

**Be back  
at 1:00**

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## AGENDA

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

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3:00 am – End markets glass to construction

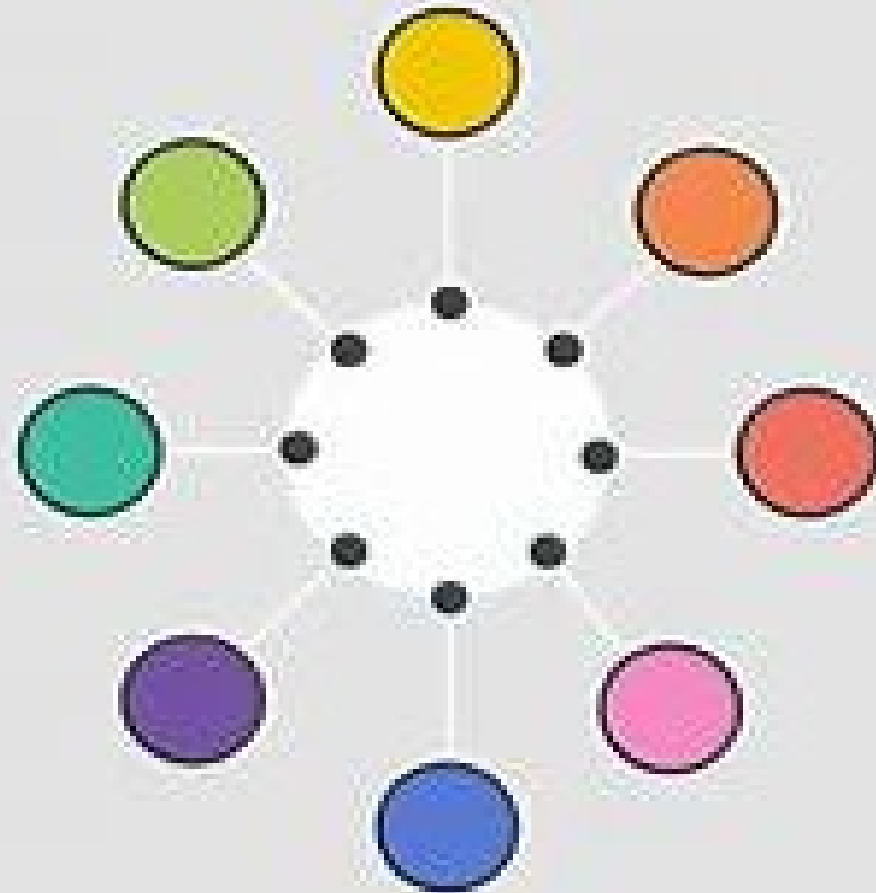
3:30 am – CLOSING



# Hub & Spoke

Chris Lueck – BIG Recyclers

Scott DeFife – Glass Packaging  
Institute





# GLASS AGGREGATION IN EASTERN WASHINGTON: B.I.G. RECYCLERS

*Presented by B.I.G. Recyclers &  
the Glass Packaging Institute (GPI)*

# OPPORTUNITY TO IMPROVE GLASS RECYCLING IN EASTERN WASHINGTON

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- Home to more than 600 wineries and craft beverage producers
- Opportunity to fill gaps in Washington's circular economy



# BIG Recyclers

25

Collaboration with 25 local wineries

USE

Glass bottles were repurposed, not recycled

GPI

Began looking for new solutions and national partnerships...





- Represents glass container manufacturing and recycling industry
- Working to fill glass recycling gap identified by the WA Recycling Market Dev Center
- Leverage local grassroots presence through national supply chain relationships



# THE STORY

- In 2022, GPI and B.I.G. Recyclers (then Ground 2 Ground) separately accepted into NextCycle
- NextCycle partnered the teams
- Began to strategize solutions for an under-served region of the state





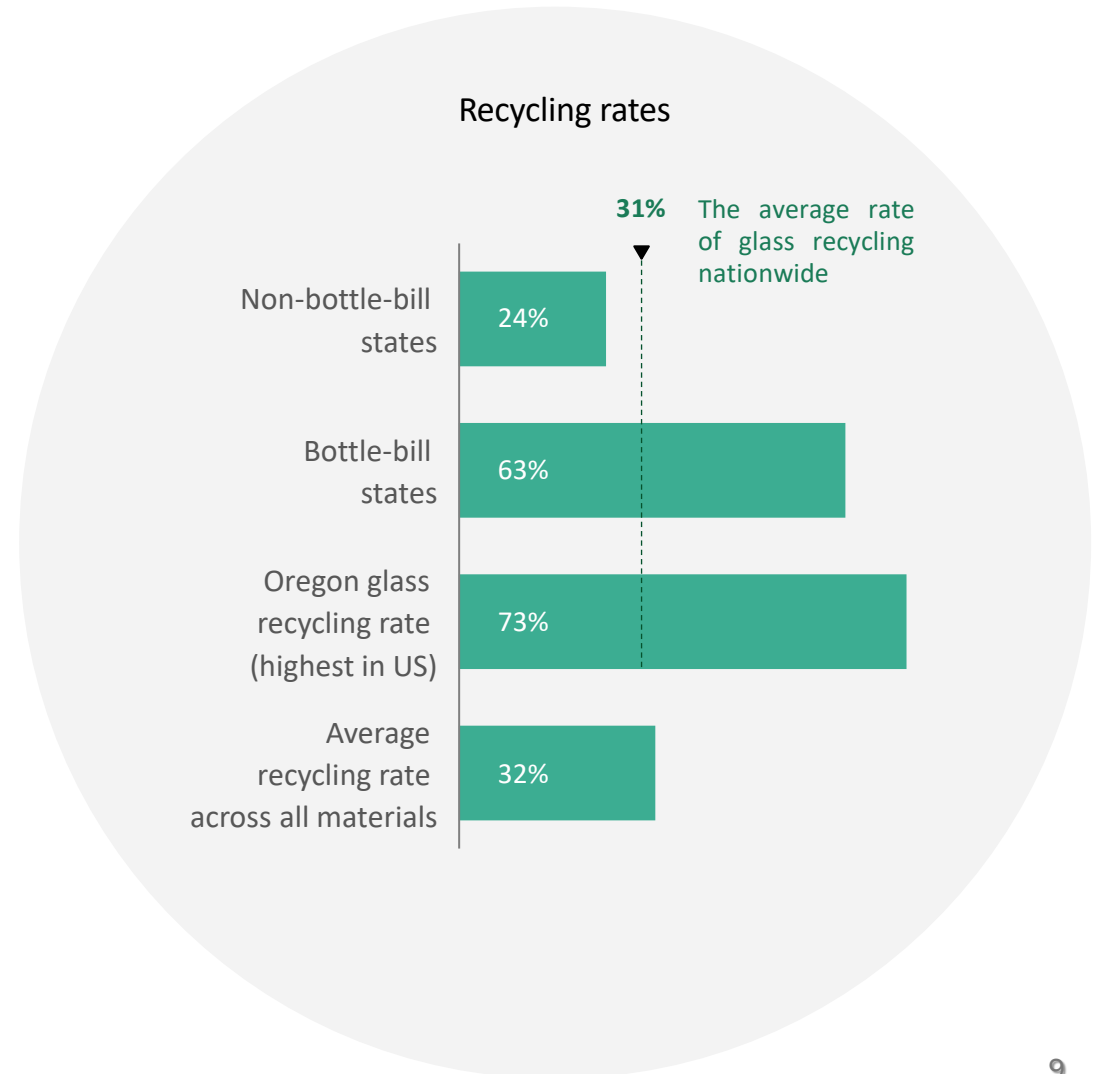
## WHY IS THIS IMPORTANT?

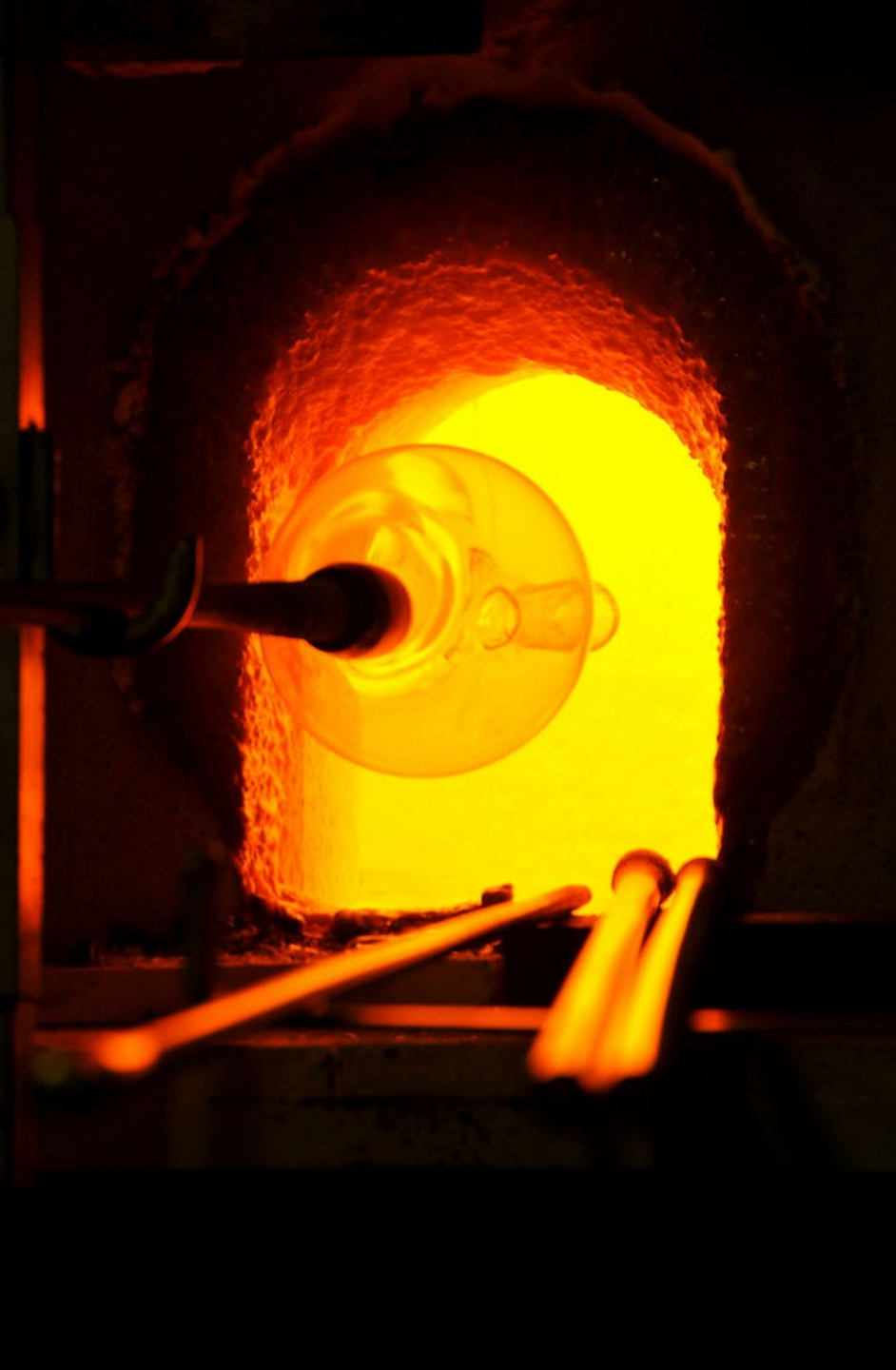
The glass container industry has set a **bold target of increasing the US recycling rate to 50%**

# 91%

of consumers want to recycle glass.  
Cities can't accomplish their zero-waste goals without it.

