

Common Greenhouse Gas Accounting Framework for the Australian Fresh Produce Industry



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Purpose

This greenhouse gas (GHG) Accounting Framework provides a pre-competitive, common approach for Australian Fresh Produce Alliance (AFPA) members to measure and report their GHG emissions in a consistent way. It has plain-English descriptions of each of the steps needed to account and report GHG emissions, and specific guidance relevant to the operations of AFPA members, agreed to by AFPA members.

The output of this Framework will be the ability of each AFPA member to produce a true, fair and consistent inventory of GHG emissions, regardless of their corporate structures or activities. This GHG inventory can be used for GHG accounting and/or reporting, as needed by each individual member.



The intended benefits of GHG accounting and reporting for AFPA members are to:

- Identify opportunities to reduce net GHG emissions, track performance, and if desired to set reduction targets
- Enable GHG inventories to meet the decision-making needs of management to:
 - Identify opportunities to reduce emissions, reduce costs and increase productivity. This includes co-benefits from GHG reduction measures such as reduced inputs and increased soil health
 - Manage reputational risks and market access opportunities
- Enable GHG inventories to meet the decision-making needs of customers and other external stakeholders.

The intended benefits of a consistent AFPA approach to GHG accounting and reporting are to:

- Achieve a common understanding of GHG accounting terminology and how methods can be consistently applied across horticulture, and the many activities that comprise AFPA member businesses
- Have a clear and consistent approach for GHG accounting and reporting that AFPA members and others can consistently follow at any AFPA member company
- Have clearly defined boundaries to bring greater clarity and to provide informed expertise to shape industry GHG reporting to customers and government
- Help all AFPA members cost-effectively prepare GHG inventories
- Proactively prepare for future accounting and assurance requirements for when climate and broader sustainability disclosures are mandated.

Contents: summary GHG reporting guidance

[Background: what are scope 1, 2 and 3 emissions?](#)

[Background: what is GHG accounting and reporting?](#)

[Principles](#)

GHG accounting and reporting steps as required by the GHG Protocol Corporate Standard:

Boundaries:	System boundary <ul style="list-style-type: none">• Cradle to first point of sale	Operational boundary <ul style="list-style-type: none">• Scope 1 & 2 emissions. Scope 3 emissions are optional• Guidance provided to account for production contract, lease & third-party activities as scope 1 or 3	Organisational boundary <ul style="list-style-type: none">• Emissions from entities AFPA members have financial control over	Base period <ul style="list-style-type: none">• Single year, for the earliest year for which members have verifiable scope 1 & 2 emissions.
Calculating GHG fluxes:	Calculation tool <ul style="list-style-type: none">• H-GAF	Collecting activity data <ul style="list-style-type: none">• Agreed sources for aggregating fertiliser, fuel etc activity data	Managing inventory quality <ul style="list-style-type: none">• Qualitative rating of data quality. Standard format for data collection	Calculation approach <ul style="list-style-type: none">• Emission factors per National GHG Inventory
Accounting and reporting:	Accounting <ul style="list-style-type: none">• Single-year reporting	Reporting <ul style="list-style-type: none">• Total business t CO₂e, & t CO₂e/t product sold		

For a detailed glossary, please refer to the glossary at the end of the [GHG Protocol Corporate Standard](#) or the [GHG Protocol Agricultural Guidance](#).



Background: what are scope 1, 2 and 3 emissions?

Scope 3 emissions come from all the third-party activities associated with your operations. For example, emissions released in the manufacture of your fertiliser, or from transporting that fertiliser to your orchard. These are hardest to accurately measure because they are outside your control.

Scope 1 emissions come from your direct actions. They can be mechanical (e.g. from diesel burnt to run your company-owned tractors) and non-mechanical (e.g. emissions from applying fertiliser to soil, which reacts with oxygen to release nitrous oxide).

Scope 2 emissions come from fossil-fueled electricity used in the operations you own.

Scope 3 emissions

- Production & transport of fertilisers, pesticides bought by you
- Emissions from activities of third parties working for you (e.g. production contracts and capital leases, contractors, ripening, propagation, etc)



Scope 1

Non-mechanical emission

Direct and non-direct soil emissions from fertiliser & lime and crop residues

Fertiliser



Row crops



Crops residue

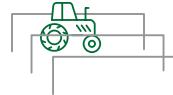


Tree crops



Mechanical emission

- Mobile machinery
- Stationary machinery
- Refrigeration



Vine crops

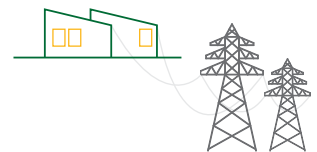


Protected crops



Scope 2 emissions

Purchased electricity



Whether emissions are scope 1, 2 or 3 depends on where the reporting entity sits in the value chain. For AFPA members, the emissions released in electricity generation to run your packing shed are your scope 2 emissions, but are part of the scope 1 emissions of the generator. The direct soil emissions released in growing your produce are your scope 1 emissions, but the direct soil emissions released by another farmer to grow produce you buy as a merchant are your scope 3 emissions.

AFPA company services

Scope 3: Upstream

Scope 1

Scope 2

Scope 3: Downstream

Producer

Grows and sells horticulture product.

Input emissions

- Fertiliser & pesticide manufacture & transportation

Direct emissions

- Mechanical (e.g. vehicles, pumps, refrigerants)
- Non-mechanical (e.g. soil)

Purchased electricity

- (From fossil fuels – i.e. that produce GHG emissions)

Post-sale emissions

- Transportation, processing, retail electricity, waste etc of produce sold by AFPA company
- Unlikely to be accounted for initially, unless these emissions are a major proportion of the AFPA company's emissions, or fi data is readily available.*

Merchant

Purchases horticulture produce from a grower for the purpose of resale.

The growers' input emissions, direct emissions, and purchased electricity for produce purchased by AFPA company

Direct emissions

- Mechanical (e.g. company-owned transport) while produce is in AFPA company's ownership

Purchased electricity

- Electricity used while produce is in AFPA company's ownership

Agent

Sells a grower's produce on the grower's behalf for a fee; does not own the produce.

Not counted – AFPA company doesn't own the produce

Purchased electricity

- Electricity used in the course of agent services (likely to be very little)

Not counted – AFPA company doesn't own the produce

* See Operational Boundary for more detail on how scope 3 emissions are accounted for.

Background: what is GHG accounting and reporting?

GHG accounting is the recognition and consolidation of GHG emissions from operations in which a parent company holds an interest (either control or equity) and linking the data to specific operations, sites, geographic locations, business processes, and owners.

GHG reporting is the presentation of GHG data in formats tailored to the needs of various reporting uses and users. Annual reporting, sustainability reporting, or compliance reporting are some common reports.

This Framework aims to support each AFPA member to collect and record data at a sufficiently disaggregated level for accounting purposes, and to consolidate that data in a format to meet a range of reporting requirements.

This Framework is based on the [GHG Protocol Corporate Standard](#) ("GHG Protocol") and [Agricultural Guidance](#). It is also cross checked to [Agriculture Innovative Australia guidance for sectoral GHG reporting](#), to be as consistent as possible with future whole-of-horticulture industry reporting.

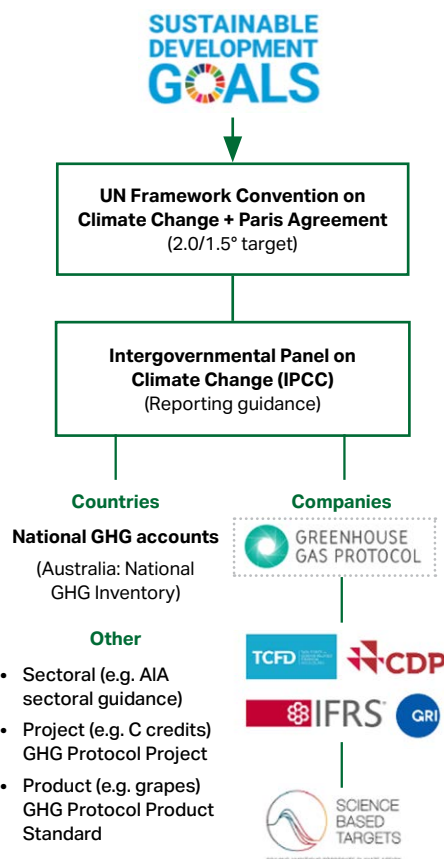
How does the GHG Protocol fit into GHG reporting?

The GHG Protocol is a widely recognized framework for company accounting and reporting GHG emissions.

It is based on the same IPCC guidance used by governments for consistent national GHG reporting.

