Circular Economy Trends / Impact Sustainability

May 15, 2019

Dennis Kittel,
Global Sustainability Manager
Amcor Rigid Packaging

Better packaging. Better world.

Amcor is the first global packaging company pledging to develop all our packaging to be recyclable or reusable by 2025

We also committed to:

- Use significantly more recycled materials
- Help drive greater packaging recycling

Additionally, we set, achieve, then raise ambitious environmental targets for our global operations

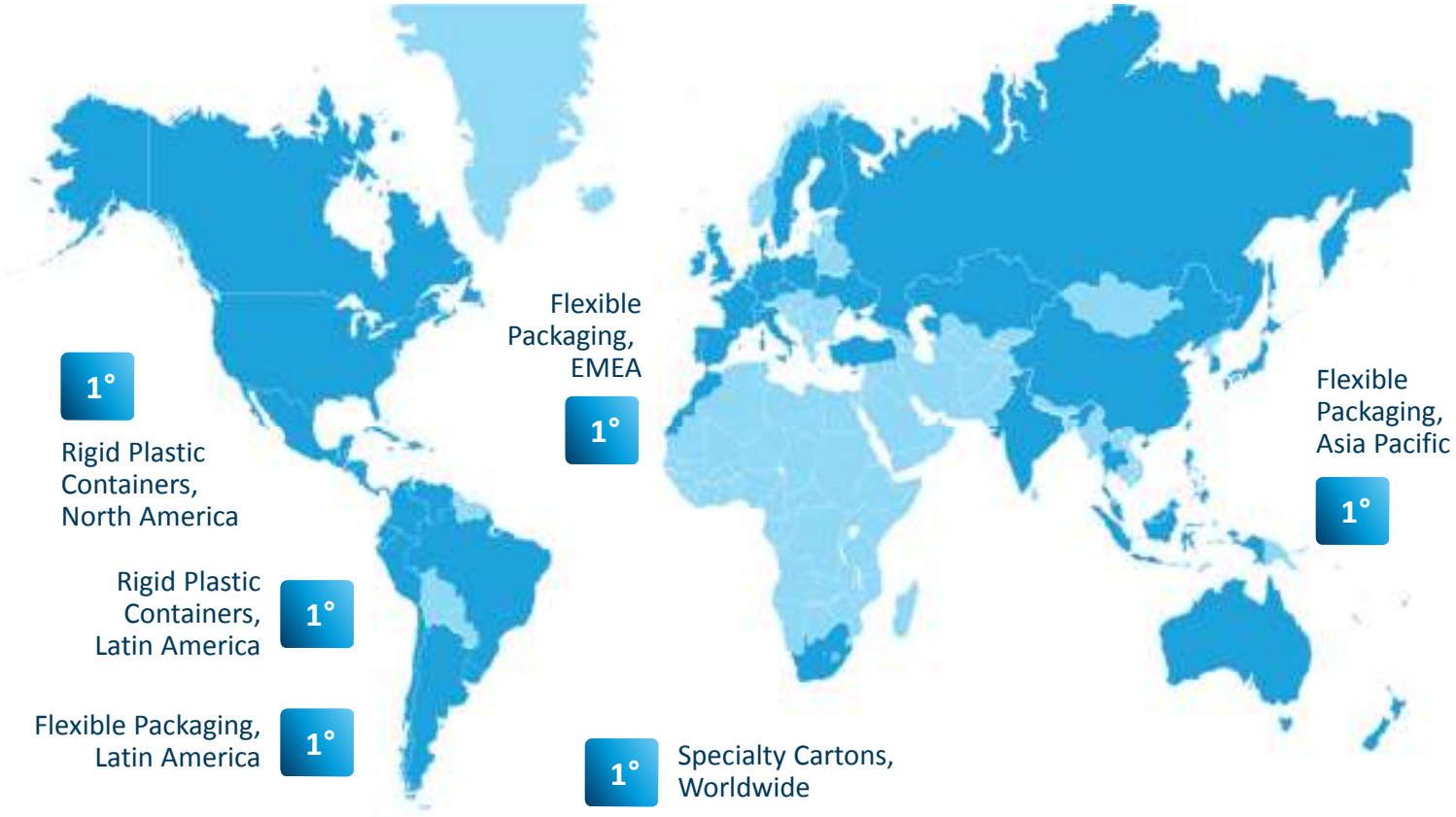
Global Company, Proud History

- Founded in Australia in 1860
- Leader in flexible and rigid plastic packaging, ~US$9B in annual sales
- Listed on Australian Securities Exchange, ~A$17B market cap
- Investment-grade balance sheet, compelling dividend
- Strong, profitable presence in all high-growth emerging markets
- Track record of value-creating acquisitions – 25 in last six years

- 33,000 people – skilled, experienced and determined
- 200 sites across 40 countries – in the Americas, Europe, Middle East, Africa and Asia Pacific, including emerging markets

- One commitment – to a consistent way of doing business: Being Amcor

Leadership positions and scale in key segments



Revenue in US$ billions (FY18)	Flexibles Europe, Middle East & Africa	Flexibles Americas	Flexibles Asia Pacific	Rigid Plastics	Specialty Cartons
	3.1	0.9	1.2	2.8	1.3


4 CANADA
31 USA
4 MEXICO
1 EL SALVADOR
DOMINICAN REPUBLIC 1
TRINIDAD & TOBAGO 1
VENEZUELA 5
4 COLOMBIA
1 ECUADOR
1 PERU
BRAZIL 6
ARGENTINA 2
Rigid Plastics
61 plants
12 countries
As of 31 December 2018

