



Australian Government

Department of Climate Change, Energy,
the Environment and Water

DRAFT Greenhouse Gas Emissions Estimation and Reporting Guidelines for Agriculture, Fisheries and Forestry Common Requirements Framework



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Acknowledgement of Country

We acknowledge the Traditional Owners of Country throughout Australia and recognise their continuing connection to land, waters and culture. We pay our respects to their Elders past and present.

Contents

1. Introduction.....	5
1.1 Context	5
1.2 The benefits of producing a GHG inventory	6
1.3 Purpose of the Guidelines	7
2. Using the Guidelines	7
2.1 Format of the Guidelines.....	7
2.2 Emissions Scopes	8
2.3 Coverage and limitations of the Guidelines	8
2.4 Steps to develop a GHG inventory	11
3. Principles for GHG inventories.....	12
4. Defining the goal of a GHG inventory.....	12
5. Defining boundaries.....	14
5.1 Organisational boundary.....	14
5.2 Reporting boundary	16
6. Estimating GHG emissions and removals.....	19
6.1 Select the calculation method	19
6.2 Collect data required for estimation	20
6.3 Calculate GHG emissions and removals.....	21
6.4 Land use, land use change and forestry methods.....	21
6.5 Scope 2 electricity emissions.....	22
7. Tracking emissions over time	22
7.1 Establishing a base year or base period	23
7.2 Recalculations	23
8. Assessing the quality of the GHG inventory	24
8.1 Data quality framework.....	25
8.2 Quality assurance.....	28
9. Reporting.....	28
9.1 Required information and documentation	28
9.2 Reporting format	29
9.3 Frequency of reporting.....	29
9.4 Reporting period	29

9.5	Base year reporting.....	30
9.6	Treatment of carbon credits and renewable energy	30
10.	Good practice documentation management	31
11.	Product-level estimation.....	31
	Appendix A – Choosing a consolidation approach	32
	Appendix B – Leased lands and agistment.....	34
	Appendix C – Criteria for applying Method 3 approaches	40
	Appendix D – Reporting template	41
	Appendix E – Key terms	46

1. Introduction

Understanding the greenhouse gas (GHG) emissions profile of a business is becoming increasingly important for agriculture, fisheries and forestry (AFF) industries. Demand for emissions data is expected to increase, driven by a range of factors including evolving market expectations, and supply chains and financial institutions seeking to monitor progress against voluntary climate commitments. Additionally, some large AFF entities may be required to report under Australia’s mandatory climate-related financial disclosures as set out in the *Corporations Act 2001*.

Although GHG calculators are available to support estimating and reporting, stakeholders have raised concerns about inconsistent results, causing uncertainty about which calculators to use or how to begin.

The Australian Government has developed the voluntary GHG Emissions Estimation and Reporting Guidelines for Agriculture, Fisheries and Forestry (the Guidelines) to improve the quality and consistency of methods—and, by extension, the tools entities rely on.

The Guidelines comprise the Common Requirements Framework and the Methodological Guidance. This document, the Common Requirements Framework, sets out the core requirements for entities to estimate and report their GHG emission and removal in a consistent and transparent way. The Methodological Guidance describes the methods and emission factors for GHG estimation.

1.1 Context

GHG emissions from agriculture, fisheries and forestry

Agriculture and land management are major contributors to global climate change, primarily through emissions of methane (from livestock) and nitrous oxide (from agricultural soils). In addition, AFF practices such as vegetation clearing or tree planting) affect carbon stocks in vegetation and soils and can cause emissions or removals of carbon dioxide (CO₂) from the atmosphere.

AFF industries also emit CO₂ from the use of diesel, petrol, and electricity. Additional emissions can occur upstream, from the production of inputs like fertiliser, feed and chemicals. These upstream emissions form part of the entity’s carbon footprint.

More information about emissions and removals produced through AFF production cycles, and what can be done to help reduce emissions can be found [here](#).

Reporting requirements and standards

A range of reporting requirements and standards have been introduced to inform industry, investors and policy makers about sources of emissions and how to target their emissions reduction efforts.

International

Australia reports its GHG emissions to the United Nations Framework Convention on Climate Change (UNFCCC) using rules designed by the Intergovernmental Panel on Climate Change (IPCC). Australia mostly uses country-specific methodologies and emissions factors in compiling its reports.

A range of additional international reporting standards align broadly with the IPCC Guidelines but are tailored to support entity-level GHG reporting. These include the [Greenhouse Gas Protocol](#) Corporate Accounting and Reporting, and Corporate Value Chain (Scope 3) Standards and the [International Standards Organization](#) 14060 series, particularly ISO 14064-1.

Entity inventory and product footprint standards have been adopted by a range of jurisdictions, supply chains and financial institutions globally – including here in Australia.

Domestic

In Australia, the National Greenhouse and Energy Reporting (NGER) Scheme requires companies that meet specific emissions or energy thresholds to report the GHG emissions associated with their energy production, consumption or industrial processes. Reporting entities must use the prescribed calculation methods and emission factors set out in the *NGER (Measurement) Determination 2008* to ensure consistency and accuracy. However, the NGER Scheme does not cover emissions associated with agricultural production (such as methane emissions from livestock) or land management activities (such as vegetation clearing).

Separately, climate-related financial disclosure (CRFD) has been introduced under the *Corporations Act 2001*. CRFD requires entities that meet specific size and financial thresholds to disclose their GHG emissions and climate risks as part of their annual reporting obligations. Under this framework, the Australian Accounting Standards Board (AASB) mandates that entities applying the Australian Sustainability Reporting Standard AASB S2: *Climate-related Disclosures (AASB S2)* measure GHG emissions in accordance with the GHG Protocol Corporate Accounting and Reporting Standard, and the Corporate Value Chain (Scope 3) Standard, unless otherwise specified by a jurisdictional authority.

While many AFF businesses may not meet the formal reporting thresholds for CRFD, they may still be asked to provide their GHG emissions data to supply chain and finance entities that are obligated to report. Importantly, the *Corporations Act 2001* does not impose a direct regulatory requirement on third parties to supply data and information to CRFD reporting entities (see [Sustainability reporting for small business | ASIC](#)). Further information on CRFD can be found [here](#).

1.2 The benefits of producing a GHG inventory

A GHG emissions inventory is a critical tool for understanding an entity's GHG emissions profile and developing effective climate change mitigation strategies. By compiling an inventory, businesses can:

- assess their exposure to GHG-related risks
- identify emissions reduction opportunities
- establish baseline data for tracking progress
- set reduction targets and monitor performance
- communicate results to stakeholders with confidence.

For AFF entities, inventories can also drive productivity and resource efficiency, supporting both environmental and economic outcomes.

A GHG inventory can be developed using existing farm management data and a GHG calculator that implements these Guidelines. Producing a GHG inventory is a practical starting point to help realise the benefits outlined above.

1.3 Purpose of the Guidelines

The Guidelines provide a nationally consistent framework and methods for estimating and reporting GHG emissions and removals from AFF entities.

The Guidelines are intended to:

- provide methods that are scientifically robust, appropriate for Australian production systems and environments, and can be applied at the entity level
- support AFF entities to estimate GHG emissions and removals for multiple reporting purposes
- support technical end users, including third party GHG emissions calculator and tool developers, agronomists and agricultural consultants, to understand and apply GHG emissions and removals estimation methods.

The Guidelines can be used in conjunction with other reporting frameworks where applicable.

The Guidelines have been designed to:

- **Align with the Australian National Greenhouse Accounts (NGA):** Estimation methods are consistent with NGA methods (where appropriate) and have been adapted for use at the entity level.
- **Build on existing standards:** The Guidelines are designed to stand on their own. However, they draw on, and are aligned with, other international and domestic standards including the Greenhouse Gas (GHG) Protocol, International Standards Organization (ISO) standards (e.g. 14064-1: 2018), and AASB S2. The Guidelines refer to these standards where relevant.
- **Provide practical methods:** The Guidelines aim to support AFF entities to obtain reliable and consistent estimates at a reasonable level of effort and cost. Entities can select from simple methods which use default values for ease of estimation through to more complex methods requiring more farm specific data which provide a more accurate estimate but can be more difficult or costly to implement.
- **Enable data reuse:** The Guidelines support a ‘collect once, use many times’ principle for data. Where possible, the Guidelines support data used in farm management to be re-used for GHG estimation.

The Guidelines will be reviewed annually and updated as needed to respond to new research findings, changes in NGA methods, and user experience.

2. Using the Guidelines

The Guidelines provide principles and requirements for designing, developing, managing and reporting entity-level GHG inventories. They include requirements and guidance for determining organisational and reporting boundaries, estimating an entity’s GHG emissions and removals, and preparing and reporting an entity’s GHG inventory and assessing data quality.

2.1 Format of the Guidelines

The Guidelines comprise 2 complementary documents.

- The **Common Requirements Framework** (this document) which provides the key principles, definitions and concepts for producing a GHG inventory. It provides requirements for, and high-level guidance on, establishing boundaries, selecting calculation approaches to estimate GHG emissions and removals, assessing data quality and reporting.
- **Methodological Guidance** which provides the specific equations, data sources, and calculation protocols needed to estimate emissions in a consistent and verifiable way.

Use of terminology in the Guidelines

While use of the Guidelines is voluntary, these documents specify requirements that need to be followed to claim compliance with the Guidelines. The following terminology is used:

- ‘Shall’ indicates what is necessary to meet the minimum requirements of these Guidelines
- ‘Should’ indicates a recommendation
- ‘May’ indicates an optional aspect.

