EPR & DRS Impact on Glass in Illinois

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Glass Container Recycling Loop

Glass bottles and jars are 100% and infinitely recyclable

1. RECYCLABLES ARE PLACED IN CURBSIDE BINS, BUSINESS RECYCLING CONTAINERS, AND/OR BROUGHT TO LOCAL RECYCLING DROP-OFF LOCATIONS
2. RECYCLABLES ARE COLLECTED
3. RECYCLABLES ARE DELIVERED TO A MATERIAL RECOVERY FACILITY (MRF)*
4. RECYCLABLES ARE SEPARATED BY MATERIAL TYPES
5. GLASS FROM THE MRF AND DROP-OFF LOCATIONS IS SENT TO A GLASS PROCESSING COMPANY
6. GLASS IS SEPARATED FROM TRASH AND OTHER CONTAMINANTS, THEN SORTED BY COLOR
7. RECYCLED GLASS IS SOLD TO GLASS CONTAINER MANUFACTURERS AND MADE INTO NEW BOTTLES AND JARS
8. CONSUMERS PURCHASE FOOD AND BEVERAGES IN GLASS PACKAGING

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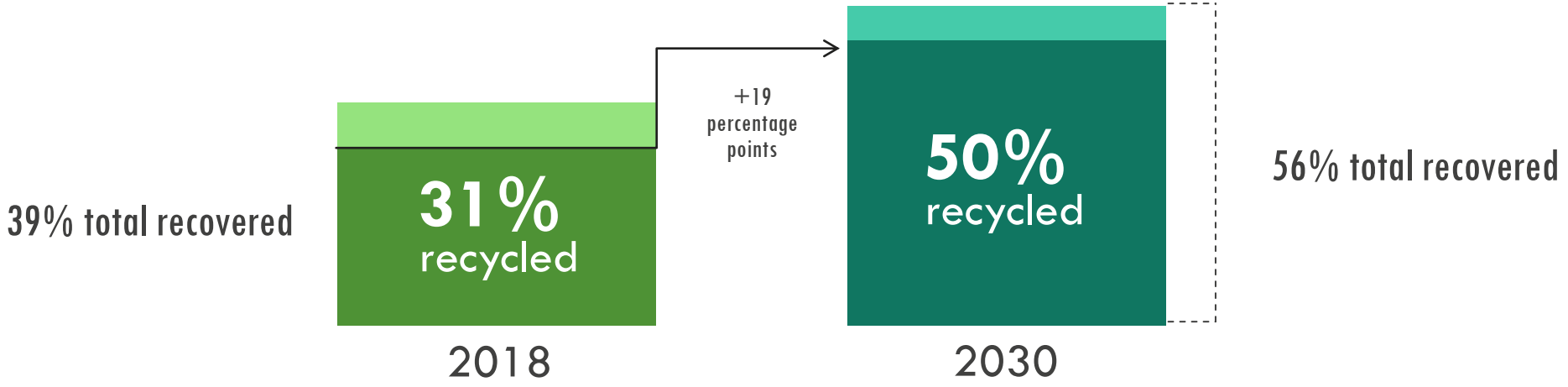
*A material recovery facility is a specialized plant that receives, separates and prepares recyclable materials for manufacturers.

