

# Activities Unlimited Science Club

September 2019



## Sustainability

By

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# Consumer Perceptions

- ❧ Packaging Waste is less than most consumers imagine (11%)
- ❧ Sustainability is a growing demand on the part of the consumer
- ❧ Packaging is Garbage
- ❧ Discarding a package is a reminder of:
  - ❧ Material loss
  - ❧ Functional loss
  - ❧ Guilt

# Waste Management

- ❧ Packaging Waste represents about 30% of Residential Solid Waste (37%)
- ❧ Initiatives continue to reduce solid waste
- ❧ **HOW WOULD YOU ATTACK THE PROBLEM OF REDUCING SOLID WASTE?**

**Table 1.1**

Average materials mix by weight in residential solid waste. These are national averages ... local proportions can vary significantly. (Source: EPA.)

<i>Material</i>	<i>Packaging</i>	<i>Nonpackaging</i>
Paper	12.7%	19.6%
Wood	4.6%	—
Metal	2.0%	5.7%
Glass	5.7%	0.8%
Plastic	4.1%	5.5%
Other misc.	0.1%	12.0%
Food waste	—	8.1%
Yard waste	—	19.0%
Totals	29.2%	70.7%

# What is Sustainability?

*“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”*

1987, BRUNDTLAND COMMISSION, UN GENERAL ASSEMBLY

# Cradle to Grave

∞ 1980's - Waste Management

∞ Manufacturers became aware of end of life (disposal) issues but were not concerned about raw material inputs.