Market Segments

Custom Beverage

Spirits and Wine

Soft Drinks and Water

Home and Personal Care

Food

Healthcare

Consumer Voice & Impact on Packaging Trends -

2019 Consumer Voice – Top 3

~Consumers are concerned about Health and Environment

- Drives smaller serving sizes.
- Development of products / markets away from CSD
- Light weight packaging and Reusable Materials
- Sustainable Solutions
- Convenience

Responsible packaging plays an essential role in contemporary society

Packaging plays a vital role in preserving fresh food

- Packaging protects the product throughout the supply chain keeping it fresh and nutritious for the consumer
- Reducing spoilage lowers the impact of agriculture, manufacturing, and transportation required to get food from farm to plate

FRESHER

Lighter packaging means better environmental outcomes

- Light weighting packaging innovations saves energy as less raw materials are used and less fuel is consumed to transport products
- It also means less packaging material is sent to landfill

LIGHTER

Keeping products safe, effective and easy to use

- Many food and pharmaceutical products can spoil from exposure to light and contact with air or moisture
- Well designed packaging provides a protection barrier, keeping the product safe

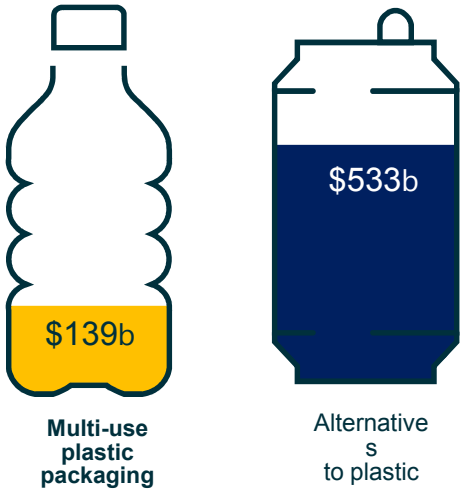
SAFER

Smarter packaging innovations are supporting our modern day lives

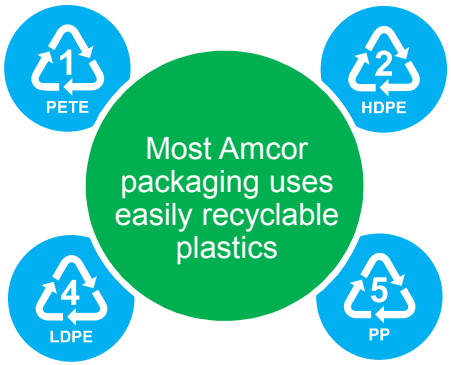
- Shelf life extension, portion control, microwavable materials, re-closing features, moisture absorbing layers and built in security solutions are just some of the ways that packaging innovations add functionality and reduce waste

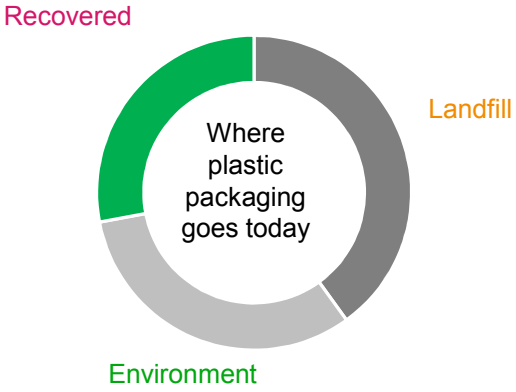
SMARTER

Plastic packaging is typically favourable across the spectrum, and most can be recycled or reused today



Environmental cost of plastic versus other packaging materials
American Chemistry Council



