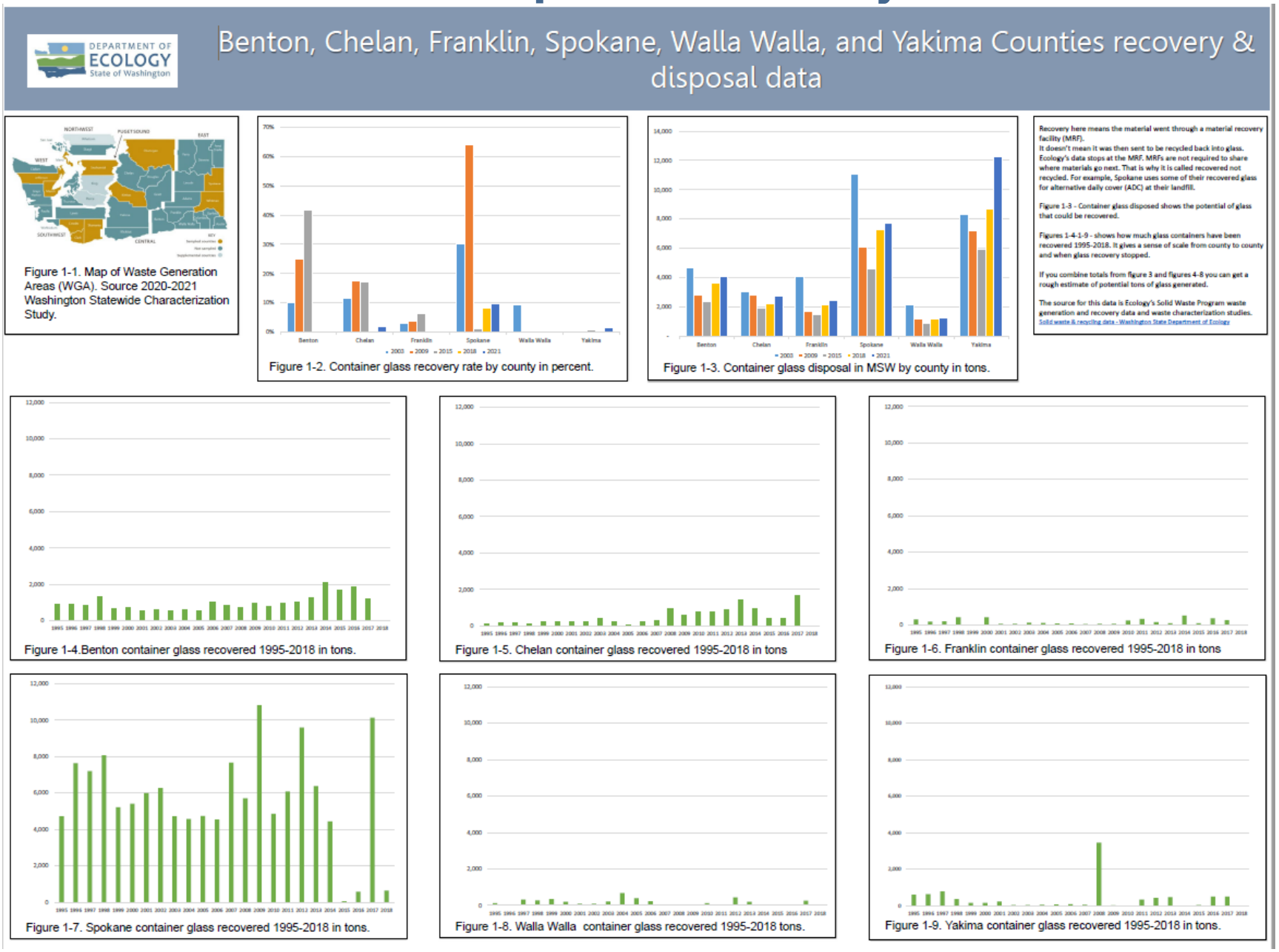



DEPARTMENT OF ECOLOGY
State of Washington

Recycling Development Center Eastern Washington Glass Summit

May 3, 2023 | 9 am – 4 pm (Pacific time)

Check out this data poster while you wait



DEPARTMENT OF ECOLOGY
State of Washington

We have a two data posters here in the room and one “where are you from” map of the state. We would like to add the online people too so:

Online folks use the chat to answer:

1. **Your name**
2. **Organization**
3. **where are you?**
4. **what you hope to get out of today?**

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DEPARTMENT OF ECOLOGY State of Washington

Washington Consumer Packaging and Paper Products Study by Eunomia for Ecology

eunomia

Figure 2-1. Map of Waste Generation Areas (WGA). Source 2020-2021 Washington Statewide Characterization Study.

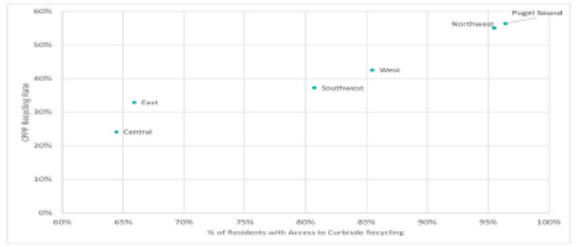


Figure 2-2. All Sector CPPP Recycling Rate vs Residential Curbside Access (2021). Source Eunomia modeling, 2021.

Material	Central	East	Northwest	Puget Sound	Southwest	West	Total
Rigid Plastic	40,000	51,100	14,900	163,700	35,500	9,800	315,000
Flexible Plastic	33,700	32,400	10,900	116,200	30,600	8,400	232,200
Metals	15,200	16,300	7,300	61,200	11,700	4,900	116,600
Paper & Cardboard	187,500	250,000	101,500	1,128,000	157,000	43,900	1,867,900
Container Glass	23,000	19,000	10,800	114,500	7,800	2,600	177,700
All CPPP	299,300	369,000	145,400	1,583,500	242,600	69,600	2,709,400
Beverage Containers	35,500	33,700	14,500	161,700	14,600	6,900	266,900

Table 1. Total Generation by WGA – All sectors in tons (2021). Source Eunomia modeling, 2021.

Material	Central	East	Northwest	Puget Sound	Southwest	West
Rigid Plastic	8%	9%	29%	31%	9%	28%
Flexible Plastic	3%	1%	4%	5%	1%	1%
Metals	9%	30%	55%	48%	52%	60%
Paper & Cardboard	35%	44%	64%	66%	51%	53%
Container Glass	5%	9%	57%	53%	9%	23%
All CPPP	24%	33%	55%	56%	37%	43%
Beverage Containers	10%	18%	68%	59%	25%	49%

Table 2. Recycling Rate by WGA – All sectors (2021). Source Eunomia modeling, 2021.

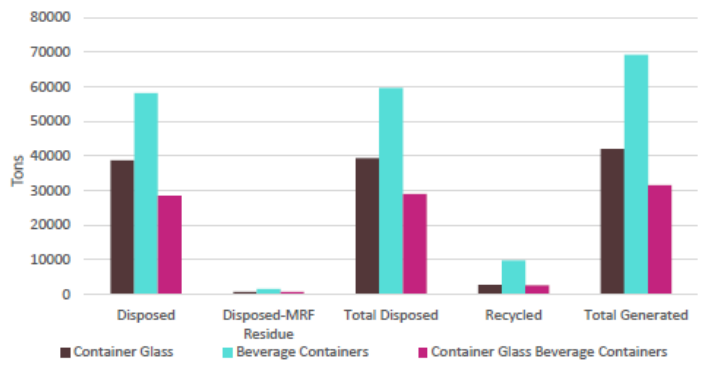


Figure 2-3. Central and Eastern regions disposed and recycled in tons– All sectors (2021). Source Eunomia modeling, 2021.

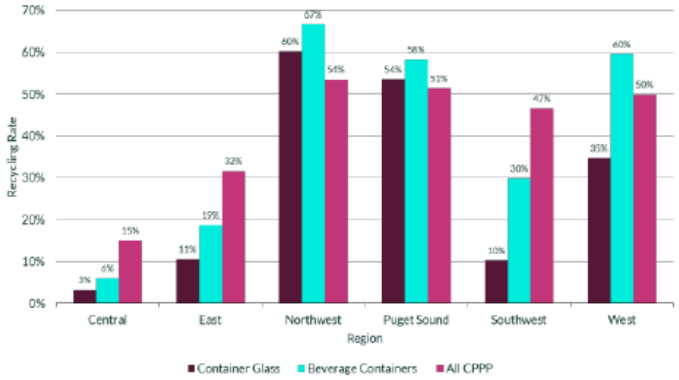


Figure 2-4. Beverage container and consumer packaging and paper products (CPPP) recycling rates – residential (2021) Source Eunomia modeling, 2021 Ecology Washington Recycling Recovery Data, 2020-2021 Washington Statewide Waste Characterization Study, 2020 King County Material Recovery Assessment.

In figure 2-4 above, Central, East, and Southwest regions have container glass recycling rates of 11% or lower. They have relatively low recycling rates of all beverage containers compared to the other regions. Glass containers appear to have a strong influence on the overall recycling rate of beverage containers, as they are the heaviest beverage container per unit. Increasing the recycling rate of glass containers may have a strong effect on increasing the recycling rate of all beverage containers.

We have a two data posters here in the room and one “where are you from” map of the state. We would like to add the online people too so:

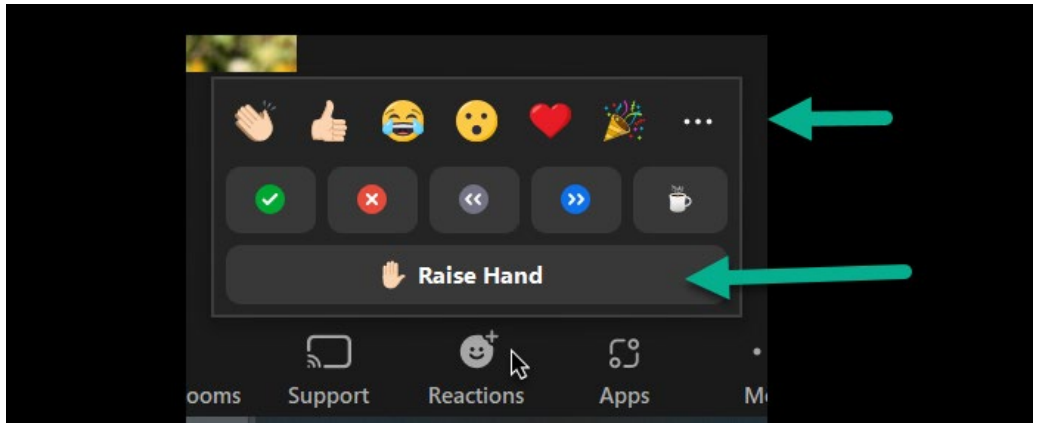
Online folks use the chat to answer:

1. Your name
2. Organization
3. where are you?
4. what you hope to get out of today?

Participating in this meeting:

Roles

- Host-Caleb – in person
- Facilitator – Mya – in person
- Online support/Note taker–Tina – Virtually
- Online support/chat monitor – Dan – virtual



Rules

- Cameras On
- Questions, please raise your hand or type them in the chat box.
- I will call on you or we can read your question from the chat.
- Use the chat to message the team if you are having technical issues.
- Use reactions to keep it interactive.

In room

- I will be the timekeeper and I have these 3, 1, Times Up cards I will hold up to help you stay on time.

*Note: we are **not** recording this meeting, meeting materials will be posted on the Advisory Board website.*

Meeting Goals

- **Convene** the patchwork of stakeholders wanting change in how glass is handled.

- **Share** information about different approaches, which Eastern WA groups are engaging, to reduce/reclaim/ reuse/recycle glass.

- **Connect** to help move toward practical and sustainable glass solutions which benefit us all.