Comparison with GHG Protocol (GHG P) and International Standards Organization (ISO) Rules

Tables and footnotes are included throughout the Common Requirements Framework to indicate how each topic is treated by the GHG Protocol and ISO.

2.2 Emissions Scopes

Under the Guidelines, GHG emissions sources and sinks are categorised as direct (Scope 1) and indirect (Scope 2 and 3)¹:

- **Scope 1 emissions** are *direct emissions or removals* from sources owned or controlled by the entity (e.g. fuel combustion, methane from livestock).
- **Scope 2 emissions** are *indirect emissions* from the generation of purchased energy consumed by the entity (e.g. emissions from the power station producing purchased electricity).
- **Scope 3 emissions** are *other indirect emissions* that occur in the value chain of the entity, both upstream and downstream. These arise from activities not owned or controlled by the entity but related to its operations (e.g. emissions associated with the production of fertiliser used on-farm).

2.3 Coverage and limitations of the Guidelines

The Guidelines provide methods for estimating annual Scope 1 and 2 emissions and removals associated with AFF activities.

Scope 3 categories

The Guidelines currently provide estimation methods for a subset of Scope 3 categories (see Table 1) relevant to AFF production. Entities will need to assess if other Scope 3 categories are relevant and material to their inventory (e.g. capital goods, downstream transportation and

¹ Note, the [International Standards Organization](#) does not use ‘Scopes’ terminology and has different categories for indirect and direct emissions. This [website](#) explains the differences.

distribution). Entities may use emission factors from national and international databases to estimate these emissions if required (e.g. [Australian Life Cycle Inventory Database](#), [Ecoinvent](#)).

Table 1: GHG Protocol Scope 3 categories

Included	Excluded
Upstream	
1. Purchased goods and services	2. Capital goods
3. Fuel and energy related activities	4. Transportation and distribution
5. Waste generated in operations	6. Business travel
8. Leased assets (land)	7. Employee commuting
	8. Leased assets (other)
Downstream	
13. Downstream leased assets (land)	9. Transportation and distribution
	10. Processing of sold products
	11. Use of sold products
	12. End-of-life treatment of sold products
	13. Downstream leased assets (other)
	14. Franchises
	15. Investments

Land use, land use change and forestry (LULUCF)

For land use change and forestry (LULUCF) related activities, methods will be provided for tree planting, human-induced regeneration, vegetation removal (including impacts on soil carbon) and savanna fire management. These are not the only activities that may impact upon the carbon stocks relevant to LULUCF. However, they are the activities for which scientifically robust methodologies are available. Methods for other LULUCF activities, including improved soil management, are subject to further development.

[Methodological Guidance for LULUCF estimation will be provided in Tranche 2.]

Product-level estimation

The Guidelines will provide requirements and guidance for estimating the partial carbon footprint of products, from cradle to gate or first point of sale. They do not include requirements and guidance for estimating full carbon footprints across the complete life cycle of a product.

[Guidance for product-level estimation to be developed in Tranche 2.]

Carbon crediting projects

The Guidelines are not intended to provide accounting methods for carbon crediting projects. GHG accounting provisions in carbon crediting schemes commonly include scheme-specific requirements, for example around additionality, baselines, permanence and discount factors. These accounting requirements are distinct from emissions estimation and reporting. See Chapter 9.7 for details on treatment of carbon credits within inventories.

Other limitations

Dependent on an entity's enterprise structure, the Guidelines may not provide methods required for the entirety of an entity's inventory. For example, if an entity manages and owns a sugarcane farm, as well as sugar milling and ethanol distilleries, they would need to refer to additional methods (e.g. [NGER \(Measurement\) Determination 2008](#)) to estimate the emissions for the industrial processing component of their inventory.

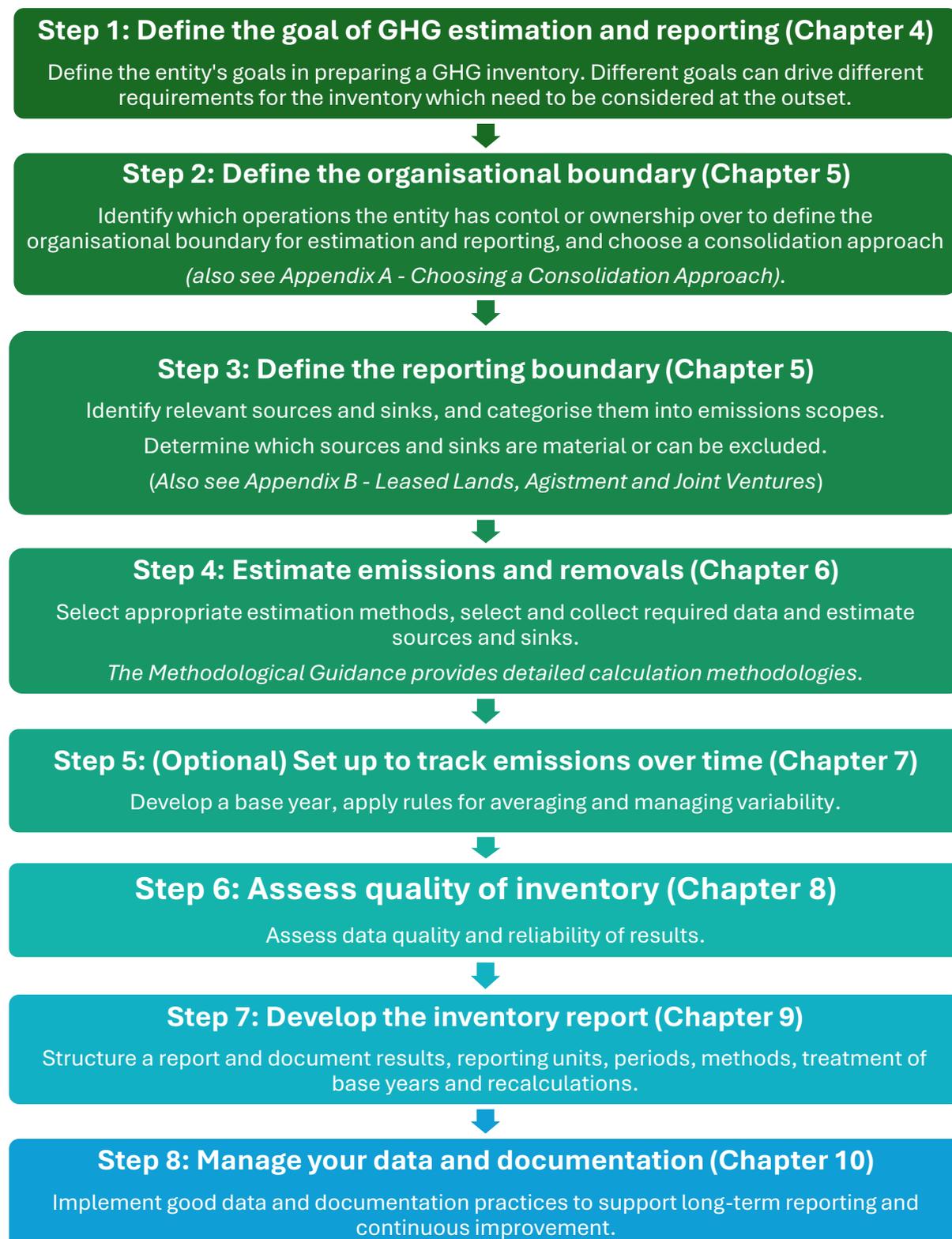
Question Reference Set A: General

As you read the Common Requirements Framework, please consider the following questions:

1. Will the content support you, or other users, to develop and design a GHG inventory and undertake reporting?
2. Could the content be presented in alternative ways to make it more accessible?
3. Is there fundamental content missing? If so, please outline your suggestions for other material that may be useful.

2.4 Steps to develop a GHG inventory

The Common Requirements Framework guides entities through the steps needed to produce high quality and reliable inventories.



3. Principles for GHG inventories

A common set of principles underpins the preparation of GHG inventories to ensure they represent a true and fair account of an entity's emissions and removals. To produce a reliable and high-quality inventory it is best practice to consider all principles.

The principles below are in alignment with the GHG Protocol and ISO Standards.

Relevance

Ensure the GHG inventory appropriately represents the GHG emissions and removals of the entity and serves the decision-making needs of end-users – both internal and external to the entity.

Completeness

Include all GHG emission and removals within the chosen inventory boundary to the extent practicable and relevant to the purpose of the inventory. Disclose and justify any specific exclusions.

Consistency

Use consistent methodologies to allow for meaningful comparisons of emissions and removals over time. Transparently document any changes to the data, inventory boundary, estimation methods, or any other relevant factors in the time series.

Accuracy

Use the best available data and methods to ensure GHG emissions and removal estimates are unbiased and uncertainties are reduced as far as practicable, and to achieve sufficient accuracy to enable users to make decisions with assurance as to the integrity of the reported information.

Transparency

Ensure all methods, data sources, assumptions, and decisions used in the inventory are clearly documented and explained.

4. Defining the goal of a GHG inventory

Before developing a GHG inventory, an entity should first define its intended goal or goals, as these will shape the estimation and reporting requirements. In many cases the inventory will need to be designed to serve multiple goals. For example, it could be used to:

- inform farm management, business planning and mitigation action planning
- comply with regulatory obligations such as [Climate-Related Financial Disclosure](#) under the *Corporations Act 2001*
- fulfil supply chains or industry reporting requirements including:
 - domestic or international market access requirements
 - reporting under the [Science-Based Targets Initiative](#) (SBTi)
 - contributions to industry-level emissions targets
 - participation in certification schemes
- align with financial services sector frameworks, such as the [Australian Sustainable Finance Taxonomy](#).