THE GLASS CONTAINER INDUSTRY HAS SET A BOLD TARGET OF INCREASING THE US RECYCLING RATE TO 50%

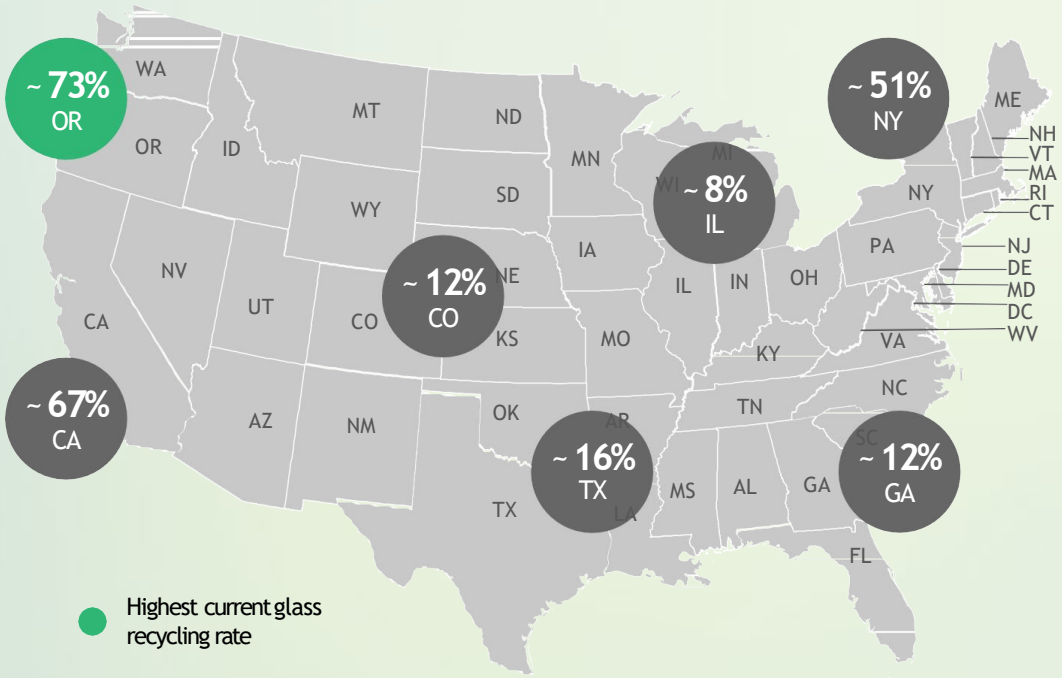
US GLASS RECYCLING AND RECOVERY RATE

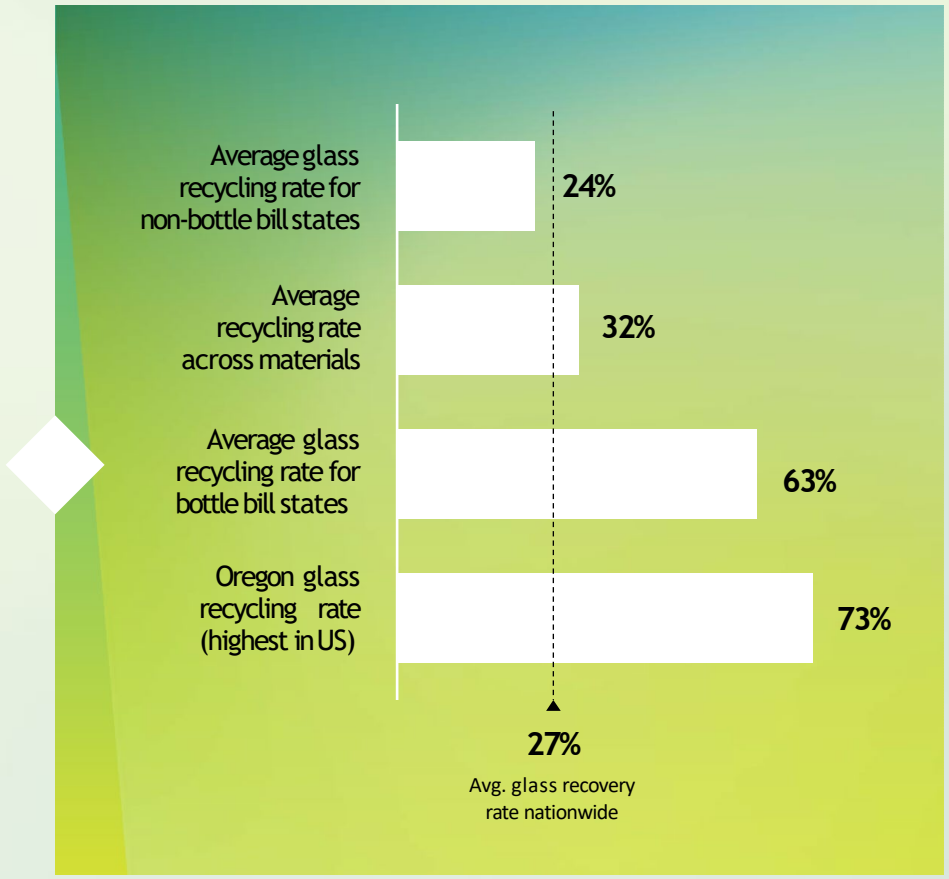


Sources: United States Environmental Protection Agency; Glass Packaging Industry (GPI); BCG.

Note: The 39% figure represents the rate of glass recovered (or collected), but some recovered glass is lost to landfills or as it moves along the recycling value chain, from sorting to processing to manufacturing. The remaining 31% is recycled into new containers. Some variability exists in how recycling rates are calculated across the US.

