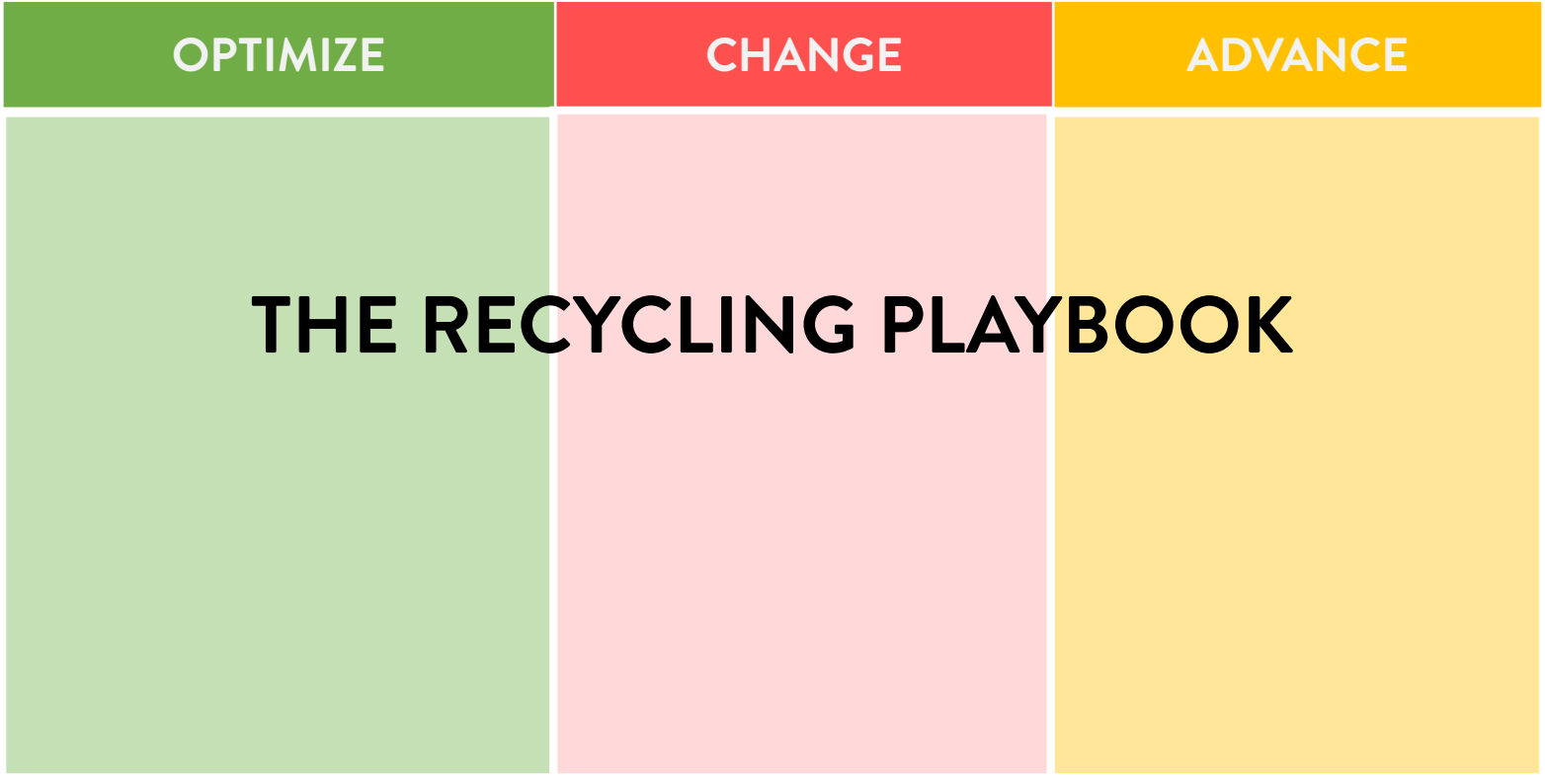
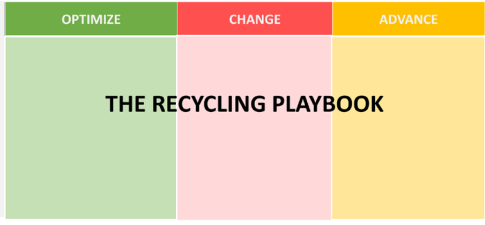
Last updated: 10/2022



October 2022 Updates



We aim to keep The Recycling Playbook a useful tool to support the transition to more sustainable packaging. As a result, periodic changes are expected since recycling and packaging are evolving.

The following changes were made to reflect the current state of U.S. recycling:

Some rigid PP packages were moved into the "optimize" classification where suppliers should work to make sure all design features are compatible with the recycling system

- The applicable packages were reclassified by How2Recycle in 2022 from considered for *Check Locally* labels to *Widely Recyclable* labels.

Additional guidance was added to:

- Clarify that PFAS in fiber packaging should be avoided per How2Recycle's position
- Include the U.S. Plastics Pact problematic and unnecessary materials
- Include design guidance from the Consumer Goods Forum's Golden Design Rules
- Include the small format working group at The Sustainability Consortium
- Include the PET working group and end-market tool at The Recycling Partnership
- Clarified RFIDs should be avoided in plastic packaging
- Include more information about PE Film design from APR Design® Guide
- Add more information about labels on glass packages
- Include design guidance from the Aluminum Association
- Include recyclability information from the American Forest and Paper Association
- Added information on composting systems and materials that are compatible with these systems

TABLE OF CONTENTS

PLAYBOOK BACKGROUND

INTRODUCTION

For companies setting recyclable packaging and recycled content goals, this document is a supplemental resource for your consideration. Information in this document is presented by packaging format (i.e., bottle, box, etc.) and is focused on the most common packaging formats found in Walmart stores. This document is not exhaustive for all packaging formats nor is the information intended to be prescriptive. For more general information on sustainable packaging, please refer to Walmart's Sustainable Packaging Playbook.

For each major packaging format, we have provided information which is designed to capture recyclability information based on existing infrastructure (with a focus on North America). This document also provides perspective on feasible recycled content levels based on current industry practice. We have also tried to identify design elements which can pose barriers or challenges to recycling.

Walmart encourages all suppliers to take a life cycle perspective when seeking to optimize package design. While we want to see all of our suppliers striving to minimize material usage and advance a circular economy for plastics, it is also important to consider potential trade-offs of material choices elsewhere in the life cycle and take those into consideration when making design choices (e.g., increased package weight impacting transportation greenhouse gas emissions, responsible sourcing of fiber based packaging, etc.).

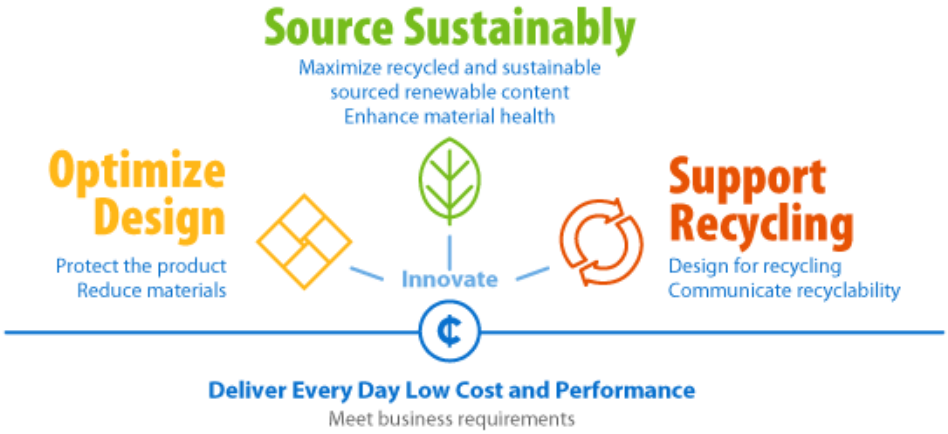
Consider using consumer-friendly recycling labels, like the How2Recycle ® label to make it easier for customers to know what they can and can't recycle. For more information, visit: members.how2recycle.info.

Thank you to Pure Strategies, The Association of Plastic Recyclers (APR), and the Sustainable Packaging Coalition who were key partners in the development of this playbook. Additional information on plastic packaging is available in the *APR Design® Guide For Plastics Recyclability.*

Suppliers are reminded that they are responsible for the compliance of their products, including their products packaging, with all applicable laws and regulations, including laws and regulations applicable to recyclability and compostability, such as the FTC's Green Guides and California's Public Resources Code. Walmart does not give its suppliers legal advice. Suppliers should consult their own counsel with questions about the applicability of laws and regulations to their products and packaging.

SUSTAINABLE PACKAGING OVERVIEW

By optimizing design, sourcing sustainably and supporting recycling in packaging, companies can work to reduce greenhouse gas emissions through reduced weight in transportation, increased use of recycled content, and mitigating carbon from landfill. Designers, manufacturers and brands have a unique opportunity to help deliver more efficient, innovative, and sustainable packaging to shelf. **The Recycling Playbook is for companies setting recyclable packaging and recycled content goals.**



DEFINITIONS

WHAT DOES RECYCLABLE MEAN?

Walmart utilizes the Ellen MacArthur Foundation's definition for recyclability for purposes of measuring progress on Walmart's global sustainability goals. The definition is broken down into two steps:

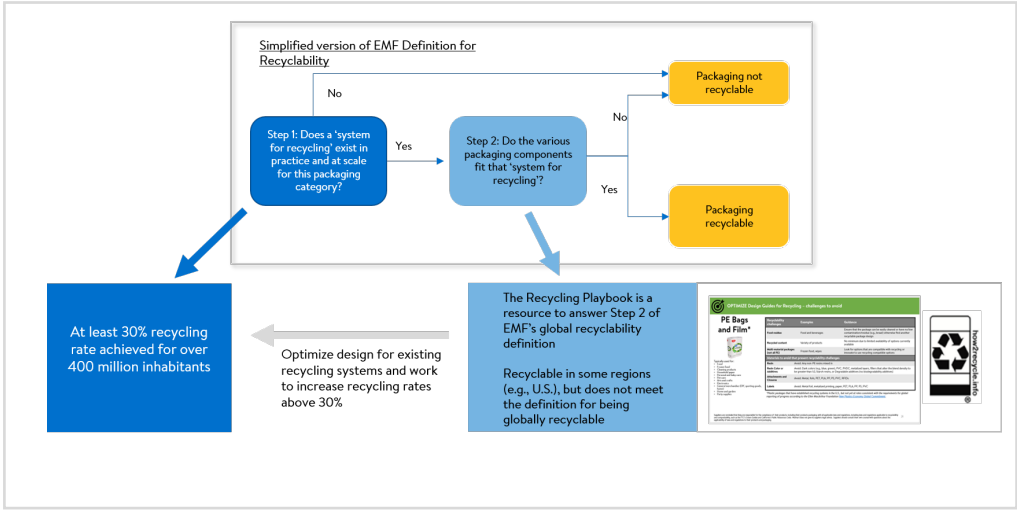
Step 1: Does a 'system for recycling' exist in practice and at scale for this packaging category (i.e., at least 30% recycling rate is achieved for over 400 million inhabitants)?

Step 2: Do the various packaging components fit that 'system for recycling'?

This guide focuses on Step 2 of the Ellen MacArthur Foundation's Definition for Recyclability (i.e., providing information on packaging components that fit the "system for recycling").

Packages identified as recyclable in this playbook meet many local requirements for recyclable claims and have established systems for collection, sorting, processing, and use again.

For those packages with less than 30% recycling rate achieved for over 400 million inhabitants (i.e., "at scale"), companies are encouraged to work to increase recycling rates to achieve Step 1 of Ellen Macarthur Foundation's definition.



A VIEW OF THE RECYCLING SYSTEM STAGES AND CONSIDERATIONS

Collection

Collection available for a substantial majority of consumers

N O

Sortation

Packages are separated and aggregated for further processing

N O

Processing

Commercial processes recover material

N O

End-Market

The recycled material is used in new products

N O

Consumer

At least a 30% recycling rate achieved for over 400 million inhabitants

N O

Recyclable

Walmart utilizes the Ellen MacArthur Foundation's definition for recyclability, and ISO definitions for recycled content, compostability, and reuse for purposes of measuring progress on Walmart's global sustainability goals

Not recyclable

Change to be recyclable OR **Advance** innovation and work with local collective organizations to improve recycling (without being problematic to the existing systems) or another circular economy solution (e.g., reusable or certified compostable package for appropriate uses)

May be recyclable in some regions (e.g., U.S.), but does not meet the definition for being globally recyclable

Optimize design for existing recycling systems and work to increase recycling rates above 30%

EXAMPLES OF RECYCLING CHALLENGES FOR PACKAGING ACROSS THE SYSTEM

Collection

No collection for PET or PP films.

- If mixed with store drop-off (for PE) it gets discarded as waste.

Sortation

Shrink sleeves can decrease the surface available to detect the plastic type for sorting.

- Undetected PET and HDPE packages get discarded as waste.

Processing

Paper labels on plastic may not easily separate in processing.

- The paper is not recovered and contaminates the plastic stream, reducing yields and quality.

End-Market

Very **small amounts of PVC** in PET are unacceptable for end markets.

- The collected, sorted, and recovered PET with PVC is contaminated, diminishing PET's value.

Consumer

Collection is less than 30% for PE plastic film through store drop-off programs (collection needs to improve).

Recyclable

Walmart utilizes the Ellen MacArthur Foundation's definition for recyclability, and ISO definitions for recycled content, compostability, and reuse for purposes of measuring progress on Walmart's global sustainability goals

Examples of recycling challenges at each stage

OPTIMIZE	CHANGE	ADVANCE

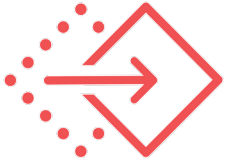
HOW TO USE THE PLAYBOOK

Optimize

Recyclable packages

Small issues can be detrimental or make a package not compatible with recycling (e.g., color, labels)

ACTION:
Use this playbook to help design out elements not recyclable and detrimental to recycling



Change

Packages that are not recyclable

These may contaminate high value recycling streams or have feasible replacements

ACTION:
Switch to a recyclable package, see this playbook for ideas

Advance

Packages that are not widely recyclable

Barriers in recycling systems at this time

ACTION:
Invest and engage in the development of a recycling, reuse, take-back, or composting solution

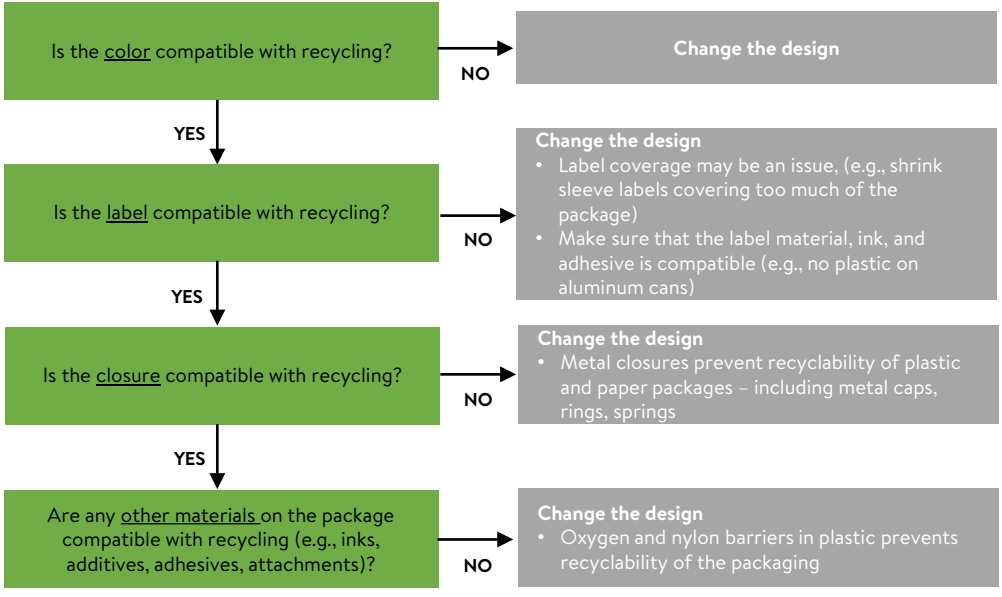
OPTIMIZE, CHANGE, OR ADVANCE PACKAGING AS APPLICABLE

Review the following pages for guidance and ideas for optimizing packages that are potentially recyclable and changing packages that are not recyclable or advancing development to get to a circular economy solution.

