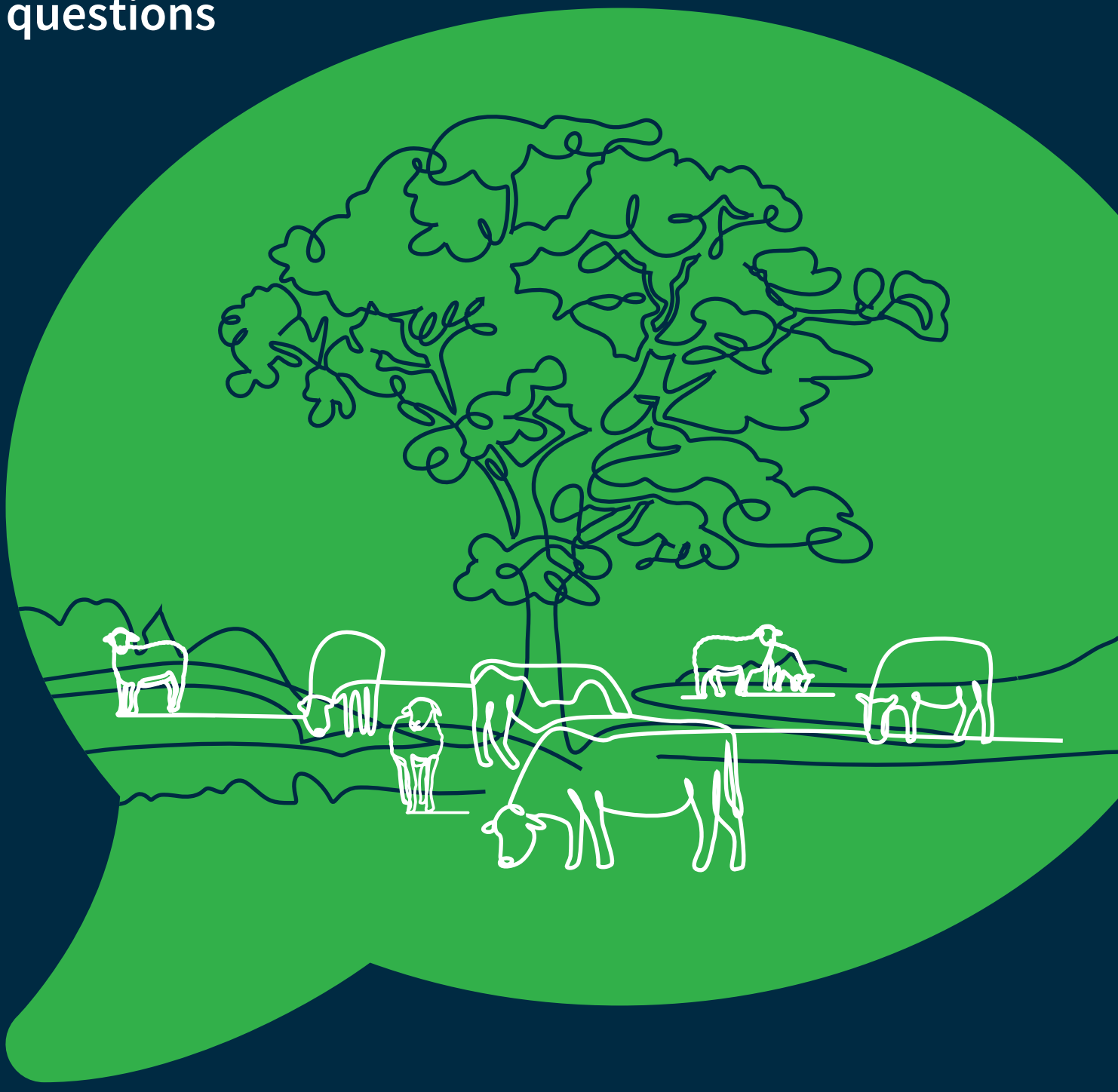
CN30

MEAT & LIVESTOCK AUSTRALIA

Carbon in the red meat industry

Frequently asked questions



October 2024

Questions

For more information on how the Australian red meat and livestock industry is committed to continuous improvement through research and development, technologies, tools and best practice and how key sustainability investments and initiatives are aligned to the industry's priorities, visit

sustainability.mla.com.au

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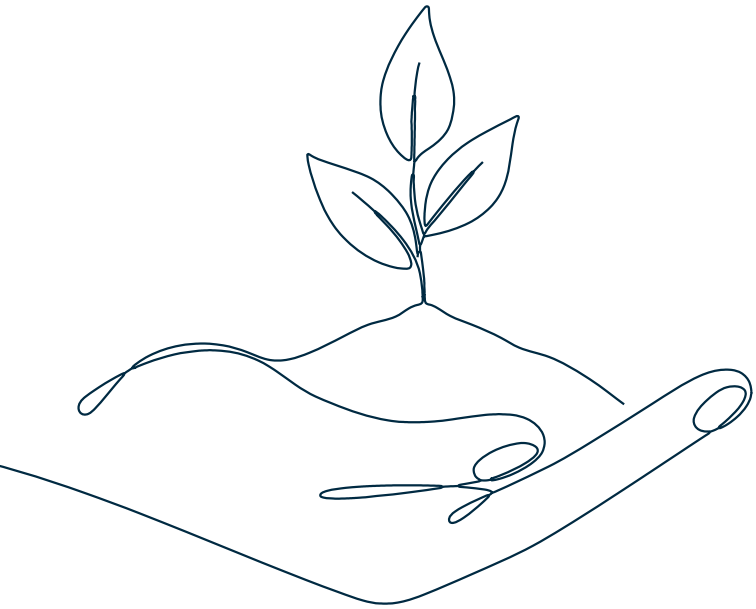
The current state

Why are we hearing so much about emissions in agriculture?

