

# INTRODUCTION TO CARBON FARMING

IN NORTHERN QUEENSLAND



## Carbon Farming in Queensland

Carbon Farming presents an opportunity for land managers to secure another income from their land as well as make improvements to **their natural capital; their land**. Land use, land use change and the forestry sector, including agricultural land use, play an important role in storing carbon.

There are two ways to farm carbon:

1. By avoiding (that is, eliminating or reducing) agricultural emissions that would otherwise have occurred by changing, or introducing, specific on-farm practices designed to reduce greenhouse gas emissions (GHG) for example: reduced methane emissions from livestock, reduced fertiliser emissions, manure management, savanna fire management or,
2. By sequestering CO<sub>2</sub> from the atmosphere and storing it in the landscape for example: reforestation and managed regrowth (collectively referred to as carbon forestry), avoided deforestation, soil carbon (reducing carbon loss or increasing sequestration).

Queensland is responsible for 90 per cent of Australia's total land sector emissions. In all other jurisdictions except Western Australia and the Northern Territory, this sector acts as a 'carbon sink', meaning that activity in the sector actually removes more carbon from the atmosphere than it releases.



## What's the issue?

The increase in concentration of greenhouse gasses (GHG) in our atmosphere is threatening both human and ecological systems. Reducing global emissions has been the topic of ongoing international debate, agreement and action. A number of gasses are responsible for global warming with water vapour (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) being the most prevalent. Each of these gasses occurs naturally in our atmosphere but at elevated levels can cause significant changes to the Earth's climate. The last century has seen a dramatic increase in GHG levels in our atmosphere, driven primarily by an increasing use and dependence on fossil fuels, and exacerbated by large scale habitat clearing.

In a bid to manage and potentially mitigate the worst of these expected outcomes, a number of global strategies (such as the Kyoto Protocol) have been proposed to reduce GHG output. In late 2015, 195 countries operating under the United Nations Framework Convention on Climate Change (UNFCCC), reached agreement on the international commitments to greenhouse gas emissions mitigation, adaptation and finance; and developed the Paris Agreement.

Under the Kyoto protocol and the Paris Agreement, Australia has made commitments to progressively reduce GHG emissions. Reducing the amount of land-clearing in Queensland is an integral step in reducing our overall emissions.





## Australian Carbon Credit Units (ACCUs) and agriculture

Setting up and maintaining a carbon farming project involves costs and risks. Any income from the sale of ACCUs, along with the co-benefits from carbon farming, will have costs attached to it. There is the cost of undertaking the actual activity or implementing the change and then there is the separate cost of generating the Carbon Credit - the extra business administrative and accounting costs.

Subject to satisfying the monitoring, auditing, reporting and other requirements under the Emissions Reduction Fund (ERF), an eligible ERF project can apply for ACCUs. Each ACCU represents one tonne of carbon dioxide equivalent (CO<sub>2</sub>-e) net abatement (through either emissions reduction or carbon sequestration) achieved by eligible activities – that accord with an approved Methodology.

The Commonwealth government determines which methods are eligible to generate ACCUs. The process for developing new methods involves the Minister for Energy and Emissions Reduction creating a priority list for new method development and then the Clean Energy Regulator developing the priority methods in collaboration with industry, potential users and other technical experts.

An ACCU is a 'financial product' under the Corporations Act 2001 and the Australian Securities and Investments Commission Act 2001. Also, of note: income from ACCUs is dealt with in a different manner to Primary Production by the Australian Taxation Office. When selling an ACCU the proceeds are counted as an earning separate to that of Primary Production. More information can be found on the Tax Treatment of ACCUs on the Clean Energy Regulator website. The Australian Taxation Office has information about Claiming Deductions for Carbon Sink Forest Expenses.

**An Australian Carbon Credit Unit** is a tradable certificate equivalent to one tonne of carbon dioxide equivalent either stored or avoided.

## What is Sequestration?

In farming carbon, the land holder can either avoid emissions or 'sequester' carbon. Sequestration is the general term used to describe the natural processes that remove CO<sub>2</sub> from the atmosphere and store it in vegetation or soil. Sequestration in vegetation occurs via the process of photosynthesis – as plants use the energy of sunlight to convert CO<sub>2</sub> to carbohydrates for their growth and maintenance. The plant's growth reflects the amount of CO<sub>2</sub> it has taken from the atmosphere. The plant is generally using more CO<sub>2</sub> in the initial years of growth, slowing over time as plants grow to their full capacity as a carbon store. The amount of carbon that can be sequestered in vegetation varies with species, soil quality, climatic conditions and land management practices.

