

How Cork Reduces Your Carbon Footprint

Sustainable Wine Packaging

The classic packaging combination of cork and glass historically represents the highest expression of wine excellence. That association continues as an icon of quality today. Glass bottles with cork finish provide a combination of sensory neutrality with the unmatched potential for natural flavor development through aging. In addition, this historic packaging offers substantial contribution to the achievement of sustainable goals.

Sustainability and Natural Cork

Most people in the wine industry are aware that the cork forest is a vital center of sustainability. According to the World Wildlife Fund, "Cork oak landscapes are one of the best examples of balanced conservation and development anywhere in the world. They also play a key role in ecological processes such as water retention, soil conservation, and carbon storage."

Not all wineries know the extent that they can share some of these sustainable values from across the Atlantic. Last year, the EU Product Environmental Footprint Category Rules (PEFCR) were adopted for wine. They specified, "Carbon permanently stored in the soil and tree biomass of cork oak forests and vines shall be taken into account if this storage goes beyond 100 years." This action reinforces carbon sequestration as a relevant environmental issue to distinguish natural cork from artificial stoppers.

The scope of this consideration is quite significant. The average wine cork has a negative carbon footprint of about -5 grams. but when the biogenic carbon fixing value of the forest is included, the net carbon balance is -276 grams per cork!

At that level, 1,000 cases finished in cork represents 3.3 metric tons of carbon dioxide emissions. To put this in perspective, 1,000 cases of cork contribute the same level of CO₂ offsets as do 83 standard solar panels. Twelve cases of cork finished wine represent an equivalent amount of CO₂ savings as the annual operation of one 250wt solar panel,

To assist in your carbon footprint calculations there is an application that shows the carbon offset value for natural cork closures at www.corkqc.com/CO2.



Closure Comparison

- A Typical Wine Cork has a Net Carbon Balance of negative -276 grams
- That is a carbon offset equal to x70 its Weight
- For 1,000 Cases of Wine That is negative -3.3 Tons of CO₂e balance
- That is equivalent to Greenhouse Gas Savings from 83 Standard 250watt Solar Panels
- Compared to Screwcaps, this improves the carbon balance by +3.9 Tons CO₂e per 1,000 Cases
- Compared to Synthetics, this improves the carbon balance by +3.5 Tons CO₂e per 1,000 Cases
- In many cases, the negative carbon balance of natural cork can reduce the combined balance of wine packaging to less than zero.



What is the term Carbon Balance, and why is it important?

Carbon balance is a valuable concept used to describe how the management of ecological entities effects climate change.

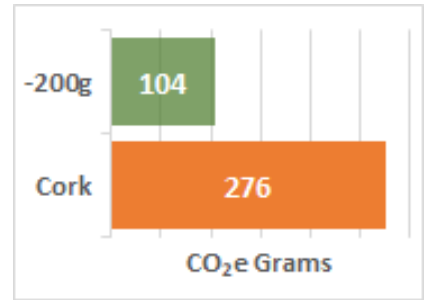
In the case of the cork forest, the balance measures the ratio between the amount of carbon dioxide (CO₂) and other greenhouse gases released into the atmosphere and the amount that is absorbed and stored in the trees. This balance is determined by the amount of CO₂ emissions from human activities, such as burning fossil fuels, and natural processes such as photosynthesis and respiration.

The Mediterranean cork forest acts as a carbon sink for 14 million tons of CO₂. The average Net Ecosystem Exchange for CO₂ for cork producing forests is -10.6 tons/ha. That is the equivalent of -278 grams per cork. When adjusted for the GHG emitted during cork production, the result is a net carbon balance of -276 grams per cork.