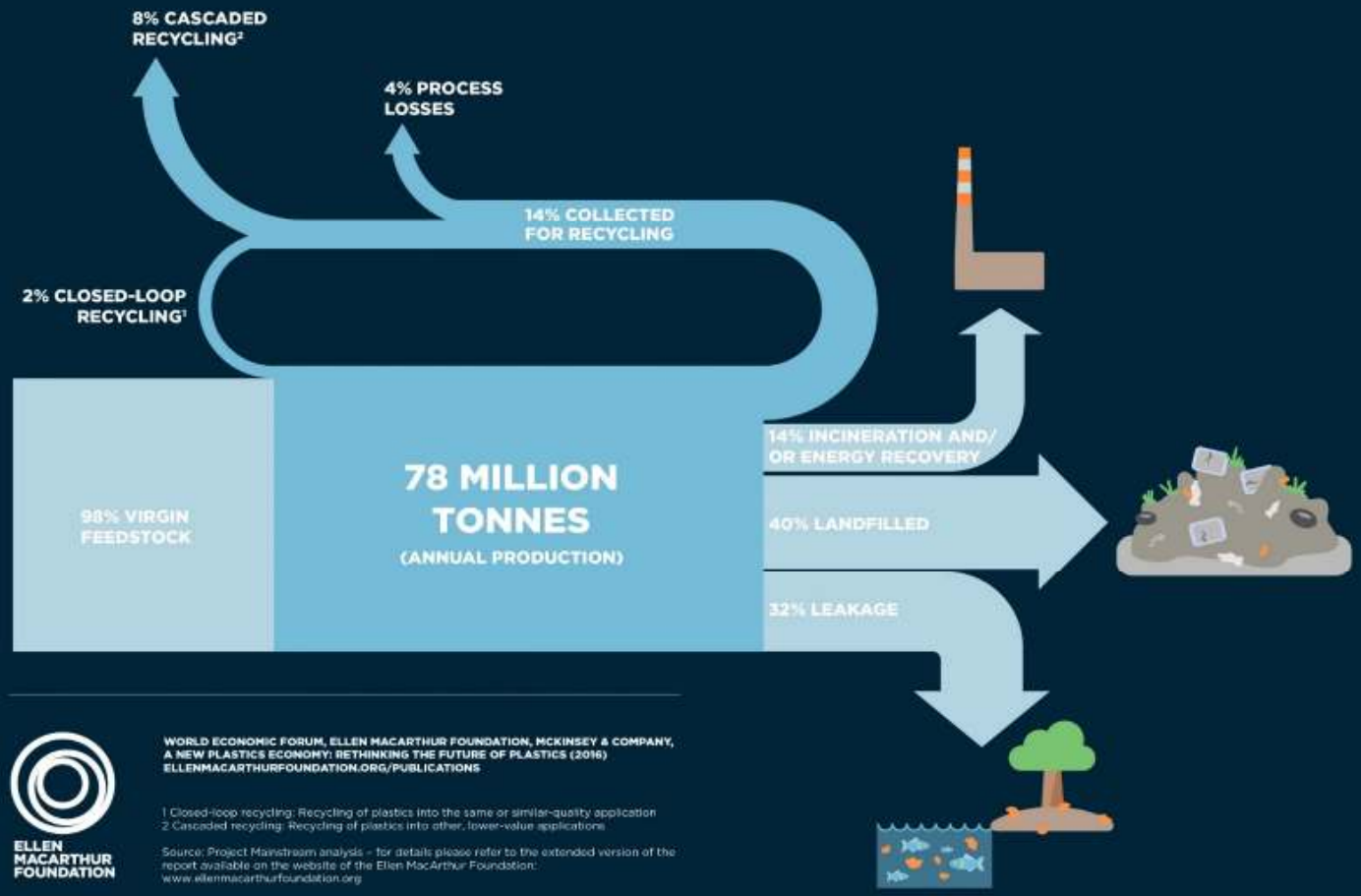


Realizing the full benefit of that requires effective waste-management and recycling systems

Data-Driven Design: Packaging & the Product Life Cycle

Source: The European Perspective on Packaging & Sustainability, INCPEN.

TODAY, PLASTIC PACKAGING MATERIAL FLOWS ARE LARGELY LINEAR



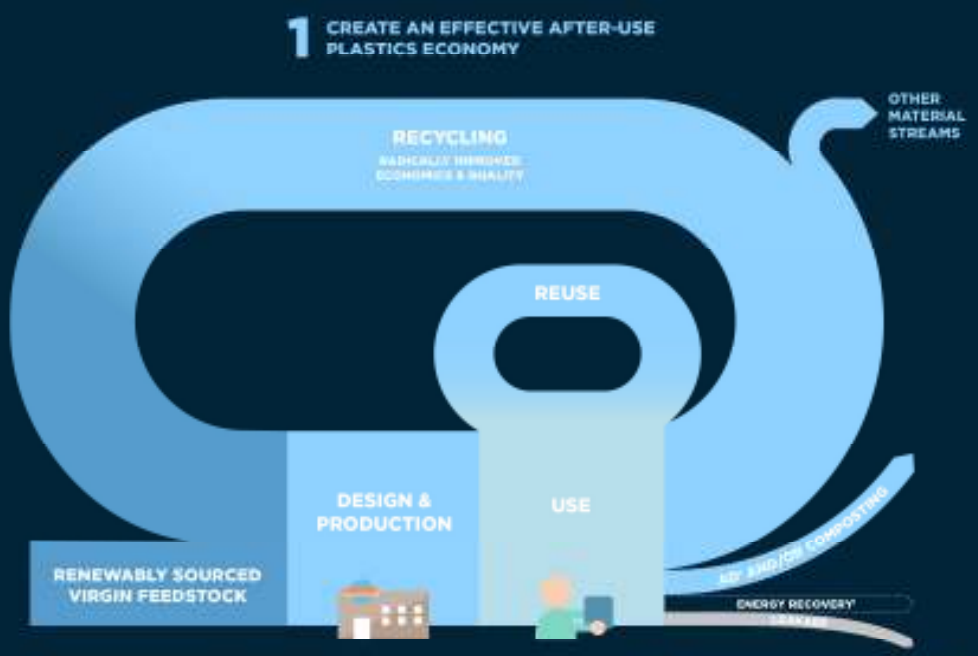
ELLEN MACARTHUR FOUNDATION

WORLD ECONOMIC FORUM, ELLEN MACARTHUR FOUNDATION, MCKINSEY & COMPANY, A NEW PLASTICS ECONOMY: RETHINKING THE FUTURE OF PLASTICS (2016) ELLENMACARTHURFOUNDATION.ORG/PUBLICATIONS

1 Closed-loop recycling: Recycling of plastics into the same or similar-quality application
2 Cascaded recycling: Recycling of plastics into other, lower-value applications

Source: Project Mainstream analysis – for details please refer to the extended version of the report available on the website of the Ellen MacArthur Foundation: www.ellenmacarthurfoundation.org

THE NEW PLASTICS ECONOMY



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1 Anaerobic digestion
2 The role of, and boundary conditions for, energy recovery in the New Plastics Economy needs to be further investigated.
Source: Project Mainstream analysis