AGENDA

DEPARTMENT OF ECOLOGY
State of Washington

9:00 am - Welcome, Goals, Roles, Rules, Agenda,

9:05 am - Policy Panel with Kara Steward, Ecology, and Scott DeFife, Glass Packaging Institute

9:40 am - Historic overview of glass recycling in Eastern WA with Dan Weston, Ecology

10:10 am - City of Walla Walla report with Shane Prudente

10:40 am - BREAK

10:50 am - Community led efforts

11:30 am – Washington State University Research with Haifang Wen

11:55 am – LUNCH BREAK

1:00 am – Hub and Spoke Model with Scott DeFife, Glass Packaging Institute, and Chris Lueck, BIG Recyclers

1:50 am – BREAK

2:00 am – End markets for glass-to-glass recycling

3:00 am – End markets glass to construction

3:30 am – CLOSING

Policy Panel

Kara Steward– Ecology's Recycling Development Center (RDC)

Scott DeFife– Glass Packaging Institute (GPI)

Washington RECYCLING DEVELOPMENT CENTER

DEPARTMENT OF ECOLOGY
State of Washington

Policy Update: Deposit return and producer responsibility

Kara Steward, Recycling Development Center, Ecology

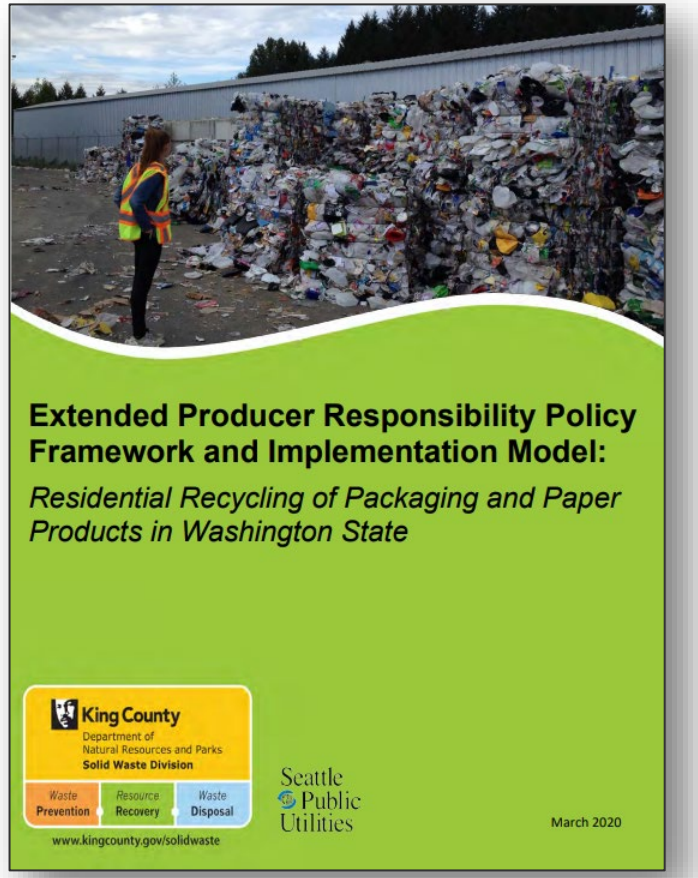
Summary of current glass management

- Local decisions on glass
  - Solid Waste Management Plan
  - Curbside, drop box
  - Commingled, separated
  - Commercial
- Solid waste laws: Chapter 70A.205 RCW
- Solid waste handling standards: Chapter 173-350 WAC

Producer Responsibility

Requires state law

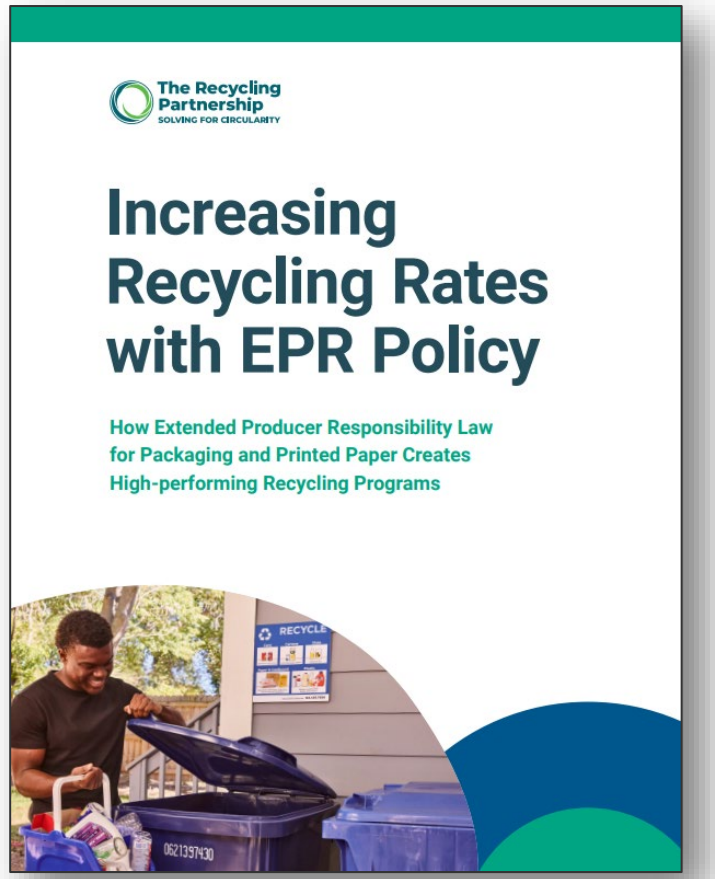
- Producer-funded
- Third-party organization
- Statewide list of materials
- Convenient service
- Recycling rate targets
- Transparency/end markets
- State oversight



https://kingcounty.gov/~/media/depts/dnrp/solid-waste/about/planning/documents/task-force-EPR-policy-framework.ashx?la=en

Producer Responsibility

Benefits	Boost recycling rates
	Increase services
	Improved communication
	Lower government/resident costs
	Stimulates investment/infrastructure
	Promotes redesign/recycled content
	Minimal impact to price of goods



https://recyclingpartnership.org/eprreport/

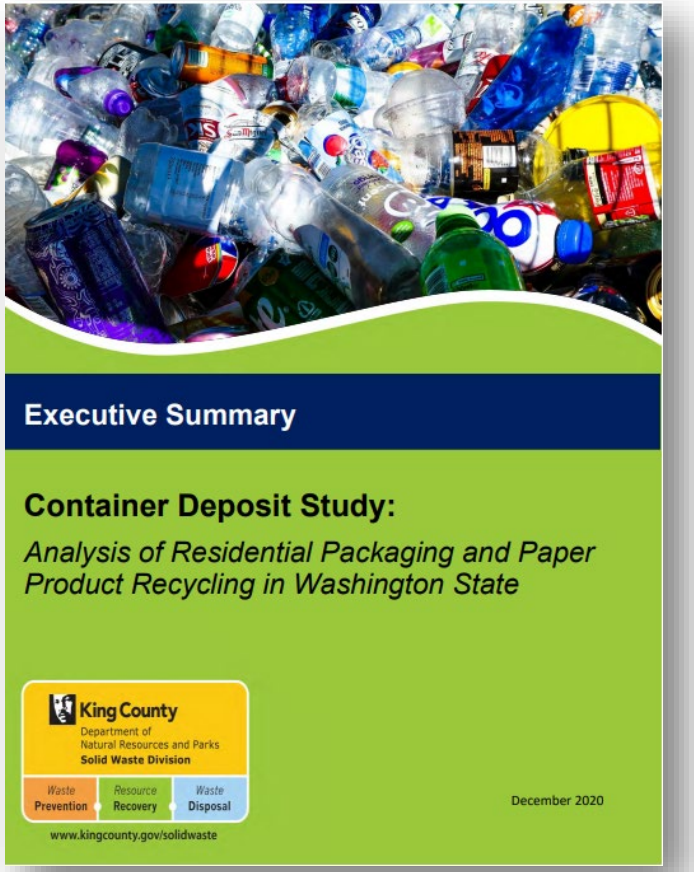
https://recyclingpartnership.org/epreconomicresearch/

https://www.oregon.gov/deq/recycling/Documents/rscRRSconsumer.pdf

Deposit Return System

Requires state law

- Distributor/producer funded
- Third-party organization
- Separate container collection
- Convenient drop-off
- Sets recycling rate targets
- Transparency/end markets
- State oversight

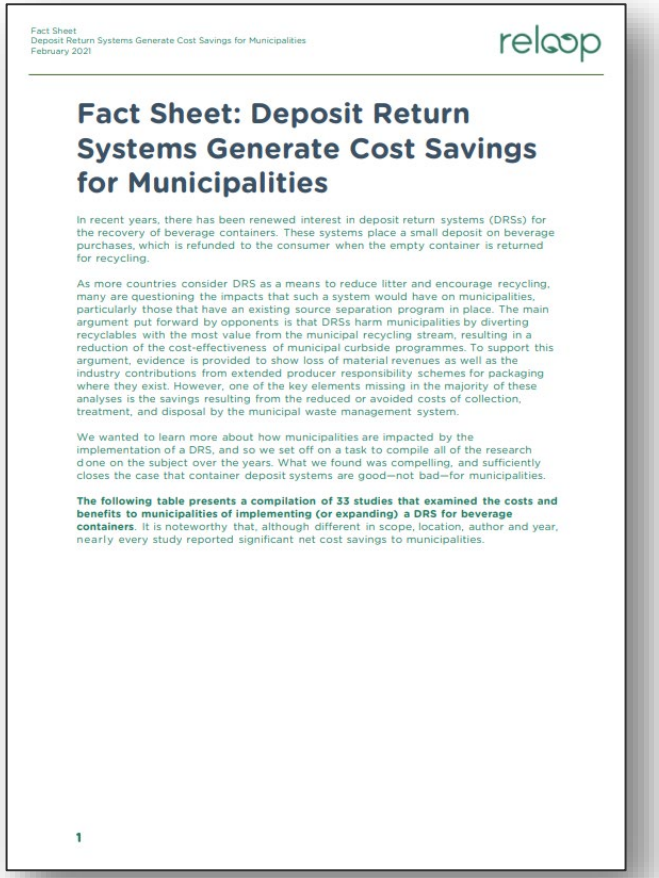


https://kingcounty.gov/en/-/media/depts/dnrp/solid-waste/about/planning/documents/task-force-container-study-executive.ashx

Deposit Return System

Benefits

- Reduce litter
- Encourage recycling
- Municipal cost savings
- Cleaner recyclables
- Reduced disposal costs
- Increases recycled content



Fact Sheet
Deposit Return Systems Generate Cost Savings for Municipalities
February 2021

reloop

Fact Sheet: Deposit Return Systems Generate Cost Savings for Municipalities

In recent years, there has been renewed interest in deposit return systems (DRSs) for the recovery of beverage containers. These systems place a small deposit on beverage purchases, which is refunded to the consumer when the empty container is returned for recycling.

As more countries consider DRS as a means to reduce litter and encourage recycling, many are questioning the impacts that such a system would have on municipalities, particularly those that have an existing source separation program in place. The main argument put forward by opponents is that DRSs harm municipalities by diverting recyclables with the most value from the municipal recycling stream, resulting in a reduction of the cost-effectiveness of municipal curbside programmes. To support this argument, evidence is provided to show loss of material revenues as well as the industry contributions from extended producer responsibility schemes for packaging where they exist. However, one of the key elements missing in the majority of these analyses is the savings resulting from the reduced or avoided costs of collection, treatment, and disposal by the municipal waste management system.

We wanted to learn more about how municipalities are impacted by the implementation of a DRS, and so we set off on a task to compile all of the research done on the subject over the years. What we found was compelling, and sufficiently closes the case that container deposit systems are good—not bad—for municipalities.

The following table presents a compilation of 33 studies that examined the costs and benefits to municipalities of implementing (or expanding) a DRS for beverage containers. It is noteworthy that, although different in scope, location, author and year, nearly every study reported significant net cost savings to municipalities.

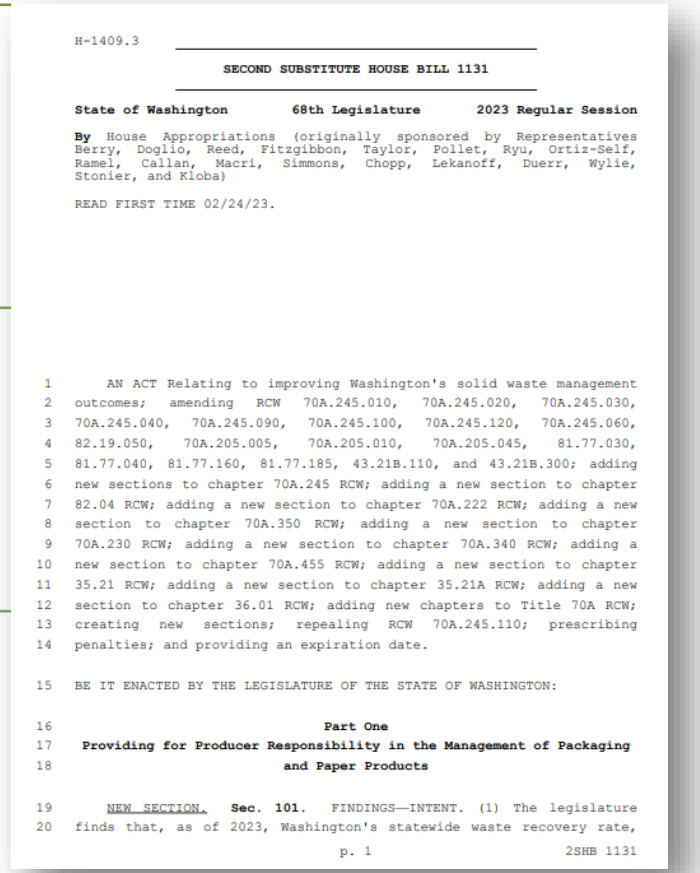
1

https://www.reloopplatform.org/wp-content/uploads/2021/05/Fact-Sheet-Economic-Savings-for-Munis-8FEB2021.pdf

The WRAP Act

House Bill 1131

- Created a producer responsibility program
- Expanded plastic recycled content requirements
- Established a deposit return program



H-1409.3

SECOND SUBSTITUTE HOUSE BILL 1131

State of Washington 68th Legislature 2023 Regular Session

By House Appropriations (originally sponsored by Representatives Berry, Doglio, Reed, Fitzgibbon, Taylor, Pollet, Ryu, Ortiz-Self, Ramel, Callan, Macri, Simmons, Chopp, Lekanoff, Duerr, Wylie, Stonier, and Kloba)

READ FIRST TIME 02/24/23.

