COMPARING THE CARBON FOOTPRINTS OF BEVERAGE CONTAINERS

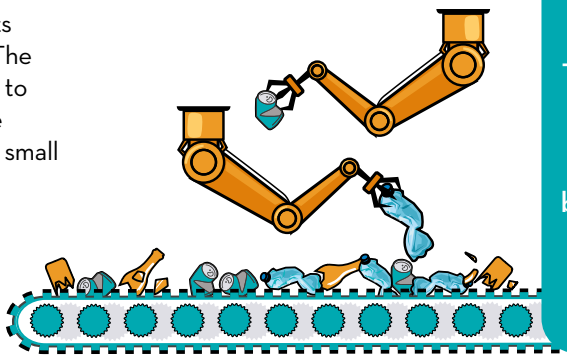
A comparative life cycle assessment (LCA) of single-use beverage packaging made from aluminium, glass and PET (polyethylene terephthalate), and drink cartons, has been published by aluminium packaging provider Ball Corporation. This information sheet extracts results for the carbon footprint of these packaging materials. The results reveal that aluminium and PET containers have far lower carbon footprints than single-use glass for carbonated (fizzy) drinks.

DID YOU KNOW?

Plastic bottles use different wall thicknesses – usually between 0.25mm and 0.89mm – depending on their use. Carbonated drinks need thicker PET bottles than those needed for still water or drinks to contain the pressure of dissolved CO_2 safely.

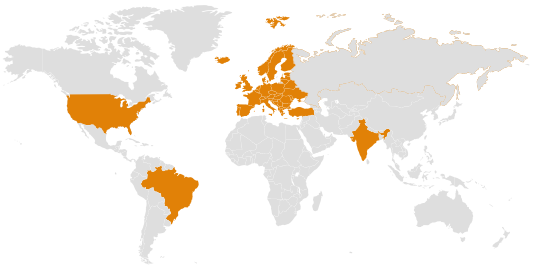
THE LIFE CYCLE ASSESSMENTS

Ball hired leading sustainability consultants Sphera (for USA, Europe and Brazil) and The Energy and Resources Institute (for India) to conduct a comparative LCA assessing the environmental performance of single-use, small to medium-sized beverage containers. For India and Brazil, re-useable glass bottles were also included.

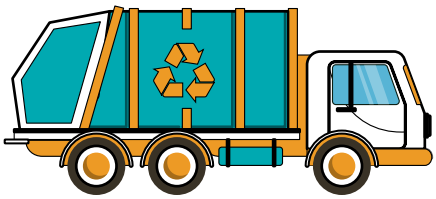


A VIEW OF BEVERAGE PACKAGING'S CARBON FOOTPRINT

The LCAs spanned four regions: USA, Europe, India and Brazil.



LCAs analysed the full value chain – including transport, filling, distribution and recycling.



The methodological approach was chosen on a regional basis, based on the local significance and acceptance of the methodology. The regional variation in rankings is mostly the result of differences in recycled content and recycling rates. Getting these assumptions as close to reality as possible and being transparent about them is key to maintaining the integrity of any LCA.

Both studies meet the requirements of the international standards for LCA according to ISO 14040 (ISO, 2006) / ISO 14044 (ISO, 2006) and were externally peer reviewed by LCA experts.

KEY FINDINGS

1

A packaging container with a larger volume requires less material compared with a container with a smaller volume, making comparisons across different container sizes difficult. To reduce the impact of container size, the two presented LCAs focused on small-to-medium-sized products, and not all beverage packaging types and formats.

2

Aluminium cans and PET bottles perform best across all regions for single-use drink containers.

3

In Brazil, of the 8 carbonated drinks containers (of varying sizes) analysed, aluminium cans are the three best-performing.

In Europe, the lowest aluminium can ranks 5th (all) and 2nd (carbonated); in the USA, 2nd (all) and 1st (carbonated); and in India, 3rd (all) and 2nd (carbonated).

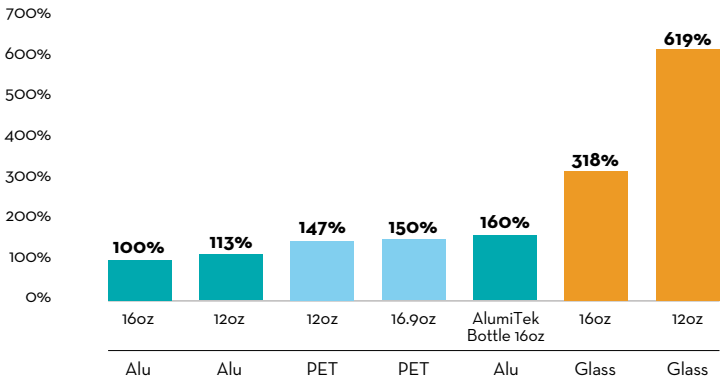
4

By far, single-use glass has the highest carbon footprint across all regions and for all drink types.

