Benefits of Glass Cullet and Factors Impacting Supply

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About the U.S. Glass Container Industry

- 48 glass container plants in 22 states comprise a $5.5 billion dollar industry

- 102 glass container furnaces produce approximately 30 billion glass food, beverage, cosmetic, spirits, wine, and beer containers annually

- The industry employs approximately 8,000 salaried and represented hourly employees in glass container plants, warehouses, sales forces ... along with thousands more in supplier companies across the U.S.
Manufacturing Issues

- Consumer demand
- Raw materials
- Labor costs
- Capital investment
- Energy
- Transportation
- Environmental impact and sustainability
- Jobs and outsourcing
2010 U.S. Glass Container Shipments by Category

- Beer (50%)
- Food (19%)
- Wine (14%)
- Non-Alcoholic Beverage (7%)
- Liquor (5%)
- Flavored Alcoholic Beverages (3%)
- Other (2%)

Source: Glass Packaging Institute (GPI)
# U.S. Glass Container Shipments & Production 2010 Compared to 2009

<table>
<thead>
<tr>
<th>Categories</th>
<th>Shipments</th>
<th>Production</th>
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</thead>
<tbody>
<tr>
<td>Jan-December, 2010 vs. Jan-December, 2009</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td>-0.9%</td>
<td>FLAT</td>
</tr>
<tr>
<td>NA Beverages</td>
<td>-6.1%</td>
<td>-1.9%</td>
</tr>
<tr>
<td>Beer</td>
<td>-8.0%</td>
<td>-7.7%</td>
</tr>
<tr>
<td>Liquor</td>
<td>-0.5%</td>
<td>-0.9%</td>
</tr>
<tr>
<td>RTD Alcohol</td>
<td>-10.1%</td>
<td>+2.8%</td>
</tr>
<tr>
<td>Wine</td>
<td>+6.5%</td>
<td>+3.0</td>
</tr>
<tr>
<td>Other</td>
<td>+0.1%</td>
<td>-7.4%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>-5.4%</td>
<td>-4.6%</td>
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</table>

Source: Glass Packaging Institute
# U.S. Glass Container Shipments & Production

First Half 2011 Compared to 2010

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</thead>
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<td><strong>Food</strong></td>
<td>+0.6%</td>
<td>-0.6%</td>
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<tr>
<td><strong>NA Beverages</strong></td>
<td>-3.4%</td>
<td>-3.1%</td>
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<td><strong>Beer</strong></td>
<td>-2.1%</td>
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<td><strong>Liquor</strong></td>
<td>-3.1%</td>
<td>-3.0%</td>
</tr>
<tr>
<td><strong>RTD Alcohol</strong></td>
<td>+1.5%</td>
<td>-14.2%</td>
</tr>
<tr>
<td><strong>Wine</strong></td>
<td>+7.5%</td>
<td>+7.1%</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>-11.1%</td>
<td>-12.5%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>-1.0%</strong></td>
<td><strong>-3.1%</strong></td>
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</tbody>
</table>

Source: Glass Packaging Institute
What is Glass?

Sand – 70–75%
Soda Ash – 10–15%
Limestone – 10–15%
Additives – 5%
Glass is 100% recyclable; it has an unlimited life and can be recycled endlessly.
Closed-Loop Glass Recycling

High-quality recycled glass = New glass bottles and jars
Environmental Benefits of Glass Recycling

- Glass is 100% recyclable; it has an unlimited life and can be recycled endlessly.
- Over a ton of natural resources saved for every ton of glass recycled.
- Energy costs drop about 2–3% for every 10% recycled glass used in the manufacturing process.
- Six tons of recycled container glass used equals one ton of carbon dioxide reduced.
Glass: Natural and Simple Recycling & Manufacturing Process

**Glass Recycling Process**

1. Curbside
2. Recycled Glass Processor
3. Sorting
4. Crush & Clean
5. Cullet (Recycled Glass)

**Glass Manufacturing Process**

- Limestone
- Soda Ash
- Sand
- Recycled Glass

↓

Heat to 2800° F (1538 ° C)
Secondary Markets for Cullet

- Countertops, floors, and interiors
- Fiberglass
- Landscaping
- Tile
Secondary Markets for Cullet

- Bead
- Fluxes/Additives
- Frictionators
- Abrasives/sand blasting
- Brick manufacturing
- Roadbed Aggregate – Diversion
- Landfill Cover – Diversion
- Filtration
Glass Container
Life Cycle Assessment
North America / Europe
Glass Container Life Cycle Assessment

1st LCA on North American Glass Industry

- Conducted 2008–2009
- Released September 2010
- Covered 105 furnaces
- 75% of industry participation
- 5 glass container companies
  - Gallo Glass
  - Leone Industries
  - Owens–Illinois, Inc.
  - Saint–Gobain Containers, Inc.
  - Vitro Packaging LLC
Glass Container
Life Cycle Assessment

- **PE Americas**
- **PE International**
- Analysis based on state of the art modeling methodology
- Strict ISO 14040/44 guidelines followed
- Peer reviewed by authorities in LCA methodology and research
Glass Container Life Cycle Assessment

LCA in Real Terms

Glass: The Perfect Cycle

1. The new glass packaging is filled with product and distributed through retail outlets.

2. The product is purchased by consumers and consumed.

3. Containers are collected through curbside, drop-off centers, and commercial on-premises locations.

4. Recovered glass packaging is crushed into cullet and used as raw material to make new glass packaging.

5. Virgin raw materials are added as needed to the mix for new packaging.

6. The raw material is formed into new glass packaging.

At 50% recycled glass in manufacturing:
Removes 2.2 M metric tons of CO2 emissions = 400,000 cars off the roads each day
U.S. Packaging Industry

