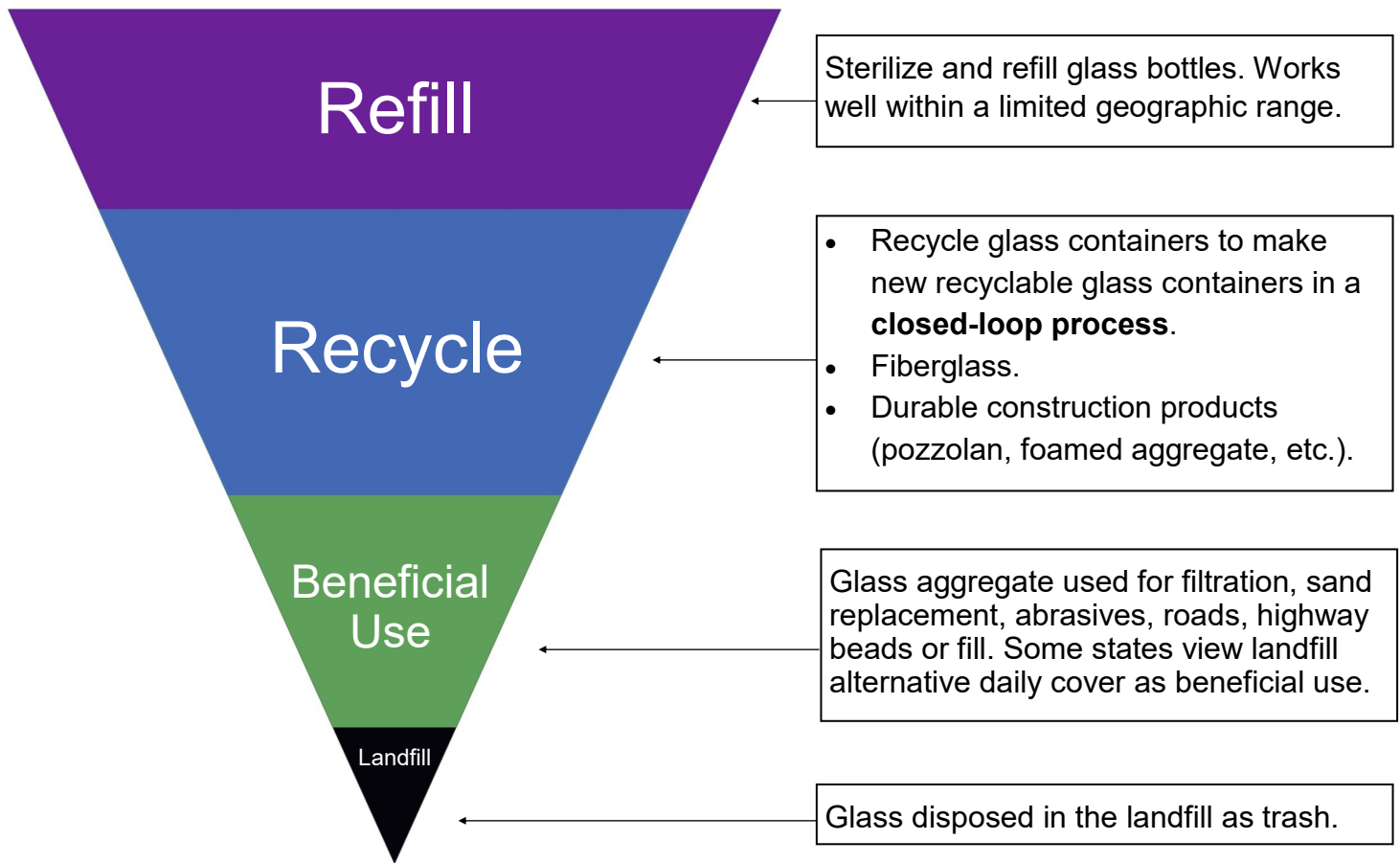


Glass Recovery Hierarchy

Glass bottles and containers are a valuable and versatile material resource. This hierarchy prioritizes common uses for glass including reuse, recycling and substitution for raw materials.



