

Aluminum Cans Leading the Way to Limit Carbon Impact

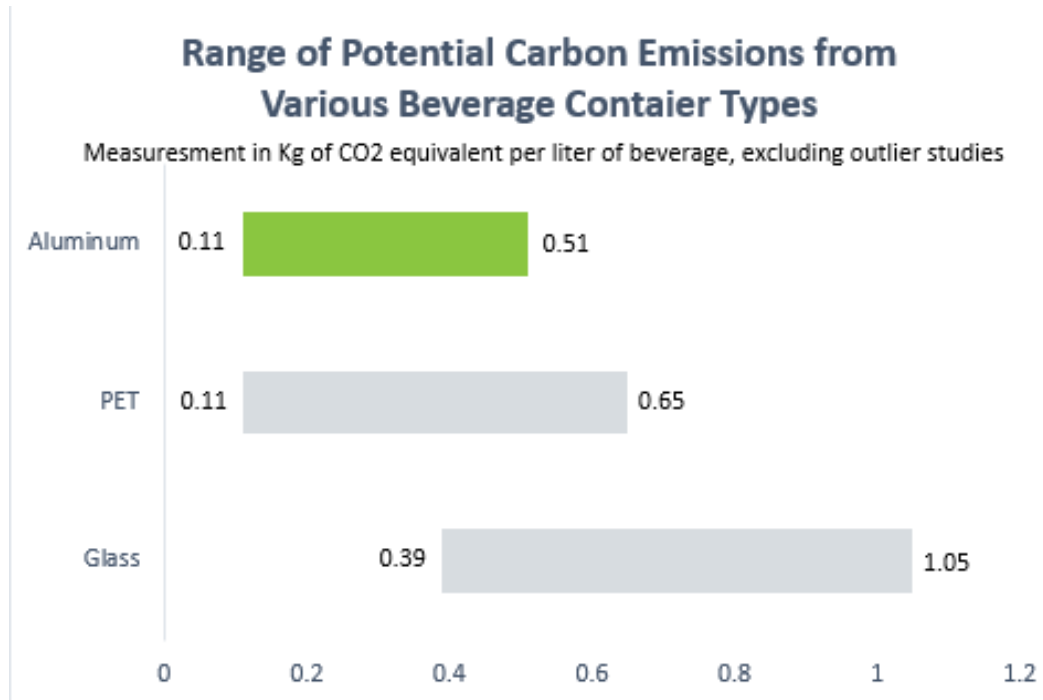
Comparative Life Cycle Assessment Analysis

John Beath Environmental



Key Takeaways

JBE Comparative LCA Literature Review



- Product life cycle assessment (LCA) is an approach for quantifying the life cycle environmental impacts of a product from raw material extraction to the recycling or disposal of the product at end-of-life.
- An analysis by John Beath Environmental of **more than a dozen life cycle assessment studies** found that aluminum beverage cans used to package carbonated drinks have a consistently lower carbon impact than glass bottles and a similar impact to plastic (PET) containers.
- Excluding study results that are true statistical outliers, the global warming potential (GWP) of aluminum beverage cans range from 0.11 – 0.51 kg CO₂e per liter of beverage packaged; glass bottles from 0.39 – 1.05 kg CO₂e; and PET/plastic bottles from 0.11 – 0.65 kg CO₂e.





“Product lifecycle assessment studies attempt to quantify the life cycle environmental impacts of a product but various assumptions and inputs can drive vastly different results from study to study.”

JOHN BEATH ENVIRONMENTAL, LLC

A Complex Process

Challenges of Life Cycle Carbon Accounting

Common challenges in developing studies comparing the carbon impact of beverage containers include:

- Assumptions about product weight (industry average vs. selected sample)
- Container size (single serving vs. larger format)
- Data quality including use of old, incomplete, or non-representative datasets vs. up-to-date, complete and representative datasets
- Study boundary (cradle-to-gate vs. cradle-to-grave)
- Product type (non-carbonated vs. carbonated beverage container)
- Transparency in reporting (Is underlying data/reporting publicly disclosed? Was the study subject to critical review?)
- Methodological approach for end-of-life recycling allocation (Cut-off vs. Substitution methods)



Aluminum cans contain **73%** recycled content on average.

