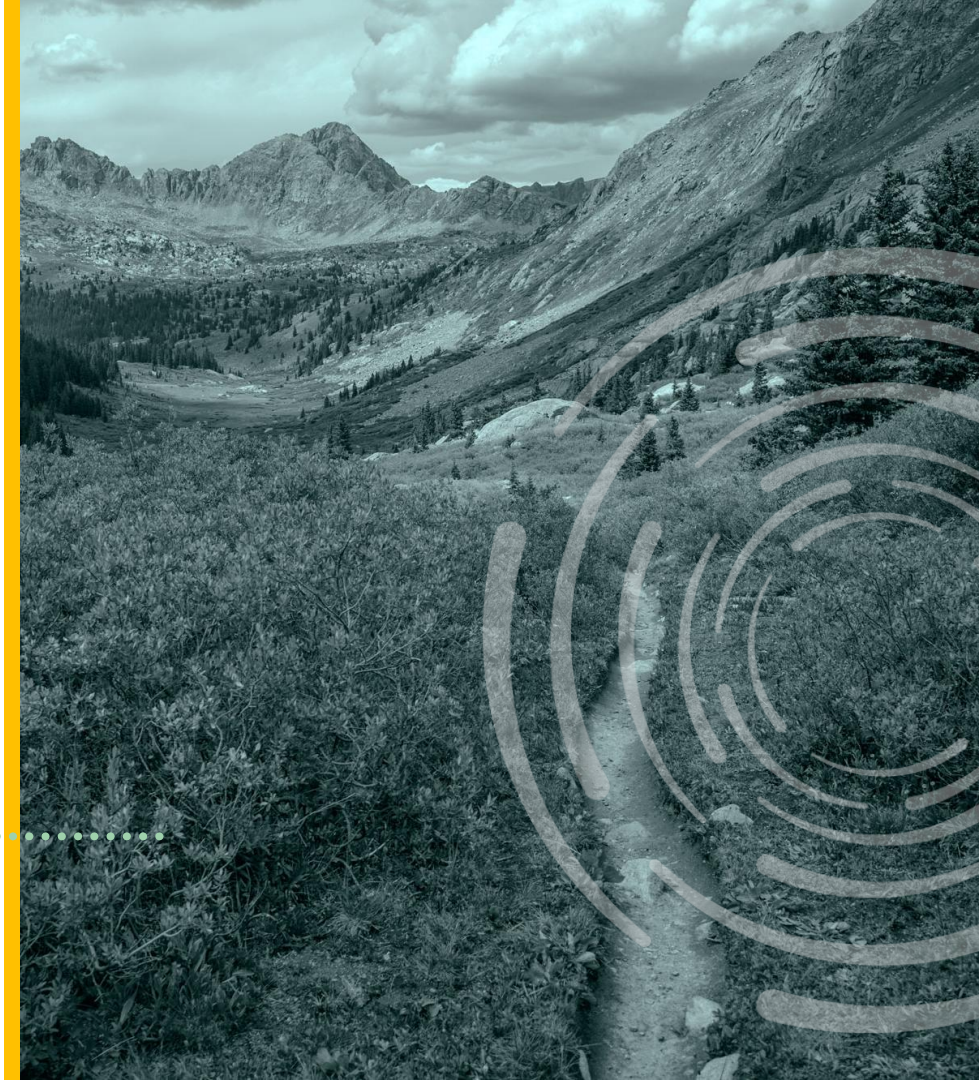
Plastic Packaging Source Reduction

TURI

Monday, May 18, 2026



Agenda

1. Overview of Virgin Plastic Reduction
2. Levers and trade-offs with case studies
3. Questions and discussion

Waste Hierarchy

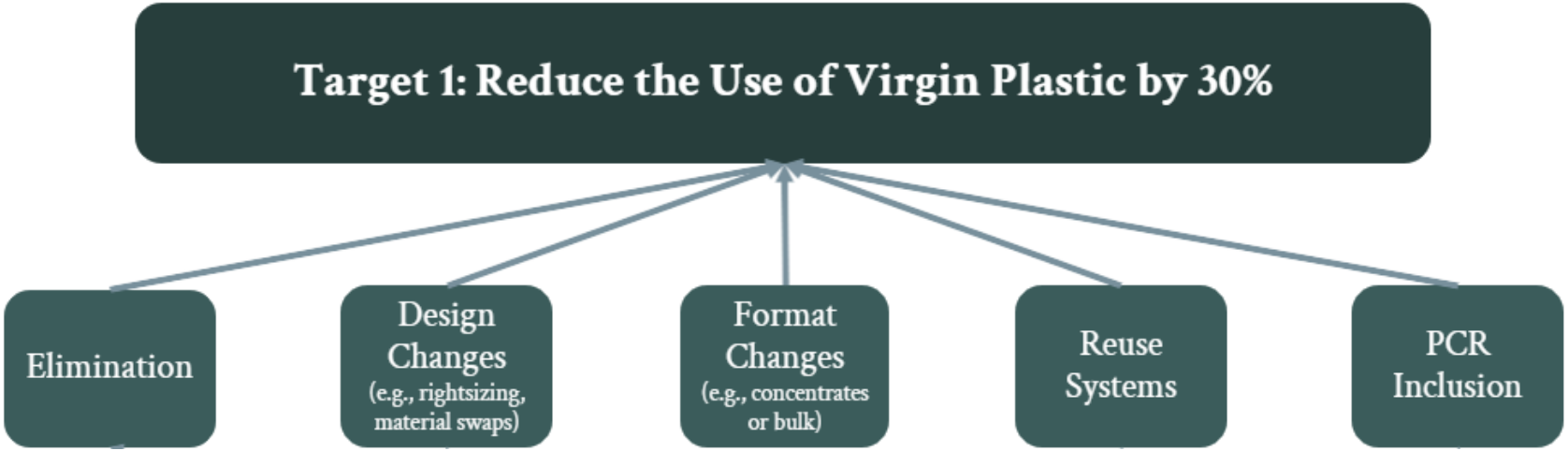
Image source: EPA

Working Virgin Plastic Reduction Definition

Virgin plastic reduction means a reduction in the amount of virgin plastic material introduced by a producer.

Virgin plastic refers to plastic polymers entering commerce for the first time.

Levers to Virgin Plastic Reduction



Elimination

- Directly eliminating unnecessary packaging without replacement
- Potential challenges and trade-offs:
  - Reduced product protection
  - Reduced hygiene through greater exposure
  - Reduced convenience

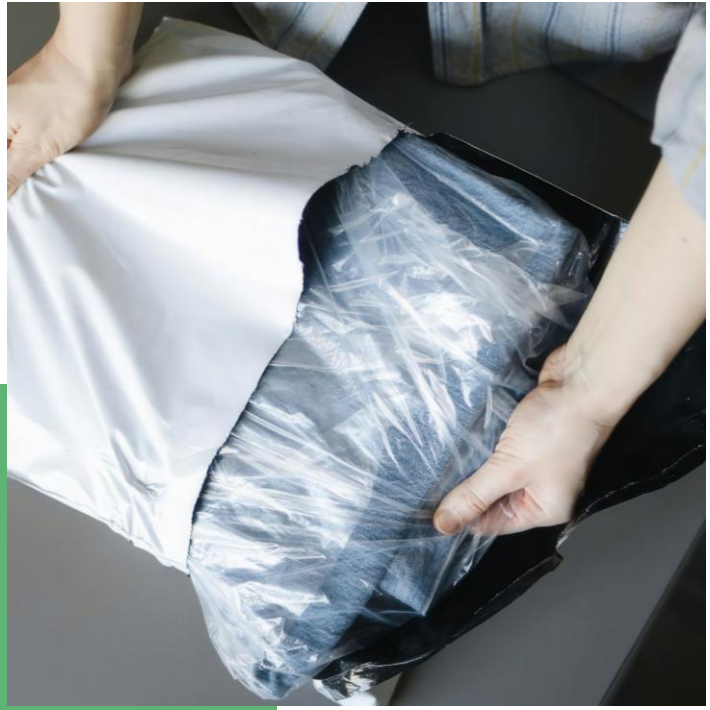


Image source: The Boxery

Case Study: Kraft Heinz Shake N' Bake

Elimination

Image source: Packaging Digest

- Shake N' Bake removed the plastic 'shaker' bag from its products
- Helps eliminate 900,000 lbs of plastic waste annually
- Consumers are encouraged to use a reusable container as the shaking vessel instead

Source: The Kraft Heinz Company

Design Changes

- Design changes that reduce the package-to-product ratio such as lightweighting; rightsizing/reducing excess headspace or slack fill; transitioning to alternative non-plastic materials
- Potential challenges and trade-offs:
  - Lightweighting:
    - Reduced durability
    - Reduced strength to withstand external conditions (i.e., temperature, humidity)
    - Reduced recyclability due to having multiple barrier layers
  - Rightsizing:
    - Reduced protective cushion
  - Alternative materials:
    - Increased transportation emissions from higher weight materials (e.g., glass)
    - Increased land use from some materials (e.g., paper)
    - Change in format can impact recyclability