OPTIMIZE Use this playbook to help design out elements not recyclable and detrimental to recycling	CHANGE Switch to a recyclable package, see guides for ideas	ADVANCE Invest and engage in the development of a recycling, reuse, take-back, or composting solution
Bags, films, and pouches: • Paper • Plastic*: PE, HDPE, MDPE, LDPE, and LLDPE	**Bags, films, and pouches**: • Made from multiple materials • Plastic: nylon, PET, PP, PVC, PVDC	**Bags, films, and pouches**: Heat-in-the-bag, some advanced barriers, meat film and soaker pads, customer demand, life cycle considerations
Bottles, jars, jugs, and tubs: • Glass • Plastic: HDPE, LDPE*, PET, some PP*	**Bottles, jars, jugs, and tubs:** • Plastic: acrylic, PETG, PS, PVC, miscellaneous plastics, and multiple materials	**Bottles, jars, jugs, and tubs:** • Some PP
Boxes: paperboard, corrugate, and molded fiber		
Canisters and cartons: paper-based including: • Simple containers without metal (e.g., paperboard) • Multi-layer containers for shelf-stable products (e.g., aseptic boxes) and coated containers for refrigerated products (e.g., gable top)	**Canisters and cartons:** paper-based containers with metal tops or bottoms	**Canisters and cartons:** coated paper-based containers for frozen products
Cans: steel, aluminum (including aerosols and others)		
Cushion, dunnage, and inserts: • Paper, corrugate, and molded fiber • Plastic*: PE	**Cushion, dunnage, and inserts:** expanded polystyrene and other resins	
Trays, clamshells, and thermoforms: • Paper and fiber-based	**Trays, clamshells, and thermoforms**: • Plastic: EPS, PS, PVC	**Trays, clamshells, and thermoforms**: • Plastic: PET
**Plastic packages that have established recycling systems in the U.S., but not yet at rates consistent with the requirements for global reporting of progress according to the New Plastics Economy Global Commitment.*	**Other**: • Blister packs (multiple materials) • Flat plastic	**Other**: • Tubes made from plastic with multiple materials • Small plastic containers (<2" in more than one dimension)

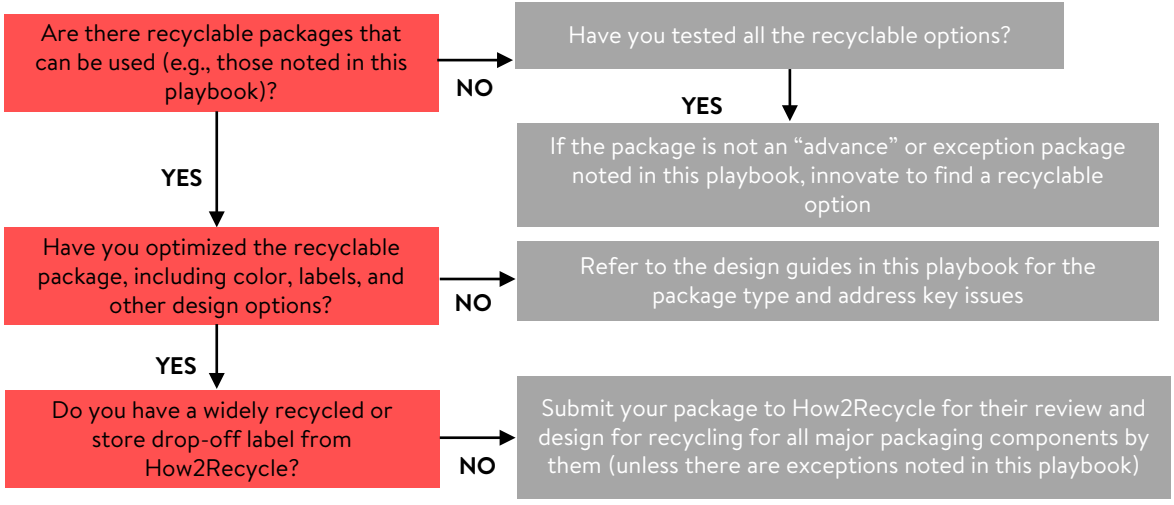
OPTIMIZE Design Guides for Recycling

Steps to take to "optimize" your package by avoiding elements not recyclable and elements detrimental to recycling in order to support sortation, processing, and end markets - **Refer to the rest of this playbook for more information; follow the green pages and avoid the challenges on the gray pages.**



CHANGE TO A RECYCLABLE PACKAGE

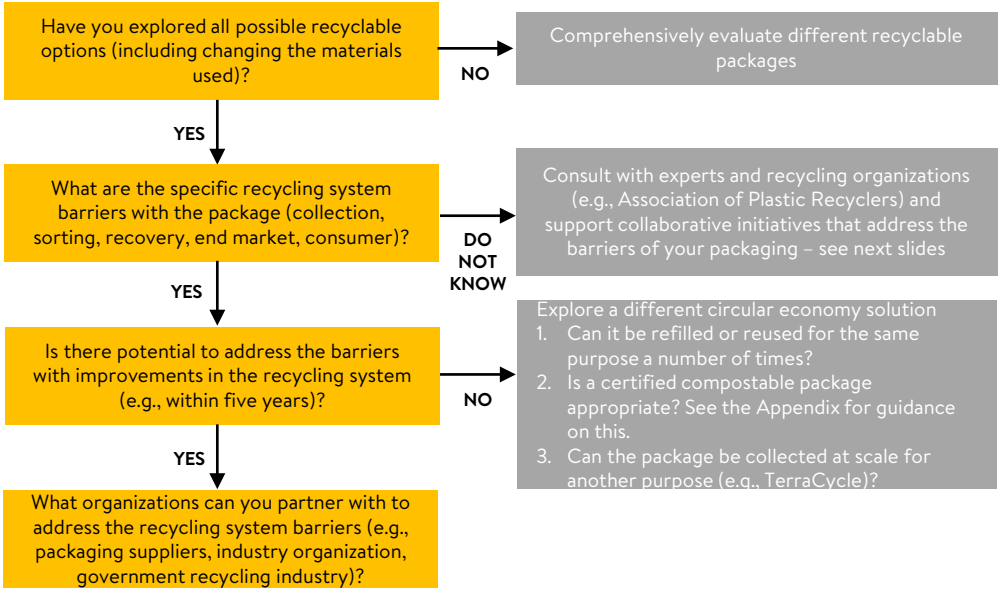
Steps to take to "change" to a recyclable package and optimize its design for recycling



Walmart's aspiration is zero plastic waste… not zero plastic. While we want to find ways to use less plastic, major packaging changes should be done with thought to ensure there aren't major trade-offs, such as an increase in greenhouse gas (GHG) emissions. If you participate in Project Gigaton, you can use the Project Gigaton packaging calculators to estimate potential GHG impacts for purposes of reporting in that program.

ADVANCE to a Circular Economy Solution

While experts recommend designing your packaging to fit the existing recycling system (optimizing or changing the package), there are some packages close to being recyclable or some that have no short-term options. Below are steps to take to "advance" your package by developing a recycling, reuse, take-back, or composting solution for the package - **Refer to the rest of this playbook for more information**



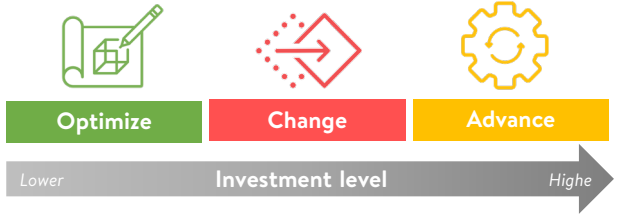
CHANGING PACKAGE DESIGN WITH A SYSTEM & LIFE CYCLE VIEW

When changing package design for recyclability, aim for:

- Optimizing each stage of the recycling system
- No major trade-offs for environmental or other impacts

Walmart's aspiration is zero plastic waste… not zero plastic. While we want to find ways to use less plastic, major packaging changes should be done with thought to ensure there aren't major trade-offs, such as an increase in greenhouse gas (GHG) emissions. If you participate in Project Gigaton, you can use the Project Gigaton packaging calculators to estimate potential GHG impacts for purposes of reporting in that program.

Design changes for recyclability have different levels of investment, optimizing packages has lower barriers and thus requires less investment of time and cost than most changes and advances



KEY LEVERS OF CHANGE TO SUPPORT RECYCLING

Optimize and *Advance* packages have key levers of change for recycling, noted below – refer to the rest of this playbook for additional information.

Change packages should switch to a recyclable package – refer to the rest of this playbook for ideas

Bold=primary focus

Design

Use best practices to design for recycling

Consumer

Reach at least a 30% recycling rate

Collection

Collection available for a substantial majority of consumers

Sortation

Packages are separated and aggregated for further processing

Processing

Commercial processes recover material

End-Market

The recycled material is used in new products

***Optimize* packages levers of change**	**Remove contaminants Use compatible labels**	**Engage consumer**				
***Advance:* Bottles, jars, jugs, and tubs made from PP**	Remove contaminants	Engage consumer		**Improve sortation**		
***Advance:* Canisters and cartons: coated paper-based containers for frozen products**	Remove contaminants	Engage consumer	**Improve collection**	**Improve sortation**	**Improve processing**	**Improve end market**
***Advance:* Trays, clamshells, and thermoforms made from PET**	Remove contaminants	Engage consumer	**Improve collection**	**Improve sortation**	Ensure processing	Ensure end market
***Advance:* Tubes made from plastic with multiple materials**	Use single resin	Engage consumer	**Improve collection**	**Improve sortation**	Improve processing	Improve end market
***Advance:* Small plastic containers (<2" in more than one dimension)**	**Use single resin**	Engage consumer		**Improve sortation**		

KEY COLLABORATIVE INITIATIVES TO SUPPORT IN ORDER TO PROGRESS RECYCLING

Below are some of the collaborative initiatives to consider investing and engaging in to progress recycling

Design

Use best practices to design for recycling

Consumer

Reach at least a 30% recycling rate

Collection

Collection available for a substantial majority of consumers

Sortation

Packages are separated and aggregated for further processing

Processing

Commercial processes recover material

End-Market

The recycled material is used in new products

***Optimize* packages levers of change**	The Association of Plastic Recyclers (APR) Design® Guide for Plastics Recycling	How2Recycle, U.S. Plastics Pact				APR Recycling Demand Champions, Project Gigaton, U.S. Plastics Pact, The Recycling Partnership Pathway*
***Advance*: Bags films and pouches made from multiple materials**	APR Films and Flexibles Committee	How2Recycle, U.S. Plastics Pact	APR, The Recycling Partnership's Film and Flexibles Coalition, Materials Recovery for the Future, U.S. Plastics Pact			
***Advance:* Canisters and cartons: coated paper-based containers for frozen products**		How2Recycle, U.S. Plastics Pact				
***Advance:* Trays, clamshells, and thermoforms made from PET**	APR PET Technical Committee	How2Recycle, U.S. Plastics Pact	APR, The Recycling Partnership PET Recycling Coalition, Foodservice Packaging Institute, U.S. Plastics Pact			
***Advance:* Tubes made from plastic with multiple materials**	APR Rigid Olefin Technical Committee	How2Recycle, U.S. Plastics Pact	APR, The Recycling Partnership, U.S. Plastics Pact			
***Advance:* Small plastic containers** (<2" in more than one dimension)	APR MRF Committee	How2Recycle, U.S. Plastics Pact	APR, The Sustainability Consortium, U.S. Plastics Pact			

**The Recycling Partnership Pathway to Circularity includes a tool to evaluate on end-markets, applicable to all packages*

OPTIMIZE	CHANGE	ADVANCE

GUIDES: BAGS, FILMS, AND POUCHES

OPTIMIZE Design Guides for Recycling – best practices

Paper Bags

Typically used for:
- Food
- Cleaning products
- Health and wellness (supplements, medicine)
- Pet care
- Arts and crafts
- General merchandise (DIY, sporting goods, automotive, home, kitchen, jewelry)
- Home and garden
- Party supplies
- Toys

Recyclable best practices: *Meets the following*	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Wet Strength Additives	Compatible with recycling processing as confirmed by Western Michigan University testing
Coatings	Use no coatings or use clay or varnish coatings
Adhesives	Minimal adhesives and tape or hydrophobic adhesives
Attachments	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Labels and Graphics	Paper or direct printed

**For the purposes of Project Gigaton, FSC-certified virgin content from all countries is recognized; SFI from the U.S. and Canada only; PEFC from Anguilla, Belgium, Czech Republic, Denmark, Estonia, Germany, Hungary, Ireland, Latvia, Lithuania, Netherlands, Portugal, South Korea, Spain, Switzerland, or the UK.*

OPTIMIZE Design Guides for Recycling – challenges to avoid

Paper Bags

Typically used for:
- Food
- Cleaning products
- Health and wellness (supplements, medicine)
- Pet care
- Arts and crafts
- General merchandise (DIY, sporting goods, automotive, home, kitchen, jewelry)
- Home and garden
- Party supplies
- Toys

Recyclability challenges	Examples	Guidance
Frozen Food Cartons	Frozen foods	Improve end market and systems for collection and recycling of material that can be recovered (e.g., fiber) or innovate to use recycling compatible options
Food-Contact and Oily/Liquid-Contact Products	Variety of products	Ensure that the package can be easily cleaned or have no/low contamination/residue otherwise find another recyclable package design (may also consider reviewing the compostable packaging information to see if that option applies)
Materials to avoid that present recyclability challenges		
Color, Layers, or Additives	Avoid: Plastic/polymer treatments or layers on fiber-based components (one side is better than both the outside and inside coated), treatments that require plastic/polymers (most holograms, high gloss), wax, bioplastic, metalized films, foils, wet strength additives that haven't passed Western Michigan University testing, dark colors, fragrances	
Attachments and Adhesives	Avoid: Metal, magnetic closures, electronics, PET, PLA, PP, PS, PVC, hot melt adhesives, stickers and adhesives (unless passes Western Michigan University testing)	
Labels	Avoid: Metal foil, metalized printing, PET, PLA, PP, PS, PVC	
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see the How2Recycle program for more information	

Suppliers are reminded that they are responsible for the compliance of their products, including their products packaging, with all applicable laws and regulations, including laws and regulations applicable to recyclability and compostability, such as the FTC's Green Guides and California's Public Resources Code. Walmart does not give its suppliers legal advice. Suppliers should consult their own counsel with questions about the applicability of laws and regulations to their products and packaging.

