

The truth about CO2 emissions in the wine industry



DE MARTINO
REINVENTING CHILE

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90% of the world's CO2 emissions are related to burning fossil fuels, which are mainly used in transport, heating/cooling and in most production processes. Burning one litre of gasoline causes an emission of approx 2,4 kg CO2, while burning one litre of diesel causes approx. 2,7 kg CO2.

A medium sized car that travels 20.000 kms in a year, will emit approximately 3700 kg of CO2 during that year. The 53 million cars that travel the 650.000 km of roads in Germany generate over 200 billion kg of CO2 per year. The number for the UK's 33 million cars is about 130 billion kg of CO2 per year...

Nature (plants, sea) has a capacity to absorb or sequester CO2, but humanity has reduced the presence of nature to such an extent that man-produced CO2 is now more than the world's carrying capacity to absorb CO2. (We would in fact need 1,2 earths to absorb the CO2 we currently produce). This explains the build-up of CO2 in our atmosphere and the effect on our climate, our health and the threat to the continuity of certain species on earth, including possibly man.

Apart from having a beneficial effect on water regulation and oxygen production, one hectare of young forest captures about 15 tonnes of CO2 per year. Bamboo is especially effective and captures 62 tonnes of CO2 per hectare per year. It would require about 140 trees to 'neutralize' an average car.

We are (too) slowly becoming aware of this and are starting to make an effort to reduce our carbon footprint. Fortunately, the technology exists to reduce the footprint of our activities by 30 - 90%. If only we can kick old habits and governments help new technologies develop rather than protect established technologies and corporations. A greater awareness of the environmental impact of our day-to-day activities will be helpful towards changing our consumption patterns.

The environmental impact of the products that we consume is not just caused by the product itself. Taken into account should be the full Life Cycle Analysis, i.e. the CO2 caused from the very beginning (extraction of raw materials and energy used to produce and distribute a product) to the very end (disposal or recycling of waste caused by the product).

This brief paper wants to help achieve a greater awareness and disprove some false myths when it comes to the CO2 generated by our passion for wines. While this study is not exhaustive, it does cover the main factors that contribute to the CO2 emitted by the wine industry and should therefore be a useful tool in increasing the awareness of wine consumers and trade.

CO2 in viticulture and vinification

Wine production is good. During the grape's growing season, CO2 is sequestered by the vines' growth and production of sugar in the grapes. This is more than the CO2 emitted by the biomass and during the fermentation process, to such an extent that production and fermentation of 1 kg of grapes reduces the CO2 by approx. 0,3 kg.

Interestingly, the production of higher alcohol wines sequesters more CO2:

Average Brix	CO2 generated/sequestered per Kg grapes
25	- 0,94 kg total CO2 sequestered 0,53 kg total Biomass CO2 emission <u>0,1 kg CO2 produced in fermentation</u> - 0,31 kg net sequestration of CO2
21	- 0,79 kg total CO2 sequestered 0,45 kg total Biomass CO2 emission <u>0,1 kg CO2 produced in fermentation</u> - 0,24 kg net sequestration of CO2

Organic and Biodynamic production methods have a minimum impact on the environment, because of the absence of artificial fertilisers, chemicals, pesticides and genetically modified materials, generally leading to lower soil emissions of nitrous oxide (N2O), a greenhouse gas 294x more damaging than CO2.

The ISO-14001 Standard is considered the first necessary step for a winery towards a more environmental friendly management of its operations. It measures and allows wineries to work towards maximizing efficiency in use of water (in many parts of the world, more than 10 litres of water is used for each litre of wine produced), energy, raw materials and maximizing recycling and waste treatment. Drip irrigation increases efficiency of water use in the vineyard by up to 90% compared to flood irrigation. Waste water treatment and/or closed loop re-use of cooling water also contribute significantly to improving the environmental impact of winery operations. Even though wine production is not especially energy intensive, use of non-contaminating and renewable energy sources (solar panels, biomass, biofuel) is growing and should be encouraged.