Improve Package Emissions by Reducing Bottle Weight

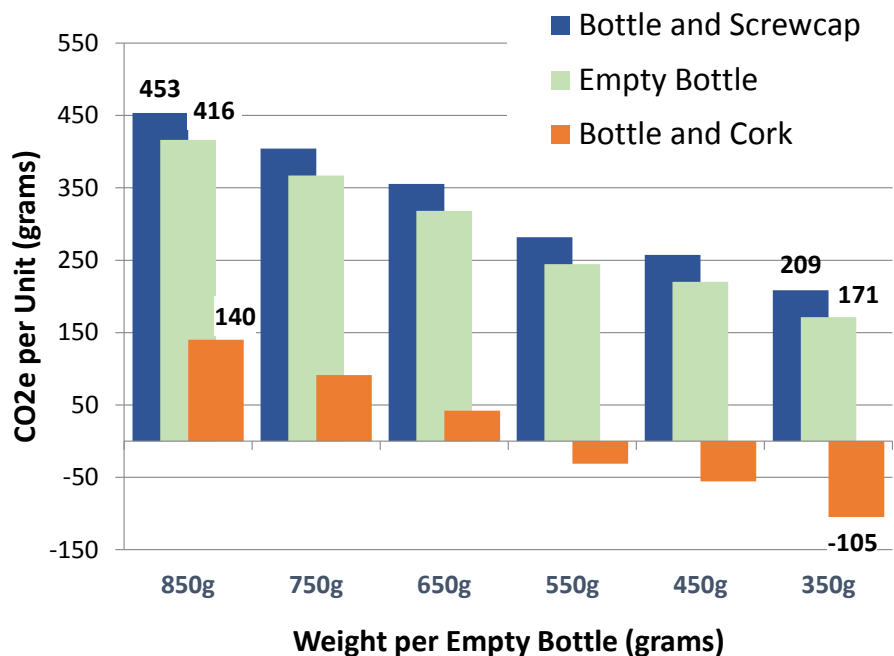
Reducing glass weight from 650g to 450g reduces the carbon footprint of one bottle by 104 grams of CO₂.

Using a natural cork reduces the carbon balance by an additional 276 grams.



- Reducing Bottle weight from “very heavy” (850g) to “ultra light” (350g) saves 245g of carbon equivalence according to IWCA calculations.
- The addition of a screwcap adds an estimated 37g to the carbon footprint of the bottle. Replacing a screwcap with cork reduces the balance by -313 grams.
- The improvement in carbon balance achieved by using a cork closure exceeds the value realized by a bottle weight reduction of 500 grams.
- This graphic assumes wine bottled with 50% recycled glass.

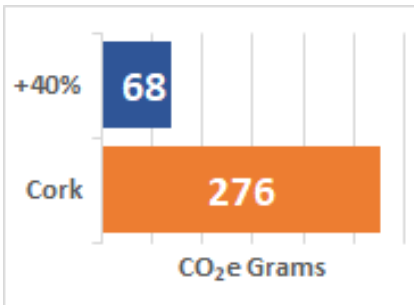
**CO₂ Balance Based on Bottle Weight (IWCA/EPA)
Compare 50% Recycled with Cork and Screwcap**



Glass calculations from IWCA GHG Calculator based on EPA assumptions for the emission factor of .60 metric tons CO₂e/short tons of Virgin Glass and .29 metric tons CO₂e/short tons of for Recycled Material. Does not include transport.

Reduce Your Carbon Footprint

Improve Package Emissions by Increasing Recycled Glass



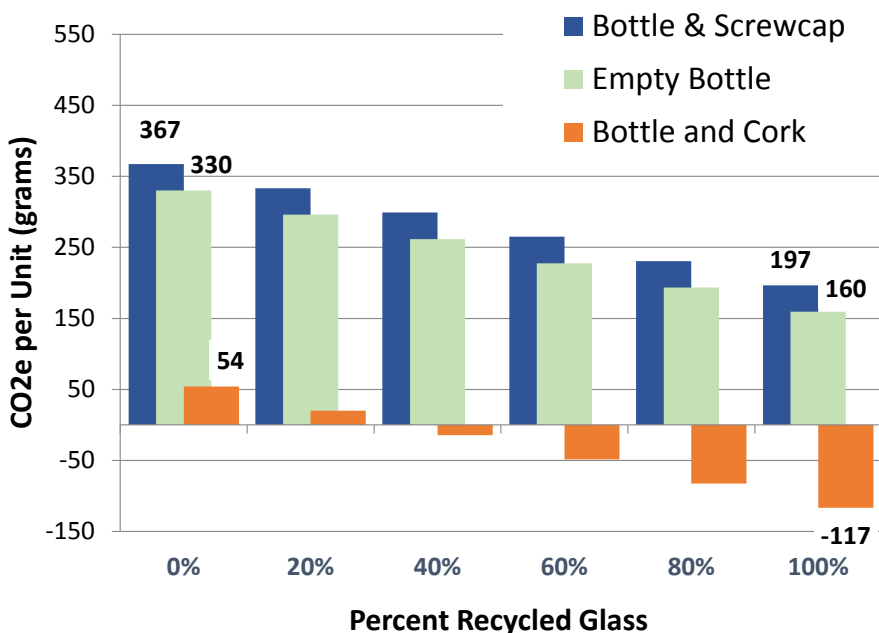
Doubling recycled glass content from 40% to 80% reduces the carbon footprint of one bottle by 68 grams of CO₂.