Carbon accumulates in soil as vegetation dies. Some is incorporated into the soil while a portion is released back into the atmosphere as carbon dioxide. Vegetation assists the retention of soil carbon. Appropriate management of agricultural soils by landholders can reduce the amount of organic carbon loss. Soils with high organic carbon content are healthier and more productive and have higher water-holding capacity.

Sequestration activities are subject to permanence obligations. This means if an ACCU is produced through sequestration, the increase in carbon must be maintained for the nominated permanence period (either 25 or 100 years). Permanence should be considered as part of the risk management strategy, considering impacts and likelihood of fire, drought and the need to sell that parcel of land.





## The Australian Government Program for Carbon Farming – The Climate Solutions Fund (CSF)

The Australian Government established the Emissions Reduction Fund (ERF) in 2014 as a means to achieve Australia's 2020 emission reduction target. In 2019 this was changed to the Climate Solutions Fund (CSF). The CSF sets out ways that industry can be a part of reducing GHG. The CSF is voluntary and includes all sectors of the economy and aims to seek the lowest cost abatement. Carbon Farming is the means for the agricultural sector to participate in the CSF. The Carbon Farming Initiative was established in 2011. It has provided the opportunity to recognise the role agriculture can play in reducing Australia's emissions and allows land managers to be paid for their actions.

Before an activity is eligible to generate credits, it requires an approved method for counting and verifying abatement. Land managers can choose to develop a project which complies with the guidelines of carbon farming Methodologies. The Clean Energy Regulator certifies the Australian Carbon Credit Units (ACCUs) which the farmer may then sell on the open market.

The Climate Solutions Fund has three parts:

**Contracting:** the Australian Government contracts for the supply of Australian Carbon Credit Units (ACCUs) via a voluntary reverse auction process that seeks to purchase lowest cost abatement in the form of ACCUs from land managers, carbon service providers, and industrial efficiency activities.

**Crediting:** The Clean Energy Regulator is responsible for crediting and verifying ACCUs generated through registered projects. These projects may have a contract with the Australian Government or be generating ACCUs for the supply to voluntary or other secondary markets such as under the Safeguard Mechanism.

**Safeguarding:** The Safeguard Mechanism seeks to ensure that the savings secured through the contracting process are not overtaken by carbon pollution from high emitting industrial sources.

As at 17 February 2021, there are 281 Queensland projects registered with the Clean Energy Regulator.

## How to become involved in Carbon Farming

The Carbon Farming Initiative and the ERF were designed so that individual landholders could register projects and undertake projects individually, however it is a complex system and a very new area of competence and activity for many people. Landowners can get involved themselves or can do so with the support of a service provider. Similarly to the consultants and assistance available for other agricultural industries, the Carbon Farming industry has service providers that assist land managers to participate. The most common entry path is for people to partner with a carbon project developer. Project developers may assist at all steps of the process up to the sale of the ACCU's or they may provide support for particular phases of the project development or implementation. Importantly some project developers share the risk of project failure, while others do not.

Before signing with a particular project developer:

- Read the Australian Carbon Industry Code of Conduct
- Do your research, speak to people who already have Carbon Projects.
- Speak to multiple project developers – look for Carbon Project Developers who will share the risk as well as the rewards,
- Check online at [Queensland Rural Industry and Development Authority](#), your industry body and groups such as the Rural Financial Counselling Service for any assistance that is available.
- Always seek independent legal and financial advice prior to signing an agreement.





People who provide financial services in relation to ACCUs and related financial products and services in Australia may require an Australian Financial Services licence (AFSL), which authorises them to provide those services.

You should obtain your own professional advice about the trading of ACCUs, having regard to your own situation.

Further information can be found on the CER website [Before you apply](#)

## Key steps in a carbon farming decision process

Do you have the legal right to undertake the project? Is there a suitable method?

Does your high-level analysis suggest that it is worth undertaking further investigation?

Is there a suitable vehicle for participation? This may involve a partnership.