## The industry's goal is ambitious given the current status of glass recycling across the US





## BENEFITS

Eliminates glass from landfills

Preserves natural resources

Extends furnace life

Reuses material infinitely

Reduces energy and manufacturing costs

Maintains quality forever

Reduces carbon emissions



## ENVIRONMENTAL IMPACT

Recycled materials are  
much more  
environmentally friendly  
than virgin materials



Achieving a 50% glass  
recycling rate reduces  
greenhouse  
gas emissions by ~1.4M  
metric tons annually



The equivalent of  
taking ~300K  
cars off the road  
each year



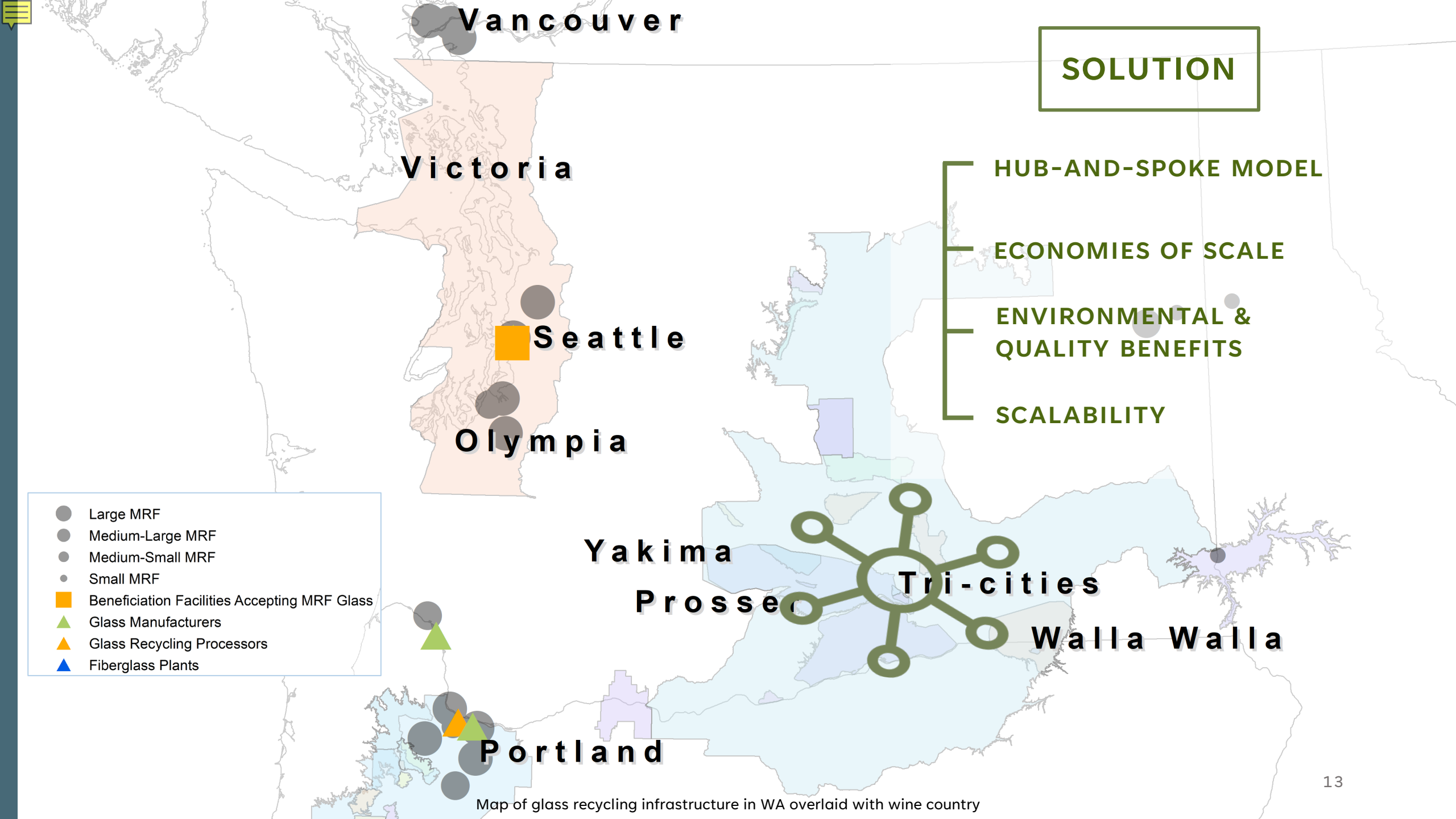
**LACK OF PROCESSING  
INFRASTRUCTURE**

**DISTANCE TO END USE MARKETS  
& DISAGGREGATION OF VOLUME**

**90K TONS NEEDLESSLY  
LANDFILLED**



**PROBLEM IN  
EASTERN WA**



**Vancouver**

**SOLUTION**

**Victoria**

- HUB-AND-SPOKE MODEL
- ECONOMIES OF SCALE
- ENVIRONMENTAL & QUALITY BENEFITS
- SCALABILITY

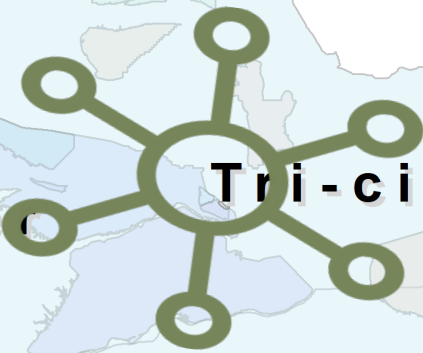
**Seattle**

**Olympia**

- Large MRF
- Medium-Large MRF
- Medium-Small MRF
- Small MRF
- Beneficiation Facilities Accepting MRF Glass
- ▲ Glass Manufacturers
- ▲ Glass Recycling Processors
- ▲ Fiberglass Plants

**Yakima**

**Prosser**



**Tri-cities**

**Walla Walla**

**Portland**

Map of glass recycling infrastructure in WA overlaid with wine country

# QUALITY MATTERS

Cleaner glass = higher  
value

## MRF GLASS



## DROP OFF GLASS

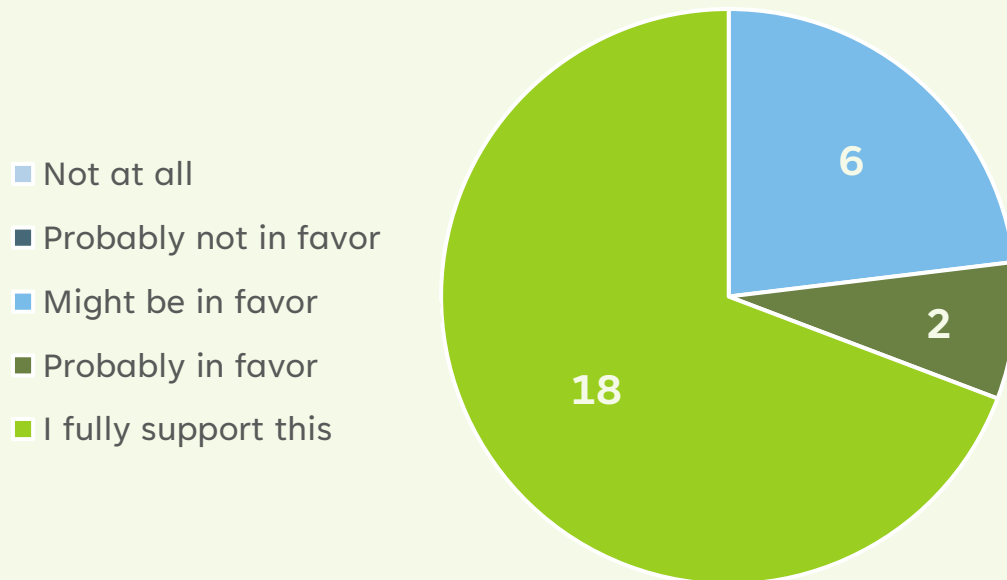


# WINERY RESPONSES

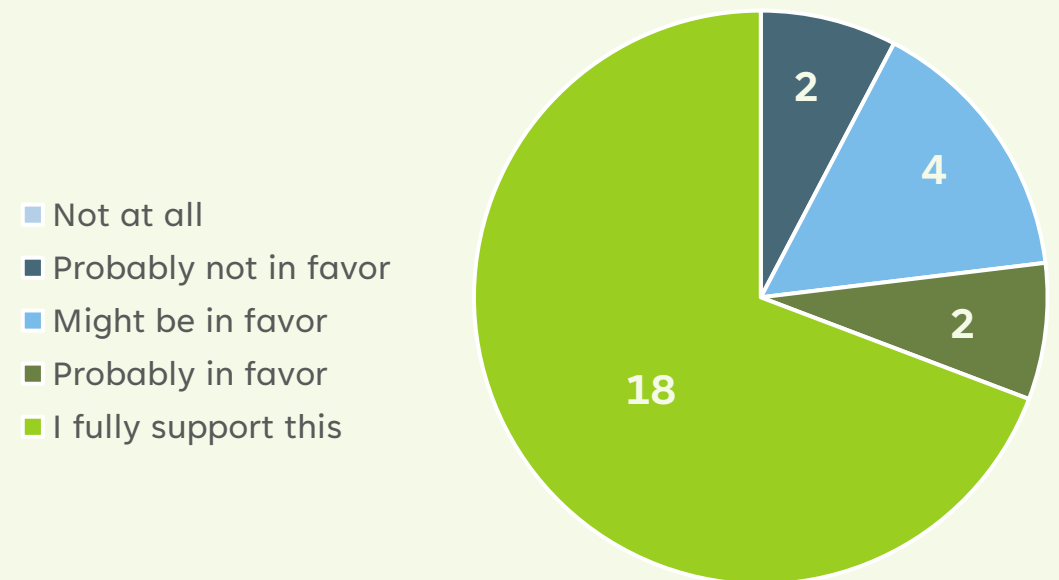
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- “Long overdue concept I am happy to support!”
- “We truly see this as a problem that we can help to solve.”