With GHG Protocol as the foundation, you can meet:

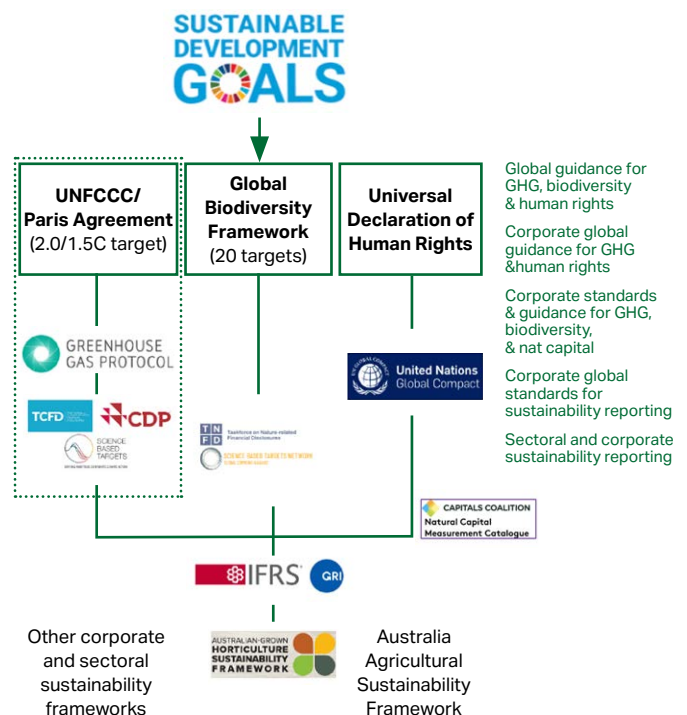
- other GHG reporting (e.g. Taskforce for Climate-related Financial Disclosures, Carbon Disclosure Project, or the IFRS or GRI sustainability reporting standards) or
- target-setting (e.g. Science Based Targets Initiative) guidance



How does GHG reporting fit into the wider sustainability landscape?

The world of sustainability reporting is ridiculously, inexcusably complicated, with multiple competing frameworks and standards jostling for attention. For AFPA members, the important points are:

1. Data gathered through the GHG Protocol allows you to report GHG emissions against any GHG or sustainability framework
2. When reporting and managing sustainability, choose one or two frameworks most important to your customers or other critical stakeholders and use their metrics
3. Align everything towards contributing to the Sustainable Development Goals.



1. Principles

The GHG Protocol requires GHG accounting and reporting to be based on the following principles:

Relevance	Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company.	See Collecting Activity Data .
Completeness	Account for and report on all GHG emission sources and activities within the chosen inventory boundary. Disclose and justify any specific exclusions.	See System Boundary , Operational Boundary , Organisational Boundary .
Consistency	Use consistent methodologies to allow for meaningful comparisons of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.	See Tracking GHG Fluxes Over Time , Calculation Tool , Recalculation Policy .
Transparency	Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.	See Reporting .
Accuracy	Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.	See Collecting Activity Data .

In line with the GHG Protocol, this Framework does not give guidance for:

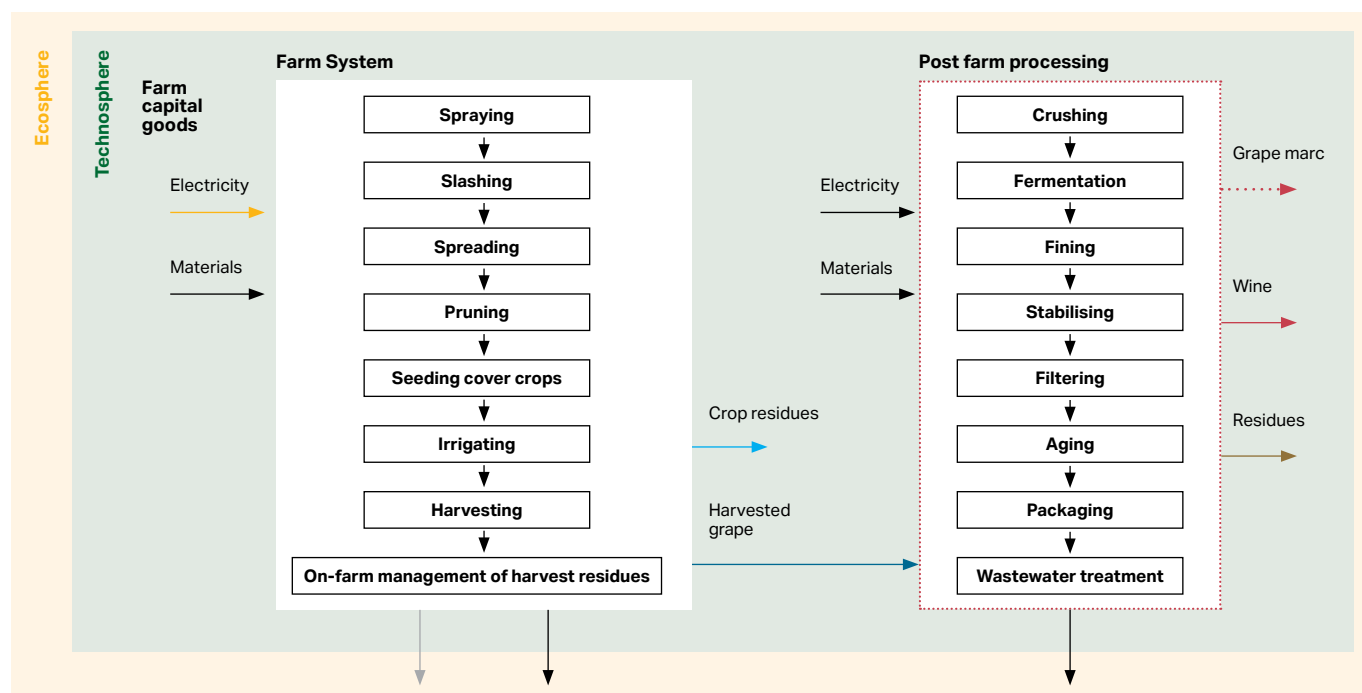
- Selection and deployment of GHG mitigation practices for APFA members
- Verifying GHG inventories (but it does contain some points for consideration by APFA at Appendix B)
- Setting GHG reduction targets
- Accounting for indirect Land Use Change (iLUC)
 - iLUC occurs when an existing crop is diverted for another purpose and replacement crops are then grown on formerly non-agricultural lands. For example, if sugarcane is diverted from sugar to biofuel production, causing forests to be cleared for additional sugarcane production. iLUC is unlikely to be relevant for APFA members (if it is, GHG Project Protocol has guidance)
- Accounting steps needed to create offset credits from soils, biomass or other sources located on farms
 - The GHG Protocol fluxes to/from C stocks are simply reported as they occur, and does not consider the permanence of C sequestration. The GHG Project Protocol and its companion document, the Land Use, Land-Use Change, and Forestry Guidance for GHG Project Accounting, has guidance if APFA members intend to participate in carbon markets.

More detail:

- [GHG Protocol Corporate Standard](#), Chapter 1

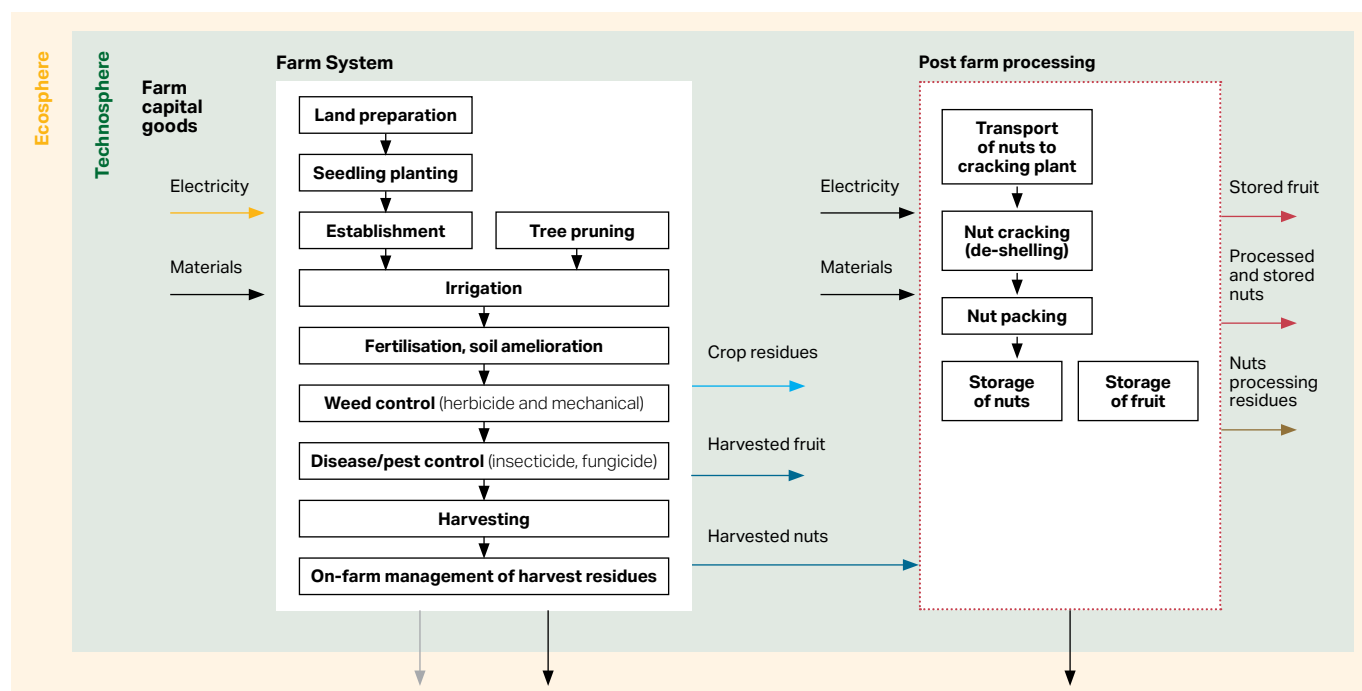
Vine crops system boundary

Figure 20 Cradle-to-farm-gate system boundary of vine fruit and cradle-to-factory-gate system boundary for wine production in Australia Post farm processing is included for wine grapes, but not other vine crops.