Consider the environmental benefits and available end markets before deciding which glass management option to use. A life-cycle assessment (LCA) looks at potential environmental impacts of a product or packaging from beginning (extraction of natural resources used for manufacturing) to end (disposal or recycling). LCAs for glass generally agree that greenhouse gas (GHG) emissions savings from recycling glass are equal to or more than GHG emissions from any transportation needed to recycle the glass. There are existing LCA studies available online, but it should be noted that LCA has limited capacity to account for all potential scenarios. Learn more about LCAs at the links below:

- International Organization for Standardization (ISO). (2006). *Life-cycle assessment* (Standard No. 14040). Retrieved from <https://www.iso.org/obp/ui/#iso:std:iso:14040:ed-2:v1:en>
- Johnson, A., & Norris, G. (2018, August 21). The impact of material mismanagement (What LCA doesn't see). *Environmental Leader*. Retrieved from <https://www.environmentalleader.com>
- Science Direct. (n.d.). *Lifecycle assessment: Learn more about lifecycle assessment*. Retrieved from <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/life-cycle-assessment>

Environmental Benefit Snapshot

Reusing or recycling materials that would otherwise be put in a landfill saves energy and reduces greenhouse gases (GHG emissions). Available markets may help determine the most practical way to manage glass. The chart below highlights environmental benefits from using glass collected through a recycling program in different ways. The list of potential uses is incomplete and additional uses may be added as they come to the marketplace.

Environmental Benefit	Reuse	Recycle			Beneficial use
	Refill bottles	Make glass containers	Make fiberglass	Make construction materials	Crush for use as aggregate
Greenhouse Gas Savings	√	√	√	√	
Energy Savings	√	√	√	√	
Recyclability	√	√			
Water Savings	√				
Material Savings	√	√	√	√	*
Landfill Diversion	√	√	√	√	√

Positive Impacts from Using Glass as a Resource

Reuse: Refillable bottles can be used about 25 times. Sterilizing and refilling a glass bottle uses about 93% less energy (based on 25 uses) and 47-82% less water than making a new bottle.

Recycle: Glass bottles can be recycled repeatedly back to their original use without loss of quality or purity, with recycled glass substituted for up to 95% of raw materials and minimal material loss. Every 10% of recycled glass used to make new bottles and jars cuts carbon emissions by about 5% and reduces energy use by about 3%. Using recycled glass cullet to make fiberglass reduces the energy needed to make new fiberglass by about 25%. Making durable construction materials like pozzolan and foamed glass aggregate conserves energy and material resources and reduces emissions.

Beneficial use: Substituting glass for aggregate saves valuable landfill space.* In states where other materials aren't available, processed glass aggregate may conserve natural resources like virgin aggregate.

Sources

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- GrassRoots Recycling Network & Institute for Local Self Reliance. (n.d.). *Environmental Benefits of Refillable Beverage Containers*. Retrieved from <http://refillables.grrn.org/environmental-benefits-2/>
- North American Insulation Manufacturers Association. (2016). *Fiberglass insulation industry: A leading user of recycled glass*. Retrieved from <http://insulationinstitute.org/wp-content/uploads/2016/04/Recycled-Glass-Flyer-April-2016.pdf>
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- 4R Sustainability, Inc. (2009). *Uncapping the potential of glass packaging: Opportunities and obstacles to creating a refillable glass bottle system for Oregon breweries*. Retrieved from <http://www.container-recycling.org/assets/pdfs/glass/Refillables-OR2010.pdf>
- The Glass Packaging Institute (GPI). (2010). *Life-cycle assessment of North American Container Glass*. Retrieved from <http://www.container-recycling.org/assets/pdfs/glass/LCA-Owens2010.pdf>

