

Last updated: 9/13/2024

OPTIMIZE	CHANGE	ADVANCE

THE RECYCLING PLAYBOOK

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PLAYBOOK BACKGROUND

INTRODUCTION

For companies setting recyclable packaging and recycled content goals, and preparing for upcoming Extended Producer Responsibility regulations, 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 more 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 potentially 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., food waste or product damages, transportation greenhouse gas emissions, responsible sourcing of fiber-based packaging, etc.). Potential solutions may be found in [Walmart's Circular Connector](#).

Consider using consumer-friendly recycling labels, like the How2Recycle[®] label to help customers understand the potential recyclability of packaging. For more information, visit: members.how2recycle.info.

Thank you to [Pure Strategies](#), The [Association of Plastic Recyclers](#) (APR), the [Biodegradable Products Institute](#) (BPI), [GreenBlue](#), and [The Recycling Partnership](#) (TRP) who were key partners in the development of this playbook. Additional information is available from resources found in the appendix.

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September 2024 Updates

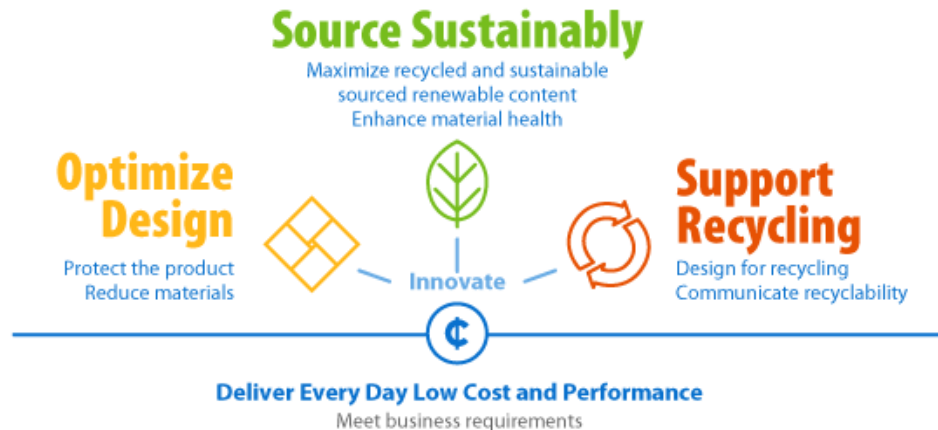
We aim to keep The Recycling Playbook a useful tool to support the transition to more sustainable packaging. Note that the recycling landscape is constantly evolving and periodic changes may occur.

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

- New sections to include the following package types:
 - Hang tags, header cards, and backer cards
 - Jars, tubs, and pails
- Combined the section for cans with the section for canisters and cartons
- Added package types to existing sections:
 - Added sachets to the bags section
 - Added PET boxes to the boxes section
 - Added HDPE cups and aluminum trays to the trays section
 - Added trapped blisters to the other section
- Added a page to clarify that eliminating and replacing plastic is a preferred path
- Clarified that the shape of fiber packaging is an additional design consideration
- Clarified that certified compostable packaging is a path to consider food/beverage products using film and small format packages that are not recyclable
- Clarified in the compostable packaging information that packaging should be recyclable/refillable and include recycled content whenever possible
- Noted that Extended Producer Responsibility is another driver for using this playbook
- Added a few new resources (e.g., Walmart's Circular Connector and others from Carton Council, The Recycling Partnership, The U.S. Plastics Pact, and Closed Loop Partners)
- Added an appendix with the [Consumer Goods Forum's](#) Golden Design Rules

MORE SUSTAINABLE PACKAGING OVERVIEW

By optimizing design, sourcing more sustainably and supporting recycling in packaging, companies can potentially help reduce greenhouse gas emissions through, for example, 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, while protecting the product. **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 of recyclability for purposes of measuring progress on Walmart's global sustainability goals. The definition is broken down into two steps:

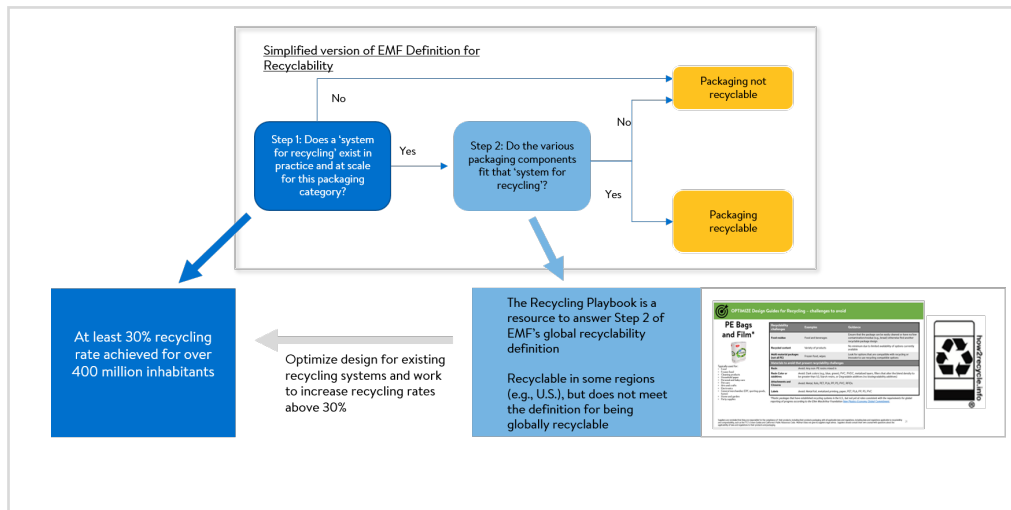
Step 1: Does a 'system for recycling' exist in practice and at scale for this packaging category (i.e., at least 30% recycling rate is achieved for over 400 million inhabitants)?

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

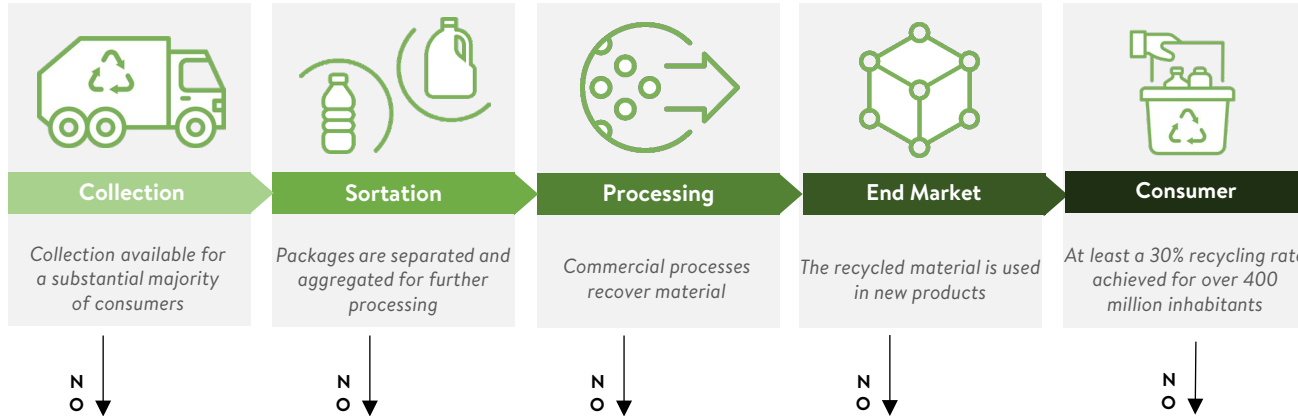
This guide focuses on Step 2 of the Ellen MacArthur Foundation's Definition for Recyclability (i.e., providing information on packaging components that fit the "system for recycling").

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



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

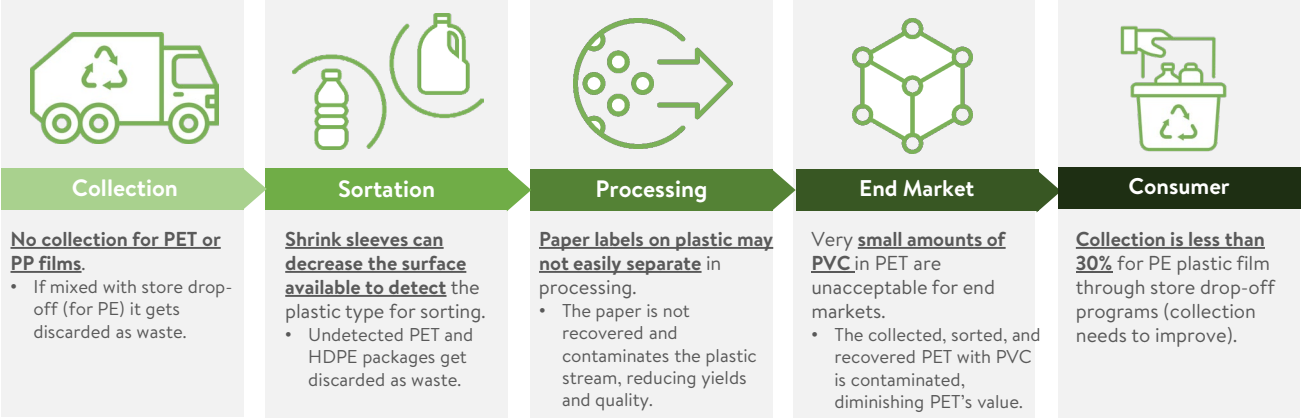
Change to be recyclable OR **Advance** innovation and work with local collective organizations to improve recycling (without being problematic to the existing systems) or another circular economy solution (e.g., reusable or certified compostable package for appropriate uses)

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%

Note: films (e.g., PE bags) are recycled through the store-drop off program since municipal recycling facilities typically have challenges sorting/processing these materials.