Tree crops system boundary

Figure 19 Cradle-to-factory-gate system boundary of fruit and nut (tree crop) production in Australia.



Source: AIA A Common Approach to Sector-Level Greenhouse-Gas Accounting for Australian Agriculture.

→ Scope 1 – direct emissions
 → Scope 2 – electricity
 → Scope 3 – Upstream materials and waste processing. Downstream electricity, materials, direct emissions
 → Farm gate product
 → Farm gate residual
 → Factory product
 → Factory co-product
 → Factory residual

3. Operational boundary (Standard)

AFFPA members shall report all scope 1 and 2 emissions. Scope 3 emissions are optional, with an aspiration to have all AFFPA members recording scope 3 emissions that are greater >1% of total emissions at a later date.

AFFPA members have many different operational arrangements, including contractors, lessees and lessors, and production contracts. Operational boundaries specify if emissions resulting from these activities are your scope 1, 2 or 3, and to what extent scope 3 emissions are measured. This involves:

- Identifying emissions associated with its operations
- Categorising them as direct and indirect emissions
 - scope 1: direct emissions from sources owned or controlled by you
 - scope 2: indirect emissions from purchased electricity
 - scope 3: other indirect emissions from sources not owned or controlled by you but are a consequence of company activities (e.g. transport of materials)
- Choosing the scope of accounting and reporting for indirect emissions.

Rationale for operational boundary: The complex number of organisations involved in horticulture operations will make accurate scope 3 reporting very difficult. To help AFFPA members start reporting emissions, the initial focus will be on reporting scope 1 and 2 as accurately as possible.

AFFPA will encourage all members to report scope 3 within a few years, as members build GHG accounting and reporting capability. Third-party and business transport, food waste and packaging are emission sources that are likely to be most significant in magnitude of contribution and easiest to source data for.

GHG Protocol Scope 3 **upstream categories**

1. Purchased goods and services
2. Transportation and distribution
3. Capital goods
4. Fuel and energy related activities
5. Waste generated in operations
6. Business travel
7. Employee commuting
8. Leased assets

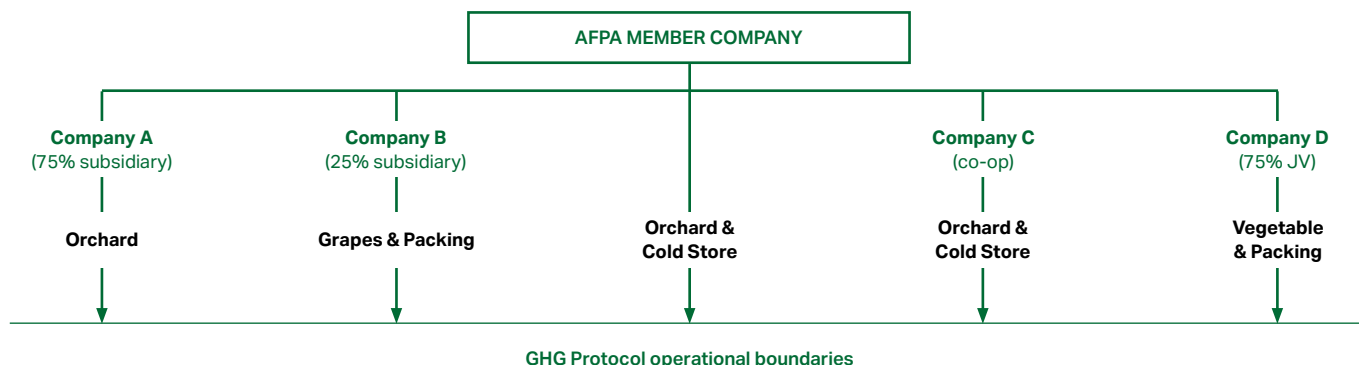
GHG Protocol Scope 3 **downstream categories**

9. Transportation and distribution
10. Processing of sold products
11. Use of sold products
12. End-of-life treatment of sold products
13. Leased assets
14. Franchises
15. Investments

More detail:

- [GHG Protocol Corporate Standard](#), Chapter 4
- [GHG Protocol Agricultural Guidance](#), Chapter 5.1
- Exposure draft, [ASRS Disclosure of Climate-related Financial Information](#)
- [International Financial Reporting Standards IFRS S2: Climate-related Disclosures](#)
- [GHG Protocol Corporate Value Chain \(Scope 3\) Standard](#)





Direct operations

- Scopes 1 and 2 at minimum, scope 3 recommended

Production contracts

- Scope 3, assuming contracted growers retain control

Third party on-farm (pruning, picking etc)

- Scope 1 (scope 3 for third party), except for contractor-owned equipment
- Scope 3 (scope 1 for third party)

Third party off-farm (R&D, propagation etc)

- Scope 3 (scope 1 for third party)

Capital lease (lessee operates the asset and has risk & reward from that asset)

- Scope 3 (scope 1 & 2 for lessee)

Operational lease (all other leases. Lessee operates, but no has risk & reward)

- Scope 1 and 2 (scope 3 for lessee)

NB: The current (January 2024) exposure draft Australian Sustainability Reporting Standards (ASRS) Standards – Disclosure of Climate-related Financial Information require disclosure of scope 3 upstream and downstream emissions where this information “is available at the reporting date without undue cost or effort.” This appears to be consistent with this AFPA GHG Accounting Framework, but members should note this expectation is likely to increase in future. The International Financial Reporting Standards (on which ASRS are based) asks companies to account for all 15 sources of scope 3 emissions as listed by the GHG Protocol scope 3 Standard.

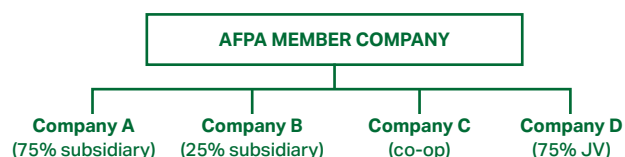


4. Organisational boundary

AFPA members shall use financial control as the default approach to define which business operations will be included in their inventory.

AFPA members vary in their legal and organisational structures. In setting organisational boundaries, AFPA members shall select one of the following approaches to consolidate GHG emissions they are responsible for, and then consistently apply that approach to define the businesses that constitute their company for the purposes of creating a GHG corporate inventory:

Example organisational structure



Equity-share approach. AFPA members account for the fluxes to/from an operation according to their share of equity (or percentage of economic interest) in that operation. Typically, the share of economic risks and rewards is aligned with ownership percentage, and equity share will normally be the same as ownership percentage.

OR

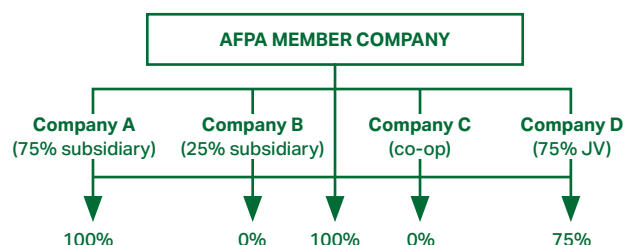
Operational control. AFPA members account for 100% of the GHG fluxes to/from an operation over which they have the authority to introduce and implement its own operating policies.

OR

Financial control. AFPA members account for 100% of the fluxes to/from an operation over which they have the ability to direct financial and operating policies with a view to gaining economic benefits. Under this criterion, the economic substance of the relationship between the company and the operation takes precedence over legal ownership, so a company may have financial control even if it has a minority interest in that operation. This is consistent with international accounting standards. If financial control is chosen, emissions from joint ventures where partners have joint financial control are allocated on an equity-share approach.

One approach must be chosen and used consistently to create an inventory, but a company may choose to create multiple inventories using different approaches. For example, financial control may be the default approach, but a member may also choose to use an operational control approach to comply with carbon trading requirements.

Example organisational structure using financial control GHG allocation approach



Rationale for organisational boundary: Financial Control is chosen as the default AFPA approach, as it is consistent with existing financial accounting and risk management methods, and because of this is also likely to be the lowest cost approach for administration and management reporting.

Applying Organisational Boundaries

A wine company owns and operates a winery and a vineyard (Vineyard B). It also owns 50% of a second vineyard (Vineyard A) that is operated by another company. The size of the wine company's inventory depends on the consolidation approach used.

Winery	Vineyard A	Vineyard B
10,000 MT CO ₂ e per year	5,000 MT CO ₂ e per year	10,000 MT CO ₂ e per year
	50% of Vineyard A is owned by another organization that controls all of Vineyard A's operations	

Approach	Emissions (metric tons CO ₂ e/yr)
Equity share	13,500
Operational control	11,000
Financial control	11,000

Source: GHG Protocol Agricultural Guidance

More detail:

- [GHG Protocol Corporate Standard](#), Chapter 3
- [GHG Protocol Agricultural Guidance](#), Chapter 5.1

5. Tracking GHG changes over time

AFPA members shall use a base year, being the earliest year for which there is verifiable scope 1 and 2 emissions.

A base year helps companies compare performance against a point in the past.

For agriculture companies, it is acceptable to choose a base period – a multi-year average of annual emissions over several consecutive years – to help smooth out fluctuations in GHG emissions that would make a single year's data unrepresentative of the company's typical emissions profile.

The base year or base period should be the earliest for which there is verifiable scope 1 and 2 emissions. A base period is required to account for scope 1 and 2 emissions, and required for scope 3 emissions when companies choose to set a reduction target.