AN ACT Relating to improving Washington's solid waste management outcomes; amending RCW 70A.245.010, 70A.245.020, 70A.245.030, 70A.245.040, 70A.245.090, 70A.245.100, 70A.245.120, 70A.245.060, 82.19.050, 70A.205.005, 70A.205.010, 70A.205.045, 81.77.030, 81.77.040, 81.77.160, 81.77.185, 43.21B.110, and 43.21B.300; adding new sections to chapter 70A.245 RCW; adding a new section to chapter 82.04 RCW; adding a new section to chapter 70A.222 RCW; adding a new section to chapter 70A.350 RCW; adding a new section to chapter 70A.230 RCW; adding a new section to chapter 70A.340 RCW; adding a new section to chapter 70A.455 RCW; adding a new section to chapter 35.21 RCW; adding a new section to chapter 35.21A RCW; adding a new section to chapter 36.01 RCW; adding new chapters to Title 70A RCW; creating new sections; repealing RCW 70A.245.110; prescribing penalties; and providing an expiration date.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF WASHINGTON:

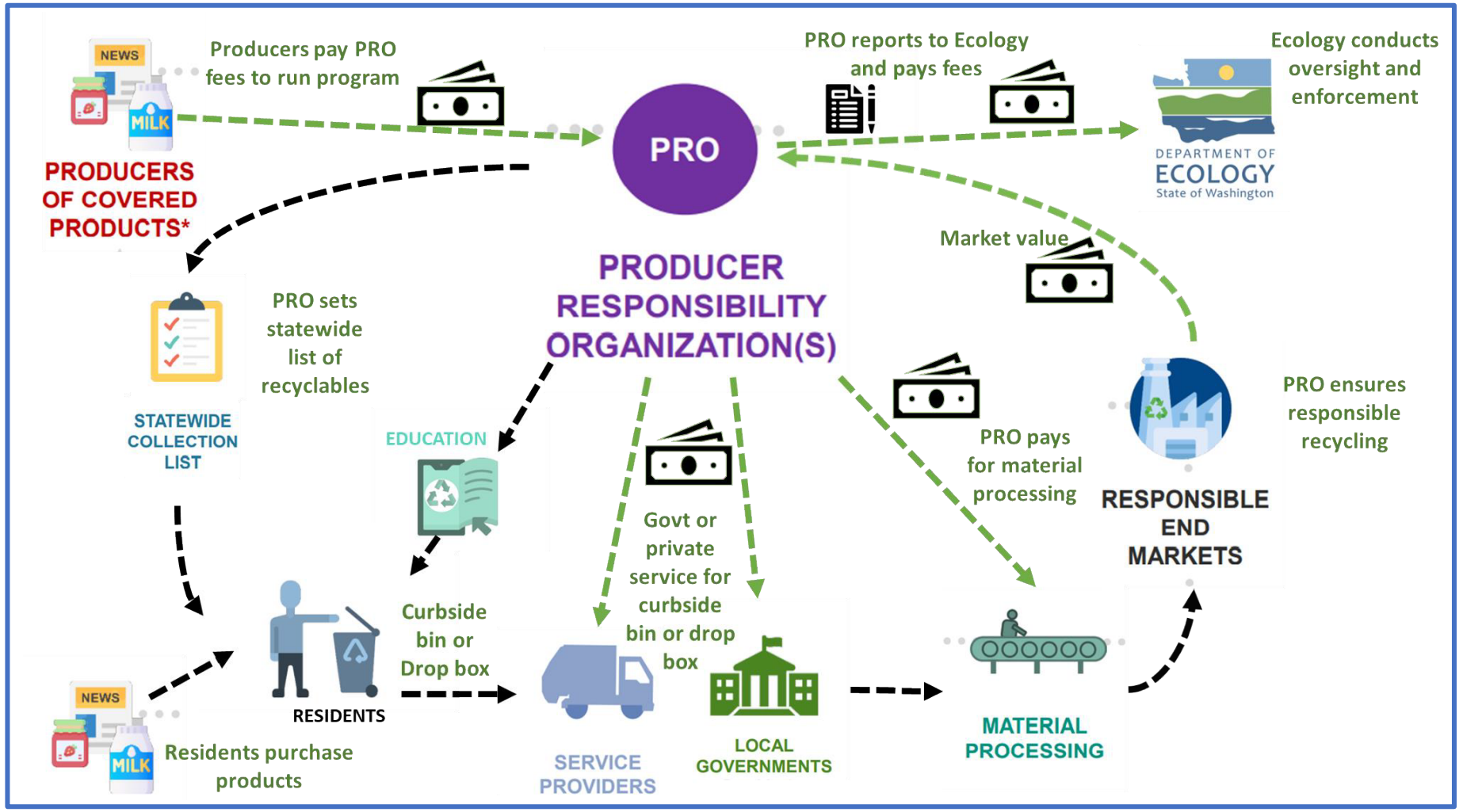
Part One
Providing for Producer Responsibility in the Management of Packaging and Paper Products

NEW SECTION. Sec. 101. FINDINGS—INTENT. (1) The legislature finds that, as of 2023, Washington's statewide waste recovery rate,

p. 1 2SHB 1131

https://app.leg.wa.gov/billsummary?BillNumber=1131&Year=2023&Initiative=false

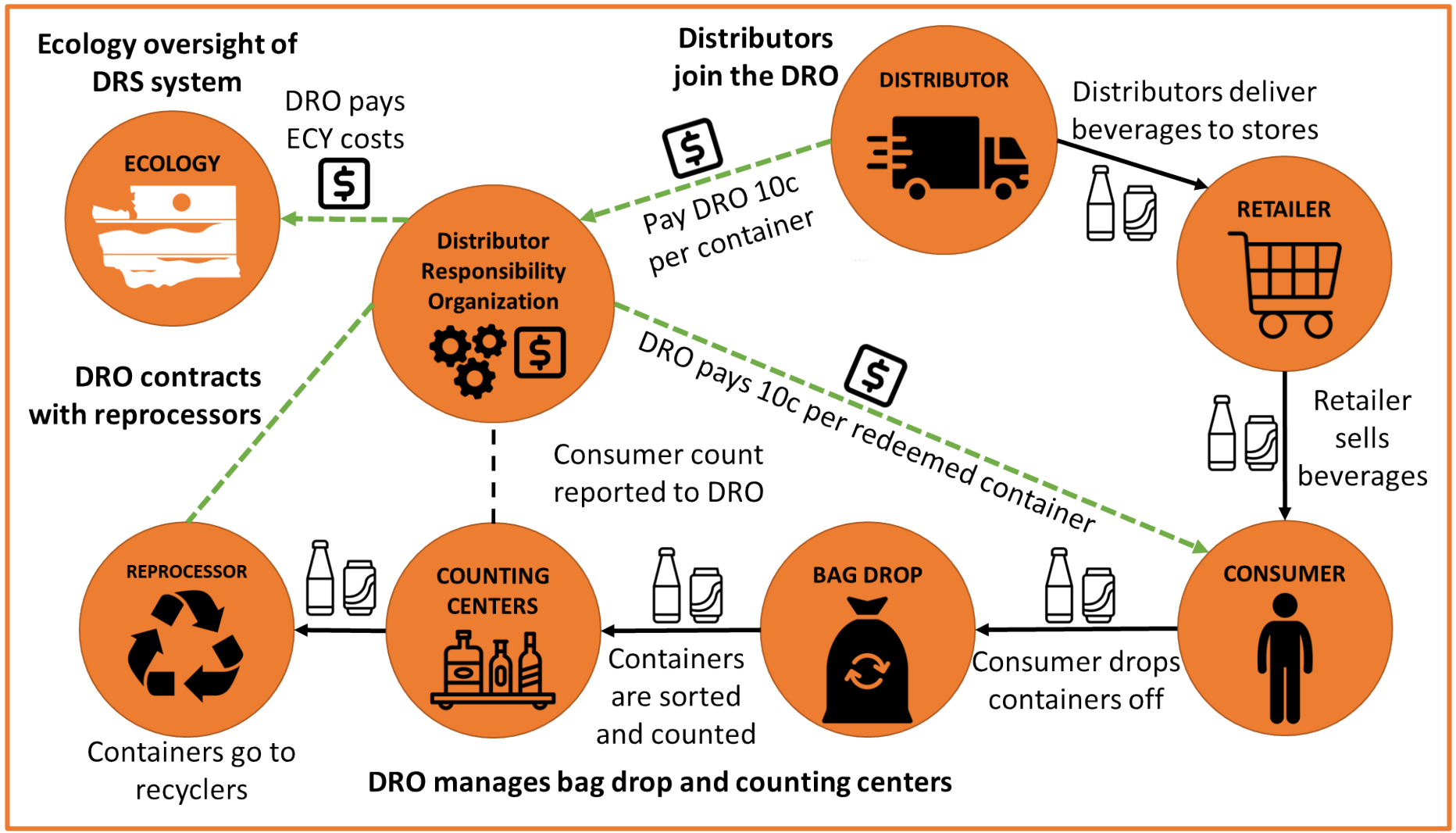
Producer Responsibility – under WRAP



Covered Products include most consumer goods packaging and paper products, with some exclusions.

While all packaging is a “covered product” and will pay into the program not all packaging will be on the statewide recyclable list.

Deposit Return System - under WRAP



Qualifying Beverage Containers:

Aluminum cans, plastic bottles, and glass bottles

Soda, beer, tea, liquor, wine, water, seltzer

Dairy milk is exempted.

Bag Drop:

Total of 270 bag drop sites – no bottle collection required at retail.

How would glass be recycled under WRAP?

EPR Statewide recyclables list

CURBSIDE collection

- Put items in curbside bin
- Put separated items curbside (glass)
- Tin cans, paper, cardboard, dairy tubs, plastic jugs

DROP OFF collection

- Take to drop off sites or depots
- Glass jars, foam, plastic bags

DRS Beverages

Qualifying beverages containers

- Take containers to bag drop for 10 cent refund
- Put in curbside bin (no refund)
- Beverage cans and glass bottles

Landfill

Unrecyclable materials

- Put these items in the garbage
- Chip bags, plastic food ware

Questions

- Kara Steward
- Kara.steward@ecy.wa.gov
- 564-999-0555

https://www.ezview.wa.gov/site/alias__1962/37596/recycling_development_center_advisory_board.aspx

Eastern Washington Glass Summit
Waste & Recycling Policy Implications

Scott DeFife
President
Glass Packaging Institute (GPI)
May 2023

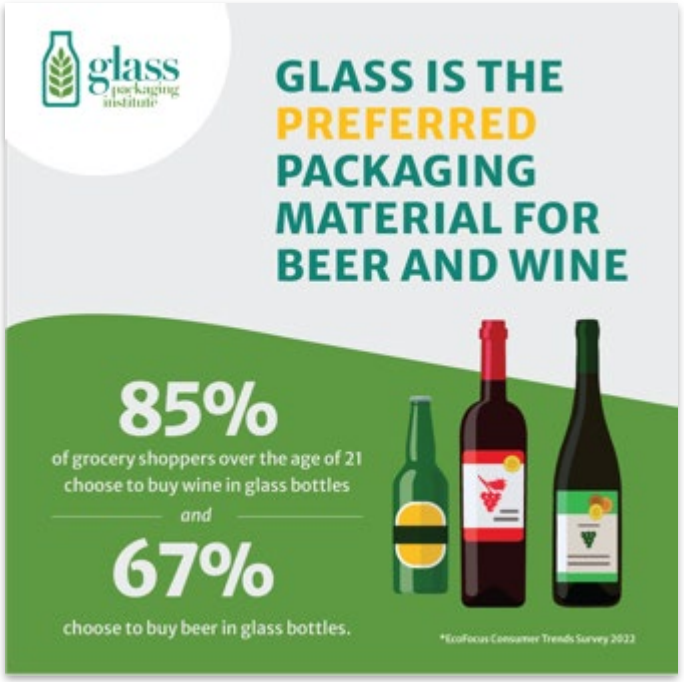
Glass is Unique

Unlike most alternative packaging materials, glass packaging:

- **Minimizes water use**
- **Avoids plastic pollution (littering)**
- **Avoids unknown or hazardous chemicals of concern**
- **Ensures sustainable sourcing**
- **Is recoverable and endlessly recyclable**
- **Does not harm biodiversity**

*Source: Friends of Glass

Consumers Trust Glass (And Want More)



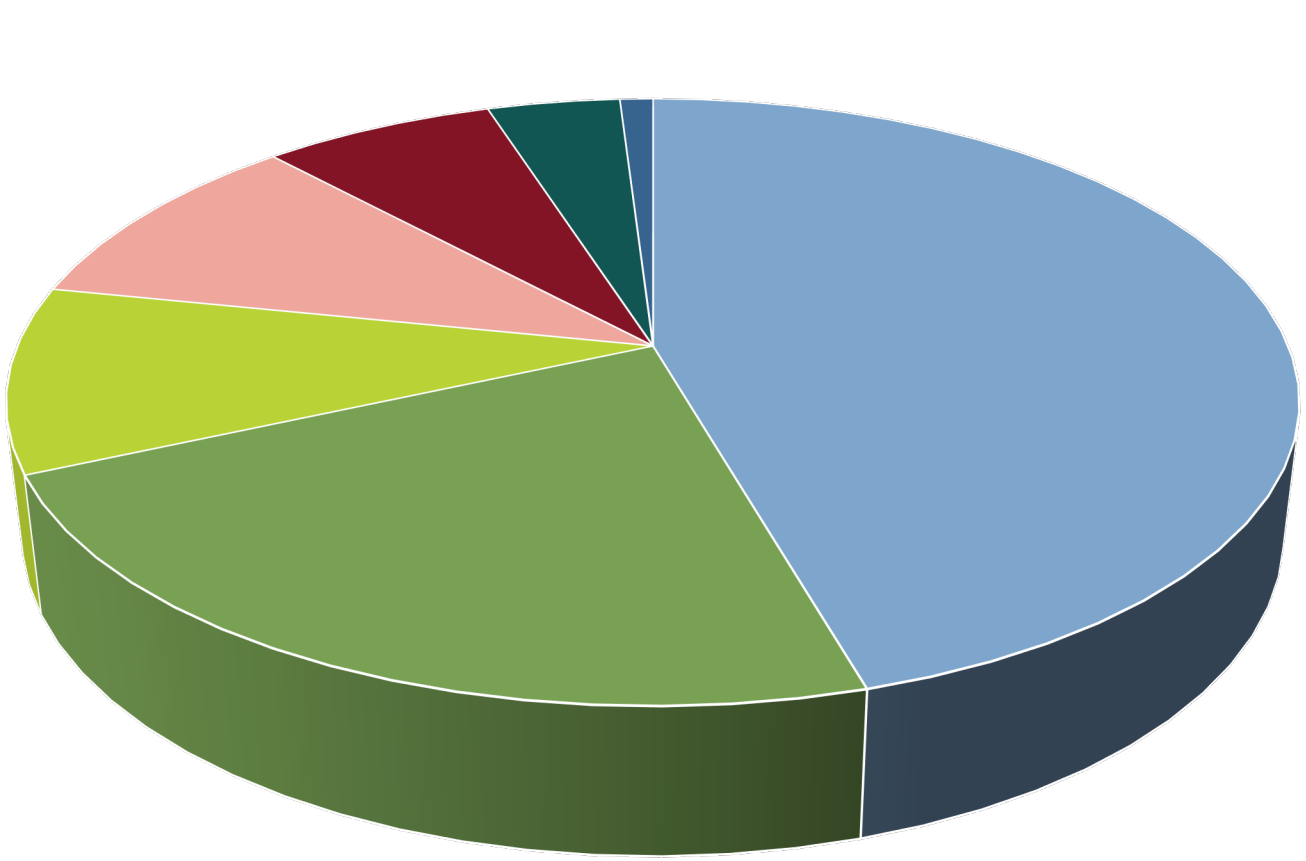
We know that U.S. consumers prefer glass packaging due to its **environmental benefits** and its ability to **protect the integrity** of the products inside.