This is up to **20X** the recycled content of plastic bottles.



Why Choose Aluminum?

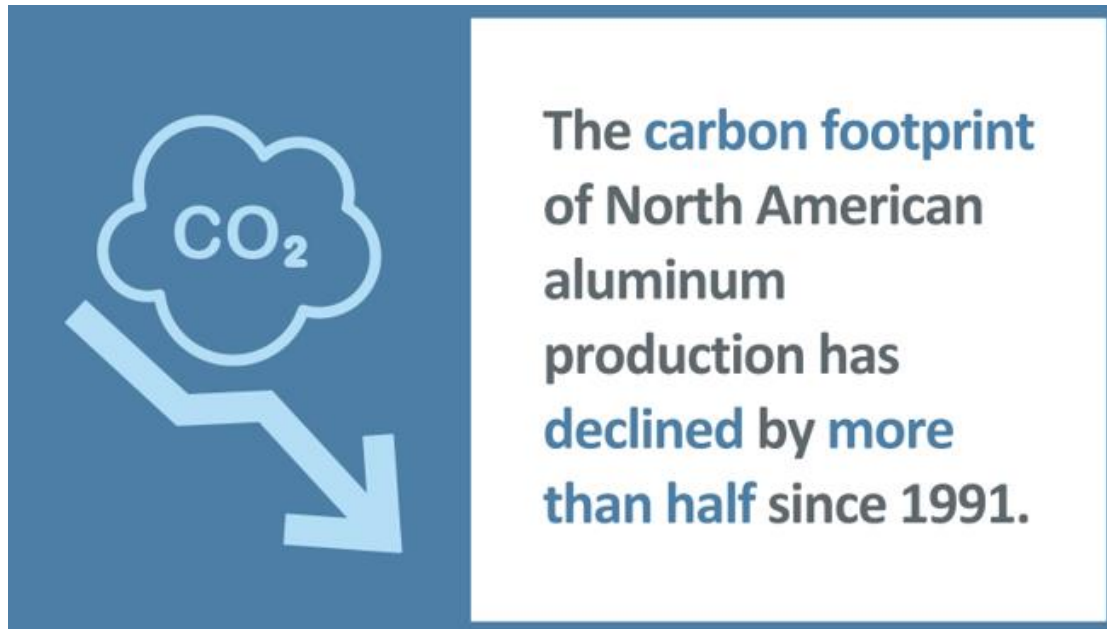
Aluminum's Other Advantages

- Globally, 75% of all the aluminum ever produced is still in productive use, while the vast majority of plastics end up dumped in landfills, oceans and elsewhere.
- Aluminum cans enjoy superior recycling rates to glass and plastic and more than 90% of the cans recycled in the United States are used to make new cans, unlike competing materials, which are often downcycled a single time – when they are recycled at all.
- Aluminum packaging represents just 3% of the weight of the recycling stream in a single family home but half the economic value – making recycling programs economically viable.

