

I. Glass Containers

(Q) About GPI and FEVE

The Glass Packaging Institute (GPI) is the trade association representing the North American glass container industry. Through GPI, glass container manufacturers speak with one voice to advocate industry standards, promote sound environmental policies and educate packaging professionals. GPI member companies manufacture glass containers for food, beverage, cosmetics and many other products. GPI also has associate members that represent a broad range of suppliers and closure manufacturers.

FEVE is the European Container Glass Federation representing glass packaging and machine-made glass tableware. The association has some 60 corporate members employing 40,000 people and representing 60 percent of the glass production in Europe spread throughout 140 plants, including Switzerland and Turkey.

(Q) How are glass containers made in the U.S.?

Glass is made from readily available domestic materials, including sand, soda ash, limestone and "cullet" (the industry term for furnace-ready scrap/recycled glass). The only material used in greater volumes than cullet is sand. These materials are mixed, or "batched," heated to a temperature of 2600 to 2800 degrees Fahrenheit and molded into the desired shape.

(Q) What does the FDA say about glass containers?

Made from nontoxic raw materials—sand, soda ash, limestone, and recycled glass or cullet—glass is the only packaging material accepted by the FDA as "GRAS" or "**generally recognized as safe**" for food and beverage contact. Glass is nonporous and impermeable, so there are no interactions between glass packaging and products to affect the flavor of foods and beverages.

II. Life Cycle Analysis

(Q) What is an LCA?

A Life Cycle Analysis or LCA is the compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle.

(Q) Why are LCAs important?

An LCA is an important tool for an industry to produce benchmarks based on scientific data for environmental improvement programs, provide a platform to carry out environmental impact assessments and to set goals for the future.

(Q) Why is the GPI LCA "cradle-to-cradle"?

The North American glass container industry purposely conducted a cradle-to-cradle LCA to obtain a total picture of our industry's environmental impact, taking the view that for an LCA to be a useful, it has to be cradle-to-cradle. We encourage other industries interested in understanding the total impact of their product on the planet to do the same.

(Q) What are the principal areas covered by the LCA?

The cradle-to-cradle inventory of container glass addresses all inputs and outputs for the production of 1 kg of container glass including:

- Extraction and processing of raw materials and cullet
- Transportation of raw materials
- The production and combustion of fuels and energy for melting and formation of glass (including all nonmelting activities at the facility)
- The impacts of post-consumer cullet treatment
- Different end-of-life recycling scenarios
- · Transportation of the finished container to the end user
- · Collection and end-of-life treatment options

Frequently Asked Questions



(Q) What were the main goals of the GPI LCA?

The GPI and FEVE conducted LCA takes into account the product's full life cycle, from the extraction of resources, production, use and recycling, to the disposal of wastes. The objective was to have an LCA, which would reflect a comprehensive and the real life situation of the entire industry, rather than focusing in on partial best production technologies scenario, within a limited and favorable scope. The LCA helps the North American glass container industry to duly assess the real environmental burdens and impacts of container glass and to set important industry targets for meaningful results.

(Q) Who conducted the LCA?

The Glass Packaging Institute (GPI) commissioned PE Americas on behalf of the majority of North American glass container manufacturers to conduct a Life Cycle Assessment (LCA) on container glass production and resulting packaging designs.

(Q) Who participated in the LCA?

LCA participating companies in North America are: Gallo Glass; Leone Industries; Owens-Illinois, Inc. (O-I); Saint-Gobain Containers, Inc.; and Vitro Packaging, LLC.

(Q) What was the methodology of the LCA?

All data were collected and provided in a consistent way, including background data used for all production and transportation processes. Participating companies with access to data provided data on raw material extraction and preparation, and particularly on cullet logistics and treatment. Data for the manufacture of container glass were supplied by participating manufacturing companies. All data were rigorously analyzed by PE Americas and cross-checked with the companies in conformity with ISO (Internal Organization for Standardization) 14040/44 standards.

(Q) In what way(s) is the study technically rigorous?

As we indicated in the methodology, the glass industry went to extraordinary steps to eliminate any biases. A third party critical review panel was engaged in North America and Europe to ensure that the highest level of compliance with ISO (Internal Organization for Standardization) 14040/44 standards was met. Experts on the critical review panel reviewed the study in three stages throughout the process, including the type of data to collect, the method of collection and standards for producing the final data. The end result is a study with third party validation.