Product  
Design



Raw  
materials



Manufacture



Transport



Use



Disposal

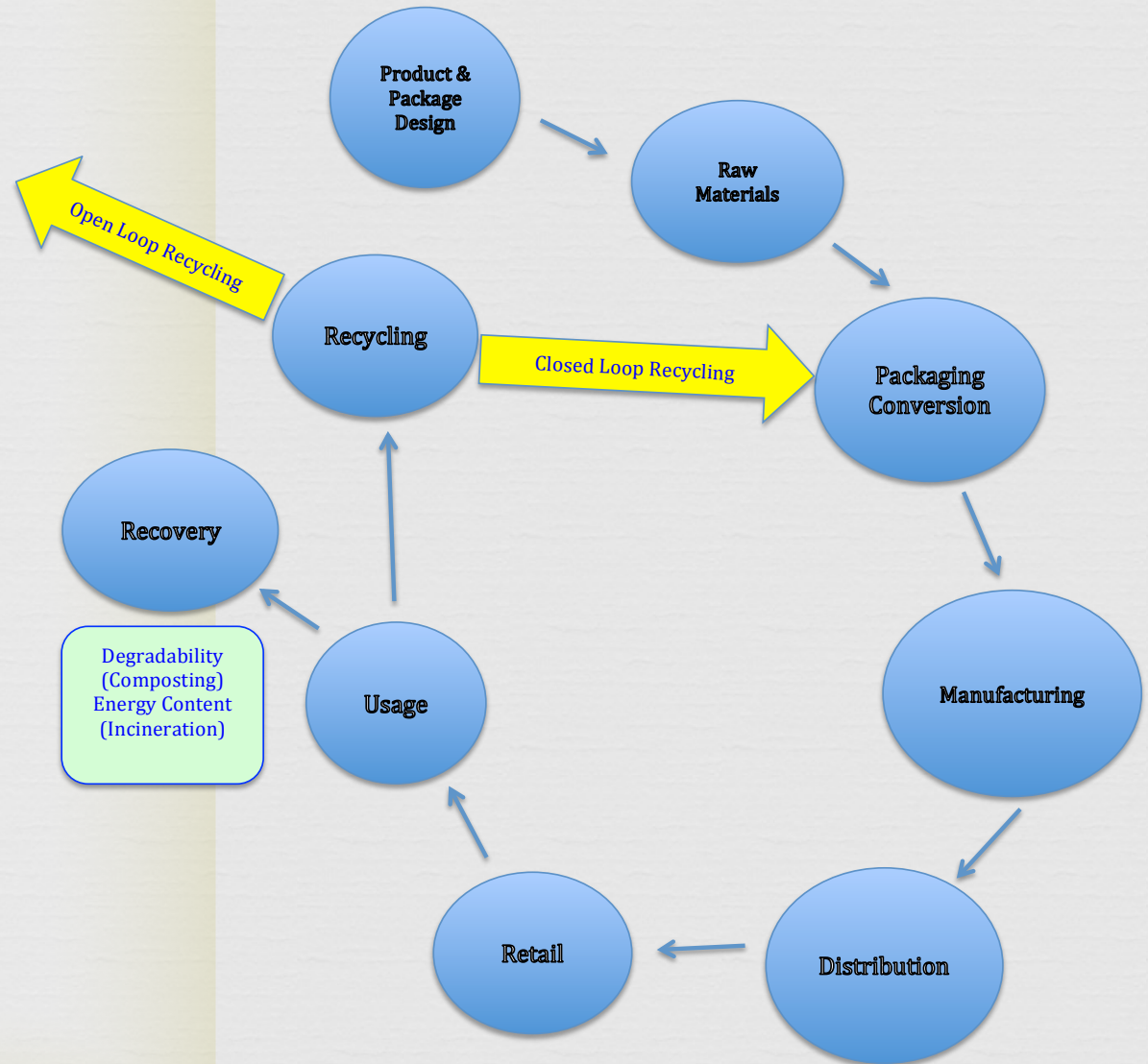
# Cradle to Cradle

## 2002: Life Cycle Analysis

Plotting the complete material, energy and process flow from raw materials to end of life.

## Cycle:

Packaging Conversion  
Manufacturing  
Distribution  
Retail  
Use  
Recycle  
Packaging Conversion



# Life Cycle Tools

- ❧ **ISO 14044: Life Cycle Assessment Requirements & Guidelines**

- ❧ Goals, Scope, Inventory Analysis, Impact Assessment, Interpretation, Reporting and Review, Limitations, Value Choices

- ❧ **Society of Environmental Toxicology & Chemistry**

- ❧ Global Guidance Principles for Chemical Life Cycle Assessment Databases (160 pages)

# Environmental Labeling (voluntary)

## ∞ ISO 14020

- ∞ Accurate
- ∞ Can not create obstacles to International Trade
- ∞ Scientific Methodology must support claims
- ∞ Methods must be available upon request
- ∞ Must consider Life Cycle
- ∞ Not inhibit innovation which may improve environmental performance
- ∞ Information demands limited to those needed to establish conformance
- ∞ Process must be open to consultation
- ∞ Information open to purchases of product



