

MOVING TOWARDS CARBON NEUTRAL FARMING

Growers need to prepare for the opportunities and challenges ahead that arise from carbon emission management, particularly whether they can generate carbon credits from their operations. But it all starts with basics, writes **Linda Drake**.

The unfolding carbon situation presents new opportunities to potato growers, particularly those on mixed farms.

Growers can choose between becoming more carbon neutral by reducing emissions and capturing carbon, or implementing changes on-farm to earn carbon credits.

Adrian James from Natural

Resource Management (NRM) North, an independent not-for-profit organisation for NRM in northern Tasmania, has been tracking the evolution of carbon farming options through funding from the Australian Government's National Landcare Program.

He suggests that the key to making a start is understanding what you want.

"You need to know if your goal is to help the industry become carbon neutral and benefit from market access or premiums from carbon-neutral products. Or is your goal to earn money from generating and trading in carbon credits? It's more challenging, but not impossible to do both," says Adrian.

For potato growers who want to start



Figure 1. Principles of regenerative / sustainable agriculture

managing carbon but are unsure how to begin, there are some key issues to think about. These include reducing farm greenhouse gas emissions, managing wastes, capturing and storing more carbon (Figure 1), and considering whether purchasing carbon offsets make sense.

“When your farm emissions match your farm carbon capture, plus offsets, your farm is carbon neutral. This is not as improbable as it might seem, with some farms already succeeding. But earning carbon credits, without becoming carbon neutral, is also perfectly viable,” Adrian says.

There are funding programs that ensure that growers get the right advice from the get-go.

The Tasmanian Government, for example, has launched a Carbon Farming Advice Rebate pilot program offering up to \$10,000 per farm through Landcare Action Grants. Similar rebates are also offered in some other states.

“Making carbon projects more attractive to farmers has involved a range of pilots and improvements, especially in the mixed environmental planting methodology. If a farmer wants to plant mixed native vegetation as a carbon offset, the current rules allow for streamlined application and reporting processes, and an exemption from expensive audit requirements,” says Adrian.

In addition to revegetation, other actions can also be considered for managing carbon on-farm.

Carbon offset methodologies are in the pipeline that can be used for assessing whole farm management and wetland carbon. These will happen under the Climate Solutions Fund (formerly the Emissions Reduction Fund), so monitor for announcements.

A new soil carbon methodology was released in December last year, allowing for a mix of soil testing and modelling of soil carbon



Figure 2. Cattle are a major source of methane, which is more than 25 times more efficient at trapping heat in the atmosphere than CO₂.



Figure 3. Measuring nitrous oxide emissions in a broccoli crop; nitrous oxide is an extremely potent greenhouse gas



Figure 4. Deep rooted perennial pastures improve and retain soil carbon.

- A. James

changes. It has decreased costs but, unfortunately, also increased complexity. Farmers participating in the soil carbon methodology can be paid for carbon baseline testing in advance through the Clean Energy Regulator.

“It’s a highly individual response that any grower will ultimately make, depending on location, scale, and business circumstances. For example, in Tasmania, where electricity is from renewable resources, the impact from carbon dioxide emitted from fossil fuels in tractors, utes and quad bikes is relatively high. Emissions also come from using lime, because it contains carbonate, while urea releases carbon

dioxide as it turns into ammonia,” Adrian says.

Potato growers who run ruminant stock need to consider managing methane emissions (Figure 2). Reducing methane from stock hinges on quality feed, high performance genetics, rapid growth for early processing, culling poor performers, early joining and supplementing feed with tannins and red seaweed.

Nitrous oxide is 280 times more potent a greenhouse gas than carbon dioxide (Figure 3), so managing nitrogen is a key factor in reducing farm emissions. While it might still be a relatively small proportion of total emissions, it may be a bigger problem to manage,



Figure 5. Planting trees boosts carbon above as well as below ground, and can earn carbon credits.

especially when soils are waterlogged and warm.

Potato production can sometimes result in high nitrous oxide emissions because they are a high-input, irrigated, warm-season crop. Adrian's tips are to accurately manage nitrogen, or use controlled release variations of fertilisers. Timing of application is critical, as is avoiding excess soil moisture through irrigation scheduling and improved drainage.

"Good soil moisture management not only reduces disease and nutrient loss, but also limits nitrous oxide emissions. Special enhanced-efficiency fertilisers can also help" Adrian says.

Capturing carbon and storing it are key steps in more sustainable agriculture, which often hinges on enhancing soil health. Improving soil carbon in areas used for growing potatoes relies largely on cover crops or pasture leys (Figure 4). Just like pastures, mixed species of deep-rooted plants often give better carbon results, because carbon lasts longer when it's stored deeper.

Addressing soil constraints, such as waterlogging, acidity, poor fertility and compaction is also critical. This includes minimising the time soil stays bare to reduce erosion. Year-round plant growth should be encouraged. If tillage is used, then organic matter can also be added. For pasture, good

quality dung beetles can be useful, and grazing management aimed at maximising ground cover and pasture production is key.

Growing woody vegetation is also valuable because it stores carbon above and below the ground and can be particularly useful for offsetting high emissions on mixed farms (Figure 5). If a grower's aim is to be carbon neutral, any tree planting can work, though fast-growing plantations capture the most carbon in the near term. If trees are used to earn carbon offsets, it must use a registered project and an approved methodology.