These different goals lead to different requirements for estimation and reporting. Key considerations include:

- **Inventory type:** whether the aim is to produce an entity-level inventory or to assess the emissions intensity for a specific product or co-products.
- **Scope 3 emissions coverage:** the extent to which indirect emissions (e.g. upstream and downstream) are included and whether this is optional or mandatory.
- **Estimation method:** the methods that will be used in estimation - from simple methods using default data through to methods that demand more detailed farm specific data.
- **Estimation / reporting period:** the period over which emissions are estimated and reported - this could be annual (calendar or financial year).
- **Base year / period:** whether a base year / period needs to be established for tracking progress.
- **Data quality, documentation, and verification:** requirements for transparency, traceability, and assurance. For example, inventories intended for verification or assurance may require higher-resolution data and more comprehensive documentation.

To ensure development of an appropriate inventory to address a given goal, the questions at Table 2 are worth considering.

Table 2: Defining the goal of an inventory

Questions	Example answers	Actions or Considerations (depending on goal)
What is / are the primary goal(s)?	Farm planning	Follow the Common Requirements Framework to define the core requirements for producing an inventory. Consult industry specific guidance and use GHG calculators available through Rural and Regional Development Corporations (RDCs), including for information on emissions reduction strategies. Focus on identifying key emission sources and opportunities for mitigation within operations and improving data management.
	Climate-related financial disclosure	Requires reporting of scope 1, 2 and both upstream and downstream Scope 3. Check AASB S2 for a full list of requirements.
	Supply chain or financial services reporting requirements	Check third party data and reporting requirements, including required Scope 3 reporting categories and any specific traceability systems compliance.
What type of inventory are you intending to produce?	Entity inventory	Follow the Common Requirements Framework (Chapters 1 -1 0) .
	Product emissions inventory	<i>[Identify [declared units] and apply the principles for allocation of emissions to specific commodities or products. Chapter 11 - Tranche 2.]</i>
Will you be communicating	Customers	If external communication is intended, use the standard templates at Appendix D and / or apply any other required reporting standards.

Questions	Example answers	Actions or Considerations (depending on goal)
results to anyone outside of your entity?	Certifiers or regulators	If required for certification or regulation, follow documentation requirements at Chapter 10 to ensure supporting documentation is in order.
Are there standards or frameworks you need to align with?	E.g. The Guidelines; GHG Protocol; ISO 14064-1; AASB S2	Map Guidelines or other standards requirements to your inventory design. Read the cues throughout these Guidelines to support conformance Regardless of the standard or framework being applied, it should be applied consistently to all elements of inventory design.
Are you trying to track your emissions over time?	Yes	Determine if you will use a single-year or multi-year base period. Apply the Guidelines rules for calculating base years as set out in Chapter 7 .

5. Defining boundaries

The next step in developing an GHG inventory is to define the organisational and reporting boundaries of the entity. These boundaries determine which emissions sources and sinks shall be included in the inventory.

5.1 Organisational boundary

The organisational boundary identifies the activities or facilities over which the entity has control. In the context of AFF production this can include land controlled by the entity and facilities such as dairies, packing sheds and cool rooms.

The organisational boundary reflects an entity’s ownership and control structure. The entity shall apply a consolidation approach:

- Operational control
- Financial control
- Equity share.

The choice of consolidation approach - or combination of approaches - depends on the purpose of the inventory (e.g. specific reporting requirements). The consolidation approach reflects how the entity exercises ownership and control across its financial, legal, and operational arrangements for the purposes of emissions estimation.

When a facility is owned or controlled by several entities, these entities should adopt the same consolidation approach for that facility. The entity shall document and report which consolidation approach it applies.

Operational control approach

An entity has *operational control* if it has full authority to introduce and implement its operating policies, including those related to environmental performance, health and safety, and day-to-day management of activities. This control exists even if the entity does not have financial control or full ownership of the operations.

- It excludes facilities or assets where the entity does not have the ability to direct day-to-day operations, even if it has an ownership stake.
- The entity reports all material emissions and removals from operations under its *operational control*.

This approach is often preferred for environmental and sustainability reporting as it aligns with practical day-to-day ability to manage and influence emissions.

Financial control approach

An entity has *financial control* if it can direct the financial and operating policies of the operation, with a view to gaining economic benefit.

- This applies even if the entity does not have the ability to direct day-to-day operations, or the operations are not fully owned by the entity.
- The entity reports all material emissions and removals from operations under its *financial control*.

This approach is often used when reporting is integrated with financial disclosures or regulatory compliance.

Equity share approach

Under the equity share approach, an entity reports emissions and removals in proportion to its ownership interests in the operations. This reflects the entity’s economic interest, rather than operational or financial control.

- If it owns 40% of a joint venture or partnership, it reports 40% of the emissions from that operation
- If the entity owns 100% of the operations it reports all material emissions and removals associated with those operations.

This approach can be useful for entities with multiple joint ventures or shared ownership arrangements.

More guidance on consolidation approaches is supplied at **Appendix A**.

Table 3: GHG Protocol and ISO 14064-1:2018 rules for consolidation approach

GHG Protocol	ISO 14064-1:2018
A reporting entity shall select and apply one consolidation approach (financial or operational control, or equity share).	ISO does not prescribe that a single consolidation approach must be chosen for defining the organisational boundary. Multiple approaches could be applied to reflect complex entity structures. However, the entity must define and justify how boundaries are drawn.

5.2 Reporting boundary

After defining the organisational boundary, the entity identifies GHG sources and sinks, that are relevant to its activities, operations, facilities, and value chain interactions, and classifies them as Scope 1, Scope 2, or Scope 3. This defines the entity’s ‘reporting boundary’².

The entity should also determine if any relevant sources and sinks will not be estimated.

Identify relevant sources and sinks

All relevant sources and sinks shall be included within the entities reporting boundary. The following emission sources and sinks are relevant to AFF entities.

- All sources and sinks from animal, crop or tree production in the entity’s control (e.g. enteric fermentation; manure management; fertiliser use, livestock waste and crop residues to soils; changes in land use; or management of vegetation and soils).
- All emissions from stationary energy and fuels used in buildings, equipment, machinery, irrigation pumps or vehicles in the entity’s control (e.g. natural gas, fuels used in generators or vehicles).
- All emissions associated with purchased energy (electricity, heat, steam or cooling) consumed by buildings, equipment, machinery or vehicles, irrigation in the entity’s control.

Entities shall also assess the 15 Scope 3 categories (as outlined in the GHG Protocol Corporate Value Chain (Scope 3) Standard) for relevance.

Scope 3 considerations

The Methodological Guidance currently only provides estimation methods for a subset of Scope 3 categories relevant to AFF production (see Table 1). If other Scope 3 categories are assessed as relevant and material, entity shall estimate the emissions if methods and emissions factors are available in other frameworks³ and national or international databases (e.g. [AusLCI](#), [Ecoinvent](#)).

Question Reference Set B: Scope 3 Estimation

The Guidelines provide a limited set of Scope 3 estimation methods and emissions factors.

Should the Guidelines specify criteria for assessing the quality of methods and data sources used for Scope 3 estimation (if a method is not supplied in the Guidelines)?

Establish if relevant sources and sinks will not be estimated

All relevant emissions sources or sinks shall be estimated and included within the GHG inventory unless:

² Note, the *reporting boundary* is termed the “*Operational Boundary*” under the GHG Protocol. Under the [Australian Standard on Sustainability Assurance ASSA 5000](#) (which will be used for assurance under AASB S2), the term “reporting boundary” is used to identify “*the activities, operations, relationships or resources to be included in the entity’s sustainability information*”.

³ For estimation of additional Scope 3 sources not covered by these Guidelines resources such as [Scope 3 Calculation Guidance | GHG Protocol](#) and [Agriculture Guidance | GHG Protocol](#)

- the sources or sinks are not considered material (see below for materiality considerations)
- it is not practicable or cost effective to collect data to estimate a source or sink
- a method for estimating a source or sink is unavailable (for Scope 3 sources see additional requirements below).

Where relevant sources or sinks are not estimated for the reasons above, but those sources / sinks are, or are likely to be, material a data management plan should be developed, stating how the entity intends to obtain the necessary data for future reports.

If any source or sink is omitted, the entity shall:

- report what is being excluded
- justify the reason for exclusion – for example, impractical to measure, no calculation approach (method) provided, lack of data, or immaterial and unlikely to influence stakeholder decisions.

Materiality

A source or sink is considered to be material if omitting, misstating or obscuring it could reasonably be expected to influence decisions made by the end-user of the inventory.

Note: Some reporting standards apply threshold criteria for assessing materiality. If the entity inventory is being produced to address a third-party reporting need, it is advisable to check their requirements.

Table 4: Treatment of materiality in international corporate reporting standards

	GHG Protocol Corporate Standard	ISO 14064-3
Materiality criteria	<i>Recommends</i> that exclusions should not exceed ~5% of the total inventory (as a guide). Note, this is not mandatory.	ISO 14064 doesn't set a fixed threshold, but an exclusion should not be made if its omission or misstatement could influence the decisions of stakeholders using the inventory (e.g. investors, regulators, customers).
Requirements	The exclusions are clearly documented and justified; and the exclusion does not affect the integrity or credibility of the report In order to express an opinion on data or information, a verifier would need to form a view on the materiality of all identified errors or uncertainties.	Clearly state what is excluded (e.g. a specific emission source, GHG type, process); the criteria / rationale used to justify the exclusion (e.g. unlikely to influence the end-users' decisions; lack of data; impractical to measure / no measurement methodology).

Categorise emissions into Scopes

The entity shall classify relevant sources and sinks into Scopes.