# Environmental Labeling (voluntary)

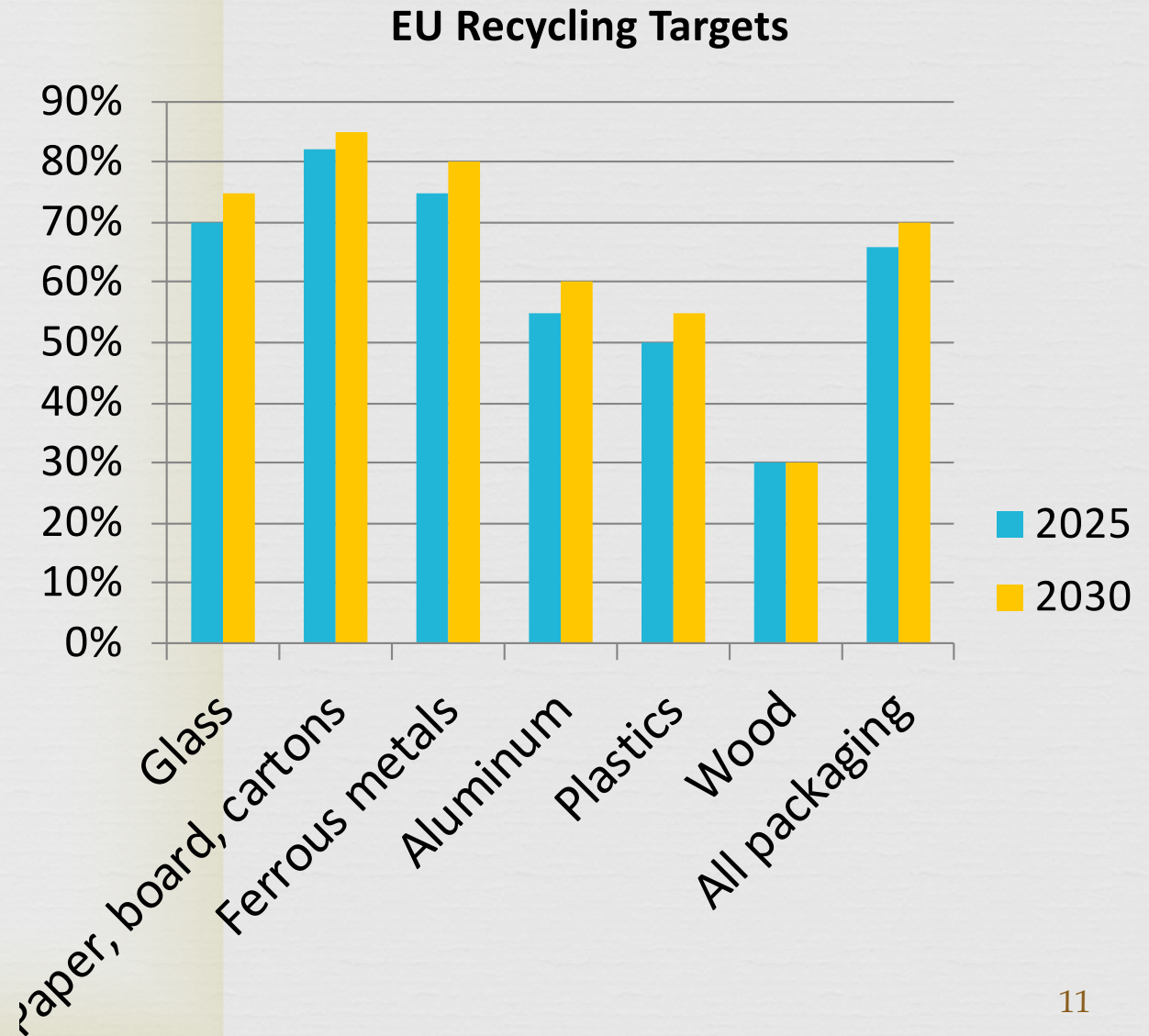
- ❧ FTC "Green Guidelines" (prevent deception)
  - ❧ Impact Reduction Strategies – avoid over exaggeration
  - ❧ Biodegradability – must be substantiated
  - ❧ Recycled Content – quantify by weight
  - ❧ Recyclability – with available recycling infrastructure
  - ❧ "Green Washing" – (Seven Sins)
    - ❧ Hidden Tradeoff, No Proof, Vague, False Label, Irrelevance, Lesser of Two Evils, Fibbing

# EU Circular Economy Packaging and Packaging & Packaging Waste Directive

- ∞ **The Circular Economy Package went into effect on July 4, 2018.**
  - ✓ 70% of all packaging waste to be recycled by 2030
  - ✓ All plastic packaging to be recyclable by 2030
  
- ∞ Amended **Packaging & Packaging Waste Directive** is part of the CEP.
  - ✓ Calls for Member States to update their packaging and textile EPR programs by July 5, 2020. Updates will include:
    - ✓ Material-specific **recycling targets** for product packaging through 2030
    - ✓ Establishment of **EPR schemes for all packaging, textiles, and some single-use plastics** by 2025
  - ✓ Commission will **strengthen Essential Requirements** by the end of 2020

# NEW DIRECTIVE: NEW EU Recycling Targets

EU Recycling Targets		
	2025	2030
Glass	70%	75%
Paper, board, cartons	82%	85%
Ferrous metals	75%	80%
Aluminum	55%	60%
Plastics	50%	55%
Wood	30%	30%
All packaging	66%	70%



Note: Some countries have higher recycling targets.