PE Bags and Film*

Typically used for:

- Food
- Frozen food
- Cleaning products
- Household paper
- Personal and baby care
- Pet care
- Arts and crafts
- Electronics
- General merchandise (DIY, sporting goods, home)
- Home and garden
- Party supplies
- Ecommerce envelope

Recyclable best practices: ***Meets the following or passed the applicable APR benchmark and definitive tests***	
Film Resin	LDPE, MDPE, LLDPE, or HDPE film
Resin Color	Unpigmented is best or white or light colors
Resin Additives	Use compatible additives at levels that do not alter the base material density (e.g., EVOH at recommended levels, see the APR Design ® Guide for more details); No degradable or biodegradability additives or starch
Fillers	Ensure density of blend is less than 1.0
Layers	PE
Labels	PE or direct printed
Attachments	PE
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	No minimum PCR content, but may be added in the future

**Plastic packages that have established recycling systems in the U.S., but not yet at rates consistent with the requirements for global reporting of progress according to the Ellen MacArthur Foundation New Plastics Economy Global Commitment.*

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OPTIMIZE Design Guides for Recycling – challenges to avoid

PE Bags and Film*

Typically used for:
- Food
- Frozen food
- Cleaning products
- Household paper
- Personal and baby care
- Pet care
- Arts and crafts
- Electronics
- General merchandise (DIY, sporting goods, home)
- Home and garden
- Party supplies
- Ecommerce envelope

Recyclability challenges	Examples	Guidance
Food residue	Food and beverages	Ensure that the package can be easily cleaned or have no/low contamination/residue (e.g., bread) otherwise find another recyclable package design
Recycled content	Variety of products	No minimum due to limited availability of options currently available
Multi-material packages (not all PE)	Frozen food, wipes	Look for options that are compatible with recycling or innovate to use recycling compatible options
Materials to avoid that present recyclability challenges		
Resin	Avoid: Any non-PE resins mixed in (avoid less than 90% PE)	
Resin Color or Additives	Avoid: Dark colors (e.g., blue, green), PVC, PVDC, metalized layers, fillers that alter the blend density to be greater than 1.0, starch resins, degradable additives (no biodegradability additives), PS, EPS, PVC, PVDC	
Attachments and Closures	Avoid: RFIDs Avoid: Metal, foils, fibers, PET, PLA, PP, PS, PVC, PVDC	
Labels	Ensure materials, adhesives, and size of sleeve/label are not problematic for recycling, i.e., use APR "preferred" labels. Avoid: Metal foil, metalized printing, paper, PET, PLA, PP, PS, PVC	
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see U.S. Plastics Pact Problematic and Unnecessary Materials and How2Recycle for more information	

**Plastic packages that have established recycling systems in the U.S., but not yet at rates consistent with the requirements for global reporting of progress according to the Ellen MacArthur Foundation New Plastics Economy Global Commitment.*

Bags, Films, Pouches

Made from multiple materials
Plastic: nylon, PET, PP, PVC, PVDC

Typically used for:
- Arts and crafts
- Apparel
- Baby food and care
- Food (e.g., nuts, produce)
- Health & wellness
- General merchandise (DIY)
- Home décor (e.g., bedding)
- Home and garden
- Household paper
- Office
- Party supplies
- Personal care
- Pet food and care
- Toys

Challenges

- It is difficult for consumers to separate multiple materials
- Nylon, flexible PET, flexible PP, PVC, PVDC are not accepted in U.S. store-drop off recycling programs and can result in loss of recyclable plastic due to contamination

Guidance

Change to:
- A similar format with a PE material only (e.g., LDPE)
- A similar format with material mixtures compatible with store-drop off (e.g., HDPE, LDPE, LLDPE, MDPE)
- A different recyclable format (e.g., paperboard box, carton, HDPE tub)

For plastic, use coatings and additives proven to be compatible recycling (e.g., EVOH/compatiblizers), *see APR Design® Guide For Plastics Recyclability and APR testing*

See the applicable guides in this playbook to optimize the new design (e.g., labels, colors) and use the How2Recycle label

Bags, Films, Pouches

Made from multiple materials
Plastic: nylon, PET, PP, PVC, PVDC

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Examples that should use recyclable options; *see next slide for exceptions to the below*

Product		Recyclable format to consider
Produce and fresh food	*Produce, lettuce, salad mixes*	*PET clamshell, PE bag*
	Dairy	*PE bag*
	Meat, poultry, fish	*PET tray, PP tray (note that films used with these may not be recyclable)*
Dry Grocery	*Cookies, crackers*	*PE bag/wrap in box*
	Bread, bagels, tortillas	*PE bag*
	Rice and coffee	*PE bag*
	Trail mix, nut mixes	*PET tub, PE bag*
	Bakery ingredients and supplies	*Paper bag, PE bag*
Beverages	*Kids juice for lunch*	*Coated paper-based box (e.g., Tetrapak)*
Frozen food	*Frozen breakfast, snacks, appetizers*	*PE bag in box*
	Frozen meals	*Paper box with a paper or PP container*
	Frozen pizza and meals	*Paper box with PE film*
	Frozen potatoes, meat, poultry, fish	*PE bag*
Pet food and snacks	*Dry pet food and snacks*	*PE bag*
Baby and personal care	*Diapers*	*PE outerwrap, corrugate box*
	Wipes without an integrated dispenser	*PE bag*
	Feminine and incontinence pads	*PE outerwrap*
Home care	*Cleaning and laundry products*	*PE bag*

ADVANCE to a Circular Economy Solution (usually a longer-term approach)

Bags, Films, Pouches

- **Made from multiple materials**
- **Plastic: nylon, PET, PP, PVC, PVDC**

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Challenges and levers of change

Design	Collection	Sortation	Processing	End-Market
Use single resin	Improve collection (curbside)*	Improve sortation	Improve processing	Improve end market

Primarily a system challenge: Multiple-material bags, films, and pouches are not collected or recycled

- Use a single resin PE design for store drop-off film collection (confirming compatibility with the Association of Plastic Recyclers test) or switch to another recyclable format
- When the above cannot work, engage in collaborative efforts working to advance appropriate recycling systems (e.g., The Recycling Partnership's Film and Flexibles Coalition, Materials Recovery for the Future, Association of Plastic Recyclers, U.S. Plastics Pact)

Example packages to advance innovation and circular solutions if cannot switch to a recyclable option

- **Heat-in-the-bag:** Frozen or fresh foods that are heated in the bag (e.g., PP bags, multiple materials).
- **Advanced barriers for refrigerated or shelf-stable foods and beverages** (e.g., to minimize oxygen and carbon dioxide transmission for fat/oil stability): Chips and crackers with fat/oil content (e.g., potato chips, tortilla chips, cheese crackers) (e.g., PP film with or without metallization); Lunchmeat, bacon, and hot dogs (e.g., PET film); Cheese/dairy or candy (e.g., PET film, metalized pouch/film).
- **Meat, poultry, and fish minor packaging components:** Film (e.g., PVDC), Soaker pad (e.g., multiple materials).
- **Product protection:** Where testing proved that significant product loss would occur with all possible recyclable options.
- **Life cycle impacts:** A peer-reviewed life cycle assessment demonstrates significant improvements across impacts.

**Store drop-off collection is available for PE bags, films, and pouches. New collection is only needed for bags, films and pouches not compatible with store drop-off.*

OPTIMIZE	CHANGE	ADVANCE

GUIDES:
BOTTLES, JARS, JUGS, AND TUBS

OPTIMIZE Design Guides for Recycling – best practices

Glass Containers

Typically used for:
- Food jars
- Beverage bottles

Recyclable best practices: *Meets the following*	
Materials	Container glass
Color	Clear, amber, green, and blue
Label	Direct print, paper
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	30%
Maximum	Up to 95% PCR

Materials that present recyclability challenges to avoid	
Labels	Ensure that plastic labels are easy to remove or avoid them (e.g., the label should not cover most of the package with a very strong adhesive)
Attachments, closures	Avoid: Anything molded into the glass or ceramic attachments/closures
Non-container glass	Avoid: Leaded glass (e.g., crystal) and heat-resistant glass (e.g., Pyrex)

PET Bottles

Typically used for:
- Water and beverages
- Grocery (e.g., condiments, sauces)
- Health & wellness (e.g., supplements)
- Personal and baby care
- Cleaning products

Recyclable best practices: *Meets the following or passed the applicable APR benchmark and definitive tests*	
Resin	PET bottle grade with a crystalline melting point between 225 and 255°C
Resin Color	Clear (if color required, transparent light blue)
Resin Additives	No degradable or biodegradability additives
Wrap Around Label or Cut & Stack	PP or PE (that float when printed)
Shrink Sleeve, Pressure Sensitive, or Direct Printed	An APR Preferred option *(Learn more at https://plasticsrecycling.org/recognition/recipients)*
Attachments	Clear if PET; colored ok for PP or PE
Closures, Pumps, and Sprays	PP or PE
Cap Liner	Liner made from PE, EVA, or TPE or no liner
Tamper Evidence	Easily fully removable, PET, PP, PE
Dimensions	Larger than 2" in two dimensions and largely 3-dimensional (vs. flat with one dimension <2")
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	25% PCR
Maximum	Up to 100% PCR

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OPTIMIZE Design Guides for Recycling – challenges to avoid

PET Bottles

Typically used for:
- Water and beverages
- Grocery (e.g., condiments, sauces)
- Health & wellness (e.g., supplements)
- Personal and baby care
- Cleaning products

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Recyclability challenges	Examples	Guidance
Nylon layers	Sparkling mineral water, food jars, and juice bottles	Use the APR recognized options or innovate to use recycling compatible options
Oxygen scavenger (or other) additives	Juice, tea, and coffee	Use the APR recognized options or innovate to use recycling compatible options (e.g., EvOH at low percentage)
Paper labels	Many products	These are a low-cost option that either need to pass APR benchmark and definitive tests or be replaced with non-paper APR recognized options
Pressure sensitive and shrink sleeve labels	Many products	See below for more information; Use the APR recognized options *(Learn more at https://plasticsrecycling.org/recognition/recipients)*
Metal parts in cap, pump, or spray	Beverages, cleaning and personal care products	Look for all plastic caps, pumps, or sprays (some applications may have functional limitations and How2Recycle labels should be used to clearly communicate that the cap, pump, or spray with metal needs to be removed before recycling)
PETG	Beverages	PETG is not the same thing as PET and should be designed out of PET packaging

Materials to avoid that present recyclability challenges	
Resin	Avoid: PETG, other non-compatible resins mixed in (some EvOH levels are ok)
Resin Color or Additives	Avoid: Transparent colors other than blue (green should be limited to compostable packaging based on guidance from the State of Washington), opaque colors, dark colors, optical brighteners, degradable additives or biodegradability additives
Attachments /Closures	Avoid: RFIDs Avoid: Metal, foils, PS, PVC, PLA, TPE/silicon with density > 1
Labels	Ensure materials, adhesives, and size of sleeve/label are not problematic for recycling, i.e., use APR "preferred" labels. Avoid the following: • Materials: Metal foil, metalized printing, PS, PVC, PLA, PETG and paper labels not APR Preferred or that do not pass APR testing • Label coverage: Those that are not APR Preferred, does not pass APRs near infrared (NIR) Sorting Potential Test, for containers of 550 ml or less labels that cover more than 55% of the bottle surface area with label, for containers greater than 550 ml labels that covert more than 70% of the bottle surface area with label • Paper labels: Those that are not APR Preferred or that do not pass APR testing • Inks: Bleeding inks or direct printing that do not pass APR testing
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see U.S. Plastics Pact Problematic and Unnecessary Materials and How2Recycle for more information

OPTIMIZE Design Guides for Recycling – best practices

HDPE Bottles

Typically used for:
- Milk
- Baby formula
- Health and wellness (supplements, medicine)
- Personal and baby care
- Cleaning products

Recyclable best practices: *Meets the following or passed the applicable APR benchmark and definitive tests*	
Resin	HDPE density 0.94-0.96
Resin Color	Unpigmented, translucent, opaque colors (not dark)
Resin Additives	No degradable or biodegradability additives
Layers	PE or EVOH less than 3%
Labels	PE, PP
Adhesives	Wash off cleanly or minimal/no adhesive
Attachments, Closures, Pumps and Sprays	PE, PLA, or PS
Cap Liner	PE, EVA or TPE
Tamper Evidence	PE, PETG
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	10% PCR for transparent/natural 25% PCR for colored
Maximum	Up to 100% PCR

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OPTIMIZE Design Guides for Recycling – challenges to avoid

HDPE Bottles

Typically used for:
- Milk
- Baby formula
- Health and wellness (supplements, medicine)
- Personal and baby care
- Cleaning products

Suppliers are reminded that they are responsible for the compliance of their products, including their products packaging, with all applicable laws and regulations, including laws and regulations applicable to recyclability and compostability, such as the FTC's Green Guides and California's Public Resources Code. Walmart does not give its suppliers legal advice. Suppliers should consult their own counsel with questions about the applicability of laws and regulations to their products and packaging.

Recyclability challenges	Examples	Guidance
Metal parts in cap, pump, or spray	Sometimes used for cleaning, personal care	Look for all plastic caps, pumps, or sprays (some applications may have functional limitations and How2Recycle labels should be used to clearly communicate that the cap, pump, or spray with metal needs to be removed before recycling)
Fillers	When fillers are added to change the density of the package so that it sinks	Adjust the use of the filler to ensure the package floats
Materials to avoid that present recyclability challenges		
Resin	Avoid: Other resins mixed in	
Resin Color or Additives	Avoid: Dark colors with L value less than 40 or near-infrared (NIR) reflectance less than or equal to 10% (can't be sorted), for non-mechanical oil products (which aren't collected for recycling), Optical brighteners, Degradable additives (no biodegradability additives), PETG, PS, EPS, PVC, PVDC	
Attachments and Closures	Avoid: RFIDs Avoid: Metal, foils, PP, PVC, silicone	
Labels	Ensure materials, adhesives, and size of sleeve/label are not problematic for recycling, i.e., use APR "preferred" labels. Minimize direct printing. Avoid the following: • Materials for any type of label: paper, PVC • Materials just for non-wash releasable labels: PLA, PS, metal foils • Label coverage: Those that are not APR Preferred, does not pass APRs near infrared (NIR) Sorting Potential Test, greater than 60% label coverage of the container side wall section	
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see U.S. Plastics Pact Problematic and Unnecessary Materials and How2Recycle for more information	

LDPE Bottles, Jugs, and Jars*

Typically used for:
- Health and wellness bottles

Recyclable best practices: *Meets the following*	
Resin	LDPE density 0.917-0.93
Resin Color	Unpigmented, white, or light colors
Resin Additives	No degradable additives or biodegradability additives
Fillers	Ensure density of blend is less than 1.0
Layers	PE
Labels	PE, PP
Attachments, Closures	PE, PLA, or PS
Dimensions	Larger than 2" in two dimensions and largely 3-dimensional (vs. flat with one dimension <2")
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	25% PCR
Maximum	Up to 100% PCR

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**Plastic packages that have established recycling systems in the U.S., but not yet at rates consistent with the requirements for global reporting of progress according to the Ellen MacArthur Foundation New Plastics Economy Global Commitment.*