EXAMPLES OF RECYCLING CHALLENGES FOR PACKAGING ACROSS THE SYSTEM



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



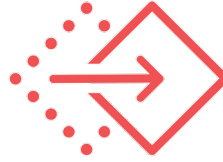
Optimize

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

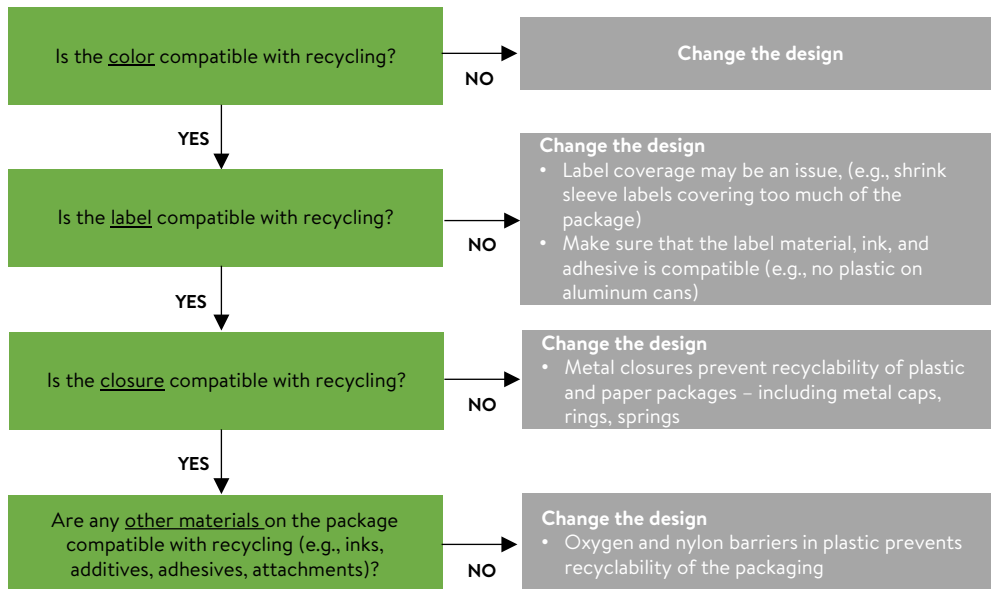
Use this playbook for guidance and ideas for optimizing packages that are potentially recyclable, changing those that are not recyclable, or advancing circular economy solutions.

OPTIMIZE	CHANGE	ADVANCE
Use this playbook to help design out elements not recyclable and detrimental to recycling	Switch to a recyclable package, see guides for ideas	Invest and engage in the development of a recycling, reuse, take-back, or composting solution
Bags, films, pouches, and sachets: <ul style="list-style-type: none">PaperPlastic*: PE, HDPE, MDPE, LDPE, and LLDPE	Bags, films, pouches, and sachets: <ul style="list-style-type: none">Made from multiple materialsPlastic: nylon, PET, PP, PVC, PVDC	Bags, films, pouches, and sachets: heat-in-the-bag, some advanced barriers, meat film and soaker pads, or other product protection or life cycle needs
Bottles and jugs: <ul style="list-style-type: none">GlassPlastic: HDPE, PET, some PP*	Bottles and jugs: plastic: acrylic, LDPE/LLDPE, PETG, PS, PVC, miscellaneous plastics, and multiple materials	Bottles and jugs: Some PP
Boxes: paperboard, corrugate, and molded fiber		Boxes: PET
Cans, canisters, and cartons: paper-based including: <ul style="list-style-type: none">Paperboard (without metal)Multi-layer/coated for shelf-stable (e.g., aseptic boxes) and refrigerated products (e.g., gable top)Metal cans (steel, aluminum; including aerosols)	Cans, canisters, and cartons: paper-based containers with metal tops or bottoms	Cans, canisters, and cartons: multi-layer/coated paper-based containers for frozen products
Cushion, dunnage, and inserts: <ul style="list-style-type: none">Paper, corrugate, and molded fiberPlastic*: PE	Cushion, dunnage, and inserts: expanded polystyrene, EPE, and other resins	
Hang tags, header cards, and backer cards: paper-based	Hang tags, header cards, and backer cards: plastic and multi-material (attached/sealed)	
Jars, tubs, and pails <ul style="list-style-type: none">GlassPlastic: HDPE, LDPE/LLDPE*, PET, some PP*	Jars, tubs, and pails: plastic: acrylic, LDPE/LLDPE, PETG, PS, PVC, miscellaneous plastics, and multiple materials	Jars, tubs, and pails: Some PP
Trays, clamshells, thermoforms, cups: <ul style="list-style-type: none">Paper and fiber-basedPlastics: HDPE	Trays, clamshells, thermoforms, cups: <ul style="list-style-type: none">Plastic: EPS, PS, PVC	Trays, clamshells, thermoforms, cups: <ul style="list-style-type: none">AluminumPlastic: PET, PP
<i>*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.</i>	Other: <ul style="list-style-type: none">Blister packs (attached/sealed multiple materials)Flat plastic	Other: <ul style="list-style-type: none">Trapped blister PETTubes made from plastic with multiple materialsSmall plastic containers (<2" in 1+ dimension)



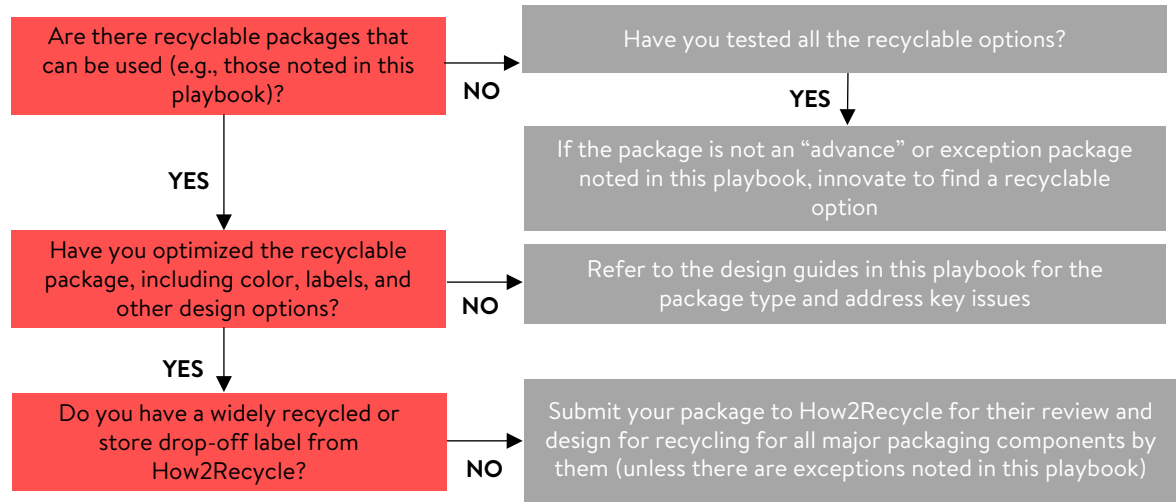
OPTIMIZE Design Guides for Recycling

Steps to take to “optimize” your package by avoiding elements not recyclable and elements potentially 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.**



Ensure that the used package can be clean and dry for recycling; Food/beverages can consider a certified compostable package, when applicable (see the compostable packaging section)

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

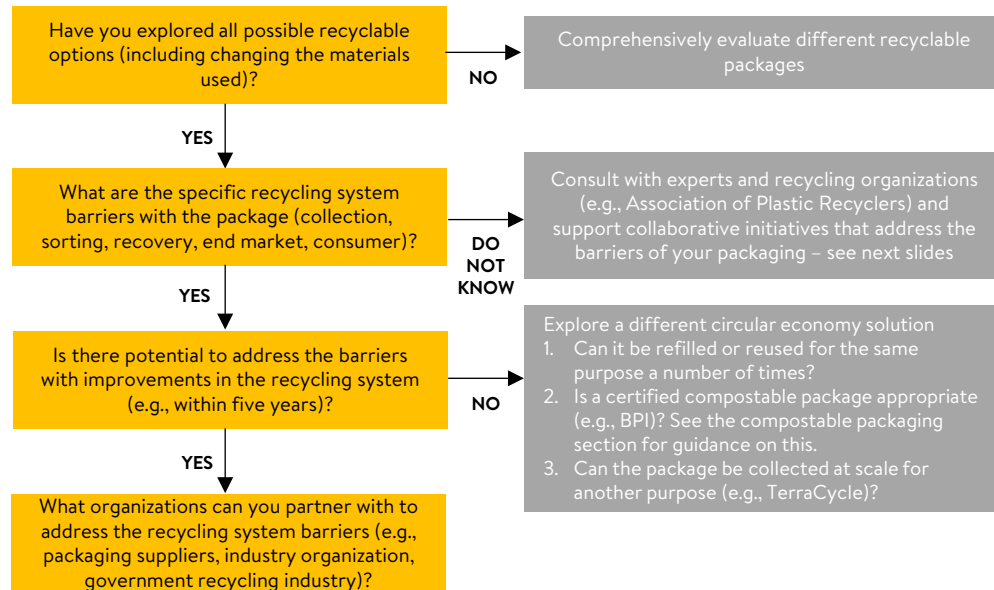


Major packaging changes should be done in a way that avoids significant trade-offs, such as an increase in greenhouse gas (GHG) emissions. If you participate in [Project Gigaton](#), you can use the [Project Gigaton packaging calculators](#) to estimate potential GHG impacts for purposes of reporting 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**, with additional information available in The Recycling Partnership's Circular Packaging Assessment Tool.



Refer to the page on key collaborative initiatives to support in order to progress recycling

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



Major packaging changes should be done in a way that avoids significant trade-offs, such as an increase in greenhouse gas (GHG) emissions. 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

**Refer to compostable packaging section*

					
Design	Consumer	Collection	Sortation	Processing	End-Market
Use best practices to design for recycling	Reach at least a 30% recycling rate	Collection available for a substantial majority of consumers	Packages are separated and aggregated for further processing	Commercial processes recover material	The recycled material is used in new products

Optimize packages levers of change

Remove contaminants, use compatible labels

Engage consumer

Advance: Bags, films, pouches, and sachets made from multiple materials

Use single resin or is a certified compostable option appropriate*

Engage consumer

Improve collection

Improve sortation

Improve processing

Improve end market

Advance: PP - Bottles and jugs; Jars, tubs, pails; Trays, clamshells, thermoforms, cups

Remove contaminants

Engage consumer

Improve collection

Improve sortation

Improve processing

Improve end market

Advance: PET – Boxes; Jars, tubs, pails; Trays, clamshells, thermoforms, cups

Remove contaminants

Engage consumer

Improve collection

Improve sortation

Ensure processing

Ensure end market

Advance: Cans, canisters, and cartons: coated paper-based containers for frozen products & Aluminum trays

Remove contaminants

Engage consumer

Improve collection

Improve sortation

Improve processing

Improve 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/APR Recognized or is a certified compostable option appropriate*