Over the last 200–300 years, human activity has increased the concentration of greenhouse gases (GHGs) in our atmosphere, causing climate change which impacts our communities and environment (IPCC, 2023). In Australia, it is estimated that climate change has already reduced average annual farm profits by 23% despite improvements in productivity and on-farm adaption (ABARES, 2021).

As these impacts are becoming more apparent, many governments, companies, investors and industries are making specific commitments to support GHG emissions reduction. Today, the world's largest economies and more than 50% of Australia's top agricultural export markets have committed to achieving net zero GHG emissions (MLA, 2022).

Meeting these commitments will be a collective responsibility and the effects are likely to flow through agricultural supply chains. As stewards of over 50% of Australia's land, producers can play an important role, not just in reducing emissions, but also by storing carbon in our grazing systems (DCCEEW, 2021; CSIRO, 2022).



What kind of climate commitments are we seeing globally?

Climate change and sustainability have been on the global policy agenda since the 1970s. In more recent times, this has come into sharp focus.

The 2016 Paris Climate Agreement was adopted by 196 parties including Australia. This was the first legally binding international treaty and the first universal global agreement on climate change. The Paris Agreement aims to hold the increase in global average temperature well below 2°C by 2100 and to pursue efforts to limit the temperature increase to 1.5°C, with a peak in emissions as soon as possible (UNFCCC, 2024).

Following this, 158 countries also committed to the Global Methane Pledge. The pledge has a focus on methane emissions reduction as a "quick win" strategy for addressing warming over the next decade whilst other technologies and innovations are being developed (GMP, 2024).

In line with their commitments, countries and economies of all sizes are establishing national targets and strategies for greenhouse gas reductions. This doesn't just influence what happens here in Australia, but what's happening in our key export markets **(Figure 1)**.

As a major exporter of beef and sheepmeat, including into high value markets, we must be on the front foot to ensure continued market access (MLA, 2023).

Figure 1. GHG emission targets of key export markets for Australian red meat

Export market	Net zero GHG emission target
European Union (EU)	■ Reduce CO_2 emissions by 55% on 1990 levels by 2030 ■ Achieve net zero emissions by 2050
China	■ Achieve net zero emissions by 2060
United States	■ Reduce CO_2 emissions by 26–28% on 2005 levels by 2030 ■ Achieve net zero emissions by 2065
South Korea	■ Reduce CO_2 emissions by 40% on 1990 levels by 2030 ■ Achieve net zero emissions by 2050
Canada	■ Reduce GHG emissions to 40–45% below 2005 levels by 2030
Japan	■ Reduce GHG emissions by 26% by 2030 compared to 2013

What kind of climate commitments are we seeing in red meat supply chains?

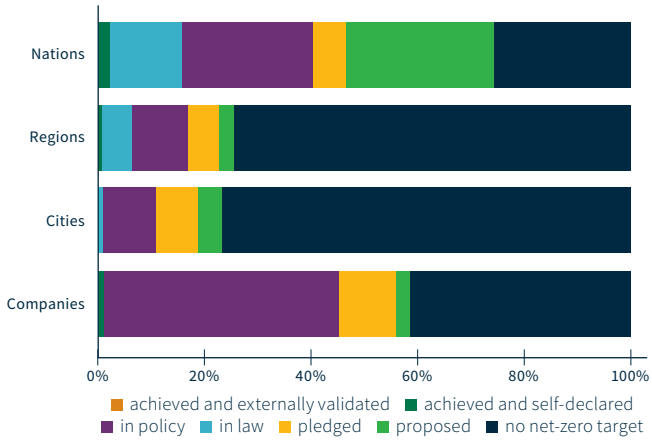
Responses to climate change are not just being driven by governments, but by companies, shareholders, consumers and community **(Figure 2)**. Many companies in the food and beverage sector (and their buyers) have committed to emissions reduction targets (Net Zero Tracker, 2024).

There are several drivers for these commitments – for some it's about risk management, compliance and market access, whilst for others it's about brand differentiation and value-adding. Companies operating within international markets are impacted by local regulations and policies that incentivise reduction targets through favourable access to credit. In Australia, additional corporate reporting requirements are also emerging.

The position of every company is different. Take a look at some of their websites to learn more about their sustainability position.

Countries, markets and companies making climate commitments are likely to have sustainable sourcing policies and/or protocols, which will flow through their supply chains. Whilst you may not need to act on these yet, it's useful to know where you stand and what farm inventory records may be helpful to keep for future use. Get to know your emissions position by creating a carbon account using the free MLA Carbon Calculator or PICCC GAF spreadsheets.