Additionally, consumers are inclined to shape their purchasing behavior accordingly.

- **92%** of consumers said they like companies that offer glass packaging because of its lower environmental impact.
- **85%** of consumers choose to buy wine in glass bottles.
- **73%** of consumers view glass food and beverage packaging as good for the environment – **this is a 20 point difference over flexible pouch (bag-in-box).**
- About **3 in 4** of consumers wish more companies offered their food and beverage products in glass packaging.

**Source: EcoFocus Trends Survey, 2022 / CARAVAN Omnibus Survey, 2022*

End Market Share of U.S. Glass Container Shipments by Category (Full Year 2022)

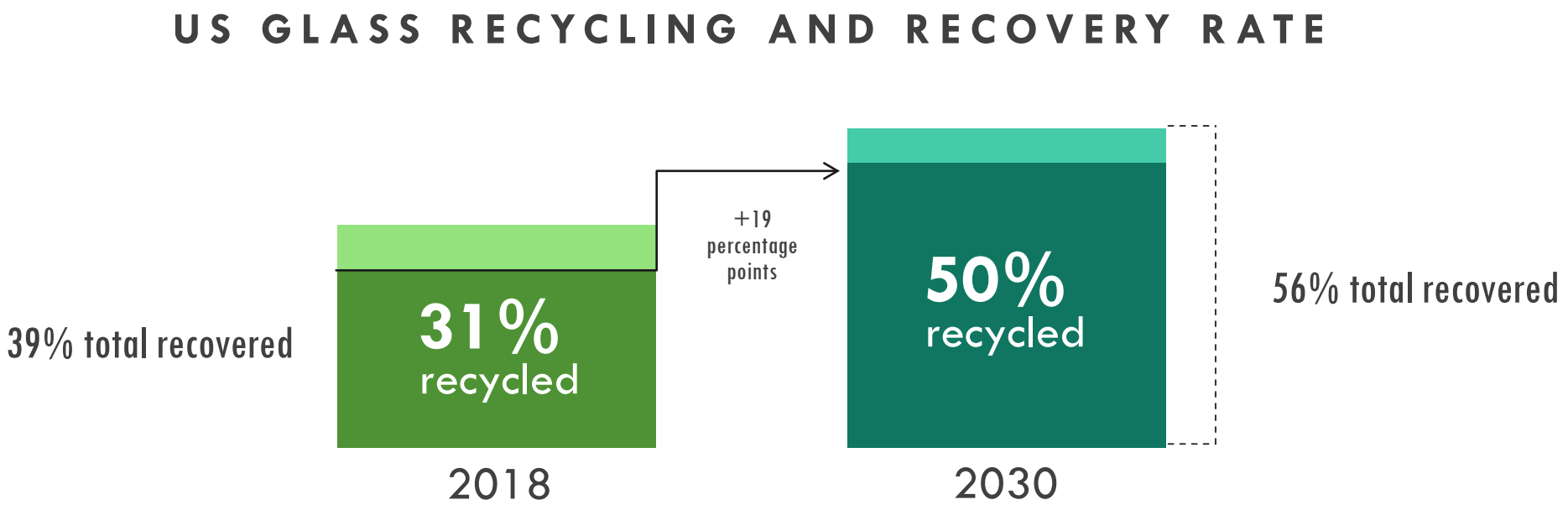


- Beer (46%)
- Food (23%)
- Non-Alcoholic Beverages (10%)
- Wine (10%)
- Spirits (7%)
- Ready to Drink (4%)
- Cosmetics/Pharma/Toiletries (<1%)

Source: Glass Packaging Institute, Precision Consulting

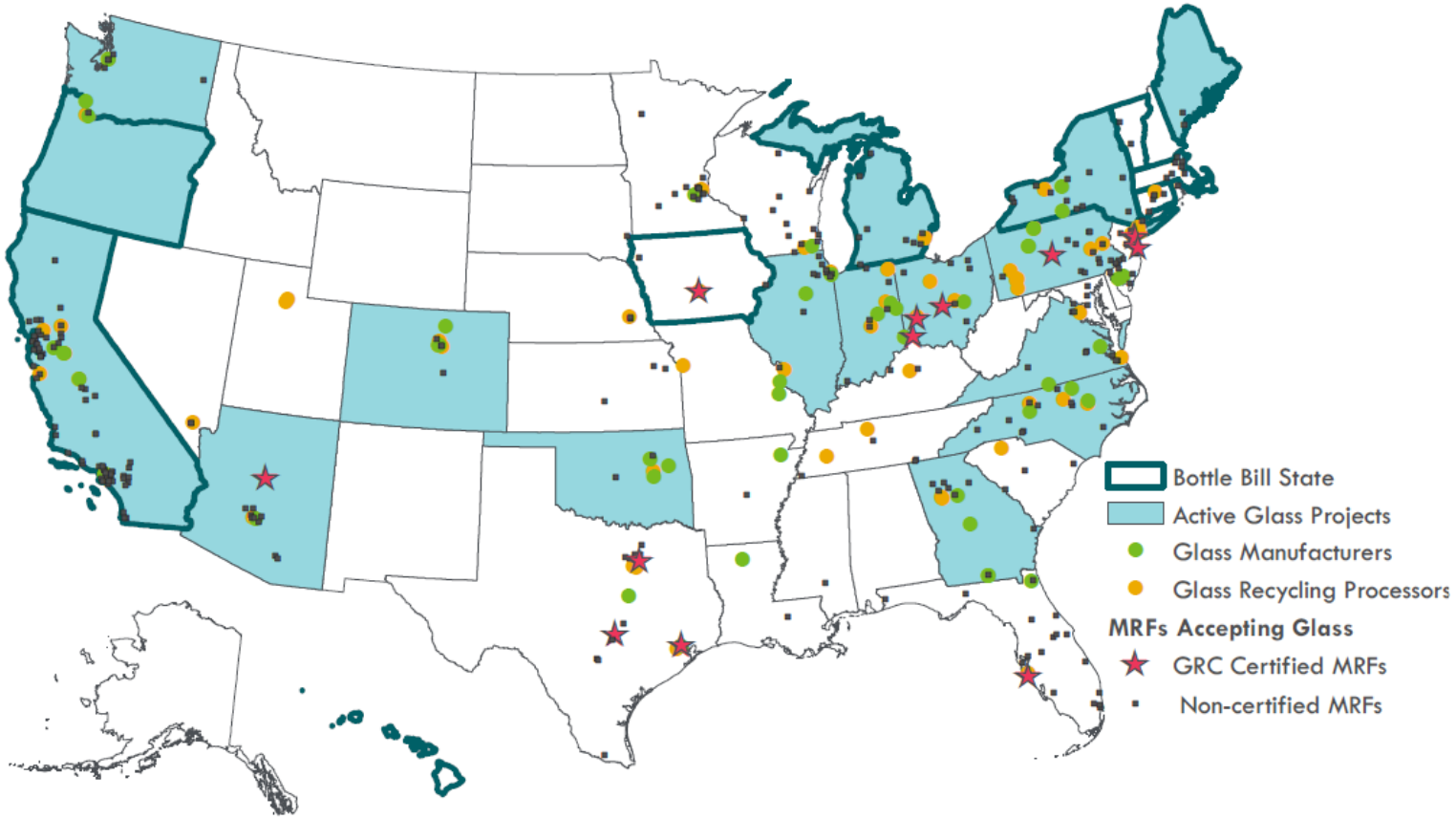
US Glass Road Map

bold target

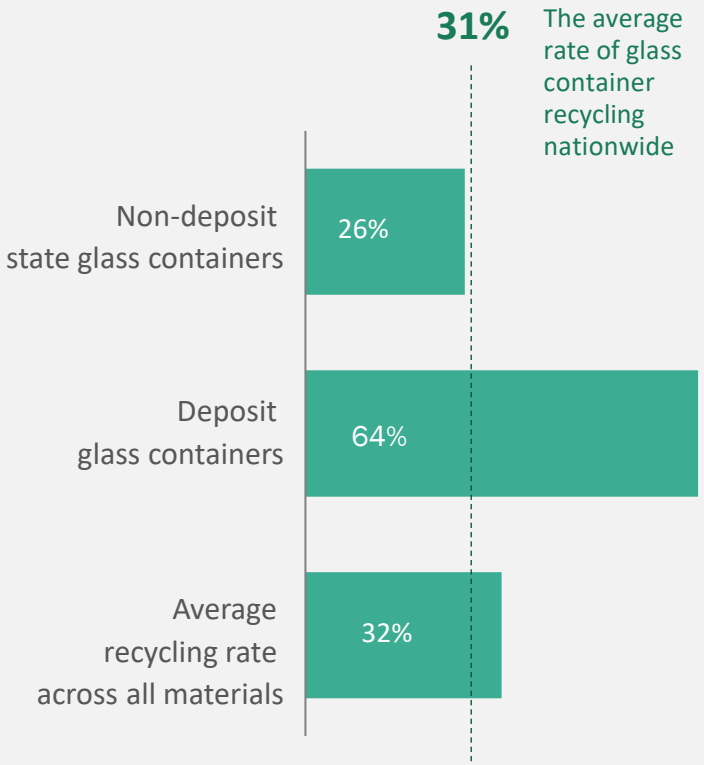


- Sources: United States Environmental Protection Agency; Glass Packaging Industry (GPI); BCG.
- Note: The 39% figure represents the rate of glass recovered (or collected), but some recovered glass is lost to landfills or as it moves along the recycling value chain, from sorting to processing to manufacturing. The remaining 31% is recycled into new containers. Some variability exists in how recycling rates are calculated across the US.