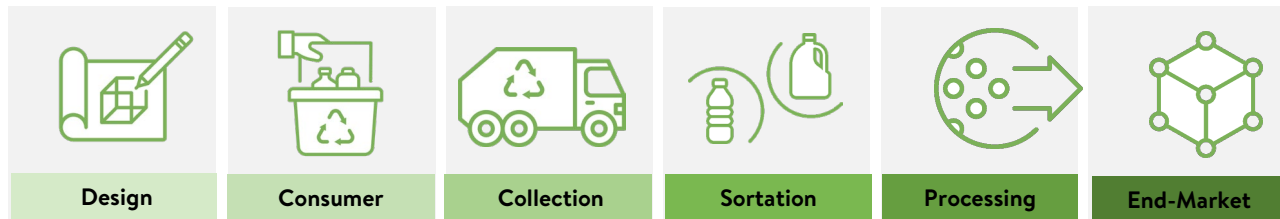
Engage consumer

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

**Refer to the compostable packaging section to determine if compostable packaging is appropriate*



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's CPA Tool*

Advance: Bags, films, pouches, and sachets made from multiple materials

APR Films and Flexibles Committee or USPP's Compostability Design For Compostability Playbook*

How2Recycle, U.S. Plastics Pact

APR, The Recycling Partnership's Film and Flexibles Coalition, U.S. Plastics Pact

Advance: PP - Bottles and jugs; Jars, tubs, pails; Trays, clamshells, thermoforms, cups

How2Recycle, U.S. Plastics Pact

The Recycling Partnership's PP Recycling Coalition

Advance: PET – Boxes; Jars, Tub, Pails; Trays, clamshells, thermoforms, cups

APR PET Technical Committee

How2Recycle, U.S. Plastics Pact

APR, The Recycling Partnership PET Recycling Coalition, Foodservice Packaging Institute, U.S. Plastics Pact

Advance: Cans, canisters, and cartons: coated paper-based containers for frozen products & Aluminum trays

How2Recycle, U.S. Plastics Pact

More action is needed here

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 or USPP's Compostability Design For Compostability Playbook*

How2Recycle, U.S. Plastics Pact

APR, The Sustainability Consortium, U.S. Plastics Pact

**The Recycling Partnership Circular Packaging Assessment (CPA) Tool guides on how to evaluate on end-markets, applicable to all packages*

OPTIMIZE

CHANGE

ADVANCE

GUIDES: BAGS, FILMS, POUCHES, AND SACHETS



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 or certified compostable package (review the compostable packaging section 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	



OPTIMIZE Design Guides for Recycling – best practices

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
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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](#).*

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.



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 use a another recyclable package or certified compostable package (review the compostable packaging section to see if that option applies)
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), untested metalized layers	
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](#).*

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CHANGE to a Recyclable Package

Bags, Films, Pouches, and Sachets

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 APR Recognition, e.g., material mixtures compatible with store-drop off (e.g., HDPE, LDPE, LLDPE, MDPE)
- A different recyclable format (e.g., paperboard box, carton, HDPE tub) or a certified compostable package, when applicable (see the compostable packaging section)

For plastic, use coatings and additives proven to be compatible recycling (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

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CHANGE to a Recyclable Package

Bags, Films, Pouches, and Sachets

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



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Examples that should change: see next slide for exceptions to the below

	Product	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

*Must be clean and dry for recycling; Food/beverages can consider a certified compostable package, when applicable (see the compostable packaging section)

**May not be eligible for a store-drop off/recyclable label from How2Recycle



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

Bags, Films, Pouches, and Sachets

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



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**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.*

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 Design * Guide and tests) or switch to another recyclable package or certified compostable package (review the compostable packaging section to see if that option applies)
- 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, metallized 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.

OPTIMIZE

CHANGE

ADVANCE

GUIDES: BOTTLES AND JUGS



Glass Containers



Typically used for:

- Food jars
- Beverage bottles

Recyclable best practices: <i>Meets the following</i>	
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)



OPTIMIZE Design Guides for Recycling – best practices

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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Recyclable best practices: <i>Meets the following or passed the applicable APR benchmark and definitive tests</i>	
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) with APR recognized adhesives, and minimize label coverage
Shrink Sleeve, Pressure Sensitive, or Direct Printed	An APR Preferred option (<i>Learn more at https://plasticsrecycling.org/recognition/recipients</i>)
Attachments	Clear if PET; colored ok for PP or PE
Closures, Pumps, and Sprays	PP or PE, or APR recognized options
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



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
Paper labels	Many products	Paper is detrimental to recycling, replace with non-paper or APR recognized options
Pressure sensitive and shrink sleeve labels	Many products	See below for more information; Use the APR recognized options (<i>Learn more at https://plasticsrecycling.org/recognition/recipients</i>)
Metal parts in cap, pump, or spray	Beverages, cleaning and personal care products	Look for all plastic caps, pumps, or sprays or APR recognized options (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	
Resin Color or Additives	Avoid: Transparent colors other than blue (green colors should be limited to compostable packaging according to 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: <ul style="list-style-type: none">• 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: <i>Meets the following or passed the applicable APR benchmark and definitive tests</i>	
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 6% (i.e., APR Design * Guide: $EVOH \leq 6.0 \text{ wt\%} + PE-g-MAH$ tie layers with $MAH > 0.1 \text{ wt\%}$ and $EVOH:tie \text{ layers ratio} \leq 2$)
Labels	PE, PP
Adhesives	Wash off cleanly or minimal/no adhesive
Attachments, Closures, Pumps and Sprays	PE, PLA, or PS; or PP less than 10% of the package by weight; the color for closures used on natural HDPE should be natural or white
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

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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 or APR recognized options (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 (e.g., 0.97 g/cm3 or more)	Adjust the use of the filler to ensure the preferred density or test according to APR
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, PVC, silicone; or PP greater than 10% of package weight	
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: <ul style="list-style-type: none">• 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	



OPTIMIZE Design Guides for Recycling – best practices

PP Bottles and Jugs*



- Rigid PP bottles and jugs, typically used for:
- Yogurt and food cups
 - Frozen food tubs
 - Personal care jars
 - (other rigid PP containers may be in the “advance” classification)

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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 less than 6% (i.e., APR Design * Guide (APR: EVOH ≤ 6.0 wt% + PP-g-MAH tie layers with MAH > 0.1 wt% and EVOH:tie layers ratio ≤ 2), 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 Bottles and Jugs



Rigid PP bottles and jugs, typically used for:

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

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Design challenges	Examples	Guidance
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 (e.g., 0.97 g/cm3 or more). 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. <ul style="list-style-type: none">• 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	

**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](#).*



ADVANCE to a Circular Economy Solution

PP Containers

Other PP rigid containers, such as formats that are not bottles and jugs (e.g., tubes, single serve coffee cups, beverage cups). (film/flexible are not included here, see bags, films, pouches)



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Challenges and levers of change



Design

Remove
contaminants



Collection

Improve collection



Sortation

Improve sortation



Processing



End-Market

Improve end-
markets

Primarily a system challenge: Some PP may have collection and end market challenges.



- Engage in The Recycling Partnership's Polypropylene Recycling Coalition, Association of Plastic Recyclers, and the U.S. Plastics Pact to advance recycling systems
- Optimize design, see previous "green" pages or consider a different design (e.g., a recyclable or certified compostable package (review the compostable packaging section to see if that option applies))

Bottles and Jugs

Made from acrylic, LDPE/LLDPE, 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, or PP
- 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

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OPTIMIZE

CHANGE

ADVANCE

GUIDES: BOXES



OPTIMIZE Design Guides for Recycling – best practices

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: <i>Meets the following</i>	
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
Windows	Use no window covering or cellulose acetate
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 or certified compostable package (review the compostable packaging section 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	



Corrugated Board



Typically used for:

- E-commerce shipping boxes

Recyclable best practices: <i>Meets the following</i>	
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
Windows	Use no window cover or cellulose acetate
Shipping Labels	Paper or direct printed
Dunnage and Padding	Tree-based fiber options

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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	



Molded Fiber



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

Recyclable best practices: <i>Meets the following</i>	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Shape	Test for sorting and include any necessary instructions for flattening as needed
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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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



ADVANCE to a Circular Economy Solution

PET Thermoforms (e.g., Boxes)



Typically used for:

- Grocery
- General merchandise (sporting goods, automotive, home)

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Challenges and levers of change



Design

Remove contaminants



Collection

Improve collection



Sortation

Improve sortation



Processing

Ensure processing



End-Market

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



ADVANCE to a Circular Economy Solution – design elements to utilize

PET Thermoforms (e.g., Boxes)



Typically used for:

- Grocery
- General merchandise (sporting goods, automotive, home)

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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) with APR recognized adhesives, and minimize label coverage
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



ADVANCE to a Circular Economy Solution – design elements to avoid

PET Thermoforms (e.g., Boxes)



Typically used for:

- Grocery
- General merchandise (sporting goods, automotive, home)

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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, PP)
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 may be 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: Foamed/expanded PET (that floats), PETG, or Other resins mixed in	
Resin Color or Additives	Avoid: Transparent colors (green color should be limited to compostable packaging according to 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 <ul style="list-style-type: none">• 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 cover 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	

OPTIMIZE

CHANGE

ADVANCE

GUIDES: CANS, CARTONS, AND CANISTERS



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
Shape	Test for sorting and include any necessary instructions for flattening as needed
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 or certified compostable package (review the compostable packaging section 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 and challenges to avoid

Multi-layer and Coated Paperboard

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.