The following questions in Table 5 are worth considering in defining your Reporting Boundary.

Table 5: Identifying your Reporting Boundary

Activity	Questions to Ask	Source	Scope
Production	What types of AFF production systems and land holdings are within the organisational boundary? What products or outputs are produced through the entity's activities? What are the major production stages and processes?	e.g. enteric fermentation; manure management	Scope 1
Land management	Has there been any land use change associated with the entity's activities? Have tree-planting, revegetation activities been undertaken over areas >0.2 ha? Has there been any change to fire management practices to reduce the severity of late dry season burns?	e.g. removal of woody vegetation	Scope 1
Leased Assets and Agistment	Does the entity lease or lease out land or facilities? Does the entity host agisted stock or agist its own stock elsewhere? Who has operational control of leases, agisted stock for emissions accounting purposes? See Appendix B for information on classifying leased lands and agistment into Scopes.	e.g. enteric fermentation from agisted animals	Scope 1 or Scope 3
Facilities and Off-Farm Operations	Are post-harvest, storage, processing or transport facilities under the entity's control? Do these facilities contribute to Scope 1 or Scope 2 emissions?	e.g. purchased energy, refrigeration	Scope 1 or 2
Contracted and Outsourced Activities	Are key activities (e.g. harvesting, spraying) performed by third parties? Are contractors using the entity's fuel and equipment or their own?	e.g. fuel use	Scope 1 or 3
Water	What energy is used to pump or treat water? (is it diesel or solar-powered)?	e.g. fuel use or purchased electricity	Scope 1 or 2
Purchased Energy	What activities use purchased electricity or other forms of purchased energy? Does the entity purchase renewable energy?	Energy use	Scope 2
Purchased Goods and Services	What purchased goods and services are essential to operations?	e.g. fertilisers, feed, packaging, chemicals	Scope 3

Activity	Questions to Ask	Source	Scope
Waste Generated in Operations	What types of waste are generated on-farm? How is this waste treated, stored, or disposed of by third parties?	e.g., crop residues, manure, packaging	Scope 1 or 3

6. Estimating GHG emissions and removals

There are three basic steps to estimating GHG emissions and removals, which are described below. Detailed guidance on how to estimate GHG emissions and removals associated with specific sources and sinks applicable to AFF activities is provided in the Methodological Guidance.

6.1 Select the calculation method

GHG emissions or removals can be estimated in different ways, ranging from simple methods using emission factors or empirical relationships to process-based models and field measurements using highly specialised equipment. The Methodological Guidance allows entities to select the calculation method that best aligns with the desired levels of accuracy and data availability.

Calculation methods have been classified according to three Method levels. In general, moving to the higher-level methods improves the accuracy of the estimates and reduces uncertainty. However, the increased complexity and additional data requirements can increase costs and resourcing requirements.

1. **Method 1** provides the minimum requirement for estimation. It generally applies the emissions factors or empirical relationships from the NGA and requires core site-specific activity data (e.g. head of livestock, tonnes of fertiliser applied). National or regional default values from the NGA are provided for other input parameters.
2. **Method 2** is more complex, usually applying the same methodological approach as Method 1 (i.e. the same equations), but requires additional site-specific data. It also includes use of the NGA process-based model FullCAM and the FullCAM-derived SAVCAM tool for LULUCF activities.
3. **Method 3** is most demanding in terms of complexity and data requirements. Method 3 approaches use higher order estimation methods, including sophisticated process-based models (other than FullCAM or SAVCAM) and detailed measurement systems tailored to specific systems, often repeated over time, and driven by high-resolution activity data. The Methodological Guidance does not currently provide Method 3 calculation approaches.

The entity should select and use the calculation method(s) that best align with available data and the entity's goal for compiling the GHG inventory (see Chapter 4). The entity may select different method levels for different sources and sinks. The entity shall document the methods applied and any changes in methods since its previous report.

Higher level methods can better reflect the impact of specific management activities on emissions. Some sources and sinks may have only one method option available in the Methodology Guidance.

Additional guidance on methods for LULUCF activities is provided in Chapter 6.4.

The methods for estimating Scope 2 emissions from purchased electricity are detailed in Chapter 6.5.

Question Reference Set C: Method 3 Approaches

As the Methodological Guidance does not currently provide Method 3 calculation approaches, we are seeking feedback on the following:

1. Should the Guidelines allow entities to develop and apply their own Method 3 approaches? What benefits or risks do you foresee with this flexibility?
2. If allowed, should the Guidelines include specific criteria for selecting and documenting Method 3 approaches to ensure accuracy, consistency and reproducibility?
3. Do the indicative criteria and reporting requirements provided in Appendix C offer sufficient guidance to support selection of a Method 3 approach? If not, what additional criteria or guidance would be helpful?
4. If you are an inventory end-user (e.g. shareholder, company director, customer, or auditor) do the indicative criteria in Appendix C provide enough information to assess the integrity of a Method 3 approach? If not, what additional guidance would be helpful?
5. If Method 3 approaches are allowed, would your organisation consider developing one? If so, for which sources and sinks, and what data or methods would you intend to use?

The Guidelines also do not currently provide methods for estimating emissions reductions from emerging mitigation technologies, such as methane-inhibiting feed additives or enhanced efficiency fertiliser.

6. Should entities be allowed to apply adjustments to Method 1 or 2 approaches to reflect these technologies provided they follow the same selection criteria and documentation requirements as a Method 3 approach?

6.2 Collect data required for estimation

The chosen calculation method determines the activity data and other input data required.

The Methodological Guidance provides suggestions of suitable data sources, and guidance on data collection to support application of Method 1 and 2 calculation approaches.

The entity shall document the sources of data used to estimate GHG emissions and removals for the reporting period, for each source or sink.

It is not always possible to collect high quality data for all sources and sinks that need to be included in an inventory. For this reason, data collection efforts should be prioritised. Entities should prioritise data collection efforts for key sources and sinks (those expected to result in higher emissions or removals, or those showing largest change over time) and for parameters that have the greatest influence of emissions (e.g. animal numbers and liveweight gain, or crop production).

6.3 Calculate GHG emissions and removals

The entity shall calculate GHG emissions and removals in accordance with the method(s) selected.

The entity shall estimate and report emissions and removals for the year in which the emissions or removal activity occurs (e.g. year of fertiliser application or land preparation). That is, management inputs should not be allocated across multiple years.

Entities shall estimate and report emissions and removal by mass of gas and mass of carbon dioxide equivalents (CO₂-e).

Global Warming Potentials (GWP)

The mass of a GHG should be multiplied by its GWP to produce the mass in units of CO₂-e.

For consistency with the NGA, National Greenhouse Gas Inventory reporting rules under the Paris Agreement and National Greenhouse and Energy Reporting (NGER) Scheme reporting requirements, entities shall convert the mass of CO₂-e, using the 100-year GWP (GWP₁₀₀) as specified in the IPCC Fifth Assessment Report (AR5) (2014) as follows:

Table 6: Global Warming Potentials

Greenhouse Gas	AR5 GWP ₁₀₀
CO ₂ (carbon dioxide)	1
CH ₄ (methane)	28
N ₂ O (nitrous oxide)	265
Synthetic GHG (e.g. refrigerants)	refer to latest NGA Factors

Where an entity is using an appropriate Scope 3 emission factor that has already been converted into CO₂-e using a different IPCC assessment report GWP₁₀₀ values, the entity is not required to recalculate the emissions factor to use the AR5 GWP₁₀₀.

Note the GHG P recommends use of the GWPs from the latest IPCC assessment report available at the reporting date (currently AR6). Under ISO 14064-1:2018, entities may report using GWP values from any IPCC assessment report.

6.4 Land use, land use change and forestry methods

Land management activities can result in emissions and removals of biogenic CO₂, CH₄ and N₂O from the atmosphere. These activities can include land clearing, establishing plantations, forest management, revegetation/regeneration, and agricultural land management practices.

The estimation of emissions and removals from LULUCF activities at the entity level is a complex and evolving area. Entities shall estimate relevant LULUCF sources and sinks where methods are provided.

The Methodological Guidance will provide methods for estimating carbon stock changes in:

- woody living and dead biomass due to land clearing, planting or regeneration, farm forestry, commercial plantations and savanna fire management
- soil organic carbon due to land clearing.

[Further guidance for the LULUCF sector will be provided in Tranche 2.]

6.5 Scope 2 electricity emissions

There are two methods for estimating scope 2 emissions from purchased electricity:

- location-based method - shows an entity’s electricity emissions in the context of its location. It reflects the emissions intensity of electricity generation within the state or territory in which it was consumed
- market-based method - shows an entity’s electricity emissions in the context of its electricity purchasing decisions. Voluntary purchases of renewable energy (with associated surrender of Renewable Energy Certificates) are assigned an emissions factor of zero.

Scope 2 emissions from purchased electricity shall be estimated and reported using the location-based method. The entity may also estimate and report scope 2 emissions using the market-based method. Note the requirements around reporting of scope 2 emissions varies between frameworks (see Table 7).

The upstream scope 3 emissions associated with purchased electricity shall be estimated using the location-based method. If an entity has elected to report market-based Scope 2 emissions then the associated scope 3 emissions shall also be estimated using the market-based method.

Table 7: Differences in approach to Scope 2 estimation and reporting requirements

GHG Protocol	Requires reporting of both the location- and market-based methods
NGER Scheme and AASB S2	Require location-based method but market-based method may also be used and disclosed separately
ISO 14064-1:2018	Allows choice of either location-based or market-based method

7. Tracking emissions over time

If the entity intends to track emissions and removals over time or is required to report against a target that is based on a historical baseline, then the entity shall establish a **base year (or period)** to provide a reference point for assessing change.