Figure 2. Tracking of net zero commitments across 4,170 global entities, showing that almost 60% of world's largest 2,000 publicly listed companies are working towards a net zero target



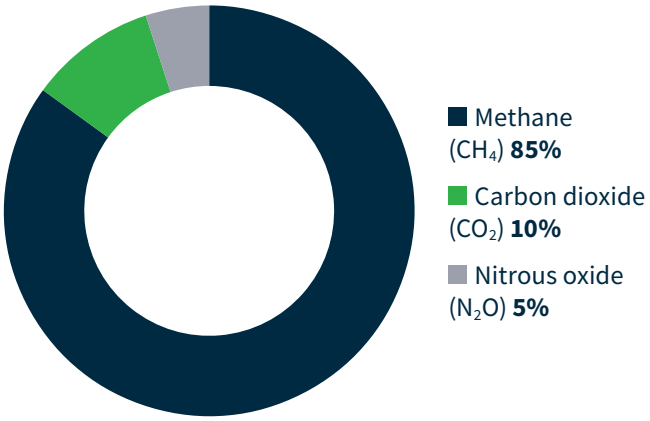
For more information, visit sciencebasedtargets.org or scan the QR code for mandatory climate-related financial disclosures.

Where do most agricultural emissions come from?

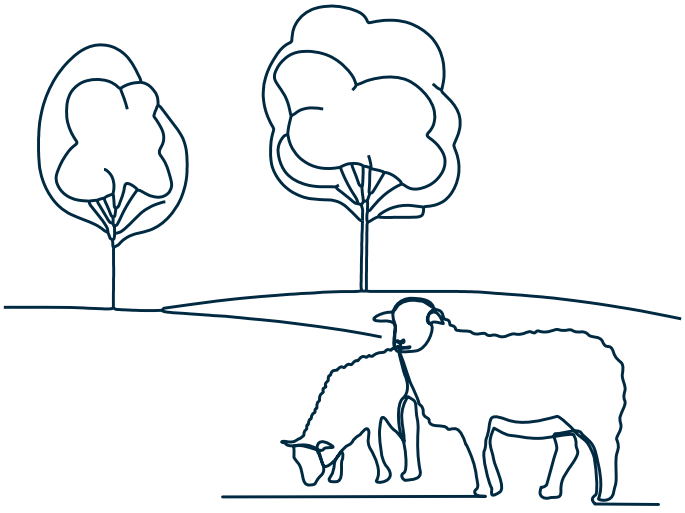
In Australia, the agricultural sector contributes approximately 18% of the total national emissions (DCCEEW, 2023), of which almost 80% are attributed to methane (ABARES, 2024). Methane from livestock – sheep and cattle – contributes approximately 11% of Australia's total emissions.

There are three main greenhouse gases (GHGs) associated with agriculture – carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4). In red meat production systems, typically 80–90% **(Figure 3)** of an enterprise's emissions are attributed to methane, which comes from the digestive processes in ruminants (Wiedemann & Dunn, 2021). Carbon dioxide and nitrogen generally come from inputs such as electricity, petrol/diesel, fertilisers and manure.

Figure 3. Typical GHG emission breakdown in beef and sheep systems (Wiedemann et al., 2015; Wiedemann et al., 2016)



Note: the exact contributions can vary by ±10% for methane and by about ±5% for nitrous oxide and carbon dioxide.



Innovation in the red meat industry

What is CN30?

CN30 is an ambitious industry target to be carbon neutral by 2030. The CN30 initiative is driving significant investment in research, development and adoption (RD&A) activities.

CN30 means that our emissions of production would be equal to, or less than, carbon stored within the vegetation and soils in land under grazing management. We still have work to do to reach this position, however promising technologies have emerged to support the industry's trajectory. In the meantime, we can start to reduce emissions by focusing on efficient management of livestock and inputs.

The purpose of the CN30 initiative is to provide producers with practical options for emissions reduction that are compatible with production and profitability. This, in turn, is intended to position the Australian red meat industry to capitalise on market opportunities into the future, including international markets or supply chains which may have requirements around emissions reporting and/or reductions.

What research is underway?

CN30 is not the only initiative driving investment in RD&A for emissions reduction in agriculture. RD&A is being undertaken in Australia and overseas, involving many industries, governments, research organisations and commercial partners.

Some of the research areas being explored include (Harrison et al., 2021):

- feed supplements for methane reduction
- additive delivery mechanisms
- cheaper and easier ways to measure emissions (plus reliable proxies)
- pastures and forages that reduce methane whilst improving productivity
- livestock genetics
- grazing strategies for carbon storage
- low-emissions fertilisers
- renewables on farm
- maximising on-farm benefits of agro-forestry.

For more information, visit mla.com.au/cn30, globalmethanehub.org, the Net Zero Emissions from Agriculture CRC at zneagcrc.com.au and scan the QR code to read the Australian Government's Agricultural and Land Sectoral Plan.

Greenhouse gases 101

Why do we talk about carbon? What about other greenhouse gases?

There are three key greenhouse gases associated with agriculture – carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4).

To standardise how we talk about greenhouse gases, which all have different properties, we use carbon as a reference point (known as carbon dioxide equivalents, CO_2-e, or 'carbon' for short).

Greenhouse gases behave differently in the atmosphere and have different capacities to absorb solar energy (known as their Global Warming Potential, GWP). The higher the GWP, the more a gas warms the earth compared to CO_2 over the same period.

Methane has a GWP100 value of 28, meaning that it is found to be 28 times more potent than CO_2 (CER, 2024) over a 100-year period.

We can convert this into CO_2-e with a simple equation, multiplying the quantity of gas by its GWP. So:

1 tonne x 28 = 28 tonnes
1 tonne CH4 = 28 tonnes CO_2-e

This is why methane is such a big factor in the carbon footprint of a livestock business.