IT IS AN AMBITIOUS GOAL GIVEN THE CURRENT STATE OF GLASS RECYCLING ACROSS THE US



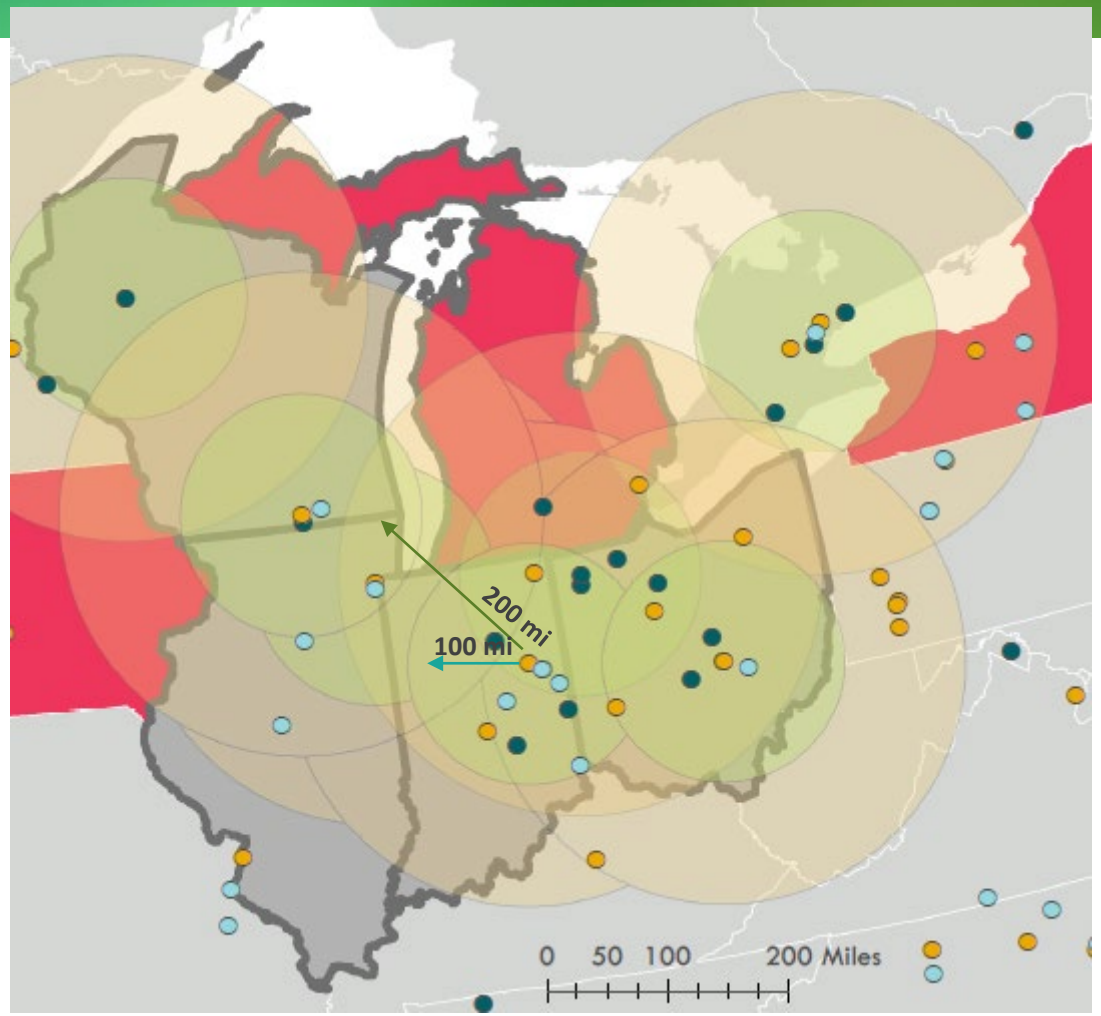


Source: GPI; Container Recycling Institute; Resource Recycling; EPA

GREAT LAKES REGION: MI, IN, IL, WI, OH

Legend

- Glass Manufacturers
- Glass Recycling Processors
- Fiberglass Plants
- Bottle Bill States



TOP EPR POLICY ISSUES

- **GLASS IS A UNICORN – ENDLESSLY RECYCLABLE BUT DOESN'T FIT SINGLE-STREAM SYSTEM WELL**
  - Hybrid System may make the most sense
  - Not like film or PET clamshells, and other more complicated packaging formats
- **WEIGHT-BASED FEES CREATE ISSUES OF COSTS FOR PRODUCERS**
  - Eco-modulation is necessary to offset weight over-indexing costs
  - Weight plays a role in movement of materials, but does not give the best targets for problematic issues in the waste management system
  - Glass End-Markets are Regional & Circular – Efforts to support domestic production help
- **CONCERNED ABOUT ONE PRO AND OFF-RAMPS**
- **CONTAMINATION HAS A MUCH STRONGER IMPACT ON COMMODITY FEES THAN OTHER COMMODITIES**
- **IF CONSIDERING COMMERCIAL RECOVERY, HOSPITALITY ZONES CONTRIBUTE A HIGHER % OF GLASS DUE TO BEVERAGE ALCOHOL**

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Industry Standards Needed for Key Components of EPR Implementation