**Germany**, for example, has a 90% plastics target in 2019.

**The UK** has an 80% glass target in 2020.

# Europe: Plastic Packaging Recycling Targets

## UK:

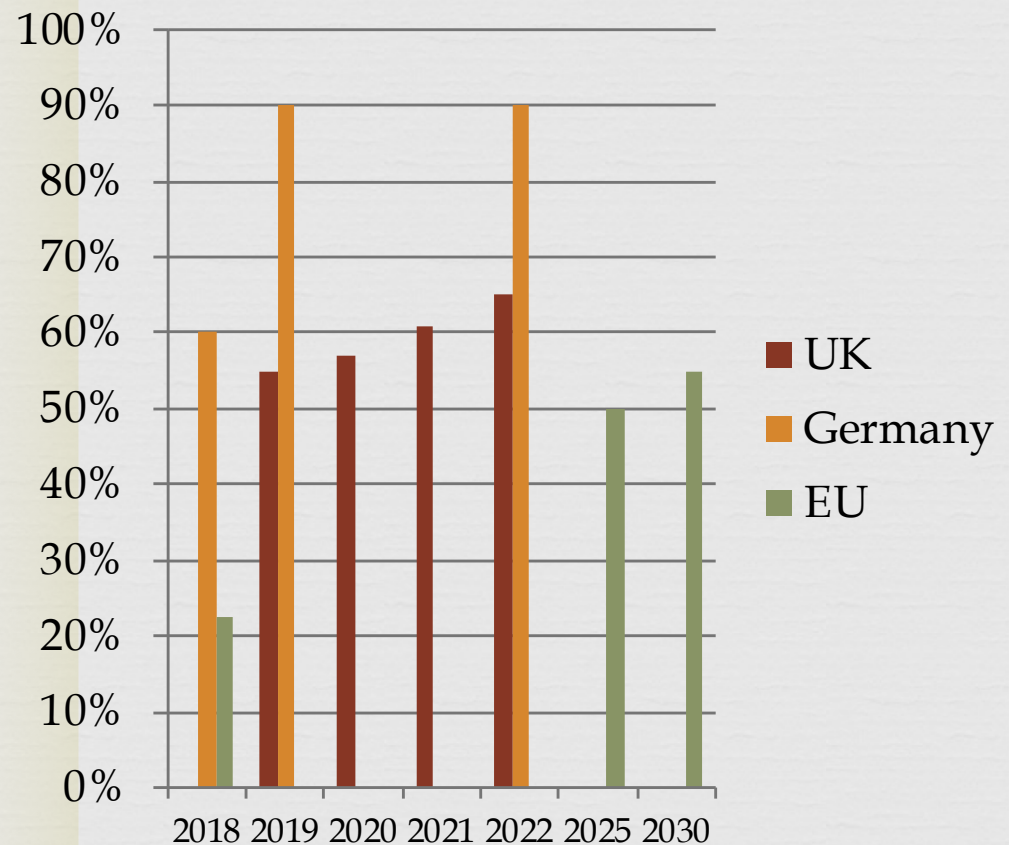
- 55% by 2019
- 57% by 2020
- 61% by 2021 (under consultation)
- 65% by 2022 (under consultation)

