



Note the discussion on Glass by the Recycling Development Center (Center) advisory board. Provide links to the notes and slides from those three meetings (June 2021 and ??) are available at the advisory board [website](#). Note that this is focused on recycling of Glass Bottles – not on plate glass, windshield glass, etc

This document provides:

- Center recommendations and goals
- A synopsis of the current glass market
- A summary of available glass data

Recommendations and Goals

The purpose of this report on glass recycling is to summarize information and challenges in the current market, and identify where the Center could take actions or support actions by others. The following recommendations and goals for glass recycling were established by the Center advisory board.

Center recommendations:

- Provide a summary of the recommendations.

Center glass market goals:

- Provide a summary of the goals.

Current system and challenges

The following provides a summary of the glass recycling market in Washington using available information and data.

Summary of the current system

Describe types of glass containers

Where is glass collected in the curbside system – use the ZWW survey:

[Publications - Zero Waste Washington](#)

Data on how many tons of glass collected for recycling in 2017

Which companies in Washington recycle glass

- Strategic Materials Inc
- Ardagh
- Owen-Illinois

Summarize info from Glass Packaging Institute, Strategic Materials from June 2021 presentations.

Add info on bottle bill v non-bottle bill data.

National average (Commerce¹ glass report)

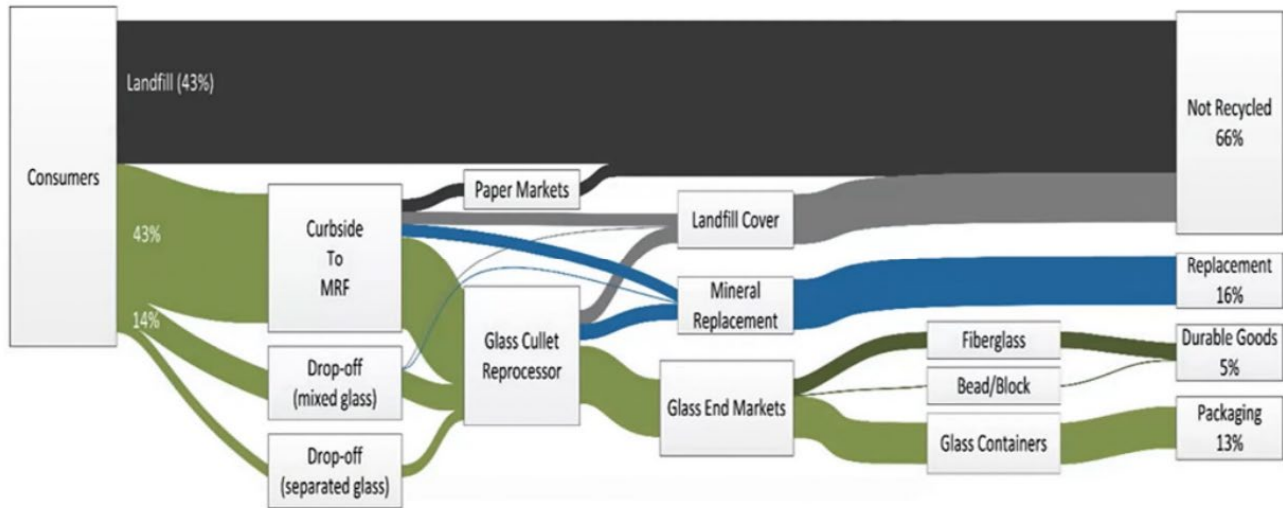


Figure 5: Flow across the Value Chain for Non-Redemption States¹⁷

COMMERCE summary:

Once a glass bottle has been used for its original purpose, there are four options: 1. Refill: Refillable bottles can be used about 25 times. Sterilizing and refilling a bottle uses about 93% less energy and 47% to 82% less water than making a new bottle.

2. Recycle: Using recycled glass cullet to make fiberglass reduces the energy needed to make new fiberglass by about 25%. Making durable construction materials like glass Pozzolan and foamed glass aggregate conserves energy and material resources, but also reduces greenhouse gas emissions. Pozzolan is a very finely ground post-consumer glass that can be used as a supplementary-cementitious material (SCM)¹⁰ Foamed glass is post-consumer glass mechanically ground into a fine powder and mixed with an environmentally-friendly foaming agent before being kiln fired. As the glass powder and foaming agent reach 1650 degrees Fahrenheit in the kiln, a chemical reaction occurs, causing the glass to foam up. Once cooled it hardens into a substance resembling lava rocks.¹¹

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

4. Landfill: Glass is disposed as trash.

Glass Demand: Summarize the market for recycling glass containers and recycling

Add RecyclingMarkets.net data on price for recyclable glass (latest version on SP is not updated - 2020 data – Dan or Ryan).