CARBONATED DRINKS

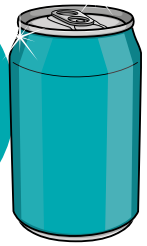
For carbonated drinks overall, the carbon footprint of aluminium and PET beverage containers is within the same range, while single-use glass has a significantly higher carbon footprint. The below graphs show the carbon footprint comparison per gallon in the US and per litre elsewhere, and use a baseline at 100% for the lowest carbon footprint. Cartons cannot hold carbonated drinks, hence cartons do not appear in the data for carbonated drinks containers.

USA



16oz

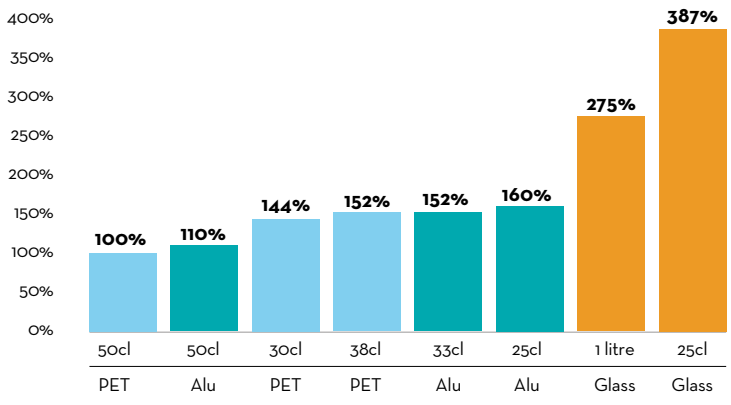
16oz aluminium cans have the lowest carbon footprints, followed closely by 12oz cans.



6x

The carbon footprint of a 12oz glass bottle is more than six times higher than a 16oz aluminium can.

EUROPE



1/2

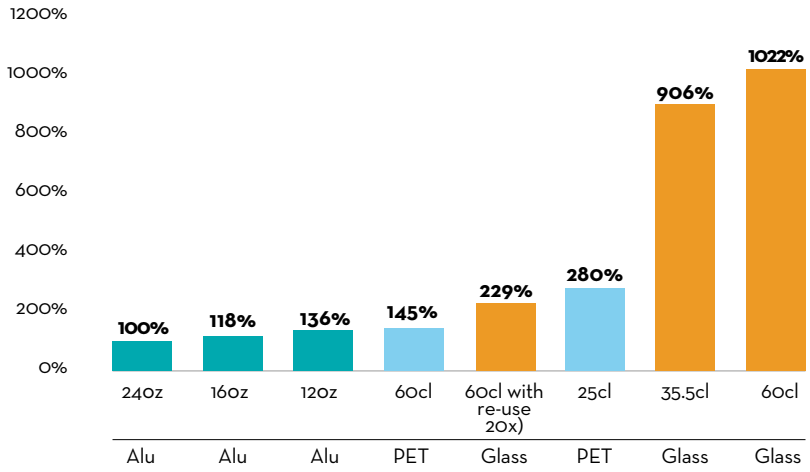
All four sizes of PET bottles and aluminium cans analysed had carbon footprints less than half of a 25cl glass bottle, and at least 40% less than a 1 litre glass bottle.

50cl

The 50cl PET bottle and 50cl aluminium can have the lowest carbon footprint.

BRAZIL

The results of all the studies in Brazil reveal that **aluminium cans have the lowest carbon footprint**, compared to PET and glass bottles.

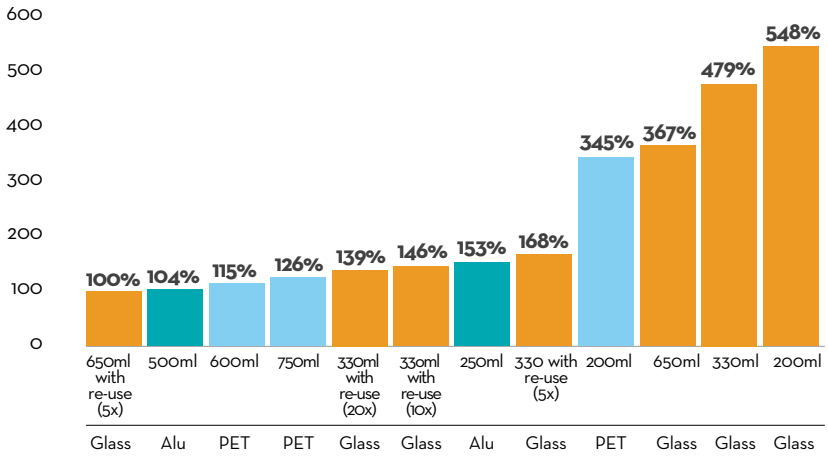


Aluminium cans had the lowest carbon footprint of all containers assessed, regardless of the size or format.