AFPA members shall document a policy for recalculating base year or base period emissions (e.g. change of ownership, change in calculation methodologies, discovery of errors). This shall include a 'significance threshold' (i.e., changes are cumulatively significant if they cause a change that exceeds x% of the base period inventory). See Appendix A for example policy.

Rationale for base period:

- A base year is chosen instead of a base period, as it will be very difficult (and hence a barrier to action) for members who haven't previously compiled accounts to source data for several past years
- Each AFPA member chooses the base year for which they have the earliest verifiable scope 1 and 2 emissions. For some members, that may be several years ago. For others who haven't yet recorded GHG emissions, it may be the current financial year
- AFPA will review progress and discuss with members if a base period of 3-5 years should be used in future, instead of the base year chosen now
- The base year will be a financial year, to align with financial reporting and with [Australian Accounting Standards Board draft climate-related financial disclosure guidance](#).



6. Identifying and calculating GHG emissions

6a Calculation tool

AFPA members shall use the H-GAF tool as the default calculator for GHG fluxes.

As GHGs have different levels of impact on global warming, they are standardised for reporting into their carbon dioxide equivalent (CO₂e). For example, one tonne of methane is equivalent to 25 tonnes of CO₂. Horticulture GHGs are carbon dioxide, methane, nitrous oxide, and HFCs and PFCs.

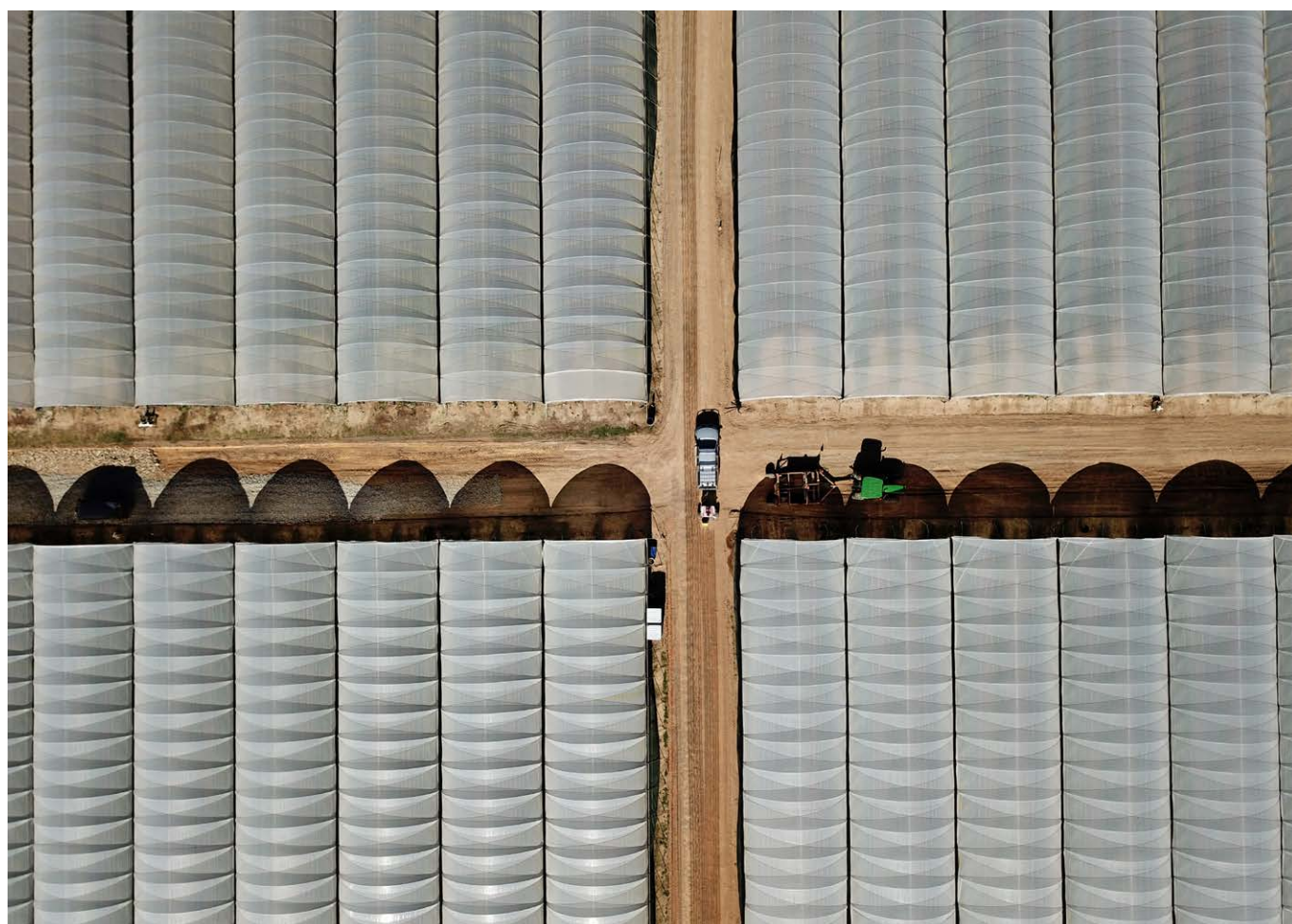
There are an increasing number of publicly available tools – spreadsheets, software and protocols – for calculating GHG fluxes based on emission factors, models or a combination of these approaches.

As different calculators often result in slightly different calculations, AFPA members shall use the same calculation tool to ensure consistency of reporting.

The choice of a calculation tool also informs the data requirements needed by AFPA members.

Rationale for calculation tool: The [H-GAF Horticulture GHG Accounting Tool](#), developed by the University of Melbourne's Primary Industries Climate Challenge Centre is chosen because it is:

- Independent and freely available
- Excel-based, which suits members' needs and avoids paying for proprietary software
- Part of a family of industry-specific calculators. Beef, sheep, grain and cotton industries all use and promote the GAF tool for their industry.



6b Collecting activity data

When collecting activity data, AFPA members shall use the acceptable data sources outlined in Table 1.

Identifying the management practices and emissions sources that need to be reflected in AFPA member inventories is a key step, because the likely accuracy of GHG flux data and the types of activity data needed vary widely among approaches. Members have agreed on the following data sources.

Table 1: Acceptable data sources direct operations (to be reported by all members, per the chosen operational boundary).

Activity		Data point		Unit	Acceptable data source
Environmental factors		Climate zone: low <600mm rainfall/high >600mm rainfall		Low/high	Orchard via BOM
Farm production data		Area cropped		Ha	Orchard data
		Mass sold* (see below for definition)		t	Sales data
Activity	Emissions	Source category	Data point	Unit	Acceptable data source
Farm input data	Scope 1 non-mechanical (land management) emissions	Agricultural soils (direct and indirect N ₂ O from fertiliser)	Non-urea nitrogen applied (including organic fertiliser)	t	Purchase/ accounting records
			Urea applied	t	
			Urea-ammonium nitrate applied	t	
			Urease inhibitor used	Yes/no	
			Nitrification inhibitor used	Yes/no	Purchase/ accounting records
			Phosphorous application	t	
			Potassium application	t	
			Sulphur application	t	
			Lime and dolomite applied	t	
			Fraction of lime as (limestone/dolomite)	%	
			Deposition, leaching and runoff	Calculated from fertiliser input data	
	Residue burning	Fraction of annual crop area that is burnt	%	N/A	
	Scope 1 mechanical emissions	Inputs for agricultural processes (machinery, packing sheds etc)	Diesel consumption: e.g. record of purchases per year	L	Purchase/ accounting records
			Petrol consumption	L	
			LPG consumption	L	
			Cool rooms refrigerant gas	Name	Site (maybe several gases)
			Charge size (amount of refrigerant gas in appliance)	t	From appliance label
			Scope 2 purchased electricity	Farm, packing, storage	Grid-supplied electricity
	(Av grid intensity per state, or actual to reflect low emission use)				
	Proportion of grid-supplied electricity that is renewable	%			Electricity
	Scope 3 pre-farm (direct operations). H-GAF calculates automatically.	Pesticide production	Pesticide applied	Kg a.i.	Purchase records
		Fertiliser and lime production	Calculated from input data above	N/A	Calculated from farm input data
		Fertiliser and pesticides transport	Calculated from input data above	N/A	

* Mass sold is the total declared weight of produce. For produce sold by the piece, AFPA members will agree on a standard unit weight (e.g. the mid-point of weight ranges from retailer specifications).

6. Identifying and calculating GHG emissions continued

Table 2: Acceptable data sources third party operations (optional, per the chosen operational boundary).

Activity	Data point	Unit	Acceptable data source	Unit	Acceptable data source
Third party input data	Scope 3 (third party operations)	Third party inputs for agricultural processes (contractor machinery, packing sheds etc) if more than 1%	Diesel consumption	L	AFPA members will meet in future to agree acceptable data sources for these, and any other material third party emissions (e.g., purchased water).
			Petrol consumption	L	
			LPG consumption	L	
			Cool rooms refrigerant gas	Name	
			Charge size (amount of refrigerant gas in appliance)	t	
			Grid-supplied electricity (Av grid intensity per state, or actual to reflect low emission use)	KWh	
			Proportion of grid-supplied electricity that is renewable	%	

Table 3: Acceptable data sources third party operations (optional only for now, per the chosen operational boundary).