ELLEN MACARTHUR FOUNDATION

Sustainability Partnerships

Industry Memberships

- Sustainable Packaging Coalition
- Packaging and Films Association
- Association of Plastics Recyclers
- Circular Economy Accelerator
- NAPCOR
- Plastics Industries Association
- PIA Recycling Subcommittee
- Plastic Recycling Corporation of California

Sustainability Indices

CDP
Carbon Disclosure Leadership Index
(Australia & New Zealand region)

- Winner of the CDP ASX200 Best Climate Disclosure Award

CDP

A complete list is available in the Appendix of Amcor's 2018 Sustainability Report

Amcor's 2025 Pledge

On January 23rd 2018 Amcor became the first global packaging company pledging to develop all its packaging to be recyclable or reusable by 2025 directly addressing a major environmental issue with capability, scale, and reach.

The action joins Amcor with 10 leading brands and retail companies making the same 2025 commitment, in collaboration with the Ellen MacArthur Foundation. Most of those companies are Amcor customers.

PEPSICO
Unilever
Coca-Cola
amcor
DANONE
Nestlé
P&G
L'ORÉAL

the Global Commitment

January 2018

- First global packaging company to pledge to develop all packaging to be recyclable or reusable by 2025
- One of nine core partners in Ellen MacArthur Foundation's New Plastics Economy Initiative (NPEC)

NEW PLASTICS ECONOMY

amcor · The Coca-Cola Company · DANONE · MARS incorporated · NOVAMONT · L'ORÉAL · PEPSICO · Unilever · VEOLIA

April 2019

- Joined 350+ other businesses, governments, and NGOs in launching NPEC/UNEP Global Commitment
- Global alignment around shared goals for a circular economy for plastic

NEW PLASTICS ECONOMY Global Commitment

Amcor's 2025 Pledge

Develop all **our packaging to be recyclable or reusable by 2025** - and more

Develop all our packaging to be recyclable or reusable by 2025

Significantly increase our use of recycled materials in our packaging

Work with others to drive consistently greater worldwide recycling of packaging

The signatories of the New Plastics Economy Global Commitment endorse the vision of a circular economy for plastics, where plastics never become waste.

The commitment is defined by three key points:

1. Eliminate problematic or unnecessary plastic packaging and move from single-use to reuse packaging models.
2. Innovate to ensure 100% of plastic packaging can be easily and safely reused, recycled or composted by 2025.
3. Circulate the plastic produced by significantly increasing the amount of plastics reused or recycled and made into new packaging or products.

Brand messaging - summary

Unilever	• Plastic is necessary for the products, but it should not damage our planet • Treating plastic packaging as a valuable resource to be managed efficiently and effectively is a key priority • Unilever commits to 100% **reusable, recyclable, or compostable** by 2025, use at least 30% recycled materials across all their plastic packaging .
PEPSICO	• 100% **recyclable, compostable or biodegradable** by 2025, use at least 30% recycled materials across all their plastic packaging • It is critical for PepsiCo and other industry members to be part of the policy discussion • Recycling and composting industries should be viewed by governments as a vital opportunity for clean technology investment and growth • PepsiCo has strong progress up to date, invests significantly into recycling improvement
KraftHeinz	• 100% **recyclable, reusable or compostable** packaging by 2025 • Situation can be addressed only collectively, no one can make a change on its own • Sustainability should be balanced with the requirements of food safety and shelf-life
Nestlé	• 100% **recyclable or reusable** packaging by 2025, use at least 30% recycled materials across all their plastic packaging • There is an urgent need to minimize the impact of packaging on the environment • We must work collaboratively together, including industry players, local and national governments, civil societies, and consumers
MARS	• 100% **recyclable, compostable or biodegradable** by 2025 • Strong focus on decreasing packaging & light weighting • “packaging had to walk a thin line between sustainability impact and the health and preservation of the food products” • science is the right way forward
J&J	• Goal: **increase recyclability** of our consumer product packaging to 90+% in key markets and to engage in partnerships to advocate material recovery and recycling efforts in key markets where recycling infrastructure is less mature • We must eliminate the notion of waste and find ways to close material loops • Many consumer products comes with refill options, so consumers can help to reduce waste

Amcor Capabilities – Post Consumer Regrind

- Over **110 million pounds** used annually
- Secured sources with over **14 suppliers** of food and non-food grade PET and HDPE globally
- Qualified use of **PCR** and **bio-based** PET / HDPE
- Through industry association membership, policy advisement, and supply chain interaction we are **working to secure increasing amounts** of high quality PCR supply

Benefits to using PCR

- ✓ 1/2 Lifecycle Greenhouse Gas (GHG) emissions
- ✓ California Incentive Payments
- ✓ Sustainable Marketability
  - ✓ Recycled Material
  - ✓ Supports GHG reduction goals