Image source: Shutterstock

Case Study: Coca-Cola Company PET bottles

Design Changes - Lightweighting

- Coca-Cola Company redesigned small PET bottles for the US and Canada, reducing the weight from 21 g to 18.5 g
- Expects will reduce virgin PET usage by the equivalent of 800 million bottles
- Expects will reduce carbon emissions by the equivalent of taking over 17,000 cars off the road for a year
- Biggest design challenge was preventing loss of product quality
- Reduced material usage also expected to contribute significantly to cost savings

Source: Packaging Digest

Case Study: Ranpak

Design Changes – Rightsizing

- 28% of consumers have received packaging too large for the product inside
- Ranpak's technology cuts box size to the correct amount of product quantity/size for e-commerce packaging
- Reduces waste and allows for 25% more parcels to fit on the pallet
- Used by Amazon

- Common plastic example is slack fill in chip bag

Source: Ranpak

Case Study: Nestlé Vital Proteins paperboard canister

Design Changes – Material Swapping

- Replaced plastic tub with paperboard tub
- 90% less plastic usage
- Requires consumer behavior change

Source: Vital Proteins

Format Changes

- Changes to the format of product delivery, such as implementing concentrates or bulk options
- Potential challenges and trade-offs:
  - Requires consumer behavior change
  - More responsibility on consumers
  - Not accessible for all consumers
  - Risk of shortened shelf life and spoilage for some products
  - Higher chance of contamination

Image source: EarthHero

Case Study: HiBAR hair care bars

Format Changes - Concentrates

- 100% plastic free shampoo and conditioner bars
- Bottled shampoo and conditioner is made up of roughly 80% water
- Since 2018, have eliminated 7 million plastic bottles and saved 1.5 million gallons of water

Source: HiBAR

Case Study: Heinz Tomato Ketchup Bag in Box

Format Changes – Bulk

- Bulk ketchup bag inside a corrugate box
- Often used in back-of-house in restaurants and other food establishments
- Can refill reusable bottles using dispenser on bulk bag
- Reduces production of more individual ketchup bottles and associated transport emissions

Image source: OpenTip

Reuse Systems

- Shifting material to reusable or refillable packaging or a reusable product within a system for reuse
- Potential challenges and trade-offs:
  - Increased transportation emissions from more durable/heavier packaging
  - Consumer behavior change required to achieve return rates needed to breakeven
  - Risk of contamination of both packaging and bulk machines
  - Reverse logistics system complexity
  - Space constraints in retail environment
  - Consumer accessibility
  - Container standardization