(Q) How will the LCA help the industry meet its 50 percent recycled content goal?

The internationally conducted LCA, surveying 105 furnaces or 75 percent of the glass container manufacturing infrastructure in North America, provides the opportunity to set imminent and future goals that we feel can help us reduce energy use and, ultimately, bring glass to a position of generating zero waste, setting the standard for the most environmentally friendly packaging materials there is.

(Q) What types of environmental impact does the LCA look at?

The LCA takes into account the product's full life cycle: from the extraction of resources, production, use and recycling, to the disposal of wastes. Areas included were environmental and health impacts such as climate change, smog, and acidification. The LCA sets an internal benchmark for the industry against which we can measure to fix targets for future environmental improvements.

The GPI LCA does not take into consideration the impact of other major benefits of container glass such as longer shelf life, impermeability, taste preservation, absence of migration or leaching of chemicals from the container into the food or beverage, price stability, natural resources availability and sustainable waste glass markets. Also, the LCA does not provide comparative data to competitive packaging materials.

(Q) How representative is the data?

The LCA data represents 75 percent of the glass container manufacturing infrastructure in North America.

(Q) Why does your data differ from FEVE or the European data?

Different markets have different rules and regulations. Europe has stiffer recycling laws and a EU wide backed recycling program. Also, European companies use synthetic soda ash and the US uses natural soda ash, which accounts for some energy differences. Europe and North America will continue to work together to reduce overall CO₂ emissions.



(Q) Does GPI's North American data vary plant to plant, region to region and company to company?

Yes. In North America, there is a range of accepted manufacturing technologies and practices used by glass container manufacturing companies at various locations. Because we used data from 105 glass container furnaces at five GPI member companies, we had to use averages. Companies that participated in the LCA were Gallo Glass; Leone Industries: Owens-Illinois, Inc (O-I); Saint-Gobain Containers, Inc (SGCI).; and Vitro Packaging, LLC. In the industry LCA, we distinguish between four possible furnace technologies and various end-of-life scenarios for glass containers. We also use averages for fuel inputs, transportation, forming and finishing.

(Q) GPI says their LCA is the "first complete and thorough cradle-to-cradle life cycle assessment (LCA) ever conducted by any food and beverage packaging industry." O-I's LCA results have already been published. Who was first and what accounts for the differences between GPI's LCA and O-I's LCA?

O-I was a participant in and is fully supportive of GPI's LCA. While applauding GPI for taking this critical step in North America, O-I wanted more specific, global information on its own operations. As stated above, there will always be differences in data from one plant to another, one region to another and one company to another. This is especially the case here because GPI's LCA uses an industry average while O-I uses specific, regional data. O-I's report measures the carbon footprint of a single product and provides the assumptions it made in calculating the carbon footprint.

(Q) Does transportation account for most of your energy use?

This LCA challenges several misconceptions about glass, including the impact of transportation and use of recycled content. Transportation of finished glass containers only comprises less than 4 to 5 percent – of the complete carbon footprint of glass packaging. Why? Because recycled glass directly reduces the amount of energy needed to extract and process raw materials. Every 10 percent of recycled glass used in production cuts carbon emissions by about 5 percent and reduces energy use by some 3 percent. Today's recycled content in glass packaging generates enough savings to completely offset the emissions produced by transportation of the finished goods.

In comparing glass with other packaging materials, shows that glass clearly has the most favorable carbon footprint when using a complete life cycle assessment.

(Q) Can I compare the glass container industry LCA results with competitive packaging material LCA results?

The GPI LCA is focused on the glass container industry and does not provide comparative data to competitive packaging materials. Until other packaging materials produce peer-reviewed, cradle-to-cradle LCAs comparisons cannot be drawn in an equitable manner.

(Q) Does data vary from plant to plant?

Yes. In North America, standardized manufacture technology does not exist across all glass container manufacturing plants. To achieve the most accurate average results for our industry, the glass container LCA distinguishes between four different furnace technologies to enable appropriate benchmarking and various scenarios for the end-of-life of container glass, and uses averages for fuel inputs, transportations, forming and finishing.

(Q) What does "cradle-to-cradle" mean?