LDPE Bottles, Jugs, and Jars*

Typically used for:
- Health and wellness bottles

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Recyclability challenges	Examples	Guidance
Full body sleeves	Variety of products	Test for compatibility with sorting (see APR near infrared (NIR) sortation potential test), covering no more than 60% of the package surface helps
Materials to avoid that present recyclability challenges		
Resin Color or Additives	Avoid: Dark colors with L value less than 40 or near-infrared (NIR) reflectance less than or equal to 10% (can't be sorted), for non-mechanical oil products (which aren't collected for recycling), optical brighteners, degradable additives or biodegradability additives, PETG, PS, EPS, PVC, PVDC	
Attachments and Closures	Avoid: RFIDs Avoid: Metal, foils, PP, PVC, floating silicone polymer	
Labels	Ensure materials, adhesives, and size of sleeve/label are not problematic for recycling, i.e., use APR "preferred" labels. Avoid the following for: • Materials for any label type: paper, PVC • Materials for just non-wash releasable: PLA, PS, metal foils • Label coverage: Those that are not APR Preferred, does not pass APRs near infrared (NIR) Sorting Potential Test, greater than 60% label coverage of the container side wall section	
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see U.S. Plastics Pact Problematic and Unnecessary Materials and How2Recycle for more information	

**Plastic packages that have established recycling systems in the U.S., but not yet at rates consistent with the requirements for global reporting of progress according to the Ellen MacArthur Foundation New Plastics Economy Global Commitment.*

OPTIMIZE Design Guides for Recycling – best practices

PP Containers*

Rigid PP tubs, bottles, jugs, and jars, typically used for:

- Yogurt and food cups
- Frozen food tubs
- Personal care jars
- (other rigid PP containers may be in the "advance" classification)

Optimize: *Meets the following or passed the applicable APR benchmark and definitive tests*	
Resin	PP
Resin Color	Any color with an L value >40 or NIR reflectance >10%
Resin Additives and Layers	EVOH, workhorse additives (e.g., thermal stabilizers, UV stabilizers, nucleating agents, clarifying agents, antistatic agents, lubricants, pigments, impact improvers, chemical blowing agents), no degradable additives or biodegradability additives
In mold labels	PP
Non-Wash Releasable Labels	PP, PE – all with PP compatible adhesives
Wash Releasable Labels	PP, PE, PLA, PS
Attachments	PP, PLA
Closures, Pumps, and Sprays	PP, PS
Cap Liner	Liner made from EVA or TPE or no liner
Tamper Evidence	PP, PE, PETG, PLA
Dimensions	Larger than 2" in two dimensions and largely 3-dimensional (vs. flat with one dimension <2")
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	25% PCR
Maximum	Up to 100% PCR

**Plastic packages that have established recycling systems in the U.S., but some (i.e., PP rigid containers are not bottles) are not yet at rates consistent with the requirements for global reporting of progress according to the Ellen MacArthur Foundation New Plastics Economy Global Commitment.*

OPTIMIZE Design Guides for Recycling – challenges to avoid

PP Containers

Rigid PP tubs, bottles, jugs, and jars, typically used for:

- Yogurt and food cups
- Frozen food tubs
- Personal care jars
- (other rigid PP containers may be in the "advance" classification)

Design challenges	Examples	Guidance
Bags and films	Snacks	Explore PE bag and film options, innovative recyclable options, or advance an appropriate circular economy program
Full body sleeves	Many products	Test for compatibility with sorting (see APR near infrared (NIR) sortation potential test). Covering no more than 60% of package surface helps.
More 2-dimensional	Variety of products	Ensure that the size and shape are compatible with the sorting recycling processes by using the test from the Association of Plastic Recyclers
Food residue	Food products	Use the How2Recycle label that will include appropriate guidance for consumers to rinse the package before recycling

Materials to avoid that present recyclability design challenges	
Resin Color or Additives	Avoid: Degradable additives, optical brighteners, dark colors (i.e., with an L value <40 or NIR reflectance <=10% can't be sorted), fillers/additives that shift the density by more than 4%. PETG, PS, EPS, PVC, PVDC
Attachments and Closures	Avoid: RFIDs Avoid: PE, metal, PVC, silicone, paper
Labels	Ensure materials, adhesives, and size of sleeve/label are not problematic for recycling, i.e., use APR "preferred" labels. Minimize direct printing. • Avoid for any label type: paper, PVC, metal foil/metalized/metal printing • Avoid for non-wash releasable labels: PLA, PS • Avoid label coverage: Those that are not APR Preferred, does not pass APRs near infrared (NIR) Sorting Potential Test, greater than 60% label coverage of the container side wall section
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see U.S. Plastics Pact Problematic and Unnecessary Materials and How2Recycle for more information

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ADVANCE to a Circular Economy Solution

PP Containers

Other PP rigid containers, such as formats that are not tubs, bottles, jugs, nor jars (e.g., tubes, single serve coffee cups, beverage cups). (film/flexible are not included here, see bags, films, pouches)

Challenges and levers of change

Primarily a system challenge: PP may pose challenges to sortability for further processing and end markets.

- Engage in The Recycling Partnership's Polypropylene Recycling Coalition, Association of Plastic Recyclers, and the U.S. Plastics Pact to advance recycling systems (while sortation is the key challenge, other aspects of the recycling system have improvement potential)
- Optimize design, see previous "green" pages

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Bottles, Jars, Jugs, and Tubs

Made from acrylic, PETG, PC, PS, PVC, miscellaneous plastics, and multiple materials (e.g., tubes with different plastics and/or metal)

Typically used for:
- Arts and crafts
- Consumables (e.g., toothpaste, lotion)
- Food
- Health & wellness (e.g., medicine)
- Personal and hair care
- Pet food

Challenges

- It may be difficult for consumers to separate multiple materials
- Acrylic, PETG, PC, PS (and high impact PS), PVC and miscellaneous plastics are detrimental to recycling of more common plastics (e.g., HDPE, PET, PP) and are not accepted by most communities for recycling

Guidance

Change to:
- A similar format made from HDPE, PET, PP for bottles, jars, jugs and tubs
- A different recyclable format (e.g., paperboard box, cartons, PE film)

For plastic, use coatings and additives proven to be compatible with recycling to add necessary functionality (e.g., EVOH/compatibilizers), *see APR Design® Guide For Plastics Recyclability and APR testing*

See the applicable guides in this playbook to optimize the new design (e.g., labels, colors) and use the How2Recycle label

See information on small plastic packages (i.e., less than 2" in more than one dimension) on another page

OPTIMIZE	CHANGE	ADVANCE

GUIDES: BOXES

Paperboard

Typically used for:
- Food
- Frozen food
- Cleaning products
- Health and wellness (supplements, medicine)
- Personal, hair, and baby care
- Cosmetics
- Pet care
- Office supplies
- Arts and crafts
- Apparel (shoes, baby, women, men)
- Electronics
- General merchandise (DIY, sporting goods, automotive, home, kitchen, jewelry)
- Home and garden
- Party supplies
- Toys

Recyclable best practices: *Meets the following*	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Wet Strength Additives	Compatible with recycling processing as confirmed by Western Michigan University testing
Coatings	Use no coatings or use clay or varnish coatings
Adhesives	Minimal adhesives and tape or hydrophobic adhesives
Attachments	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Labels and Graphics	Paper or direct printed
Dunnage and Padding	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber options

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OPTIMIZE Design Guides for Recycling – challenges to avoid

Paperboard

Typically used for:
- Food
- Frozen food
- Cleaning products
- Health and wellness (supplements, medicine)
- Personal, hair, and baby care
- Cosmetics
- Pet care
- Office supplies
- Arts and crafts
- Apparel (shoes, baby, women, men)
- Electronics
- General merchandise (DIY, sporting goods, automotive, home, kitchen, jewelry)
- Home and garden
- Party supplies
- Toys

Recyclability challenges	Examples	Guidance
Frozen Food Cartons	Frozen foods	Improve end market and systems for collection and recycling of material that can be recovered (e.g., fiber) or innovate to use recycling compatible options
Food-Contact and Oily/Liquid-Contact Products	Variety of products	Ensure that the package can be easily cleaned or have no/low contamination/residue (e.g., frozen waffles) otherwise find another recyclable package design (may also consider reviewing the compostable packaging information to see that option applies)
Materials to avoid that present recyclability challenges		
Color, Layers, or Additives	Avoid: Plastic/polymer treatments or layers on fiber-based components (one side is better than both the outside and inside coated), treatments that require plastic/polymers (most holograms, high gloss), wax, bioplastic, metalized films, foils, wet strength additives that haven't passed Western Michigan University testing, dark colors, fragrances	
Attachments and Adhesives	Avoid: Metal, magnetic closures, electronics, PET, PLA, PP, PS, PVC, hot melt adhesives, stickers and adhesives (unless passes Western Michigan University testing)	
Labels	Avoid: Metal foil, metalized printing, PET, PLA, PP, PS, PVC	
Dunnage and Padding	Avoid: EPS and other expanded resin materials (see cushion, dunnage, and insert guidance in this playbook)	
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see the How2Recycle program for more information	

OPTIMIZE Design Guides for Recycling – best practices

Corrugated Board

Typically used for:
- E-commerce shipping boxes

Recyclable best practices: *Meets the following*	
Corrugated Box Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Color	Natural color
Coatings	Use no coatings or use clay or varnish coatings
Graphics	Direct printed
Adhesives	Minimal adhesives and tape
Attachments	Fiber
Shipping Labels	Paper or direct printed
Dunnage and Padding	Tree-based fiber options

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OPTIMIZE Design Guides for Recycling – challenges to avoid

Corrugated Board

Typically used for:
- E-commerce shipping boxes

Recyclability challenges	Examples	Guidance
Any addition that was not listed as recyclable	Variety of applications	Consider having the package tested by Western Michigan University
Adhesives	Hot melt	Avoid hot melt adhesives and use instead water-soluble adhesives
Materials to avoid that present recyclability challenges		
Color, Layers, or Additives	Avoid: Plastic/polymer treatments or layers on fiber-based components (one side is better than both the outside and inside coated), treatments that require plastic/polymers (most holograms, high gloss), wax, bioplastic, metalized films, foils, wet strength additives that haven't passed Western Michigan University testing, dark colors, fragrances	
Attachments	Avoid: Metal, magnetic closures, electronics, PET, PLA, PP, PS, PVC	
Labels	Avoid: Metal foil, metalized printing, PET, PLA, PP, PS, PVC	
Dunnage and Padding	Avoid: EPS and other expanded resin materials (see cushion, dunnage, and insert guidance in this playbook)	
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see the How2Recycle program for more information	

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OPTIMIZE Design Guides for Recycling – best practices

Molded Fiber

Typically used for:
- Frozen food trays (for some applications)
- Produce trays
- Bakery trays

Recyclable best practices: *Meets the following*	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Wet Strength Additives	Compatible with recycling as confirmed by Western Michigan University testing
Coatings	Use no coatings or use clay or varnish coatings
Adhesives	Minimal adhesives and tape or hydrophobic adhesives
Attachments	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Labels and Graphics	Paper or direct printed
Dunnage and Padding	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber options
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	Use certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Maximum	Up to 100% PCR

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OPTIMIZE Design Guides for Recycling – challenges to avoid

Molded Fiber

Typically used for:
- Frozen food trays (for some applications)
- Produce trays
- Bakery trays

Materials to avoid that present recyclability challenges	
Color, Layers, or Additives	Avoid: Plastic/polymer treatments or layers on fiber-based components (one side is better than both the outside and inside coated), treatments that require plastic/polymers (most holograms, high gloss), wax, metalized films, foils, wet strength additives that haven't passed Western Michigan University testing, dark colors, fragrances
Attachments and Adhesives	Avoid: Metal, magnetic closures, electronics, PET, PLA, PP, PS, PVC, hot melt adhesives, stickers and adhesives (unless passes Western Michigan University testing)
Labels	Avoid: Metal foil, metalized printing, PET, PLA, PP, PS, PVC
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see the How2Recycle program for more information

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OPTIMIZE	CHANGE	ADVANCE

GUIDES: CARTONS AND CANISTERS

OPTIMIZE Design Guides for Recycling – best practices

Paperboard

Typically used for:

- Food
- Health and wellness (supplements, medicine)
- Personal, hair, and baby care
- Cosmetics
- Office supplies
- Arts and crafts
- General merchandise (DIY, sporting goods, automotive, home, kitchen, jewelry)
- Party supplies
- Toys

Recyclable best practices: *Meets the following*	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Wet Strength Additives	Compatible with recycling processing as confirmed by Western Michigan University testing
Coatings	Use no coatings or use clay or varnish coatings
Adhesives	Minimal adhesives and tape or hydrophobic adhesives
Attachments	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Labels and Graphics	Paper or direct printed
Dunnage and Padding	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber options

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OPTIMIZE Design Guides for Recycling – challenges to avoid

Paperboard

Typically used for:
- Food
- Health and wellness (supplements, medicine)
- Personal, hair, and baby care
- Cosmetics
- Office supplies
- Arts and crafts
- General merchandise (DIY, sporting goods, automotive, home, kitchen, jewelry)
- Party supplies
- Toys

Recyclability challenges	Examples	Guidance
Rigid Canisters or Cartons	Variety of products	Very rigid paper packages that are more three-dimensional than two-dimensional may not be sorted with the paper recycling and end up as waste, therefore it is best to test for sorting and include any necessary instructions for flattening as needed
Frozen Food Cartons	Frozen foods	Improve end market and systems for collection and recycling of material that can be recovered (e.g., fiber) or innovate to use recycling compatible options
Food-Contact and Oily/Liquid-Contact Products	Variety of products	Ensure that the package can be easily cleaned or have no/low contamination/residue otherwise find another recyclable package design (may also consider reviewing the compostable packaging information to see that option applies)
Materials to avoid that present recyclability challenges		
Color, Layers, or Additives	Avoid: Plastic/polymer treatments or layers on fiber-based components (one side is better than both the outside and inside coated), treatments that require plastic/polymers (most holograms, high gloss), wax, bioplastic, metalized films, foils, wet strength additives that haven't passed Western Michigan University testing, dark colors, fragrances	
Attachments and Adhesives	Avoid: Metal, magnetic closures, electronics, PET, PLA, PP, PS, PVC, Hot melt adhesives, Stickers and adhesives (unless passes Western Michigan University testing)	
Labels	Avoid: Metal foil, metalized printing, PET, PLA, PP, PS, PVC	
Dunnage and Padding	Avoid: EPS and other expanded resin materials (see cushion, dunnage, and insert guidance in this playbook)	
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see the How2Recycle program for more information	

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Canisters and Cartons

Coated paper for shelf-stable or refrigerated foods and beverages

Typically used for:
- Shelf stable broth, milk, wine, juice (sometimes referred to as aseptic boxes, bricks, or TetraPak)
- Refrigerated milk, juice (sometimes referred to as gable top)

Frozen food cartons are not currently recyclable.