GOOD for the environment:

- 1. Organic or Biodynamic wine producing methods.*
- 2. Wineries with Environmental Management Systems and Policies (f.e. based on ISO-14001).*
- 3. Higher alcohol wines.*

CO2 generated by packaging:

The CO2 footprint of any type of packaging can be reduced significantly by reducing the weight of the packaging and increasing the % of recycled material that goes into the packaging. Production of a virgin glass bottle generates more CO2 than a PET bottle, but recycling rates for glass are generally higher than for PET (f.e. UK: 50% glass versus 20% PET). Production of one lightweight (365g) glass bottle with high recycled-glass (80%) content is similar to that of a 54g PET bottle with 0% recycled content, approximately 220 g CO2.

PET recycling is rising and more and more foodstuff is being packed in recycled PET (rPET). A 54g PET bottle with 50% recycled content generates 'only' about 154g CO2 during manufacture.

A lot has been debated about wine closures. In fact, the eco-impact of closures on the overall eco-impact of a bottle of wine is very small. Production of a natural cork has a lower impact (1 g CO2 per bottle) on the environment than alternative closures such as synthetic cork or screw caps (3 g CO2). However, if one bottle of wine generates an average total of 1,5 kg of CO2 during its life cycle, a small defect rate of 2% caused by cork taint at the end of the cycle already is equivalent to 30 g CO2 per bottle, turning natural cork into a less preferred eco-option from a complete life cycle point of view.

GOOD for the environment:

4. *Light weight packaging*
5. *Packaging material with high recycled content.*
6. *Biodegradable (not available yet for wine) or easily recyclable packaging (i.e. easily separable and re-usable materials)*
7. *Spoil-proof closures.*

CO2 caused by transport:

Most CO2 in the wine industry is caused by transport and by the choice of packaging. Typically transport generates between 55% and 65% of all CO2 generated in the production, packaging and distribution of a wine. However, it is a myth that wines from overseas by definition generate more CO2 than wines from our own continent. Crucial is not the distance, but the mode of transport used. Sea transport is far more eco-friendly per km than road transport and transporting wine in bulk and bottling it close to destination can save 35-50% in transport CO2.

Following are levels of CO2 generated per tonne and km for various modes of transport:

Transport mode	g CO2/ tonne km	g CO2 / bottle km *	g CO2 / bottle km ** (bulk)
Air	570 g	0,76 g	
ship (standard)	52 g	0,07 g	0,04 g
ship (refriger.)	67 g	0,09 g	0,05 g
Road	252 g	0,34 g	0,20 g

* based on 20' container carrying 12000 light-weight (375g) glass bottles

** based on 20' container carrying 24.000 litres bulk in flexitank.

This means that transport CO2 emissions on a light-weight glass bottle transported by boat from f.e. Valparaiso, Chile to Rotterdam are approx. 780g. If transported by road, the same CO2 per bottle would be emitted during a 2400 km truck ride. If transported in bulk, however, transport of the wine from Chile would generate 445g CO2, which would be equivalent of road transport of a bottle over 1400 kms, the distance that most Spanish or Southern Italian wines travel to arrive to northern European markets.

More contrastingly, a Californian wine trucked to New York generates 1,3 kg CO2 per bottle in transport only, while shipping a wine by boat to New York generates f.e. 380 g CO2 from Bordeaux or 533 g CO2 from Chile.

Significant CO2 emissions can also be generated by transport and handling of products in the market of destination. From an ecological point of view, distribution options that minimize internal transport and intermediary stocks, such as f.e. internet based sales, are a good option.

GOOD for the environment:

8. *Prefer sea transport over road transport.*
9. *Wine shipped in bulk and bottled close to market of destination.*
10. *Local produce in eco-friendly packaging and with limited road transport.*
11. *Internet based sales.*

Final Considerations:

While wine is a relatively eco-friendly product, the international wine trade is making a sizeable contribution to man's greenhouse gas emissions, with each bottle currently generating an estimated 1,5 kg of CO₂ during its lifetime. Organic production methods, pro-active Environmental Management by wineries, Innovations in packaging, Light-weighting, Close-to-destination filling, Preference of sea over road-transport, etc. can all help us significantly reduce the Eco-impact of our passion for wine. This report's main objective is to increase awareness in the wine trade and among wine consumers about the positive eco-impact that their product choices can have. Other variables, such as supply chain requirements, shelf life requirements, recyclability, inertia in consumer preferences and business models, may influence the speed of change in producers, but higher awareness on the part of producers, trade and consumers will eventually lead to a more Eco-friendly industry and a better planet.