The 2019 Recycling yearbook by ISRI provides an overview of glass recycling in the US²:

- 80% of recovered glass containers are made into new glass containers

¹ https://www.ezview.wa.gov/Portals/_1962/Documents/rdcab/WashingtonsGlassHalfFullorHalfEmpty.pdf

² <http://www.scrap2.org/yearbook/50/>

- Every ton of glass recycled saves raw materials, energy, reducing emissions

Summarize any changes in glass recycling prices – any overseas restrictions (no?), any covid? Any future projections? Plastic bottles v Glass bottles?

CHALLENGES

Contamination

Material loss

Other challenges

Glass: Data

Ecology receives annual reports from facilities across the state of Washington that handle solid wastes, including businesses that handle recyclable materials. The most recent data available from those reports is for calendar year 2017. Data reported to Ecology for 2017³ is shown in Figure 3.

Total waste generation includes recovered materials, municipal solid waste (MSW) disposed, and other disposed wastes. Recovered material includes those materials recovered for recycling (7,768,524 tons) and materials recovered for land application, anaerobic digestion, or energy recovered and materials landfilled and disposed (558,537 tons).

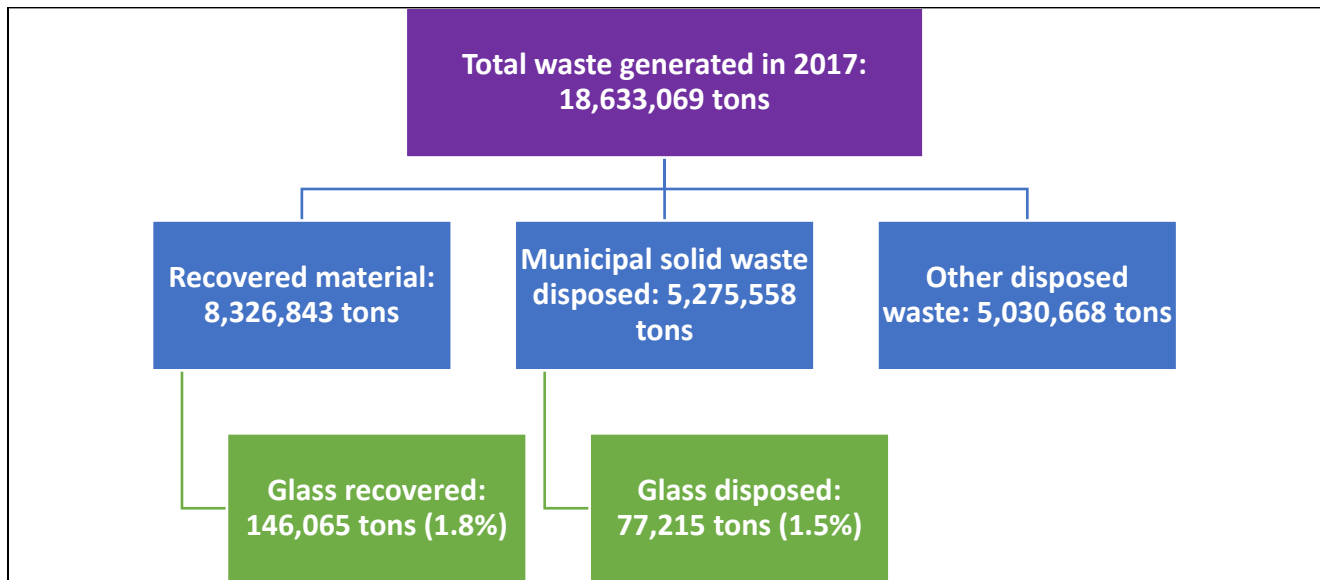


Figure 1 - Chart of solid waste generation, recovery, and disposal data

RECOVERED FOR RECYCLING: Of the 8.3 million tons of recovered material, a total of 7,768,524 tons of materials were collected for recycling. General categories of recyclable materials include: construction/demolition (46 %), metal (20%), organics (17%), paper (12%), **glass (2%)**, moderate risk waste (1.3%), plastic (0.9%), and other materials (0.7% - mattresses, textiles, tires).

³ <https://ecology.wa.gov/Research-Data/Data-resources/Solid-waste-recycling-data>

Of the 7.7 million tons of recyclable material, 146.065 tons of glass was reported to Ecology as recovered for recycling (from the spreadsheet reporting material collected for recycling – SolidWastesData2014-2017)).

Tons of glass recovered for recycling, some of this goes back into glass, some of this goes into construction aggregate.

County	Tons collected	County	Tons collected
Walla Walla	1	Jefferson	1,041
San Juan	5	Benton	1,047
Wahkiakum	8	Skagit	1,223
Columbia	22	Island	2,530
Grant	46	Spokane	2,808
Okanogan	126	Kitsap	3,057
Skamania	208	Thurston	4,165
Lewis	245	Clark	4,835
Klickitat	342	Whatcom	13,311
Franklin	348	Snohomish	22,917
Pacific	386	Pierce	26,838
Cowlitz	403	King	34,648
Mason	562	King - Seattle	42,195
Kittitas	583	Out Of State	65,127
Clallam	685	TOTAL	230,478
Chelan	766		

DISPOSED: The 10,306,225 tons of disposed waste material is separated into municipal solid waste (MSW, 51% or 5,275,558 tons) and other wastes (inert, contaminated soils, demolition, industrial, auto shred, wood - 49% or 5,030,688 tons). Glass from commercial and residential sources is in the MSW stream.