Ongoing Improvement

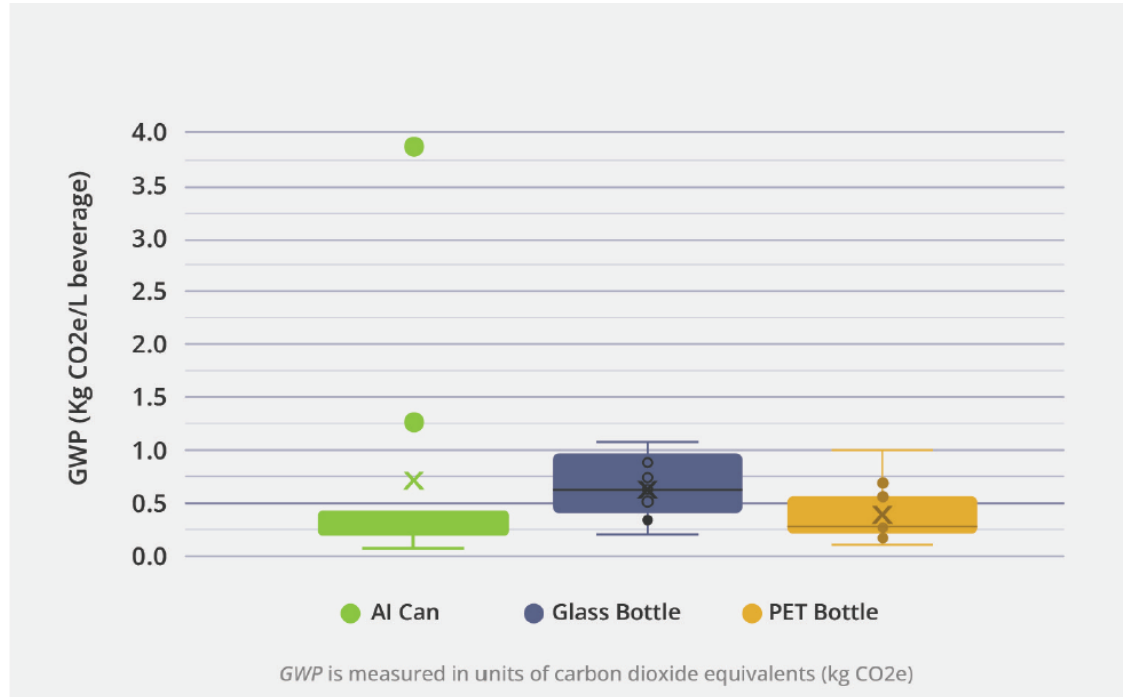
Part of the Green Transition

- The use of aluminum enables lower carbon outcomes in markets like automotive, building and packaging.
- The aluminum industry continues to make progress through efficiency improvements; increased low carbon electricity use; efforts to increase end-of-life product recycling; and innovations like inert anode and other technologies that eliminate direct carbon emissions in the aluminum smelting process.
- The industry is working to increase aluminum recovery and recycling including advocacy for container deposit/recycling refund programs which are proven to drive aluminum can recycling rates.



Outlier Studies

Why Some Study Results Were Excluded



- The JBE analysis disregards outlier numbers from two studies (**Carbon Trust, 2010; Owens Illinois, 2010**) in its conclusion of the literature review.
- These studies include statistical outlier values for the global warming potential (GWP) of both aluminum cans and PET bottles. In addition, one study that contains a GWP value for glass bottle is also excluded from the conclusion since the value does not fit with the scope of the analysis.
- Outliers can be true errors or true values. To determine the difference, one must either have a scientific knowledge regarding to what's possible in the real-world manufacturing practice, or, have the access to the data in the study that drove the conclusion.
- In this instance, the outlier values for both aluminum cans and PET bottles are highly not possible in the real-world of manufacturing practice, and they were presented in a “black box,” meaning that the authors failed to disclose necessary information to support their conclusions. Thus, the values are considered true statistical outliers and are excluded from the conclusions of this literature review.

2023 NAPCOR Study

Issues and Challenges

A 2023 study by the National Association of PET Container Resources (NAPCOR) found significantly higher global warming potential values for aluminum versus PET. The study has several shortcomings:

- Up-to-date PET data but dated aluminum data
- Included package sizes that are not comparable (2-liter PET bottle vs. single serve can)
- Secondary packaging (film wrap, cardboard, etc.) considered for some package types, but not others
- Lack of transparency in visibility into the LCA models and calculations