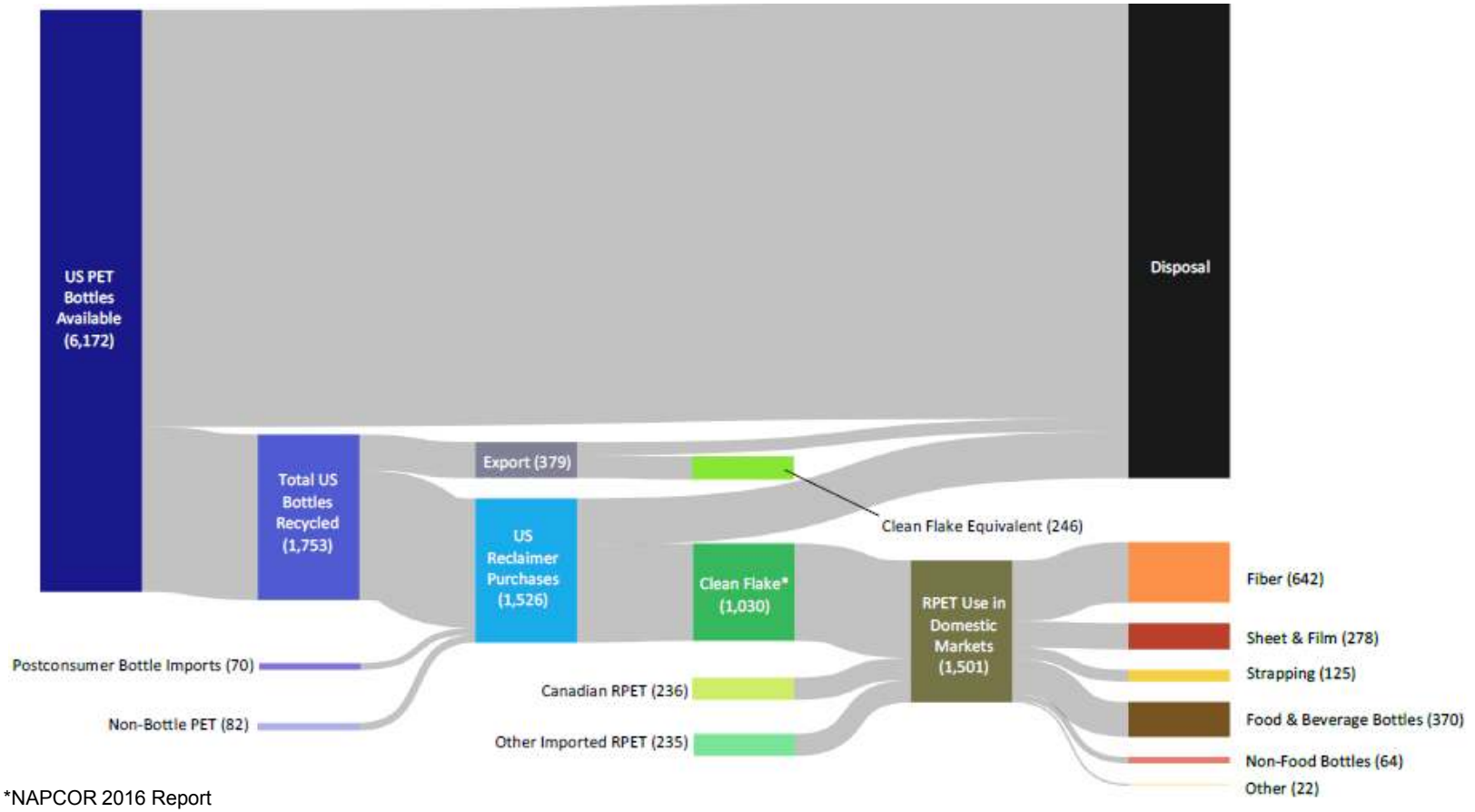
Assessments to be made using PCR

- Manufacturing variability based on source of material (curbside bales vs. deposit bales)
- Color changes: >25% PCR (L*a*b* values)
- Supply Constraints for High Quality Materials normally come from U.S. deposit states like Michigan, Oregon, and California

Collection is and will continue to be an Issue

- If all 2025 Pledge commitments are met, the packaging industry will see a shortage of rPET and rHDPE Post Consumer Regrind ~ 2020 - 2021

PET Material Flows in the US (MM lbs)



*NAPCOR 2016 Report

Circular Economy Influences Common Definitions

Global Alignment

Global Definitions - Recycling

Definition: Material Recycling

Reprocessing, by means of a manufacturing process, of a used packaging material into a product, a component incorporated into a product, or a secondary (recycled) raw material; excluding energy recovery and the use of the product as a fuel.

Definition: Recyclable Packaging

A package or packaging component is recyclable if its successful collection, sorting and recycling is proven to work in practice and at scale.

Notes:

- Packaging for which the only proven way of recycling is recycling into applications that do not allow any further use cycles (e.g. plastics-to-roads) cannot be considered recyclable packaging

- Amcor's commitment is to design all packaging to be recyclable where infrastructure and recycling systems exist for those packages. In addition to endorsements in the Global Commitment, Amcor acknowledges that energy recovery and other uses of plastic packaging offer positive outcomes vs. litter and plastic pollution, and may support those solutions when appropriate.

Defining packaging to be recyclable – Global Plastics Protocol

"Developed to be recyclable" and a commitment to use more recycled materials is only relevant if our packaging is actually collected and recycled. This will be critical for our long-term right to operate.

A package is defined as recyclable if its successful collection, sorting and recycling is proven to work in practice and at scale. And there is a market for the finished material.

Three Elements

- Recyclable – Fundamentally the material must be recyclable, meaning technology exists to recycle this packaging and material. In this case the recycling must be at a sufficient scale.
- Collection System – A successful collection system must exist for the item for a majority of the population area. In practice currently and at scale sufficient to capture the volume available.
- A Market - A viable end market for the recyclate is available in order to put the material back in use.