Entire Waste and Recycling Industry as well as Materials Trades Engaged

- Responsible End Markets and Certification – GPI on CAA Standards Task Force
- PCR Traceability and Certification
- Design Guide for Recycling (largely a decorations issue) for Glass
- Small Format Packaging /Chemicals of Concern with Plastics ("intentionally added") and microplastics could result in broad, unspecific examinations of applications of polymers and places where small plastics are processed.

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Quality Matters

Bottle Bill Glass vs Single-Stream MRF “Glass” (aka “Residual”)

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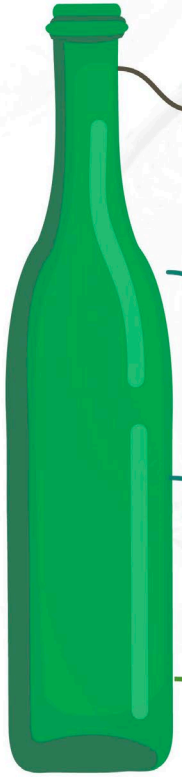
UNDERSTANDING RECYCLING STREAMS

How glass is collected affects the quality and volume of the material and influences yield and value.



SINGLE STREAM

Glass is mixed with other recyclables in the same bin, collected, sorted and manufactured into new containers.

40%

of single stream glass is suitable to be recycled into new containers.

COMMUNITY DROP-OFF

Glass and other recyclables are separated by the consumer at their drop-off location.

60%

of community drop-off glass is suitable to be recycled into new containers.