Recyclable best practices: *Meets the following*	
Material	Shelf stable cartons: primarily of paper with a thin layer of polyethylene and an additional layer of aluminum Refrigerated cartons: primarily of paper with a thin layer of polyethylene
Attachments	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	Use certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber

Recyclability challenges	Examples	Guidance
Frozen Food Cartons	Frozen foods	Improve end market and systems for collection and recycling of material that can be recovered (e.g., fiber) or innovate to use recycling compatible options
Mixed materials	Beverages	Avoid using non-paper materials beyond those used in the carton itself - see materials above (e.g., no metal attachments/closures, RFIDs)

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Canisters and Cartons

- **Paper-based containers with a metal top or bottom**

Typically used for:
- Baby food
- Frozen juice concentrate
- Grocery (e.g., coffee, chips)

Shelf-stable and refrigerated cartons and bricks (e.g., TetraPak) are recyclable

Challenges

- It may be difficult for consumers to separate multiple materials
- Metal can be detected during sorting in recycling systems, potentially losing the paper recycling value
- Rigid paper containers may not sort with paper, potentially losing the paper recycling value
- Double sided coated frozen paperboard containers may not be accepted for recycling

Guidance

Change to:
- A similar format with a single material and optimize for recycling (e.g., paperboard canister or box or HDPE tub)
    - Very rigid paper packages that are more three-dimensional than two-dimensional may not be sorted with the paper recycling and end up as waste, therefore it is best to test for sorting and include any necessary instructions for flattening as needed
- A different recyclable format (e.g., paperboard box, PE film, PET tub, PP tub), *coatings for paper-based packaging may need to validate recyclability with testing (e.g., through Western Michigan University tests)*

See the applicable guides in this playbook to optimize the new design (e.g., labels, colors) and use the How2Recycle label

(see next page for information on frozen food containers)

ADVANCE to a Circular Economy Solution (usually a longer-term approach)

Canisters and Cartons

- **Coated paper-based frozen food containers**

Typically used for:
- Ice cream and related products

Shelf-stable and refrigerated cartons and bricks (e.g., TetraPak) are recyclable

Challenges and levers of change

Design	Collection	Sortation	Processing	End-Market
Remove contaminants	Improve collection	Improve sortation	Improve processing	Improve end market

Both design and system challenges: Mixtures of materials, such as with the coatings, may be difficult to separate and may end up as waste

- Optimize design, switch to a recyclable format, or identify collaborators to develop recycling system; reach out to the Carton Council to learn how they developed a new recycling market like this

Optimize design and advance the recycling system

- Switch to a recyclable format (e.g., use recyclable coating, use a PET or PP tub) or develop an appropriate circular economy solution (e.g., advance the recycling system, reuse, or composting)
  - If using paper with recyclable coatings proven to fit in a recycling system (e.g., a new one), be sure to avoid including metal and ensure compatible with recycling systems, especially for sortability since very rigid paper packages that are more three-dimensional than two-dimensional may not be sorted with the paper recycling and end up as waste, therefore it is best to test for sorting and include any necessary instructions for flattening as needed

Use the How2Recycle label

OPTIMIZE	CHANGE	ADVANCE

GUIDES: CANS

Metal Containers

Typically used for:
- Beverage cans
- Food cans
- Aerosol food cans
- Aerosol cleaning product cans

Recyclable best practices: *Meets the following*	
Materials	Aluminum, steel
Labels	Lacquer printing on container
Attachments, closures	Same metal as package
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	70% aluminum, 20% steel
Maximum	Up to 100% PCR

Recyclability challenges	Examples	Guidance
Full body sleeves	Beverages	Avoid using or ensure compatible with removal during recycling (since a contaminant that reduces value of recycled metal and can slow down recycling operations)
Mixed materials	Beverages	Avoid PVC; avoid using non-metal materials (e.g., no plastic, lead, steel, or glass); and maximize total portion of aluminum in aluminum containers
Metal trays and pans	Frozen food	Shift to a recyclable option (e.g., light colored PP) or work to improve the acceptance of these for recycling (currently metal trays not collected by enough communities because they are difficult to separate from cans; limited value; can have food contamination)
Materials to avoid that present recyclability challenges		
Attachments and Closures	Avoid: Plastic, stickers	
Labels	Avoid: Stickers, full body plastic sleeves	

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OPTIMIZE	CHANGE	ADVANCE

GUIDES: CUSHION, DUNNAGE, AND INSERTS

OPTIMIZE Design Guides for Recycling – best practices

Paper Cushion

Paper-based air pillow or paper sheets

Typically used for:
- General merchandise
- Home and garden
- Ecommerce

Recyclable best practices: *Meets the following*	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Wet Strength Additives	Compatible with recycling processing as confirmed by Western Michigan University testing
Coatings	Use no coatings or use clay or varnish coatings
Adhesives	Minimal adhesives and tape or hydrophobic adhesives
Attachments	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Labels and Graphics	Paper or direct printed

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OPTIMIZE Design Guides for Recycling – challenges to avoid

Paper Cushion

Paper-based air pillow or paper sheets

Typically used for:
- General merchandise
- Home and garden
- Ecommerce

Materials to avoid that present recyclability challenges	
Color, Layers, or Additives	Avoid: Plastic/polymer treatments or layers on fiber-based components (one side is better than both the outside and inside coated), treatments that require plastic/polymers (most holograms, high gloss), wax, bioplastic, coatings, metalized films, foils, wet strength additives that haven't passed Western Michigan University testing, dark colors, fragrances
Attachments and Adhesives	Avoid: Metal, magnetic closures, electronics, PET, PLA, PP, PS, PVC, Hot melt adhesives, Stickers and adhesives (unless passes Western Michigan University testing)
Labels	Avoid: Metal foil, metalized printing, PET, PLA, PP, PS, PVC
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see the How2Recycle program for more information

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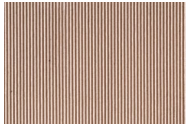
OPTIMIZE Design Guides for Recycling – best practices

Corrugated Board



Typically used for:
- General merchandise
- Home and garden
- Ecommerce

Recyclable best practices: *Meets the following*	
Corrugated Box Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Color	Natural color
Coatings	Use no coatings or use clay or varnish coatings
Graphics	Direct printed
Adhesives	Minimal adhesives and tape
Attachments	Fiber

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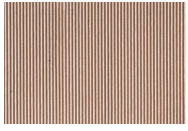
Corrugated Board



Typically used for:
- General merchandise
- Home and garden
- Ecommerce

Materials to avoid that present recyclability challenges	
Color, Layers, or Additives	Avoid: Plastic/polymer treatments or layers on fiber-based components (one side is better than both the outside and inside coated), treatments that require plastic/polymers (most holograms, high gloss), wax, bioplastic, metalized films, foils, wet strength additives that haven't passed Western Michigan University testing, dark colors, fragrances
Attachments and Adhesives	Avoid: Metal, magnetic closures, electronics, PET, PLA, PP, PS, PVC, Hot melt adhesives, Stickers and adhesives (unless passes Western Michigan University testing)
Labels	Avoid: Metal foil, metalized printing, PET, PLA, PP, PS, PVC
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see the How2Recycle program for more information

Suppliers are reminded that they are responsible for the compliance of their products, including their products packaging, with all applicable laws and regulations, including laws and regulations applicable to recyclability and compostability, such as the FTC's Green Guides and California's Public Resources Code. Walmart does not give its suppliers legal advice. Suppliers should consult their own counsel with questions about the applicability of laws and regulations to their products and packaging.

Molded Fiber

Molded fiber could be used with the following:
- General merchandise
- Home and garden
- Ecommerce

Recyclable best practices: *Meets the following*	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Wet Strength Additives	Compatible with recycling as confirmed by Western Michigan University testing
Coatings	Use no coatings or use clay or varnish coatings
Adhesives	Minimal adhesives and tape or hydrophobic adhesives
Attachments	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Labels and Graphics	Paper or direct printed
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	Use certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Maximum	Up to 100% PCR

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OPTIMIZE Design Guides for Recycling – challenges to avoid

Molded Fiber

Molded fiber could be used with the following:

- General merchandise
- Home and garden
- Ecommerce

Materials to avoid that present recyclability challenges	
Color, Layers, or Additives	Avoid: Plastic/polymer treatments or layers on fiber-based components (one side is better than both the outside and inside coated), treatments that require plastic/polymers (most holograms, high gloss), wax, metalized films, foils, wet strength additives that haven't passed Western Michigan University testing, dark colors, fragrances
Attachments and Adhesives	Avoid: Metal, magnetic closures, electronics, PET, PLA, PP, PS, PVC, Hot melt adhesives, Stickers and adhesives (unless passes Western Michigan University testing)
Labels	Avoid: Metal foil, metalized printing, PET, PLA, PP, PS, PVC
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see the How2Recycle program for more information

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PE Cushion*

Typically used for:
- General merchandise
- Home and garden
- Ecommerce

Recyclable best practices: *Meets the following or passed the applicable APR benchmark and definitive tests*	
Resin	LDPE, MDPE, LLDPE, or HDPE film
Resin Color	Unpigmented is best or white or light colors
Resin Additives	Use compatible additives at levels that do not alter the base material density (e.g., EVOH at recommended levels, see the APR Design ® Guide for more details); No degradable or biodegradability additives or starch
Fillers	Ensure density of blend is less than 1.0
Layers	PE
Labels	PE or direct printed
Attachments	PE
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	No minimum PCR content, but may be added in the future

**Plastic packages that have established recycling systems in the U.S., but not yet at rates consistent with the requirements for global reporting of progress according to the Ellen MacArthur Foundation New Plastics Economy Global Commitment.*

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OPTIMIZE Design Guides for Recycling – challenges to avoid

PE Cushion*

Typically used for:
- General merchandise
- Home and garden
- Ecommerce

Recyclability challenges	Examples	Guidance
Recycled content	Variety of products	No minimum due to limited availability of options currently available
Materials to avoid that present recyclability challenges		
Resin	Avoid: Any non-PE resins mixed in (avoid less than 90% PE)	
Resin Color or Additives	Avoid: Dark colors (e.g., blue, green), PVC, PVDC, metalized layers, fillers that alter the blend density to be greater than 1.0, Starch resins, Degradable additives (no biodegradability additives), PS, EPS, PVC, PVDC	
Attachments and Closures	Avoid: RFIDs Avoid: Metal, foils, fibers, PET, PLA, PP, PS, PVC, PVDC	
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see U.S. Plastics Pact Problematic and Unnecessary Materials and How2Recycle for more information	

**Plastic packages that have established recycling systems in the U.S., but not yet at rates consistent with the requirements for global reporting of progress according to the Ellen MacArthur Foundation New Plastics Economy Global Commitment.*

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Foam Cushion, Dunnage, Inserts

- **Expanded polystyrene or other resins, nylon**
- **Mushroom packaging**

Typically used for:
- General merchandise
- Home and garden

Challenges

- Expanded polystyrene (EPS) and other foam (expanded PET, expanded PP, expanded PE), nylon, mushroom packaging* for cushion, dunnage, or inserts are not accepted by most communities for recycling

Guidance

Change to:
- A design that doesn't have the need for cushion, dunnage, and inserts
- A material that is recyclable such as corrugate, paper and paperboard, PE air pillows, and molded fiber

See the applicable guides in this playbook to optimize the new design (e.g., labels, colors) and use the How2Recycle label

**While mushroom packaging is often compostable, recyclable options are preferred for this type of packaging.*

OPTIMIZE	CHANGE	ADVANCE

GUIDES: TRAYS, CLAMSHELLS, AND THERMOFORMS

Paperboard

Typically used for:

- Food
- Frozen food
- Cleaning products
- Health and wellness (supplements, medicine)
- Personal, hair, and baby care
- Cosmetics
- Pet care
- Office supplies
- Arts and crafts
- Apparel (shoes, baby, women, men)
- Electronics
- General merchandise (DIY, sporting goods, automotive, home, kitchen, jewelry)
- Home and garden
- Party supplies
- Toys

Recyclable best practices: *Meets the following*	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Wet Strength Additives	Compatible with recycling processing as confirmed by Western Michigan University testing
Coatings	Use no coatings or use clay or varnish coatings
Adhesives	Minimal adhesives and tape or hydrophobic adhesives
Attachments	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Labels and Graphics	Paper or direct printed
Dunnage and Padding	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber options

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OPTIMIZE Design Guides for Recycling – challenges to avoid

Paperboard

Typically used for:
- Food
- Frozen food
- Cleaning products
- Health and wellness (supplements, medicine)
- Personal, hair, and baby care
- Cosmetics
- Pet care
- Office supplies
- Arts and crafts
- Apparel (shoes, baby, women, men)
- Electronics
- General merchandise (DIY, sporting goods, automotive, home, kitchen, jewelry)
- Home and garden
- Party supplies
- Toys

Recyclability challenges	Examples	Guidance
Frozen Food Cartons	Frozen foods	Improve end market and systems for collection and recycling of material that can be recovered (e.g., fiber) or innovate to use recycling compatible options
Food-Contact and Oily/Liquid-Contact Products	Variety of products	Ensure that the package can be easily cleaned or have no/low contamination/residue (e.g., frozen waffles) otherwise find another recyclable package design (may also consider reviewing the compostable packaging information to see if that option applies)
Materials to avoid that present recyclability challenges		
Color, Layers, or Additives	Avoid: Plastic/polymer treatments or layers on fiber-based components (one side is better than both the outside and inside coated), treatments that require plastic/polymers (most holograms, high gloss), wax, bioplastic, metalized films, foils, wet strength additives that haven't passed Western Michigan University testing, dark colors, fragrances	
Attachments and Adhesives	Avoid: Metal, magnetic closures, electronics, PET, PLA, PP, PS, PVC, hot melt adhesives, stickers and adhesives (unless passes Western Michigan University testing)	
Labels	Avoid: Metal foil, metalized printing, PET, PLA, PP, PS, PVC	
Dunnage and Padding	Avoid: EPS and other expanded resin materials (see cushion, dunnage, and insert guidance in this playbook)	
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see the How2Recycle program for more information	

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OPTIMIZE Design Guides for Recycling – best practices

Molded Fiber

Typically used for:
- Frozen food trays (for some applications)
- Produce trays
- Bakery trays

Recyclable best practices: *Meets the following*	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Wet Strength Additives	Compatible with recycling as confirmed by Western Michigan University testing
Coatings	Use no coatings or use clay or varnish coatings
Adhesives	Minimal adhesives and tape or hydrophobic adhesives
Attachments	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Labels and Graphics	Paper or direct printed
Dunnage and Padding	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber options
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	Use certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Maximum	Up to 100% PCR

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OPTIMIZE Design Guides for Recycling – challenges to avoid

Molded Fiber

Typically used for:
- Frozen food trays (for some applications)
- Produce trays
- Bakery trays

Recyclability challenges	Examples	Guidance
Food-Contact and Oily/Liquid-Contact Products	Variety of products	Ensure that the package can be easily cleaned or have no/low contamination/residue (e.g., frozen waffles) otherwise find another recyclable package design (may also consider reviewing the compostable packaging information to see that option applies)
Materials to avoid that present recyclability challenges		
Color, Layers, or Additives	Avoid: Plastic/polymer treatments or layers on fiber-based components (one side is better than both the outside and inside coated), treatments that require plastic/polymers (most holograms, high gloss), wax, metalized films, foils, wet strength additives that haven't passed Western Michigan University testing, dark colors, fragrances	
Attachments and Adhesives	Avoid: Metal, magnetic closures, electronics, PET, PLA, PP, PS, PVC, hot melt adhesives, stickers and adhesives (unless passes Western Michigan University testing)	
Labels	Avoid: Metal foil, metalized printing, PET, PLA, PP, PS, PVC	
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see the How2Recycle program for more information	

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ADVANCE to a Circular Economy Solution

PET Thermoforms (e.g., Boxes, Clamshells, Cups)

Typically used for:
- Bakery and deli
- Eggs
- General merchandise (sporting goods, automotive, home)

Challenges and levers of change

Design	Collection	Sortation	Processing	End-Market
Remove contaminants	Improve collection	Improve sortation	Ensure processing	Ensure end market

Both design and system challenges:
- Collection dropped below levels considered to be widely "recyclable"
- These packages may have contaminating materials (e.g., labels, adhesives)

- Engage in the Association of Plastic Recyclers, The Recycling Partnership, Foodservice Packaging Institute, U.S. Plastics Pact to advance recycling systems
- Optimize design or switch to a recyclable format (e.g., paper bag), see following pages

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ADVANCE to a Circular Economy Solution – design elements to utilize

PET Thermoforms (e.g., Boxes, Clamshells, Cups)

Typically used for:
- Bakery and deli
- Eggs
- General merchandise (sporting goods, automotive, home)

Optimize: ***Meets the following or passed the applicable APR benchmark and definitive tests***	
Resin	PET bottle grade with a crystalline melting point between 225 and 255°C
Resin Color	Clear
Resin Additives	No degradable or biodegradability additives
Label	PP or PE (that float when printed)
Attachments	Clear if PET; colored ok for PP or PE
Tamper Evidence	Easily fully removable, PET, PP, or PE
Dimensions	Larger than 2" in two dimensions and largely 3-dimensional (vs. flat with one dimension <2")
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	25% PCR
Maximum	Up to 100% PCR

Use the How2Recycle label

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ADVANCE to a Circular Economy Solution – design elements to avoid

PET Thermoforms (e.g., Boxes, Clamshells, Cups)

Typically used for:
- Bakery and deli
- Eggs
- General merchandise (sporting goods, automotive, home)

Suppliers are reminded that they are responsible for the compliance of their products, including their products packaging, with all applicable laws and regulations, including laws and regulations applicable to recyclability and compostability, such as the FTC's Green Guides and California's Public Resources Code. Walmart does not give its suppliers legal advice. Suppliers should consult their own counsel with questions about the applicability of laws and regulations to their products and packaging.