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Recyclable best practices: *Meets the following*

Material	<u>Shelf stable cartons</u> : primarily of unbleached paper with a thin layer of LDPE and an additional layer of laminated foil <u>Refrigerated cartons</u> : primarily of paper with a thin layer of LDPE
Attachments	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Inks, Dyes, Adhesives	Water soluble, ultraviolet, electron beam inks, and dyes and adhesives

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

Recyclability challenges	Examples	Guidance
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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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OPTIMIZE Design Guides for Recycling – best practices and challenges to avoid

Metal Cans and Canisters



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

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Recyclable best practices: <i>Meets the following</i>	
Materials	Aluminum, steel (minimizing tin when possible)
Labels	Lacquer printing on container
Attachments, closures	Same metal as package
Aerosol propellant	Compressed noncombustible gases, such as nitrogen and compressed air, when possible (some applications require liquid so aim for low flammability of the can)
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	

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

Multi-layer and Coated Paperboard

- 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

Remove contaminants



Collection

Improve collection



Sortation

Improve sortation



Processing

Improve processing



End-Market

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

Paperboard with Metal

- 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)

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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Paper Cushion

Paper-based air pillow or paper sheets



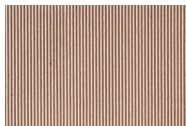
- Typically used for:
- General merchandise
 - Home and garden
 - Ecommerce

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



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

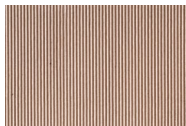
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OPTIMIZE Design Guides for Recycling – challenges to avoid

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

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Molded Fiber



Molded fiber could be used with the following:

- General merchandise
- Home and garden
- Ecommerce

Recyclable best practices: <i>Meets the following</i>	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Shape	Test for sorting and include any necessary instructions for flattening as needed
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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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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OPTIMIZE Design Guides for Recycling – best practices

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
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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](#).*

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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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CHANGE to a Recyclable Package

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: HANG TAGS, HEADER AND BACKER CARDS



Paper-based Tags and Cards



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

Recyclable best practices: <i>Meets the following</i>	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Size	Compatible with sorting, e.g., at least one side greater than or equal to 2.25 inches or preferred if both sides are 2.25 inches or more
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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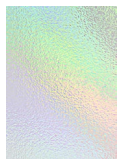
Paper-based Tags and Cards



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

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

Plastic and Multi-material Tags and Cards



Typically used for:

- Arts and crafts
- Cosmetics
- Electronics
- Apparel
- General merchandise
- Home and garden

Challenges

- Plastic that is largely flat is typically not sorted with plastic. Flat plastic may end up with paper recycling in which case it potentially contaminates paper or does not get recycled
- Multi-material is difficult for consumers to separate multiple materials when they are attached or sealed and ends up as waste

Guidance

Change:

- Design out need for material
- Use paper-based option

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

OPTIMIZE

CHANGE

ADVANCE

GUIDES: JARS, TUBS, AND PAILS



Glass Containers



Typically used for:

- Food jars
- Beverage bottles

Recyclable best practices: <i>Meets the following</i>	
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)



OPTIMIZE Design Guides for Recycling – best practices

PET Jars, Tubs, Pails



Typically used for:

- Deli
- Grocery

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Recyclable best practices: <i>Meets the following or passed the applicable APR benchmark and definitive tests</i>	
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) with APR recognized adhesives, and minimize label coverage
Shrink Sleeve, Pressure Sensitive, or Direct Printed	An APR Preferred option (<i>Learn more at https://plasticsrecycling.org/recognition/recipients</i>)
Attachments	Clear if PET; colored ok for PP or PE
Closures, Pumps, and Sprays	PP or PE, or APR recognized options
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



PET Jars, Tubs, Pails



Typically used for:

- Deli
- Grocery

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
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
Paper labels	Many products	Paper labels are detrimental to recycling and should 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 (<i>Learn more at https://plasticsrecycling.org/recognition/recipients</i>)
Metal parts in cap, pump, or spray	Beverages, cleaning and personal care products	Look for all plastic caps, pumps, or sprays or APR recognized options (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: Foamed/expanded PET (that floats), PETG, other non-compatible resins mixed in	
Resin Color or Additives	Avoid: Transparent colors other than blue (green color should be limited to compostable packaging according to 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: <ul style="list-style-type: none">• 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 Jars, Tubs, Pails



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

Recyclable best practices: <i>Meets the following or passed the applicable APR benchmark and definitive tests</i>	
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 6% (i.e., APR Design * Guide: EVOH ≤ 6.0 wt% + PE-g-MAH tie layers with MAH > 0.1 wt% and EVOH:tie layers ratio ≤ 2)
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 Jars, Tubs, Pails



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

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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 or APR recognized options (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 (e.g., 0.97 g/cm3 or more)	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, PVC, silicone; or PP greater than 10% of package weight	
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: <ul style="list-style-type: none">• 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	



OPTIMIZE Design Guides for Recycling – best practices

PP Jars, Tubs*



- Rigid PP bottles and jugs, typically used for:
- Yogurt and food cups
 - Frozen food tubs
 - Personal care jars
 - (other rigid PP containers may be in the “advance” classification)

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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 less than 6% (i.e., APR Design * Guide (APR: EVOH ≤ 6.0 wt% + PP-g-MAH tie layers with MAH > 0.1 wt% and EVOH:tie layers ratio ≤ 2), 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 Jars, Tubs*



Rigid PP bottles and jugs, typically used for:

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

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Design challenges	Examples	Guidance
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. <ul style="list-style-type: none">• 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	

**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](#).*



ADVANCE to a Circular Economy Solution

PP Containers

Other PP rigid containers, such as formats that are not bottles and jugs (e.g., tubes, single serve coffee cups, beverage cups). (film/flexible are not included here, see bags, films, pouches)

Challenges and levers of change



Design

Remove
contaminants



Collection

Improve collection



Sortation

Improve sortation



Processing



End-Market

Improve end
markets

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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Jars, Tubs, Pails

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
- 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

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OPTIMIZE

CHANGE

ADVANCE

**GUIDES:
TRAYS, CLAMSHELLS, THERMOFORMS,
AND CUPS**



OPTIMIZE Design Guides for Recycling – best practices

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

**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.*

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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 or certified compostable package (review the compostable packaging section 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	



Molded Fiber



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

Recyclable best practices: <i>Meets the following</i>	
Material	Certified responsibly sourced fiber (e.g., FSC*) and/or recycled fiber
Shape	Test for sorting and include any necessary instructions for flattening as needed
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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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 or certified compostable package (review the compostable packaging section 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, 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	



OPTIMIZE Design Guides for Recycling – best practices

HDPE Containers



Typically used for:

- 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 6% (i.e., APR Design * Guide: $EVOH \leq 6.0 \text{ wt\%} + PE\text{-}g\text{-}MAH$ tie layers with $MAH > 0.1 \text{ wt\%}$ and $EVOH\text{:}tie \text{ layers ratio} \leq 2$)
Labels	PE, PP
Adhesives	Wash off cleanly or minimal/no adhesive
Attachments, Closures, Pumps and Sprays	PE, PLA, or PS; or PP less than 10% of the package by weight; the color for closures used on natural HDPE should be natural or white
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 Containers



Typically used for:

- Health and wellness (supplements, medicine)
- Personal and baby care
- Cleaning products

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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 or APR recognized options (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 (e.g., 0.97 g/cm3 or more)	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, PVC, silicone; or PP greater than 10% of package weight	
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: <ul style="list-style-type: none">• 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	



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)

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Challenges and levers of change



Design

Remove
contaminants



Collection

Improve collection



Sortation

Improve sortation



Processing

Ensure processing



End-Market

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



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) with APR recognized adhesives, and minimize label coverage
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)

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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, PP)
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: Foamed/expanded PET (that floats), 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 <ul style="list-style-type: none">• 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 cover 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	



ADVANCE to a Circular Economy Solution

PP Containers

Other PP rigid containers, such as formats that are not bottles and jugs (e.g., tubes, single serve coffee cups, beverage cups). (film/flexible are not included here, see bags, films, pouches)

Challenges and levers of change



Design

Remove
contaminants



Collection

Improve collection



Sortation

Improve sortation



Processing



End-Market

Primarily a system challenge: improve collection and sortation to ensure 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 system
- Optimize design, see PP container "green" pages (e.g., bottles and jugs)

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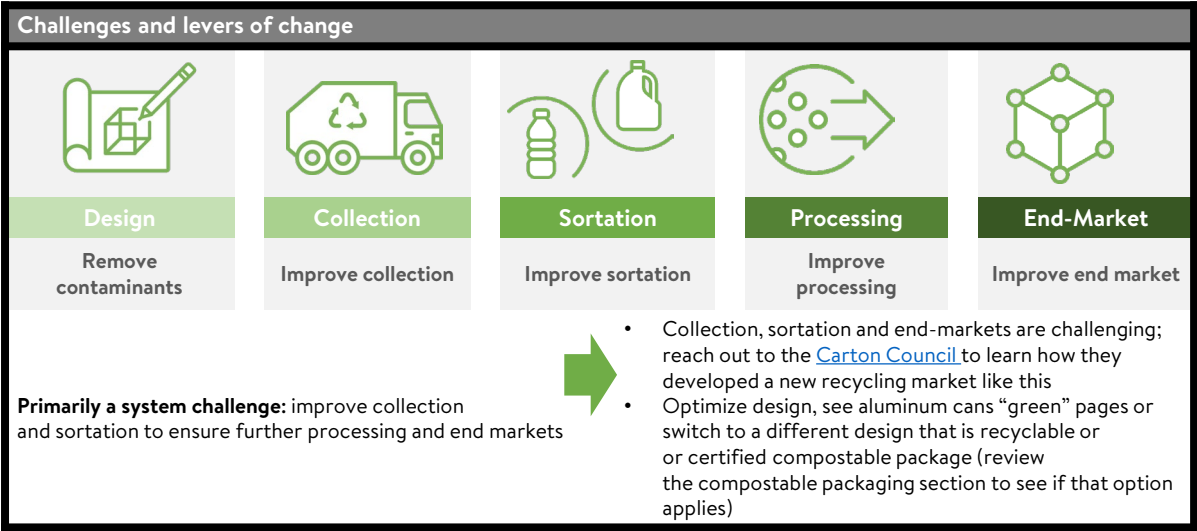
ADVANCE to a Circular Economy Solution (usually a longer-term approach)

Aluminum Trays



Typically used for:

- Food
- Pet food



Use the How2Recycle label

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.