US Glass Infrastructure and Recycling Rates



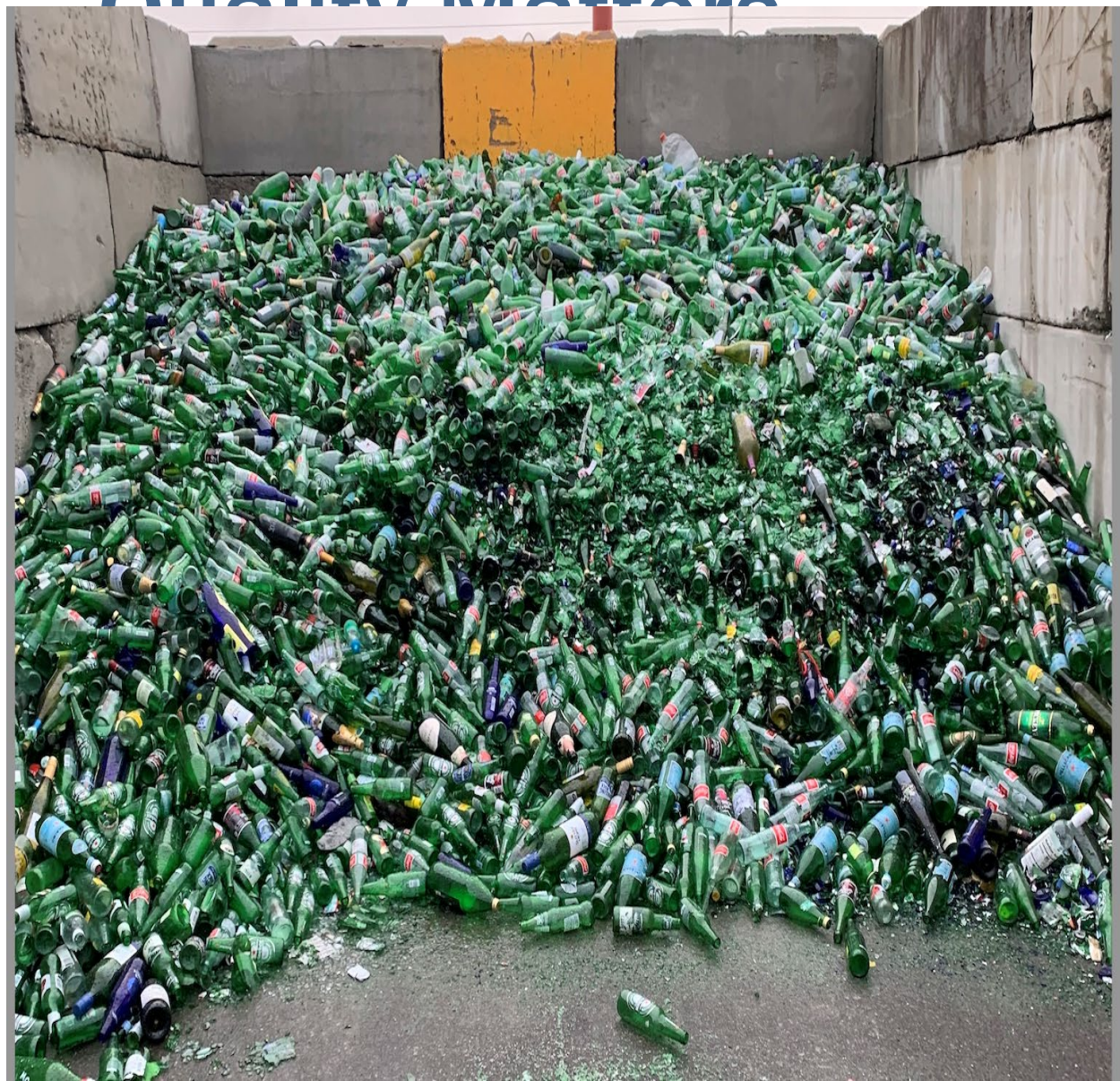
RECYCLING RATES



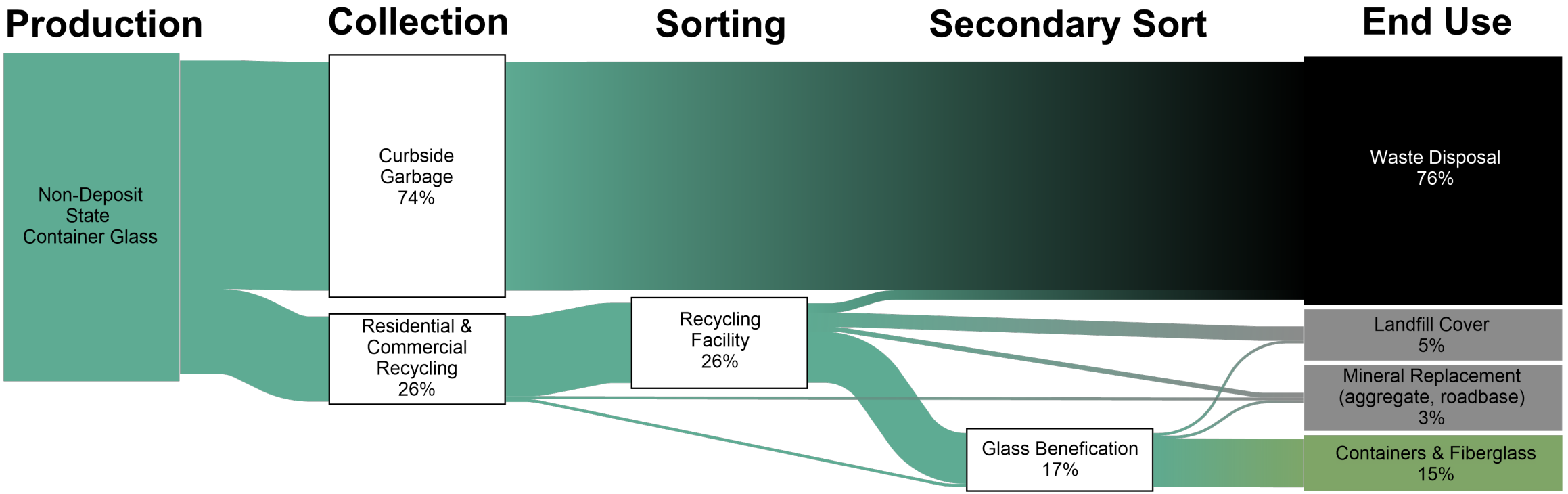
Recycling rate sources: CRI 2020, EPA 2018 data, and RRS 2018 data.

Quality Matters

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



Glass Container Material Flow Across the Value Chain – Non-Redemption States [DRAFT]

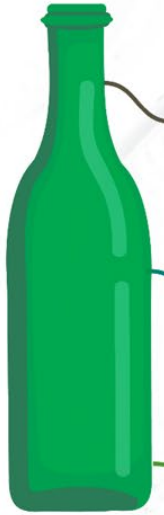


Notes: Generation based on 2018 CRI Glass Beverage container sales data and EPA 2018 data for non-beverage container glass and adjusted by population of non-deposit states. Residential and Commercial Recycling includes glass containers collected by any means. 210,000 tons assumed to be collected through 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.

glass packaging institute

UNDERSTANDING RECYCLING STREAMS

Knowing which method of glass recycling is most effective will help you choose the method that will make the greatest impact.



SINGLE STREAM

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

42%

of glass is suitable to be recycled into new containers.

SEPARATE STREAM

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

60%

of glass is suitable to be recycled into new containers.

DEPOSIT STREAM

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

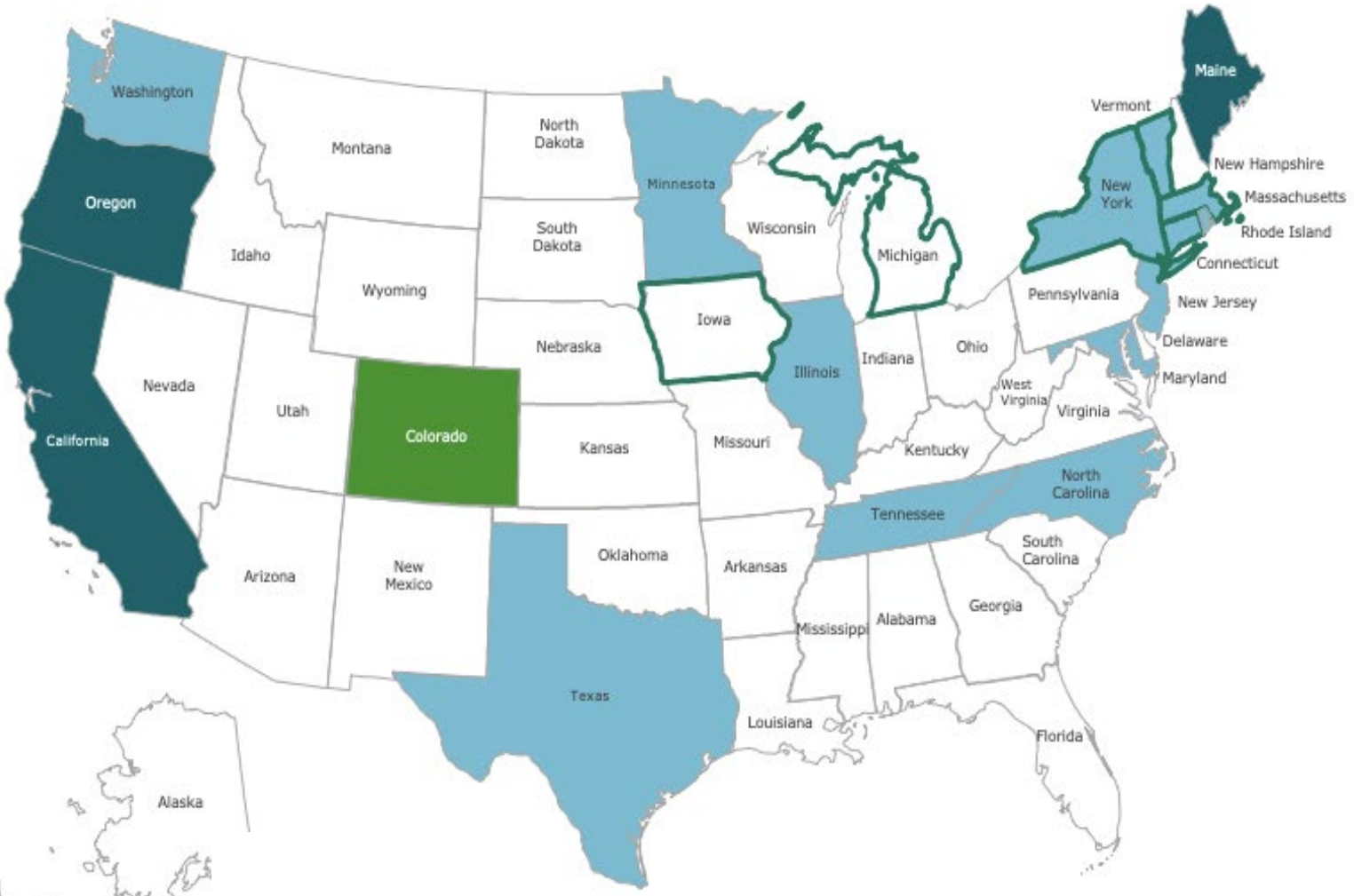
92%

of **deposit stream glass** is recycled into new products.

Each system has it's advantages. Container drop-off always provides the highest volume of yield for glass recycling. Single-stream is better than no stream, but deposit and separate-stream are the most efficient.

GPI.ORG

Packaging EPR and Deposit Landscape



EPR & DRS Enacted

EPR Only Enacted

DRS Only Enacted

2024 Watch List

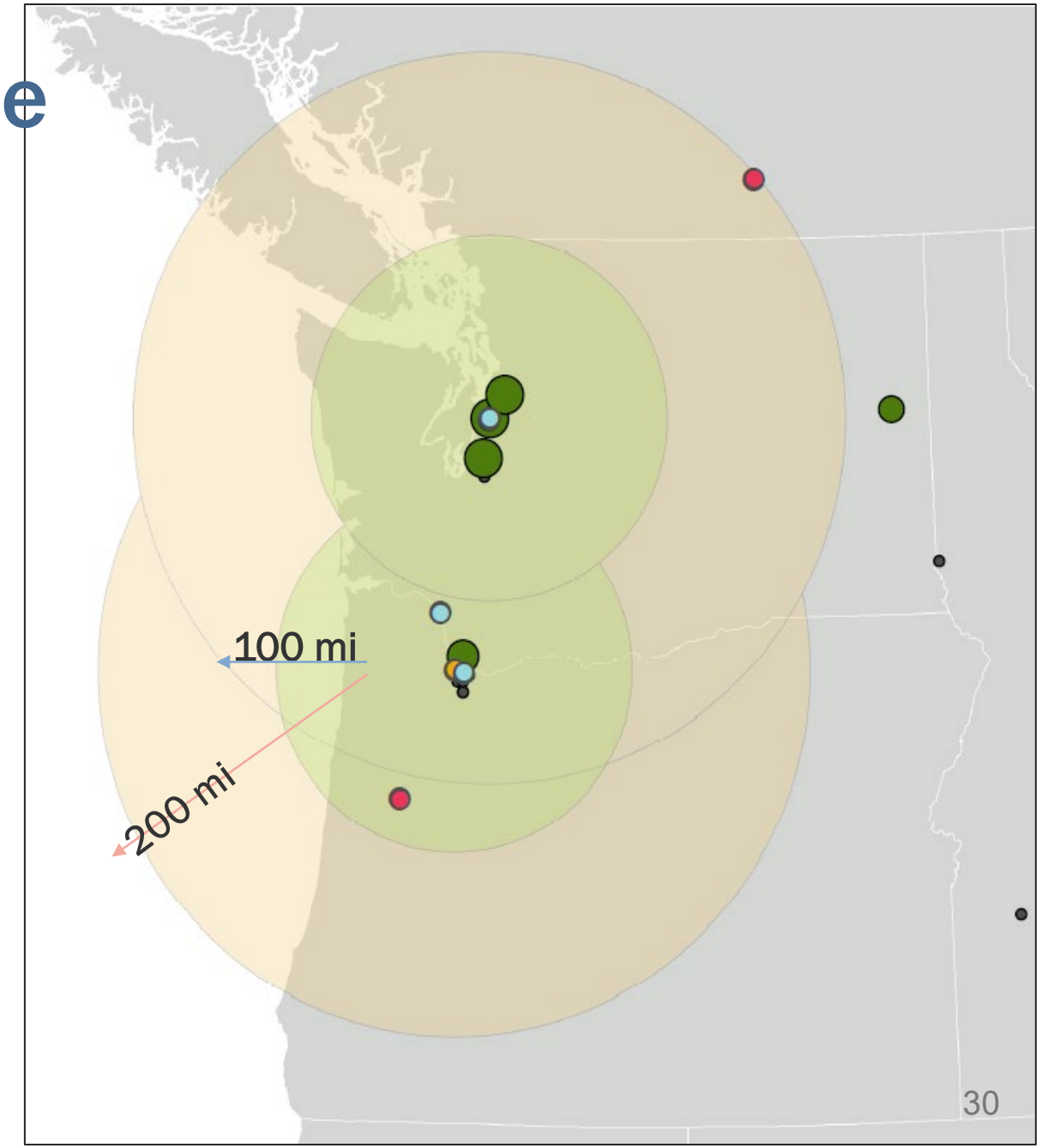
PNW Glass Infrastructure

Legend

- Glass Manufacturers
- Glass Recycling Processors
- Fiberglass Plants
- MRFs not accepting glass

Glass MRFs by Throughput (TPY)

- Unknown
- 1 - 25,000
- 25,000 - 50,000
- 50,000 - 75,000
- 75,000 - 100,000
- > 100,000



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	Beverage (Tons)	Non-beverage (Tons)	Total Tons Collected	Total Percent Capture	2022+ Policy	Beverage (Tons)	Non-beverage (Tons	Total Tons Collected	Total Percent Capture	Change in Tons	Percent in Change Tons
CA	DRS	703,300	23,000	726,300	54%	EPR/enhanced DRS	826,600	46,000	872,600	65%	146,300	20%
OR	DRS	60,600	12,700	73,300	57%	EPR/enhanced DRS	73,100	25,300	98,400	76%	25,100	34%
CO	None	42,700	12,400	55,100	23%	EPR	92,800	26,900	119,700	50%	64,600	117%
ME	DRS	50,200	3,600	53,800	71%	EPR	50,200	8,100	58,300	77%	4,500	8%
WA	None	65,300	13,400	78,700	22%	EPR w/ DRS	243,200	46,000	289,200	80%	210,500	267%
WA	None	46,200	13,400	59,600	22%	EPR w/o DRS	130,600	46,000	176,600	65%	117,000	196%
Total	**970k–990k**					**1.33M-1.44M**					**360k-450k**	**37-46%**

EPR POLICIES THAT DISALLOW ADC TO COUNT AS RECYCLING WILL FURTHER INCREASE CULLET TO END MARKETS.