Farm input data	Scope 1 removals	Perennial woody crops	CO ₂ removal due to change in area of perennial woody crops (agroforestry, forest restoration, windbreaks, biodiversity zones)	Ha	Orchard data** (see below for definition)
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** To be eligible to be counted as a windbreak, managed restoration zone, etc., these areas must meet minimum density requirements. AFPA members shall adopt the SBTi FLAG definition of a forest: Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ.

More detail:

- [GHG Protocol Corporate Standard](#), Chapter 6
- [GHG Protocol Agricultural Guidance](#), Chapter 7.1

6c. Managing inventory quality

The GHG fluxes to/from agricultural sources – and especially non-mechanical sources – are inevitably estimated with some degree of uncertainty. Identifying sources of uncertainty can help companies understand the steps required to improve the inventory quality and the level of confidence users should have in both the inventory results and any estimates of emissions reductions from changes in farming practices. A qualitative assessment of activity data quality shall be undertaken using the AIA matrix for assessing data quality (see following page), and included in GHG reporting.

Input data	Is there high quality data? (Rating Based on AIA table on next page)	Are there are data gaps?	Is there uncertainty on data inventory quality?
Rainfall zone	Yes. AIA quality assessment: 1	No	No
Area cropped	Yes. AIA quality assessment: 1	No	No
Mass sold	Yes. AIA quality assessment: 1	No	No
Fertiliser use	Yes. AIA quality assessment: 1	No	No
Lime and dolomite use	Yes. AIA quality assessment: 1	No	No
Pesticide use	Yes. AIA quality assessment: 1	No	No
Fuel use	Yes. AIA quality assessment: 1	No	No
Electricity use	Yes. AIA quality assessment: 1	No	No
Refrigerant	Yes. AIA quality assessment: 1	No	No
Third party inputs	Yes via QA or export protocol docs	Yes	No



Per the chosen operational boundary, acceptable quality data sources for scope 3/third party inputs will be identified in future, when AFPA members build capacity and capability to report scope 1 and 2 with confidence.

When managing inventory quality, companies should focus on reducing parameter uncertainty. A GHG Protocol [quantitative inventory uncertainty tool](#) is available to assist this, but aggregating statistical uncertainty to this level is considered a lower priority for AFPA members for now because of the relatively high data quality and the early stage of common AFPA GHG reporting.

More detail:

- [GHG Protocol Corporate Standard](#), Chapter 7
- [GHG Protocol Agricultural Guidance](#), Chapter 7.2

6. Identifying and calculating GHG emissions continued

AIA matrix for assessing data quality

Indicator score	1	2	3	4	5 (Default)
Reliability	Data based on sector level surveys such as farm surveys, industry benchmarks, ABS and ABARES surveys and NGGI data	Data partly based on assumptions	Data partly based on qualified estimates	Qualified estimate (e.g., by industrial expert)	Non-qualified estimate
Completeness	Representative data from the whole area relevant to the sector for the whole year	Representative data from >50% of the area relevant to the sector, over an adequate period to even out extreme fluctuations	Representative data from <50% of the area or involving some extreme values	Representative data from only one site/small area	Representativeness unknown or data from small number of sites and from shorter periods
Temporal correlation	Annual data for the year reported	Less than 3 years of difference of the time period of the dataset	Less than 6 years of difference to the time period of the dataset	Less than 10 years of difference to the time period of the dataset	Age of data unknown or more than 10 years of difference to the time period of the dataset
Geographical correlation	Data from area under study	Average data from larger area in which the area under study is included	Data from area with similar production conditions	Data from area with slightly similar production conditions	Data from unknown or distinctly different area (North America instead of Middle East, OECD-Europe instead of Russia)
Farm practices and technological correlation**	Data from enterprises, processes and materials under study	Data from processes and materials under study (i.e. identical technology) but from different enterprises	Data from processes and materials under study from different technology	Data on related processes or materials	Data on related processes on laboratory scale or from different technology

Adapted from Ciroth et al (2016).

** Technological considerations can also include post farm processing of products such as abattoirs, dairy, sugar and wine production.

Source: AIA: GHG Accounting for Australian Agriculture

6d Data Management and Aggregation

AFPA members shall use the same standardised format for reporting and collecting data.
AFPA members may choose a centralised or decentralised approach to aggregate data from multiple sites or business units.

Data management

AFPA members need to gather and summarise data from multiple orchards or business units (as defined by the organisational boundary). AFPA members need to plan this process carefully to minimize the reporting burden, reduce the risk of errors, and ensure all facilities are collecting information in an approved, consistent basis. This requires the use of a standardised reporting format and standardised data inventory procedures.

Rationale for data management process:

- Each member will develop their own process and tools (Excel templates, proprietary software etc) to collect data from sites within their business
- AFPA will provide members with expected AFPA GHG reporting, so members know what data they will be asked to share as part of aggregated industry reporting.

Data aggregation

There are two basic approaches for gathering data on GHG emissions from a corporation's facilities:

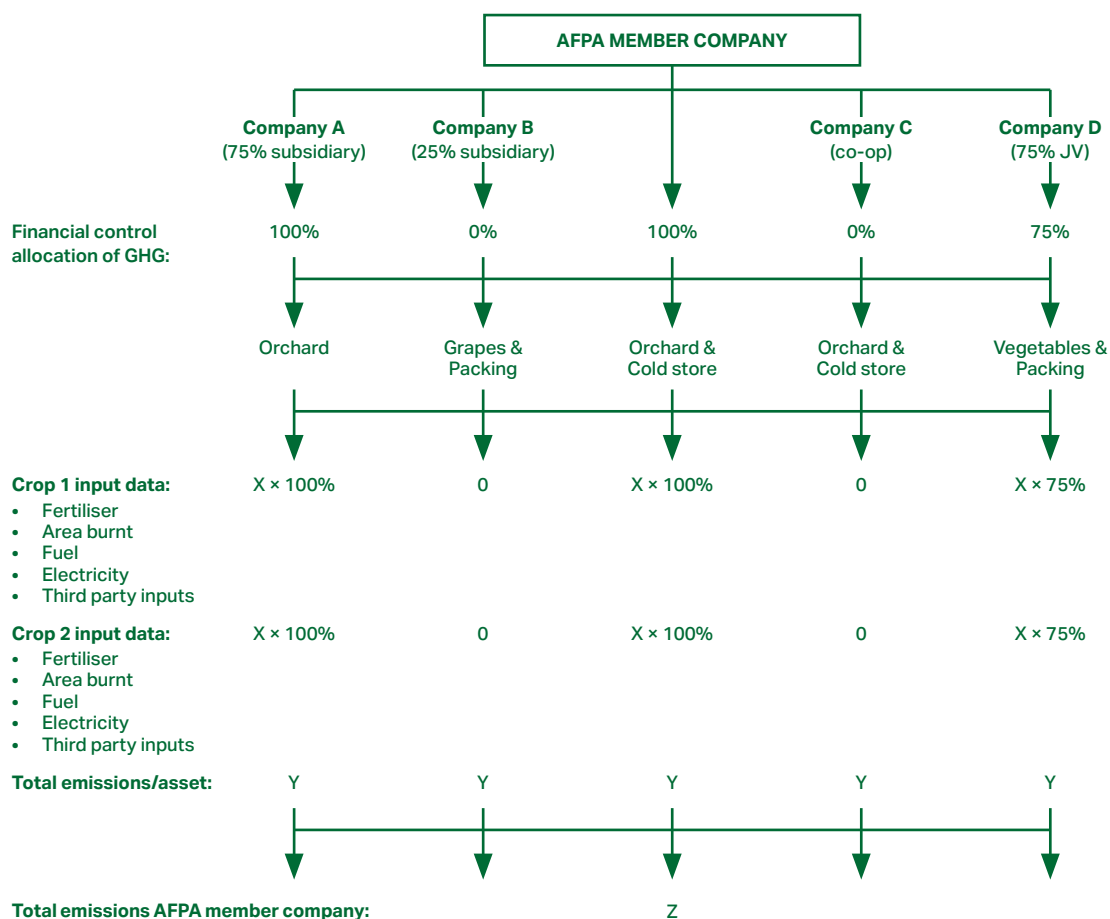
- Centralized: individual orchards/entities report activity data (e.g. quantity of fuel used) to the corporate level, where emissions are calculated.
- Decentralized: individual orchards/entities collect activity data, calculate their GHG emissions, and report emissions to the corporate level.

Rationale for data aggregation process:

Each member will decide if a centralised or decentralised approach best meets their needs.

More detail:

- [GHG Protocol Corporate Standard](#), Chapter 7
- [GHG Protocol Agricultural Guidance](#), Chapter 7.2



7. Calculation approach

Standardised emission factors included in the chosen calculation tool shall be used to calculate fluxes. Emission factors shall be consistent with the latest National Greenhouse Gas Inventory report and latest Australian National Greenhouse Accounts Factors.

GHG fluxes are normally determined in three different ways:

- Field measurements using highly specialised equipment
- Empirical models and process-based models
- Emission factors. These factors are calculated ratios relating GHG emissions to a proxy measure of activity at an emissions source. E.g. one gigajoule of energy from combusted diesel in a stationary motor (e.g. an irrigation pump) releases 70.2kg CO₂e of scope 1 emissions (i.e. from burning the diesel on-farm) and 18.0kg CO₂e of scope 3 emissions (i.e. from producing diesel at the refinery).

Companies should select the most accurate calculation approach that best meets their objectives for compiling an inventory and the GHG accounting and reporting principles.