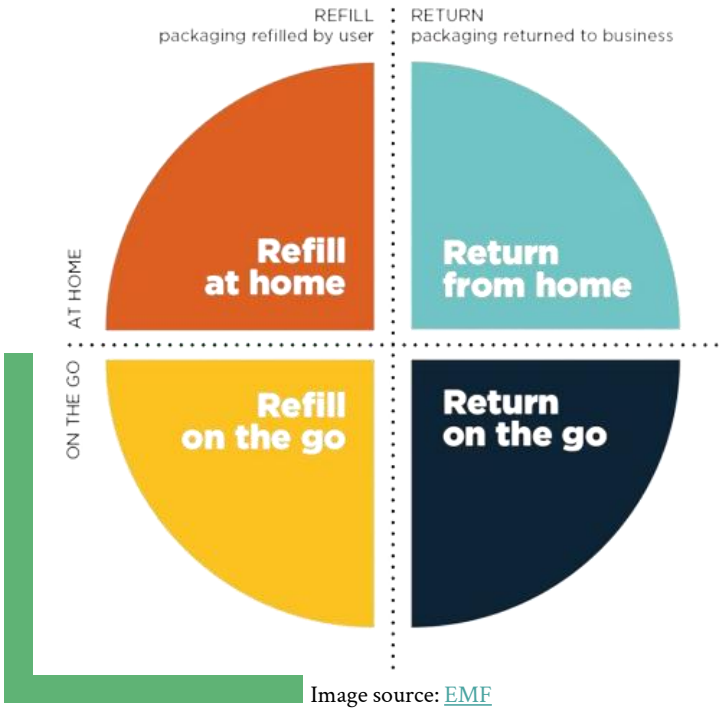


Image source: EMF

Case Study: IFCO reusable crates

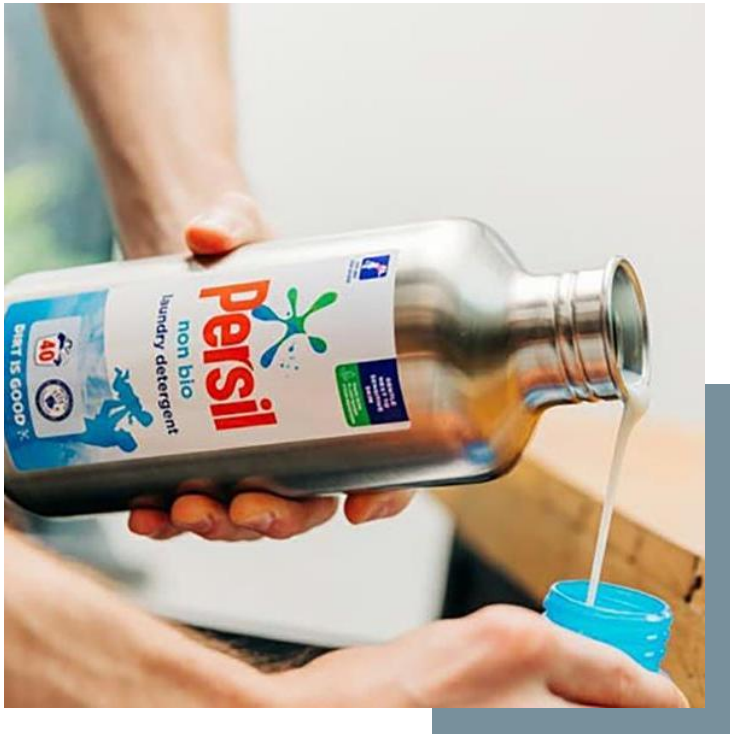
Reuse Systems - Reuse

- IFCO offers shelf-ready reusable crates for fresh products
- For fruits and veggies, meat and poultry, fish and seafood, eggs and dairy, baked goods, bananas, and more
- Eliminates packaging waste, costs, and food waste
- Also offer reusable pallets for supply chain needs

Source: IFCO

Case Study: Unilever return and refill on-the-go trials

Reuse Systems – Return/Refill



- Trial at Asda stores for home care products to reduce single-use plastics
- Return on the go (pre-fill) and refill on the go models
- Stainless-steel bottles
- Has since expanded to other retailers
- Weekly purchases of Persil were 1/3 higher than the equivalent single-use pack

Source: Packaging Europe

PCR and Bioplastics as VPR Levers

- The use of responsibly sourced PCR and bioplastics are both recognized by the USPP as strategies that are necessary to accomplishing a circular economy for plastics packaging.
- The extent to which these strategies qualify as source reduction levers in Extended Producer Responsibility (EPR) laws and other legislation varies by state, but they are *at least* incentivized in most policy frameworks through Alternative Compliance and eco-modulation.
- This variation depends on what virgin plastic is defined as within the legislation, as well as other factors such as being widely recyclable or compostable at end-of-life.

PCR Inclusion

- Switching from virgin material to postconsumer recycled (PCR) content, prioritizing domestically sourced PCR with chain of custody certification
- Post-industrial/pre-consumer recycled (PIR) content may also be considered, which are materials diverted from the waste stream during a manufacturing process (e.g., production scrap)
- Potential challenges and trade-offs:
  - Limited demand for PCR and high costs compared to single-use
  - Aesthetic changes (e.g., color, clarity)
  - Possible odor, especially for sensitive products (e.g., food contact, pharma)
  - Decreased mechanical strength

Image source: Dow

Case Study: Paragon Films Beyond PCR machine stretch film

PCR Inclusion

- Incorporates 25% certified domestic PCR content in a 39-gauge format
- Reduces virgin resin use by 54%
- Prevents approximately 490 metric tons of CO_2 emissions per million pounds of film produced

Source: Paragon Films

Bioplastics

- Switching to plastic derived from plants or other renewable biomass
- Should be responsibly-sourced
- Potential challenges and trade-offs:
  - May or may not be compostable or recyclable
  - Confusion around end-of-life management
  - Thicker material required to meet performance of fossil-fuel based plastics
  - Limited shelf-life

Image source: RapidClean

Case Study: Danone/Activia PLA yogurt pack

Bioplastics

- Activia in Germany switched to a PLA (polylactic acid) yogurt pack
- LCA showed improvement of the product's packaging footprint by 25%, and that it uses 43% less fossil resources

Source: Packaging World

Any questions?

Discussion Questions

- Are there other trade offs you can think of that we missed?
- How does what you heard relate to production from a toxics use production perspective?
- What would the primary source reduction strategy for your facility be? What would the trade offs be?

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