# CLOSED-LOOP RECYCLING

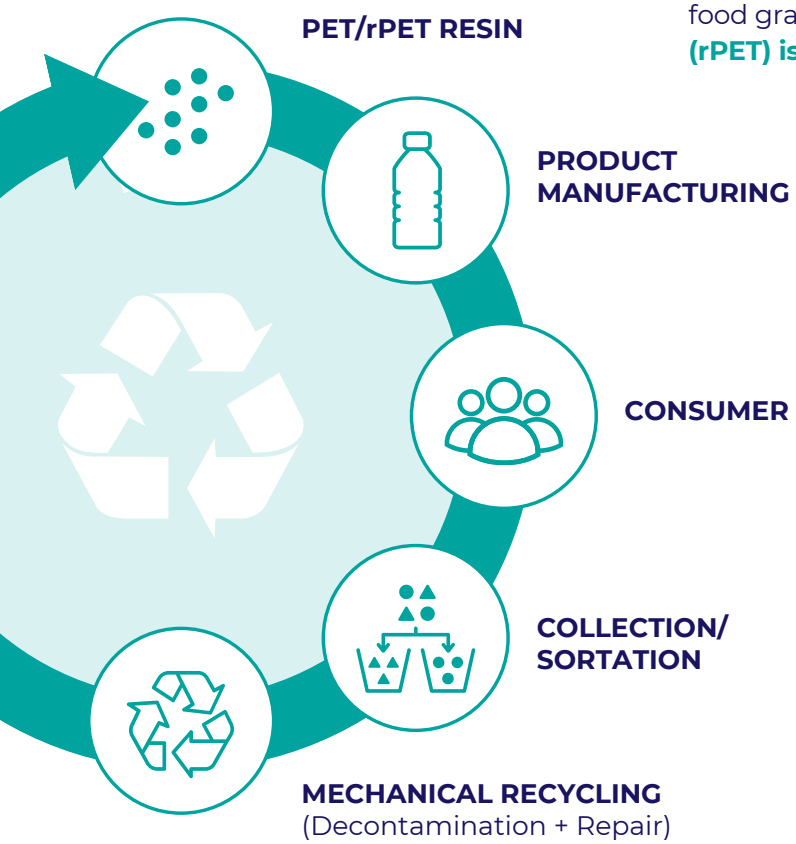
## FOR PET BOTTLES

### PET PLASTIC*

Identified by the #1 resin code, PET plastic is a food and medical grade polymer that preserves and protects our food and health. PET has many food contact applications, including bottled water.

1 PET

PET is a circular food grade material that can be restored to its food grade quality by mechanical recycling. **100% recycled PET (rPET) is used today in many food and beverage applications.**




### WHAT IS CLOSED-LOOP PET RECYCLING?

Also called bottle-to-bottle recycling, closed-loop PET recycling occurs when bottles are recycled and returned to a food grade quality, then remade into new bottles. Recovered PET bottles are a valuable raw material that can be used over and over again.

During the mechanical recycling process, the PET material is decontaminated and restored, and returned to a quality worthy of a new PET bottle.

### HOW MANY LOOPS?

A scientific peer-reviewed study published in the journal *Sustainability* circulated the same PET material a **minimum of 11x** using 75% rPET and 25% virgin PET without impacting its ability to be used again for a new food grade bottle.

"This study," the authors explain, "demonstrated that even after eleven cycles the quality criteria of rPET suitable for bottle production could be achieved."[1]

"[...] this level of recycled content can be maintained indefinitely without compromising quality."

~ Pinter et al., 2021[1]

1. Elisabeth Pinter et al., "Circularity Study on PET Bottle-To-Bottle Recycling," *Sustainability* 13, no. 13 (2021): 7370, doi: 10.3390/su13137370.

*PET stands for "polyethylene terephthalate" and belongs to the polyester family of polymers.

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# REBUILDING THE PET

## INTRINSIC VISCOSITY

**Intrinsic viscosity (IV)** is a measurement of flow that reflects polymer chain length. Longer polymer chains are more resistant to flow when melted, resulting in a higher IV value. PET bottles require specific material properties to achieve proper functionality and performance in packaging, one key property being IV.

### IV LOSS

When PET is exposed to high temperatures, such as when melted to form products or packaging, the PET polymer chains break down and decrease the IV.

### IV REBUILD

Steps in the mechanical recycling process repair these broken polymer chains, therefore rebuilding the IV and returning the material back to a quality worthy of a new bottle.


## MAINTAINING HIGH QUALITY MATERIAL

In a circular economy, waste is a resource, and waste management becomes resource management. Maintaining a clean recycling stream and a high material quality can be done through **proper waste (resource) management and infrastructure, along with circular product design.**

Mechanically recycling PET is preferred for its lower impact, however, advanced recycling can help keep challenging material in circulation and supplement the existing circular economy.