## DOES YOUR WINERY SUPPORT RECYCLING EMPTY GLASS WINE BOTTLES?



## WOULD YOU BE PREPARED TO DROP OFF CLEAN AND EMPTY WINE BOTTLES AT THE AIRPORT SPOKE?

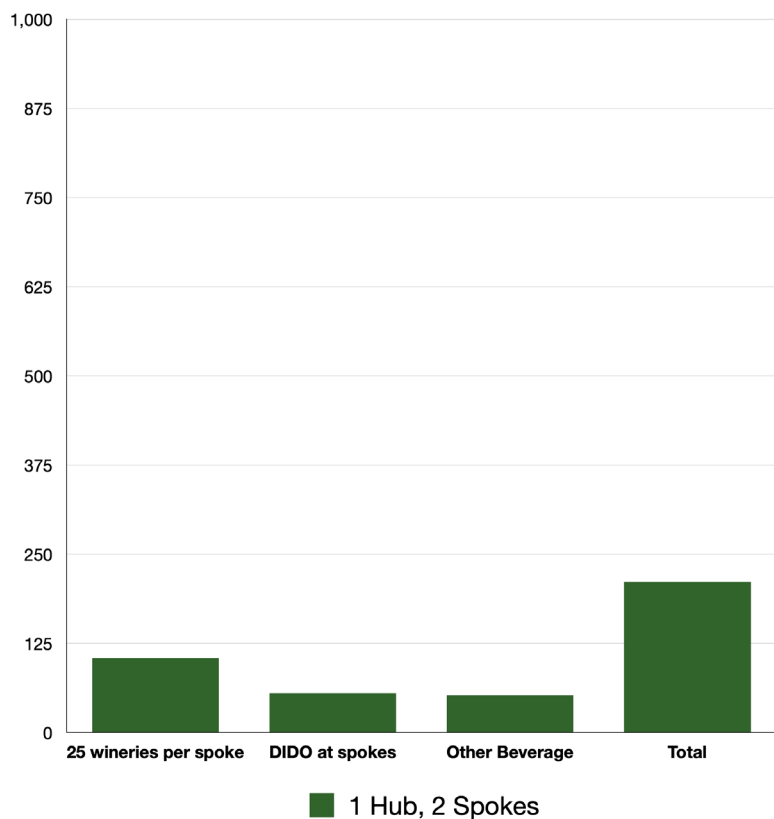




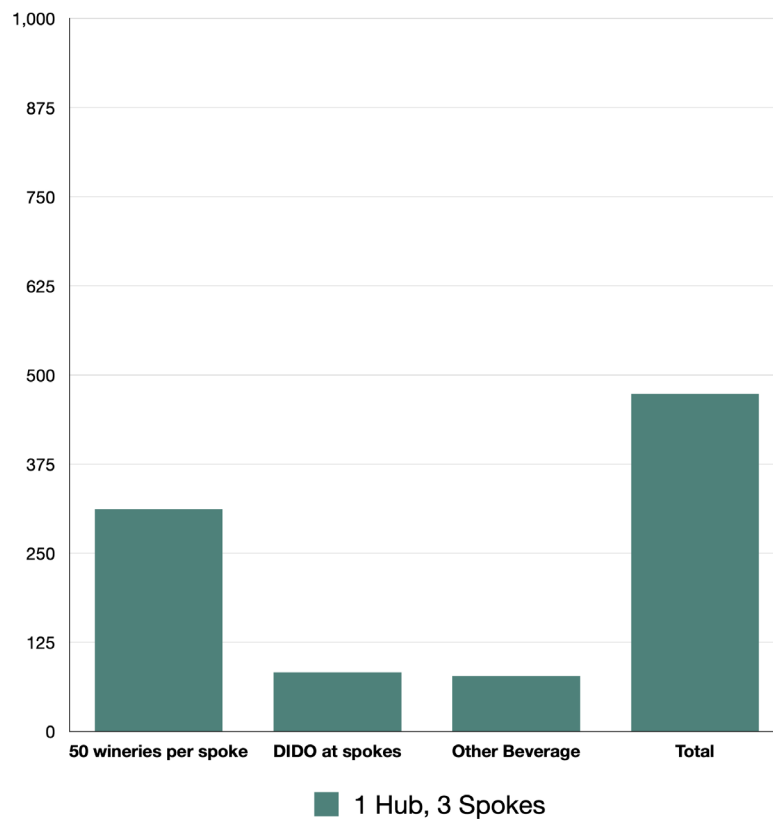
# ANNUAL TONNAGE PROJECTIONS

Diverted from Landfills  
and Recycled

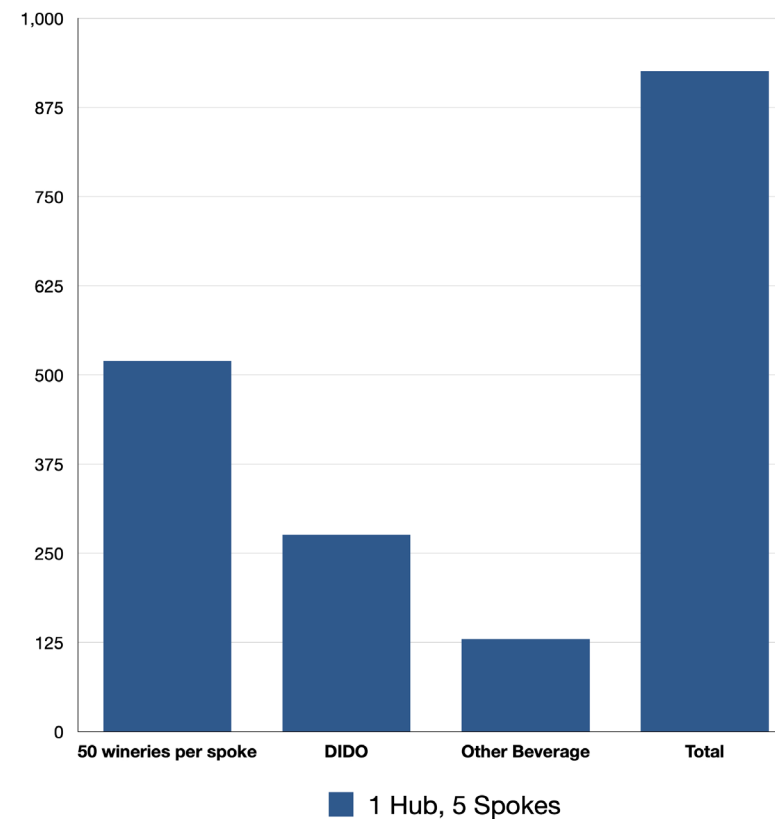
## Startup Projection



## 2-Year Projection



## 3-Year Projection





# NEEDS & NEXT STEPS FOR 2023 & BEYOND



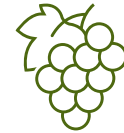
## FORMALIZE SITE AGREEMENT & TRANSPORTATION

- Formalize MOU for hub  
– Transfer station in BDI in Pasco
- Build out local spokes  
– Walla Walla and Red Mountain/Richland
- Match transportation method and collection equipment  
(opportunity for rail)



## LOCAL PARTNERS

- Identify future spoke locations – Benton City, Prosser, Yakima
- Promote program and encourage participation



## BEVERAGE INDUSTRY PARTNERS

- Build membership
- Collect glass
- Public recognition



## SUSTAINABLE FUNDING MODEL

- Create co-operative and finalize members fees
- Grants and/or pilot support to secure equipment



**Scott DeFife**

President

Glass Packaging Institute

[sdefife@gpi.org](mailto:sdefife@gpi.org)



**Chris Lueck**

Chairman

B.I.G. Recyclers

[vtwineguy@gmail.com](mailto:vtwineguy@gmail.com)

**THANK YOU**



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# Let's take a 10 minute break



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# End Markets for Glass-to-Glass Recycling

Laura Hennemann – Strategic Materials (SMI)

Robert Hippert – O-I Glass

Alex Winters – Ardagh Group





# End Markets for Glass-to-Glass Recycling

Laura Hennemann – Strategic Materials (SMI)

Robert Hippert – O-I Glass

Alex Winters – Ardagh Group





EASTERN WASHINGTON GLASS SUMMIT  
PANEL – OI GLASS

MAY 2023





## OUR GLOBAL LOCATIONS



**69**  
**PLANTS**

**19**  
**COUNTRIES**

**~24,000**  
**EMPLOYEES**

*Numbers do not include O-I joint ventures.*

# O-I SUSTAINABILITY GOALS



**50%  
TARGET**

Increase recycled content to 50% average by 2030. O-I is taking a tailored approach to increase recycled content rates across its enterprise network as rates vary significantly by geography.



**ZERO  
WASTE**

Reduce the amount of natural resource used and reduce the generation of waste by reuse and recycling as we drive towards a Zero Waste organization.



**25%  
WATER REDUCTION**

We are committed to reducing our global water usage 25% by 2030, prioritizing operations in higher risk areas.



**ZERO  
INJURIES**

As part of our journey toward zero injuries, we are committed to a 50% improvement of our Total Recordable Incident Rate (TRIR) by 2030.



**40%  
RENEWABLE**

Renewable energy is a pillar in our strategy to lower carbon emissions. Our goal is to reach 40% renewable energy use by 2030 and to reduce total energy consumption by 9%.



**R&D  
TRANSFORMATION**

Reinvent and re-imagine glassmaking – where the circularity of glass meets the potential of our MAGMA melting technology, low-carbon alternative fuels, and light-weighted glass packaging.



**25%  
GHG REDUCTION**

Approved SBTi target to reduce GHG emissions 25% by 2030 (interim target of 10% by 2025).



**SOCIAL  
IMPACT**

We see tremendous opportunity to positively impact the planet and communities where we operate. We will collaborate with customers, NGOs, suppliers and local leaders to make glass recycling available in 100% of our locations.