Emission factors are most commonly used because direct monitoring is either unavailable or prohibitively expensive.

Note though, emission factors are based on averages and are not very effective in capturing the geographical variation in the biophysical processes that underpin GHG fluxes, and/or specific farm management practices that impact emissions significantly more than average. As a result, they tend to become less accurate as spatial resolution increases from a national level to a farm-level. This means if AFPA members are taking specific actions that significantly reduce or increase emissions in their assets more than "average", it may be appropriate to use field measurements or models.

Rationale for calculation approach: emission factors will be used because activity data is relatively high quality.

Members may individually or collectively invest in future research to use direct measurement or new modelling if practices are likely to result in fluxes that are significantly different to those estimated by emission factors.

More detail:

- The [National Greenhouse Accounts \(NGA\) Factors](#) provides emission factors and methods that help companies and individuals estimate greenhouse gas emissions. These factors are also used by the Federal Government to calculate the National Greenhouse Gas Inventory (NGGI) quarterly updates.



8. Accounting

Single year reporting period

Reporting periods for horticulture should be one year (i.e. not a three- or five-year average). Reporting calculator and version is to be included in reporting.

- AIA advises the exception to this is if a single year is not representative of the entity's production – for example, significant expansion of tree crops could have a multi-year average reporting period for establishment and one-year reporting periods for production.

Zero net fluxes and stock data in inventories

Net CO₂ fluxes to/from organic C stocks in soils and biomass are accounted as zero.

- GHG Protocol Agricultural Guidance is companies should report the net CO₂ fluxes (in tonnes CO₂) to/from organic C stocks in mineral/organic soils and above-ground and below-ground woody biomass, as well as the CO₂ emissions from dead organic matter and biomass combustion. However, H-GAF assumes these to be in equilibrium, and are reported as zero.

No amortizing changes in carbon stocks over time

As stocks are assumed to be zero over time, and because AFPA members are estimating GHG emission fluxes for each year, amortisation will not be needed.

GHG Protocol Agricultural Guidance notes that shifts in management practices during the reporting period will often have long-lasting effects on C stocks that may persist for decades, and the rate of change may vary over time. Amortizing the CO₂ fluxes from changes in C stocks involves allocating these fluxes across time, if the estimated data are generated for the transition period as a whole (e.g. a 30-year life of an orchard). Amortization is not needed if CO₂ fluxes are quantified within the reporting period.

Agricultural offset and renewable energy projects

Accounting for renewable energy projects

- If the energy is consumed on-site, the project may reduce the amount of electricity or fuel consumed, resulting in a reduction in scope 1 or scope 2 emissions that will be evident when comparing inventories over time.
- If the energy is sent off-site, it shall not be used to lower scope 1 or scope 2 emissions.

Accounting for transactions in offset credits

Should a company sell an offset that has been generated within its organizational boundaries, it shall remove the associated emissions reductions from its corporate inventory to prevent double counting. It should also disclose the sale, and the protocol used to verify the emissions reductions.

More detail:

- [GHG Protocol Corporate Standard](#), Chapter 8
- [GHG Protocol Agricultural Guidance](#), Chapter 8

9. Reporting (Standard)

A credible GHG emissions report presents relevant information that is complete, consistent, accurate and transparent. While it takes time to develop a rigorous and complete corporate inventory of GHG emissions, knowledge will improve with experience in calculating and reporting data. It is therefore recommended that a public GHG report:

- Be based on the best data available at the time of publication, while being transparent about its limitations
- Communicate any material discrepancies identified in previous years
- Include the company's gross emissions for its chosen inventory boundary separate from and independent of any GHG trades it might engage in.

Use of ratio indicators: Two principal aspects of GHG performance are of interest to management and stakeholders. One concerns the overall GHG impact of a company: that is the absolute quantity of GHG emissions released to the atmosphere. The other concerns the company's GHG emissions normalised by some business metric that results in a ratio indicator. The GHG Protocol requires reporting of absolute emissions; reporting of ratio indicators is optional.

AFPA members will report absolute emissions (t CO₂e) and intensity emissions (t CO₂e/t product sold) at business aggregate level.

A standard reporting template from the GHG Protocol for corporate level accounting is at Appendix C. AFPA members may choose to use this, or develop their own format that complies with GHG Protocol requirements. The GHG Protocol requires:

- General information, including company name, organisational and operational boundaries, calculation methodology etc. Most of this information is provided in this Framework – it will be a very quick exercise to develop this content
- Total and intensity emissions for the reporting period, broken down by scope 1, 2 (and 3 if included) and compared to the base year
- Additional optional information, including:
 - Organisational boundaries: list of all legal entities included by the accounts
 - Disclosure of GHG-related risks and opportunities
 - An outline of any GHG management/reduction programs or strategies and governance
 - A description of performance measured against internal and external benchmarks, including context for significant change in emissions
 - Comment on data quality or limitations, and plans in place to improve inventory quality.

AFPA may aggregate (non-attributable to individual member) GHG emissions. Public reporting could entail:

- Total AFPA CO₂e GHG emissions, and/or the proportion of Australia's total emissions
- Average AFPA CO₂e GHG emissions per kg of product sold
- Total AFPA GHG removals and/or total carbon sinks in AFPA orchards
- Potentially key impact metrics, such as nitrogen use efficiency and/or proportion of renewable energy generated
- Potentially qualitative contextual reporting in line with corporate carbon disclosures:
 - Climate-related impacts, risks and opportunities

More detail:

- [GHG Protocol Corporate Standard](#), Chapter 9
- [GHG Protocol Agricultural Guidance](#), Chapter 9

Appendix A: base period recalculation policy

To ensure consistent tracking of GHG fluxes over time, the base period inventory shall be recalculated when changes occur that would significantly impact the base inventory. These changes include:

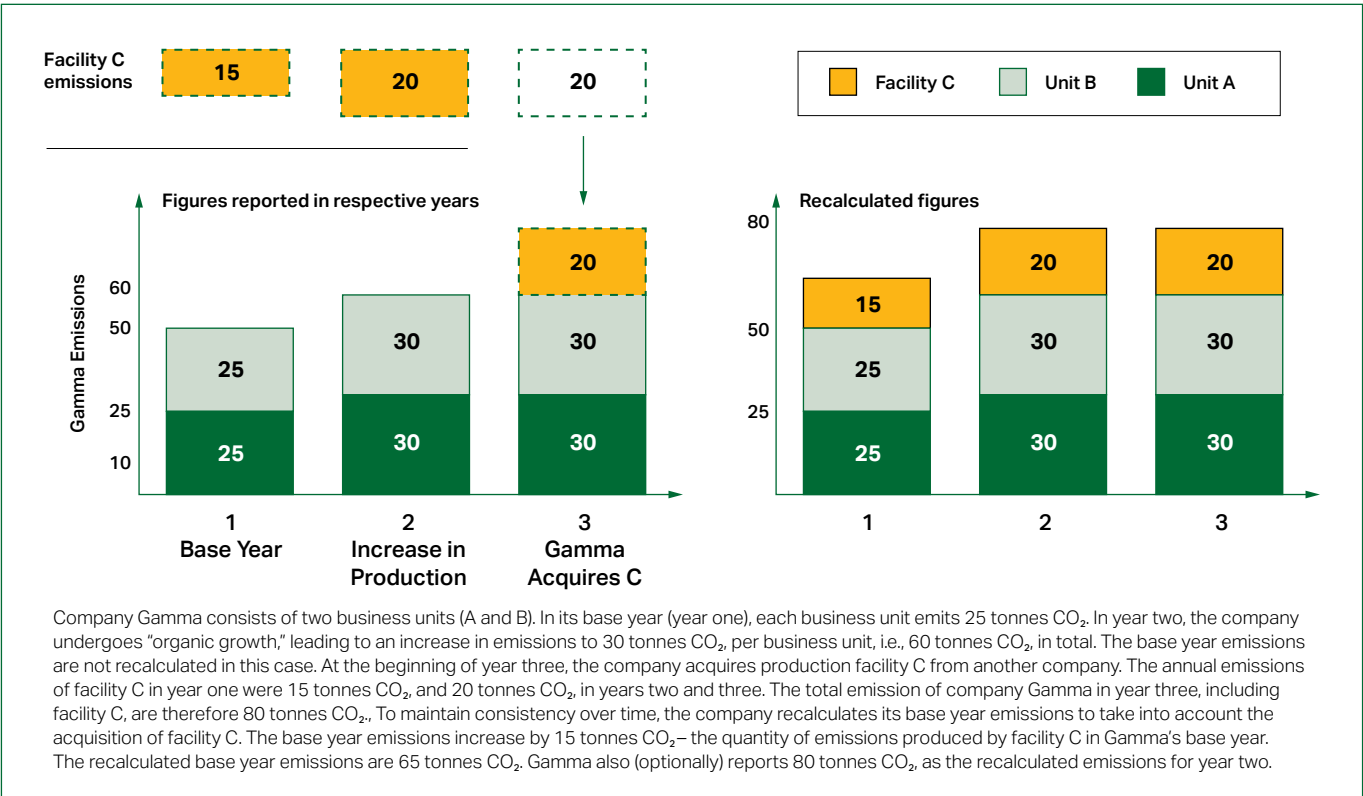
- Structural changes that transfer the ownership or control of operations from one company to another as long as those operations existed in the base period of the reporting company
 - Examples: mergers, acquisitions, and divestments (see figures 6-8 following from GHG Protocol Agriculture Guidance).
- Changes in calculation methodologies
 - Example: the use of improved emission factors.
- The discovery of errors that are significant on their own or collectively.