## Germany:

- 60% in 2018
- 90% by 2019
- 90% by 2022

## EU:

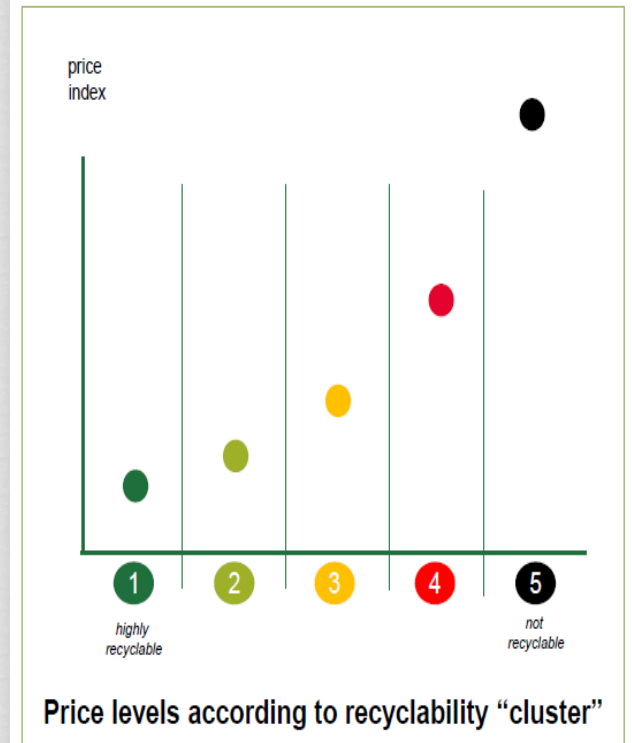
- 22.5% in 2018
- 50% by 2025
- 55% by 2030



# Eco-Modulated Packaging Fees

- ❧ **Germany:** Packaging to be classified through a “Cluster Tool” in 2020. For each cluster, a different price will apply.
- ❧ **Netherlands:** From January 1, 2019, a **lower rate** applies to plastic goods that can be sorted and recycled with a positive market value. **Higher rate** applies to “all plastic packaging that cannot be unequivocally identified as being recyclable within the current systems of collection, sorting and recycling existing in the Netherlands.”
- ❧ **Sweden:** Effective April 1, 2019, plastics categories changed, and an increased level of fees is applied to non-recommended resins and design choices (such as labels that cover >60% of the bottles, EVOH barrier>2%, black plastic).
- ❧ **Italy:** Effective April 1, 2019, 4 plastics categories with two fee levels, based on level of recoverability.

## Draft proposal for 2020




Die Gruppe mit dem Grünen Punkt | Der Grüne Punkt Group

Source: Der Grüne Punkt Group, March 2019. Workshop on Design4Recycling and Eco-modulation in Germany

# France: CITEO 2020 Rates

CITEO currently only has one EPR fee for all plastics. Beginning in 2020, there will be **7 categories for plastic packaging** “to reflect the level of development of recycling facilities”:

	Material Rates (in ct €/kg):	
	Plastic	
 <p>LEVEL OF DEVELOPMENT OF THE RECYCLING CHANNEL</p>	Bottle and vial in clear PET	28,88
	Bottle and vial in coloured PET, in PE or PP	30,92
	Rigid packaging in PE, PP or PET	33,30
	Flexible PE packaging	36,08
	PS rigid packaging	38,85
	Complex packaging or other resins excluding PVC	41,63
	Packaging containing PVC	48,57

Source: CITEO 2020 rates for recycling household packaging

# France: CITEO 2020 Disruptor Fees

## ☞ **Penalty (malus) fees:**

- **100%** for PET packaging using mineral opacifiers at a > 4% rate
- **100%** for bottles without a recycling channel (i.e. plastic bottles that are *not* made of PET, HDPE or PP)
- **50%** for disruptive packaging, such as:
  - ☞ Glass other than soda-lime, or glass with a disruptive infused element such as ceramic
  - ☞ Reinforced cardboard
  - ☞ Rigid colored PET combined with aluminum, PVC, or silicone
- **10%** for disruptive packaging, such as:
  - ☞ Glass with a non-magnetic steel closing system
  - ☞ Rigid plastics that are dark in color and not detectable by optical sorting, or made of PE or PP with high density
  - ☞ PET containing glass beads
  - ☞ Cardboard/paper packaging with inks with mineral oils