Energy Required to Make Various Packaging Materials

- Recycled Glass
- Virgin Glass
- Recycled Aluminum
- Recycled PET
- Virgin PET
- Virgin Aluminum

Source: Daniel Imhof  *Paper or Plastic*,
http://www.environmentaldefense.org/home.cfm
Industry Recycling Goal: 50% Recycled Content by 2013

➢ First Objective:
   ◦ Preserve U.S. jobs in an “Energy Intensive, Trade Exposed” environment:
     – Improve competitiveness
     – Reduce high energy costs
     – Support improved materials management models
Industry Recycling Goal: 50% Recycled Content by 2013

Second Objective:
- Drive industry sustainability initiatives
  - Conserve energy
  - Save raw materials
  - Reduce air emissions … including NOx, SOx, PM, and greenhouse gases (e.g. CO₂)
  - “Reduce/Reuse” in all aspect of plant operations … water, cardboard, lubricants, electricity, etc.
Achieving the Goal

To achieve goal must improve the quantity and quality of recovered recycled glass:

- **Partnerships with stakeholders** to improve glass recycling
- **Better data collection/analysis**
- **Effective legislative initiatives** at federal and state levels
- **Single-stream recycling best practices** “SWOT” analysis, including processing technologies
- **Expanded bar, restaurant, and hotel collection** programs
- **Consumer education**
Sources for Recycled Glass Containers

- **Curbside** (usually single-stream)
- **Drop-off**
- **Beverage container deposits** (currently 10 states)
- **Commercial on-premise** (bars, restaurants, hotels, etc.)
- **Unused inventory**
- **In-house cullet**
Closed-Loop Glass Recycling: Current Cullet Usage Criteria

- **Container Glass Only**: no ceramic coffee cups, drinking glasses, Pyrex, ovenware, mirrors, etc.
- **Contaminant Free**: No ferrous materials, ceramics, etc.
- **Color Sorted**: Clear, Amber, and Green
- **Meets plant specifications** as to particle size (usually 3/8 inch)
Impact of Contamination on Closed-Loop Glass Recycling

- Contamination can occur when glass containers are:
  - Set out for recycling collection
  - During collection and processing
  - In transit

- Unwanted items in recycled glass:
  - Decreases value of recovered glass
  - Increases costs for recycling
  - Slows down production
  - Reduces quality
  - Damages glass manufacturing equipment
Why is Cullet Quality Important?

- The effects of ceramic contamination.
- Bubble caused by heat-resistant overware.
- Surface flaw due to a tiny "seed" of metal.
Recycling Collection Systems

- **Curbside single-stream** recycling collection
  - 40% of glass gets recycled into new glass containers, on average; another 40% ends up in landfills

- **Mixed glass collected in dual-stream systems**
  - yields an average of 90% of glass being recycled into glass containers and fiberglass

- **Container deposit systems**
  - color-sorted materials results in 98% glass being recycled

Source: Container Recycling Institute, 2009 Study
Beverage Container Deposit States

Current Bottle Bills
California
Connecticut
Hawaii
Iowa
Maine
Massachusetts
Michigan
New York
Oregon
Vermont

Targeted States
Texas
Oklahoma
Florida
Tennessee

Repealed Laws
Columbia, MO
Delaware
Collection Systems and Glass Quality at Cullet Processor

- Recycled glass from on-premise and drop-off
  - Limited contamination
  - Little loss of glass for closed-loop recycling

- Recycled glass from single-stream collection
  - 10% – 20% trash
  - 10% – 30% fines (under 3/8”)
  - Some glass loss through sorting inefficiencies
  - Total capture = 50% – 70%
78 Cullet Processor Locations in 32 States

- California: 11
- Pennsylvania: 9
- Indiana: 4
- Ohio: 4
- New Jersey: 4
- New York: 4
- North Carolina: 4
- Florida: 3
- Georgia: 3
- Texas: 3
- Connecticut: 3
- New York: 4
Cullet Processor Locations and Sorting Technology

- Growth in cullet processor locations:
  - **New locations** in 2011: Phoenix, Las Vegas, Baltimore, and St. Paul, MN; more in the works

- Expansion in sorting technologies:
  - Optical sorting and ceramic detection technologies more than doubled
  - From 10 in 2008 to 22 in 2010
  - Available in most new 2011 facilities and those planned
Closed-Loop Glass Recycling: Cullet Quality and Markets

MRF Processing and Quality
- Glass handling
- Sorting equipment
- Negative sort

Markets for Closed-Loop Glass Recycling
- Additional costs to sort at cullet processor
- Uneven geographic dispersion of end-markets
- Poor quality leads to diversion alternatives
Improving Recycled Glass Markets and Revenue

➢ To improve markets—and revenue—for recovered glass:
  ➢ **Step up quality control** to weed out contamination
  ➢ **Retain glass size** during collection and processing
  ➢ Set up **recycling contract incentives** with a shared revenue component
  ➢ Use of **optical sorting and ceramic detection equipment**
Industry Approaches

- Glass manufacturers
- Glass Processing
  - State endeavors
  - New businesses
- New economic opportunities
  - Competitive use for recycled glass
  - Business development
- Partnerships
Organizations with Recycling Interest

- Ameripen
- Curbside Value Partnership
- Environmental NGOs
- Keep America Beautiful, Inc.
- National Recycling Coalition
- Product Stewardship Council
- Packaging Trade Associations and CPG Trade Associations
- Recycling Organization of North America
- State and Regional Recycling Organizations
- Sustainable Packaging Coalition
- SWANA, ISRI, NSWMA (hauler associations)
Thank You!

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