

Food miles:



A small part of the
sustainability story
for NZ Wine



NEW ZEALAND WINE
PURE DISCOVERY



Executive Summary

The concept of 'food miles' considers emissions associated with just a single component of the complex value chain that produces consumable products like wine and delivers them to market: the distance products travel from their point of origin to their point of consumption.

New Zealand Wine (NZW) remains committed to reducing emissions and other environmental and social impacts across the entirety of our value chains. We have committed to a goal of the industry achieving net-zero emissions ahead of the regulatory deadline of 2050.

Because food miles look only at emissions associated with freight and not those associated with the production phase (which can account for the majority of emissions) it is an inadequate measure of emissions and fails to account for efficient production practices in producer regions.

Despite this fact, food miles are at times mistakenly used interchangeably with the concept of sustainability (i.e. how can a product be sustainable if it has been shipped from NZ?).

Although an easy to communicate concept, 'food miles' should not be considered a proxy measure of product sustainability or environmental impact.

The concepts of product sustainability (based on the three key pillars of environment, economy and social wellbeing) and Life Cycle Analysis (an assessment of impacts of products across the complete value chain from cradle to grave) give a far more accurate, comprehensive and meaningful picture of the relative impacts to people and the planet associated with any product, including NZ wine.

There is a growing body of evidence, based on improved understanding of emissions and other sustainability metrics across value chains, that demonstrates NZ is able to deliver products to international markets more efficiently and with higher certainties pertaining to value chain sustainability (including environmental impact and labour force exploitation) than many local markets.

Even when transport distance is considered, some key benefits of purchasing NZ wine from a sustainability point of view include:

1. Well managed production practices (fuel and fertiliser use) in NZ can result in wine being delivered to international markets more efficiently than local markets are able to
2. Wine shipped from NZ by sea can have significantly lower environmental impacts than those travelling shorter distances by road
3. A recent trend toward bottling NZ wine closer to market further reduces emissions associated with sea freight (by up to 40%)
4. NZ's national grid is over 80% renewable, the OECD average sits at 25% - this means far fewer emissions associated with the production phase of bringing NZ goods to market
5. Strict labour laws and enforcement and some of the lowest levels of corruption in the world provide high levels of confidence that human exploitation is low risk through the NZ value chain
6. NZ's reputation for reliable product labelling and traceability (including safety) are important consumer demands in all developed world markets

The food miles concept

The concept of “food miles”—or the distance foods travel from their point of origin to their point of consumption—has been around for many years. The Covid-19 pandemic has brought into sharp focus the interconnectedness of our societies, economies, and physical environment like no other event in modern human history.

However, it may well also drive renewed interest in supporting local, geographic-based consumption following the economic and social fallout the world has is experiencing. In response, the New Zealand wine industry is in a good position to leverage its sustainability credentials as a differentiator in export markets. In order to do this effectively it is important that all staff and stakeholders have clarity on how food miles fits as part of the sustainability story.

The food miles narrative has long promoted local consumption for a number of reasons, some of which are social and economic. However it has increasingly been reduced to one that focuses largely on the distance food travels (food miles), rather than the method of travel or other variables that affect the Green House Gas (GHG) emissions associated with the production and shipment of consumables like food and wine.

It encourages communities to buy their food locally when possible, on the assumption that doing so will result in lower GHG emissions than buying imported foods and beverages. This in turn, the theory goes, results in improved environmental performance.

Accordingly, consumables shipped long distances—for example wine from NZ to Northern Hemisphere markets—are associated with a high level of food miles and therefore higher levels of environmental harm (due to emissions) than products sourced from closer locales.

While emissions from transport of goods to overseas consumer markets is an indisputable contribution to environmental degradation and climate change, the reality is that food miles are a poor proxy for total environmental harm, or broader sustainability metrics.

Life Cycle Analysis

A Life Cycle Analysis (LCA) approach ensures all relevant emissions of GHGs in the supply chains of food, not simply those associated with transport, are accounted for, giving us a more complete picture.

A 2017 study by the New Zealand Institute for Plant & Food Research¹ did just this. Their research into GHG emissions for non-pastoral farming - including NZ grapes and winemaking - looked at the total LCA of products. Emissions from NZ grapes were expressed as grams of carbon per 750 ml bottle of wine, shipped (Wairau Valley Sauvignon Blanc specifically).

The study found that the main emission contributors came from the production phase (37% of total emissions) and the packaging phase (35% of total). Emissions from shipping were found to be significantly lower (22% of total emissions) when analysed in the context of the entire value chain. The researchers concluded that the largest gains to be made in emissions reductions were associated with the packaging and bottling phase (namely due to embodied emissions of glass bottles) as opposed to shipping.

Of note also was the fact that the per hectare carbon emissions of vineyards were found to be the lowest of the NZ horticultural primary industries studied (roughly 50% lower than NZ kiwifruit and apples, even when shipping was considered).