MANAGED SEPARATE STREAM

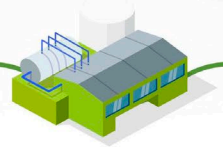
Glass and other recyclables are separated and sorted BEFORE being picked up curbside or dropped off.

92%

of managed separate stream glass is suitable to be recycled into new containers.

DEPOSIT STREAM

Consumer returns glass to redemption facility and collects money per item returned.



98%

of deposit stream glass is suitable to be recycled into new containers.

Each system has its advantages. Single stream is convenient, produces high volume, but has higher contamination. Separate stream or drop-off is typically a cleaner glass stream with lower glass volume. Deposit systems produce high glass volume and higher quality glass.

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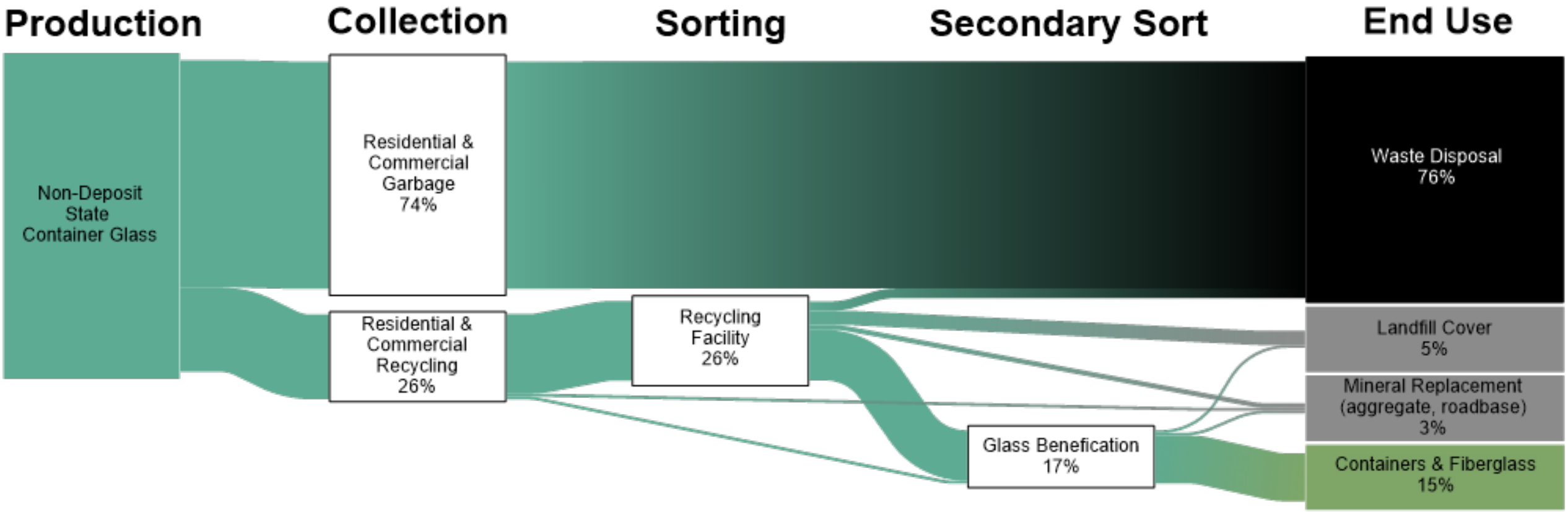
GLASS CONTAINER MATERIAL FLOW ACROSS THE VALUE CHAIN – NON-REDEMPTION STATES [DRAFT]



Notes: Generation based on 2018 CRI Glass Beverage container sales data and EPA 2018 data for non-beverage container glass and adjusted by population of non-deposit states. Residential and Commercial Recycling includes glass containers collected by any means. 210,000 tons assumed to be collected through source separated drop off or other programs and sent directly to beneficiation or mineral placement. Drop off tonnages assume 1/3 of drop off are staffed (8,400) and collect 25 tons per year of source separated glass. Drop off split between beneficiation and material replacement estimated by RRS at 50/50. MRF yield based on single and dual stream avg. yields published by GRC and assumes 80/20 single/dual stream split. Other MRF outflows informed by NERC 2018 MRF study. 10% of beneficiation outflows estimated to go to mineral replacement and landfill cover. Cullet use for packaging provided by GPI and adjusted to remove 2017 redeemed glass deposit tonnage and fiberglass tonnages provided from primary source.