A multi-year base period is recommended for AFF entities whose operations are affected by seasonal variation and production cycles that extend over multiple years. Applying a multi-year average helps reduce the influence of year-to-year fluctuations creating a more representative reference point for tracking emissions and removals over time. A single-year base year may be appropriate where annual variability is low.

A suitable interval for quantifying a base period should ideally cover multiple production cycles and consider climatic cycles relevant to the location and production system. For example, a period of 3-5 years may be appropriate to establish a representative base year for tracking emissions and removals over time.

7.1 Establishing a base year or base period

To establish a base year or period the entity shall:

Step 1: Select the base year (or period)

- Choose a single year or contiguous multi-year period for which reliable data and data representative of normal operations is available.
 - If a corporate base year has already been established, centre the multi-year period on that year.
 - If reliable or representative data are not available for past years, the entity may use its first GHG inventory period as its base year.
- Provide a clear rationale for the selected year or period.

Step 2: Estimate annual GHG emissions and removals and base period value

- Estimate the *annual* GHG emissions and removals (by gas and scope) for the base year, or for each year in the base period.
- If using a multi-year average calculate the mean of the annual totals to derive the base period value.
- Document data sources and methods used to estimate emissions and removals.

Step 3: Document outliers and data exclusions

- Document any extreme or non-representative events (e.g., droughts, fires, or market disruptions).
- Outliers should generally be included unless demonstrably non-representative of typical operations.
- If any data are excluded, document the exclusion criteria and, if relevant, describe the effect on the average.

If the entity changes its base year the entity shall disclose the reasons and implications for targets and trend analysis.

7.2 Recalculations

Recalculations of previous inventories ensures time series consistency when methodologies, emission factors, or entity boundaries change. Recalculations provide integrity in tracking GHG emissions trends and assessing progress against the base year or base period.

The entity shall consider the need for recalculations when substantial cumulative changes in emissions result from:

- a) Methodological changes:
 - Relevant methods in the Methodological Guidance are revised.
 - Errors in previous calculations are identified.
 - The calculation approach used changes from lower to higher Method level.

- The scope 2 methodology used changes from location-based to market-based.
- b) Structural changes:
- Changes to entity boundaries through acquisition, divestment, or outsourcing.
 - Changes to reporting boundaries affecting scope classification.
 - Discovery of previously unreported emission sources or sinks.

The entity shall not recalculate its base-year GHG inventory to reflect changes in production levels or acquisition of operations that did not exist in the base year.

If significant cumulative changes are identified the entity:

- shall recalculate the base year/period
- should consider recalculating all previous GHG inventories in the time series if necessary to trend integrity.

When recalculations are undertaken, the entity shall:

- apply the updated methodology consistently to the base year or period and most recent inventory
- document the nature and rationale for recalculations and the recalculation methodology
- report both original and recalculated values for transparency

The entity shall develop, document and apply a base-year review and recalculation procedure to address significant cumulative changes in base-year emissions. To determine significance the entity should set significance thresholds (i.e. if they cause a change that exceeds x% of the base period inventory). These Guidelines do not define significance thresholds. Once defined, the significance thresholds should be applied consistently over time.

8. Assessing the quality of the GHG inventory

GHG emissions and removals estimation is always subject to a degree of uncertainty.

Uncertainty in estimation arises from both:

- the simplifications, assumptions, and approximations within a calculation or a process-based model used to estimate emissions
- the parameters / data used to calculate inventory (e.g. emission factors, activity data and other input data (e.g. feed composition)).

In general, entities should focus on understanding and reducing uncertainty associated with the data they use for GHG emissions and removals estimation as this is generally within their immediate control.

Assessing data quality can:

- help an entity to understand where best to direct resources to improve the quality of the GHG inventory
- provide intended-users of the GHG inventory with confidence in the estimates
- enable the quality of GHG inventories to be compared across years or entities.

The structured approach outlined conceptually in *Chapter 8.1 Data Quality Framework* provides a defensible, transparent foundation for assessing data quality.

8.1 Data quality framework

A qualitative assessment of the quality of activity and other input data, as well as scope 3 emission factors shall be undertaken using the data quality framework described below.

The purpose of this framework is to provide a transparent and consistent approach to assess the quality of data used in estimating GHG emissions and removals.

Data quality categories

The quality categories used in the data quality framework are set about below.

Temporal representativeness

Temporal representativeness denotes how well data reflect the time-period for which emissions or removals are being estimated.

Spatial representativeness

Spatial representativeness denotes the degree to which the data reflects the geographic location (or locations) of the entity's AFF activities (e.g. location specific, regional or national). For entity specific data, spatial partitioning of the data *within* the physical footprint of the entity is also considered (e.g. paddock-level versus whole of entity level).

Sample size

The sample size denotes the comprehensiveness of the data collected. The data quality data increases as the sample size used to the estimate the value increases

Scope 3 data quality

Scope 3 data quality denotes how representative, reliable, and specific the data are to the actual goods and services purchased, used, or sold — and therefore how much confidence can be placed in the resulting Scope 3 emission estimates.

Implementation

For each source and sink, and the associated data and scope 3 emissions factors, the entity shall provide a data quality score against the quality categories as detailed in score framework – see Table 8.

Categories with higher values are deemed to have a higher quality than categories with lower values.

Implementation steps

Step 1: For each source and sink estimated as per Chapter 6 document the Method applied.

Step 2: Identify all data sources and Scope 3 emission factors, to be used in calculating GHG emissions and removals for the Method.

Step 3: Assess and record the data quality scores for each data input and data quality category. Note, not all data quality categories will be relevant for some data types.

Step 4: Follow the Reporting Guidance at Chapter 9, including documenting assumptions and sources to ensure transparency.

Step 5: Review and update annually to reflect improved data sources or methods.

An example data quality table is provided in the Reporting Template at **Appendix D**.

Question Reference Set D: Data Quality Framework

1. Do the proposed data quality categories effectively capture the key dimensions needed to assess and communicate data quality differences?
2. If not, what additional categories or refinements would you suggest?
3. Are the scoring criteria for each category clear, practical, and meaningful for evaluating data quality?
4. Do they support consistent assessment across different datasets?

Table 8: Data quality scoring framework

Quality score	Temporal representativeness ^(a)	Spatial representativeness ^(b)	Sample size	Scope 3
5	Data collected covers the time-period for which emissions are being estimated	Data covers specific entity location(s) with spatial partitioning or using stratified sampling within property	Data based on sample size of >90% (e.g. total annual fuel purchases)	
4	Data collected represents activities that occurred within 2 years of the time-period being assessed	Data covers specific entity location(s) without spatial partitioning within property	Data based on sample size of 51-90%	Verified data provided by supplier consistent with ISO14067
3	Data collected represents activities that occurred within 3 years of to the time-period being assessed	Data based on regional data from a government or industry database or survey	Data based on sample size of 21-50%	Regionally relevant product specific value from database developed using international best practice
2	Data collected represents activities that occurred within 4 years of the time-period being assessed	Data based on state data from a government or industry database or survey	Data based on sample size of <20% (e.g. liveweight measured for 10% of herd)	Nationally relevant product specific value from database developed using international best practice
1	Age of data unknown or data collected > 4 years prior to the time-period being assessed	Data based on national data from a government or industry database or survey	Unknown (e.g. data based on national/state/regional data source)	Geographically generic product specific value from database developed using international best practice

(a) The data could include annual data or a mean of annual data representing activities that occurred in the time-period being assessed or within the specified number of years from time-period being assessed.

(b) Data without spatial partitioning would represent data for whole of entity or location. Data with spatial partitioning might have data differentiated by paddock or field.

8.2 Quality assurance

The entity shall implement quality assurance procedures including:

- internal review of calculations and data
- documenting review findings and corrections
- periodic assessment of data collection procedures.

All estimation methods and data used to generate a GHG inventory shall be documented and, where necessary, retained to allow a quality assurance or verification process to be conducted.

Additional data from independent sources should also be collected and retained to facilitate verification of activity data. Independent data that are collected to allow verification of activity data should be obtained from a recognised reputable source or where site-specific data are collected should be obtained using equipment that is calibrated according to a recognised standard.

9. Reporting

9.1 Required information and documentation

A complete emissions report provides sufficient information for informed decision-making and verification. Requirements can differ depending on the intended goal of the inventory. If reporting to a third party, the entity should check their requirements for reporting.

To meet the minimum requirement of these Guidelines, entities shall report the following.

- a) Entity information:
 - reporting entity name and ABN
 - a summary business profile of the entity (e.g. AFF activity types, properties, localities)
 - organisational and reporting boundaries, including the consolidation approach used to set the organisational boundary
 - responsible person and contact information.
- b) Summary information containing:
 - reporting period(s) covered
 - information on the base year or period (where relevant)
 - total emissions by scope in metric tonnes of CO₂-e
 - material changes in boundaries (e.g. due to entity restructure) or methods
 - comparison with base year or previous reporting period (where relevant)
 - significant events affecting emissions (e.g. bushfire, destocking in drought).
- c) Detailed emissions and removals inventory:
 - emissions and removal by scope, source or sink category, gas type, in mass of gas and carbon dioxide equivalents (CO₂-e)
 - biogenic carbon must be separately reported to fossil carbon
 - method level applied for each source and sink estimated
 - activity data for each source and sink estimated
 - quality score for each method and data source

- disclosure of any omitted or excluded sources and sinks (see materiality for details of what shall be included).
- d) Methodology documentation:
 - version of Methodological Guidance applied
 - details of any GHG calculation tools used
 - data collection procedures
 - quality assurance measures.
- e) Details of carbon credits as per Chapter 9.6.