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 (avoiding foamed/expanded PET which is not recyclable), PP (rigid or foamed can be recyclable), or molded fiber
- A different recyclable format (e.g., box, bag) or certified compostable package (review the compostable packaging section to see if that option applies)

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**



ADVANCE to a Circular Economy Solution

Trapped Blister - PET Thermoforms

Either all PET or non-attached paper/PET
where the paper is easily removed



Typically used for:

- Bakery and deli
- Eggs
- General merchandise (sporting goods, automotive, home)

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Challenges and levers of change



Design

Remove
contaminants



Collection

Improve collection



Sortation

Improve sortation



Processing

Ensure processing



End-Market

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



ADVANCE to a Circular Economy Solution – design elements to utilize

Trapped Blister - PET Thermoforms

Either all PET or non-attached
paper/PET where the paper is easily removed



Typically used for:

- Bakery and deli
- Eggs
- General merchandise (sporting goods, automotive, home)

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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) or APR Recognized
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



ADVANCE to a Circular Economy Solution – design elements to avoid

Trapped Blister - PET Thermoforms

Either all PET or non-attached
paper/PET where the paper is easily removed



Typically used for:

- Bakery and deli
- Eggs
- General merchandise (sporting goods, automotive, home)

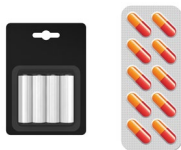
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Design challenges	Examples	Guidance
Black trays	Bakery and produce	Black currently isn't detected in sorting for PET, has no valuable end markets, it should be switched to clear or transparent light blue or green if it isn't 100% PCR
Non-PET clamshells	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., attached 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 color should be limited to compostable packaging according to 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 <ul style="list-style-type: none">• 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 cover 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	

CHANGE to a Recyclable Package

Blister Packs

Multiple materials that are attached or sealed together, 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 when they are attached or sealed
- 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
- An APR recognized blister system (e.g., Amcor AmSky™)

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

Use single resin



Collection

Expand collection



Sortation

Improve sortation



Processing

Improve processing



End-Market

Improve end market

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



- Design tubes according to the APR Res-Tube-1 design resource, seek APR recognition, 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 according to the APR Res-Tube-1 design resource, seek APR recognition, 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, 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

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OPTIMIZE

CHANGE

ADVANCE

**GUIDES: OTHER PACKAGES: SMALL OR
FLAT**



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

Use single resin



Collection



Sortation

Improve sortation



Processing



End-Market

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 package, reusable, or certified compostable package (review the compostable packaging section to see if that option applies)

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

- Design small packages to pass the test for recycling sorting. Ensure that the size and shape are compatible with the recycling process by using the tests 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 or pilot reuse solution

Use the How2Recycle label

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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 2D-3D sortation protocol 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

ELIMINATE OR SUBSTITUTE PLASTIC

WHEN TO ELIMINATE OR SUBSTITUTE PLASTIC PACKAGING?

End-of-life may be improved with the reduction of plastic, but ensure there aren't notable trade-offs

ELIMATE: Is the plastic component needed?

SUBSTITUTE: Are there recyclable non-plastic options - replace or redesign

Examples to illustrate opportunities, more product categories apply		
	ELIMINATE	SUBSTITUTE
Windows	Open window for apparel, hardware, home, office	No window for food
Blister packs	Redesign to backer card only for electronics, toys	Paperboard “blister” for electronics, hardware, jewelry/accessories, toys
Outer wraps	Paperboard band for apparel, home, jewelry/accessories, seasonal	Paper wrap for consumables, office
Trays, Clamshells, Thermoforms, Cups		Paperboard design for egg cartons and other food
Bottles		Metal, glass, or paperboard cartons for beverages (trade-offs are a common challenge for bottle substitutes)
Hangers/hooks		Paperboard hooks or boxes/ backer cards for electronics, home, shoes
Dunnage	Eliminate void space for electronics, furniture	Paper-based alternatives for electronics, furniture (e.g., hex, molded, paperboard)

Trade-offs to consider

Waste – ensure it is recyclable or compostable, if applicable

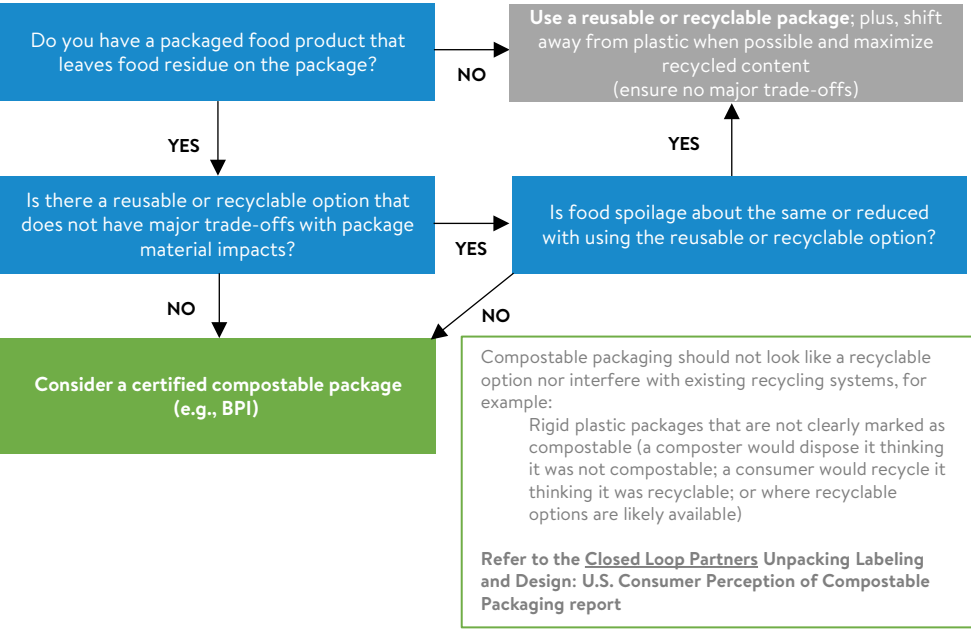
GHGs – aim to be comparable or lower; recycled content, weight, natural or biobased, renewable energy in processing/transport

Safety/quality – avoid compromising product safety and damages

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



Example products that might consider certified compostable packaging:

- Tea bags and coffee pods
- Frozen food trays
- Bakery and deli items
- Single serve condiments

WHAT TO WATCH FOR: COMPOSTABLE PACKAGING

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

INDUSTRIAL COMPOSTING: Current access to industrial composting programs is limited in the U.S.

- Approximately 12% 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

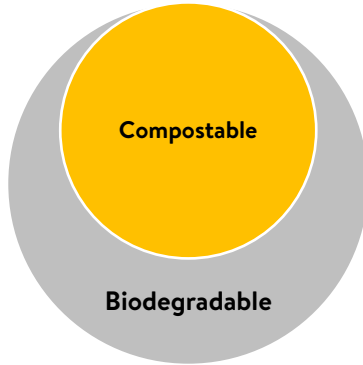
- Look for ***BPI certified compostable packaging (for industrial composting) PLUS TUV's OK compost home certification (BPI is evaluating a home compostable certification program)***

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

Degrades 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*

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



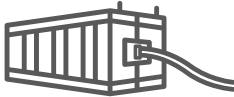
- Do not use in petroleum-based plastics since compromises the recycling stream (Source: [Sustainable Packaging Coalition](#)).
- Do not use in compostable packaging since they are not needed.
- **Marine degradability:** This is a subset of biodegradability, where the material can effectively break down in marine environments, and while is a desirable attribute for some materials, this is not a claim that should be made on any packaging.

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).

Note: Potential applications of intentionally added per- and polyfluoroalkyl substances (PFAS) may include grease and water-proof fiber-based packaging and should be avoided. BPI compostable certification does not allow for intentional addition of PFAS. (Source: [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
			
<i>Description</i>	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 or 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.
<i>Timeframe to finished compost</i>	6-9 months	3-6 months	In vessel 3 days- 6 weeks followed by windrow or ASP to finish
<i>Advantages</i>	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
<i>Limitations</i>	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

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WHAT PACKAGING MATERIALS ARE COMPOSTABLE?

Not all materials are compatible with common industrial composting systems. The following raw materials typically pass certification testing requirements, but not in all cases so be sure to complete the certification process for your package.

Material *
Starch
PLA (Polylactic acid)
Paper and Card
Recycled Paper Pulp
Molded Bagasse Pulp
Molded Palm Fiber
Molded Bamboo Fiber/Pulp
Paperfoam
High Amylose Corn Starch
Thermoplastic starch (TPS)
Polyhydroxyalkanoate (PHA) - Canola oil base
Polyhydroxybutyrate (PHB)
Cellulose-based Films

** Raw material only, does not consider other packaging attributes such as closures, format, etc.*

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 by a separate program (e.g., TUV OK compost home)
 - 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, do not make 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 [BPI](#), [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, the [State of California](#) laws and [others](#)