Contact Info & Educational Resources

Glass packaging & recycling questions: Email Scott DeFife at **sdefife@gpi.org**

Media inquiries: Contact Shauna Hamilton at **shauna@sqcomms.com**

Educational resources: Visit the GPI website at **www.gpi.org**

Follow us on social media!

@ChooseGlass

Historical Overview

Dan Weston– Ecology Solid Waste Program

Washington RECYCLING DEVELOPMENT CENTER

AGENDA

DEPARTMENT OF ECOLOGY
State of Washington

9:00 am - Welcome, Goals, Roles, Rules, Agenda,

9:05 am - Policy Panel with Kara Steward, Ecology, and Scott DeFife, Glass Packaging Institute

9:40 am - Historic overview of glass recycling in Eastern WA with Dan Weston, Ecology

10:10 am - City of Walla Walla report with Shane Prudente

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2:00 am – End markets for glass-to-glass recycling

3:00 am – End markets glass to construction

3:30 am – CLOSING

City of Walla Walla report

Shane Prudente– City of Walla Walla

Washington RECYCLING DEVELOPMENT CENTER

City of Walla Walla

A WONDERFUL PLACE TO **LIVE WORK PLAY**

GLASS RECYCLING ALTERNATIVES REPORT SUMMARY

May 3, 2023

Presented by:

Shane Prudente

Public Works Communications Coordinator

History

- Until 2007, glass was part of the single stream recycling mix in Walla Walla. To preserve the quality of the materials, glass was seperated and the city established depots for collection.

- In 2012, the City the city elected to end the glass recycling program due to expense and the inadequacy of the recycling program as it existed.

City of Walla Walla

Why Look at Glass Recycling Now?

- Residents have been asking about glass recycling for some time – both informally and through the City's annual Resident Satisfaction Survey

- The current recycling contract with BDI ends in January of 2024, so the timing is right to consider glass options for the next contract

City of Walla Walla

Collection Options

- **Curbside – glass-only collection route**
  - Collection 1x per month
  - City customers only
  - 32 gallon cart
- **Curbside – dual collection**
  - Collect with regular recycling (EOW)
  - City customers only
  - 18 gallon bin
- **Depot – residents drop glass at depots**
  - Monitoring recommended
  - Would need to be funded by landfill fund

City of Walla Walla

Glass Recovery Options

- **Haul to Portland**
  - Recycle (new glass bottles)
- **Haul to Seattle**
  - Recycle (new glass bottles)
- **Crush locally**
  - Repurpose (sand, aggregate, etc.)
- **Landfill**
  - Disposal (trash)

City of Walla Walla

Greenhouse Gas (GHG) Analysis

Table 9: Glass Transport Impact Summary

Collection Alternative	Estimated Tons	Net GHG Impact (MTCO2E)
Glass Collection Route	624	+77.47
Dual Stream Recycling	624	+9.50
Depot Collection	294	+168.64

Table 10: Glass Recovery Impact Summary

Recovery Alternative	Estimated Tons	Net GHG Impact of Alternative Compared to Landfilling (MTCO2E)
Recycle Glass in Portland	624	-160
Recycle Glass in Seattle	624	-158
Pulverize Glass	624	-61
Reuse Wine Bottles (1)	390	-5,129

City of Walla Walla

Recommendation

Collection – Curbside, dual collection

- 18 gallon bin, picked up every other week (alongside recycling)

Recovery – Recycle (Seattle)

- This solution – to be implemented in 2024 - is the best combination of convenience for residents, reuse application (true recycling) and environmental impact.
- Provides the highest potential for participation and tonnage due to convenience and simplicity
- Can be implemented at a relatively low cost
- Proven, reliable system
- Lowest transport + recovery GHG footprint
- Glass is truly recycled in a closed loop

City of Walla Walla

City of Walla Walla Resident Satisfaction Survey Questions

1. On previous satisfaction surveys, residents have expressed a desire to implement a glass recycling program. Would you support a curbside glass recycling program being provided by the City?
2. Would you be willing to pay a monthly fee that could range between $1.75 to $3.50 per month (in addition to the current recycling rate) for curbside glass recycling?

Answer options

- Definitely support
- Probably support
- Probably NOT support
- Definitely NOT support
- Need more information

Monthly Cost Calculation/Estimate

Dual Stream	Rate	Contingency (20%)	Inflation Factor (8% for 2023)	Inflation Factor (8% for 2024)	City Admin Mark-Up (30%)	2024 Rounded Rate (per mo)
To Portland	$0.94	$0.19	$0.09	$0.10	$0.39	$1.75
To Seattle	$0.89	$0.18	$0.09	$0.09	$0.32	$1.60

City of Walla Walla

Committee and Resident Feedback

- Feedback from SWAC and Sustainability Committees
  - Both committees agreed with recommendation.
- Resident Satisfaction Survey (CSS)
  - Over 75% said they support/probably support a program.
  - Over 60% said they support/probably support a monthly fee of up to $3.50/mo. to pay for it.

City of Walla Walla

Next Steps

- Request fee/quote from BDI for potential inclusion in the next recycling contract

City of Walla Walla

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Let's take a 10 minute break

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Suzanne Noble– Ellensburg Glass Recycling Cooperative

Ariahna Jones– Waste Loop

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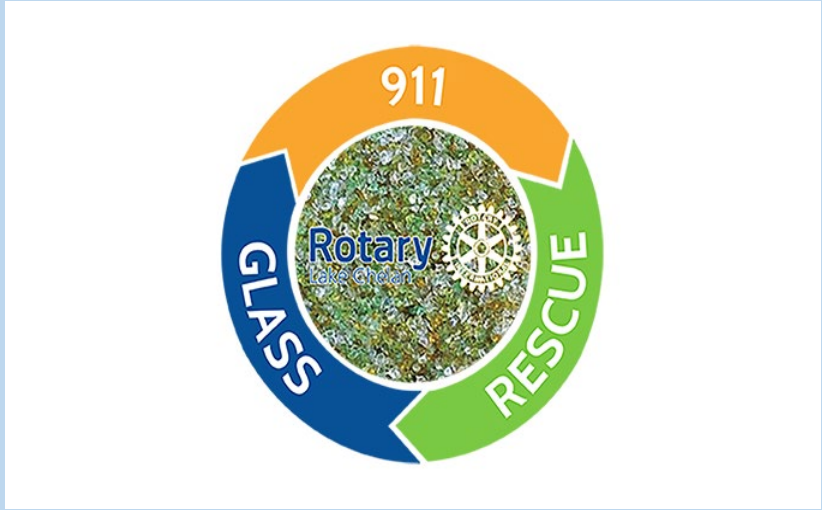


911 Glass Rescue

Project of the Rotary Club of Lake Chelan

Preserve Planet Earth Committee

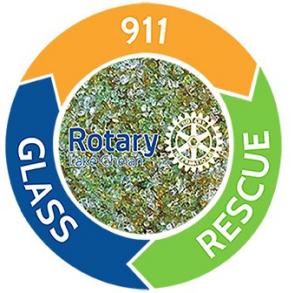
Devise a Sustainable, Local Model for Used Glass Recycling:

- Avoid Transportation Costs/Carbon Footprint
- Eliminate Dependence on a Third Party (Strategic Materials)
- Devise a Local Solution to a Local Problem
- Make a Marketable (Friendly) Product

Andela Products Commercial Pulverizing System

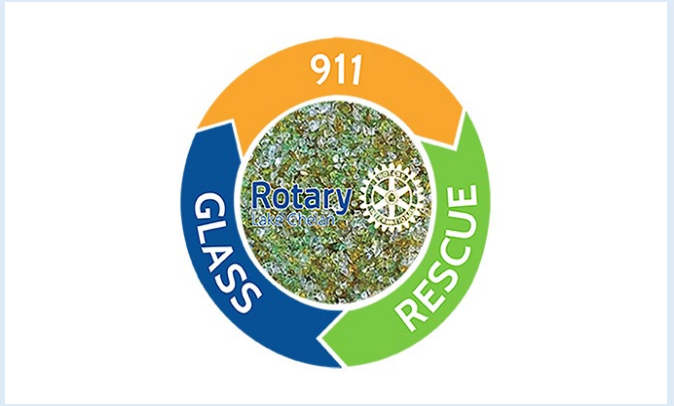
Andela GP-05L, Capable of 1 to 2 Tons Per Hour

Andela Products Background



- 25 Years in Business
- Worldwide Market for its Systems
- Proven Track Record/End Markets Knowledge
- Friendly Product with Rounded Edges
- “No Fuss” Process- Labels, Corks, Lids Removed by System

Partnership with City



- Housed at City Recycle Center
- City Supplies Electricity, Propane, Extra Lift
- Public Works Dept. Assistance
- Operating Agreement Limits our Operation

Paulie En Route to Chelan

Grand Opening July 24, 2021

Mike Steele Officiates

Ribbon Cutting Mayor Goedde

Councilmembers & County Comissioners Attend

Media Coverage by KOZI, The Mirror, Wenatchee World

911 Glass Rescue

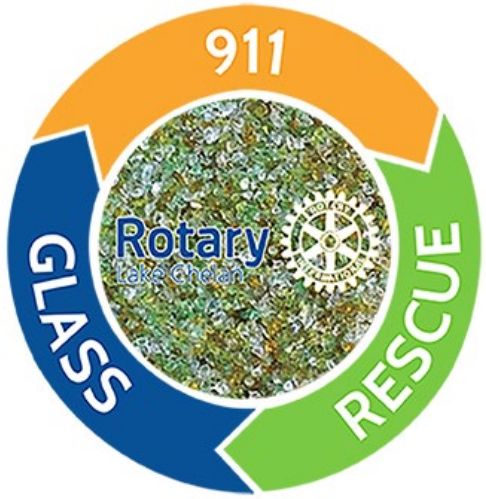
- 9-11 Million tons of Glass to Landfill Per Year
- 501(c)(3)
- 7 Member Board of Trustees
- One Paid Staff

911 Glass Statistics

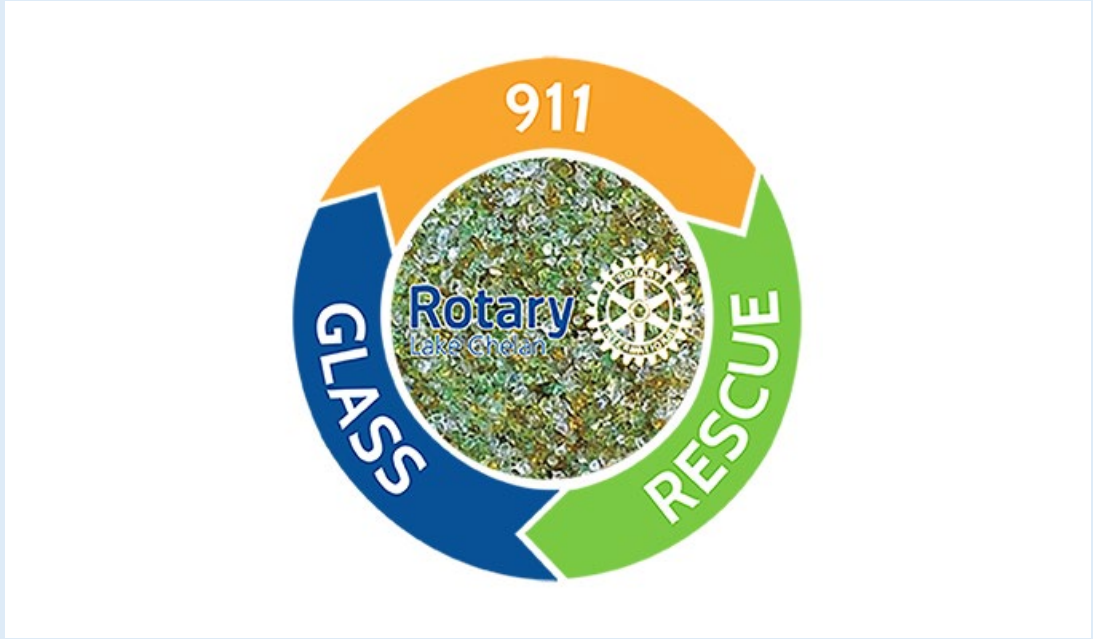
- 21 Months of Operation
- Serve 40 to 80 Customers Per Week, Plus Wineries & Businesses
- Crushed Over 500,000 Pounds to Date

Product Uses

- Paths & Walkways
- Garden Mulch
- Construction Fill (Airport)
- Hydroponics
- Driveway/Sidewalk Traction
- Pavers
- Craft/Decorative Projects




We're Proud Sponsors of 911 Glass Rescue!
This winery supports 911 Glass Rescue
The Lake Chelan Rotary Club
These bottles have been embellished with
pulverized glass from this winery!



QUESTIONS?

