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Keeping our customers in the lead

Quantifying Environmental Impacts of Beverage Packages

Comparing the Total Environmental Impact of Beverage Packages in North America

Objective:

The objective of these studies were to compare the total environmental impacts of PET versus the primary package types used in North America for CSD and Wine. All package types were considered to be best in class.

CSD - Three package types were considered: 23.9g PET bottle/355ml (2.3g HDPE closure), 200.0g glass bottle/355ml (2.1g metal closure), and 11.3g aluminum can/355ml (2.8g aluminum can end).

Wine - Two package types were considered: 611.6g glass bottle/750ml (4.4g metal closure), and 45g PET bottle/750ml (4.4g metal closure)

The environmental impact was calculated by focusing on weight of materials, total energy consumption, and total greenhouse gas release. A cradle-to-grave analysis was completed for each packaging scenario, including all processing, transportation, and raw materials (energy and GHG releases are accounted for starting from when the raw material was in its original state via LCI inputs e.g. oil in the ground, boxite mining for aluminum, etc...). The overall goal was to quantify the environmental impacts of each packaging type.

Results:

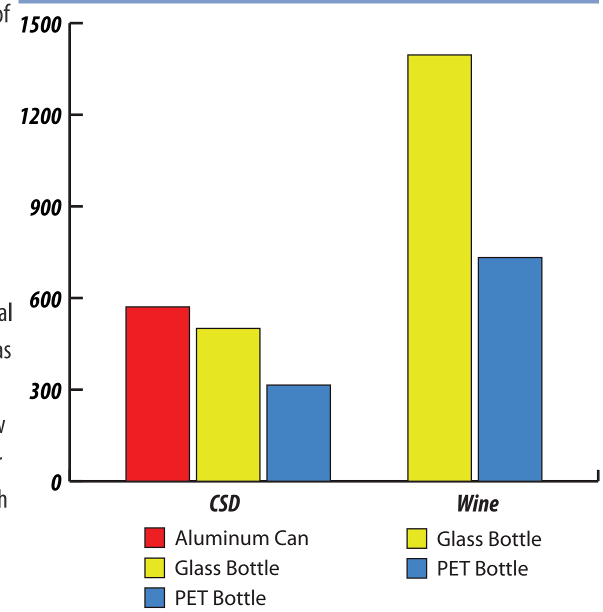
CSD - PET had the lowest GHG emissions to produce at 314.9 lbs/1,000 units. Glass bottle had the second best GHG emissions at 504.4 lbs/1,000 units. Aluminum can had the worst GHG emissions to produce at 570.9 lbs/1,000 units.
PET had the lowest energy consumption to produce at 3,225 MJ/1,000 units.
Aluminum can had the second best energy consumption at 3,917 MJ/1,000 units.
Glass bottle had the worst energy consumption at 4,227 MJ/1,000 units.

Wine - PET had the better GHG emissions to produce at 732.5 lbs/1,000 units, while glass had GHG emissions to produce of 1,395.8 lbs/1,000 units. PET had the better energy consumption to produce at 7,132 MJ/1,000 units, while glass had energy consumption to produce at 12,480 MJ/1,000 units.

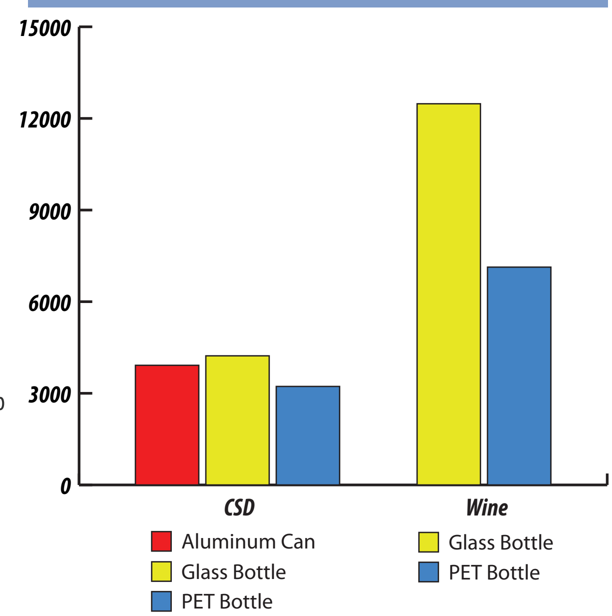
Conclusion:

PET is an environmentally responsible packaging choice for a wide variety of applications, however it may not always the best choice for every application. Increased recycle rates, and the inclusion of PCR content into new bottles would help lower PET's current environmental footprint. PET does provide increased package robustness vs specific packaging alternatives in terms of shatter and puncture resistance.

GHG Emissions (lbs /1,000 units)



Energy Consumption (MJ /1,000 units)



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Assumptions:

CSD - Package manufacturing and filling operations are co-located, keeping transport impacts low.

PCR content rates were : Aluminum Can = 46%, Glass Bottle 39%, PET Bottle 0%

Fill speeds (per min) Al Can = 2,000, Glass Bottle = 1,250, PET Bottle = 1,350

Ship distance to retail for all three packaging types was 800km

Labels were not considered for any package

Wine - Glass bottle and PET bottle production were located 50 miles from filling operations

Recycling rates were: Glass Bottle 30%, PET Bottle 20%

Fill speeds (units per min) Glass Bottle = 300, PET Bottle = 400

Ship distance to retail for both packaging types was 400km

Oxygen scavenger barrier and 5% colorant used for PET bottle

Labels were not considered for any package

Exclusions:

Energy and GHG emissions for transport from retail store to consumer's location were ignored as these are not easily modeled.

Consumption of the distribution network including electricity and GHG emissions for distribution centers and supermarkets.

Infrastructure (buildings) are not considered. Buildings have a long service life. The environmental impacts of their construction and disposal, in terms of each packaging unit can be regarded as insignificant.

Home consumer energy consumption (e.g. refrigerator usage).

PET Benefits:

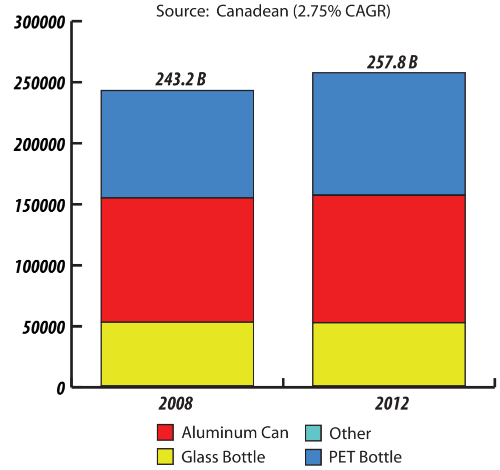
Significant weight savings over glass (Shipping cost advantages)

Shape Flexibility - can assume traditional bottle shapes

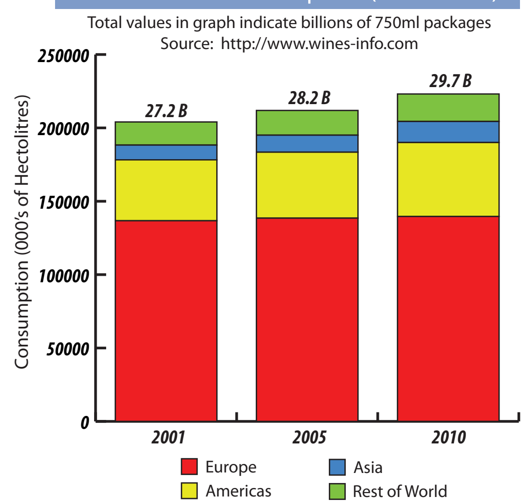
Rapid ramp up time to set up preform-blowing production cells

Shatter and puncture resistance of PET package vs Glass (CSD & Wine) & aluminum can (CSD)

Global CSD by Package Type (000's)



Global Wine Consumption (Hectolitres)



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