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Houston Clean City Commission

QUARTERLY REPORT Q3 2024; CONTAINER GLASS

OVERVIEW

In accordance with the City's Code of Ordinances Chapter 39 Article III, the Houston Clean City Commission is to direct and oversee a comprehensive litter control program for the purpose of reducing and controlling to an acceptable level the concentration of litter in the city and to bring about a long-term improvement in the attitudes and trash handling habits of citizens. The ordinance in Section 39-37 further directs the Commission to "each quarter, during the months of January, April, July and October submit a written report to the mayor and city council summarizing the status of the clean city program." Through a study completed in 2022, the Commission determined that the regional trash handling habit change which will most greatly impact Houston's ability to effectively compete in a future, more-circular economy is to improve the volume and quality of waste materials flowing directly from waste generators to local facilities engaged in related materials reclamation and to support the development of additional local reclamation capability. With this in mind, each of the Commission's Quarterly reports will focus on how a specific waste type is generated and managed in greater Houston and note opportunities for improvement, if identified. Reports will be kept to two pages, submitted in writing to the City and shared at an upcoming public City Council meeting.

Our Q3 2024 report focuses on container glass.

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- City of Houston Solid Waste Management Department (Veronica Lizama, Dep. Director - Administration, David Vasquez - Manager, Recycling, Keith Koski, Manager - City of Houston Reuse Warehouse for Building Materials, Meagan Riche, Administrative Specialist)

Houston Clean City Commission Quarterly Report to City Council			
Topic:	Container Glass		
Date:	11/24/24	**Committee**:	Comm'rs Tyler, Smith, Machado, Wilfalk, Clark, Boehme, Asaduddin, Yearwood, Roberts and Liu

Overview:

Glass-making is an ancient practice. Craftsmen working in Mesopotamia discovered the art of mixing sand, soda, and lime to make glass about 4,000 years ago. For thousands of years, glass was a luxury item, reserved for the upper classes. As a status symbol, glass was originally used for art and jewelry. The earliest glass containers held contents considered precious, like scented oils or perfumes.

Luxury and art glass are now a vanishingly small component of a $100+ billion USD glass manufacturing industry. Container glass accounts for ~40% of revenue. Besides container glass, there is strong and increasing demand for architectural glass, automotive glass and smart glass. These more highly engineered glass products are typically coated, layered or chemically altered to impact how the glass reflects or transmits light, provides soundproofing or insulation, is toughened for thermal or physical shock resistance, or tempered for safety. These advanced glass products typically cannot be recycled with container glass.

Container glass is an ideal source of glass cullet, the industry term for crushed or broken glass, due to its chemical consistency and simplicity. Glass cullet can be directly introduced to glass manufacturing by mixing it with soda ash, sand, limestone and feldspar to produce molten glass. Doing so saves energy both by requiring fewer virgin resources and because a slightly lower melting temperature is required as more cullet is introduced. In the United States, just over 30% of glass containers get recycled, a number which contrasts unfavorably with Europe's almost 80% glass container recycling rate. As with aluminum beverage containers, states which have implemented container deposit legislation achieve far higher recycling rates than those which have not. The glass container recycling rate in Texas is below 20%[1]. Because Houston's residential recycling program accepts glass, Houston's container glass recycling rate likely exceeds the average Texas rate, likely underperforms the average national rate, and is probably around 20%.

It is unclear whether the market for container glass will grow or shrink long-term. Container material choice is based on many factors. Glass offers many advantages, including a longer product shelf life than any other packaging material due to glass being nonporous, impermeable and generally inert. Glass offers premium branding opportunities and while it does not degrade in a landfill setting, it also does not leach harmful chemicals. Glass can be recycled endlessly with no loss in quality or purity. The primary drawbacks to glass as a choice of container material is the amount of energy needed for manufacturing, which translates to higher cost, and the risk of shattering. Plastic containers in particular are a long-term threat to glass container market share primarily due to lower cost.

The United States is a manufacturer and net importer of container glass. In 2022, the United States exported $477M and imported $2.14B in glass bottles and was therefore the largest importer of glass bottles in the world[2]. Container glass is a waste stream of significant scale and expected to be so for the foreseeable future.

Current State (system participants, areas of local success, regional/national models to follow)

Most container glass waste comes from households, bars and restaurants. Container glass is strictly empty bottles and jars. Although some glass containers are used for commercial or industrial purposes, such as pharmaceutical or chemical transport and storage, the overwhelming majority of bottles and jars manufactured are intended to be used for food and beverage storage and transport. Defects and scrap generated during container glass manufacturing and handling creates a post-industrial container glass waste stream of smaller scale than post-consumer bottles and jars.