Note that the GWP figure for each gas is revised over time based on new scientific knowledge of gases. GWP100 figures are published by the IPCC at ipcc.ch/reports. They are also updated in Australia's National Greenhouse and Energy Reporting Scheme . Scan the QR code to keep up to date.

What is emissions intensity vs. net emissions?

Two figures generated in carbon accounting are net emissions and emissions intensity. These figures satisfy different reporting and accreditation requirements.

Net emissions

Net emissions refers to the carbon balance of an enterprise, accounting for carbon output (emissions) minus carbon storage (sequestration).

Net emissions figures are largely influenced by enterprise scale (number of livestock), type (e.g. breeding, trading, feed lotting), annual or seasonal management strategies (e.g. destocking, restocking).

For this reason, it is not particularly useful to compare net emissions figures between operations or between years.

Emissions intensity

Emissions intensity refers to an enterprise's emissions produced relative to output (e.g. tonnes of CO_2-e per tonne of liveweight or greasy wool). It is a measure of efficiency.

Emissions intensity can be improved in a herd or flock by improving reproduction rates, reducing disease or mortalities, improving rate of weight gain or decreasing time to turn off.

Emissions intensity allows for comparison and benchmarking between different operations (when comparing products of the same unit).

Figure 4. Expected emissions intensity ranges (excluding sequestration from vegetation) (Wiedemann et al 2015, 2016)

Emission source	Emissions intensity expected range	Unit
Sheepmeat – breeding, growing, finishing	6–10	kg CO_2e/kg LW
Wool	20–35	kg CO_2e/kg greasy wool
Sheepmeat (trade sheep) exclusing scope 3 livestock emissions	2.5–4	kg CO_2e/kg LWG
Beef – breeding, growing, finishing	9–18	kg CO_2e/kg LW
Beef traded cattle excluding scope 3 livestock emissions	5–9	kg CO_2e/kg LWG

How can I lower emissions on-farm whilst maintaining productivity?

Focus on improving emissions intensity. Emissions intensity refers to the emissions produced per unit of product (e.g. CO_2-e per kilogram of liveweight or greasy wool). A more efficient business will typically have a lower emissions intensity.

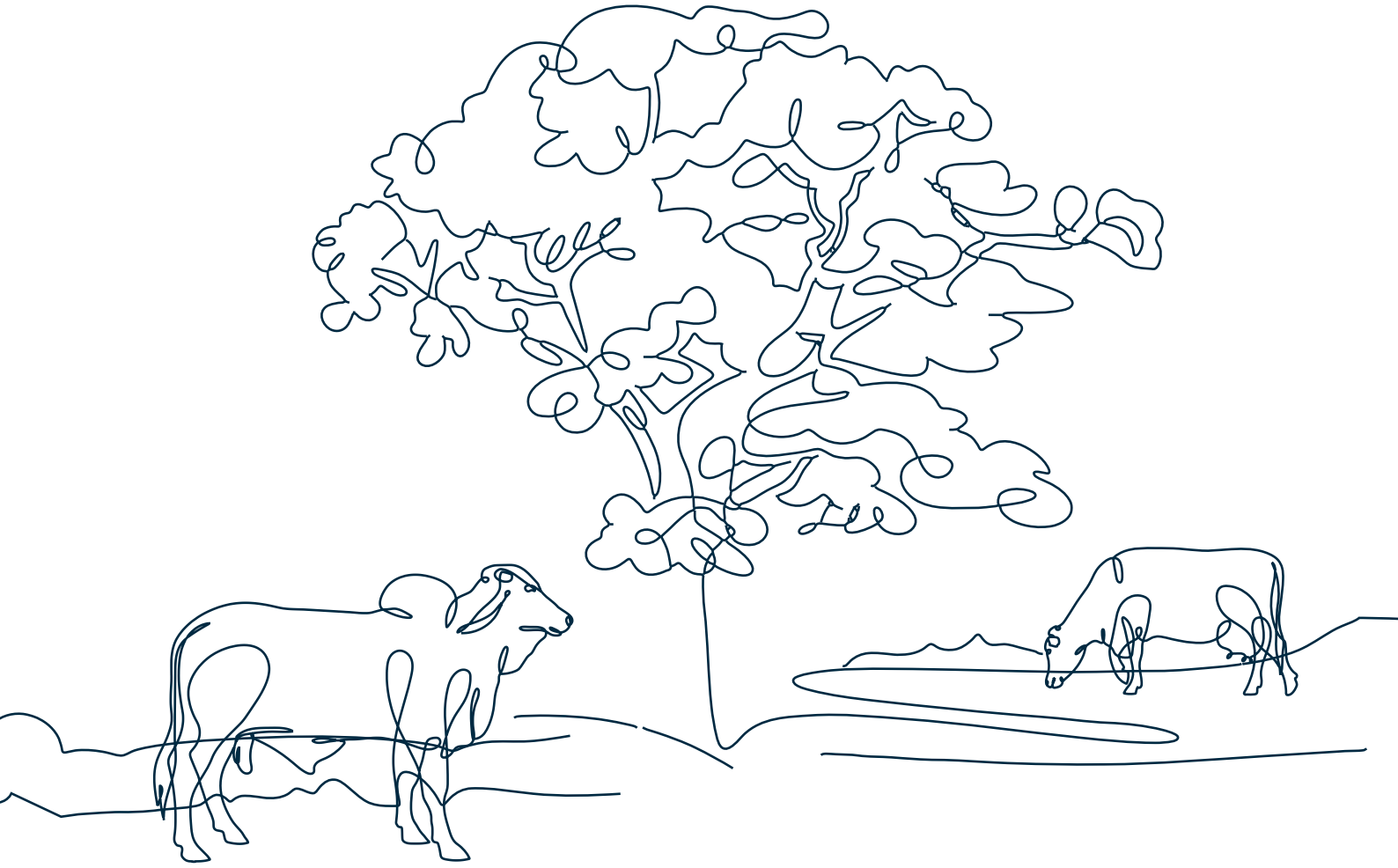
Management decisions that improve reproduction rate, reduce disease or mortalities, improve rate of weight gain or decrease time to turn off can all improve emissions intensity.