The entity may report the inventory by geographic or operational unit where the entity operates multiple:

- properties or production sites
- enterprise types (e.g. cropping and livestock)
- management systems.

9.2 Reporting format

The entity shall:

- use standardised templates provided at **Appendix D**.
- ensure all quantitative data includes units of measurement.

9.3 Frequency of reporting

The frequency of reporting depends on the goal of the inventory and third-party requirements.

Entities should review and update their GHG inventory annually. This can help entities to:

- identify additional emission sources from new activities
- keep on top of activity data, methods and emission factors, as required
- collate annual emissions data.

9.4 Reporting period

Single year

The entity shall use a single-year reporting period. This can be a 12-month period aligned with current financial reports, a financial or calendar year, dependent on the goal of the inventory and any relevant third-party requirements.

When reporting, the entity should identify any significant seasonal variations or exceptional events affecting emissions during the reporting period.

Multi-year average

For some production systems there can be large interannual variability due to factors such as climate or production cycles. As such, a single year of data will often not be representative of an entity's normal operations. It is recommended that entities also report a multi-year average.

A suitable interval for quantifying a multi-year average base year should ideally cover multiple production cycles and consider climatic cycles relevant to the location and production system.

A period of 3-5 years can be appropriate to establish a representative base year for tracking emissions and removals over time.

To report a multi-year average the entity shall:

Step 1: Select the multi-year period

- Define the number of contiguous years that will be averaged, in the same manner that a multi-year base period would be defined (as per Chapter 7.1).
- If a base period has been established the entity should apply the same number of years for the reporting year average.

Step 2: Calculate the multi-year average

- For each new reporting year, shift the period forward by one year and calculate the average.

Step 3: Document assumptions and exclusions

- Record the selected period and rationale for the choice
- Document any events excluded due to atypical events and justify the exclusion

9.5 Base year reporting

Where the entity has established a base year (or base period) the entity shall:

- report the base year (or base period) chosen and the rationale for the selection
- report the base year review and recalculation policy
- report the base year inventory in accordance with the requirements in Chapter 7.1
- explain and document the nature and rationale for any recalculations following Chapter 7.2
- report both the original and adjusted base year.

9.6 Treatment of carbon credits and renewable energy

Carbon credit projects

If a registered carbon credit project occurs within the organisational boundary the entity shall:

- Report all emissions and removals from the registered project areas/activities in the inventory.
 - Credited abatement is not deducted from the inventory.
- Document project information as supplementary data:
 - project methodology and crediting period
 - area of land under the project (hectares)
 - the project number and / or the Lot/DP (Deposited Plan) details of the land, where relevant
 - credits generated (t CO₂-e) during the reporting period
 - disposition of credits (sold, retained, or retired).

Purchased credits

Carbon credits purchased from outside the organisational boundary shall not be included in the GHG inventory but may be reported separately.

Renewable energy projects

If the entity has a large-scale renewable energy generation project within its organisational boundary it shall:

- report renewable energy produced on-site and exported as supplementary information
- not include emission reductions for renewable energy where certificates are created and sold.

10. Good practice documentation management

Comprehensive documentation supports quality assurance and verification processes, and enables continuous improvement.

The entity shall maintain:

- a) Data management records:
 - data collection procedures and responsibilities
 - primary data sources with collection dates
 - data validation and quality control processes
 - treatment of data gaps and estimates
- b) Calculation records:
 - complete calculation worksheets or software outputs
 - emission factor selection rationale
 - provide clear audit trails from activity data to reported emissions
- c) Change management documentation:
 - log of methodology changes
 - recalculation procedures and triggers
 - base year adjustment records
 - version control for calculation tools.

Entities should retain supporting documentation for a minimum of five years (note if reporting under AASB S2, documentation should be retained for 7 years).

11. Product-level estimation

[General guidance on product-level estimation, including principles for product allocation, will be developed in Tranche 2.]

Appendix A – Choosing a consolidation approach

Rules of thumb

1. If the entity controls operations day-to-day, *operational control* is an appropriate choice.
2. If the entity’s business interests consolidate financially (that is there is financial control across the scope of all businesses), *financial control* is an appropriate choice.
3. If the entity is an investor, with partial stakes in operations and financial arrangements, *equity control* is an appropriate choice.
4. ISO supports multiple consolidation approaches to be applied, recognising that complex organisations may have different operational or ownership structures across activities or assets. Therefore an entity may legitimately apply different consolidation approaches for different parts of the inventory. Once the approach to consolidation has been determined (whether mixed or a singular approach) the approach shall be maintained consistently over time.
5. Where uncertainty exists regarding the application of consolidation approaches, the entity should consider whether the selected consolidation method(s) enables the comprehensive capture of all material GHG sources and sinks over which the entity has ownership, control, or influence. This approach supports the principles of completeness and transparency and strengthens conformance with assurance and verification requirements.

Case study: Broadmeadow Farms Pty Ltd

Broadmeadow Farms Pty Ltd is a family-run enterprise with diversified agricultural operations. The core cropping business is wholly owned and operated under the Broadmeadow Farms ABN. The family also operates livestock enterprises through the Daly Family Trust and holds a 20% equity share in a Grain Storage Co-operative.

Business profile:

1. **Broadmeadow Farms Pty Ltd** – cropping operations 100% owned. Main business.
2. **Daly Family Trust Pty Ltd** – livestock operations *operationally* controlled by Broadmeadow Farms. Financial decisions are made by a Trustee (not related to Broadmeadow Farms). Separate ABN to Broadmeadow Farms.
3. **Grain Storage Co-operative** – 20% equity share. Separate ABN to Broadmeadow Farms.

Although the three entities are legally distinct, they are operationally and strategically interconnected and ultimately Broadmeadow Farms is the beneficiary of all their operations.

Applying a consolidation approach under ISO 14064-1 rules

Under ISO 14064-1:2018, *Broadmeadow Farms* must select a consolidation approach (or combination of approaches) that best represents its control or influence over emissions and removals.

ISO allows the use of multiple consolidation approaches – as long as the rationale is transparent, consistent over time, and avoids double counting.

Table 1 explains a rationale for Broadmeadow Farms combining *operational control* for its wholly owned and managed entities, with *equity share* for the Grain Storage Co-operative minority holding. This mixed approach ensures completeness, capturing all material sources and sinks where the business has ownership, control, or influence.

Table 1: Broadmeadow Farms consolidation approach under ISO rules

Entity	Rationale	Inventory inclusion
Broadmeadow Farms Pty Ltd (cropping)	100% owned and managed with both <i>financial and operational control</i> .	100% of emissions and removals included
Daly Family Trust (livestock)	<i>Operationally</i> controlled by Broadmeadow Farms, though financial control sits with the trustee. Inclusion justified under <i>operational control</i> .	100% of emissions and removals included
Grain Storage Co-operative (20% share)	No operational or financial control, but 20% ownership stake provides partial responsibility. Included under equity share .	20% of emissions and removals included

Applying a consolidation approach under the GHG Protocol Corporate Standard

Entities must select one approach for consistency across the corporate inventory but can describe *equity-based supplementary disclosures* if needed.

The following table explains the rationale for Broadmeadow Farms selecting the *operational control* approach under the GHG Protocol rules.

Table 2: Broadmeadow Farms consolidation approach under ISO rules

Entity	Rationale	Inventory inclusion
Broadmeadow Farms Pty Ltd (cropping)	Operated and managed by Broadmeadow	100% of emissions and removals included
Daly Family Trust (livestock)	Operated by Broadmeadow Farms, day-to-day control exercised by same management	100% of emissions and removals included
Grain Storage Co-operative (20% share)	No operational control	Excluded (but may be reported separately as an investment or scope 3 category)

Appendix B – Leased lands and agistment

Leases

Under revised Australian Accounting Standards Boards AASB standards ([AASB 16 Leases](#)) almost all leases are now treated as financial (capital) leases by the lessee. This means that right-of-use arrangements for leased assets in the agricultural sector (e.g. land, machinery, or buildings) are recognised on the lessee’s balance sheet, and the lessee *controls the use of the asset* for the lease term and bears the associated risks and rewards.

As such, *the party who has control over the activities / operations* that generate emissions or removals is responsible for reporting Scope 1. Typically, this will be the lessee in most agricultural lease arrangements – as follows:

Lessee: The lessee generally has both *financial and operational control* of the leased asset. They determine how the leased asset is managed and bear the economic benefits and risks of its use. They report emissions or removals from the use of the leased asset as Scope 1.

Lessor: Retains legal ownership of the asset but typically has no operational control once the lease is in place. The lessor, where relevant may report *Scope 3 (downstream leased-asset)* emissions associated with the lessee’s use of the asset. However, if the lessor is directing land use change on leased land then the lessor retains Scope 1 reporting responsibility and the lessee would treat as Scope 3.

See Table 1 for more guidance.

Question Reference Set E: Leases

The Australian Accounting Standards Board’s (AASB) [AASB 16](#) changed accounting rules for leases by removing the distinction between operating and financial leases *for lessees*. As such, the scope of emissions would depend on whether the party has control over the activities / operations that generate emissions or removals.

1. Is this appropriate for emissions reporting in the agricultural context, and if not, why not?
2. Does the guidance provided in the table provide sufficient clarity and the most common scenarios? Is there additional information that could assist users?