Community led efforts

Tom Tochterman– 911 Glass Rescue

Suzanne Noble– Ellensburg Glass Recycling Cooperative

Ariahna Jones– Waste Loop

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Environmental
Sustainability in
Ellensburg
Starting with Glass

Glass Recycling Ends…

Transport Handling Cost outweigh Reimbursement Rate

35 Tons of Glass/yr is now being landfilled as Solid Waste

Community Mobilizes…

Https://www.facebook.com/groups/2776709935705820

https://www.facebook.com/groups/KittitasCommunityConnect/permalink/3634519949900847

Brainstorming commences…

Transport Costs

Local Glass Crusher

Bottle Bill

Washington state had Washington Beverage Container Deposit on November 6, 1979 ballot as Initiative 61. Had it passed it would have established a minimum 5¢ deposit. However, measure was defeated with 57.63% voters rejecting the proposition.

Which Bottle Crusher?

Andela – Needed an End market

- https://www.youtube.com/watch?v=2xIFMYxw_cM&feature=emb_logo

Expleco GLS –Start small and showcase

https://video.search.yahoo.com/yhs/search?fr=yhs-LK
SF01&hsimp=yhs-
SF01&hspart=Lkry&p=glacial+til+glas+crushing+machine#
d=1&vid=f9a4a832a8a80d2df1f25268
fcead4b&action=c
k

Expleco GLS 2.0

- https://www.youtube.com/watch?v=aUei6yQb10E&feature=youtu.h

Glass Cooperative

Partnership of three local service organizations

Insurance and Location

Oddfellows of Ellensburg

Funding Stream

Ellensburg Morning Rotary Foundation

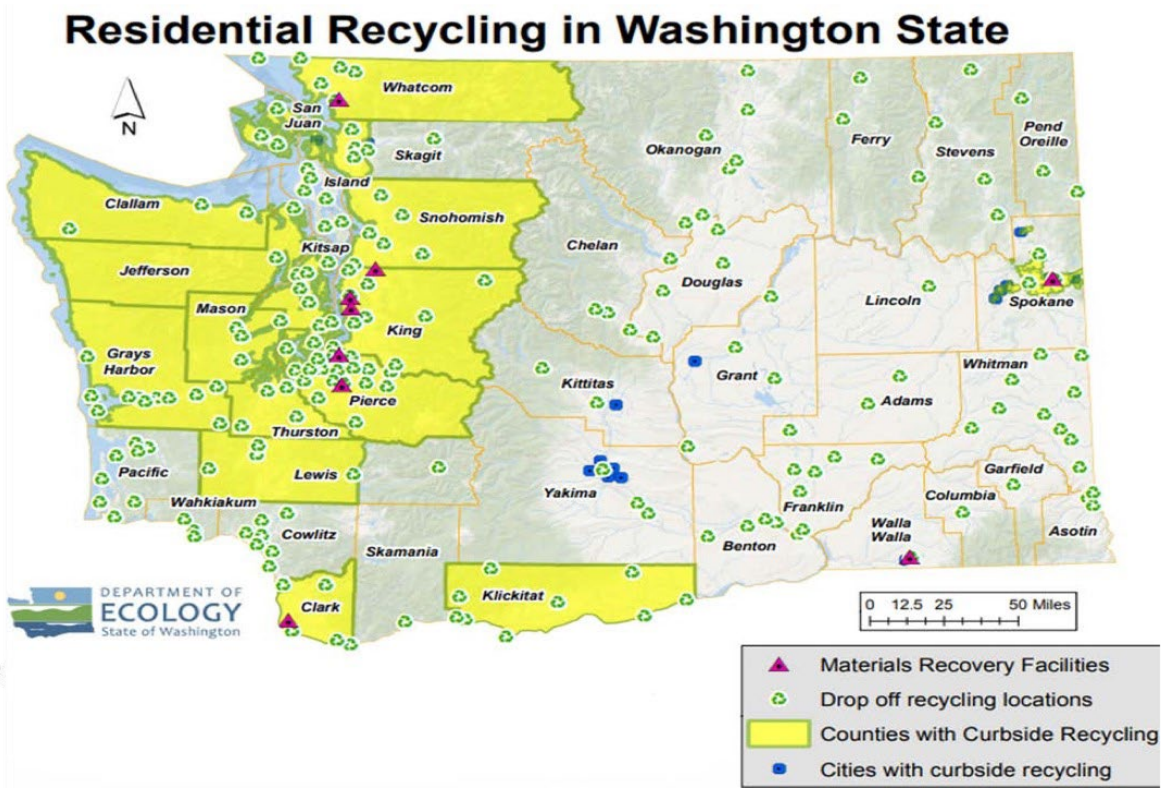
Operation

Rodeo City Repair Café and volunteers

Next Steps

House Bill 1543 from the 2019 Legislature established two CLEAR mandates through new and amended RCWs.

- Requiring municipalities to implement a Contamination Reduction and Outreach Plan (CROP) plan which is due July 1, 2021.
- Establishing a formal partnership between the WA state Department of Commerce and the WA state Department of Ecology.


Residential Recycling in Washington State
N
Whatcom
San Juan
Skagit
Island
Clallam
Snohomish
Kitsap
Jefferson
Mason
King
Grays Harbor
Pierce
Thurston
Pacific
Lewis
Wahkiakum
Cowlitz
Skamania
Clark
Klickitat
Okanogan
Ferry
Stevens
Pend Oreille
Chelan
Douglas
Lincoln
Spokane
Kittitas
Grant
Adams
Whitman
Yakima
Franklin
Walla Walla
Benton
Garfield
Columbia
Asotin
DEPARTMENT OF ECOLOGY
State of Washington
0 12.5 25 50 Miles
Materials Recovery Facilities
Drop off recycling locations
Counties with Curbside Recycling
Cities with curbside recycling

Recycling Development Center

…

Our Economic Resource

Imperative for Kittitas County to connect with the Department of Commerce to offer Bower's Field Business property and get in line. Well situated for materials recovery and processing.

- Opportune time to be proactive
- Central Location on I-90
- Many Micro-breweries and Wineries
- Inexpensive Power
- Inexpensive Lease Options
- NERC Business moving to PNW
- Offer LEED Credits

https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/Recycling-Development-Center

Next Cycle Michigan and Colorado

Building A Circular Economy

Inviting Partnership and Collaboration

https://www.nextcyclemichigan.com

RECYCLING is a $13 Billion Industry

Includes: collectors, processors, recycled product manufacturers and equipment makers

Recycling is an employment multiplier of 2.4 - this means for every 10 jobs in recycling, there are 14 others created in the SC economy.

Consumers ♥ Glass

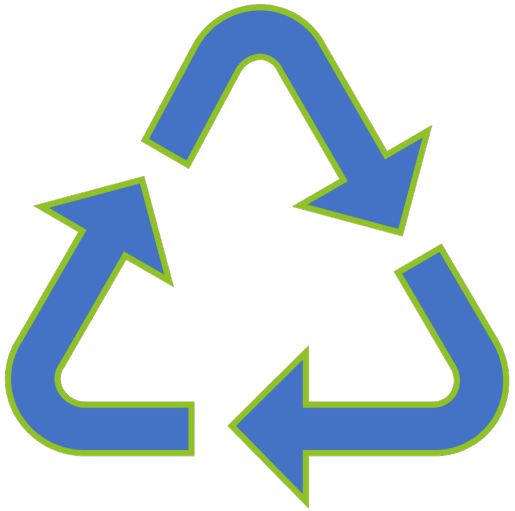
•Glass is made from all-natural sustainable raw materials.

•It is the preferred packaging for consumers concerned about their health and the environment.

•Consumers prefer glass packaging for preserving a product's taste or flavor and maintaining the integrity or healthiness of foods and beverages.

•Glass is the only widely-used packaging material considered "GRAS" or "generally recognized as safe" by the U.S. Food and Drug Administration.

Environmental Gains of Recycling Glass



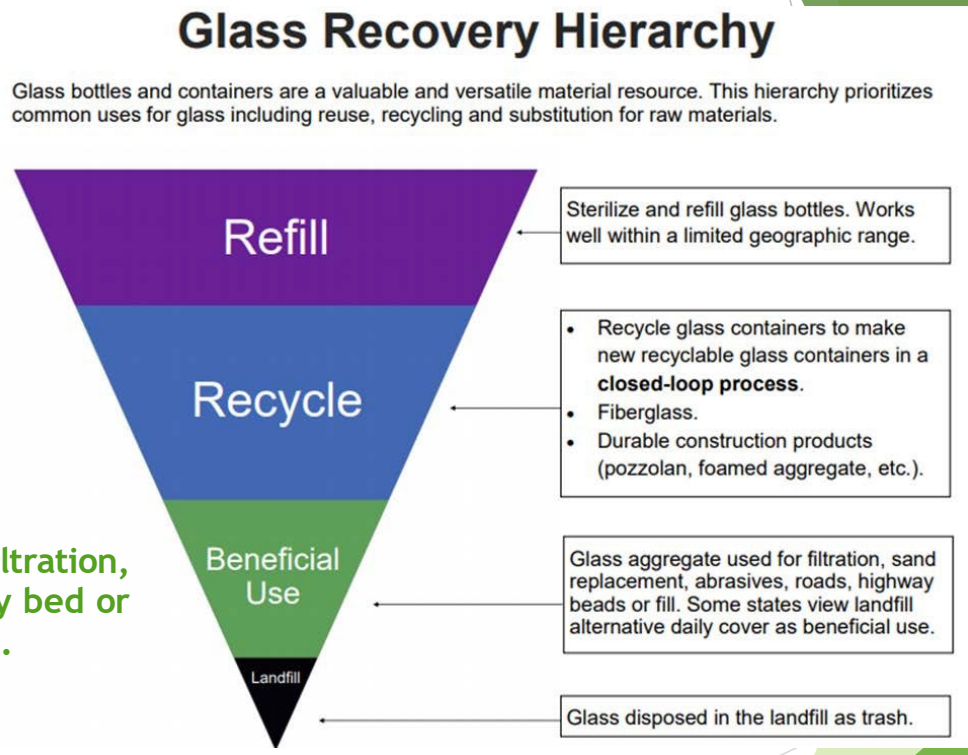
- Saves raw materials – Pound for Pound
- The container and fiberglass industries collectively purchase 3.2 million tons
- Lowers Energy Costs significantly
- Cuts CO2 emissions
- Reduces particulates and greenhouse gasses
- Extends Life of Furnace

Glass Recovery Options

Sterilizing and refilling saves 93% energy and 47-82% water

Repeatedly recycled back to their original use without loss of quality or purity

Glass can be substituted as aggregate for filtration, sand replacement, abrasives, road/highway bed or fill, and alternative daily cover for landfills.

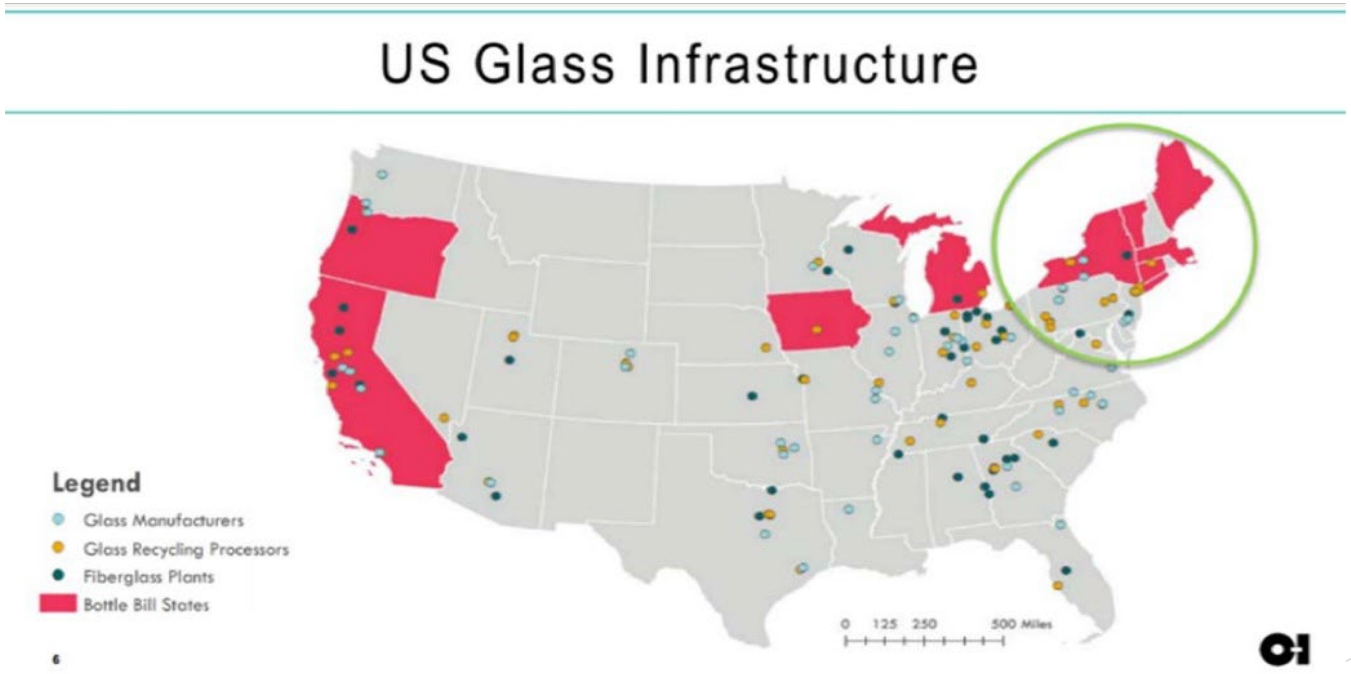


POZZOLAN[i]

- **Glass pozzolan and industrial filler made from 100% recycled post-consumer glass. It is a safer, sustainable and higher-performing material that dramatically reduces embodied CO_2 emissions in concrete.**

- file:///Users/suzannenoble/Desktop/Glass%20Recycling/Pozzolan%20Concrete%20%7C%20Glass%20Concrete%20%7C%20Pozzotive.webarchive

Where are the Glass Recycling Factories in the USA



Beyond the USA

European Union

- Double the glass recovery of the US
- Many countries with EPR or deposit programs, starting from 1989 – 2016
- European Landfill Directive laid the groundwork for recycling success

Canada

Every province has beverage container recycling

Producer responsibility in several noteworthy programs:

Ontario, Quebec, Manitoba, British Columbia (BC)

Thank you for your attention.
This concludes today's presentation

Community led efforts

Julie McCoy- 911 Glass Rescue
Suzanne Noble- Ellensburg Glass Recycling Cooperative
Ariahna Jones- Waste Loop

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Washington State University (WSU) Research

Dr. Haifang Wen– WSU Civil & Environmental Engineering

Washington RECYCLING DEVELOPMENT CENTER

Use of Crushed Glass in Asphalt Mixture

Dr. Haifang Wen, PE, Fellow of ASCE

Associate Professor and Director of
Washington Center for Asphalt Technology
Department of Civil and Environmental Engineering

Washington State University

May 3, 2023

Background

- Every year, about 10 million tons of waste glass is produced worldwide due to the consumption.