Example: the discovery of errors in activity data.

Significance threshold

Changes are cumulatively significant for AFPA members if they cause a change that exceeds 5% of the base period inventory. The significance threshold should be applied consistently over time.

Figure 1: Base year emissions recalculation for an acquisition



Appendix A: base period recalculation policy continued

Figure 2: Base year emissions recalculation for a divestment

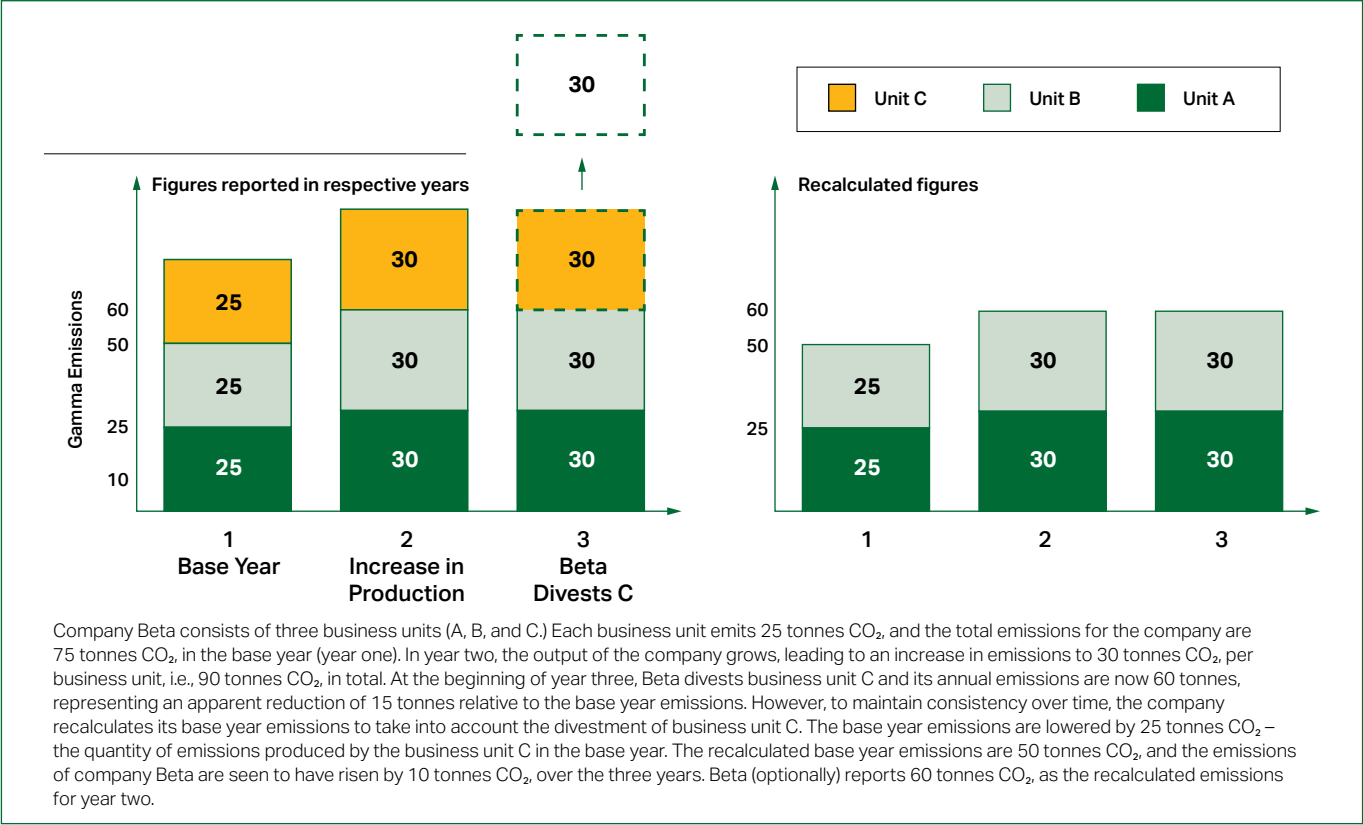
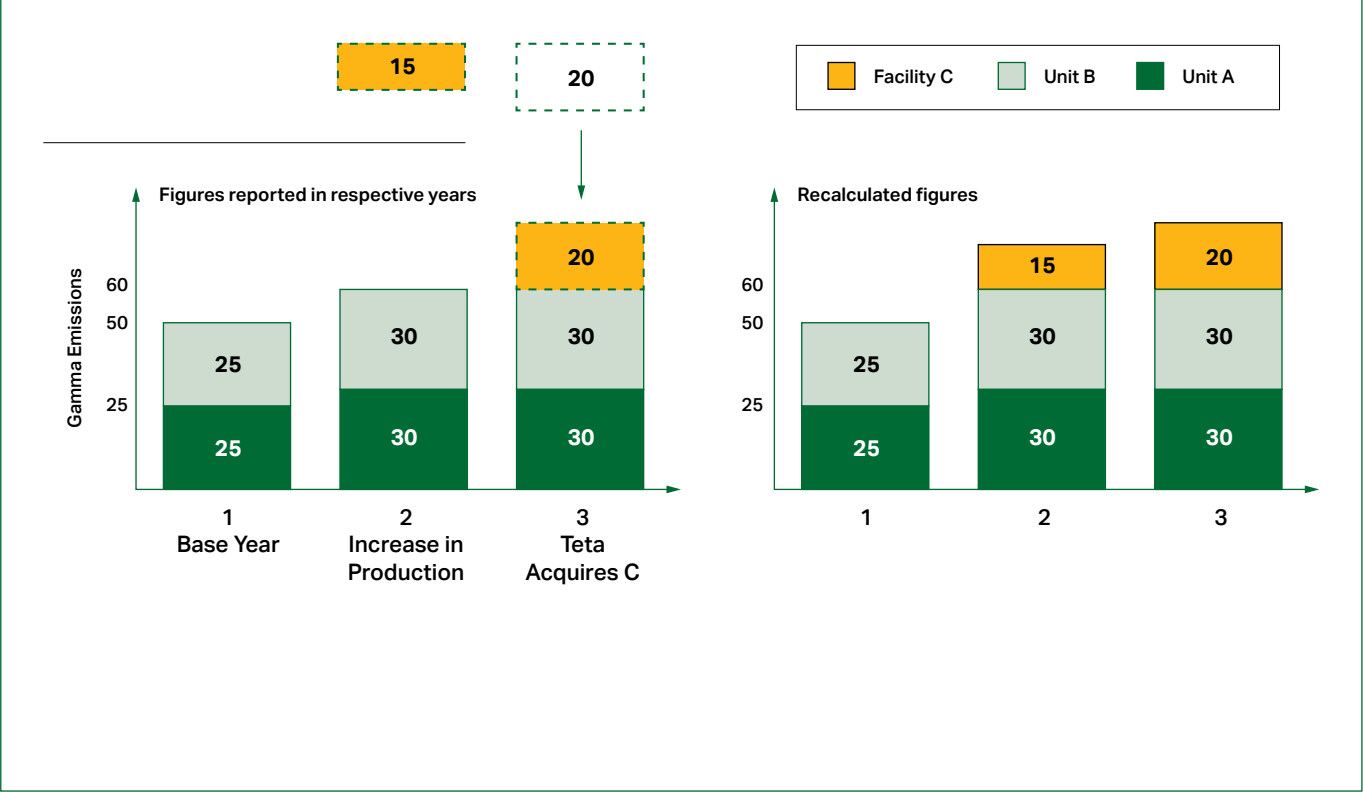


Figure 3: Acquisition of a facility that came into existence after the base year was set



Appendix B: Verification guidance

Verification of data for accounting and reporting is outside GHG Protocol scope.

Verification typically involves two steps:

1. An evaluation of whether the GHG accounting and reporting methodology (i.e. GHG Protocol Corporate Standard) has been correctly implemented
2. Identification of any material discrepancies.
 - a. While the concept of materiality involves a value judgment, the point at which a discrepancy becomes material (materiality threshold) is usually pre-defined. As a rule of thumb, an error is considered to be materially misleading if its value exceeds 5% of the total inventory for the part of the organization being verified. (GHG Protocol Chapter 10).

AFPA members will individually decide if verification is needed, and how this should be done to meet their needs.



Appendix C: AFPA member reporting template (from GHG Protocol Corporate Standard)

This sample reporting template illustrates the reporting requirements of the *GHG Protocol Corporate Standard* and the *Scope 3 Standard*. Companies may use any format to report emissions, provided that it contains all of the reporting requirements. This sample reporting template includes scope 1, scope 2, and scope 3 emissions and contains required information only. Companies should also report optional information where relevant.

AFPA members have agreed at this stage, to not report on Scope 3 emissions, this supplied template extends beyond current agreement, but is indicative of what future reporting may incorporate.

Part 1: Descriptive information

Descriptive information	Company response
Company name	
Description of the company	
Chosen consolidation approach (equity share, operational control or financial control)	
Description of the businesses and operations included in the company's organizational boundary	
The reporting period covered	
A list of scope 3 activities included in the report	
A list of scope 1, scope 2, and scope 3 activities excluded from the report with justification for their exclusion	
The year chosen as base year and rationale for choosing the base year ¹	
Once a base year has been established, the chosen base year emissions recalculation policy. If base year emissions have been recalculated, the context for any significant emissions changes that triggered the recalculation.	