10x

The carbon footprint of a 60cl glass bottle is over 10 times higher than a 24oz (approximately 71cl) aluminium can.

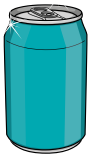
INDIA



3x

Single-use glass bottles have the three highest carbon footprints. The carbon footprint of the 200ml glass bottle is over three times that of the 250ml aluminium can.

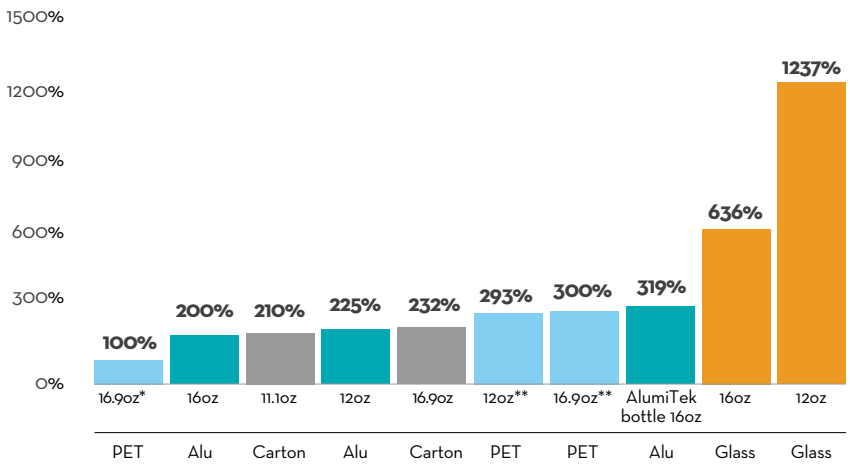
However, the container with the lowest carbon footprint is glass – the 650ml with 5 x re-use, closely followed by the 500ml aluminium can.



ALL DRINKS (CARBONATED AND NON-CARBONATED)

When comparing all drink types, including carbonated and non-carbonated, aluminium cans have the smallest carbon footprint in Brazil. In the USA and Europe, PET for non-carbonated drinks produces the smallest carbon footprint. For India, the lowest carbon footprint was reached with beverage cartons. The below graphs show the carbon footprint comparison per gallon in the US and per litre elsewhere and use a baseline at 100% for the lowest.

USA



*Non-carbonated **Carbonated

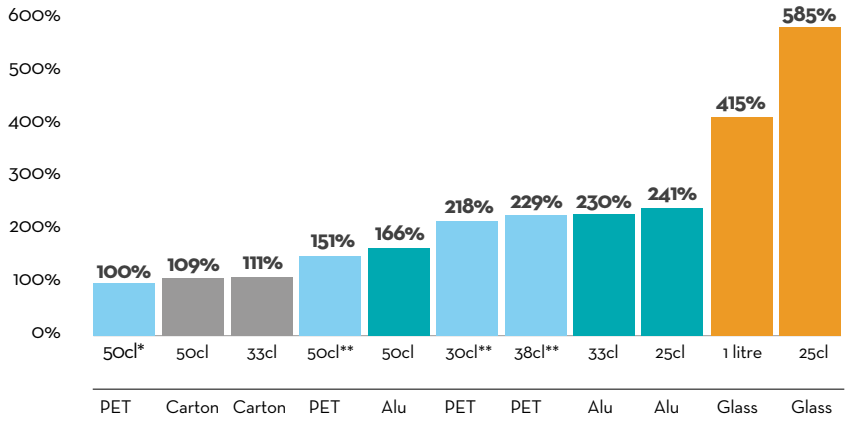
16oz

The 16oz aluminium can has the second lowest carbon footprint. The beverage container that produced the lowest carbon footprint is the 16.9oz PET bottle (for non-carbonated drinks only).

6–10x

The carbon footprint of a glass bottle is 6-10 times higher than the carbon footprint of the lowest-ranking PET bottle. The carbon footprint of the worst-performing aluminium can (AlumiTek bottle) was half that of the best performing glass bottle (16oz).