**DIVERSITY  
& INCLUSION**

Create a diverse and inclusive environment where people feel welcomed to create a better future for themselves, each other, and O-I. We are focused on increasing all aspects of diversity across our team.



**SUPPLY CHAIN  
SUSTAINABILITY**

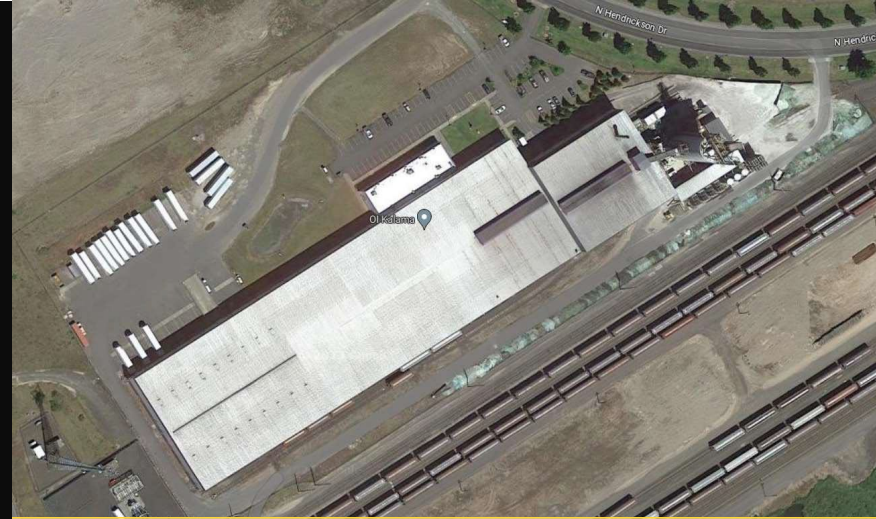
Achieve sustainability balance, together, by aligning our supply chain with our 2030 sustainability vision and goals.



# O-I KALAMA

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- Opened in 2012
  - 1 furnace with 2 manufacturing lines
  - ~90 Employees
  - Primarily services the wine market
  - Typically produces flint or tinted flint
  - Used about 30,000 tons of cullet in 2022
  - **WE WANT MORE CULLET!**
- 





Questions?



# End Markets for Glass-to-Glass Recycling

Laura Hennemann – Strategic Materials (SMI)

Robert Hippert – O-I Glass

Alex Winters – Ardagh Group



# Ardagh Glass Packaging

## *Eastern Washington Glass Summit*

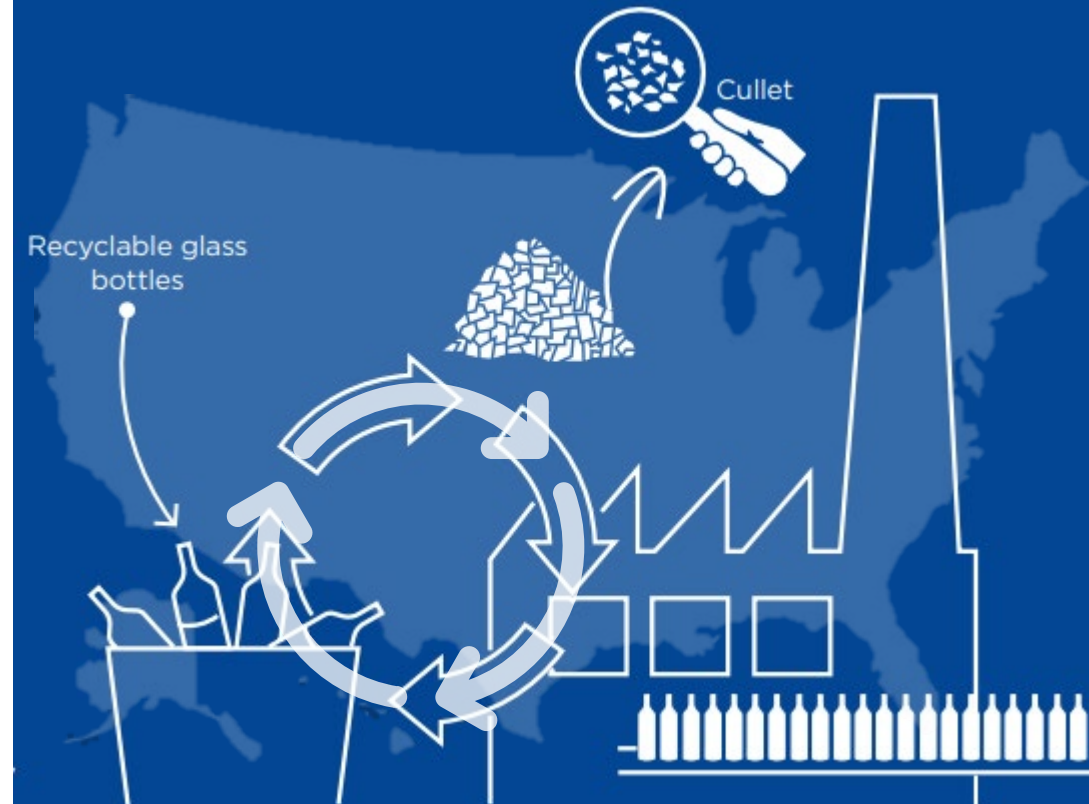
# Ardagh Glass Packaging

## Eastern Washington Glass Summit

INTRO TO ARDAGH & SUSTAINABILITY

SCOPE EMISSIONS

BENEFITS OF CULLET



# Our business



\$10bn group revenue\*



65 production facilities



21,000+ employees globally

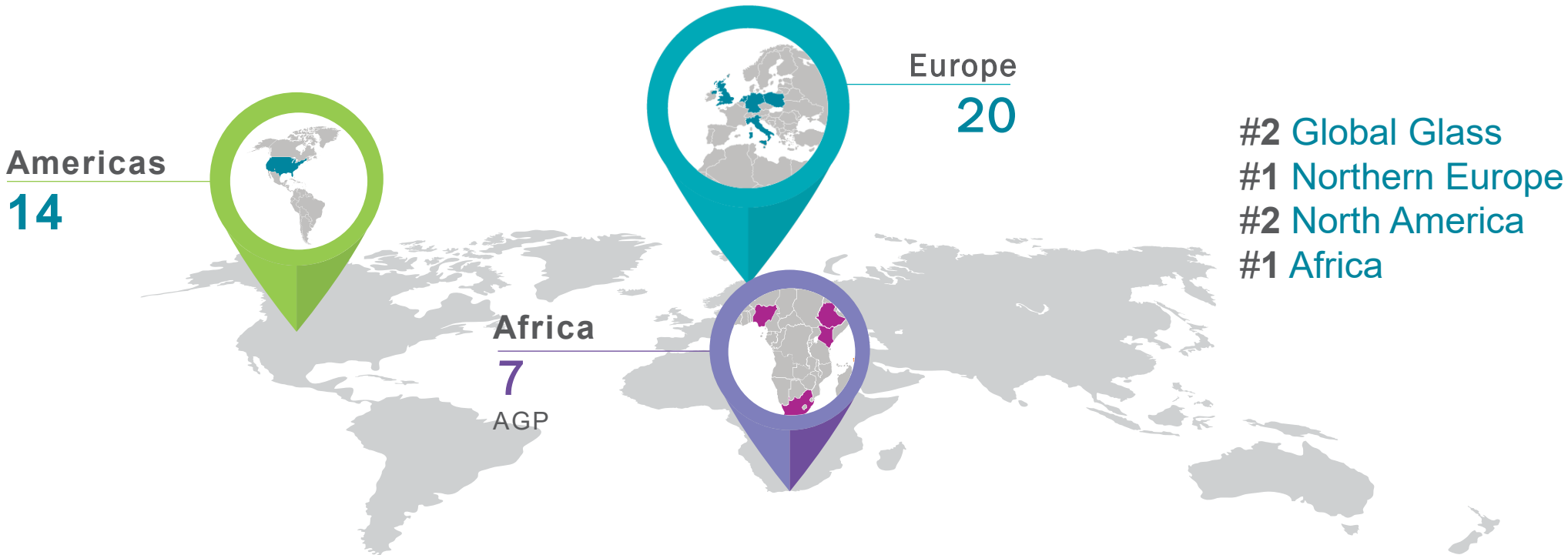


Manufacturing in 16 countries

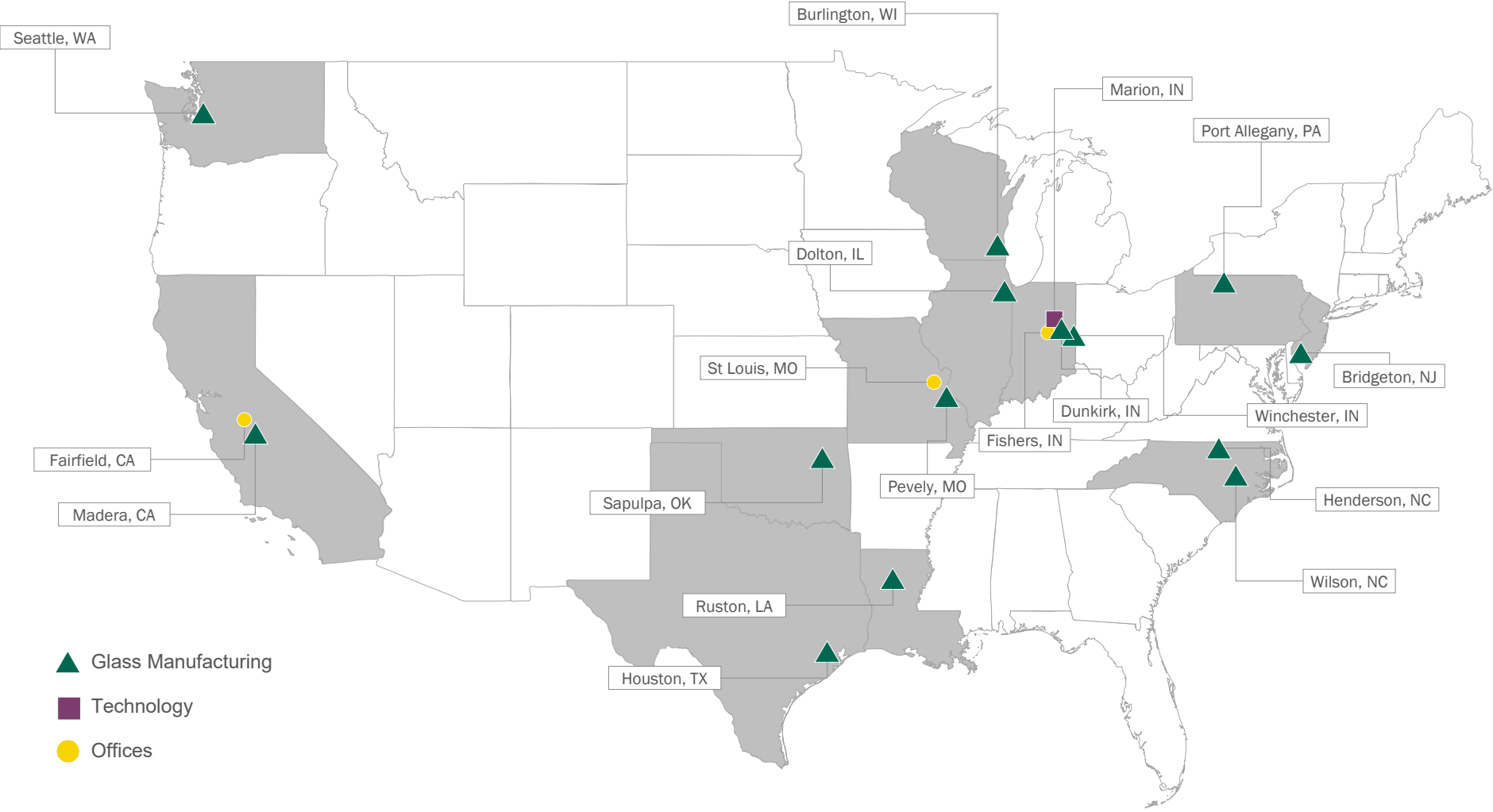
\*Annualized run rate, including Consol acquisition



