

Europe-wide life-cycle assessment of NCSO packaging systems



The Europe-wide “Comparative life-cycle assessment of packaging systems for non-carbonated soft drinks” commissioned by SIG Combibloc, analyzes and compares the environmental impacts of beverage cartons, disposable PET bottles and disposable glass bottles across three main relevant packaging sizes (200-250ml; 1,000ml; 1,500ml).

The assessment includes NCSO (non-carbonated soft drinks) packaging in the juices, nectars and still fruit drinks categories.

The results are relevant for the European market and not limited to a particular country.

The study was conducted by the IFEU institute and the results have been critically reviewed to ensure the compliance with the ISO 14040ff standards on LCA.



Beverage carton 250 ml 1,000 ml 1,500 ml

PET bottle 250 ml 1,000 ml 1,500 ml

Glass bottle 200 ml 1,000 ml



This life-cycle assessment (LCA) evaluates the entire life cycle of NCSD packaging taking into account all relevant environmental impact categories – beginning with the extraction and refining of the raw materials, to the manufacture of the packaging, the transportation, the filling process, distribution to the retailing stage and right up to disposal or recycling after use. Not included are the filling goods, shopping and use phases as these are assumed to be equal for each packaging system. The study was also critically reviewed and verified by an independent panel of experts.

ISO 14040ff compliant and critically reviewed

- LCA is an important environmental tool for companies to furnish credible proof of their environmental responsibility to different stakeholders
- LCAs are the only tool for environmental assessment being standardized worldwide according to binding ISO 14040ff standards

Institute for Energy and Environmental Research (IFEU)

The independent IFEU institute based in Heidelberg, Germany, is one of the most reputable environmental research institutes in Europe, with extensive industry knowledge due to several LCAs on the environmental performance of the PET bottle, the beverage can and the beverage carton.

Results:

Primary raw material as key driver of environmental performance

Type of raw material and quantity are the decisive factors with regard to environmental impact.

Beverage carton with better environmental performance in most impact categories

Across all sizes, the beverage carton performs significantly better in the key impact categories “climate change” (up to 64% against PET) and “fossil resource consumption” (up to 75% against PET). This is because wood has a carbon neutral balance and the cardboard is produced with a high level of renewable energy (>90%).

Manufactured mainly from pulp fibres obtained from wood, a renewable resource, carton packs consequently show the highest impact in the “use of nature” category. But in contrast to finite resources, a constant supply of this raw material is possible: Having 100% of its cardboard suppliers, its converting sites and sales offices FSC Chain of Custody - certified, SIG Combibloc can prove that 100% of the wood fibres used to produce the carton packs are from controlled or FSC-certified sources.

The results show that carton packs perform better in the key impact categories even when assuming a notional but not yet realistic average recycled PET share of 50%. Furthermore, carton packs show a significant potential for a further 20% reduction of CO₂ emissions using a new carton structure which is under development.

Overview LCA results

Beverage carton vs. PET bottle

carton significantly better
no significant difference
carton significantly „worse”¹

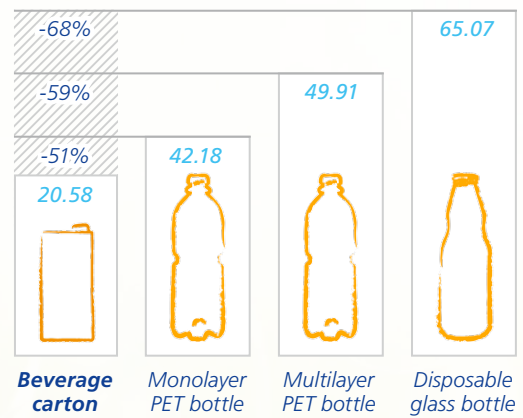


Size	Small	Medium	Large	
Fossil resource consumption (in kg crude oil equivalent)*	-75%	-51%	-47%	Resource-related impact categories
Non-renewable primary energy (in giga joule)*	-70%	-42%	-35%	
Total primary energy consumption (in giga joule)*	-61%	-24%	-14%	
Use of nature (in m ²)*	+65%	+93%	+85%	
Climate change (in kg CO ₂ equivalent)*	-64%	-28%	-18%	Emission-related impact categories
Acidification (in g SO ₂ equivalent)*	-54%	-13%	-1,3%	
Eutrophication (in g PO ₄ equivalent)*	-56%	+/-0%	+5%	
Human toxicity PM₁₀ (in g PM ₁₀ equivalent)*	-57%	-15%	-7%	

* per packaging required for 1,000 L non-carbonated soft drinks
¹ at a 10% significance level

Fossil resource consumption (medium size)

(in kg crude oil equivalent; per packaging required for packaging 1,000 L non-carbonated soft drinks)



Climate change (medium size)

(in kg CO₂ equivalent; per packaging required for packaging 1,000 L non-carbonated soft drinks)