Additionally, some pastures and legumes have shown potential for methane reduction and livestock productivity, either by improving the nutritional quality of feed or by filling feed gaps (Badgery et al. 2023). Legumes can also fix nitrogen and reduce the need for fertilisers. Research into anti-methanogenic plants is ongoing.

Grazing management strategies have not been shown to impact soil carbon directly but can benefit the drivers of soil carbon sequestration such as plant production, persistence and groundcover (McDonald et al., 2023). This research is also continuing.

Additionally, well managed trees, which sequester carbon, can have positive impacts for livestock by providing shade and shelter (Meyer et al., 2021). Agro-forestry is being explored by producers across different regions of Australia.

Savannah fire management is also recognised as a way to avoid the emissions which result from hot, uncontrolled burns. Careful, early, dry season burning can reduce fuel loads and create fire breaks in the landscape, as well as maintain the productive potential of the land by stimulating new growth, promoting desirable species and controlling weeds.



Carbon accounting

What is a carbon account?

Carbon accounting, or greenhouse gas accounting, is the process used to calculate how much carbon dioxide equivalent (CO_2-e) is emitted from an enterprise's activities over a certain period (usually a calendar year or financial year).

Greenhouse gas accounting considers the greenhouse gas emissions correlated with certain activities, and the amount of these activities happening in an enterprise (e.g. the emissions from different classes of livestock, how many livestock you have and for how long they're on the property).

You can use a carbon account to determine the emissions intensity and the net emissions of your enterprise. Get to know your position by generating a carbon account through the MLA Carbon Calculator or PICCC GAF spreadsheets.

Seasonal factors liked restocking strategy or drought can peak and trough your calculated emissions and emissions intensity in a single year. For a more reliable picture of a business's emissions intensity, repeat an estimate using a carbon calculator tool over multiple seasons.

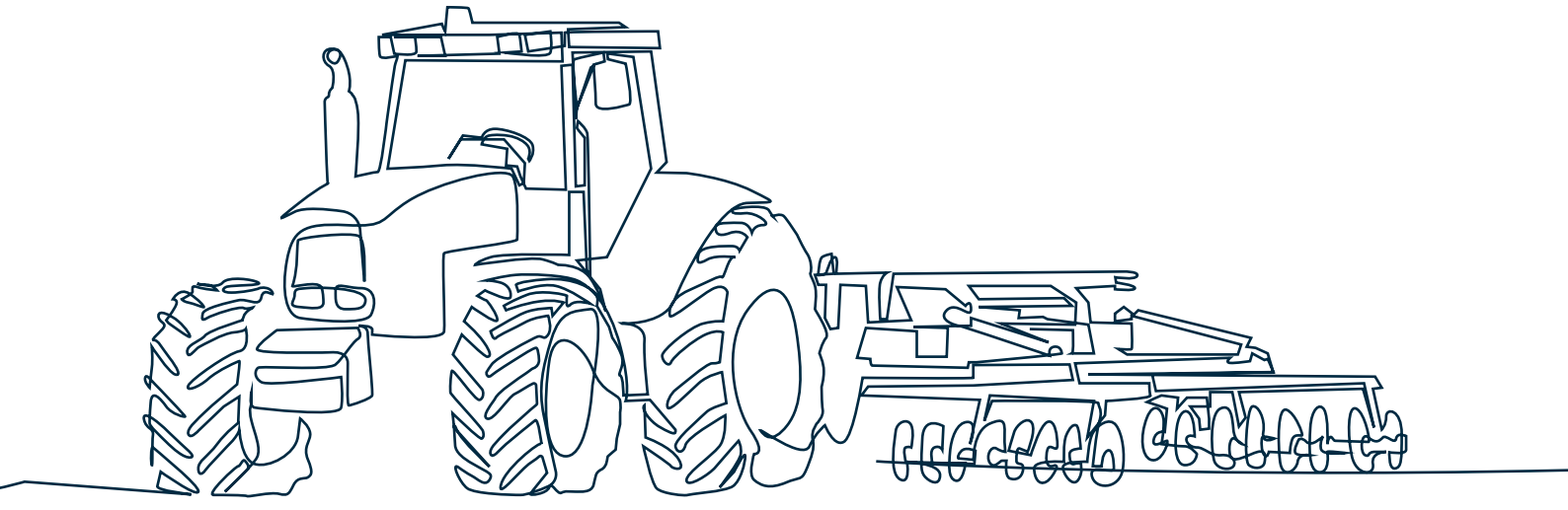
How can I create a carbon account?

For carbon accounting, the most recognised tools in Australia are developed based on the Greenhouse Accounting Framework (GAF) calculators. There are GAF tools for sheep and beef, goats, feedlot, cropping and other industries.