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OPTIMIZE

CHANGE

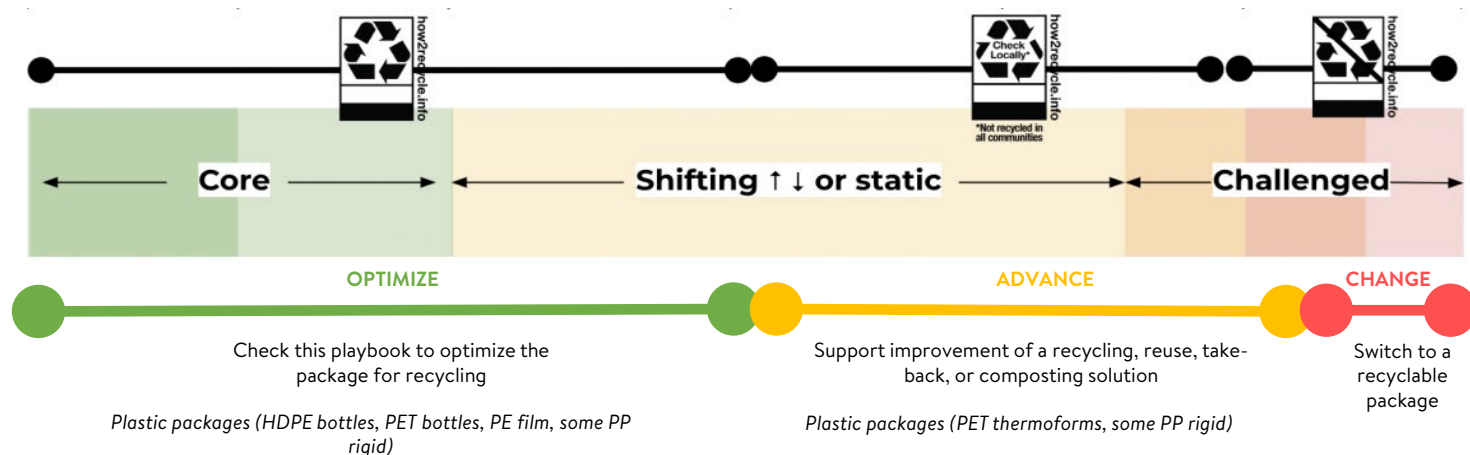
ADVANCE

APPENDIX

A LOOK AT THE RANGE AND EVOLVING RECYCLING STATUS OF PACKAGING

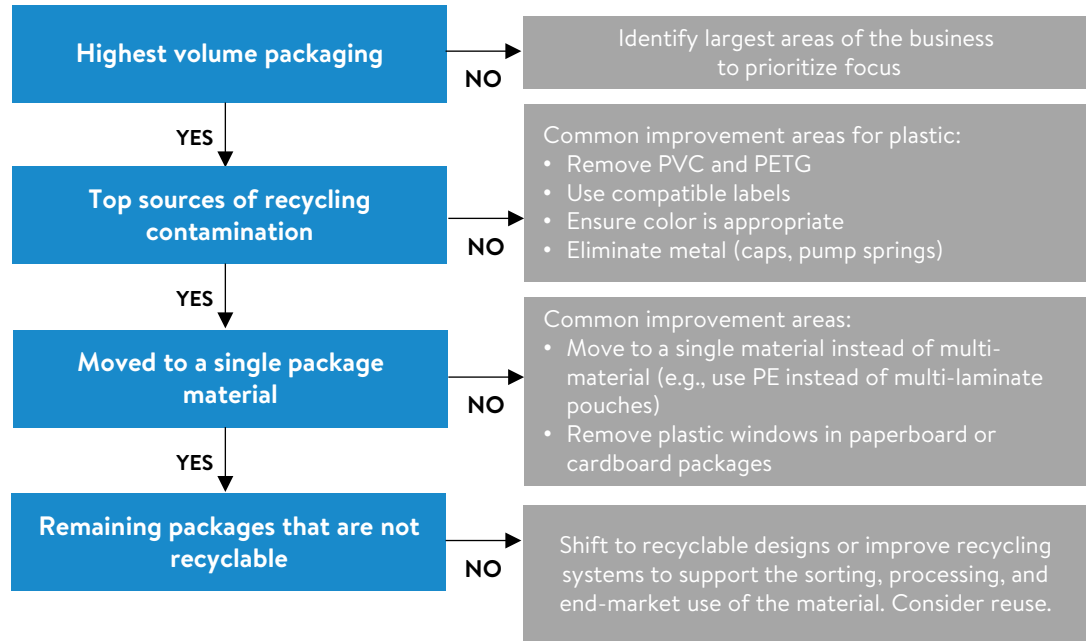
According to [How2Recycle](https://how2recycle.info), there are core package types that the current recycling system in the US and Canada was designed for and are widely recyclable (e.g., corrugated boxes, aluminum cans, HDPE bottles, etc.); other package types may have barriers to recycling, which can 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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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.

REUSABLE PACKAGING OVERVIEW

Reusable packaging is an important circular solution. This overview information is not intended to be detailed guidance for reusable packaging. Please refer to these resources for more information: Sustainable Packaging Coalition's [Designing More Successful Reusable Packaging Programs](#) and the Ellen McArthur Foundation's [Reuse: Rethinking Packaging](#).

The Sustainable Packaging Coalition suggests that brands consider reusable packaging, such as for:

- **Items that are used in foodservice** (e.g. beverage cups, takeout containers), which are more likely to reach high levels of reuse in practice due to their pervasiveness
- **Items that are bought frequently** (e.g. personal care, home care, supplies for work environments), since they are consumed fairly quickly and have high levels of repeat purchasing
- **Items purchased online that are returned often** (e.g. clothes, footwear), since products are already being sent back by consumers when they don't fit or match expectations
- **Where purchasing a specific quantity of product is important** and consumers express a desire to purchase less or more than the standard quantity sold
- **Where the current packaging fails to adequately protect the product** and there are chronically high loss or damage rates
- **Where there is already a "closed loop system"** of return in place, such as rentals
- **Where there is a subscription model** in place and used packaging can be collected during the delivery of the next order
- **Packaging that is often stored in the open or on display** (e.g. soap dispensers) and a more durable, "counter-worthy" design is important to the consumer



Success for reusable packaging is like a three-legged stool that relies on long-term consumer engagement, high return rates in practice, and lower environmental footprint.

Source: [Sustainable Packaging Coalition](#)

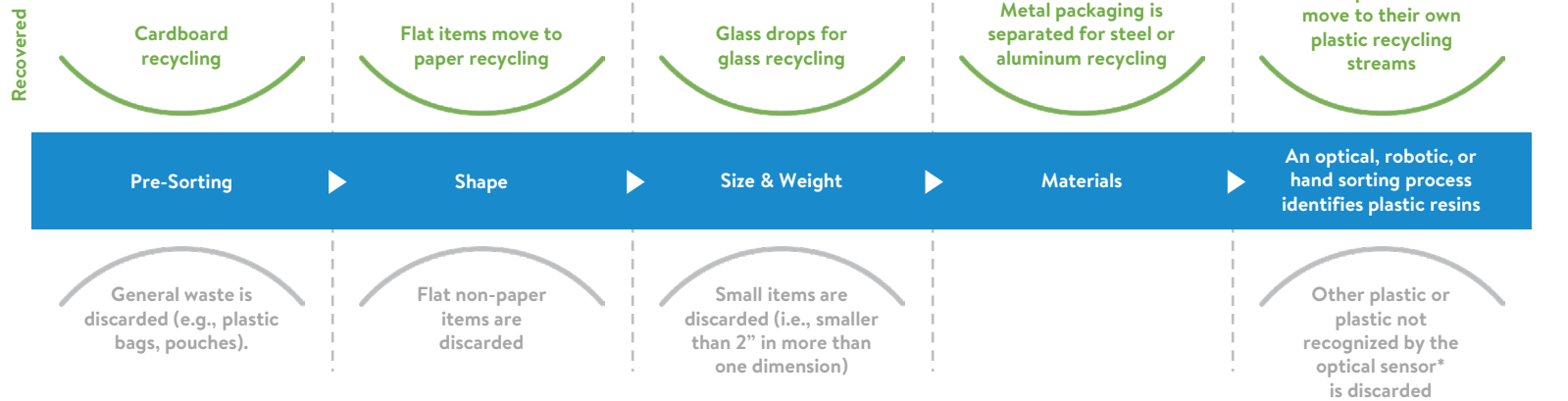
PACKAGING DESIGN CHANGE TIMEFRAMES

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*:

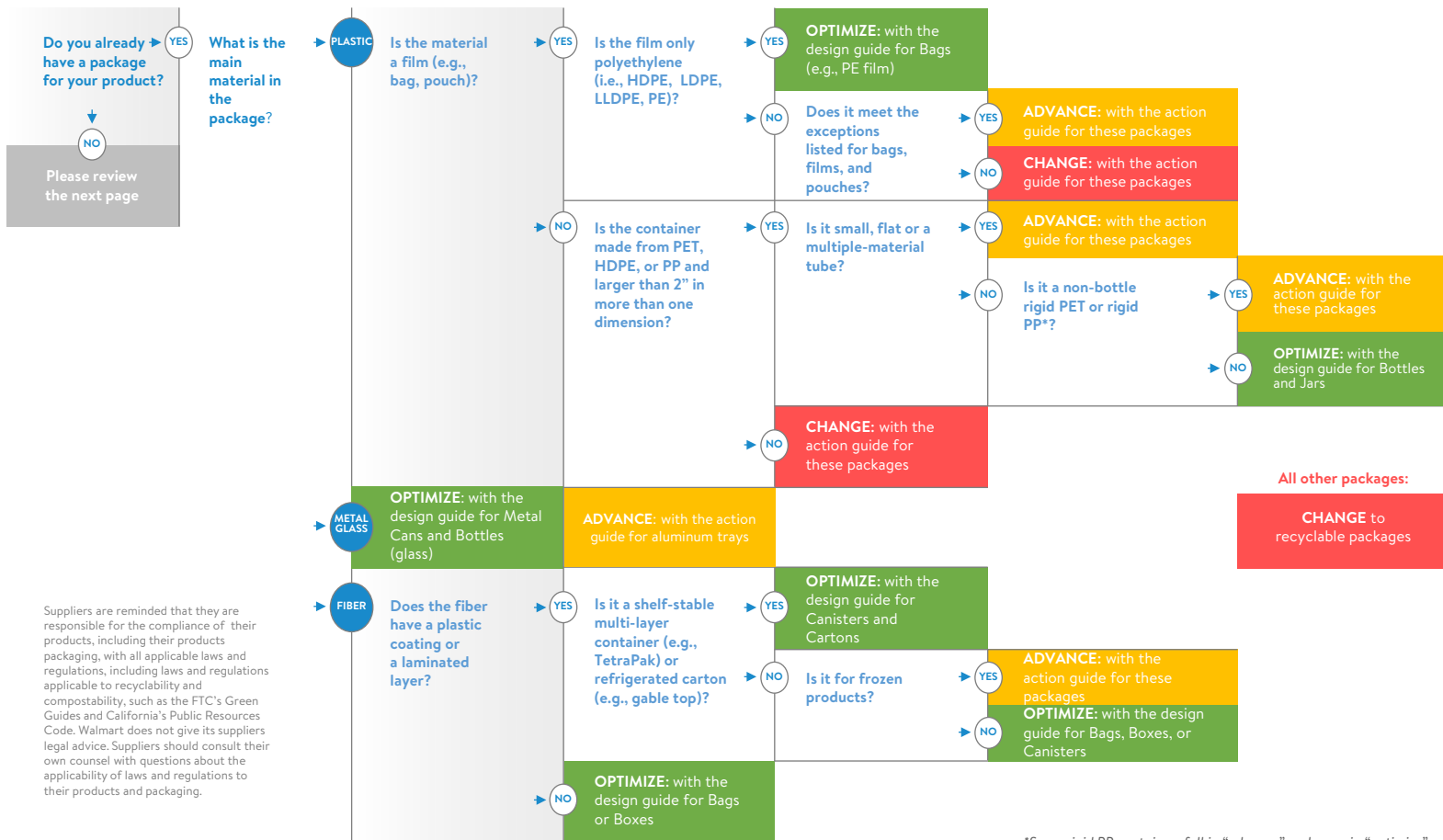


Components of a package are not separated at this stage of processing and if not compatible with the material stream, may contaminate it resulting losses. Refer to the appropriate guide in this playbook for more information.