Undertake detailed financial and risk analysis and obtain professional advice about the viability of your project.

Develop the implementation plan and seek a contract to support proceeding with the project.



## Four steps to participate in the CSF

### Step 1 – Apply

You can participate in the Climate Solutions Fund as individuals, sole traders, companies, local, state and territory government bodies and trusts.

To participate you will need to:

apply to become a Climate Solutions Fund participant  
register your project to receive Australian carbon credit units under the Climate Solutions Fund.

### Step 2 – Contracts and auctions

Climate Solutions Fund participants with a registered project may bid for a contract to sell their Australian carbon credit units to the Clean Energy Regulator. The Clean Energy Regulator will run auctions to select bidders according to price. For certain projects that can demonstrate additional co-benefit outcomes, selling your credits to the LRF may be an option.

### Step 3 – Reporting and auditing

To receive Australian carbon credit units, you will need to submit reports on your registered projects, including reporting on your emissions reductions. You will also need to have your project audited on a regular schedule.

### Step 4 – Delivery and payment

Participants who have a contract with the Clean Energy Regulator will deliver Australian carbon credit units according to the schedule in their contract and will then be paid at the price bid at auction and set out in the contract.

More detail about the steps involved is available on the [Clean Energy Regulator's website](#).





Photo: Andrew Drysdale

## Land Restoration Fund

The Queensland Government's Land Restoration Fund (LRF) aims to expand carbon farming in the state by supporting land-sector projects that deliver clear environmental, social and economic co-benefits that deliver clear environmental, social and economic, and First Nations co-benefits in addition to generating ACCUs.

The three priority areas for investment are:

Land restoration to improve the health of wetlands and coastal ecosystems, including the Great Barrier Reef.

Land restoration for threatened species and biodiversity.

Land restoration for social and economic sustainability.

The Land Restoration Fund supports projects that:

sequester carbon in land and soil to reduce Queensland's carbon emissions

boost revenue sources for farmers and other landholders in regional and rural Queensland

deliver social and community benefits

deliver cultural and community benefits for Traditional Owners

improve Great Barrier Reef water quality

enhance wetlands for fisheries and hatcheries improving commercial fishing opportunities

strengthen critical habitat protection

restore ecosystems and degraded land.

The LRF will formally support the following carbon farming co-benefits:

1. benefits to soil health
2. benefits to the Great Barrier Reef
3. benefits to wetlands
4. benefits to coastal ecosystems
5. benefits to threatened ecosystems
6. benefits to threatened wildlife
7. benefits to native vegetation

Projects wishing to apply to the LRF must register with the CSF and go through the CSF crediting process.

Further information is available at the [Land Restoration Fund website](#).

The Land Restoration Fund supports projects that deliver greater benefits and may create increased incentives for land managers to be involved. This may be through providing increased financial return or supporting broader benefits than producing ACCU's through the Emissions Reduction Fund alone.

## Examples of Carbon Farming Projects

### Vegetation

- Protecting native forests by reducing land clearing.
- Planting trees to grow carbon stocks.
- Regenerating native forest on previously cleared land.
- Savanna burning.
- Managing bushfires in Australia's savannas to avoid high intensity fires.

### Agriculture

- Reducing emissions from beef cattle and milking cows through dietary supplements or efficient herd management.
- Capturing and destroying the methane from effluent waste at piggeries.
- Building soil carbon through changed farming practices such as crop stubble retention.

An emerging market is that of Blue Carbon which is carbon stored in coastal ecosystems (mangroves, tidal marshes and seagrasses). As of January 2021, the Clean Energy Regulator has yet to approve a method for Blue Carbon, but it has been listed as a priority to be developed over the next 12 months. A report has been produced by the Department of the Environment and Energy to further explain potential Blue Carbon opportunities; Towards an Emissions Reduction Fund Method for Blue Carbon, September 2019.





## Be clear about the reasons for participating

Taking up carbon farming is like any other agricultural production decision within an enterprise. Like changing crops, breeding a new line of cattle, or shifting production systems it is a complex decision with many factors to consider. These vary from property to property and it is important to be clear on why a carbon project may suit your enterprise.