Design challenges	Examples	Guidance
Black trays	Bakery and produce	Black currently isn't detected in sorting for PET, has no valuable end markets, it should be switched to clear or transparent light blue or green if it isn't 100% PCR
Non-PET clamshells	Variety of products	Look to switch to a recyclable format (e.g., paper, PET)
More 2-dimensional	Variety of products	Ensure that the size and shape are compatible with the sorting recycling processes by using the test from the Association of Plastic Recyclers
Blister packages (e.g., paper and plastic)	Toys, general merchandise, health and wellness	These are often hard to separate or are not used by recyclers, design or innovate to use a recyclable package (e.g., paper, PET, PE film/bag)

Materials to avoid that present recyclability design challenges	
Resin	Avoid: PETG, or Other resins mixed in
Resin Color or Additives	Avoid: Transparent colors (green should be limited to compostable packaging based on guidance from the State of Washington), opaque colors, dark colors (i.e., with an L value <40 or NIR reflectance <=10% can't be sorted), degradable additives or biodegradability additives, PETG, PS, EPS, PVC, PVDC
Attachments/Closures	Avoid: RFIDs Avoid: Metal, foils, PS, PVC, PLA, PETG
Labels and Adhesives	Ensure materials, adhesives, and size of sleeve/label is not problematic for recycling, i.e., use APR "preferred" labels. Avoid the following • Materials: Metal foil, metalized printing, PS, PVC, PLA, PETG, paper labels not APR Preferred or that do not pass APR testing • Label coverage: Those that are not APR Preferred, does not pass APRs near infrared (NIR) Sorting Potential Test, for containers of 550 ml or less labels that cover more than 55% of the bottle surface area with label, for containers greater than 550 ml labels that covert more than 70% of the bottle surface area with label • Inks: Bleeding inks or direct printing that do not pass APR testing, minimize direct printing on the container
Other	Avoid intentionally added per- and polyfluoroalkyl substances (PFASs) – see U.S. Plastics Pact Problematic and Unnecessary Materials and How2Recycle for more information

Trays, Clamshells, Thermoforms, Cases

EPS, PS, PVC, Acrylic

Typically used for:
- Arts and crafts
- Cosmetics
- Electronics
- Food (e.g., bakery, cookies, deli, frozen, meat)
- General merchandise
- Home Décor and Do It Yourself
- Office
- Personal care
- Toys

Challenges

- Acrylic, expanded polystyrene (EPS), polystyrene (PS), polyvinyl chloride (PVC) are not accepted by most communities for recycling
- These materials can be detrimental to the recycling of more common plastics and can result in losses due to contamination

Guidance

Change to:
- A similar format that is a recyclable option such as PET, PP, or molded fiber
- A different recyclable format (e.g., box, bag)

See the appendix for information on compostable packaging to see if this option applies

See the applicable guides in this playbook to optimize the new design (e.g., labels, colors) and use the How2Recycle label

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OPTIMIZE	CHANGE	ADVANCE

GUIDES: OTHER PACKAGES: BLISTER PACKS

Blister Packs

(usually with multiple materials such as PET/paper, PVC/metal)

Typically used for:
- Arts and crafts
- Consumables
- Health & wellness (e.g., supplements, medicine)
- Electronics
- General merchandise
- Home Décor and Do It Yourself
- Office
- Toys

Challenges

- It is difficult for consumers to separate multiple materials
- Commonly used PVC thermoforms are detrimental to plastic recycling

Guidance

Change to:
- A different format with a single material (e.g., paperboard box, PE bag)
- A similar format with materials that are easily separated and recyclable on their own (e.g., PET clamshell or tray with paper insert), or use the acceptable attachments noted in this playbook

Avoid materials that are detrimental to plastic recycling (e.g., PVC, PETG, foils), including adhesives that remain on the plastic that are not compatible with recycling

See the applicable guides in this playbook to optimize the new design (e.g., labels, colors) and use the How2Recycle label

Exception for Drugs: When drugs require individual dosing with tamper evidence and product protection that another option cannot provide, blister packs with multiple materials are acceptable, but the company should have a development pipeline that aims to replace this design with recyclable alternatives (supplements are not included in this exception)

Example recyclable formats to consider

Paperboard box	Paperboard display	PE bag	PET clamshell, tray
			

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OPTIMIZE	CHANGE	ADVANCE

GUIDES: OTHER PACKAGES: PLASTIC TUBES WITH MULTIPLE MATERIALS

ADVANCE to a Circular Economy Solution (usually a longer-term approach)

Tubes

- **Plastic and made of multiple materials (aluminum, plastic)**

Typically used for:
- Arts and crafts
- Consumables (e.g., toothpaste, lotion)
- Health & wellness (e.g., medicine)

Challenges and levers of change

Design	Collection	Sortation	Processing	End-Market
Use single resin	Expand collection	Improve sortation	Improve processing	Improve end market

Both design and system challenges: Tubes often are a mixture of materials not collected for recycling

- Design tubes from a single PE resin and engage in the Association of Plastic Recyclers Tube Working Group, The Recycling Partnership, and the U.S. Plastics Pact to advance recycling systems
- Or switch to a recyclable format

Work to advance innovation in recyclable packaging or the development of an appropriate circular economy solution

- Use a different package material and format that is recyclable (e.g., paperboard box, PE bag)
- Or design tubes from a single PE resin optimized for recycling (e.g., use compatible additives such as limited EVOH, *see APR Design® Guide For Plastics Recyclability)*, see Colgate Palmolive toothpaste tube development, and engage in the industry to advance its recycling (see above)

If a recyclable option is not feasible, help advance the development of an appropriate circular economy solution (e.g., reuse, composting, take-back) for the current package (e.g., packages with significant product residue detrimental to recycling or not compatible with recycling, packages smaller than 2" in more than one dimension).

Use the How2Recycle label

OPTIMIZE	CHANGE	ADVANCE

GUIDES: OTHER PACKAGES: FLAT OR SMALL PLASTIC

Flat plastic

Flat plastic has 2 dimensions or is more 2-dimensional than 3-dimensional

Flat plastic found across the store as a window on a package or the package itself.

- Grocery (e.g., bakery, pasta)
- Consumables (e.g., cosmetics)
- General merchandise (e.g., electronic accessories)
- Toys

Challenges

- Flat plastic may end up with paper recycling in which case it potentially contaminates paper or does not get recycled

Guidance

Change:

- Design out flat plastic packaging components (e.g., windows)

For PET thermoforms that are not a window but more of a plastic box or container that could be more 2-dimensional than 3-dimensional, see PET thermoform guidance and:

- Ensure that the size and shape are compatible with the recycling process by using the test from the Association of Plastic Recyclers
- Or **Change** to a recyclable format (e.g., box, bag)

See the applicable guides in this playbook to optimize the new design (e.g., labels, colors) and use the How2Recycle label

ADVANCE to a Circular Economy Solution (usually a longer-term approach)

Small plastic containers

- **Small packages are <2" in more than one dimension**

Small packages are typically used for:
- Arts and crafts
- Consumables (e.g., toothpaste, lotion)
- Health & wellness (e.g., medicine)
- Cosmetics

Challenges and levers of change

Design	Collection	Sortation	Processing	End-Market
Use single resin		Improve sortation		

Primarily a system challenge: Small packages can fall through recycling sorting steps to end up as waste

- Optimize design and engage in the Association of Plastic Recyclers, The Sustainability Consortium, and the U.S. Plastics Pact to advance recycling systems for these harder to recycle items
- Or switch to a recyclable format

Work to advance innovation in recyclable packaging or the development of an appropriate circular economy solution

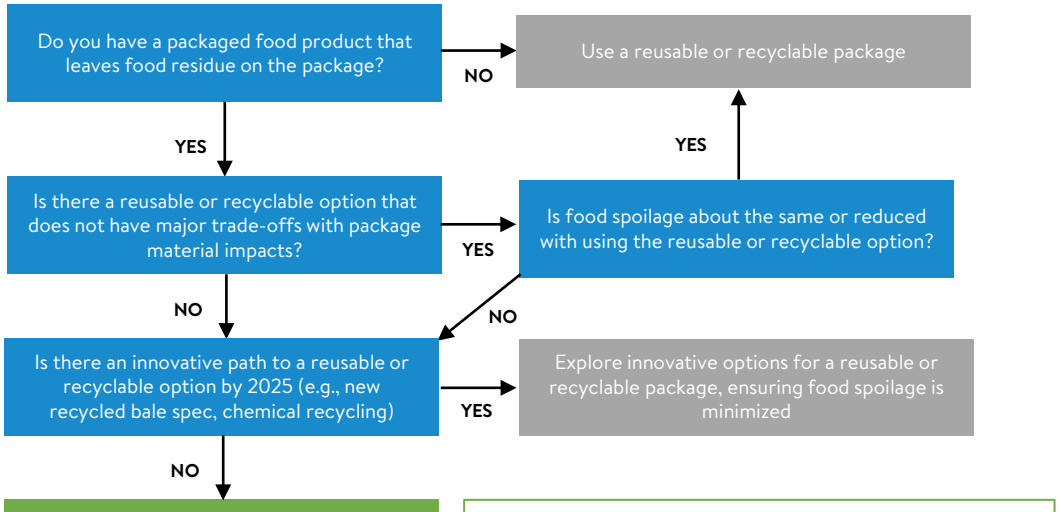
- Design small packages to pass the test for sorting. Ensure that the size and shape are compatible with the recycling process by using the test from the Association of Plastic Recyclers. However, increasing the package size and material use are not recommended. Also, ensure that the overall design is optimized for recycling the material (e.g., labels, color, caps). Refer to the applicable green/gray design pages (e.g., HDPE bottle, etc.).
- If cannot meet requirement for sorting, help advance the development of an appropriate circular economy solution
- Or switch to a recyclable format

Use the How2Recycle label

COMPOSTABLE PACKAGING

WHEN IS COMPOSTABLE PACKAGING AN OPTION?

When packaging, food waste, and end-of-life impacts are balanced & reusable and recyclable options do not work



What looks like a recyclable option or could interfere with existing recycling systems?

- Rigid plastic packages (a composter would dispose it thinking it was not compostable; a consumer would recycle it thinking it was recyclable; or where recyclable options are likely available)

Example products that might consider compostable packaging:

- Single serve condiments
- Chips and snack foods

This information applies to retail product packaging (e.g., does not refer to food service, products)

WHAT TO WATCH FOR: COMPOSTABLE PACKAGING

Composting is a natural degradation process that produces a soil conditioner from organic materials

INDUSTRIAL COMPOSTING: **Consumers currently do not have enough access** to industrial composting programs

- Approximately 5% of U.S. households have access to curbside food waste collection; not all programs accepting compostable packaging
- *Look for **Biodegradable Products Institute** (BPI) certified compostable packaging (or equivalent)*

COMMUNITY AND HOME COMPOSTING: Usually **a long process with small volumes** and with some technical limitations

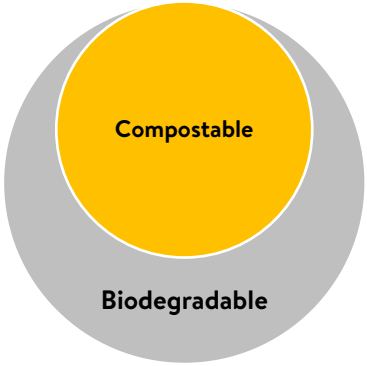
- *Look for **BPI certified compostable packaging PLUS TUV's OK compost home certification***

If compostable packaging proves to be the best way to balance end-of-life management, packaging material impacts, and food waste be sure to* **support the expansion of composting access for consumers** (e.g., engage with and/or fund organizations, policy development, and other efforts increasing composting access)

**Applicable for countries with composting in countries that do not have any consumer composting access or that ban packaging in composting should not use compostable packaging (e.g., South Africa).*

COMPOSTABLE PACKAGING IS NOT THE SAME AS BIODEGRADABLE

Do not make claims about biodegradability of packaging, only refer to compostability (when applicable)



Compostable

Biodegrades into compost at a rate consistent with other known compostable materials and without visible residue as verified through standard tests.

Biodegradable

Under appropriate conditions, breaks down into carbon dioxide, minerals and other materials found in nature. *Note: packages can be biodegradable but are not compostable; biodegradation cannot expect to happen in a landfill; making biodegradable claims are not instructing a responsible end-of-life behavior and are confusing to consumers.*

Biodegradable additives: Used to help something partially biodegrade but does not enable compostability and should be avoided in packaging.

- Do not use in petroleum-based plastics since compromises the recycling stream (Source: Sustainable Packaging Coalition).
- Do not use in compostable packaging since they are not needed.

Marine degradability: This is a subset of biodegradability, where the material can effectively break down in marine environments, and while is a desirable attribute for some materials, this is not a claim that should be made on any packaging.

PFAS: Long and short chain per- and poly-fluorinated alky substances (PFAS) are often used to grease and water-proof fiber-based packaging and should be avoided. BPI compostable certification does not allow for intentional addition of PFAS. (Source: *BPI*).

***Bio-based** refers only to the source of the materials the package was made from and does not mean the package is compostable or biodegradable (e.g., bio-based PET is recyclable and not biodegradable) – look for certification to confirm compostability (e.g., BPI).*

WHAT SYSTEMS ARE COMMONLY AVAILABLE FOR COMPOSTING PACKAGING?