**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.*

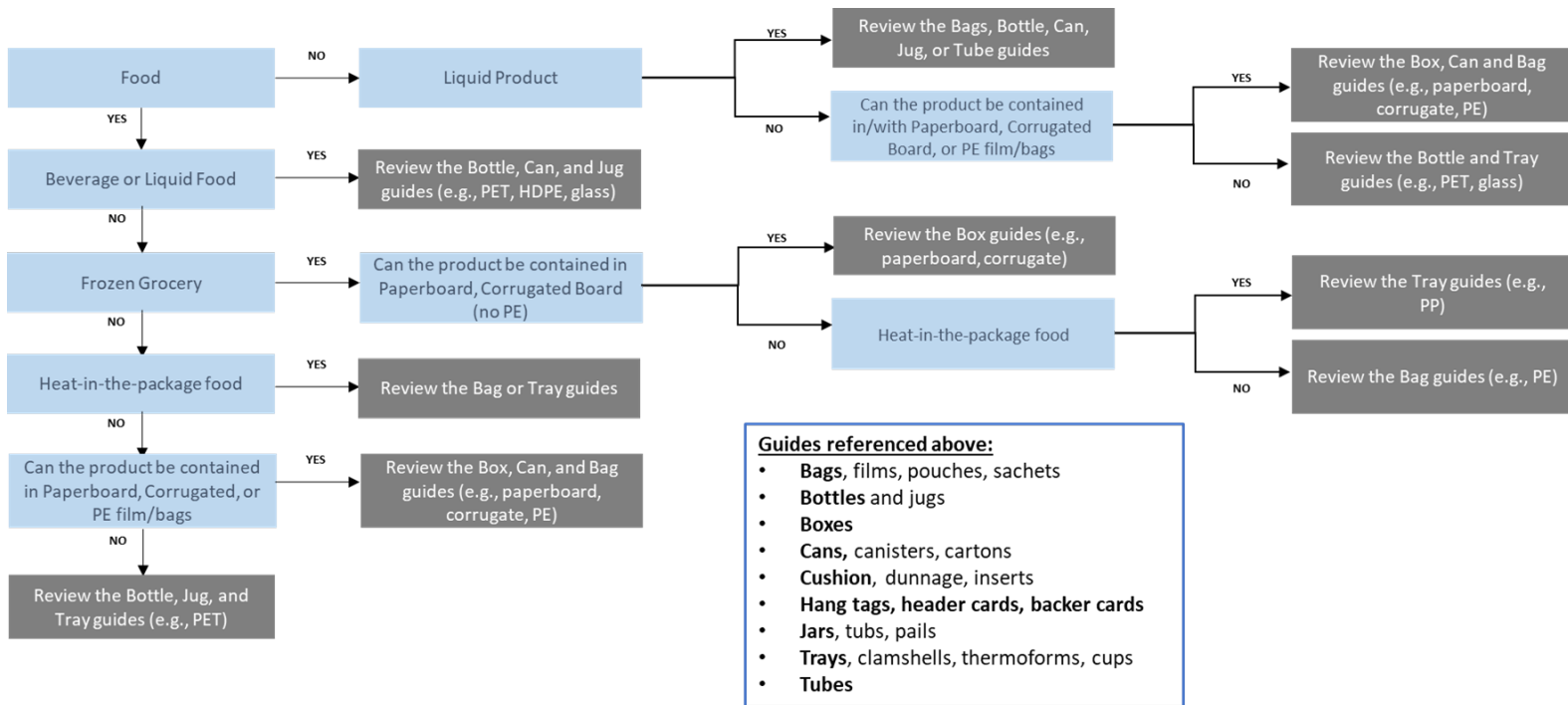
**Labels, pigments, and inks may interfere with the optical sensor leading to PET or other recyclable plastic being discarded; testing is recommended.*

WHICH GUIDE TO START WITH?



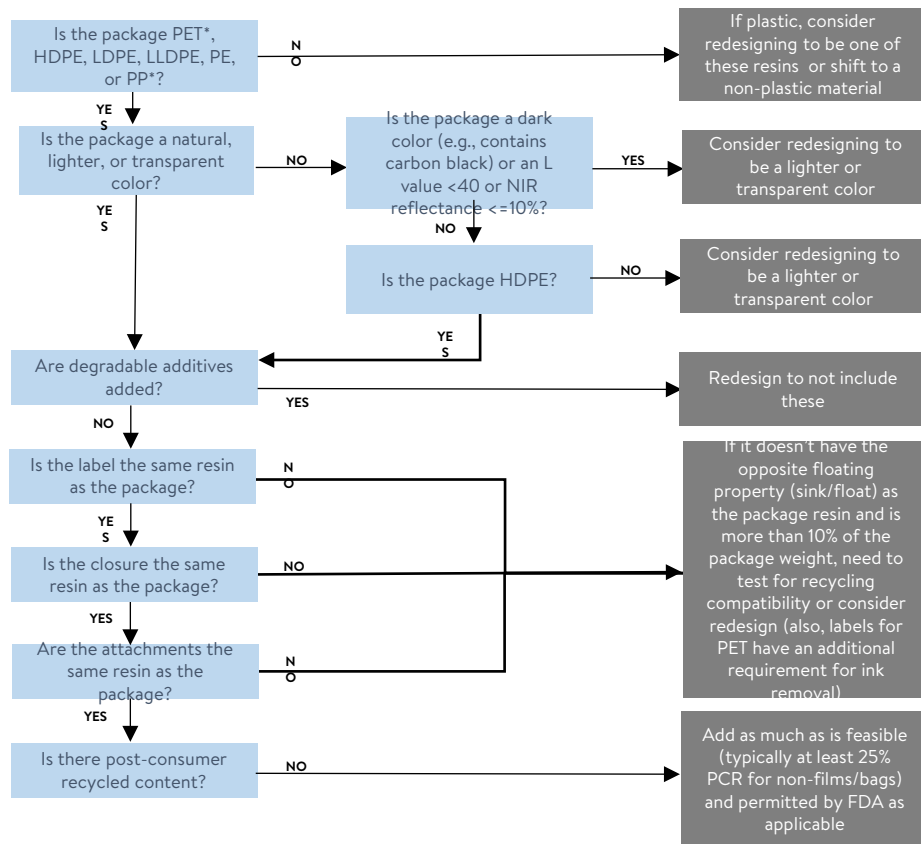
WHICH GUIDE TO START WITH?

If you don't have a package for your product



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QUICK TIPS FOR DESIGNING PLASTIC PACKAGING FOR RECYCLABILITY



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

1

GOLDEN DESIGN RULE

Increase Value in PET Recycling

- Use transparent and uncoloured **PET** (preferred), or transparent blue or green in all PET bottles^{1,2}
- Ensure material choice, adhesive choice and size of sleeve or label is not problematic for recycling^{3,4,5}

PET is polyethylene terephthalate, one of the most commonly used plastic materials. This Golden Design Rule applies to all PET bottles in food and non-food applications, including beverages, home care products, personal care products, and more. Switching from coloured to transparent PET bottles will positively impact supply of high quality recycled PET, and helps ensure only materials that have a viable closed loop recycling pathway are used.

FOOTNOTES: 1) With a minimum L value of 40; 2) Exception: Where barrier protections (for UV light, CO₂, or O₂) are required for product shelf life and other solutions (e.g., full-body sleeves) are not possible; 3) Including phase out of PETG and PLA labels/sleeves, non-water soluble/dispersible adhesives and sleeves that cover more than 75% of bottle (unless proven not to limit the recyclability of the product); 4) Exception: Unless proven not to limit the recyclability of the product (e.g. cPET, sleeves that detach during recycling processes prior to optical sorting); 5) Exception: Small non-recyclable bottles exempt

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2

GOLDEN DESIGN RULE

Remove Problematic Elements from Packaging

- a. No **undetectable¹ carbon black²**
- b. No **PVC** or **PVDC^{2,3}**
- c. No **EPS** or **PS²**
- d. No **PETG** in rigid plastic packaging^{2,3}
- e. No **oxo-degradable⁴**

Undetectable carbon black is undetectable in the sorting process when using Near Infra-Red (NIR) technology, which is widely used in plastics recycling systems. As a result, dark-coloured packaging commonly ends up as residue and is disposed of in landfill or incineration. It is commonly used in meat and vegetable trays and bottles. As well as minimising avoidable environmental impacts, removing carbon black would help increase the volume of recycled plastic.

PVC or PVDC is polyvinylidene chloride or polyvinylidene dichloride. It can be problematic if in the recycling stream by disrupting the recycling of some other plastics. It is found in several types of plastic packaging, including meat trays, plastic film around vegetables or blister packs.

EPS or PS is expanded polystyrene or polystyrene. (E)PS is too uncommon the packaging materials stream to make recycling economically viable. As a result, it is rarely sorted from household waste and recycled, with the majority of it incinerated or landfilled. Examples of its application are food takeaway containers, yoghurt pots, and cushioning/filler. This element of Golden Design Rule 2 excludes other types of polystyrene such as SAN or ABS.

PETG is polyethylene terephthalate, and is a contaminant in the PET recycling stream which lowers the value of recycled PET materials. It is found in, for example, drinking bottles and cooking oil containers. This element applies to all single-use rigid packaging materials in the consumer goods market.

Finally, **oxo-degradable** plastics contribute to microplastic pollution and are not suited for long-term reuse, recycling at scale or composting. Uses include shrink and stretch film, carrier bags, blister packs, bottles, labels and caps. This element of Golden Design Rule 2 applies to all oxo-degradable plastics as defined by CEN, the European Standards authority, unless use is required by law.

FOOTNOTES: 1) *Undetectable means by commonly used sortation technologies;* 2) *Exception: This rule does not apply to small non-recyclable packs;* 3) *Exception: Except in medical applications where there is no alternative;* 4) *Exception: Except where legally required; "This rule does not apply to oxo-biodegradable plastics"* FOOT

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3

GOLDEN DESIGN RULE

Eliminate Excess Headspace

- Eliminate excess headspace for all flexible pack types, such that the maximum headspace is 30% or less across the product categories outlined in the rule.

This Golden Design Rule applies to the following categories: cleaning products, confectionary, dry groceries, frozen foods & ice-cream, health & wellness, personal & baby care, pet food, produce & fresh food, shelf stable foods, water & beverages. By eliminating excess headspace in flexible packaging, companies reduce the demand for virgin plastic and reduce the absolute amount of plastic being placed on to the market.

4

GOLDEN DESIGN RULE

Reduce Plastic Overwraps

- Reduce plastic overwraps by only using them when “necessary” (as defined by the developed guideline)

This Golden Design Rule applies to the following categories:

- Food: confectionary, crisps and snacks, canned and tinned food, beverages.
- Non-food: home care, personal care, baby care

By removing unnecessary overwraps, companies reduce the demand for virgin plastic and reduce the absolute amount of plastic being placed on to the market.

5

GOLDEN DESIGN RULE

Increase Recycling Value for PET Thermoformed Trays and Other PET Thermoformed Packaging

For PET thermoformed trays and other PET thermoformed packaging:

1. Regional design guidelines to fit with existing recycling programs¹ shall be met wherever possible.
2. For packaging that is not accepted by existing recycling programmes, and where there is a clear pathway for a future recycling system by 2025², the following requirements apply:
 - A Use transparent and uncoloured (preferred), or transparent blue or green PET³
 - B Ensure material choice, adhesive choice, inks and size of sleeve or label is not problematic for recycling⁴
 - C Use only mono-material PET⁵
 - D Use minimal or moderate direct printing⁶
 - E Ensure material choice and adhesive choice of lidding films, inserts or other components is not problematic for recycling⁷

PET trays are not currently recycled at in practice and at scale but solutions are being scaled-up in Europe and North America – a rule to increase recyclability would provide a boost to emerging recycling infrastructure and increase the quantity and availability of rPET which is necessary to meet targets around recycled content³ This rule is aligned with published retailer guidelines and third-party guidelines such as APR, RecyClass / PetCore and WRAP.