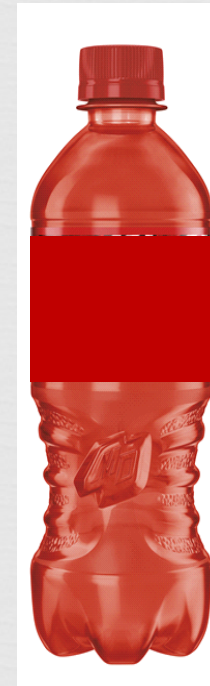
# France: CITEO 2020 Bonus Fees

## ∞ Bonus (discount) fees:

- **50%** for PE or PP packaging containing at least 50% recycled material
- **8%** for recyclability improvement (i.e. switching to a mono-material packaging system or reducing packaging units in a sales unit)
- **8%** for using complete sorting guidelines for all packaging units including Triman
- **5%** for using the Triman logo without related sorting instructions
- **4%** for awareness actions on sorting, such as on TV/radio, display, press or digital medium with purchase of space



# CITEO 2020 Fees for 12 oz. PET Bottles (in USD/1,000 units)



Clear PET with sorting instructions	Clear PET (no sorting instructions)	Colored PET	Colored PET with PVC	Opaque PET
\$8.00	\$8.69	\$10.01	\$18.99	\$18.21

# Company Commitments

**THE NEW PLASTICS ECONOMY:**  
RETHINKING THE FUTURE OF  
PLASTICS & CATALYSING ACTION

# New Plastics Economy Global Commitment

- ✧ The Ellen MacArthur Foundation (EMF) in collaboration with UN Environment launched the Global Commitment in October 2018, and it is the most ambitious EMF initiative to date.
- ✧ 400+ (and rapidly expanding) packaging producers, brands, retailers, recyclers, governments and NGOs – **companies representing over 20% of all plastic packaging produced worldwide** – have committed to:

- ✓ Take action to **eliminate** problematic or unnecessary plastic packaging by 2025
- ✓ Take action to move from single-use towards **reuse models** where relevant by 2025
- ✓ 100% of plastic packaging to be **reusable, recyclable or compostable by 2025**
- ✓ Set an ambitious 2025 **recycled content target** across all plastic packaging used



L'OCCITANE  
EN PROVENCE



L'ORÉAL



Johnson & Johnson

## According to EMF:

*A packaging or packaging component is recyclable if its successful post-consumer collection, sorting and recycling is **proven to work in practice and at a scale.***



Global  
Commitment

- **“In practice and at scale”** = 30% post-consumer recycling rate for at least 400 million inhabitants, or on markets where packaging is sold
- Recyclable if over 95% of packaging by weight is recyclable
- Minor components compatible with process

# Ellen MacArthur Foundation Definition of “Recyclable”

- ☞ **Packaging is considered recyclable if it:**
- ✓ Is accepted in a significant number of collection systems
  - ✓ Is compatible with the material stream it is collected in
  - ✓ Is sorted into defined streams and the majority of that stream is effectively recycled
  - ✓ Can be processed and recycled with commercial recycling processes
  - ✓ Has a viable end market available to keep material in circulation

**A packaging system could meet EMF recyclability requirements but have “limited recyclability” or “no recyclability” under US FTC guidelines.**



# What's Currently Recyclable?

As of today, the following plastic formats are considered recyclable by the Ellen MacArthur Foundation because they reach the 30% collection rate by a sufficient population:

- ✧ PET bottles
- ✧ HDPE bottles
- ✧ HDPE other rigid
- ✧ PP bottles
- ✧ PP other rigid
- ✧ Flexible LDPE



Image source: Washington County, OR. "Recycling Plastics Properly."