- *There are ~ 1,000 industrial composting facilities that accept waste from consumers in the U.S., of which ~ 16% currently accept compostable packaging*
- *The most common systems include windrow, aerated static pile (ASP), or in-vessel systems.*

	WINDROW	AERATED STATIC PILE (ASP)	IN-VESSEL
			
Description	Waste is formed into rows of long piles -called windrows – and periodically turned, manually or mechanically.	Waste is pre-mixed and placed in large piles where fans push pr pull air through the pile.	Waste is fed into a drum, silo, concrete-lined trench, or similar equipment. May include aeration, agitation, or temperature control systems.
Timeframe to finished compost	6-9 months	3-6 months	In vessel 3 days- 6 weeks followed by windrow or ASP to finish
Advantages	Can process large volumes of material and creates large amounts of finished compost Simpler system to operate Longer timeframe for materials to breakdown	Requires less land and labor than windrow composting Shorter timeframe and controlled environment for materials to breakdown Odor treatment can be integrated	Can be small enough to be sited directly on-site at institutions Shorter timeframe and controlled environment for materials to breakdown Odor treatment can be integrated
Limitations	Requires larger parcels of land to site and scale Requires regulatory zoning, siting, and enforcement (e.g., odor, size, water quality, etc.) Higher operating cost (e.g., fuel use)	Requires more infrastructure and technical insight to correctly install and maintain Requires regulatory zoning, siting, and enforcement (e.g., odor, size, water quality, etc.) May pose a challenge for bioplastics composting	More expensive on a per unit basis May require more technical expertise to operate

Source: Sustainable Packaging Coalition: Compostable Packaging Collaborative

WHAT PACKAGING MATERIALS ARE COMPOSTABLE?

Not all materials are compatible with common industrial composting systems

Material *	Windrows	Aerated Static Pile (ASP)	Covered in-vessel (IVC)
Starch	Yes	Yes	Yes
PLA (Polylactic acid)	Yes	Yes	Yes
Paper and Card	Yes	Yes	Yes
Recycled Paper Pulp	Yes	Yes	Yes
Molded Bagasse Pulp	Yes	Yes	Yes
Molded Palm Fiber	Yes	Yes	Yes
Molded Bamboo Fiber/Pulp	Yes	Yes	Yes
Paperfoam	Yes	Yes	Yes
High Amylose Corn Starch	Yes	Yes	Yes
Thermoplastic starch (TPS)	Yes	Yes	Yes
Polyhydroxyalkanoate (PHA) - Canola oil base	Sometimes**	Sometimes**	Sometimes**
Polyhydroxybutyrate (PHB)	Sometimes**	Sometimes**	Sometimes**
Uncoated Cellulose-based Films	Sometimes**	Sometimes**	Sometimes**

** Raw material only, does not consider other packaging attributes such as closures, format, etc.*
*** May depend on packaging compositions & thicknesses*

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BEST PRACTICES: HOW TO LABEL COMPOSTABLE PACKAGING

1. **Clearly indicate that the package is certified for industrially composting by including the BPI Certification Mark.** The BPI Certification Mark and the How2Compost label can be included to reinforce on-product claims and differentiate between certified items and non-compostable packaging for certified items. All compostable claims must be qualified to make clear that:
   - The item is not home compostable unless it is certified specifically for home compostability
   - Commercial compost facilities are not available to a majority of consumers or communities where the item is sold

2. **If you are using a compostable label, avoid making claims about any of the following**:**
   - Biodegradable
   - Decomposable
   - Degradable
   - Marine degradable
   - Oxo-degradable
   - Recyclable (recyclable packages should not be labeled with compostable labels since recyclable packages should be recycled)

   ***Adapted from Washington State*

3. **Follow applicable laws, such as (but not limited to):**
   - US Federal Trade Commission Green Guides
   - Washington State law on the marketing the degradability of products

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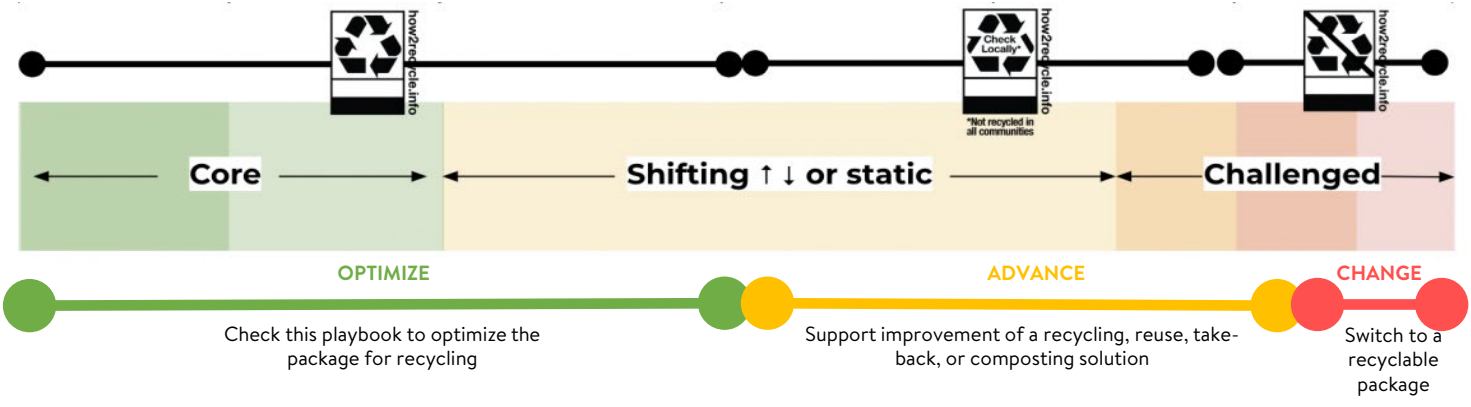
OPTIMIZE	CHANGE	ADVANCE

APPENDIX

A LOOK AT THE RANGE AND EVOLVING RECYCLING STATUS OF PACKAGING

According to How2Recycle, there are core package types that the current recycling system was designed for and are widely recyclable (e.g., corrugated boxes, aluminum cans, HDPE bottles, etc.); other package types may have barriers to recycling, which can change from time to time and impact the recyclability label in the How2Recycle program. This playbook contains references suppliers can use to help effectuate change to increase the recyclability of non-core package types.*

For plastic packaging, detailed guidance is provided in the APR Design ™ Guide for Plastic Recyclability.



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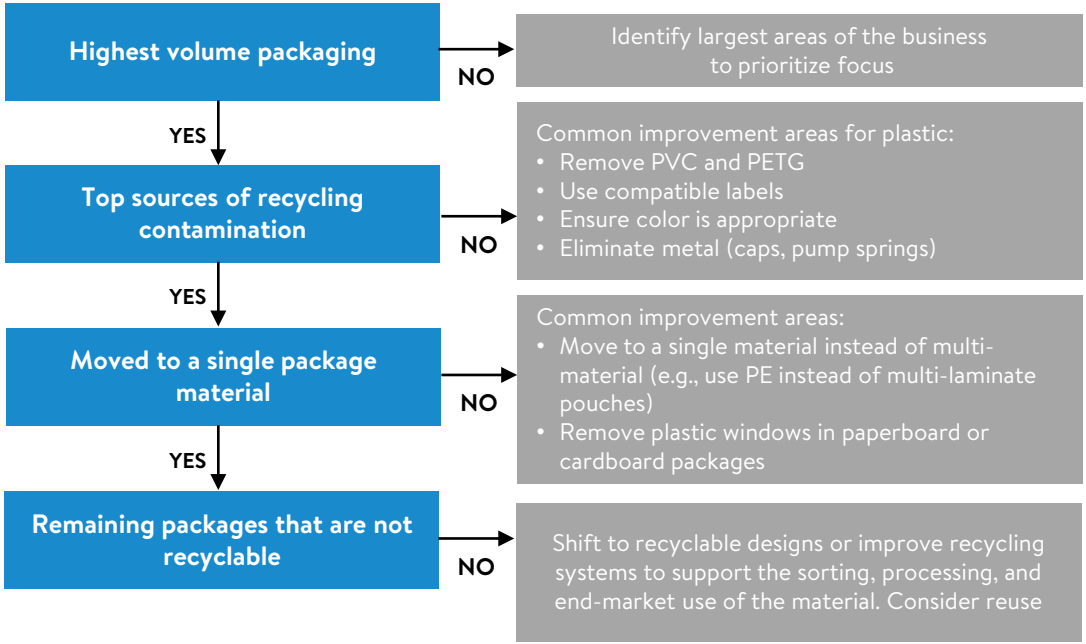
*How2Recycle figure source: https://how2recycle.info/futureguide

HAVE YOU ADDRESSED?



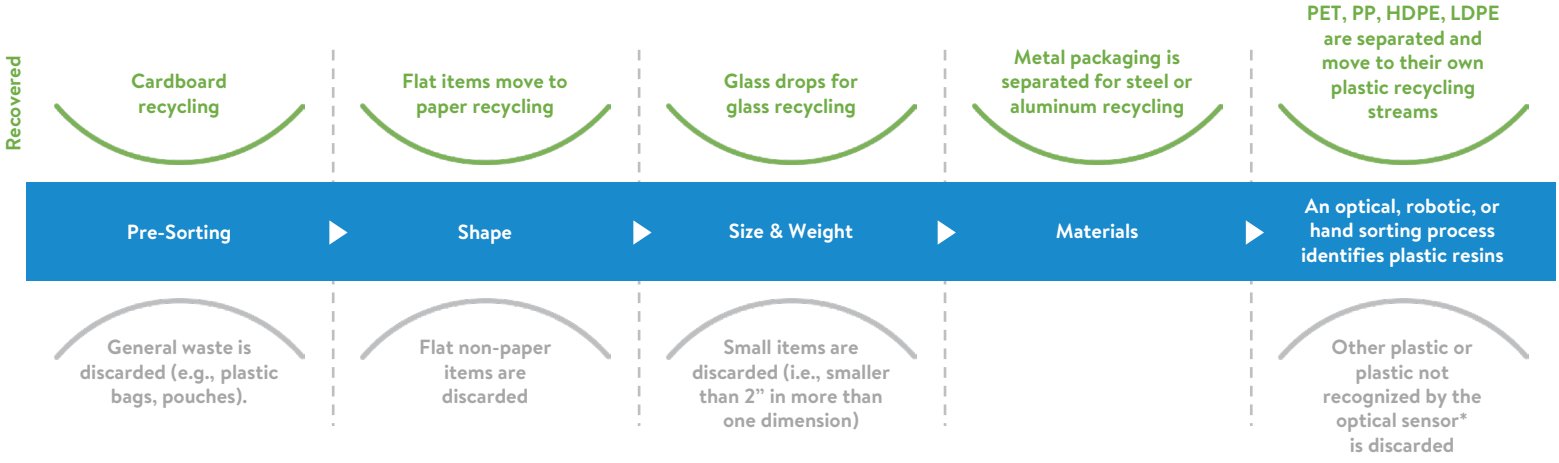
Packages that are very minimal (e.g., product stickers) are low in priority to design for recyclability. Reduce cost by simplifying packaging, e.g., number of material types, weight, and components.

PACKAGING DESIGN CHANGE TIMEFRAMES

Packaging design (i.e., structural vs. label graphics) changes have a wide range of timelines, sometimes taking over 18 months. **Plan for the time to make the needed design changes** when looking to meet targets or launch dates.

A CLOSER LOOK AT SORTATION

After collection, packaging goes to a Material Recovery Facility (MRF) for sorting*:

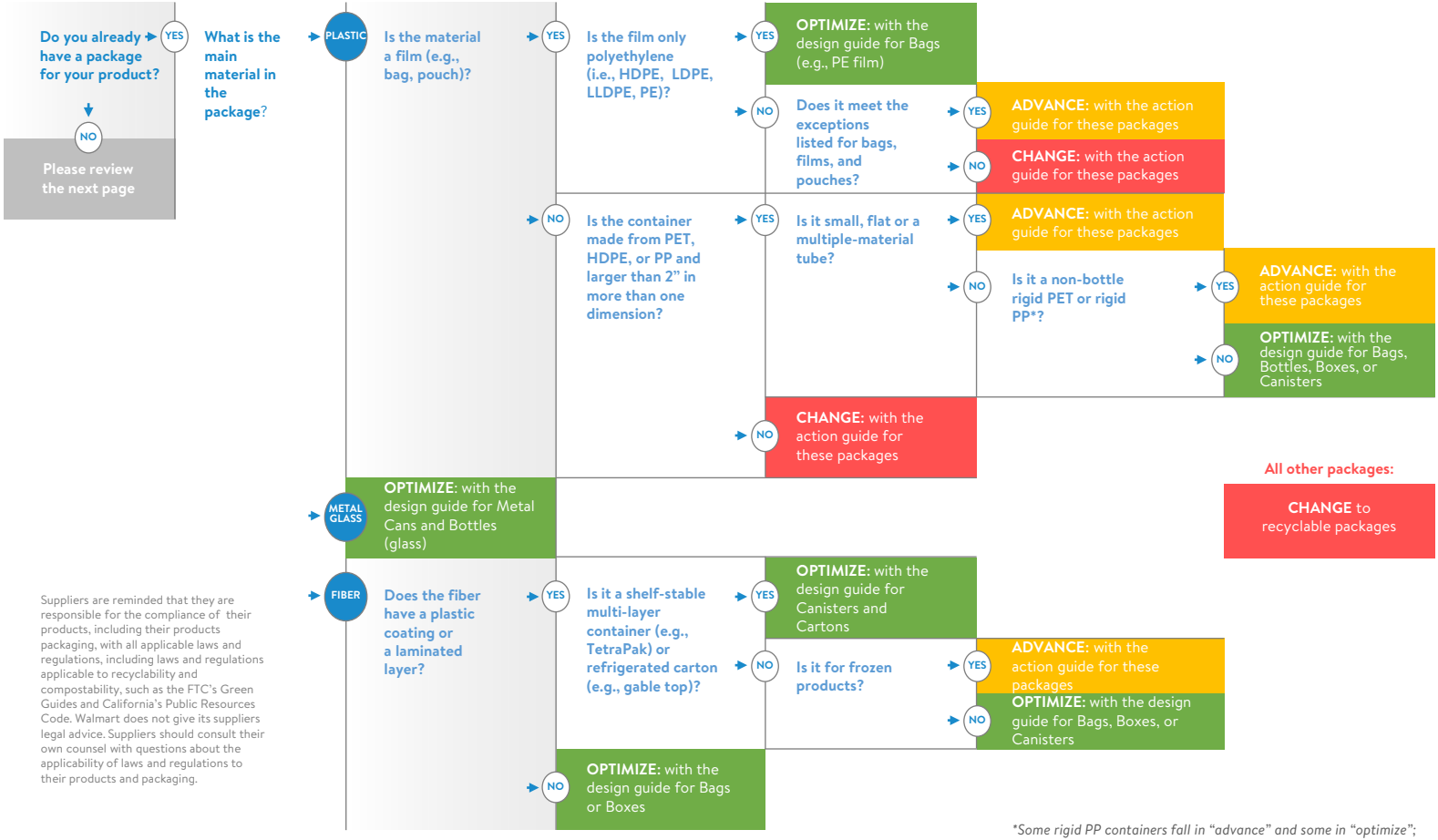


Components of a package are not separated at this stage of processing and if not compatible with the material stream, may contaminate it resulting losses. Refer to the appropriate guide in this playbook for more information.

**Facilities have different equipment and technologies resulting in variations in the order or result of sorting (e.g., glass sorted before paper) – this figure is a generalized representation.*

**Labels, pigments, and inks may interfere with the optical sensor leading to PET or other recyclable plastic being discarded; testing is recommended.*

WHICH GUIDE TO START WITH?