Influences to Defining Recyclability

Ellen MacArthur Foundation's **New Plastics Economy** initiative, increasing recovery and recycling. Global Plastics Protocal

The Association of Plastic Recyclers. , International trade association representing the recycling industry. APR Design Guide.

Recycling Definitions Applied

Container	Criteria		
	Material Recyclable	Existing Collection Method Exists	Viable end market for Recycled Material exists
 PET Clear or tinted Bottle / HDPE Closure.	✓	✓	✓
 PET bottles with metal tamper evident closure. Resulting metal contamination makes this package detrimental to the recycling end market.	✓	✓	X
 White PET bottles or opaque colors are detrimental to PET recycling and lack secondary market.	✓	✓	X
 Mutli Layer EVOH PP with EVOH Oxygen Barrier Layer less than 3%.	✓	✓	✓

Global Definitions - Reuse

Definition: Post consumer recycled material

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.

Industrial Regrind is not considered PCR:

Industrial Regrind is the reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

Definition: Reuse of packaging

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.

Definition: Reusable packaging

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.

Notes:

- The principal components of reusable packaging should accomplish a number of trips or rotations in normally predictable conditions. Examples include b-to-b applications such as totes and pallets, or consumer packaging when a system for reuse exists where the item is placed in the market.
- Secondary uses, e.g. the use of a package as a pencil holder or flower pot do not qualify as reuse. (ISO 18603)

Global Influencers

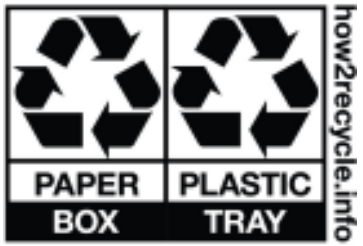
Influences – Significant but updates desired
Resin Identification Codes

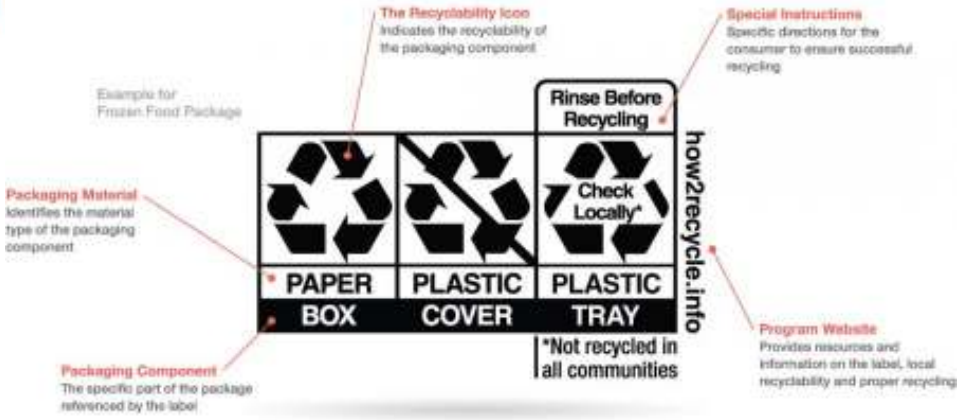
- RIC's – Resin Identification Codes
  - The Resin Identification code was initiated in 1988 by SPI, The Plastics industry Trade Association, with the intent that it would assist recyclers in the delivery of a consistent product by allowing easy identification by consumers SPI

- The % of all ackagi

Influences: Trending UP
Recycling – How2Recycle Labels -www.how2recycle.info

- SPC & GreenBlue
- Offers direction to consumers





Design Guides – Common Direction

Design Guides for Recycling

3 Recycle Design guides were recently published or updated

1) APR - Association of Plastic Recyclers
2) SPC – Sustainable Packaging Coalition
3) Walmart

In addition:
Problem Bottles APR – 5 for Focus

Retailers

Walmart

APR Design Guide Evolution -

- APR Design® Guide Home
- APR Design® Guide Resources
- Test Methods
- Test Methods Resources
- Training Program
- Questions?
- Disclaimer

APR Design® Guide Sections

- PET
- HDPE
- PVC
- PE Film
- PP
- EPS
- PS
- PLA

BASE POLYMER | BARRIER LAYERS, COATINGS & ADDITIVES | COLOR | DIMENSIONS | CLOSURES AND DISPENSERS | LABELS, INKS AND ADHESIVES | ATTACHMENTS | BIO-BASED PET RESIN | POSTCONSUMER CONTENT | RESIN IDENTIFICATION CODE, RIC

PET and PET variants resins which have a crystalline melting point between 225 and 255C are preferred.
Materials of a lower melt point or non-crystalline materials often become sticky in the reclaimers' pre-extrusion dryer when the dryer is operated at PET temperatures and prevent the material from flowing through the process. Materials of a higher melt point remain solid in the reclaimers' extruder and cause blockages in melt screens. Both conditions greatly hinder the ability of the reclaimer to operate.

Blends of PET and other resins require testing to determine the appropriate APR recyclability category.
Other resins may be blended into the PET to enhance certain properties during the package's intended first use. The materials' effect on the RPET in future uses must be evaluated since it will not be removed in the recycling system.