Lincoln University (NZ) researchers conducted a similar LCA to compare the GHG emissions generated by producing UK lamb, dairy products, apples, and onions for the domestic market on the one hand, with GHG emissions generated by producing these same items in New Zealand and transporting them to the UK.²

¹ Clothier et. Al. 2017. Futures for New Zealand's arable and horticultural industries in relation to their land area, productivity, profitability, greenhouse gas emissions and mitigations. New Zealand Institute for Plant & Food Research: Report prepared for New Zealand Agricultural Greenhouse Gas Research Centre. PFR SPTS No.14440.

² https://www.landcareresearch.co.nz/_data/assets/pdf_file/0003/39927/food_miles.pdf

The study concluded that, even factoring in the shipping of the NZ products to the UK, New Zealand was twice as energy efficient at producing dairy products; four times as efficient in producing lamb; and on the whole more efficient at producing apples and onions.

The researchers demonstrated that due to NZ's efficiency in producing agricultural products, it is less harmful for the environment for British consumers to purchase at least certain NZ products instead of locally grown products, even once GHGs generated through transporting the items was taken into account.

Reasons for the increased efficiency of NZ sourced products included:

- NZ farmers utilise far less fuel and fertilisers³ in the production process than UK producers
- While NZ onions required more energy inputs in the production process, UK onions that compete on the market with NZ market have to be cold stored for nine months (due to the different growing seasons in the two countries), resulting in more significant GHG emissions
- Apple production is less energy-intensive than UK production
- UK apples that would take the place of NZ apples in the marketplace would require cold-storage for up to six months
- UK producers were found to have much higher emissions from fuel use and fertilisers than NZ producers
- Due to climatic and soil differences NZ producers are able to use far less fertiliser than their UK counterparts.

It should be noted too, that the study was conducted at a time when the national grid in NZ (used for electricity in the production phase of agricultural goods) was only 65% 'green'⁴, whereas in 2020 that figure is around 84%. The UK's national energy grid is currently around only 48.5% green.⁵ It's likely that if the study was corrected for national grid emissions factor, it would result in even more compelling evidence of the efficiency of NZ-produced products.

Indeed, taking the LCA approach consistently demonstrates that the GHG emissions associated with bringing food and beverage to market are dominated by the production phase (growing and processing raw products such as grapes) as opposed to the freight and shipping phase.

Researchers in the US found that 83% of emissions from food (on average across imported and domestically produced) are associated with the production phase. Transportation was found to represent only 11% of life cycle GHG emissions, and final delivery from producer to retail contributed only 4% of emissions.⁶

Further, when the transport of food is examined, it reveals that the bulk of emissions come from the road transport of food within a country, rather than cross-border shipments. In fact, one of the biggest contributors to the GHG emissions associated with a food product, on a per unit basis, is auto travel by the consumer driving to the shop or market and back.⁷

³ Leftover nitrogen in fertilisers that hasn't been absorbed by plants, essentially reacts with the soil to produce Nitrous Oxide (N₂O) which is then emitted to atmosphere. N₂O is around 265 times more effective at trapping heat in the atmosphere than carbon and it depletes our ozone layer. Agriculture accounts for around 80% of human-caused N₂O emissions globally and for 8-14% of all greenhouse gasses.

⁴ Green energy refers to electricity produced for the national grid that is renewable and low carbon emitting (such as hydrological power)

⁵ <https://www.nationalgrid.com/britain-hits-historic-clean-energy-milestone-zero-carbon-electricity-outstrips-fossil-fuels-2019>

⁶ Food-Miles and the Relative Climate Impacts of Food Choices in the United States Christopher L. Weber and H. Scott Matthews Environmental Science & Technology 2008 42 (10), 3508-3513 DOI: 10.1021/es702969f

⁷ Rich Pirog, Food Miles: A Simple Metaphor to Contrast Local and Global Food Systems, HUNGER & ENVTL. NUTRITION NEWSL. (Hunger & Environmental Nutrition Dietetic Practice Group, Carson City, NV), Summer 2004



Transport Types

The inadequacy of food miles is further highlighted when the vastly different GHG emissions resulting from different forms of transport is considered. Wine from New Zealand in general is ocean freighted to international markets which produces significantly lower emissions than transport by air, road, or rail.⁸

A U.S. study determined that grapes shipped by boat from Chile to Philadelphia (USA) resulted in a similar level of per kilo carbon dioxide as grapes transported by truck from California to Philadelphia. Even though the “food miles” were much higher for the Chilean grapes, this did not translate into higher GHG emissions because water transport is significantly more energy efficient.⁹

A similar study by MIT academics¹⁰ found a bottle of domestic wine sent to New York from California had a carbon footprint about 1.8 times that of a bottle of wine imported to New York from France, largely because of the extensive time the California wine spent being transported by trucks. Based on the amount of emissions involved in moving goods one mile, trucks generated six times the emissions of rail and 10 times the emissions of container ships. Long-haul air freight was found to generate 47 times as much emissions per ton-mile as ocean freight. The take-away message according to the lead author was that “... distance does not simply equal a higher carbon footprint”.



