



Best Practices in Glass Recycling

The Recycling Status of Container Glass

Material: Recycled Glass

Issue: Glass container recycling has been having variable success in recent years. Production in the glass container industry has been flat or slightly declining on a per capita basis, while recycling programs are collecting increasing percentages of generated glass. This Best Practice discusses the status of glass recycling on the national level.

Best Practice According to the Glass Packaging Institute, approximately 10.6 million tons of glass containers (41 billion containers) were manufactured in the United States in 1995, representing approximately 6% of the U.S. municipal waste stream by weight. Of that total, the U.S. glass industry estimates that 63% is flint (clear), 25% is amber (brown), 10% is green, and 2% is blue or other colors. Generation of waste glass containers is actually greater than container manufacturing because of importation of glass packages for products like beer and wine. A large percentage of imported containers is green, so the percentage of glass in the waste stream is closer to 57% clear, 25% amber, and 18% green. Franklin Associates(1) estimated that the total amount of glass containers entering the waste stream domestically declined from 14.0 million tons in 1980 to 12.1 million tons in 1994. The overall decline in glass packaging has been attributed to the increased use of other types of packaging, including plastic and aluminum. Also, some of the decrease in total generated glass may be due to the manufacture of lighter bottles.

1995 Glass Container Recycling Data

Recycling Purchases	
Container Manufacturing	2,440,313
Refillables	606,312
Secondary Markets	701,213
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	3,747,838

Major opportunities for glass recycling include the following:

Container Manufacturing Container manufacturers have always known that melting recycled glass with virgin materials lowers kiln temperatures and increases homogeneity of the entire batch. The manufacturers originally processed, or "beneficiated," recycled cullet themselves. As recycling infrastructure has grown, most manufacturers have moved away from internal processing of glass cullet, to buying cullet through third-party processors who interact with the recycling community. As of 1995, 66 glass container manufacturers operated in 27 states in the United States. From 1987 through 1993, domestic glass container manufacturing plants increased purchases of cullet by over 95% by increasing the percentages of recycled glass in new containers. In 1993, a total of 2,432,463 tons of recovered glass were purchased for the production of new containers.

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The maximum value of recycled glass to container manufacturers is approximately the substitution value for the virgin materials it replaces. There are some other issues of lowered energy consumption and longer furnace life, but these factors operate at the margins. One study⁽⁶⁾ estimated the ceiling price for beneficiated cullet at \$45 to \$60/ton, with no great changes expected. Some states have passed laws requiring glass container manufacturers to use a minimum percentage of recycled glass in the production of new containers. In Oregon, for example, glass container manufacturers were required to use at least 35% post-consumer cullet by 1995. California has even more aggressive laws requiring glass manufacturers to increase use to 65% recycled content by 2005. These requirements have resulted in temporary price spikes in some parts of the country.

Fiberglass Insulation Trends in fiberglass insulation manufacturing show increased consumption of mixed-color cullet. In 1993, approximately 350,000 tons of cullet were bought by the fiberglass industry, or 4% of the total. Due to inconsistencies in the supply of recycled glass, fiberglass insulation manufacturers have been tentative in using glass cullet. However, California content requirements and federal procurement guidelines for purchasing fiberglass insulation with recycled content have increased the motivation for cullet use in fiberglass. Fiberglass insulation manufacturers have two primary concerns about cullet quality: 1) fiberglass manufacturing is more sensitive than container manufacturing to contaminants and to differences in the composition and color of glass; and 2) boron, the most expensive ingredient in fiberglass, is not found in glass containers.

Alternative Markets - Numerous other markets are being investigated across the country for recycled glass. For information related to a number of these specific applications [see the Best Practices INDEX](#). The only alternative that consumes significant volumes nationally at this time is the use of glass as a construction aggregate.

Implementation: Local recyclers should build a total cost model for their situation, taking into consideration all of the costs of collection through processing and transportation, and weighing market options based on those alternatives, while always keeping an open mind to new market options.

Benefits: Knowledge of market opportunities is critical to maximizing revenue and identifying appropriate recycling program design. This best practice provides an overview of major market opportunities and should be balanced by identifying the realities of regional infrastructure.

Application Sites Recycling Programs, material recovery facilities

Contact: For more information about this Best Practice, contact CWC, (206) 443-7746, e-mail info@cw.org.

References:

- (1) *Characterization of Municipal Solid Waste in the United States 1995 Update*, Franklin Assoc., 1996.
- (2) *Glass Container Market Recovery Study*, prepared by SWANA, with the EPA and GPI, Dec. 1995.
- (3) *Glass Composition and Breakage in a Commingled System for Curbside Handling*, Joe Paradiso, Consumers Glass, July 1995.
- (4) *Optimizing the Collection of Glass Containers*, Shaan Kervis Hamilton, [Resource Recycling](#), 7/95.
- (5) *Sorting Glass Collection Differences*, *Recycling Today*, May 1996 issue, page 58.
- (6) *Recycled Material Prices - Two Decades Past and Future*, Clean Washington Center Rpt #C8, 1994.
- (7) Hamilton, Shaan, Solid Waste Association of North America, Silver Spring, MD.

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