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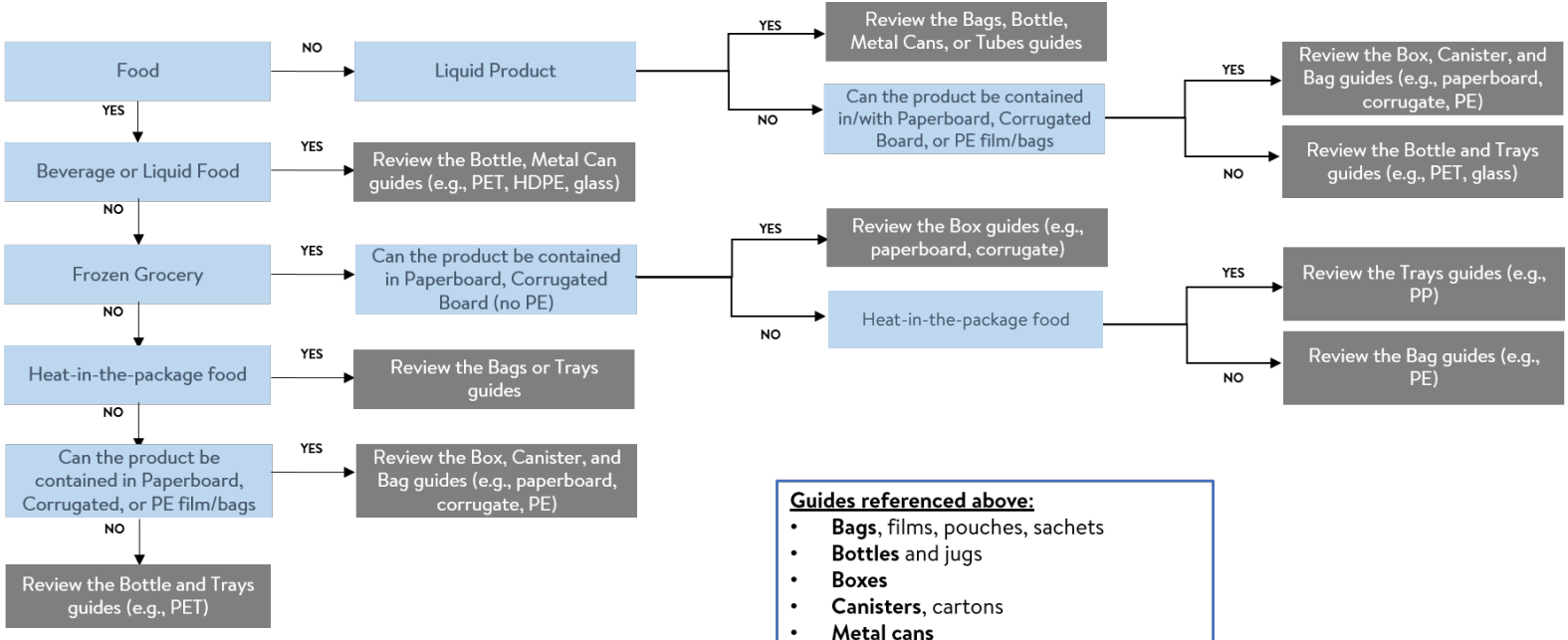
*Some rigid PP containers fall in "advance" and some in "optimize"; refer to the corresponding pages in the playbook for more information

WHICH GUIDE TO START WITH?

If you don't have a package for your product



Guides referenced above:

- **Bags**, films, pouches, sachets
- **Bottles** and jugs
- **Boxes**
- **Canisters**, cartons
- **Metal cans**
- **Trays**, clamshells, thermoforms
- **Tubes**

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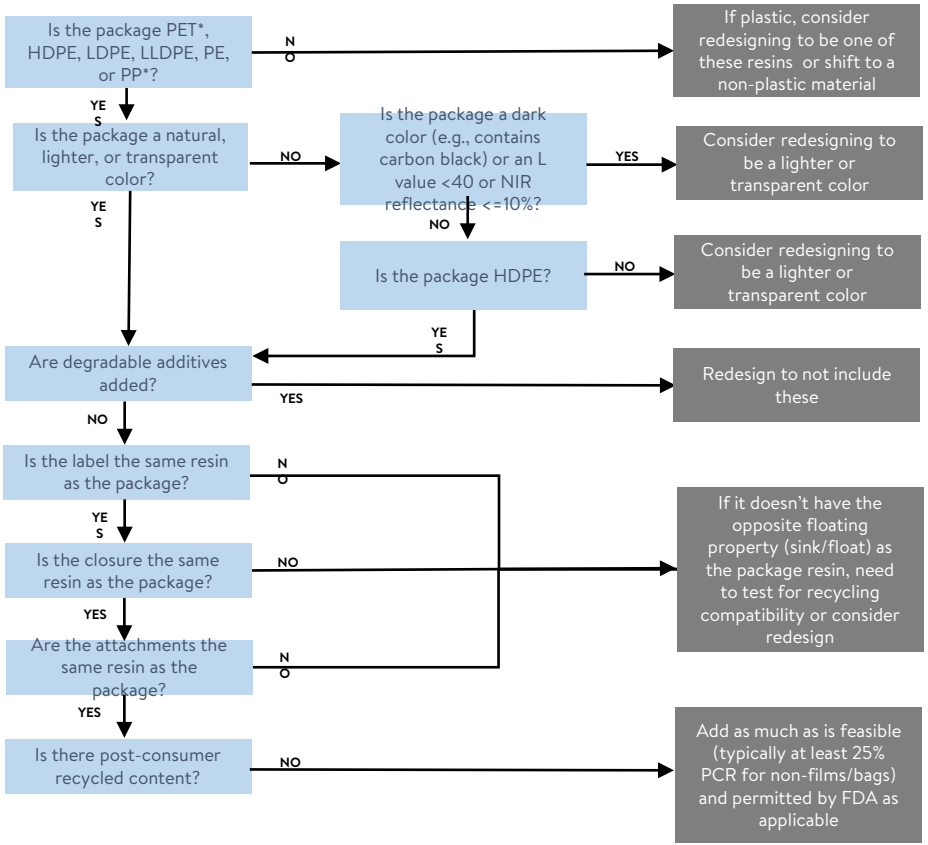
QUICK TIPS FOR DESIGNING PLASTIC PACKAGING FOR RECYCLABILITY



*How2Recycle currently classifies non-bottle rigid PET and some rigid PP packages with a "Check Locally" label.

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THE U.S. PLASTIC PACT PROBLEMATIC AND UNNCECESSARY MATERIALS

The playbook includes these items in the “materials to avoid” sections for plastic packages

U.S. Pact Activators will take measures to eliminate these items by 2025, please visit: https://usplasticspact.org/problematic-materials/

- Cutlery*
- Intentionally added[1] Per- and Polyfluoroalkyl Substances (PFAS)[2]
- Non-Detectable Pigments such as Carbon Black
- Opaque or Pigmented PET – Polyethylene Terephthalate bottles (any color other than transparent blue or green)
- Oxo-Degradable Additives, including oxo-biodegradable additives
- PETG – Polyethylene Terephthalate Glycol in rigid packaging
- Problematic Label Constructions – This includes adhesives, inks, materials (e.g., PETG, PVC, PLA, paper). Avoid formats/materials/features that render a package detrimental or non-recyclable per the APR Design® Guide. Labels should meet APR Preferred Guidance for coverage and compatibility and be tested in any areas where this is unclear.
- PS – Polystyrene, including EPS (Expanded Polystyrene)
- PVC – Polyvinyl Chloride, including PVDC (Polyvinylidene Chloride)
- Stirrers*
- Straws*

*When non-reusable, non-recyclable, or non-compostable per U.S. Pact definitions and provided as an ancillary item to the primary container. For instance, a packet of plastic cutlery provided with a prepared salad or a straw/stirrer provided with an on-the-go beverage would be defined as problematic whereas cutlery, straws, or stirrers sold as a product would not.

[1] “Intentionally added” either in the package or in the manufacturing of that package.

[2] “PFAS” or perfluoroalkyl and polyfluoroalkyl substances are defined as the class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom at or above 100 parts per million, as measured in total organic fluorine.

The 11 items listed are not currently reusable, recyclable, or compostable with existing U.S. infrastructure at scale and are not projected to be kept in a closed loop in practice and at scale by 2025.

Source: U.S. Plastic Pact’s Problematic and Unnecessary Materials List

GLOSSARY

WALMART UTILIZES ELLEN MACARTHUR FOUNDATION'S DEFINITION FOR RECYCLABILITY AND ISO DEFINITIONS FOR RECYCLED CONTENT, COMPOSTABILITY, AND REUSE FOR PURPOSES OF MEASURING PROGRESS ON WALMART'S GLOBAL SUSTAINABILITY GOALS

The below are Walmart's simplified definitions. For the full definitions, please visit:
https://www.ellenmacarthurfoundation.org/assets/downloads/13319-Global-Commitment-Definitions.pdf

Recyclable

Definition: If its successful post-consumer collection, sorting, and recycling is proven to work in practice and at scale (1).

(1) In practice and at scale threshold: Does that packaging achieve a 30% post-consumer recycling rate in multiple regions, collectively representing at least 400 million inhabitants.

What to look for:

- *Meets the "green pages" of the Recycling Playbook (though in practice and at scale may not be met in all cases)*
- *Reviewed by How2Recycle as Optimally or Recyclable but needs improvement*

Post-Consumer Recycled (PCR) Content

Definition: Proportion, by mass, of post-consumer (1) recycled material in a product or packaging (ISO 14021:2016).

(1) Post-consumer recycled (PCR) content is 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.

- PCR material differs from pre-consumer in that pre-consumer consists of materials that were never in use before being recycled (e.g., Production scrap).

What to look for:

- *Post-consumer not pre-consumer recycled content*

Compostable

Definition: If it is in compliance with relevant international compostability standards and if its successful post-consumer collection, (sorting), and composting is proven to work in practice and at scale.

- Undergoes degradation by biological processes during composting to yield, carbon dioxide, water, inorganic compounds, and biomass (humus-like substance) at a rate consistent with other known compostable materials and leaves no visible, distinguishable or toxic residue (Source: ISO 17088: 2012, ISO 14021: 2016)

What to look for:

- *BPI Certified industrially compostable (or equivalent*)*
- *BPI Certified plus TUV's OK compost Home*

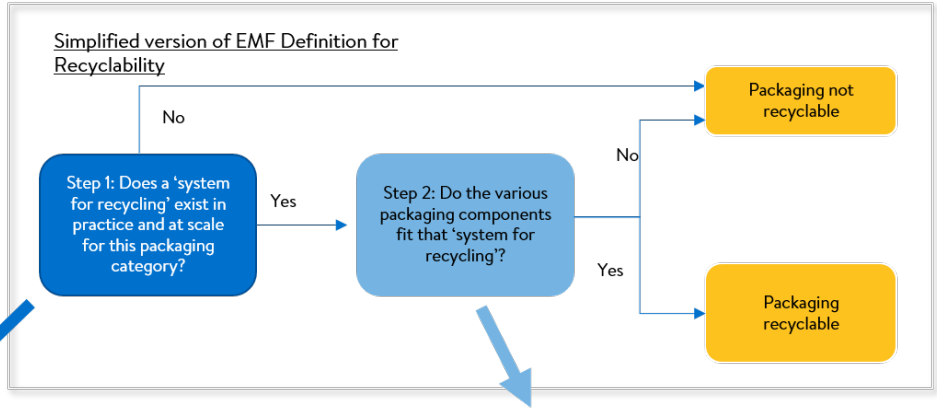
**Outside of the North America, BPI can be used or other programs that follow similar standards (e.g., ASTM D6400/D6868, EN 13432, or CAN/BNQ 0017-088) and prohibit added PFAS (e.g., TUV).*

Reuse

Definition: Operation by which packaging is refilled or used for the same purpose for which it was conceived, with or without the support of auxiliary products present on the market, enabling the packaging to be refilled (ISO 18603:2013).

- Reusable packaging is packaging which has been designed to accomplish or proves its ability to accomplish a minimum number of trips or rotations in a system for reuse.

SIMPLIFIED VERSION OF ELLEN MACARTHUR FOUNDATION'S NEW PLASTICS ECONOMY GLOBAL COMMITMENT DEFINITION FOR RECYCLABILITY OF PLASTICS

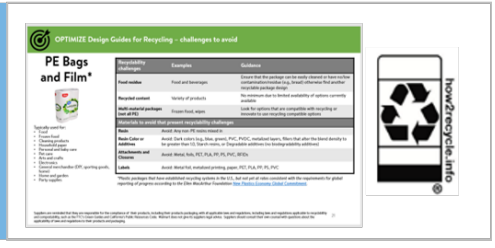


At least 30% recycling rate achieved for over 400 million inhabitants

Optimize design for existing recycling systems and work to increase recycling rates above 30%

The Recycling Playbook is a resource to answer Step 2 of EMF's global recyclability definition

Recyclable in some regions (e.g., U.S.), but does not meet the definition for being globally recyclable



ADDITIONAL TERMS AND ACRONYMS

- **Biodegradable:** Breakdown of an organic chemical compound by micro-organisms in the presence of oxygen to carbon dioxide, water, and mineral salts of any other elements present (mineralization) and new biomass or in the absence of oxygen to carbon dioxide, methane, mineral salts, and new biomass (Source: ISO 18606: 2013).
- **Circular economy solution (for packaging):** Packaging that is recycled or composted (or both), ideally after several reuse cycles. This may include package deposit programs, take-back programs, municipal recycling, or other systems (e.g., educational campaign to encourage the placement of smaller packages into larger ones of same material composition, collection for chemical recycling) where the material is recovered and processed so the material is kept in use in the economy (Adapted from: Ellen MacArthur Foundation New Plastics Economy Global Commitment).
- **Miscellaneous plastics:** There are plastics that are not typically recyclable or are not commonly used in notable quantities, such as acrylonitrile butadiene styrene, polybutylene terephthalate, polylactic acid, polyoxymethylene, and styrene-acrylonitrile.
- **Package:** Any product to be used for the containment, protection, handling, delivery, storage, transport and presentation of goods, from raw materials to processed goods, from the producer to the user or consumer, including processor, assembler or other intermediary (Source: ISO 21067:2007).
- **Packaging components**: Part of packaging that can be separated by hand or by using simple physical means (Source: ISO 18601:2013).
- **Preferred:** Attributes that support recycling by the majority of the Materials Recovery Facilities and recyclers with minimal, or no, negative effect on the productivity of the operation or final product quality (Source: APR Design ® Guide for Plastics Recyclability)

- **ASTM:** American Society for Testing and Materials
- **BPI:** Biodegradable Products Institute
- **CAN/BNQ:** Canada Bureau de Normalisation du Québec
- **EN:** European Standards
- **EPS:** expanded polystyrene
- **EVA:** ethylene vinyl acetate
- **EVOH:** ethylene vinyl alcohol
- **FSC:** Forest Stewardship Council
- **HDPE:** high density polyethylene
- **LDPE:** low density polyethylene
- **LLDPE:** linear low density polyethylene
- **MDPE:** medium-density polyethylene
- **PE:** polyethylene
- **PET:** polyethylene terephthalate
- **PETG:** polyethylene terephthalate glycol
- **PC:** polycarbonate
- **PFAS** Per and polyfluoroalkyl substances
- **PLA:** polylactic acid
- **PP:** polypropylene
- **PS:** polystyrene
- **PVC:** polyvinyl chloride
- **PVDC:** polyvinylidene chloride
- **RFID:** Radio-frequency identification
- **TPE:** thermoplastic elastomer
- **UV:** ultraviolet

Resin Identification Codes