



*Keeping our customers in the lead*

# Quantifying Environmental Impacts of Wine Packaging

Comparing the Total Environmental Impact of Wine Packages in North America

## Objective:

The objective of these studies were to compare the total environmental impacts of PET versus the primary package type used in North America for wine. Both package types were considered to be best in class. Two package types were considered: 611.6g glass bottle/750ml (4.4g metal closure), and 45.0g 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, etc.... The overall goal was to quantify the environmental impacts of each packaging type.

## Results:

PET had lower GHG emissions to produce at 732.5 lbs/1,000 units vs 1,395.8 lbs/1,000 units for the Glass bottle (90% more than the PET bottle).

PET had lower energy consumption to produce at 7,132 MJ/1,000 units vs 12,480 MJ/1,000 units for the Glass bottle (75% more than the PET bottle).

## Conclusions:

PET is an environmentally responsible packaging choice for wine. PET offers shape benefits, and similar line speed efficiencies compared to glass. 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 the glass bottle as well. Depending upon spoilage rates due to package failure, this can be a significant cost.

## Definitions:

*Cradle-to-Grave* - Cradle-to-grave is the full Life Cycle Assessment from manufacture ('cradle') to use phase and finally disposal phase ('grave').

*LCI* - Life Cycle Inventories. An accounting of the energy and waste associated with the creation of a new product through use and disposal.

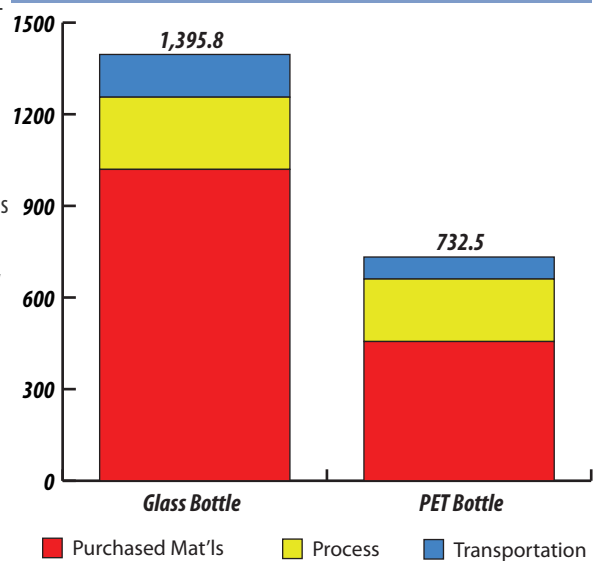
*Process* - Anything related to manufacture and filling of the primary package and its components.

*Purchased Materials* - Any material used for the manufacture of the primary package, including: raw materials/packaging, pallet packaging, etc...

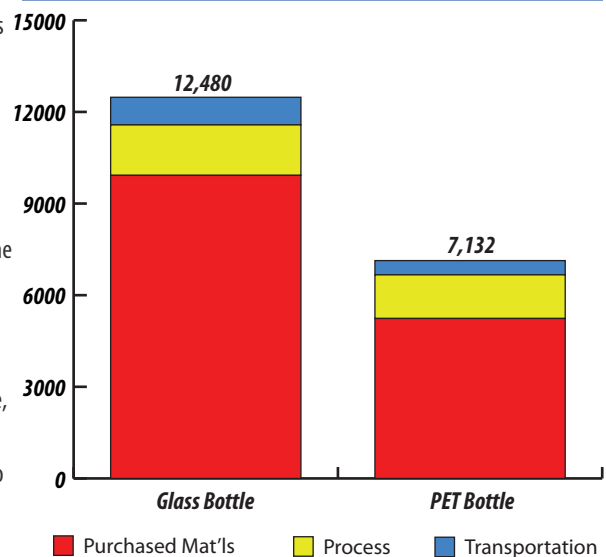
*Transportation* - Anything related to the movement of materials from one location to another.

*PCR* - Post-Consumer Recyclate. Material that was used by a consumer and then recycled for use in a new product (e.g. PET bottle).

GHG Emissions (lbs /1,000 units)



Energy Consumption (MJ /1,000 units)



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## Assumptions:

- Glass bottle and PET bottle production were located 50 miles from filling operations.
- Recycling rates were: Glass Bottle 30% and PET Bottle 20%.
- Fill speeds (units per min): Glass Bottle = 300, PET Bottle = 400.
- Ship distance to retail for all three 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.
- Robustness of PET package vs Glass.
- No major re-tooling requirements to run PET on glasss filling lines.

Geography	North America	
Beverage Type	Wine	
Package	Bottle (Glass)	Bottle (PET)
Size (ml)	750	750
Weight per Unit lbs (g)	1.3484 (611.62)	0.0992 (45.0)
Material	Glass	PET
Cycle Time		15 sec
Colorant / Barrier		5% / Oxygen Scavenger
Closure	Metal Cap	Metal Cap
Weight per Unit lbs (g)	0.0096 (4.35)	0.0096 (4.35)
Material	Screw Cap Metal (Al)	Screw Cap Metal (Al)

## Global Wine Consumption (Hectolitres)

Total values in graph indicate billions of 750ml packages  
Source: <http://www.wines-info.com>