You can access the individual GAF tools, which are in Excel format, through the PICCC. The MLA Carbon Calculator integrates several of the GAF tools for red meat production and mixed farming. There is also a Quick Start option you can use for a rough estimate of your position, although this does not replace completing a full carbon calculation. These tools are all freely accessible online.

For more information and support using these tools, email cn30@mla.com.au and visit:

- carbon-calculator.mla.com.au
- quick-start-carbon-calculator.mla.com.au
- For user guide, data checklist and technical manual – carbon-calculator.mla.com.au/dashboard/resources
- (SB-GAF) Sheep & Beef GHG Accounting Framework spreadsheet piccc.org.au/resources/Tools
- MLA Toolbox online learning module – mla.com.au/elearning-measure-emissions
- Carbon Farming Outreach program module. Scan the QR code to access the topic – Your greenhouse gas account.



What are emissions 'scopes' and why do they matter?

Emissions scopes are used in carbon accounting to characterise where emissions come from.

According to the GHG Protocol, emissions are defined into three scopes **(Figure 5)**.

Figure 5. Sources and boundaries of city GHG emissions (Fong et al., 2014)

Scope 1 and 2 emissions are the most relevant to you as a business, as these sources are within your operational control. However, sometimes scope 3 emissions are used for reporting or accreditation under different programs.

Your scope 1 and 2 emissions are your customer's scope 3 emissions, such as processors and retailers. If these entities are reporting on their scope 3 emissions, they will need to include your on-farm emissions in their account.

Whilst you may not need to act on this yet, it's useful to know where your farm is positioned, and what farm inventory records might be helpful to answer this question in future.

- Learn more about the scopes with MLA's Carbon 101 eLearning course, available at The toolbox: mla.com.au/carbon-101.
- Get to know your emissions position by generating a carbon account through the MLA Carbon Calculator at carbon-calculator.mla.com.au or use the PICCC GAF spreadsheets at piccc.org.au/resources/Tools.

How do we account for methane in greenhouse gas accounting?

Greenhouse gases act, and interact, differently in the atmosphere and have different capacities to contribute to warming (known as their Global Warming Potential, GWP). Methane (CH_4), for example, is a more potent gas than carbon dioxide (CO_2), but doesn't last as long in the atmosphere.

There are different approaches to equate greenhouse gases based on their different properties:

- **GWP100**: The most commonly used metric which estimates greenhouse gases with respect to their relative impact over a 100-year time period. This metric is widely used in international reporting.
- **Absolute emissions:** It is also common to see reporting the absolute volumes (megatonnes) of greenhouse gases by type. No GWP multiplier is applied.
- **GWP*** is a model, rather than a metric, which compares gases over a 20-year moving timeframe. Whilst GWP* is thought to better reflect the shorter lifespan of methane, the baseline year moves, and the figures will fluctuate based on the 20-year period chosen.

Annual industry reporting by CSIRO reports the red meat sector emissions using both approaches (Mayberry, 2023). Producers or businesses can use either system for their own reporting, but it can be difficult for an individual producer to calculate GWP* as it requires 20 years worth of data and there are currently no public, online tools available to estimate under this framework.

The choice of system for reporting our emissions will largely be driven by supply chains and markets who are asking for this information.

Carbon credits and markets

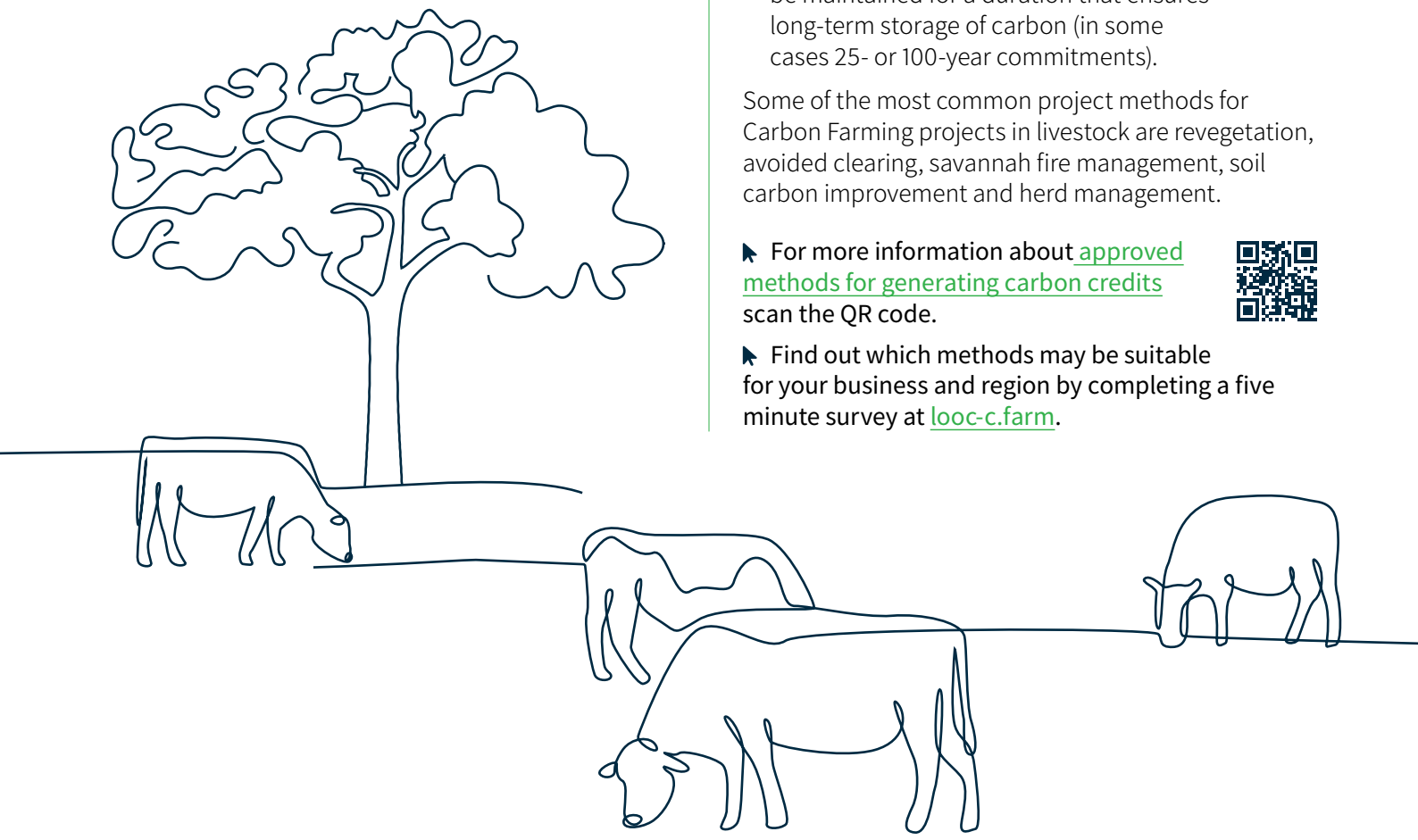
What is 'carbon farming'?