Definitive Test: Critical Guidance Protocol for Clear PET Resins and Molded Articles

APR – Problem Bottles – Five for Focus

Five for Focus

1. PETG shrink sleeve labels
2. Pressure sensitive labels
3. Extrusion blow molded containers that employ PETG
4. Metal closures and lidding
5. Barrier for oxygen and carbon dioxide

Strategies:

- For 1, 2 & 3 there are APR Recognized products in commercial use. Drive these to be the norm in wide use.
- For metals – emphasize plastic closures; on-pack messaging as Plan B
- For barrier – emphasize innovation

- APR Board Approval, full support, assigned high priority
- Other letters re: problem bottles - sent strategically to date

SPC Design Guide

Amcor Featured in SPC 'Design for Recycled Content Guide'

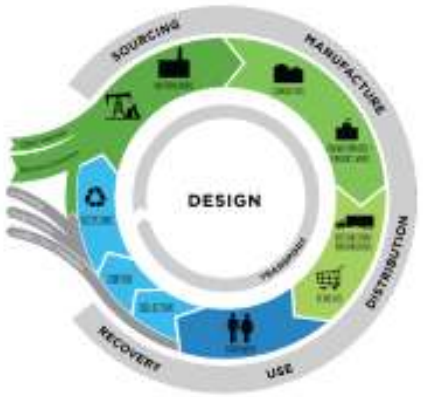
March 18, 2019

The Sustainable Packaging Coalition has released a first-of-its-kind Design For Recycled Content Guide to help companies make decisions about using recycled content in packaging. More...

Sustainable Packaging Coalition

Recently released design for recycle direction for the following:

PET – PP – HDPE - All Plastics
Aluminum – Corrugate – Glass
Paper Board – PE Film – PS – Steel



Key takeaways

- The use of recycled PET is common in the marketplace, and there are examples of PET packaging using 100% recycled content. However, current availability of supply may limit the number of PET packages that can use high percentages of recycled PET.
- PET is generally regarded as an easy starting point for brands interested in using recycled plastics.
- PET is widely accepted in recycling systems and has higher collection rates than many plastics, providing a regular flow of feedstock for recycled PET.
- There is heavy competition for the highest quality, food-grade recycled PET, resulting in higher prices. Lower quality PET is more available and more likely to be available at a cost advantage.
- There are no significant performance challenges when using recycled PET, owing in part to the fact that unlike other plastics, the intrinsic viscosity of recycled PET can be upgraded to near-virgin levels.

regionally, depending on the recycling infrastructure and the characteristics of the incoming PET stream available to the recycler.

Walmart Design Guide

Packaging formats in the Playbook Deep Dive:

- PET Bottles
- PET Thermoforms
- PE Bags and Film
- HDPE Bottles
- Paperboard
- Corrugated Board

Packaging formats not yet in the Playbook Deep Dive, include but not limited to:

- PP and Other Plastic Packaging
- Shelf Stable or Refrigerated Cartons
- Coated Cartons
- Glass
- Blister Packages
- Multi-layer Flexible Packaging

Walmart – Green is Preferred Packaging

Walmart sustainable packaging playbook deep dive: Supporting Recycling

PET Bottles

Application Notes
informative, not comprehensive

PET bottles is often used with the following:

- Water and beverages
- Grocery (e.g., condiments, sauces)
- Health & Wellness (e.g., supplements)
- Personal and baby care
- Cleaning products

Recyclable: *Meets the following or passed the applicable APR benchmark and definitive tests*	
Bottle Resin	PET bottle grade with a crystalline melting point between 225° and 255°C
Resin Color	Clear, transparent light blue, or transparent green are currently preferred
Resin Additives	No degradable or biodegradable additives
Wrap Around Label or Cut & Stack	PP or PE (that float when printed)
Shrink Sleeve, Pressure Sensitive, or Direct Printed	An APR preferred option (Learn more at https://plasticsrecycling.org/recognition/recipients)
Attachments	Clear if PET; colored ok for PP or PE
Closures, Pumps, and Sprays	PP or PE that floats (no metal)
Cap Liner	Liner made from PE, EVA, or TPE or no liner
Tamper Evidence	Easily fully removable, PET, PP, PE (no PVC)
Feasible post-consumer recycled content levels based on current industry practice	
Minimum (may increase over time)	25% PCR
Maximum	Up to 100% PCR

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.

Walmart - Red for areas with opportunity to improve

Walmart sustainable packaging playbook deep dive: Supporting Recycling

PET Bottles

Application Notes
Informative, not comprehensive

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Recyclability Challenges	Examples	Guidance
Nylon Layers	Sparkling mineral water, jars, and juice	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 (ex. EvOH at low%)
Paper Labels	Many products	These are a low cost option that either need to pass APR benchmark and definitive tests or be replaced with non-paper APR recognized options
Pressure Sensitive and Shrink Sleeve Labels	Many products	Use the APR recognized options (Learn more at http://plasticrecycling.org/recognition/recipients)
Metal Parts in Cap, Pump, or Spray	Beverages, cleaning, and personal care products	Look for all plastic caps, pumps, or sprays (some applications may have functional limitations and How2Recycle® labels should be used to clearly communicate that the cap, pump, or spray with metal needs to be removed before recycling)
PETG	Beverages	PETG is not the same thing as PET and should be designed out of PET packaging
Materials that present recyclability challenges		
Resin	PETG, or Other non-compatible resins mixed in (some EvOH levels are ok)	
Resin Color or Additives	Transparent colors other than blue and green, opaque colors, dark colors, degradable additives (no biodegradable additives)	
Attachments and Closures	Metal, Foils, PS, PVC, PLA, TPE/Silicon with density > 1	
Labels	Metal foil, metalized printing, PS, PVC, PLA, full body shrink sleeve or pressure sensitive labels that are not APR preferred, does not pass near infrared (NIR) Sorting Potential Test, greater than 60% printed label coverage of the container side wall section for pressure sensitive or 75% for sleeves, or paper labels that are not APR preferred, avoid bleeding inks	