Undertaking a carbon project is a business decision with costs and benefits. However not all decisions are purely financial and considerations such as increased sustainability through diversification, opportunities for succession, alternative land uses for less traditionally productive areas, lifestyle decisions, project co-benefits and personal interest in the products or outcomes being developed, all play a part. Having a clear understanding of the drivers behind participation in carbon farming will help determine the type of project being developed and its value to the enterprise.

An additional critical factor in this decision will be the regulatory requirements of the ERF. This will dictate what activities are actually eligible on your property and will contribute to determining profitability.

There are many activities that may benefit the landholder and reduce greenhouse gas emissions but are either not recognized by the ERF or are not economically viable.

Landholders may want to consider the benefits of joining together with other landholders through aggregation.

Because administrative and compliance costs of even a smaller carbon project may be considerable percentage wise, the cost to produce an ACCU will often decrease with higher numbers of ACCUs to be sold. Joining with projects with the same Methodology across a catchment or river system for example, can reduce some of the environmental risks like fire, drought or storm events.

The Clean Energy Regulator website provides information about [Aggregation](#) under the Emissions Reduction Fund.

Like any new business venture, the choice to participate in carbon farming should include a careful consideration of the costs and benefits involved, alongside the risks of the activity being considered. Before deciding to proceed, this should be compared to other activity that could be undertaken within the enterprise. Equally, if the decision is made to not participate, the reasons should be clear, so that if something changes in the future then the opportunity to capitalise is recognised.

## Some of the Co-benefits of Carbon Farming

In addition to generating revenue in carbon markets, a carbon farming project may also generate a range of co-benefits for your enterprise. Those benefits will clearly depend on the nature of the farming enterprise and on the type of carbon farming. They include:

- improving water use efficiency
- providing protection for stock (through trees providing shade and windbreaks)
- improving livestock production efficiency
- creating financial diversification
- improving environmental benefits such as increasing habitat area for a threatened species
- improving soil quality
- improving fertiliser use efficiency
- improving the amenity and aesthetics of the local environment.

Co-benefits may be private (accruing within the farm enterprise) or public (accruing to the wider environment outside the farm boundary).



## Methodologies

Land managers may undertake many actions which reduce the GHG emissions of their enterprise. In order to gain a financial benefit from generating ACCUs, one of the specific Carbon Farming Methods must be used, following explicit instructions for setting up, undertaking, recording and monitoring the project. There are also specific auditing requirements for projects. Examples of Carbon Farming projects can be found on the Australian Government – Clean Energy Regulator website and are summarised below. The Beef cattle herd management method can reduce the emissions intensity of beef cattle production by reducing cattle emissions per kilogram of live-weight produced.

- The Feeding nitrates to beef cattle method reduce greenhouse gas emissions from pasture-fed beef cattle by substituting urea supplements with a nitrate supplement in the form of lick blocks.
- The Measurement of soil carbon sequestration in agricultural systems method credits measured increases in soil carbon as a result of one or more new or materially different management activities in grazing or cropping land (including woody horticulture) that store carbon in that land.
- A soil carbon in grazing systems project involves storing carbon on grazing land by introducing activities that either increase inputs of carbon to the soil, reduce losses of carbon from the soil or both.
- A model-based soil carbon project involves setting up specific project management activities on eligible land that aim to remove carbon from the atmosphere by increasing the amount of carbon added to the soil. As they grow, plants take up carbon and return it to the soil, where it is broken down to form soil carbon.
- Vegetation projects generate abatement by removing carbon dioxide from the atmosphere and storing it as carbon in plants as they grow. Examples of vegetation activities could include:
  - a. reforestation
  - b. revegetation, or
  - c. protecting native forest or vegetation that is at imminent risk of clearing.
- The Destruction of Methane Dairy Manure method sets out the rules for projects that reduce the release of

methane generated from dairy manure. A project using this method requires the installation and operation of pond covers, gas capture equipment and combustion equipment to existing uncovered effluent treatments, or the replacement of conventional ponds with covered ponds systems.

- The Dietary Additives to milking Cows method applies to Emissions Reduction Fund projects that feed eligible additives to milking cows to reduce the amount of methane emissions. Increasing the fat content of a milking cow's diet reduces methane emissions produced as a result of enteric fermentation (digestive process).
- Savanna Fire Management projects aim to reduce the frequency and extent of late dry season fires in savannas, resulting in fewer greenhouse gas emissions and more carbon being sequestered in dead organic matter.