Every five years, Ecology conducts a waste characterization study of MSW from residential, commercial, and self-hauled sources. The amount of glass material in MSW in 2017 is estimated using the waste characterization study percentages of recoverable material in MSW⁴.

Based on the waste characterization analysis 2.25 percent of the municipal waste stream includes glass or ceramics, a total of 118,835 tons. Disposed container glass totals 77,215 tons (in 2017).

Category of Glass	Tons disposed in 2017
Clear glass	39,765
Green Glass	10,580
Brown glass	26,871
Plate Glass	8,718
Stoneware/kitchen ceramics	4,260
Remainder/composite	28,641
TOTAL	118,835

⁴ <https://apps.ecology.wa.gov/publications/SummaryPages/1607032.html>

GLASS RECOVERED AND DISPOSED: Based on the reported recovery and estimated disposal of glass in 2017 (detailed above), share what the data says here

EXPORTS: any exported glass??

DATA GAPS:

Add data gap discussion here.

Commerce report – Further Research Opportunities

Provide more detailed Washington state data and analysis: Summarize (or provide in detail if possible) the collection and processing of glass at Washington’s MRFs. Where and how much is delivered to Strategic Materials? Collection of glass by county would be informative. If there is glass collected in jurisdictions without easy access to a glass end user, it could lead to a market opportunity. For example, the City of Spokane collects glass (used at the landfill for road bed/alternate daily cover), but it’s too costly to transport across the state to Strategic Materials. Would there be an opportunity in eastern Washington for a glass recycler? If Spokane County were to start collecting glass, would that support an eastern WA glass recycler?

Examine manufacturing usage of recycled glass material: This report was compiled with information that was, largely, already publically available. Specific uses of recycled glass material after they are transferred to a manufacturer are not readily available. In the future, researchers could gain a more detailed understanding of how glass could be relevant to producers of recycled glass products by learning what glass manufacturers need, for which products, and which consumers are demanding these products.

Follow up on recent changes to other states’ legislation/system improvements: In recent years, several states proposed changes to their recycling systems that would affect the glass recycling market. Unfortunately, many halted these changes to redirect state funds during the COVID-19 pandemic. Future researchers should follow up to see if states still think the recycling system changes are worth making, and if so, see what effects those changes have on different glass recycling markets.

Examine trends and challenges pertaining to non-recyclable glass: Light bulbs, windows, ovenware, Pyrex, crystal, and ceramics are manufactured through different processes and contain contaminants; therefore they cannot be recycled into glass cullet. Further research is needed to explore alternative uses for these types of glass.

Research current landfill practices and possible improvements: In some instances, it is more cost effective to send contaminated glass to a landfill as trash rather than to clean and process it as a recyclable material. Financial deterrents like fines or tax penalties could discourage landfill usage. Research examined from the European Union shows the benefits of imposing penalties for landfilling too much recyclable material.

Explore alternative transportation methods or incentives: One of the challenges to making glass recycling profitable is transportation costs. In some areas, MRFs are not in close proximity to the glass recycling facilities. Transportation of these recyclables can be costly, especially if the material arrives contaminated (in which case the transportation costs could exceed the profits from recycling the material). Future researchers should explore possible alternative transportation methods, systems that are more cost effective, or adding a glass processor/recycler to another area of the state (where there is sufficient glass quantity to operate).

RECOMMENDATIONS

Add any Center advisory board discussions here related to glass recycling.

Commerce Report Recommendations

Implement glass improvement programs at collection and materials recovery facilities to shift focus from quantity to quality. Promote programs that have clearly demonstrated their ability to produce high-quality recycled glass suitable for reuse in the manufacture of new glass containers. One example is the separation of glass from other materials collected from curbside residences.

Create agency partnerships to develop procurement guidelines with recycling stakeholders to promote use of recycled glass materials in projects. Ecology, Commerce and the Department of Transportation could partner to lead this effort.

Implement policies to increase the use of recycled material in glass products and packaging produced in the state by setting minimum recycled content targets.

Create an Extended Producer Responsibility (EPR) Program to transfer responsibility for end-of-life management for glass products and packaging to the producers using the glass packaging (bottles and jars).

Increase awareness and education by developing partnerships between glass recycling companies and communities to improve the quality and amount of recycled glass collected, recycled, and made available for purchase. Promote consistent messaging throughout the state emphasizing the importance of glass recycling. Enforcement of new policies or programs without educating the public will not be as effective.

Work in collaboration with stakeholders and the community to build on existing programs and establish new programs for collection and recovery of beverage containers, such as a container deposit program for beverage containers.