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Trends –

PCR - Process Support

Recycling Technologies

Emerging Materials

Emerging Label for Compatibility - Innovation

- **Deseaming**

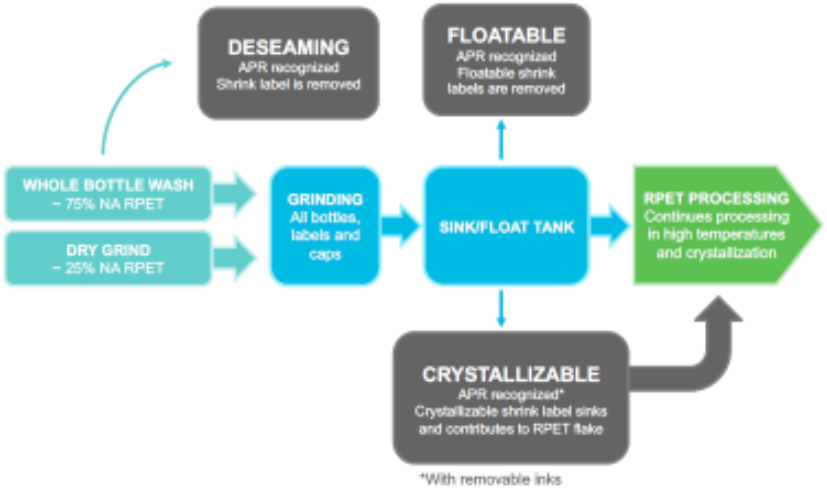
  Shrink label removed at the during the wash practice at the start of the recycling process, before grinding.

- **Floatable**

  Printed or Opaque Label that floats and separates from PET bottles after grinding. Biax HDPE / LDPE or PETG

- **Crystallizable PET**

  Polyester shrink label that is compatible with PET during the recycling process.



Recycling Technologies - Emerging

Traditional

-Mechanical Recycling Grinding / Separation/ Filtration

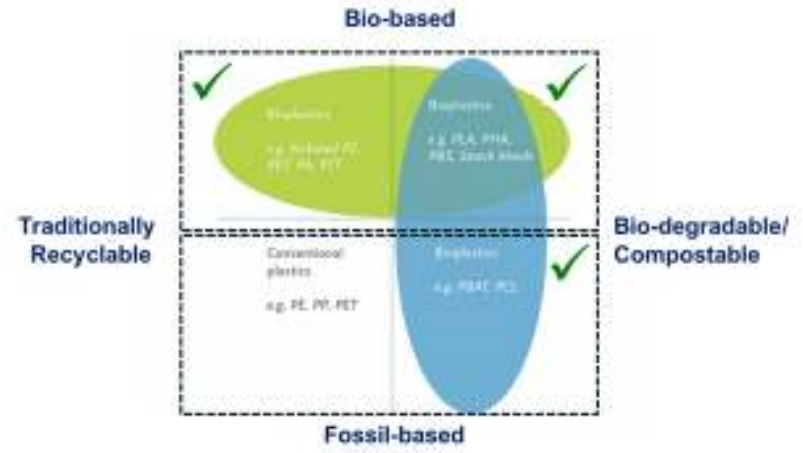
Chemical Recycling

-Indorama LOOP
-Renewology – Plastic to Fuel Salt Lake City, Phoenix,Nova Scotia
- PureCycle PP

Emerging

-Enzymatic Recycling, Carbios Ambercycle

Emerging Materials and Bio-materials



	Non-biodegradable	Biodegradable (in industrial composting installation)	Biodegradable (in water in nature)
On the market today	Bio-PE (drop-in) PA11, PA10.12, PA4.10	PLA (and *PLA/PHA blends*) PHA (and *PHA/TPS blends*)	PHA Regenerated cellulose
Under development (not on the market yet)	PEF Drop ins: Bio-PP , Bio-PVC, Bio-PET, Bio-PTT PBT PA6, PA6.10, PA66, PA12	Bio-PBS Cellulose Acetate PGA *PLA/TPS blends* *Bio-PBS/TPS blends*	

PGA - Polyglycolic acid / plant/fossil

PEF - Polyethylene Furanoate / Plant based

PTF - Polytrimethylene Furandicarboxylate / plant based

PHA – Polyhydroxyalkanoate / Plant based

PLA - Polylactic acid / plant based

PBS Polybutylene succinate / plant based

PBAT - Polybutylene adipate terephthalate / plant based

PCL - Polycaprolactone

<u>Traditional Materials Bio Sourced</u>

Bio-PET – up to 30% plant based

Bio- PE or PP / plant based

Ocean Conservancy

International COASTAL Cleanup

459,249
Glass Pieces

Summary

- **Ellen MacArthur's, Circular Economy has the global attention of suppliers and Brands.**
- **Collection needs to greatly improve to support recycling**
  - Recycle Rates (per EPA and SPC) are ~
    54% - Aluminum Cans, 24% PET, 16.4% HDPE, 8 % PP
- **Education and Consistency**
  - – Design Guides, Global Definitions, How-2-Recycle
- **New Post Consumer Regrind manufacturing methods under development**
  - Chemical Recycling…
- **New Materials emerging – Bio source, recyclable …**

Amcor promotes the reuse and recyclability of plastic materials.

Thank you