## Useful Resources:

- Carbon Farming In Qld: Qld focused strategies and resources for climate change.

<http://www.qld.gov.au/landrestorationfund>

- Clean energy regulator: Austn Govt media releases, links to information hubs around auditing & markets.

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

- Project and Contract registers: Interactive Project Map link to see projects by state or method.

<http://www.cleanenergyregulator.gov.au/ERF/projectand-contracts-registers>

<http://www.cleanenergyregulator.gov.au/ERF/Choosing-a-project-type/Opportunities-for-the-landsector>

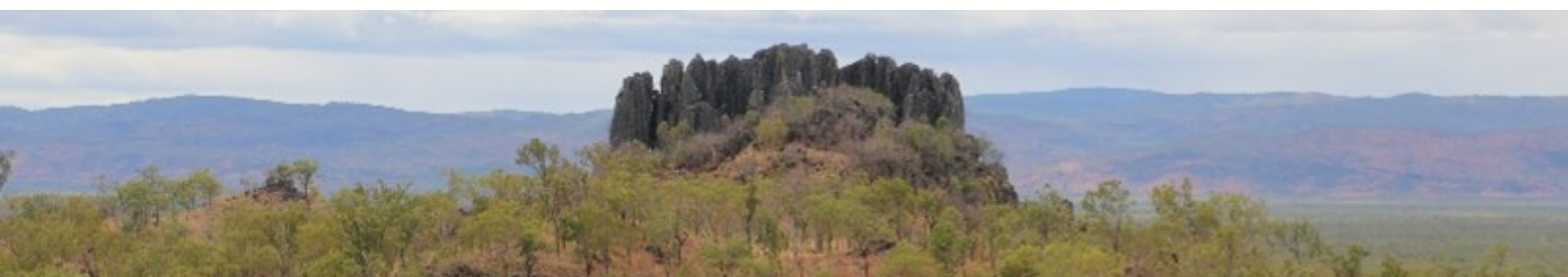
- Carbon Market Institute Industry Code of Conduct: A guide for everyone in the Carbon Market from project developers to advisers. Check project developer signatories.

<http://marketplace.carbonmarketinstitute.org/code/>

- Carbon Credits (Carbon Farming Initiative) Act 2011: Up to date legislation for attaining carbon credits.

<https://www.legislation.gov.au/Series/C2011A00101>

- Department of Environment and Resource Management, Qld (2011), Carbon Farming in Rural Queensland.





## Methodologies in use in Northern Queensland

Not all Methodologies are appropriate for all areas in Australia. Within Queensland, existing land use types as well as topography and climate, influence which methods are more appropriate for an area. The main Methodologies for Northern Queensland are identified below (areas include Southern Gulf, Northern Gulf, Cape York and Torres Strait NRM Regions).

### Savanna Fire Management and Green House Gas Emissions

Low intensity fires are an integral part of the savanna nutrient cycle as well as the life cycle of many plants. Fire occurrence is related to seasonal accumulation of organic matter and can be brought about by human or natural causes. GHG emissions from higher intensity late dry season fires are much greater than those from low intensity early dry season fires. On average, late dry season fires emit 52% more emissions per unit area than early dry season fires. The profile of gases in a late season hot burn is different to that of a cooler early season burn, with the hotter fires releasing more harmful GHG than the cooler fires.

### Current Activity

The current methods for generating Australian carbon credit units through a savanna burning project are the

Savanna fire management - sequestration and emissions avoidance and Savanna fire management - sequestration emissions avoidance methods.

### Required Actions

Under these methods, land managers will need to consider some or all of the following strategies to reduce fire intensity so that less area is burnt by late dry season fires:

- implementing an early dry season fire regime to reduce fuel loads
- reducing the total area of land burnt
- establishing firebreaks or reinforcing natural barriers to contain the spread of severe fires.

### Co-Benefits

The restoration of managed fire regimes across sparsely populated regions will generate livelihood opportunities on traditional Indigenous lands and increase financial returns for pastoral enterprises. Hazard minimisation is an important benefit of having controlled burns early in the season, whilst being able to better manage feed for stock having green pick and a good seed source for following years. Indigenous communities are well-placed to participate in and benefit from savanna burning, notably through their ownership of lands, ecological knowledge and demographic distribution.