Table 1 - Scope 1 or Scope 3 reporting responsibilities for lessees versus lessors on leased lands

Consolidation approach	Responsibilities	Lessee activities	Example sources / sinks	Lessee treatment	Lessor's treatment
Operational or financial control	Lessee manages the land	Grazing or cropping operations	Enteric CH ₄ , manure N ₂ O, soil N ₂ O (fertiliser, grazing)	Scope 1 – Lessee reports as direct emissions	Scope 3 (downstream) – Lessor reports as indirect emissions
Operational or financial control	Lessee initiates and implements the land use change	Land use change (initiated by lessee) - e.g. clearing woody vegetation	Vegetation clearing or planting	Scope 1 (LULUCF) – Lessee reports as direct emissions.	Scope 3 (downstream) – Lessor reports as indirect emissions
Operational or financial control	Lessor directs (or implements) land use change	Land use change <i>directed by the lessor</i> (e.g. clearing required pre-lease)	Vegetation clearing or planting	Scope 3 (upstream) – Lessee reports emissions as indirect emissions.	Scope 1 (LULUCF) – Lessor reports as direct emissions.
Equity share	Joint management	Share farming or joint operation (e.g. grazing or cropping) on leased lands	All relevant agricultural and land-use sources in proportion to equity share.	Scope 1 (pro-rata) – Report share of total emissions and removals from land use.	Scope 1 (pro-rata) – Report share of ownership or retained equity.

Agistment

In these Guidelines, reporting responsibility for Scope 1 versus Scope 3 emissions from agisted stock depends on who exercises operational control and receives the most financial benefit from the agisted livestock's performance.

Note, under the GHG Protocol Agricultural Guidance, the landholder always assumes Scope 1 emissions reporting responsibilities regardless of who maintains operational or financial control of the animals. If required to report using GHG Protocol, an entity could either choose to follow the GHG Protocol Agricultural Guidance rules, or transparently document the treatment of agisted animals in line with the rules below.

Agistment in Australia typically falls into one of two broad scenarios. Either:

- the landholder takes primary responsibility for management and performance of agisted stock; or
- the livestock owner continues to manage the stock and their performance on the landholder's land.

Scenario 1 – operational control of livestock maintained by the landholder

In this scenario, the landholder takes primary responsibility for day-to-day management of the agisted stock and is financially rewarded for their performance.

Because the landholder is operationally responsible for the agisted stock, they are responsible for reporting Scope 1 livestock emissions (enteric and manure), along with any land-use, land-use change, and forestry (LULUCF) emissions or removals associated with the property.

Typical indicators of this scenario include:

- The landholder makes daily management decisions about feeding, breeding, veterinary care, and animal movements.
- The landholder accepts production risk, such as changes in mortality or growth rates.
- The landholder is financially rewarded for herd performance, for example, being paid per kilogram of liveweight gain rather than a simple pasture-lease fee.

Rules

Scope 1 livestock emissions: If the landholder manages the stock *as if they were their own*, they are deemed to have operational or financial control and therefore shall include the emissions in their Scope 1 inventory.

Scope 3 Livestock emissions: The livestock owner shall report the enteric and manure emissions as part of their Scope 3 emissions.

Scope 1 LULUCF emissions: The landholder shall report LULUCF emissions or removals associated with the property as their Scope 1.

Scenario 2 – operational control of livestock maintained by the livestock owner

In this scenario, the livestock owner retains management control over the agisted animals and receives the economic benefits from animal performance (e.g. does not pay the landholder for kilogram of liveweight gain).

The landholder only provides access to feed and water, and general supervision of the property. The livestock owner is deemed to have operational and financial control of the agisted animals and must therefore report 100% of enteric and manure emissions as their Scope 1 emissions. Any land use, land use change, and forestry (LULUCF) emissions or removals associated with the property would be reported as the landholder's Scope 1 emissions.

Typical indicators of this scenario include:

- the livestock owner retains the production risk (e.g. animal health, weight gain, or losses)
- the livestock owner makes all financial and management decisions about the herd
- the landholder's role is limited to providing pasture or agistment facilities, without directing herd management or benefiting from performance.

Rules

Scope 1 livestock emissions: If the livestock owner retains day-to-day management and receives the primary economic benefit from livestock performance, the livestock owner shall report all enteric and manure Scope 1 emissions associated with the agisted livestock.

Scope 3 Livestock emissions: The landholder's role is limited to providing access to feed or water, or general oversight, without directing management or benefiting financially from herd performance. The landholder shall report the enteric and manure emissions from agisted livestock as their Scope 3 emissions.

Scope 1 LULUCF emissions: The landholder shall report LULUCF emissions or removals associated with the property as their Scope 1.

Table 2 provides example scenarios for agistment and Scope 1 or 3 reporting responsibilities.

Table 2: Agistment scenarios

Scenario and Activity	Livestock Owner Reporting Responsibility	Landholder Reporting Responsibility	Notes on consolidation approach
Short-term agistment, livestock owned by farmer, no land management changes; no landholder management of animals (other than presence on land)	Scope 1	Scope 3: may optionally disclose animal emissions	Livestock owner retains operational & financial control of herd. Landholder provides feed/water access.
Long-term / managed agistment where <i>landholder</i> makes animal management decisions	Scope 3 (under other Upstream Leased Assets)	Scope 1	Landholder effectively controls herd operations and bears production risk.
Agistment fee tied to animal performance (custom feeding)	Scope 3 (under other Upstream Leased Assets)	Scope 1	Landholder effectively controls herd operations and bears production risk.
Landholder clears land / sows pasture for agistment	No obligation to report emissions	Scope 1	Landholder exercises operational control of land. LUC emissions split proportionally only if equity shared.
Landholder applies fertiliser / irrigates	No obligation to report emissions	Scope 1	Landholder's direct emissions.

Question Reference Set F: Agistment Rules

The GHG Protocol Agricultural Guidance treatment of agistment (which assigns Scope 1 reporting responsibility for the livestock on agisted land to the land holder) is different to the general principles for determining estimation and reporting responsibilities outlined in the GHG Corporate Standard (which would assign responsibility for Scope 1 reporting dependent on operational or financial control).

In Australia, some existing domestic GHG calculators assign Scope 1 reporting responsibility to the livestock owner (rather than the landholder).

In these Guidelines we are opting to assign Scope 1 reporting responsibility to whoever maintains operational or financial control of the livestock, *regardless of land or stock ownership.*

1. Does this approach make sense?
2. If not, should the Guidelines:
 - i. Follow the GHG P Agricultural Guidance rule of assigning Scope 1 reporting responsibility to the land holder?
 - ii. Follow domestic GHG calculator approach of assigning Scope 1 reporting responsibility to the livestock owner?

Appendix C – Criteria for applying Method 3 approaches

This appendix provides draft proposed rules and criteria for Method 3 approaches for consultation purposes.

If an entity chooses to use a Method 3 approach, the entity shall document the approach and rationale for its selection, including information to demonstrate that the approach yields accurate, consistent and reproducible results (e.g. provide uncertainty ranges or confidence levels). To ensure Method 3 approaches are robust and credible, they must meet a set of minimum criteria as described below.

Method 3 approaches shall either be:

1. **Consistent with a method published in a peer reviewed scientific journal**⁴. The study from which the method has been taken shall be relevant to the context (e.g. farming system, environment) in which it is being used to estimate GHG emissions or removals. For example, a method for estimating emissions reductions associated with a feed supplement that is derived from confinement fed animals cannot be applied to a pasture-based system. This requirement ensures that only methods that are applicable to the system being assessed are used.
2. **Consistent with a methodology from a carbon crediting program that has [International Carbon Reduction and Offset Alliance \(ICROA\) accreditation](#)**. The system to which the methodology is applied shall be an eligible system under that methodology.

In addition, data used for Method 3 approaches shall be:

1. **Compliant with domestic or international measurement standards**. Where a Method 3 approach relies upon the direct measurement of a GHG in the field, compliance with a relevant domestic or internationally recognised standard shall be demonstrated for the period during which measurements were taken. This requirement is to ensure the approach yields accurate, consistent and reproducible results.
2. **Laboratory accredited**. Where a Method 3 approach uses data from laboratory analysis, documentation shall be provided that the laboratory was accredited by a relevant internationally or domestically recognised standard for the analysis performed at the time of analysis (e.g. ISO 17025 – General Laboratory Accreditation; National Association of Testing Authorities). The analysis method and any sample preparation shall be consistent with those used in published literature, be fit for purpose and reported.

⁴ A scientific journal shall be classified as a level 1 or 2 journal on the Norwegian Register For Scientific Journals, Series and Publishers (<https://kanalregister.hkdir.no/>)

Appendix D – Reporting template

Summary

Entity name and ABN/s	
Reporting / assessment period	<i>e.g. financial reporting year; calendar year.</i>
Business profile and structure	[Outline type of operation] <i>e.g. mixed farming system producing grain, legumes and sheep meat.</i>
Property locations	<i>E.g. 3 properties in Victoria Wimmera and Mallee</i>
Production types and areas	<i>E.g. Property 1: Wimmera. #ha; # paddocks grain and legume production. Lot and DP identifiers.</i>
Base year (or period)	[Only required if tracking emissions over time - note timeframe over which base period has been calculated]
Base period average net emissions	t/CO ₂ -e (if relevant)
Current reporting period net emissions	t/CO ₂ -e
Difference with base period emissions	t/CO ₂ -e (if relevant)
Conditions experienced during reporting period	<i>E.g. Property 1: x% higher rainfall than previous reporting period</i>
Organisational boundary approach	<input type="checkbox"/> Operational control <input type="checkbox"/> Financial control <input type="checkbox"/> Equity share
GHG calculator used in assessment	
Contact name	

Note, *blue italicised text* in boxes throughout the Reporting Template is example text only.