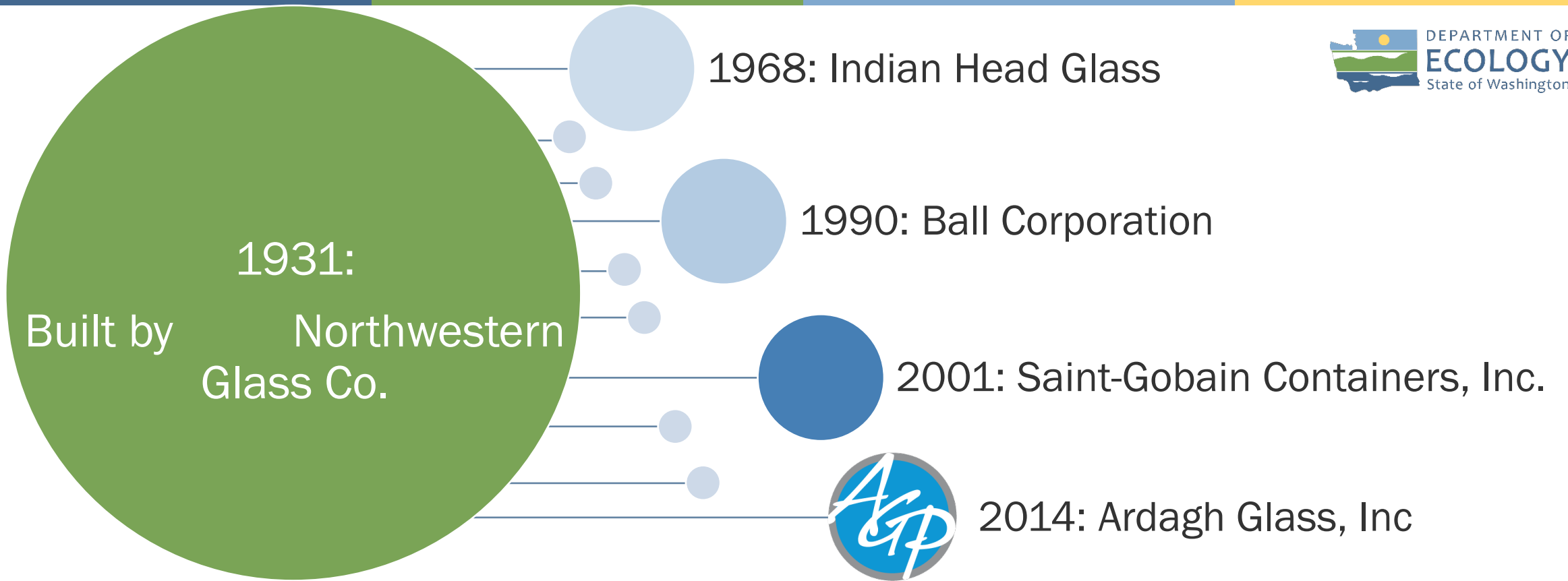
# Ardagh Glass Packaging footprint



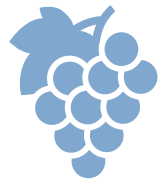
# Ardagh Glass Packaging Footprint



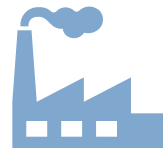
14  
Glass



~330  
employees



Glass for wine  
& food



3 glass  
furnaces



7 days/week;  
365 days/year



~700k  
containers per  
day



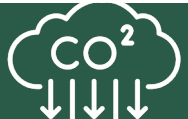
“

Our aim is to minimize any environmental impact of our business while remaining economically sustainable and socially responsible.

”

## EMISSIONS AND ECOLOGY

## SOCIAL



### Minimize our GHG emissions



### Minimize our ecological impact



### Our people & our communities

- Align with Science-Based Target Initiative
- Achieve 100% renewable electricity
- Implement energy efficiency projects
- Increase recycled content
- Innovate in product design
- Source sustainably
- Partner on low carbon transport
- Minimize NOx emissions

- Achieve excellence in water management
- Promote zero waste to landfill across all plants
- Support increased recycling and use of recycled content
- Promote circularity narratives on use of infinitely recyclable glass

**Our People:**

- Diversity & Inclusion
- Increase engagement levels
- Recognition

**Our Communities:**

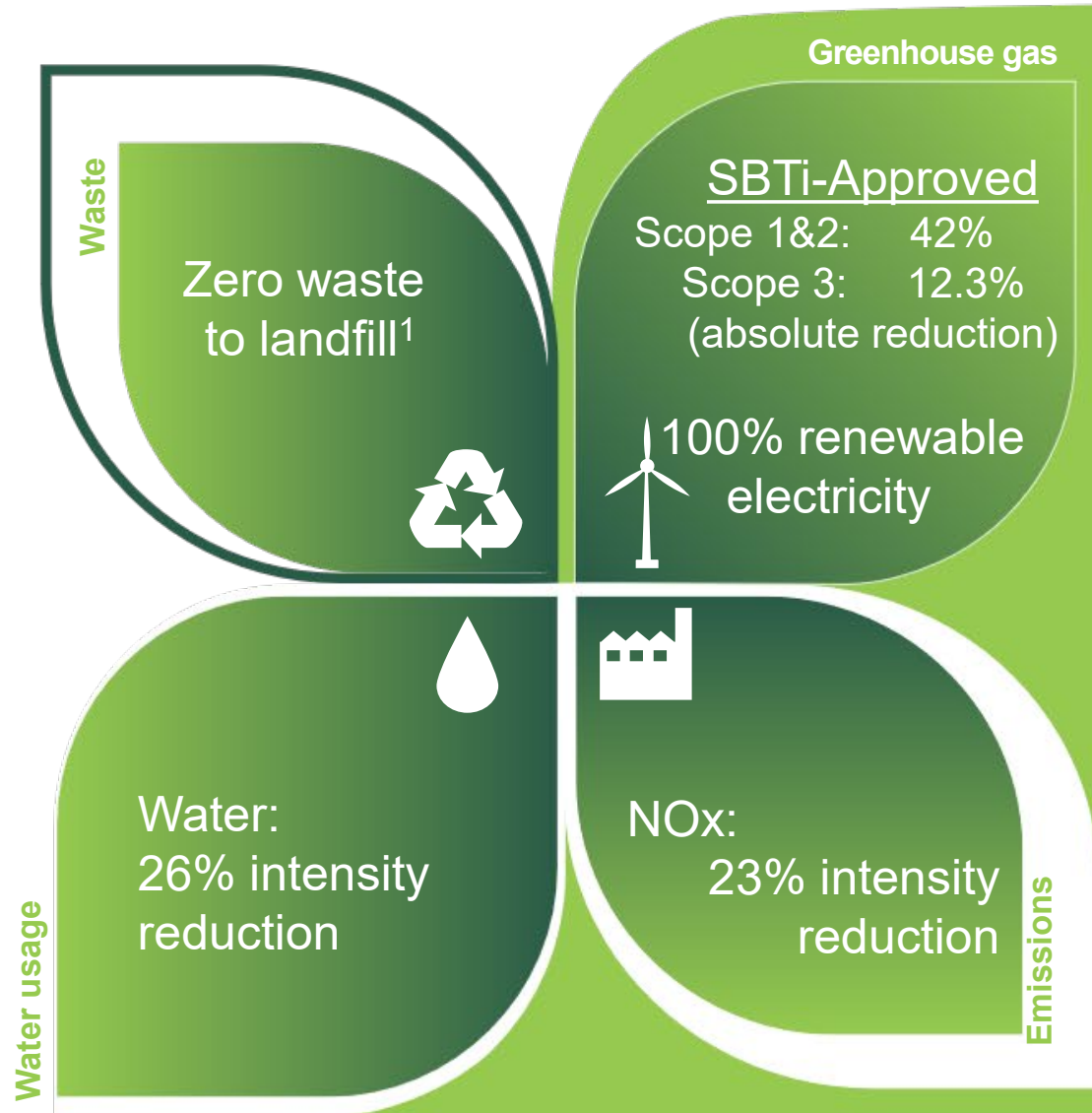
- Engage proactively with our local communities
- Accelerate our investment in Ardagh for Education