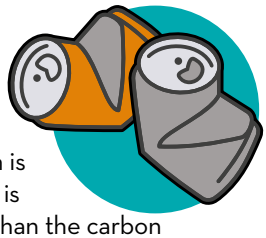
EUROPE



*Non-carbonated **Carbonated

50cl

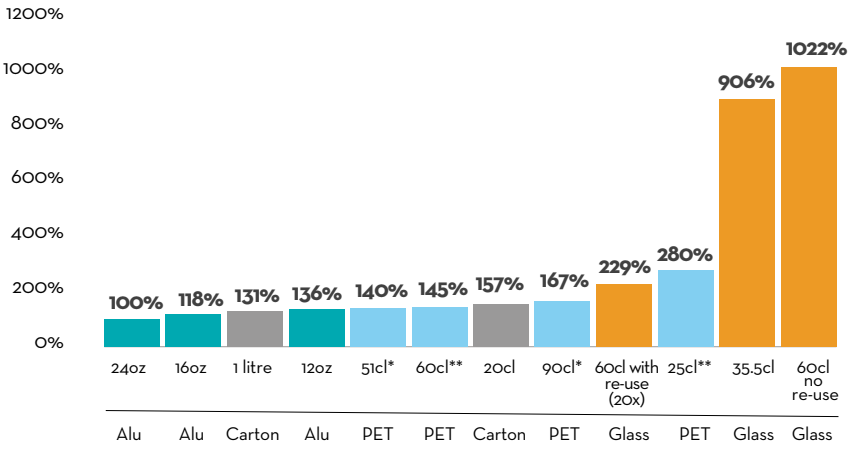
The 50cl PET bottle for non-carbonated drinks (extremely light) has the lowest carbon footprint.



+70%

The lowest carbon footprint for aluminium is for the 50cl can, which is more than 70% lower than the carbon footprint for the best performing glass bottle (which is a 1 litre).

BRAZIL



*Non-carbonated **Carbonated

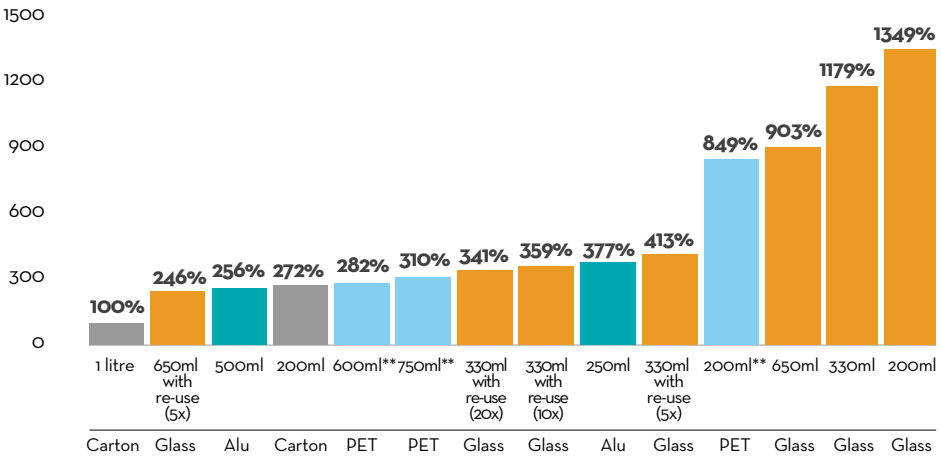
1st & 2nd

The 24oz and 16oz aluminium cans take first and second place respectively for the lowest carbon footprint produced.

2x

Reusable glass bottles (60cl) with 20 refills have a carbon footprint that is double the size of aluminium cans.

INDIA

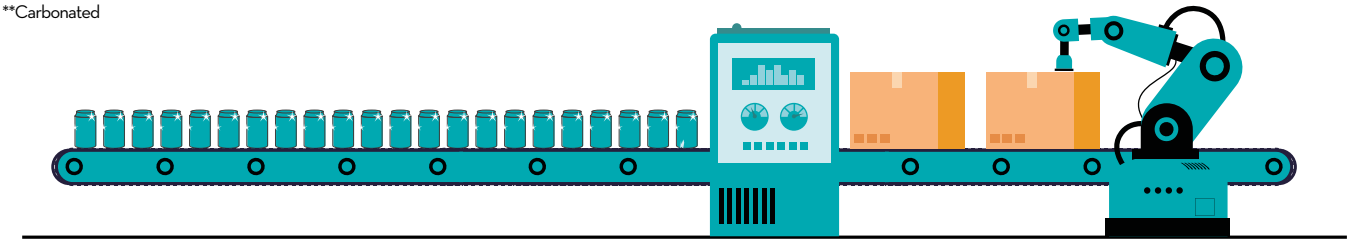


**Carbonated

>1/3

The carbon footprint of the worst performing aluminium can (250ml) is less than one-third of the carbon footprint of the worst performing glass bottle (200ml), and less than half of the worst performing PET (200ml).

This is the only region and category in which a carton (in this case, 1 litre) is the best performing container in terms of carbon footprint.



Source: ball.com (USA, Europe, Brazil) and teriin.org (India)