## Risks and Limitations

Although fire is an important tool in maintaining savanna health, adverse fire regimes can significantly damage savanna biodiversity. Outcomes other than emissions reductions need to be considered in project design to prevent adverse impacts on ecological, economic and cultural values. Regular cool burns may increase woody regrowth and have adverse ecological impacts. The need to manage feed availability needs to be balanced within the burning regime and seasonal variation will impact differently as the season progresses. Also, the current savanna burning methodology is only applicable to areas receiving over 600mm annual precipitation.

## Reducing Livestock Methane Emissions

Like all ruminants, cattle produce methane through digestive processes. They also produce small amounts of nitrous oxide (N<sub>2</sub>O) through manure and urine. The amount of methane produced is related to the quality and digestibility of their forage diet. As tropical pastures can provide a poorly digestible food source, northern beef cattle under extensive grazing may produce higher per animal emissions. The focus of activities is on reducing the amount of GHG emissions for every kg of beef produced.



The most immediate potential comes from increasing production efficiency by modifying herd management and stocking rates, as well as enhancing health and nutrition with options like selective breeding becoming more important in the medium term. Many strategies to enhance productive efficiency will invariably raise production costs, requiring investment in new technologies, training and an intensification of management, though these costs may be offset by improved efficiencies. Two methods are currently approved for use with cattle herd management:

- Beef cattle herd management.
- Reducing greenhouse gas emissions by feeding nitrates to beef cattle.

## Required Actions Beef Cattle Herd Management

Under the beef cattle herd management method, producers can undertake a range of activities that reduce emissions from a herd of cattle that are ordinarily grazed together by:

- Increasing the ratio of weight to age of the herd
- Reducing the average age of the herd
- Reducing the proportion of unproductive animals in the herd or
- Changing the ratio of livestock classes within the herd to increase total annual liveweight gain of the herd.





By growing a steer and turning it off for market more quickly, or by increasing the calving frequency of cows, more kg of beef may be produced per kg of methane emitted. Improving weaning rates through feed supplementation, improved animal health and removal of unproductive cows from the herd would also reduce emissions. It has been estimated that a 10% increase in weaning rates in low performance cattle grazing systems would reduce CO<sub>2</sub>-e emissions by 2kg for every kg of live weight gain. Improving breeder herd performance may also improve enterprise profitability, however these factors will vary according to regional production conditions, production systems and markets. It is important to calculate the optimum turnoff age, herd size and structure to minimise overall herd emissions while maximising turnoff and economic returns.

## Required Actions Feeding Nitrates to Beef Cattle

Diet directly influences methane emissions of cattle and often, particularly in the northern beef herd, our pastures are low in protein and digestibility. This means that some cattle, particularly those raised on northern pastures, have higher emissions due to a low-quality diet. Using feed supplementation to increase digestibility may be an option especially as some feed supplements are known to directly inhibit the production of methane (e.g. oilseeds or legumes). From a logistical and economic point of view, this solution would not always be practical considering the extent of many properties but there may be opportunities for providing supplements to cattle through water supplies or lick blocks.

Some pastoralists already use urea lick blocks to increase the amount of nitrogen that stomach bacteria can convert to protein, therefore improving weight gain and productivity.

Under this method, land managers have the opportunity to replace the urea lick blocks with nitrate blocks which will reduce the amount of enteric methane produced by the cattle for the same feed intake, and therefore reduce greenhouse gas emissions. Enteric methane is the methane produced in ruminant animals when microbes decompose and ferment plant materials.

## Benefits

Improvements to production efficiency may also lead to increased enterprise profitability, with the opportunity to generate and sell ACCUs providing an additional mechanism for covering the costs of achieving increased productivity.

## Risks and Limitations

The size of the herd will impact on the number of ACCUs that may be generated and therefore the cost effectiveness of undertaking a project of this type. The cost of undertaking the management changes required (such as purchase of supplements) may mean that the method is only applicable to large herd sizes. Additionally, the cost of undertaking some changes may outweigh the return from the sale of ACCUs. Both livestock methods rely on baselines being set on existing management regimes and information, so good record keeping is necessary. This means there is limited applicability in situations where people are already undertaking intensive or advanced herd management practices, and the use of nitrate supplements requires that land managers were previously using urea based supplements (at least once in the last 5 years).