- Glass recycling can save energy and decrease environmental waste (Issa, 2016).

- Glass is recognized for its potential to modify asphalt due to its inorganic and non-metallic composition, making it an environmentally sustainable option (Issa, 2016).
  - 500 million tons of asphalt is produced each year

The world's leading glass industry website

Ohio Department of Transportation (Tao, 2017)

Background

- The crushed structure and angularity of glass cullet particles enhance the stiffness and frictional resistance of the asphalt mixture (Arabani, 2011).

- Incorporating glass particles in asphalt mixtures can contribute to reducing the carbon footprint of the construction industry and promoting the development of a more sustainable infrastructure.
  - 1/6 ton of carbon reduction for 1 ton of glass recycled

Ohio Department of Transportation (Tao, 2017)

Objectives

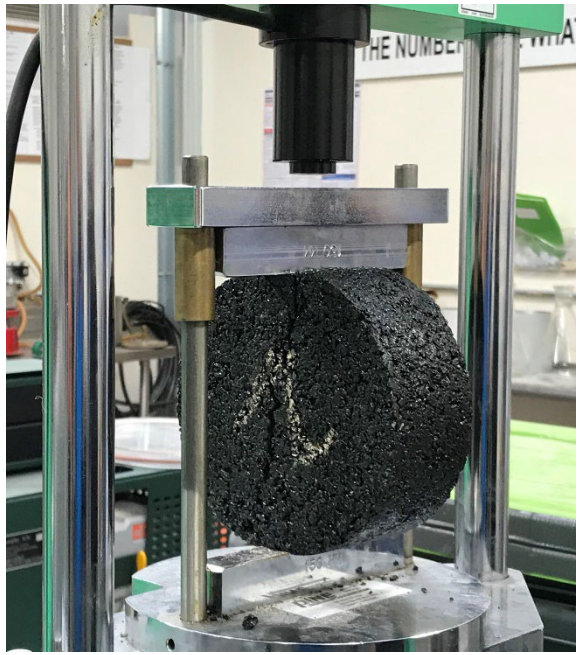
- This study proposes the utilization of glass particles as a substitute for aggregates in asphalt pavements.
- Glass cullet particles were used to replace fine aggregates particles sizes (#8-0) in the asphalt mix, at 5% of aggregate mix weight.
- The volumetric results, cracking and rutting results were collected at different glass dosages.

Methodology

- An asphalt mix previously designed in the laboratory with 4% air void and an asphalt content of 6.7% was used.
- The glass particles used were obtained based on the particle size gradation of #8 – 0.
- Depending on the glass dosage used, the fine particles of the virgin aggregate used in the asphalt mixture were replaced (i.e., 5%).

Methodology

- The mixing of the aggregates, binder and glass was carried out based on the standard mixing process, and following the mixing (170°C x 2hr) and compaction (157°C x 2hr.) temperatures based on the binder used (PG 64H-28) for volumetric samples.
- The performance samples requires conditioning of 3.5hr. at 135°C and 0.5 hr. at compaction temperature (157°C).



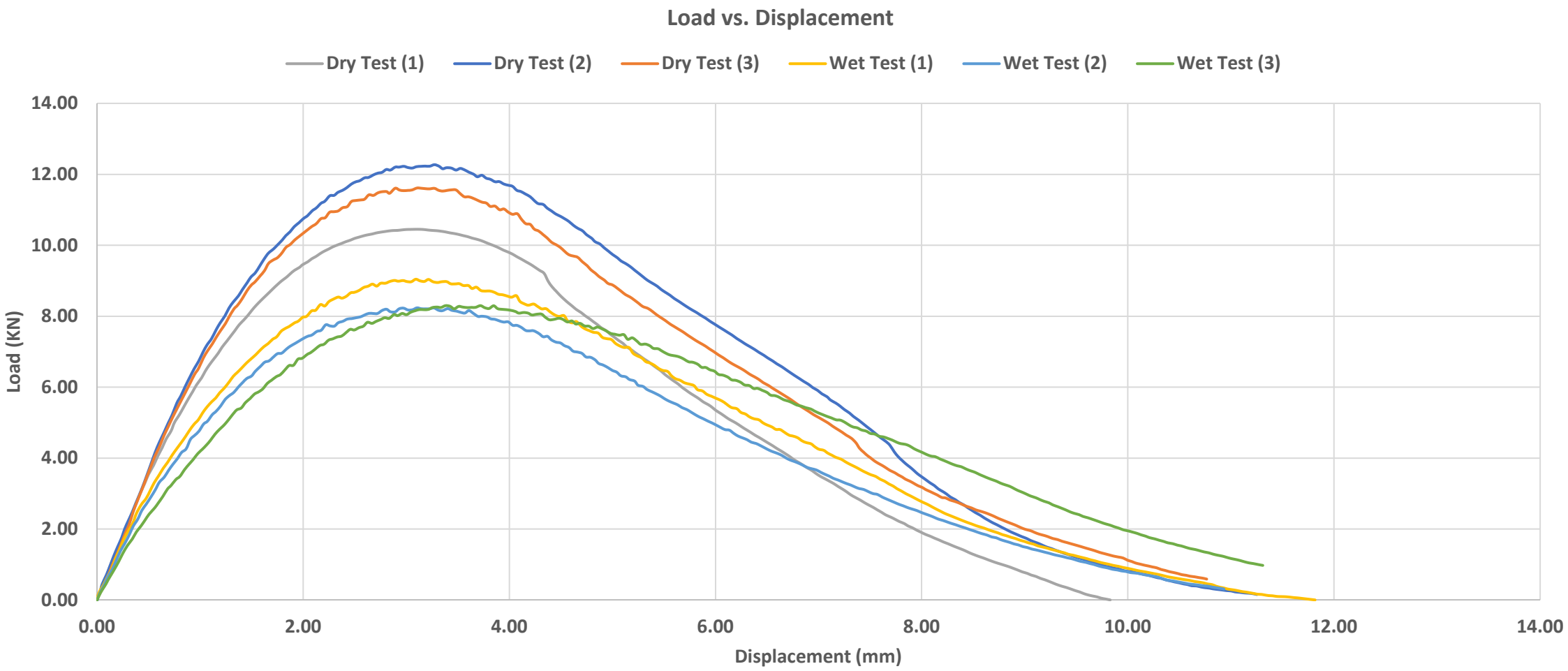
Preliminary Findings

Volumetric Results

Amount of added Glass	AC (%)	V_a (%)	VMA (%)	VFA (%)
0%	6.7	4.0	16.0	76.1
5%	6.7	4.3	16.5	74.4

- The use of glass slightly increased the VMA and air void
- Likely due to angularity of crushed glass
- Increased stability of the asphalt materials

Cracking Test Results



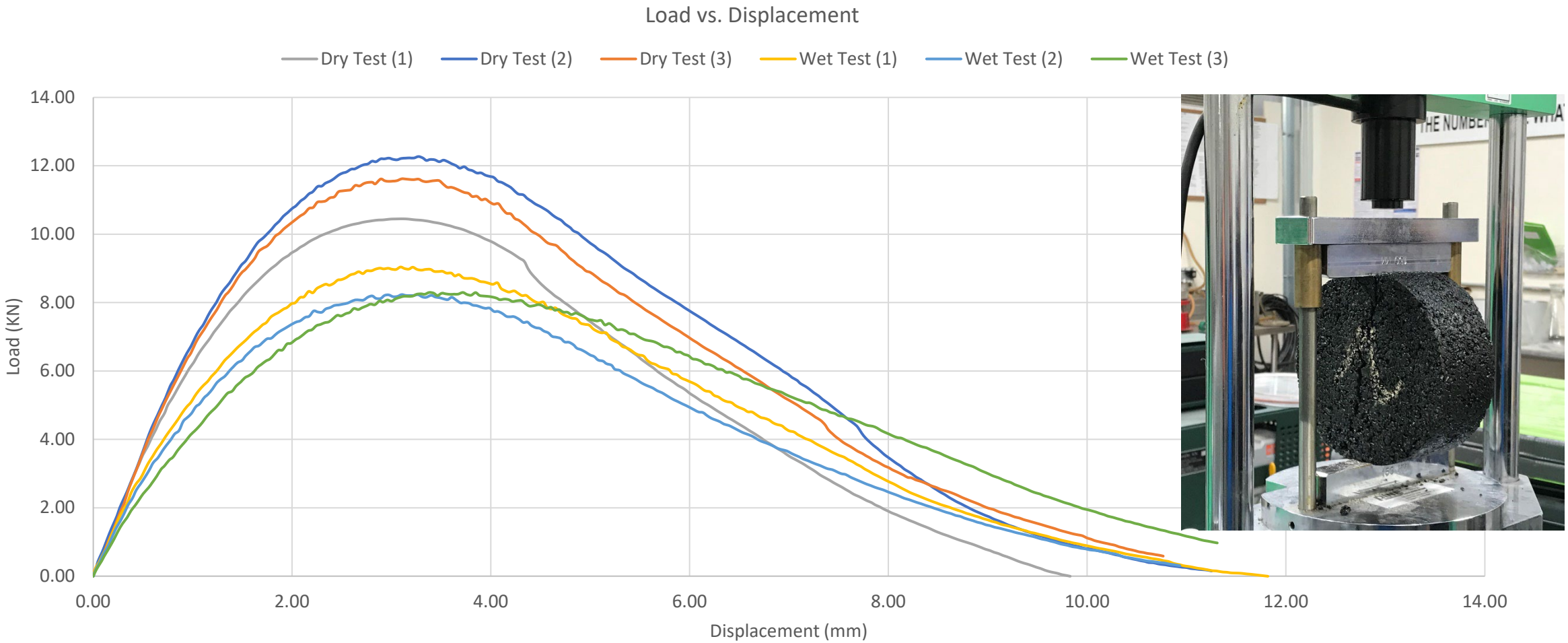
Cracking Test Results

Cracking Index	0%	5%
IDT Strength (psi)	100.1	74.5
CT-index	79.1	111.6
Rut Depth (mm)	4.6	1.3

- Increased cracking resistance due to addition of crushed glass
- Increased rutting resistance

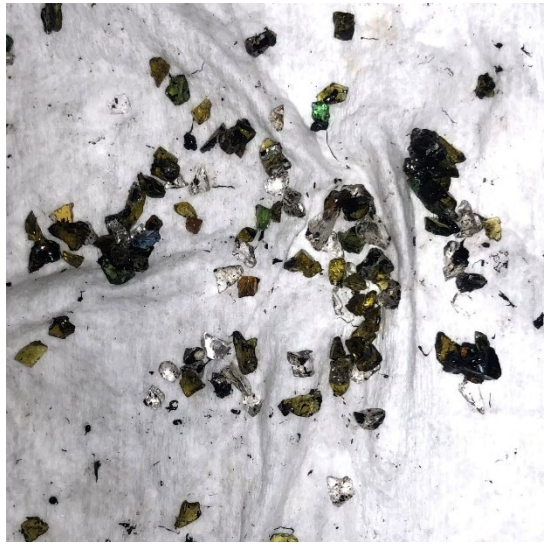
Moisture Damage at 5% Glass Added

❑ Retained strength after freeze-thaw conditioning: 74.5%, less than 80% required.



Stripping Test by Boiling Water Method (ASTM-D3625)

- Potential stripping of asphalt from glass, likely due to surface charge of glass
- Not captured by current WSDOT specification



Test Results after Adding Stripping Agent

	0% Glass Mix	5% Glass Mix	5% Glass Mix + Anti-stripping
IDT Strength (psi)	100.1	74.5	86.2
CT-index	79.1	111.6	85.6
Rut Depth (mm)	4.6	1.3	2.1

- Anti-stripping agent was added by 0.067% of mix
- Improve the adhesion between the asphalt binder and the aggregate, preventing moisture intrusion and reducing the stripping
- Increased retained strength from 74.5% to 86.2%, with a minimum of 80% being required.

Stripping Test by Boiling Water Method (ASTM-D3625) after adding anti-stripping agent

- No more stripping of asphalt after addition of anti-stripping agent

Hamburg Rutting Test after Adding Anti-stripping Agent

- Rutting performance remains excellent after anti-stripping agent was added.

	0% Glass Mix	5% Glass Mix	5% Glass Mix + Anti-stripping
Rut Depth (mm)	4.6	1.3	2.1

Summary

- There are a lot of room to recycle more glass for different applications
- Adding crushed fine glass to asphalt seems to be a good option due to large quantity needed
- The performance of asphalt materials with 5% glass is good in terms of cracking and rutting
- There is potential stripping that can be addressed by the anti-stripping agent
- Current WSDOT specifications do not detect the stripping issue and special provision is needed.

Questions?

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Be back at 1:00