### Our sustainability filter

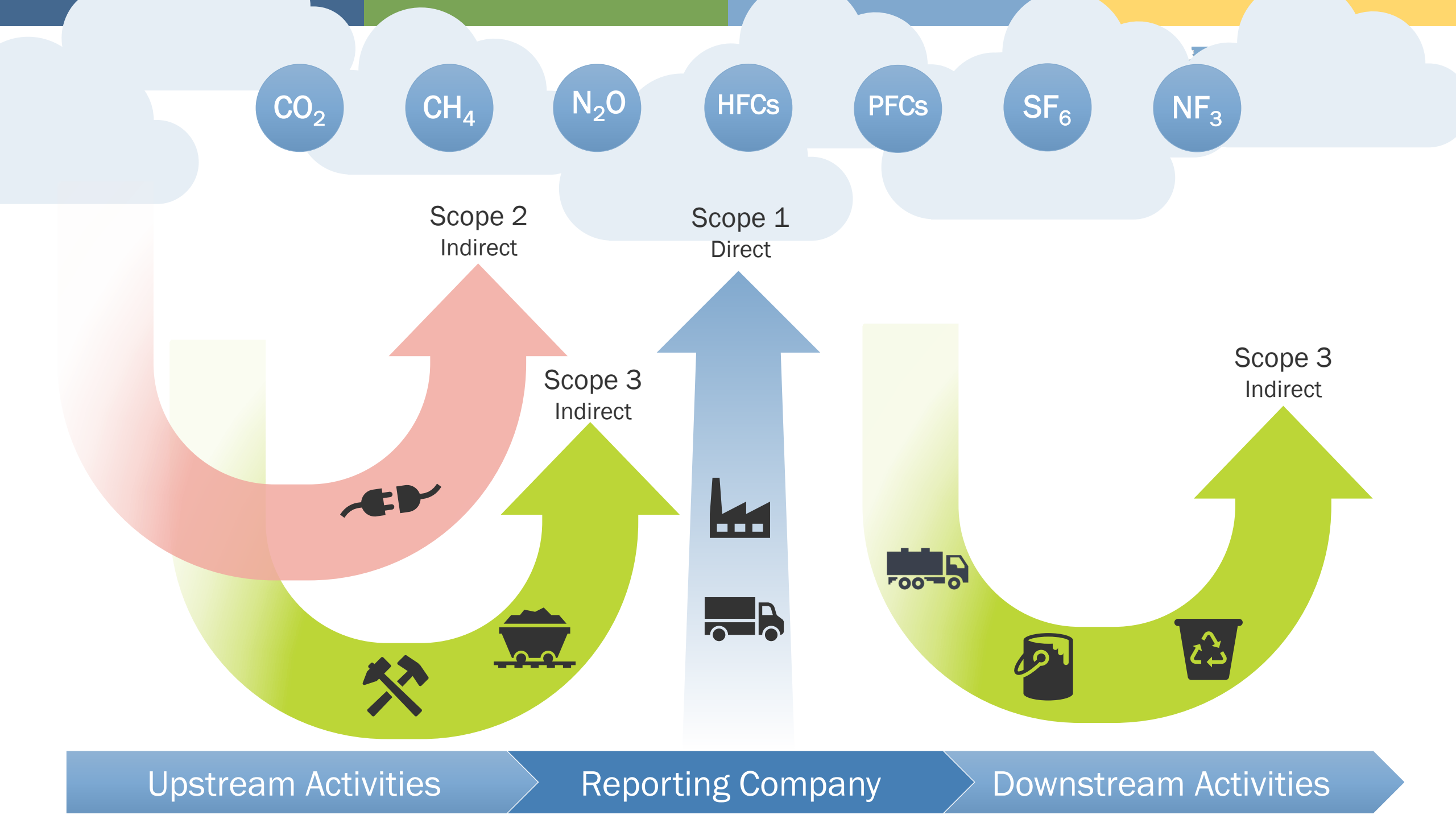
Sustainability only has a sustainable impact if it is economically viable both long and short term

# 2030 targets

2020 baseline year



<sup>1</sup>Zero waste to landfill for operational waste streams where allowable by regulation





Cullet



New technologies



Energy efficiency



Renewable electricity



Product design



Low-carbon transport





# Cullet

## Scope 1 & 2

2-3% energy savings per 10% of cullet

## Scope 3

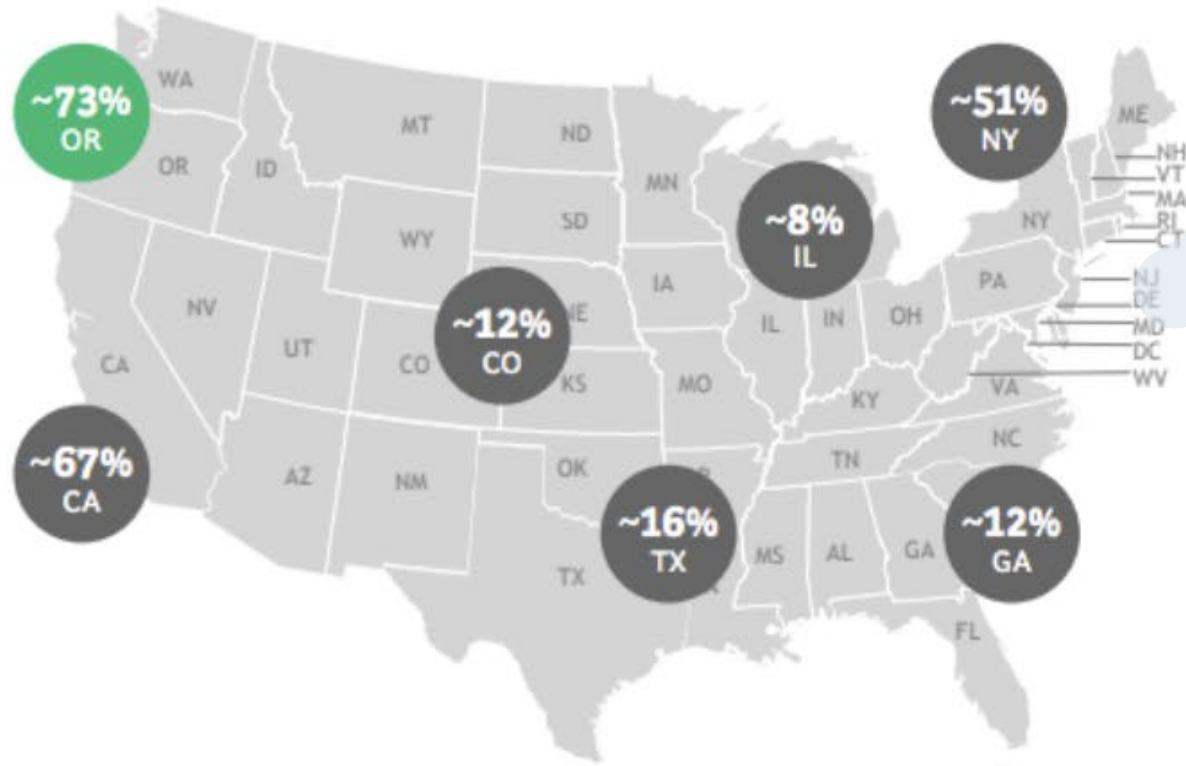
Reduce need for virgin raw materials

Reduced waste to landfills

Fragmented approach across the US

Infinitely recyclable without loss of quality

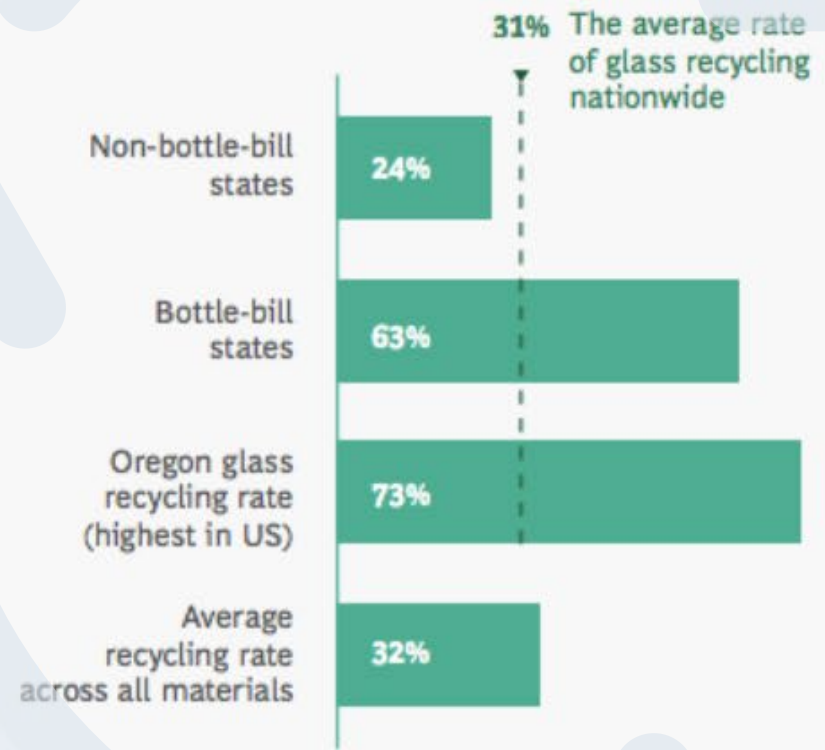
# The industry's goal is ambitious given the current status of glass recycling across the US



● Highest current glass recycling rate

● Representative glass-recycling rates in high-population states

## Recycling rates





- Europe glass cullet
- North America glass cullet
- Virgin material





Collection through community partnership

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Volume through glass circularity

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Quality through clean collection



An aerial photograph of a dense, lush green forest. The trees are tightly packed, creating a textured canopy of various shades of green. The lighting is even, highlighting the intricate patterns of the foliage.