Sources:

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- Environmental Management Systems – Philip Stapleton, Margaret Glover, Petie Davis.
- The Natural Advantage of Nations – Karlson Hargroves, Michael Smith
- WRAP study – Recycled PET (rPET) in retail packaging
- WRAP study - The Carbon impact of bottling Australian wine in the UK: PET and glass bottles
- International Wine Carbon Calculator
- Reducing CO2 emissions in the global road transport sector – Japan Automobile Manufacturers Association



DE MARTINO REINVENTING CHILE

De Martino's 'Xtreme Sustainability' wine-project: Nuevo Mundo

De Martino is Chile's leader in sustainable wine production. The country's 2nd largest producer of Organic wines, De Martino in 2009 is to become the first winery in the world that will be allowed to sell Carbon Credits. This is thanks to important initiatives and investment in emission reducing technologies. Most important of these is the Liquid Residue Treatment Methodology that De Martino registered under the Kyoto Protocol of the UNFCCC (United Nations Framework Convention on Climate Change), which will reduce the emissions of methane into the atmosphere by at least 6.000 tons of CO₂-equivalents per year (the equivalent of taking approximately 1600 cars off the road). De Martino has so far invested 1,5 million USD in emission-reducing technologies.

The 'Xtreme Sustainability' project's main objectives are:

1. Make consumers more aware of ways and opportunities to help protect the environment.
2. Provide De Martino with a pilot project, whose learning at a later phase can be implemented company- or hopefully industry-wide.
3. Build strategic relationships with key retailers that share our concern for the environment, which will allow us to jointly develop a Total Life Cycle approach towards satisfying wine drinkers' needs and exceeding their expectations in the most eco-efficient way possible.

Nuevo Mundo will be the name of a new, **extremely sustainable wine from De Martino** that will be released in European markets in July 2009. Taking the full Life Cycle Analysis as a starting point, both the wine and the production processes were re-designed to minimize emissions of greenhouse gasses, without compromising the quality of the final wine product. Main focus in this is on:

- Transport efficiency: reduction of unnecessary transport and weight
- Production efficiency: energy efficiency and reduction of unnecessary processes and spoilage, reduction of waiting time and inventories
- Reduction and treatment of waste
- Ease of recycling
- Organic viticulture
- ISO14001 Environmental Management System

Main features of the Nuevo Mundo Organic wines:

- **Completely Carbon Neutral**
- From the First Winery in the World that will be allowed to sell Carbon Credit on the international markets in 2009.
- **Organically Grown Grapes**, (BCS Ökogarantie certified), harvested by hand from De Martino's own Estate in Isla de Maipo and processed and produced on the Estate according to ISO14001, using the highest environmental standards.
- Unoaked, to avoid oak having to be shipped in from overseas.
- Shipped in bulk to Europe, filled close to market of destination in high quality low weight 3-layer PET bottles, with PET screw caps, to facilitate recycling.

- While De Martino favours the most eco-friendly recyclable PET bottle, based on local consumer preferences, Nuevo Mundo will also appear in an eco-friendly BIB and in light-weight glass bottle with screw cap.
- Less than 2 weeks of inventory and shipped directly to one single retail partner, to avoid unnecessary intermediary handling, storage and distribution.
- Minimize printing; maximize use of e-marketing and EDI.

The increased efficiency in transport and packaging only (two mayor contributors to greenhouse gas emissions), compared to conventional glass-bottled in origin wine, is already reducing CO2 emissions per bottle by approximately 400 g. This means that for every container of Nuevo Mundo Organic wine in PET sold, the savings in CO2 are equivalent to taking one medium sized car off the road for an entire year.

Product details:



Nuevo Mundo Organic Carmenère 2008 and Nuevo Mundo Organic Sauv Blanc 2009 in 750ml high quality 3-layer PET bottle:

- PET screw cap stopper
- Chlorine-free, biodegradable carton and eco-friendly labels
- Bottle height: 287mm; case (12) weight 9,9 Kg (versus 15+ Kg for glass bottles)
- Light weight PET packaging allows 2300 cases in 40' container, rather than 1400 cases of conventional glass bottles.
- Shelf life of the 3-layer PET bottle: 2 years (1 year guaranteed).
- Filled to the highest quality standards at Paul Sapin, France.