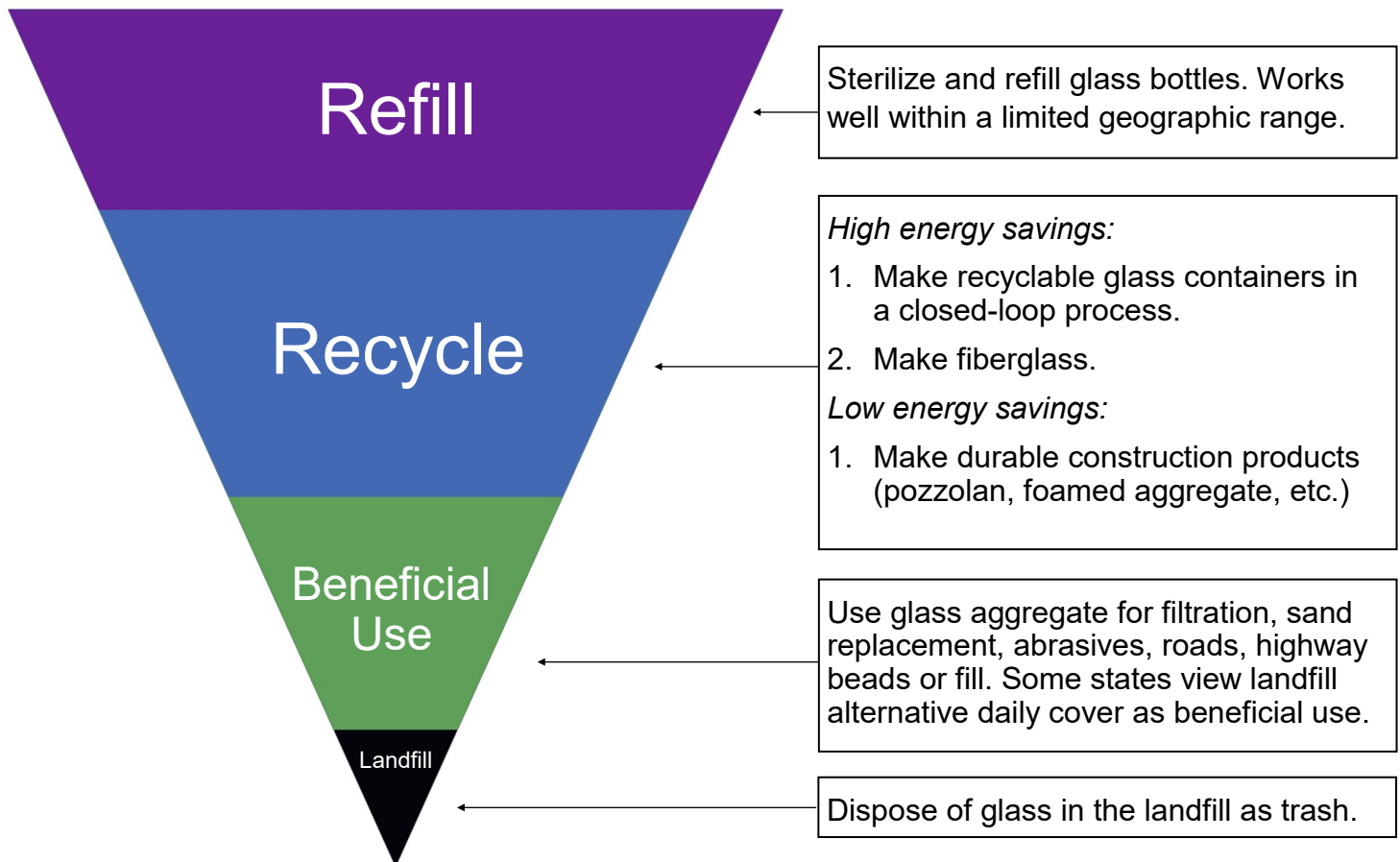


Glass Recovery Hierarchy

Glass bottles and containers are a valuable and versatile material resource. This hierarchy prioritizes common uses for glass, which can be reused, recycled, or substituted for raw materials.



Consider unique circumstances before deciding which glass management option is best for your geographic area. 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). There are existing LCA studies available online. It should be noted that LCA has limited capacity to account for all potential scenarios. Learn more about LCA at the links below:

- Life-cycle assessment, International Organization for Standardization (ISO), 2006:
<https://www.iso.org/obp/ui/#iso:std:iso:14040:ed-2:v1:en>
- Life-cycle assessment of North American Container Glass, Glass Packaging Institute (GPI), 2010:
http://www.gpi.org/sites/default/files/N-American_Glass_Container_LCA.pdf
- The complete life-cycle assessment, Owens-Illinois, 2010:
http://www.o-i.com/uploadedFiles/Content/Stacked_Content/OI_LCA_031010.pdf
- ♦ The Impact of Material Mismanagement (What LCA Doesn't See)
<https://www.environmentalleader.com/2018/08/the-impact-of-material-mismanagement-what-lca-doesnt-see/>

Environmental Benefit Snapshot

Reusing or recycling materials that would otherwise be put in a landfill saves energy and reduces greenhouse gas (GHG emissions). LCAs for glass generally agree that GHG emissions savings from recycling glass are equal to or more than GHG emissions from any transportation needed to recycle the glass. 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 not complete and new uses may be added as they come into 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 an average of 15-30 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 glass bottle.

Recycle: Glass is endlessly recyclable. 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%. Fiberglass insulation also conserves energy throughout its lifetime. One insulated home's annual energy savings reduces greenhouse gas emissions by about the same amount as taking 6-12 automobiles off the road for an entire year (home insulation in cold climates has a bigger emissions reduction). Making pozzolan and other long-lasting products conserves material resources.

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

Sources

- ◆ Life-cycle assessment of North American Container Glass, Glass Packaging Institute (GPI), 2010: http://www.gpi.org/sites/default/files/N-American_Glass_Container_LCA.pdf
- ◆ The complete life-cycle assessment, Owens-Illinois, 2010: http://www.o-i.com/uploadedFiles/Content/Stacked_Content/OI_LCA_031010.pdf
- ◆ Environmental Benefits of Refillable Beverage Containers: <http://refillables.grn.org/environmental-benefits-2/>