**Thank you**

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# End Markets for Glass to construction

Alan Rogers – Aero Aggregates



# Recycled Glass to Resilient Infrastructure

Archie Filshill, Ph.D. ENV SP



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HIGHLY FRICTIONAL • NON-LEACHING • ROT-RESISTANT • NON-FLAMMABLE • DURABLE • SAFE

---

made in the USA from recycled container glass



# UL-FGA<sup>®</sup>

**Ultra-Lightweight**

**Good Insulator**

**High Friction  
Angle**

**Seismic Designs**



**Frost Resistant**

**Capillary Break**

**Free-Draining**

**Load-Bearing**

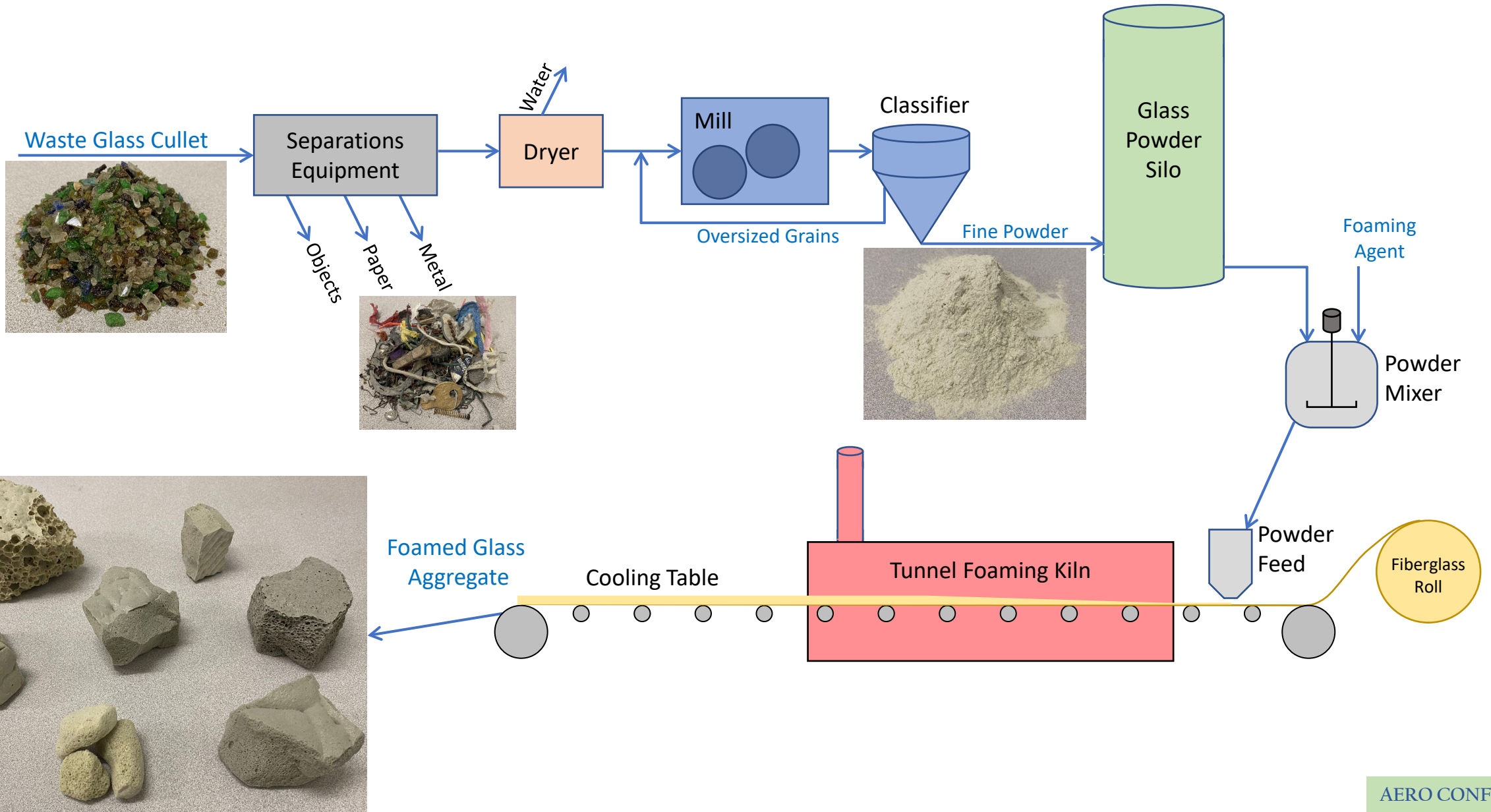
A person's hands are shown holding a small amount of dark, granular material over a conveyor belt. The background is a blue-tinted industrial setting with various machinery and structures.

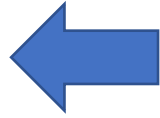
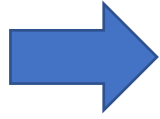
# 1

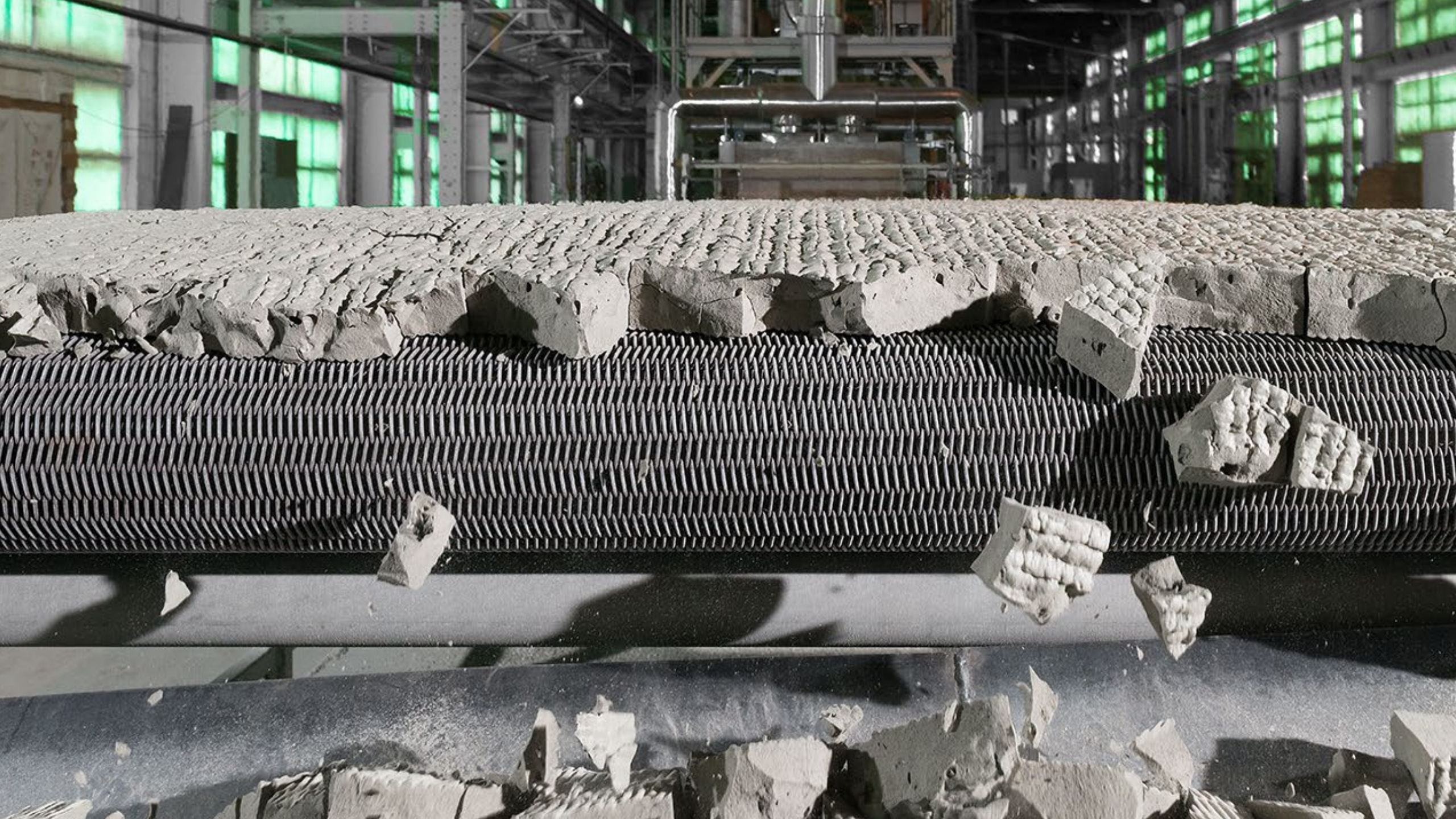
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**100% Curbside Glass  
Powder Mixed With  
Foaming Agent**

# Foamed Glass Aggregate (FGA) Manufacturing Process









# Shipping

- Up to 100 CY/trailer
- Reduced carbon footprint
  - 1 trailer of Foamed Glass
  - 7 tri-axial loads of stone
- Delivery in Super Sacks
  - 3 CY: 1,200 lbs vs. 8,000 lbs



A construction site background featuring a semi-truck on the left, heavy machinery in the center, and a large pile of gravel in the foreground. A dark blue diagonal overlay covers the right side of the image.

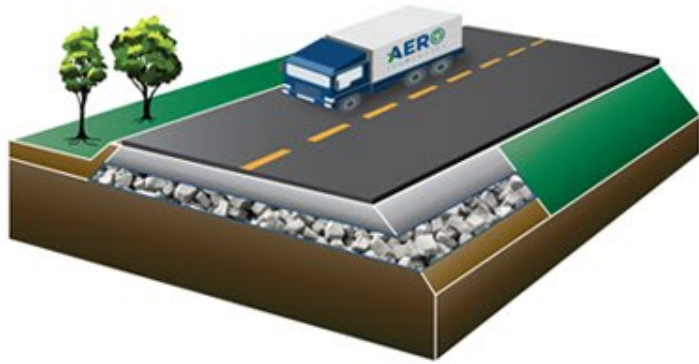
# UL-FGA<sup>®</sup> Applications

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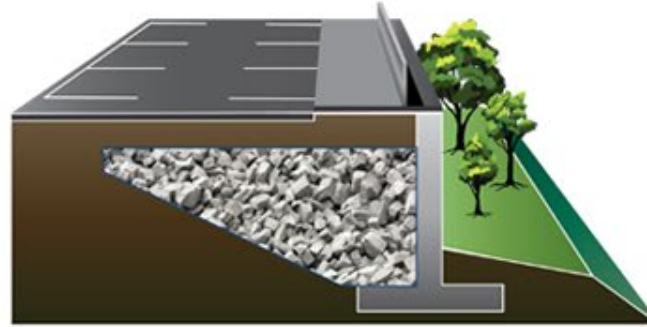
## INFRASTRUCTURE