Using a natural cork reduces the carbon balance by an additional 276 grams.



- Increasing the percentage of recycled glass from “virgin” (0% recycled) to 100% recycled glass saves 188g of carbon equivalence according to IWCA calculations.
- The addition of a screwcap adds 37g to the carbon footprint of the bottle. Replacing a screwcap with cork reduces the balance by -313 grams.
- The improvement in carbon balance achieved by using a cork closure is more significant than the full range of recycled glass content.
- This graphic assumes a wine bottle weighing 550 grams.

CO₂ Balance Based on % Recycled (IWCA/EPA) Compare 550g Bottle with Cork and Screwcap



Glass calculations from IWCA GHG Calculator based on EPA assumptions for the emission factor of .60 metric tons CO₂e/short tons of Virgin Glass and .29 metric tons CO₂e/short tons of for Recycled Material. Does not include transport.

Sustainable Qualities of Glass Bottles, and Statistics for Recycling

- Glass is 100% recyclable and can be recycled endlessly without loss in quality or purity.
- Glass is made from readily available domestic materials, such as sand, soda ash, limestone, and “cullet,” the industry term for furnace-ready recycled glass.
- Recycled glass can be substituted for up to 95% of raw materials.
- Recycled glass is always part of the recipe for glass, and the more that is used, the greater the decrease in energy used in the furnace.
- Current GHG calculations use an emission factor for recycled glass that is roughly half of that used for virgin materials.
- [According to the U.S. EPA](#) - 39.8% of wine and liquor bottles were recycled. In total, 33.1% of all glass food and beverage containers were recycled.
- Glass bottles have been reduced in weight by approximately 40% over the past 30 years.



Why 100 Years?

EU guidelines encourage the recognition of retained biogenic carbon storage for habitats of 100 years in age.

That distinction includes some vineyards and virtually the entire cork forest. This age limit excludes contributions from most traditional agriculture, and reflects the negative GHG impact from soil tillage and the excessive GHG footprint of most harvesting operations.

US sustainable organizations are still determining how to apply biogenic sequestration values, but European authorities have agreed that the substantial carbon balance of the cork forest should be recognized in GHG calculations.

EU authorities see the cork forest as a natural habitat that incurs no tillage and is devoid of destructive harvesting methods. It provides a crucial source of carbon sequestration and guidelines were drawn to reflect this valuable sustainable quality.

Carbon Footprint Calculations and Assumptions

1. Carbon Footprint for the Manufacture of Natural Corks

Model Based on Estimates for traditional corks from:

- [Ernst & Young Life Cycle Analysis prepared for Corticeira Amorim](#)
- [KPMG International Life Cycle Analysis prepared for M.A. Silva](#)

Both Models show a negative net footprint in which the stored carbon value of the product exceeds the emissions related to manufacturing. Results are described as "cradle to gate" and show an Average Carbon Footprint for Natural Cork = -4.95 g/cork.

The breakdown includes an average of 2.1g GHG during manufacture and preparation. This is offset by -7.05 grams of retained carbon in the cork.

2. Carbon Footprint for the Manufacture of Aluminum Screwcaps

Model Based on Estimates from:

- Corticeira Amorim, PriceWaterhouseCooper, Ecobilan, "[Analysis of the life cycle of Cork, Aluminum and Plastic Wine Closures - October 2008](#)" [PWCE-LCA-Cork-Report.pdf](#)

Carbon Footprint for Screwcaps = 37.17 g/cap

3. Carbon Footprint for the Manufacture of Synthetic Stoppers

Model Based on Estimates from:

- Corticeira Amorim, PriceWaterhouseCooper, Ecobilan, "[Analysis of the life cycle of Cork, Aluminum and Plastic Wine Closures - October 2008](#)" [PWCE-LCA-Cork-Report.pdf](#)

Carbon Footprint for Synthetics = 14.83 g/stopper

4. Carbon Offset from Contribution of the Cork Forest

Rationale Based on Recommendations from:

- [EU Product Environmental Footprint Category Rules \(PEFCR\) for Still and Sparkling Wine:](#)

Model Based on Estimates from:

- Long term Ecosystem flux measurements from a representative cork forest in central Portugal. Costa-e Silva, et.al 2015, [of an extremely dry winter on net ecosystem carbon exchange and tree phenology at a cork oak woodland \(2015\).](#)



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