FOOTNOTES: 1) Recycling programmes are at different stages of development in different regions, so companies are recommended to check regional advice or guidelines such as those provided by APR in the US. Signatories should use the exceptions reporting process to record cases where they have followed regional design guidelines instead of the Golden Design Rules. 2) As accepted by industry associations and multi-stakeholder value-chain initiatives such as RecyClass/PetCore and Plastics Pacts and targeting recycling rates of >30%. 3) With an L-value of 40; Do not use fillers that affect clarity; coatings should not lead to misdetection of the packaging and misdirection to waste. 4) Including phase out of paper labels and PETG, PVC and PLA labels/sleeves, and non-water soluble/dispersible adhesives. Labels/sleeves should not lead to misdetection of the packaging and misdirection to waste. 5) Including minimum 95% PET content with an intrinsic viscosity that is suitable for the recycling programme in region. Do not use materials that have a negative impact on rPET clarity. 6) E.g. production date or expiry date; Where additional printing is necessary, use of labels is preferred. If this is not possible, use only inks that do not bleed. 7) Lidding films, inserts and other components should not lead to the misdetection of the main packaging, and if using non-PET polymers, density should be <1g/cm3. *EMF New Plastics Economy Global Commitment Progress Report 2020

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6

GOLDEN DESIGN RULE

Increase Recycling Value in Flexible Consumer Packaging

For flexible consumer packaging made mostly from plastic¹:

1. Regional design guidelines to fit with existing recycling programmes² shall be met wherever possible.
2. For packaging that is not accepted by existing recycling programs, and where there is a clear pathway for a future recycling system by 2025³, the following requirements apply:
 - A. Maximise polyolefin content:
 - B. Preferably >90% mono PE, or >90% mono PP
 - C. Minimum either >80% mono PE, >80% mono PP or >80% mixed polyolefins
 - D. Density <1 g/cm³
 - E. Each barrier layer should not exceed 5% of the total packaging structure weight⁴
 - F. No PVC, PVDC, fibres, aluminium foil, PET

Demand for flexible packaging is expected to increase with increasing demand for convenience food and online retailing.

Consumer flexible plastic packaging is not currently recycled in practice and at scale, however there are multiple efforts underway to improve collection, sorting and recycling systems to recycle flexible materials. All consumer flexible packaging made mostly from plastic:

- 'Consumer' packaging is packaging likely to end up either in the household waste stream or disposed of by consumers during consumption outside the home
- 'Flexible' packaging is packaging that does not keep its shape when moved or emptied.
- 'Made mostly from plastic' defined as packaging made from >50% plastic (i.e. where plastic is the predominant material)

FOOTNOTES: 1) 'Mostly from plastic' defined as packaging which is > 50% plastic (based on EU recognised definition of a 'predominant' material). This rule does not cover compostable plastic packaging that meets accepted certification standards for compostability. 2) Recycling programmes are at different stages of development in different regions, so companies are recommended to check regional advice or guidelines such as those provided by APR in the US. Signatories should use the exceptions reporting process to record cases where they have followed regional design guidelines instead of the Golden Design Rules. 3) As accepted by industry associations and multi-stakeholder value-chain initiatives such as CEFLEX and Plastics Pacts and targeting recycling rates of > 30%. 4) Only use barrier layers and barrier coatings proven not to limit the recyclability of the packaging. AlOx, SiOx, EVOH and PVOH are recommended. Excess outer metallisation (as a barrier or for decoration) could lead to misdetection of the packaging and misdirection to waste. *EMF New Plastics Economy Global Commitment Progress Report 2020

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7

GOLDEN DESIGN RULE

Increase Recycling Value in Rigid HDPE and PP

For all rigid HDPE and PP packaging:

- For all labels, ensure material choice, adhesive choice, inks and size is not problematic for recycling¹
- Use minimal or moderate direct printing²
- For closures, ensure material choice, liners and seals are not problematic for recycling
- Do not use fillers that increase the density of the packaging to $>1\text{g/cm}^3$

The rule applies to all rigid HDPE and PP packaging, including bottles and squeeze tubes. Rigid HDPE and PP packaging is recycled in practice and at scale in many markets², but there is significant scope for increasing value in recycling and increasing availability and quantity of recycled material.³

FOOTNOTES: 1) Including phase out of paper labels, and PET, PETG, PLA and PVC labels/sleeves; and non-water soluble/dispersible adhesives. Labels/sleeves should not lead to misdirection of the packaging and misdirection to waste. For in-mould labelling use only polyolefins. 2) E.g. production or expiry date. Where additional printing is necessary, use of labels is preferred. If this is not possible, use only inks that do not bleed or which are proven not to limit recyclability. 3) Including phase out of silicone valves, and PVC and silicone seals; PS and PVC; and steel and aluminium caps. Closures should not lead to the misdirection of the packaging and misdirection to waste. * EMF New Plastics Economy Global Commitment Progress Report 2020

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8

GOLDEN DESIGN RULE

Reduce Virgin Plastic Use in Business-to-Business Plastic Packaging

Reduce the use of virgin plastic in business-business (B2B) plastic packaging¹ in a way that is environmentally beneficial by:

- a. Eliminating unnecessary plastic (defined as unnecessary if it can be removed without compromising supply chain/operational efficiencies)
- b. Using post-consumer recycled content (where plastic is necessary)
- c. Switching to reuse models or alternative materials

- This segment of the packaging market generally does not require food-grade plastics or barrier properties so can be well suited to the use of recycled plastics or substitute materials
 - Reusable alternatives to single-use packaging are available (See EMF Upstream Innovation Guide for examples of reuse models for this packaging segment)
 - Reducing the use of virgin plastic through elimination, use of recycled content and reuse models could lead to a lower environmental impact from both a waste and GHG emissions perspective if done in an environmentally net beneficial way
- The intended scope of this rule is to cover all plastic packaging that does not reach the consumer (as distinct from rule 4 on overwraps). This means all packaging that does not end up either in the household waste stream or is disposed of by consumers during consumption outside the home. This could include, but is not limited to:
- Packaging that is additional to the consumer packaging, and that may be used for protection and collation of individual units during storage, transport and distribution, and to display primary packs on shelf;
 - Transportation packaging, including pallets, slip sheets, and stretch wrap used for the shipment and distribution of goods

FOOTNOTES: 1) The intended scope of this rule is to cover all plastic packaging that does not reach the consumer, as distinct from rule 4 on overwraps. This means all packaging all packaging that does not end up either in the household waste stream or is disposed of by consumers during consumption outside the home

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GOLDEN DESIGN RULE

Use On-Pack Recycling Instructions

Include recycling or reuse instructions on consumer plastic packaging¹

A high-level rule allows companies to implement the rule according to what is possible in different markets.

Consumers have a key role to play in ensuring packaging is sorted for the appropriate end-of-life solution; clear and accurate on-pack recycling instructions can increase the chances that this role is fulfilled.

There are a growing number of initiatives developing guidelines for on-pack recycling instructions working towards a standardised and accurate way of communicating recycling and reuse instructions to consumers in different markets.

The scope: All consumer plastic packaging: ‘Consumer’ packaging is packaging likely to end up either in the household waste stream or disposed of by consumers during consumption outside the home.

FOOTNOTES: 1) Instructions should reflect the local conditions. Companies should continue to work at the local level to determine the most accurate way to reflect this in each country

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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

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

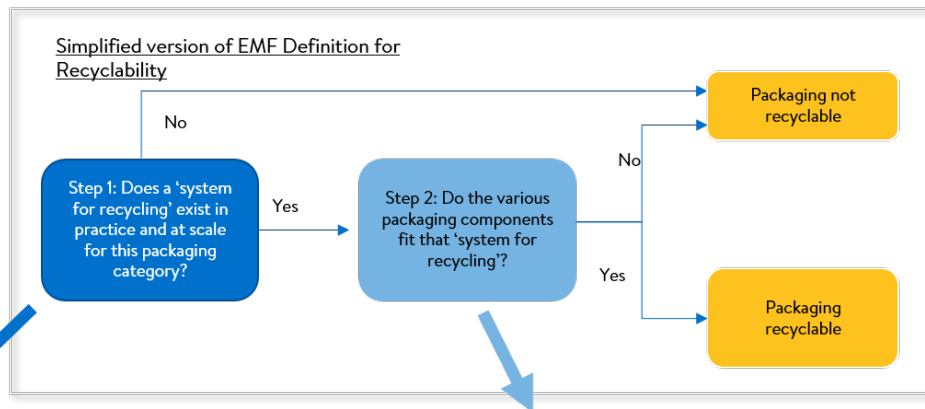
*Outside of the North America, BPI can be used or other programs that follow similar standards (e.g., ASTM D6400/D6868, EN 13432, or CAN/BNQ 0017-088) and prohibit added PFAS (e.g., TUV).

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

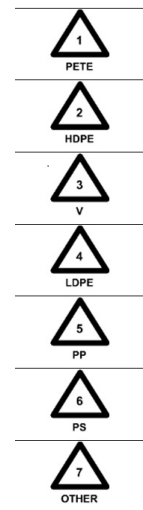
Recyclable in some regions (e.g., U.S.), but does not meet the definition for being globally recyclable



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



ADDITIONAL RESOURCES

Design Guides

Aluminum Cans: Aluminum Association's [Aluminum Container Design Guide](#)

Compostable Packaging: Closed Loop Partners [Unpacking Labeling and Design: U.S. Consumer Perception of Compostable Packaging](#)

Fiber-Based Packaging: American Forests and Paper Association [Design Guidance for Recyclability](#)

Paper Cartons: Carton Council's Food and Beverage Cartons [Design Guidance for Recyclability](#)

Plastic Packaging: Association of Plastic Recyclers [Design * Guide for Plastics Recyclability](#)

Steel: Can Manufacturers Institute [Steel Container Design Guide for Recyclability](#)

Assessment Tools

The Recycling Partnership [Circular Packaging Assessment Tool](#)

The Recycling Partnership [Recycle Check](#)