A "cradle-to-cradle" assessment addresses the environmental aspects and potential environmental impacts (e.g., use of resources and environmental consequences of releases) throughout a product's life cycle from raw material acquisition through production, use, end-of-life treatment, recycling, and if needed, final disposal.

(Q) What are gate-to-gate or cradle-to-gate LCAs?

Unlike cradle-to-cradle analyses, a gate-to-gate analysis just looks at what happens at a particular location, such as production at one manufacturing plant. Cradle-to-gate analyses address the environmental impacts of a product from raw material acquisition through production, or before a product leaves a plant. Neither scenario tells the whole story because they do not view the total process impact. Once a product leaves a plant, it still impacts the environment.

Frequently Asked Questions



III. Recycling and Sustainability

(Q) What does it mean to recycle?

The glass container industry believes recycling means a product should be cradle-to-cradle, or should be able to become the exact same product again. Some container packaging products are "down-cycled" to be used in other ways and will ultimately enter landfills where they will decompose and give off CO_2 gas. Only glass packaging can be recycled endlessly back to its original use without loss of quality or purity.

(Q) What is the U.S. recycling rate for glass containers?

The most recent report from 2008 indicates the national glass container recycling rate is 28 percent. Of that, 35.6 percent of glass bottles used for beer and soft drinks were recycled. In California, glass bottle recycling rates near 79 percent. Thus, the industry believes achieving the 50 percent recycled content goal by 2013 is achievable.

(Q) What percentage of glass recovered is used to make new bottles and jars?

An estimated 80 percent of recovered glass containers are made into new glass bottles. The remainder is used for secondary uses such as in fiberglass, tile, abrasives, filtration, bead manufacturing, and aggregate in road use.

(Q) Why did the industry set a goal to use 50 percent recycled content in the manufacture of new glass bottles and jars by 2013?

Using larger amounts of post-consumer glass in the manufacturing of new glass containers is an important tool in reducing carbon dioxide and other emissions from glass manufacturing plants. Through use of recycled glass, the industry is able to reduce its raw material usage and its overall carbon footprint, making glass containers an even more sustainable.

(Q) What happens when glass containers go to the landfill?

Some glass unfortunately ends up in landfills, where it is crushed and used as a stabilizer in the fill along with dirt because it is inorganic or inert and helps stabilize the landfill. Other types of containers will eventually breakdown and give off CO_2 gas as they decompose.

(Q) Does the LCA indicate benefits of using recycled glass?

Yes, the LCA points out that manufacturers benefit from using recycled glass in several ways—it reduces emissions and consumption of raw materials, extends furnace life, and saves energy.

(Q) Does the United States use refillable glass bottles?

Current demand for refillable glass bottles is not as high in the United States as in Canada, Mexico, European or South American countries. A rewashing infrastructure no longer exists in the U.S. where soft drink and beer companies can purchase product. There is no longer a national refillable glass bottle rewashing infrastructure in place in the U.S.

(Q) What has the glass container industry done in the past to reduce its environmental impact?

GPI member companies committed in late 2008 to using at least 50 percent recycled glass or cullet by the end of 2013 in the manufacture of new glass bottles and jars. Achieving this commitment necessitates an increase in glass recycling and post-consumer cullet availability. Additionally, the infrastructure to collect cullet must be examined and improved. The industry continues to work with partners to improve and expand curbside programs, develop on-premise or bar-restaurant-and-hotel programs, and build on current deposit programs for collecting cullet.

(Q) Is the glass container industry manufacturing lighter-weight bottles?

Improved technology has led to lighter weight glass containers that are remarkably strong and safe. The glass packaging industry continues to look for ways to strengthen glass, through new surface treatments and better designs, without sacrificing the improvements in material reduction. Improvements in coating technologies have helped to make glass more durable and versatile for consumer use. Lightweighting has become one of the single most important innovations in the industry.

(Q) How sustainable is glass?

Any food or beverage maker concerned about sustainability should choose glass. Recycling glass reduces consumption of raw materials, extends the life of plant equipment such as furnaces, and saves energy. Some container packaging products are "down-cycled" to be used in other ways. Only glass packaging can be recycled endlessly back to its original use without loss of quality or purity for food and beverage contact. Glass is the true definition of a recyclable material, because glass can be recycled in a closed loop manner, back into the same kind of packaging.