# Global Plastics Pacts Goals and Targets

	UK Plastics Pact	France National Pact on Plastic Packaging	Netherlands Plastics Pact	Chilean Plastics Pact
<b>Education Initiatives</b>		Lead awareness-raising and educational activities with the general public on issues related to plastic packaging		
<b>Elimination</b>	Eliminate problematic or unnecessary single-use packaging through redesign, innovation or alternative (reuse) delivery methods	Define a list of packaging to be designated as problematic or unnecessary and measures to be taken to have them eliminated		Eliminate plastic packaging and single-use utensils that are problematic or unnecessary through redesign and innovation
<b>Reduction Target</b>			Use 20% less plastic than in 2017	
<b>Recyclability Target</b>	100% of plastic packaging to be reusable, recyclable or compostable	Eco-design packaging to make it reusable, recyclable or 100% compostable	Make plastic products and packaging from 100% recyclable plastics by 2020	100% of plastic containers and packaging must be designed to be reusable, recyclable or compostable
<b>Recycling Rate</b>	70% of plastic packaging effectively recycled or composted	Collectively recycle 60% of plastic packaging by 2022	Recycle 70% of all single-use plastic products and packaging without loss of quality	One-third of plastic containers and packaging effectively recycled, reused or composted
<b>Recycled Content Target</b>	30% average recycled content across all plastic packaging	30% average recycled plastic in packaging	Minimum 35% recycled plastic in all single-use items	25% average recycled material in plastic containers and packaging
<b>Members</b>	Coca-Cola, Danone, Nestle, P&G, PepsiCo, Unilever	Coca-Cola, Danone, L'Oreal, Nestle, Unilever	Coca-Cola, Nestle, Unilever	Amcor, Nestle, Coca-Cola, Unilever

# About SPICE

∞ The **Sustainable Packaging Initiative for Cosmetics (SPICE)** was founded in 2018 to bring together organizations in the cosmetics industry “to collectively shape the future of sustainable packaging.”

## SPICE topics of focus for year

1:

- Recycled materials
- Bio-based plastics
- Finishing and decorating processes
- Tertiary packaging and distribution
- Reusable/rechargeable/refillable packaging
- Take-back programs
- Recycling disruptors
- End-of-life streams by country

## Corporate members include:







# ELIMINATE THE IDEA OF WASTE

TerraCycle's third step is to redesign products to enter into a reuse platform, completely eliminating the idea of waste.



# TRENDING: “PACKAGING FREE” SUPERMARKETS

Packaging free supermarkets are gaining traction in Europe and North America.

Although “packaging free” supermarkets solve for the sustainability challenge of the consumer, they create other consumer challenges:

- The consumer must **clean packaging between uses**
- The consumers must **go to the store for product refill**
- The consumer must **wait in line** to refill their products
- The consumer has **limited product and brand options**



# THE SOLUTION:

Borrow from the past, but modernize.



Loop

# GUIDING PHILOSOPHY

Current Disposable archetype  
COGS to Brand

Durable / Loop archetype  
Asset to Brand



Increasing consumer delight

= \$0.10/bottle

3,000%  
increase in budget

\$3/bottle =

\$0.10 / unit

\$3 / unit

Price per fill  
= \$0.10

70%  
reduction in cost

Price per fill  
\$0.03 =

1

100

Decreasing costs to vendor

The Loop model brings an entirely new thinking and economic philosophy to packaging design

Total number of possible uses

By TerraCycle

Launching in NYC & Paris areas after global announcement at the World Economic Forum. January 2019

## FOR CONSUMABLES:

Giving consumers a more convenient, premium product experience, all while eliminating the idea of waste.

1)

Partners redesign packaging to be durable, refillable and with more features.