Absolute emissions and removals by source

Scope	Source / Activity	Gas	Method	Mass of gas (t)	GWP ⁵	CO ₂ -e Emissions (t)
Scope 1 emissions						
Scope 1	<i>e.g. enteric fermentation (sheep)</i>	CH ₄	1		28 (AR5)	
Scope 1	<i>manure management</i>	N ₂ O	2		265 (AR5)	
Scope 1 total						
Scope 2 emissions						
Location-based	<i>purchased electricity</i>	CO ₂			1	
Scope 3 emissions						
Scope 3	<i>purchased feed</i>	CO ₂ -e			n/a	
Scope 3	<i>purchased seeds & fertilisers</i>	CO ₂ -e			n/a	
Scope 3 total						
Biogenic CO₂						
Scope 1	<i>vegetation clearance</i>	Biogenic CO ₂	2		1	
Scope 1	<i>Tree planting</i>	Biogenic CO ₂	2		1	
Biogenic CO₂ total						

⁵ Note, cite specific GWP approach used. To meet the minimum requirements of these Guidelines, GWP from IPCC AR5 (as specified in Chapter 6.3) shall be applied unless different EF required by reporting framework.

Totals by gas

Gas	Scope 1 (t)	Scope 2 (t)	Scope 3 (t)	Total (t)	GWP ⁶	Total (t CO ₂ -e)
Fossil CO ₂						
Biogenic CO ₂						
CH ₄						
N ₂ O						
TOTAL						

Land Use, Land Use Change and Forestry (Biogenic carbon)

Lot and DP information	Area (ha)	Date of event	Activity type	Method	Quantity (tCO ₂ -e)
			<i>e.g. Vegetation clearance (VC)</i>		
			<i>e.g. Increasing tree biomass by reducing severity of late dry season burns</i>		

Emissions sources not estimated in this inventory

Clearly state what is being excluded (e.g. a specific emission source, GHG type, process); justify the reason for exclusion – for example, impractical to measure / no measurement methodology, lack of data, or immaterial and unlikely to influence stakeholder decisions.

Scope	Source / Activity	Gas type/s	Reason for exclusion	Estimated quantitative impact on inventory (if possible)
Scope 3	<i>E.g. Purchased goods and services: mineral salt licks (mining and transport of salt licks)</i>	<i>(CO₂ CH₄)</i>	<i>Impractical to measure; inadequate data / EFs to calculate</i>	Unquantified

⁶ Note, cite specific GWP source. To meet the minimum requirements of these Guidelines, GWP from IPCC AR5 (as specified in Chapter 6.3) shall be applied unless different EF required by reporting framework.

Methods and data quality

Scope	Source or sink	Estimation method	Activity data or input parameter	Data source	Data quality rating Temporal	Data quality rating Spatial	Data quality rating Sample size	Data quality rating Scope 3 EF
1	e.g. enteric fermentation – Grazing beef	Method 2	Number of animals in each class	Farm records – full herd muster from 18 months ago	3	4	5	n/a
			Animal liveweights	Default state value from Method 1	1	2	1	n/a
			Liveweight gain	Optiweight data from one paddock (<20% of herd) monitored over 12 months of reporting period	5	4	2	n/a
1	Fertiliser use (non-irrigated pasture)	Method 1	Amount of fertiliser applied	Farm data records (management software) on application rates (not estimates) for all paddocks	5	4	5	n/a
1	Crop residue management	Method 1	Annual production of crop (tonnes)	Yield map on a field basis from calibrated yield monitor on header for reporting year	5	4	5	n/a
			Crop attributes	Default national value from Method 1	1	1	1	n/a
2	Purchased energy	Location Method	kW electricity consumption	Quarterly consumption and supply invoices for all metered points	5	n/a	5	n/a
3	Purchased fertiliser	Method 2	kg of fertiliser used	Purchase invoices for reporting year.	5	5	5	n/a
			Emissions factor	Supplier-reported EFs.	n/a	n/a	n/a	5
3	Purchased mineral supplements	Method 1	kg of supplements used	Purchase invoices for reporting year.	5	5	5	n/a
			Emissions Factor	Default EF values from AusLCI database	n/a	n/a	n/a	3

Carbon credits (if relevant)

Credit status	Type	Lot / DP identifiers (where relevant)	Credits (t CO ₂ -e)	Crediting scheme	Credit registry & ID	Credit Retirement date
Generated and retired	On site project – plantation					
Generated and sold	On site project – plantation			[e.g. ACCU]	-	-
Purchased and retired	Unknown					

Market-based Scope 2 emissions (if relevant)

Type	Unit	Amount	Source / evidence
Scope 2 (Market-based)	t CO ₂ -e-		
Amount of electricity purchased from the grid	kWh		Retailer invoice
Eligible Renewable Energy Certificates (RECs) voluntarily surrendered (includes Green Power and large-scale generation certificates)	MWh		Clean Energy Regulator (CER) REC registry / retailer invoice
Eligible RECs issued for electricity produced and consumed on site (included LGCs)	MWh		CER REC registry
Renewable power percentage under the Large-scale Renewable Energy Target	%		CER
Residual mix factor for state	kg CO ₂ -e/MWh		NGA factors
Supplementary information			
Eligible RECs issued for electricity produced exported	MWh		CER REC registry

Appendix E – Key terms

Term	Definition
Activity data	Quantitative measure of an activity over a specified period, that results in <i>GHG emissions or removals</i> . Examples: numbers of livestock and their liveweight gain; tonnes of fertiliser applied; litres of fuel used.
Anthropogenic	Caused or influenced by people, either directly or indirectly (<i>as opposed to non-anthropogenic or natural processes</i>)
Biogenic carbon	Carbon that is contained in or derived from biomass. Biogenic carbon must be quantified and disclosed separately from fossil carbon emissions.
Carbon credit	A tradeable instrument (certificate) representing a reduction, removal or avoidance of one metric tonne of <i>carbon dioxide equivalents (tCO₂-e)</i> that has been achieved relative to a baseline.
Carbon dioxide equivalent (CO₂-e)	A standard unit for comparing emissions of different greenhouse gases by expressing them as the amount of CO ₂ that would have the same warming effect over a set period (usually 100 years).
Emission factor	A representative value that quantifies the <i>GHG emissions or removals</i> per unit of an activity. Emission factors are often based on a sample of measurement data, averaged to develop a representative rate of emission for a given activity level under a given set of operating conditions. Example: kg methane (CH ₄) per animal per day.
Emissions intensity	The quantity of <i>emissions</i> per unit of product. Emissions intensity can be expressed per unit of total mass, mass of protein or energy, or economic value of production.

Term	Definition
	Example: kg CO ₂ -e per kg meat
Global warming potential (GWP)	<p>A factor describing the radiative forcing impact (on the atmosphere) of one unit of a given GHG relative to one unit of CO₂.</p> <p>The GWP represents the <i>combined effect</i> of:</p> <ul style="list-style-type: none"> • the differing times that GHGs remain in the atmosphere • and their different effectiveness in causing radiative forcing (that is, in heating the Earth's atmosphere). <p>GWP is measured in units of carbon dioxide equivalents (CO₂-e). The most common time horizon is 100 years (GWP100).</p>
Greenhouse gas (GHG)	<p>Gases that absorb and emit radiation causing the greenhouse effect. These gases include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and certain fluorinated gases.</p> <p>GHGs differ in their potency as a GHG and their atmospheric lifetime.</p>
Land use, land use change and forestry (LULUCF)	<p>GHG inventory sector encompassing emissions and removals of greenhouse gases resulting from direct human-induced land use, land-use change, and forestry activities. This includes activities such as afforestation, reforestation, deforestation, forest management, land management.</p>
Method	<p>The procedures for measurement and estimation of <i>GHG emissions</i> and <i>removals</i>.</p>
Mitigation	<p>Human intervention to reduce the sources or enhance the sinks of greenhouse gases.</p>
National Greenhouse Accounts (NGA)	<p>Australia's National Greenhouse Accounts provide detailed estimates of the nation's greenhouse gas (GHG) emissions, including where they come from and how they change over time. The NGA methods for estimating GHG emissions and removals provide the foundation for these Guidelines. Published by the Department of Climate Change, Energy, the Environment and Water (DCCEEW).</p>

Term	Definition
National Greenhouse and Energy Reporting (NGER) Scheme	<p>The National Greenhouse and Energy Reporting (NGER) Scheme is a single national framework for reporting company information about:</p> <ul style="list-style-type: none"> • greenhouse gas emissions • energy production • energy consumption. <p>Facilities producing annual emissions over 25 kt CO₂-e, or corporate groups with emissions over 50 kt CO₂-e, are required to undertake NGER reporting.</p>
Removal	Removal of greenhouse gases and/or their precursors from the atmosphere by a sink (storing them in plants, soils, oceans, or engineered systems (like carbon capture and storage))
Science-based targets initiative (SBTi)	An initiative that aims to support companies to set <i>GHG emission</i> reduction and <i>net zero</i> targets in line with climate science and <i>Paris Agreement</i> goals.
Sink	A reservoir, process, or mechanism that removes a greenhouse gas, an aerosol, or a precursor of a greenhouse gas from the atmosphere.
Soil carbon Soil organic carbon	<i>Carbon</i> present in the soil carbon pool. Soil carbon usually refers to soil organic carbon. Soil organic carbon is derived from <i>biomass</i> , such as leaf litter, dead roots and manure. Carbon constitutes about 50% of the dry mass of soil organic matter. In alkaline soils, carbon can also be present as soil inorganic carbon, e.g., as carbonate.
Source	A process, activity or mechanism that releases a <i>GHG</i> , an aerosol or a precursor to a GHG into the atmosphere.