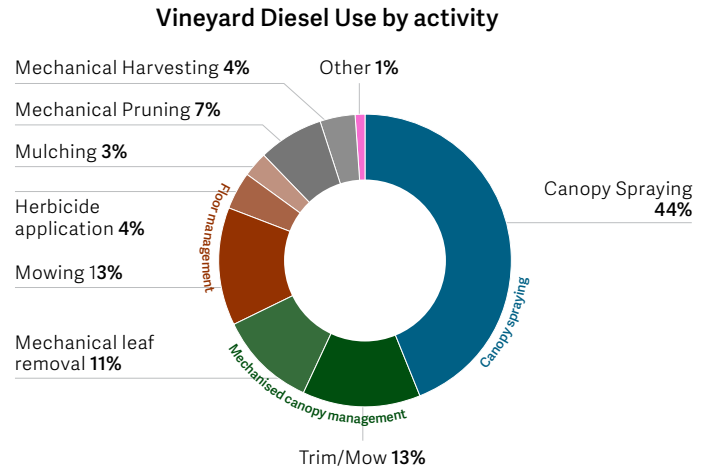


Vineyard Fuel Use – Response to the National Fuel Plan

The Government has recently released the National Fuel Plan 2026 to address fuel supply uncertainty arising from the conflict in the Middle East. In response, New Zealand Winegrowers (NZW) and the Bragato Research Institute (BRI) are developing practical resources to support growers in managing rising fuel costs affecting vineyards. This document outlines current fuel usage in vineyards¹ and provides possible reduction strategies. Growers may want to reduce low priority activities immediately to reduce costs and consider reducing moderate priorities if fuel restrictions are introduced in future.



Where fuel is used on the vineyard

Using data from the BRI Carbon Calculator project, the fuel used to undertake various vineyard activities was collected across several sites and aggregated based on the frequency at which tasks are carried out (see **Standard model vineyard below**)². Generally, fuel consumption is highest for those activities that require low operating speed and high PTO and/or hydraulic oil flow requirements, such as inter-row and under-vine cultivation. However, fuel consumption on a per hectare basis is more influenced by row spacings, single or multi-row equipment setups, and the frequency at which an activity is carried out. Over a season, the greatest fuel use is for canopy spraying (44%), mechanised canopy management (24%) and floor management (19%).

Prioritising fuel use on the vineyard

Prioritising activities can help growers achieve fuel reductions of 10, 20 and 30%. The balance between reduced fuel use and the risk to vine health and business viability will shift with the increased fuel reduction target, and so individual vineyards should consider their own context.

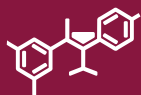
An example of priority activities and management techniques is listed in Table 1 below, and uses a prioritisation approach. High-priority activities include harvesting, protecting the crop from frost or disease throughout the growing season, and maintaining the vineyard infrastructure. Low-priority activities are those that could be successfully reduced or delayed, such as mowing non-productive areas around the vineyard.

Low Priority Reduce, delay or remove	Moderate Priority Review and reduce/remove/implement where appropriate	High Priority Critical activities with high impact to crop, vineyard health and business that should not be removed
Excess mowing	Excess mechanised canopy management	Harvesting of fruit
Mowing non-productive land area	Irrigation and nutrition to moderate canopy and under-vine vegetative growth	Canopy spraying E-L 18 to E-L 32 (flowering to bunch closure) to prevent disease
Groundwork (inter-row cultivation, rolling, crimping)	Prioritising herbicide application and active ingredient as required	Mechanised canopy management for disease control
Post-harvest frost protection (autumn)	Solid fertiliser/compost application	Spring frost protection
	Canopy spraying E-L 4 to E-L 17	Canopy spraying - Grapevine trunk disease dormant applications
	Canopy spraying E-L 34 to E-L 38	Trellis and infrastructure maintenance
	Pre-prune prior to Klima	
	Under-vine cultivation - prioritise finger-weeder and star tiller over weeding knife	

Table 1. Examples of prioritisation of vineyard activities based on business risk.

¹ Fuel refers to diesel (95% of liquid fuel utilised in NZ vineyards, National GHG Emissions Report 2024, NZ Wine).

² Fuel consumption used in frost protection, fleet vehicles and supply chain has been omitted.



Frost Protection

Frost protection is a high-priority activity that uses a relatively large amount of fuel (approximately 25 litres per hour per fan). Nonetheless, not all frost protection is of equal importance, and there are some potential savings to be made depending on the risk appetite of the individual vineyard owner.

In autumn once harvest is completed, frost protection to keep the leaves on longer is unnecessary and should be treated as low priority. There is no tangible evidence that post-harvest canopy is required to ensure next season's production.

Fuel efficiency depends on ensuring the correct setting of switch-on temperatures. Many frost machines have quick conservative (warm) switch-on temperatures. Damage typically doesn't occur above -0.5 degrees C, yet most machines are set above +0.5 degrees. As an example, a 1° difference can be 3-4 hours of operation, using 25L per hour. If diesel supply is limited, this is an area where savings can be made.

Frequency of vineyard activities

A reduction in diesel by 10, 20 and 30% can be achieved using the framework above and defining priority activities and subsequently changing the frequency of tasks accordingly. Most passes are likely to occur during the growing season (September-April), except for mechanical pruning and mulching, which usually occur during winter, and maintenance, which is year-round.

Passes by activity	Standard (model vineyard)	10% Reduction	20% Reduction	30% Reduction
Canopy spraying*	14.2	14.2	13	11
Mowing	7	4	4	4
Trim/mow	3	2	2	2
Herbicide*	2.5	2	1.75	1.5
Leaf removal	2	2	1	1
Mechanical pruning	2	2	2	1
Mulching	1	1	1	1
Machine harvesting	1	1	1	1
Maintenance (i.e. post replacement)	1	1	1	1
Fertiliser	1	1	0	0
Total vineyard passes	34.7	30.2	26.75	23.5

Table 2. Modelled vineyard activities and fuel reduction strategies – example activities.

*National Plant Protection Report 2024 (New Zealand Winegrowers)

This approach, where frequency of task is estimated based on typical practices, demonstrates that the choices made day to day in the vineyard can play an important role in conserving fuel. Meaningful reductions in vineyard fuel use are achievable through informed prioritisation of machinery operations and careful balancing of operational risk. By understanding where fuel is consumed, growers can target low- and moderate-priority activities for reduction without compromising crop health or business viability. While some high-priority activities remain essential, this guidance shows opportunities where fuel can be safely reduced while still keeping vines healthy and productive.

Further information:

- This document was created from project BRI25-006 – Carbon Calculator, funded by the NZ Wine levy. More information on this project can be found [here](#)
- Vineyard benchmarking personalised reports on fuel use can be found here: [Personalised Reports - New Zealand Winegrowers](#)
- Information on the Fuel Response Plan 2026 can be found [here](#)