Move package from being a COGS to an asset

2)

Consumers detail their subscription by selecting which & how many products they want in each cycle.

Loop packs & ships product in durable and reusable shipping tote

3)

Consumer receives products in Loop tote and enjoys

Loop manages/handles customer service inquiries.

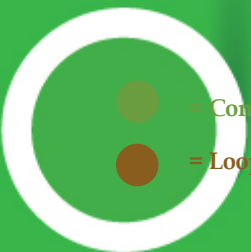
4)

Consumers put empty containers back in Loop tote.

Loop's shipping partner picks up the Loop tote.

NO WASTE

Design TBD



= Consumer Experience

= Loop/Partner Operations



As soon as consumers send back the empty product, Loop will automatically fulfill with new product.

Loop professionally cleans the reusable bottles and sends to Partners for refilling.

# Sustainability Discussion Questions



# Science Club Planning



Lamont-Doherty Earth Observatory  
COLUMBIA UNIVERSITY | EARTH INSTITUTE



Lamont-Doherty Earth Observatory  
COLUMBIA UNIVERSITY | EARTH INSTITUTE

# OPEN HOUSE

Discover Earth Science

SATURDAY, OCTOBER 5, 2019 ► [OPENHOUSE.LDEO.COLUMBIA.EDU](https://openhouse.ldeo.columbia.edu)



ALLIANCEBERNSTEIN\*

Orange & Rockland

Frank Gumper, Anonymous, Florentin Maurrasse, Taylor Rental, Superior Audio Visual,  
HNA Palisades Premier Conference Center, South Oranget own Ambulance Corps

ENJOY • EXPLORE • LEARN

*Open House 2019 is set for Saturday, October 5! Register for free below, or on [Eventbrite](#).*

Whether you're an aspiring young scientist or a long-time science enthusiast, you're sure to enjoy Lamont-Doherty's Open House. Tour a lab, participate in hands-on earth science demonstrations, and learn from world-renowned researchers about their latest discoveries.

Open House is free and open to the public, with a \$5 [suggested donation](#).



# Lamont-Doherty Earth Observatory Open House

Sat, Oct 5, 2019 10:00 AM - 4:00 PM EDT

## General Admission

Free

Sales end on Oct 5, 2019

1

Powered by **eventbrite**

English (US)



### Order Summary

1 x General Admission	\$0.00
<b>Total</b>	<b>\$0.00</b>

Register

## FEATURING EXHIBITS FROM ACROSS OUR INITIATIVES:



Climate and Life



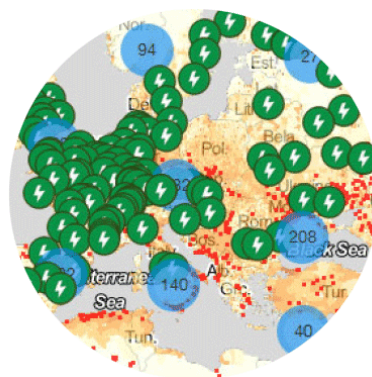
Changing Ice, Changing Continents



Anticipating Earthquakes

Coastlines

Extreme Weather and  
Climate



Real-Time Earth

## RECENT NEWS

NOVEMBER 05, 2018

### Watch: Why We Love Open House

Faculty and staff volunteers at the 2018 Open House talk about their experiences.

Tags: [Videos](#)

OCTOBER 18, 2018

### 9 Awesome Exhibits from the 2018 Lamont Open House

This annual celebration consists of talks by Lamont's world-renowned experts as well as dozens of hands-on activities and experiments for kids to learn about how our planet works.

Tags: [Videos](#) [Photos](#)

OCTOBER 09, 2018

## Livestream the 2018 Monell Lectures

Can't make it to all the lectures at Open House? Watch the livestream of the Monell auditorium lectures here. Videos will also be available to watch after the event.

Tags: [Videos](#)

### More News