Carbon farming is the process of taking carbon out of the atmosphere and turning it into product as efficiently as possible. Often the term is used to refer to activities that generate carbon credits.

Carbon credits are generated through actions that increase the amount of carbon being stored in soils and vegetation on your property, or reducing greenhouse gas emissions as compared to your 'business as usual', and registering a carbon project to generate Australian Carbon Credit Units.

What is a carbon credit?

A carbon credit represents 1 tonne of carbon dioxide equivalent abated or stored. In Australia, the financial product for carbon is an Australian Carbon Credit Unit (ACCU) which is issued by the Clean Energy Regulator through the ACCU Scheme.



What carbon farming practices are eligible to earn carbon credits?

To earn tradeable carbon credits, there are strict rules to follow, including approved methods, contracts, monitoring and reporting.

The most common method for generating a carbon credit in Australia is via the government's ACCU Scheme, but there are other voluntary market programs in Australia and across the world.

Approved methods must be used to earn Australian Carbon Credit Units (ACCUs) under the ACCU Scheme. You can view these methods on the Clean Energy Regulator (CER) website. A five-minute survey via CSIRO's LOOC-C tool can also guide you on the most suitable methods for your business and region.

There are a few additional factors to consider:

- **Additionality:** A carbon project will only be eligible if it is additional. The project cannot be considered business as usual.
- **Permanence:** Sequestration projects must be maintained for a duration that ensures long-term storage of carbon (in some cases 25- or 100-year commitments).

Some of the most common project methods for Carbon Farming projects in livestock are revegetation, avoided clearing, savannah fire management, soil carbon improvement and herd management.

For more information about approved methods for generating carbon credits scan the QR code.

Find out which methods may be suitable for your business and region by completing a five minute survey at looc-c.farm.

What is carbon offsetting?

Carbon offsets refer to the purchase of carbon credits to compensate for emissions that a business produces. Landholders and producers can generate credits through recognised carbon farming projects to sell as offsets to third parties who do not have the capacity to reduce emissions within their business, like airlines or banks. Producers may also purchase offsets to achieve a carbon neutral status for their own enterprise or product.

Once a credit has been sold on the open market, they cannot be used against your own emissions. Rather than trading credits off-farm for revenue, holding onto some or surplus credits may be important to maintain market access or to supply low carbon/carbon neutral brands in future.

This decision should be balanced by the capacity of the project to yield carbon credits over the lifetime, and the desire to recover upfront investment of establishing a carbon project.

What is carbon insetting?

Carbon insetting refers to carbon stored or reduced on-farm which is “inset” against the business’s carbon baseline, to balance its own emissions (i.e. not purchasing or retiring offsets).

Insetting can be a strategy for producers to lower or neutralise their net emissions position without participating in the ACCU Scheme. However, a business may also generate ACCUs which they don’t sell, and instead hold to use, which is also referred to by some as insetting.

What should I be doing now? Where should I start?