Container glass makes up a significant fraction of municipal solid waste. Based on 2018 EPA estimates, glass waste is 4% of total tonnage. Container glass further concentrates in residential single-stream recycling and in Houston consistently accounts for more than 10% of total tonnage. The value of waste glass depends on contamination level and proximity to market. Source-separated container glass waste and glass manufacturing scrap has more value than glass waste from single stream recycling due to much less contamination and higher recovery in the former. About 90% of source separated glass ends up recycled compared to about 60%

of the glass that flows through Houston single-stream recycling. Proximity to market affects glass value because glass is heavy and expensive to handle and transport, so glass waste close to a recycling facility is worth more.

There are many US locations which do not have nearby glass recycling facilities. Houston is fortunate to be the host city for a glass cullet producing facility currently owned and operated by Sibelco as well as host to multiple material recovery facilities (MRFs) which have waste glass sorting capability. At Sibelco's facility, container glass waste is crushed and sorted to make cullets of various grit sizes which are then resold to primarily Texas end markets. Near Houston, a significant amount of cullet is used as air blast cleaning abrasive. The Sibelco facility can only accept glass manufacturing scrap or source-separated post-consumer container glass due to not having the equipment to process more contaminated streams. A significant amount of glass recovered by Houston-area MRFs from single-stream recycling programs is routed to the greater Dallas area for additional processing before it can be used as a manufacturing input. Even under the best of circumstances, because cullet is not a particularly valuable resource, the cost of glass recycling exceeds the value of the recycled glass. The locations and capabilities of Houston area facilities imply that the most cost-effective way to handle container glass waste is local processing for the local market, an option only currently available for manufacturing scrap and source-separated post-consumer container glass. The second most cost-effective approach is landfill disposal. The most expensive way to handle Houston's container glass waste is through single-stream recycling. Niche reuse and refill programs for glass exist but program costs are not transparent.

Houston area single-stream residential recycling programs accept container glass and Houston residential container glass waste is accepted at the neighborhood depositories operated by the Houston Solid Waste Management Department. The WM facility at 1200 Brittmoore allows public source-separated drop-off of container glass (delivered by passenger vehicles only) and Sibelco allows public source-separated glass drop-off of container glass at their facility on 8436 Kopman Dr. Assuming that Houston trends are consistent with national trends, most area bars and restaurants do not recycle their container glass waste and most glass containers from residences without curbside recycling service end up landfilled.

Challenges and Opportunities

1) **Promote the establishment of privately-managed source-separated container glass waste programs with a focus on bars and restaurants.** Bars and restaurants produce container glass waste at a significant scale yet most is landfilled. Due to the local presence of an operational facility that will accept source-separated glass, encouraging disposal of bar and restaurant container glass via source-separated recycling extends landfill life, supports a more circular economy and supports job creation. While any privately-managed glass refill-and-reuse program or source-separated recycling program is worth recognition and encouragement, bars and restaurants are prioritized because many produce high volumes, they can train staff to adhere to the waste handling practices that deliver a clean, high-quality materials stream, and through collaboration may offer the shortest new program development timelines.

2) **Ensure glass dropped off at the neighborhood depositories is source-separated and flows to the Houston-based glass recycling facility.** For operations simplification in an equipment and staff constrained environment, glass dropped off at the neighborhood depositories currently flows to single-stream recycling, which downgrades its value.

3) **Continue to accept container glass through the single stream recycling program.** Changing the mix of what is and is not allowed in curbside recycling bins can be confusing and demoralizing and lead to a lack of confidence in the system long-term. People expect to be able to recycle container glass.

4) **Specify "empty glass bottles and jars" as acceptable for recycling in SWD and other City communications, not simply "glass"**. Glass products like drinking glasses, mirrors, automotive glass, flower vases, cookware, laboratory vials, and similar items are not container glass. Example guidance: Accepted: Empty glass bottles and jars. Not an empty bottle or a jar? Reuse, donate or carefully dispose of your item.

5) **Focal point:** A designated person to monitor progress towards Commission recommendations is needed.

1) https://www.gpi.org/sites/default/files/content-files/Lists%20and%20Resources/BCG%20Report_A%20Circular%20Future%20For%20Glass.pdf
2) https://oec.world/en/profile/bilateral-product/glass-bottles/reporter/usa