Carbon accounting

With growing global interest in sustainability, Australian grapegrowers are showing an increasing interest in options for measuring and demonstrating their impacts on the environment. In this column, AWRI Manager – Sustainability and Viticulture, Dr Mardi Longbottom, answers some of the more common questions about carbon accounting in viticulture.

What is carbon accounting and why do some businesses do it?

Carbon accounting is a process used to calculate the amount of greenhouse gases (GHGs) generated by a business and it may be used to compare and contrast the business's performance over time or against other businesses. Greenhouse gases released into the atmosphere insulate the earth and the increasing concentration of GHGs caused by human activities in the atmosphere is the primary cause of climate change. The predominant GHGs include carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), which, for the purposes of carbon accounting, are converted to carbon equivalent units (CO_2-e).

To facilitate the consistency of accounting and prevent double-counting between organisations, GHGs are categorised into three different 'scopes' (Table 1). Most organisational carbon accounts are based on scope 1 and 2 emissions because the data is typically measured and reported within normal business operations. Scope 3 emissions are much

Table 1. Categories of greenhouse gas emissions (GHGs) and examples from vineyards and wineries

	Description	Vineyard emission sources	Winery emission sources
Scope 1	GHGs emitted directly from a business/facility	• Fuels used in the vineyard (e.g. petrol, diesel, LPG) • Nitrous oxide from nitrogen fertiliser • Company owned vehicles	• Fuels used in the winery (e.g. natural gas, petrol, diesel, LPG) • Winemaking CO2 (purchased) • Synthetic refrigerant emissions • Methane from on-site composting and wastewater
Scope 2	GHGs emitted indirectly by the business as a result of electricity generation	• Purchased electricity used onsite for irrigation	• Purchased electricity used in the winery
Scope 3	GHGs emitted indirectly by the business from sources not owned or controlled by the business (i.e. from products, services or resources used in the business)	• Transport of goods to the vineyard by others • Production of fertilisers • Contractor owned vehicles (fuel use) • Electricity used by irrigation providers	• Production of grapes • Transport of goods to the winery • Production of winery additives • Glass manufacture • Wine transport • Waste disposal • Employee business travel

more difficult to quantify because they are generated by other organisations and their measurement requires detailed insights into those organisations to precisely understand the emissions. When scope 3 information is readily available and/or the business has some control of the emission (e.g. fuel used by a contractor) it may be identified and included in a carbon account.

What does it mean to be carbon neutral?

For a product or business to claim carbon neutrality, it must have achieved the status of net zero carbon emissions. In achieving this, a business must follow the following steps: measure, reduce, offset, validate and report. The first step is to calculate the total emissions generated in creating the product or by the business using the scopes defined above. Next, a process to reduce emissions is implemented to reduce the total emissions relative to the business-as-usual baseline. Any remaining/outstanding emissions are then 'offset' by purchasing carbon credits, tradeable units equivalent to one tonne CO_2-e. Carbon credits are issued for activities that avoid, reduce or remove GHGs from the atmosphere and when they are included in the carbon equation, they bring the sum of emissions to zero.

Business/product emissions – offsets = zero

Common practices adopted by vineyards and wineries to reduce emissions include the installation of solar systems to reduce reliance on fossil fuel generated electricity, grazing sheep in vineyards to reduce diesel use, installing insulation in wineries to reduce the energy required for cooling and optimising refrigeration and boiler efficiencies. Once a product or business emissions are zero, the claims require validation through an independent body, followed by the release of a published public summary of the claims. A detailed fact sheet containing information about making carbon neutral claims is available on Wine Australia's website.

I'm working to improve my vineyard soil health – can I use increased soil carbon to offset my GHG emissions?

It is difficult to accurately estimate increases in soil carbon and the associated potential GHG abatement over long periods of time because soil carbon is part of the soil ecosystem, which is influenced by soil type, temperature, soil moisture and microbial activity. Currently, under the Australian Government's Emissions Reduction Fund, achieving 'carbon credits' requires verified soil carbon baseline data, implementation of approved practice change, and ongoing measurement and maintenance of the practice for at least 25 years. For most people, the cost, complexity and risk of this commitment far exceeds the benefits. The new Soil Carbon Method 2021 being developed by the Australian Government may offer more options for vineyards to participate in soil carbon farming and GHG abatement in the future.

Apart from GHG abatement, making changes to vineyard soil management which increase soil carbon can lead to improved productivity and profitability. Increasing soil carbon can increase soil biodiversity and the value of ecosystem services. It can also improve overall soil health, cation exchange capacity, soil structure and water holding and buffering capacity, which all contribute to productivity gains.

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References and further reading

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