Future Direction for NZW

NZW believes a great product is not truly great if it is not sustainable. We continue to grow and develop our sustainability programmes that we have had in place for decades. Our Board has committed to the goal of the New Zealand wine industry being net carbon-zero before governments deadline of 2050.

The pledge is being delivered through initiatives that are already taking place within the New Zealand wine industry. These initiatives include a Climate Change Mitigation Programme to support members through the transition to a zero-carbon economy, improvements to the Sustainable Winegrowing New Zealand (SWNZ) scorecard that better enables measurement of industry progress against greenhouse gas emissions, and a Bragato Research Institute Climate Change Research Programme providing guidance on adjusting vineyard practices in response to our changing climate.

⁸ <https://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/2019-emission-factors-summary.pdf>

⁹ Rich Pirog, Food Miles: A Simple Metaphor to Contrast Local and Global Food Systems, HUNGER & ENVTL. NUTRITION NEWSL. (Hunger & Environmental Nutrition Dietetic Practice Group, Carson City, NV), Summer 2004

¹⁰ Simchi-Levi, David. 2013. Operations Rules: Delivering Customer Value through Flexible Operations. The MIT Press.



Conclusion: Sustainability vs. Food Miles

Food miles only consider emissions associated with a single component of the complex value chain that produces food and delivers it in market (distance foods travel from their point of origin to their point of consumption). Despite this fact, it is at times mistakenly used interchangeably with the concept of sustainability (i.e. how can a product be sustainable if it has been shipped from NZ?).

Food miles should not be considered a proxy measure of product sustainability. The concept of sustainability is often seen to be based on three key pillars, that of environmental, economic and social well-being. Principles of these pillars are;

- Environmental sustainability relates to the ability to maintain rates of renewable resource harvest, minimise pollution creation, and non-renewable resource depletion.
- Economic sustainability is the ability to support a defined level of economic production.
- Social sustainability is the ability of a social system, such as a country, to function at a defined level of social wellbeing over time.

Therefore, when assessing the sustainability credentials of consumables produced/grown in NZ, considering food miles is an inadequate and misleading measure of a product's sustainability.

Even when transport distance is considered, some key benefits of purchasing NZ wine from a sustainability point of view include;

1. Well managed production practices in NZ can result in products being delivered to international markets more efficiently than local markets are able to (as seen in studies referenced above)
2. NZ's national grid is around 84% renewable, the OECD average sits at 25% - this means far fewer emissions associated with the production phase (accounting for the bulk of total emissions) of bringing NZ goods to market
3. Strict labour laws and enforcement and some of the lowest levels of corruption¹¹ in the world provide high levels of confidence that human exploitation is low-risk through the NZ value chain
4. The recent passing of the world leading Zero Carbon Bill in NZ ensures that all industries are legally mandated to meet climate change targets set out in the Paris Agreement. The New Zealand wine industry has committed to become carbon neutral prior to the 2050 regulatory timeframe.
5. Products shipped from NZ by sea often have significantly lower environmental impacts than those travelling shorter distances by road¹²
6. High levels of forestry in NZ offset roughly a third of all gross emissions across NZ's industries
7. NZ also enjoys a good reputation for product labelling and traceability (including safety) which are important consumer demands in all developed world markets

Further Reading

Product Life Cycle Analysis

- [Life Cycle Association of New Zealand](#)
- [ISO 14040: Life cycle assessment Principles and Framework](#)

NZ Zero Carbon Bill

- [NZ Ministry for the Environment](#)
- [NZs transition to a low emissions, climate resilient economy](#)
- [NZ Emissions Inventory as per reporting requirements under the United Nations Framework Convention on Climate Change and the Kyoto Protocol](#)
- [NZ Emissions Trading Scheme \(outlining our national carbon sinks\)](#)

NZW Sustainable Winegrowing Certification

Circular Economies

- [Ellen Macarthur Foundation](#)
- [Circular Economy Accelerator NZ](#)
- [European Green Deal](#)

Emissions factors for transport types

- [New Zealand MfE 2019 Emissions Factors](#)
- [Fifth Assessment Report of the Intergovernmental Panel on Climate Change \(2014\). Chapter 8, Transport.](#)
- [World Shipping Council emissions comparison](#)

Product and packaging sustainability

- [WRAP UK](#)

United National Sustainable Development Goals

¹¹ Transparency International Perceived Corruption Index ranked NZ and Denmark as the least corrupt countries in the world 2020

¹² https://www.landcareresearch.co.nz/data/assets/pdf_file/0003/39927/food_miles.pdf