NON-GLASS RESIDUE IN MD MRF GLASS

GPI Commissioned 3rd Party Blind Analysis of NGR (Non-Glass Residue) of glass commodity from Maryland

Samples from:

- MRFs w/out any secondary cleanup equipment
- MRFs w/ secondary cleanup equipment
- Dual-stream or separate drop off material

While some glass from the existing MRFs can become a glass container again, a majority of glass produced by single-stream MRFs without secondary cleaning equipment cannot be recycled back into glass containers and will go to downcycled end-markets.

Lower NGR means less waste material being moved multiple times, lower EPR fees and increased processing efficiency and more end-markets

% of Non-Glass Residue in MD Glass Samples*

- 8% Single Stream w/ Secondary Cleanup
- 16% Dual Stream MRF
- 49% Single Stream w/o Secondary Cleanup

SECONDARY GLASS CLEANING Equipment

- Vacuum Systems
- Light Fraction Trommels
- Air Knives
- Magnetic Head Pulleys

~~Projected EPR +~~ DRS IMPACT watch list for epr

MARYLAND

Baseline	121,700
EPR	158,800
EPR+DRS	205,000

WASHINGTON

Baseline	84,200
EPR	221,300
EPR+DRS	287,700

ILLINOIS

Baseline	149,100
EPR	329,400
EPR+DRS	425,200

States that could implement **BOTH EPR + DRS** could capture more glass than EPR alone.

+586,300 *tons per year (collectively)*
EPR + DRS in MD, IL, WA

(calculated based on an estimated **75%** EPR non-deposit residential recycling rate and 79% recycling rate for deposit glass.)

EPR: Extended Producer Responsibility | DRS: Deposit Return System

NET INCREASE IN GLASS COLLECTED FOR RECYCLING DUE TO EPR & DRS EXPANSION

STATE	BASELINE TONS COLLECTED			PROJECTED TONS AND PERCENT COLLECTED WITH PROPOSED OR RECENTLY ENACTED POLICY			NET IMPACT (PERCENT CHANGE/ TONNAGE CHANGE)	
	Policy before 2022	Total Tons Collected	Total Percent Capture	2022+ Policy	Total Tons Collected	Total Percent Capture	Change in Tons	Percent in Change Tons
CA	DRS	726,300	54%	EPR/enhanced DRS	872,600	65%	146,300	20%
OR	DRS	73,300	57%	EPR/enhanced DRS	98,400	76%	25,100	34%
CO	None	54,900	25%	EPR	109,700	50%	54,800	100%
ME	DRS	53,800	71%	EPR	58,300	77%	4,500	8%
WA	None	78,700	22%	EPR w/DRS	289,200	80%	210,500	267%
WA	None	59,600	22%	EPR w/o DRS	176,600	65%	117,000	196%
MD	None	86,100	44%	EPR	164,300	84%	78,200	91%
MD	None	113,700	44%	EPR w/ DRS	206,300	80%	92,600	81%
NY	DRS	321,900	63%	EPR/enhanced DRS	419,700	74%	97,800	30%
MN	None	100,500	56%	EPR	151,800	84%	51,300	51%
MN	None	132,700	56%	EPR w/ DRS	190,600	80%	57,900	44%
Total		**1.48M- 1.56M**			**2.05M-2.24M**		**575k-690k**	**39%-44%**

* Preliminary Estimates: IL 455,000 tons of glass available; 45k tons collected; DRS tons could equal 273k tons, EPR+DRS could equal 364k tons or 6 to 8 times the amount of glass now EPR policies that disallow ADC to count as recycling will further increase cullet to end markets.