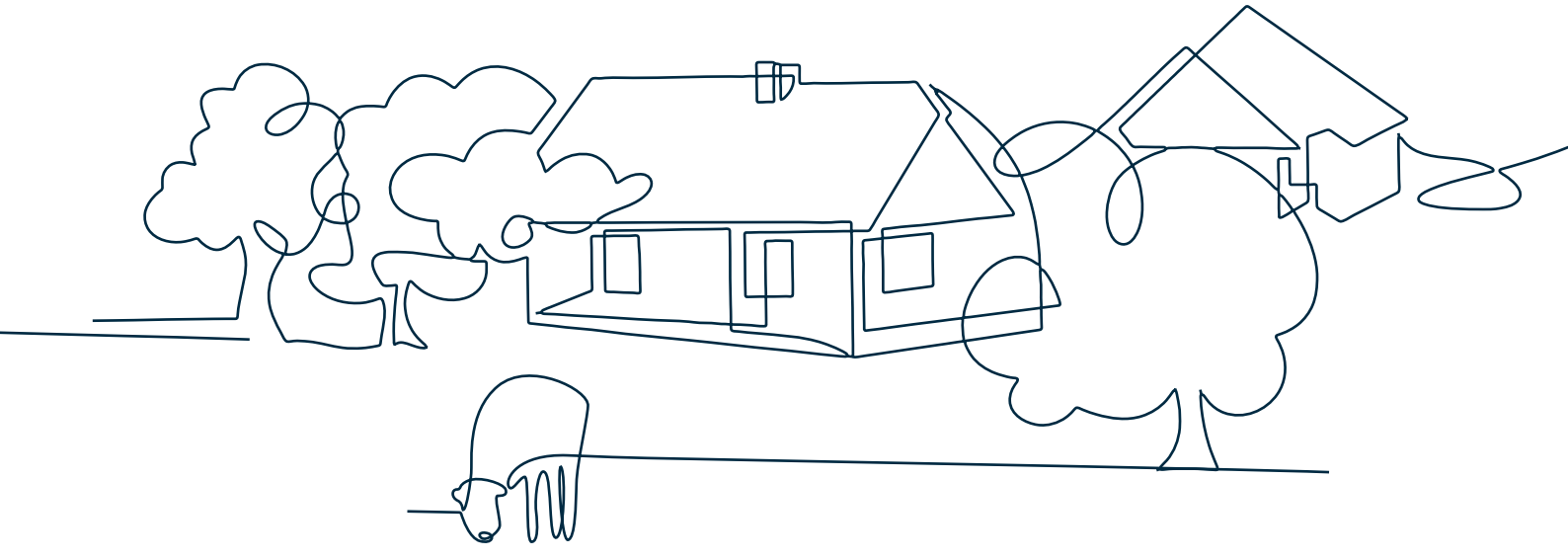
Many of the management strategies used by red meat producers to improve livestock and land productivity also reduce emissions intensity and/or net emissions. Keeping a record of your actions and improvements will be the best way to be recognised for this.

If you want to better understand your current position or find out where you can make additional improvements, a carbon account is a good place to start.

You can’t manage what you don’t measure, and in many cases, the first lesson from attempting a carbon calculator is realising farm records you may not be keeping that could have value down the track. Having a look at the data requirements to complete a calculation is a good first step so you can ensure these are readily available when you do complete your carbon account.

Complete a carbon account on your own or with an independent consultant to see where your emissions are coming from on-farm. A consultant should be able to assist you to understand where you are benchmarked relative to other producers in your region. You can also use the calculator to model some practice changes and their flow-on effect on emissions (e.g., an improvement in weaning or marking rates).

Completing a carbon account is a learning process and may take time in the first instance. Over time, this process will become more familiar.



I want to launch a registered carbon farming project. Who do I talk to?

MLA does not provide commercial advice about carbon development companies, but can provide suggestions on what to consider. For example, you can:

Attend a Carbon EDGE workshop to discuss some of the management strategies available to you. Alternatively, use tools such as the LOOC-C tool to get an idea of the methodologies relevant to your business.

Complete a carbon account of your business, online or with an independent consultant.

Complete MLA's freely available eLearning modules.

Consider your capacity to lodge the project independently or whether you wish to engage a carbon project developer.

If you choose to have a third party register the project on your behalf, do your due diligence. You may like to talk to several developers to understand the different offerings and arrangements between companies. Have any contracts reviewed by a trusted legal advisor and accountant.

Check your chosen company is a signatory to the Carbon Market Institute's Australian Carbon Industry Code of Conduct.

Understand the implications of the project and what they mean for your property, cash flow, taxation, or decision autonomy over the long-term.

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Key terms and acronyms

ACCU	**Australian Carbon Credit Unit**	A unit that represents one tonne of carbon dioxide equivalent (CO_2-e) abated (i.e. not emitted) or stored. An ACCU is a financial product, issued by the Clean Energy Regulator, that can be sold, held or retired. An ACCU, which is used to offset an enterprise's emissions, can only be retired once. Once it's retired, it's no longer in circulation. Note: carbon credits can be issued under other schemes, however they are not ACCUs.
	ACCU Scheme	Formerly called the Emissions Reduction Fund, the ACCU Scheme is the mechanism for administering projects that generate ACCUs.
CER	**Clean Energy Regulator**	The Clean Energy Regulator administers Australian Government schemes to measure, manage, reduce and offset carbon emissions in Australia (the ACCU Scheme).
CO_2-e	**Carbon dioxide equivalent**	A standard unit of measure used for greenhouse gases. Expressed as an equivalent amount of carbon dioxide, commonly referred to as 'carbon'.
EI	**Emissions intensity**	Greenhouse gas emissions per unit of product (e.g. tonnes of liveweight or greasy wool).
GAF	**Greenhouse Accounting Framework**	Also known as the 'carbon calculator'. SB-GAF – Sheep and Beef Greenhouse Accounting Framework Go-GAF – Goat Greenhouse Accounting Framework
GWP	**Global Warming Potential**	Describes the warming potential of a gas, taking into account the potency and behaviour of the gas in the atmosphere. GWP100 and GWP* are systems that aim to characterise the warming effect of the gases over a period of time..
	Insetting	When businesses can measure carbon sinks within their boundary and use this to reduce their net emissions position. This can be done with or without the creation of offset units.
	Offsetting	Reducing emissions position of an entity by acquiring and using an 'offset' or carbon credit generated outside the business.

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