"Under the carbon model that is used in offset projects, mature forest systems don't capture carbon as quickly as rapidly growing younger trees, and carbon captured last year doesn't balance out emissions this year," Adrian says.

In working out how many trees to plant, the short answer is, the more the better. A rolling program of newly planted zones continues to provide rapid growth as other areas mature. Working out the area of vegetation needed to balance out emissions requires carbon accounting, usually starting with a farm carbon calculator.

There is also the option to purchase carbon offsets to counter farm emissions, but that can be the most expensive option. Adrian says it's

worth getting advice on eligibility before deciding on any schemes, and taking into account your individual circumstances.

Engaging a third party provider can help optimise the financial opportunities from capturing and storing large amounts of carbon. Ambitious growers with an appetite for risk (and paperwork!) may be able to take advantage of special deals in voluntary markets. However, Australian Carbon Credit Units (ACCU) are certified, so there are many rules. The largest market in Australia is currently the Australian Government, which can simplify the transaction. While revegetation projects are easier now, Adrian says that it is often better to pay a specialist to do most of the paperwork, reducing complexity and risk.

Earning carbon credits from soil or vegetation requires a 25-year minimum time frame. While increasing soil carbon is harder to achieve on cropped ground, it's not impossible to see useful carbon improvements. It's also essential that you don't start until you've registered the project. Any carbon sampling done beforehand can't be used, so register first, and use an independent contractor to establish baseline soil carbon to at least 30cm.

Carbon service providers are a growing sector, but farmers should do their homework first to ensure the deal is a fair one for both sides.

A webinar presented by Adrian in October 2021 on De-mystifying the Carbon Story contains worked examples of the costs and returns of planting shelterbelts to earn carbon credits, though note the carbon price and some methodologies may have changed: potatolink.com.au/webinars

Other resources from NRM North, including interim results from its soil carbon and diverse pasture trials can be found at nrmnorth.org.au/land/soil-carbon-project/

CARBON CALCULATORS: USEFUL BUT NOT PERFECT

Carbon calculators allow a grower to establish a baseline on their emissions. While more are being developed and refined, so far they are somewhat a blunt instrument. They give an indication of emissions but are inherently inaccurate at a farm level.

A calculator is available for farms producing beef, dairy and grains. It may have some application for potato growers with diversified interests, but is complex and takes time to enter material. A key deficiency is that the livestock calculators don't include soil carbon:

www.picc.org.au/resources/Tools

Based in the UK, the Cool Farm Alliance has developed a Cool Farm tool, for field level assessment of greenhouse gases, biodiversity and water:

<https://coolfarmtool.org/coolfarmtool/>

Another simple calculator, covering basic inputs:

<https://www.vegetableclimate.com/tools/carbon-footprinting-tools/vegetable-carbon-calculator/>

Developed some years ago by HortInnovation, this tool doesn't cover the full range of inputs that need to be considered for an accurate indication of emissions on farm but is geared to the horticultural sector.

Consultants can do the work for you, but are likely to be expensive due to the data required.

RESOURCES TO BUILD KNOWLEDGE

Understanding how the **Clean Energy Regulator** and the Emissions Reduction Fund work are essential for those looking to earn carbon credits. The Clean Energy Regulator website has key, comprehensive information on how to participate in the Emissions Reduction Fund, registering projects, steps needed to be compliant with its rigorous criteria and other resources:

<http://www.cleanenergyregulator.gov.au/ERF>

Meat and Livestock Australia's Carbon Neutral 2030 Program has comprehensive resources for producers on managing emissions:

<https://www.mla.com.au/cn30>

CSIRO's online tool to start looking at market opportunities:

<https://looc-c.farm/>

Elders has a soil carbon and herd management service:

<https://eldersrural.com.au/tech-services/carbon-farming/>

Grain Growers has produced a document that gives an invaluable overview of carbon in agriculture. *Carbon and Cropping* includes definitions and explanations of terms, soil carbon and farming practices, carbon markets, reducing carbon footprints and an extensive list of additional resources. While intended for grain growers, potato growers will find this highly useful as most material is non-specific. Either an excellent starting point on your carbon journey, or to broaden and deepen understanding of the myriad elements of sustainability, this is 40 pages of clear concise information for non-experts, with good graphic elements to aid understanding:

<https://www.graingrowers.com.au/wp-content/uploads/Carbon-and-Cropping-September-2021.pdf>

Rabobank Research Food & Agribusiness: It's Australia and New Zealand *podcast* features research analysts discussing what's setting the pace for global sustainability transitions, including drivers such as consumer preferences and government policy responses in the EU, US and other overseas markets. Although focused on grains, dairy and other food commodities, the perspectives in each episode are valuable to all players involved in food production, particularly on the increasing importance of carbon management for continued access to markets and finance. While rarely potato specific, sustainability issues as drivers of market changes have application to food growers, as do episodes addressing recent fertiliser and land price surges. Download from your preferred podcast supplier.

PotatoLink has hosted a series of *webinars* on sustainability related topics:

<https://potatolink.com.au/>

Soil Wealth is another project, with many applications for potato growers:

<https://www.soilwealth.com.au/>