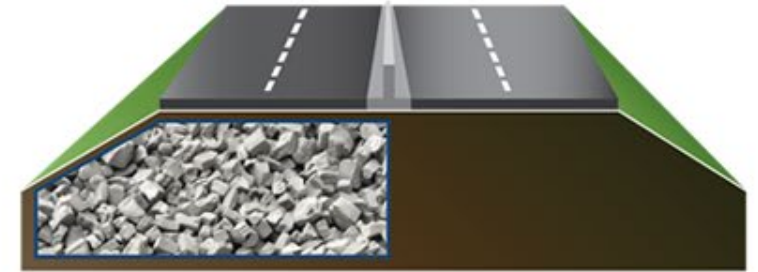
# INFRASTRUCTURE APPLICATIONS



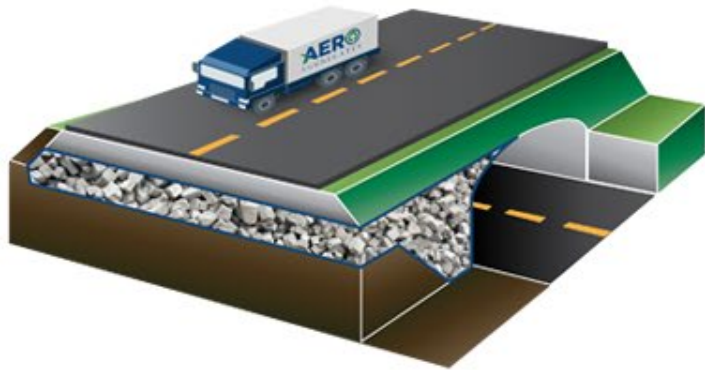
**Embankments**



**Retaining Walls &  
Bridge Abutments**



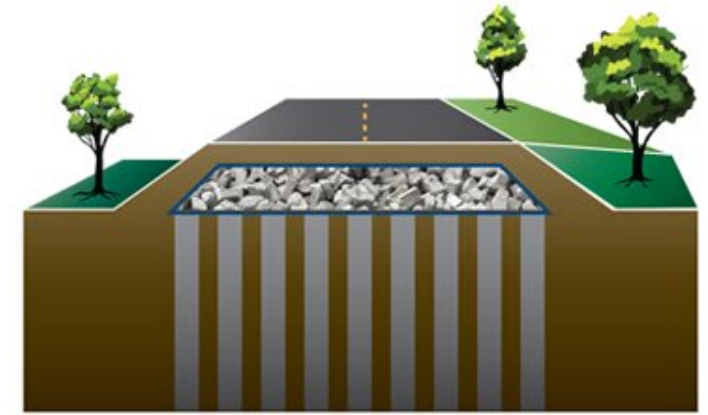
**Roadway Widening**



**Tunnels & Culverts**

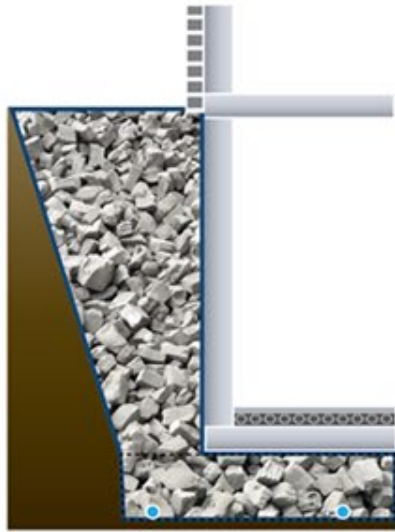


**Utilities**

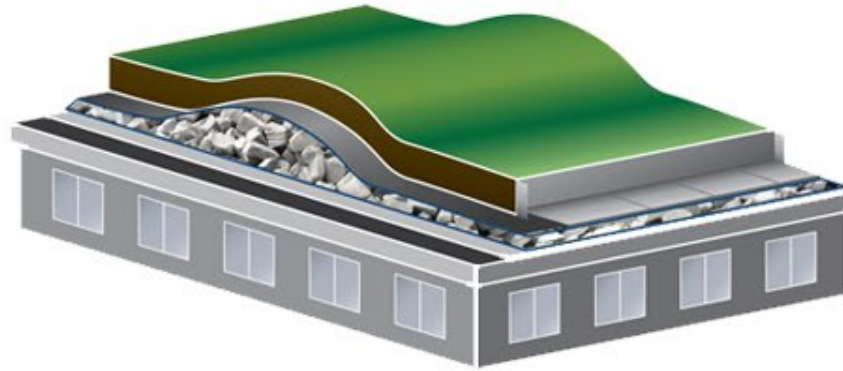


**Load Distribution**

# COMMERCIAL CONSTRUCTION



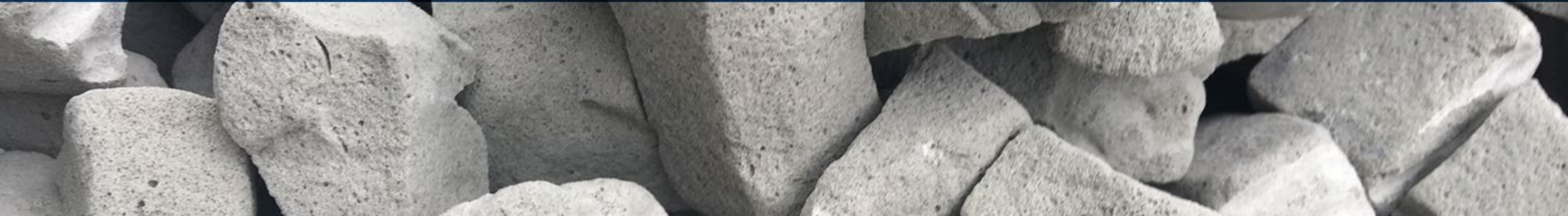
**Foundation  
Walls & Slabs**



**Greenroofs**



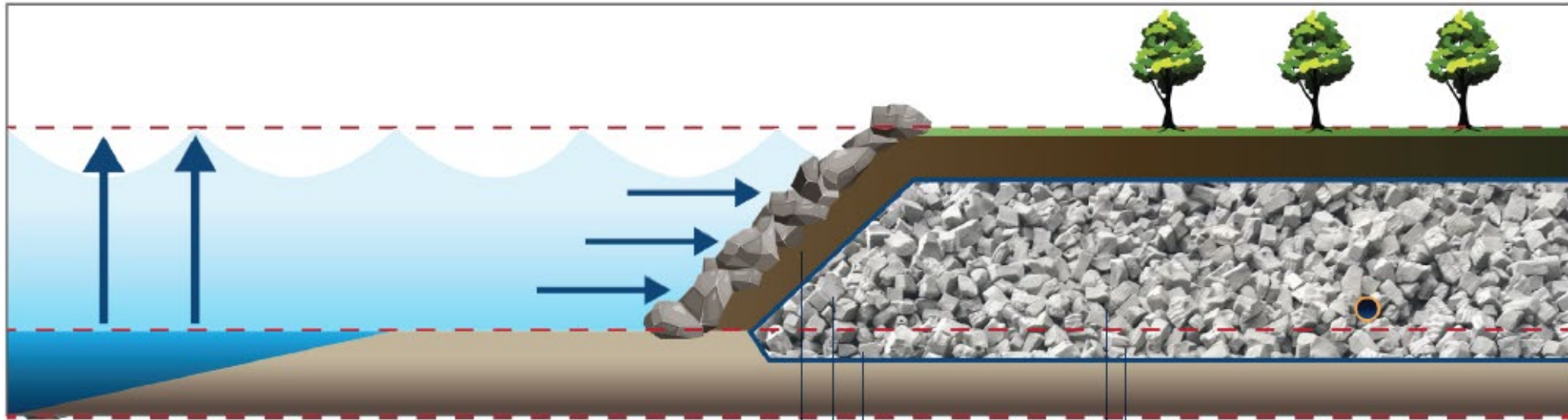
**Plaza Decks**





# Sea Levels & Severe Weather

# Application Areas - Resiliency



## UL-FGA BENEFITS

- Quick & easy to install
- Ultra-lightweight
- Frost proof
- Stability
- Excellent drainage properties
- Not weather sensitive

**STABILITY**  
Designs up to 45°  
without additional  
reinforcement

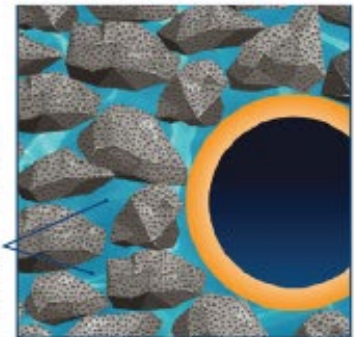
**ULTRA-LIGHTWEIGHT**  
80% lighter than gravel.  
No foundation required

**LOAD CARRYING CAPACITY**  
Can be used for all load classes



**RODENT RESISTANT**  
Resists burrowing  
animals and insects

**STORMWATER STORAGE**  
40% void space for additional  
stormwater storage  
and promotes infiltration



# Harbor Isle, Hempstead NY



# AvalonBay, Long Island, NY



# Featured Projects



Route 6/10 Interchange  
Reconstruction, Providence, RI



## A LIGHTER CHOICE

Rhode Island DOT is partnering with FHWA on the Route 6/10 Interchange project, the largest design-build in the state's history. In addition to bridge work, planners are employing an ultraflight foamed glass aggregate on this project, which is 100% post-consumer, reducing landfill and providing a cost savings of \$3 million. Photo: RIDOT.

### SUBMIT YOUR PHOTOS

Send to Brian W. Budzynski at [bbudzynski@cg.com](mailto:bbudzynski@cg.com). All photos must be current (taken within 1-2 weeks of the time of submission). Please refrain from contacting us if you see any safety violations.

For the latest news, go to [www.roadbridges.com](http://www.roadbridges.com)



# Boston, Logan Airport



# Philadelphia International Airport Fuel Tank Control Building



RCA Pier, Camden, NJ



**RCA Pier and Hilton Garden Inn, Camden, NJ**



Route 7 Wittpenn Bridge  
Kearny, NJ



**I-80 Bridges over Rockaway River, Denville, NJ**



**I-80 Bridges over Rockaway River, Denville, NJ**





# Shirley Chisholm State Park - "Skybowl"

Brooklyn, NY



# Shirley Chisholm State Park - "Skybowl"

Brooklyn, NY



# Foamed Glass Aggregate: An Engineered, Sustainable Construction Material



- Ultra Lightweight Fill
- Predictable Material Behavior
  - High Friction Angle
  - Chemically Non-reactive
  - UV stable
  - Volume Stable
  - Durable/ Freeze-Thaw tested
- 100% Recycled Glass
  - Post-Consumer
- Lower Carbon Footprint
  - Lower Total Energy
- Fewer trucks required for delivery
- Accelerated Construction:
- Less equipment and time for installation
- Not weather sensitive
- Ideal for seismic designs
- Non reactive and durable



# Wrap up

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## Things to remember

- Fill out the post summit survey, coming via email later this week.
- Slide deck will be posted to the EZ page next week.
- Stay tuned for summer meeting focused on glass packaging reuse and recycling.



# Thank you all for coming!

Planning Committee: Kara, Tina, Caleb, Michelle Mulrony, Kirk Esmond, April Sheeley, Scott DeFife, Rory Wintersteen, and Deb and Mary from 501 Consulting and Dan Weston.  
Thank you!

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