1. If a company has different base years for different scopes, base year information should be provided separately for each scope. Establishing a base year is required for scope 1 and 2 emissions, and required for scope 3 emissions when companies choose to track performance or set a reduction target.

Part 2: Greenhouse gas emissions data

Reporting Year

Emissions	Total (mtCO ₂ e)	CO ₂ (mt)	CH ₄ (mt)	N ₂ O (mt)	HFCs (mt)	PFCs (mt)	SF ₆ (mt)
Scope 1							
Scope 2							
Scope 3 (Optional)							

Base Year

Year chosen as base year

Clarification of company-determined policy for making base year emissions recalculations

Context for any significant emissions changes that trigger base year emissions recalculations

Base year emissions

Emissions	Total (mtCO ₂ e)	CO ₂ (mt)	CH ₄ (mt)	N ₂ O (mt)	HFCs (mt)	PFCs (mt)	SF ₆ (mt)
Scope 1							
Scope 2							
Scope 3 (Optional)							

(As noted in Section 3 Operational Boundary, AFPA members have agreed scope 3 emissions are optional initially, but there is an aspiration to have all AFPA members reporting scope 3 emissions > 1% of total emissions by 2026/27.

NB: The current (January 2024) exposure draft Australian Sustainability Reporting Standards (ASRS) Standards – Disclosure of Climate-related Financial Information require disclosure of scope 3 upstream and downstream emissions where this information “is available at the reporting date without undue cost or effort.” This appears to be consistent with this AFPA GHG Accounting Framework, but members should note this expectation is likely to increase in future. The International Financial Reporting Standards (on which ASRS are based) asks companies to account for all 15 sources of scope 3 emissions as listed by the GHG Protocol scope 3 Standard – which are listed below in this template.

So while members may initially only account for scope 1 and 2 emissions, the list of scope 3 sources in the following table is indicative of what future Australian disclosure requirements may incorporate.)

Appendix C: AFPA member reporting template (from GHG Protocol Corporate Standard) continued

Scopes and categories ²	Metric tons CO ₂ e
Scope 1: Direct emissions from owned/controlled operations	
Scope 2: Indirect emissions from the use of purchased electricity, steam, heating, and cooling	
Upstream scope 3 emissions	
Category 1: Purchased goods and services	
Category 2: Capital goods	
Category 3: Fuel- and energy-related activities (not included in scope 1 or scope 2)	
Category 4: Upstream transportation and distribution	
Category 5: Waste generated in operations	
Category 6: Business travel	
Category 7: Employee commuting	
Category 8: Upstream leased assets	
Other	
Downstream scope 3 emissions	
Category 9: Downstream transportation and distribution	
Category 10: Processing of sold products	
Category 11: Use of sold products	
Category 12: End-of-life treatment of sold products	
Category 13: Downstream leased assets	
Category 14: Franchises	
Category 15: Investments ³	
Other	

2. Further disaggregation of certain categories may be necessary. Additionally, if categorization of scope 3 activities is not followed as prescribed in the standard, indicate where they are included.

3. If the reporting company is an initial sponsor or lender of a project, also account for the projected lifetime emissions of relevant projects financed during the reporting year and report those emissions separately from scope 3.

Part 3: Description of methodologies and data used

Scope	Methodologies used to calculate or measure emissions, providing a reference or link to any calculation tools used			
Scope 1				
Scope 2				
Scope and category	Description of the types and sources of data used to calculate emissions	Description of the data quality of reported emissions	Description of the methodologies, allocation methods, and assumptions used to calculate emissions	Percentage of emissions calculated using data obtained from suppliers or other value chain partners
Upstream scope 3 emissions				
Category 1: Purchased goods and services				
Category 2: Capital goods				
Category 3: Fuel- and energy-related activities (not included in scope 1 or scope 2)				
Category 4: Upstream transportation and distribution				
Category 5: Waste generated in operations				
Category 6: Business travel				
Category 7: Employee commuting				
Category 8: Upstream leased assets				
Other				
Scope and category	Description of the types and sources of data used to calculate emissions	Description of the data quality of reported emissions	Description of the methodologies, allocation methods, and assumptions used to calculate emissions	Percentage of emissions calculated using data obtained from suppliers or other value chain partners
Downstream scope 3 emissions				
Category 9: Downstream transportation and distribution				
Category 10: Processing of sold products				
Category 11: Use of sold products				
Category 12: End-of-life treatment of sold products				
Category 13: Downstream leased assets				
Category 14: Franchises				
Category 15: Investments ⁴				
Other				

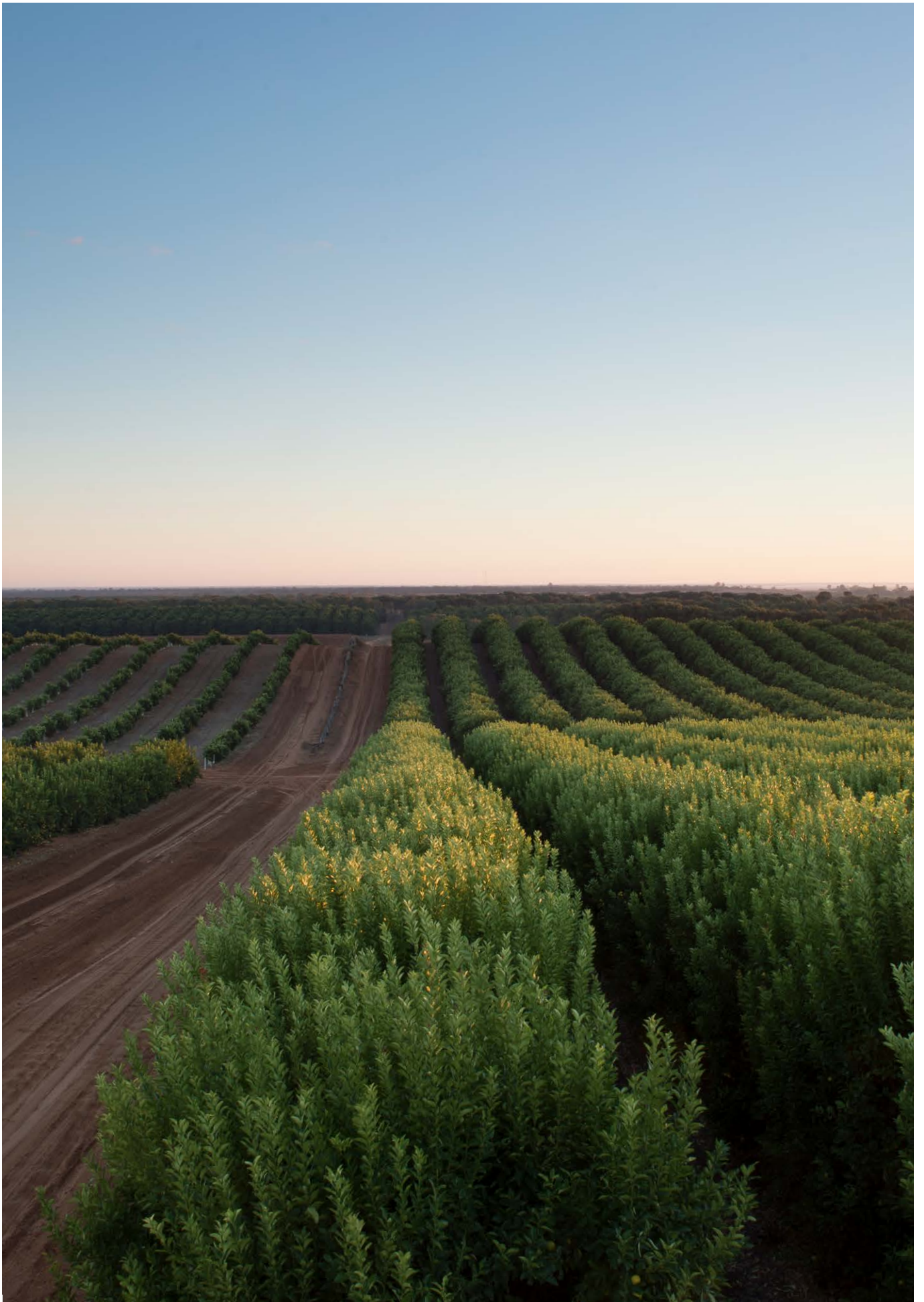
4. If the reporting company is an initial sponsor or lender of a project, also account for the projected lifetime emissions of relevant projects financed during the reporting year and report those emissions separately from scope 3.

Appendix C: AFPA member reporting template (from GHG Protocol Corporate Standard) continued

Part 4: Optional Information

As stated on page 120 of the Corporate Value Chain (Scope 3) Accounting and Reporting Standard, a public GHG emissions report should include, when applicable, the following additional information:

- Emissions data further subdivided where this adds relevancy and transparency (e.g., by business unit, facility, country, source type, activity type, etc.)
- Emissions data further disaggregated within scope 3 categories where this adds relevance and transparency (e.g. reporting by different types of purchased materials within category 1, or different types of sold products within category 11)
- Emissions from scope 3 activities not included in the list of scope 3 categories (e.g., transportation, of attendees to/from conferences/events), reported separately (e.g., in an "other" scope 3 category)
- Emissions of GHGs reported in metric tons of each individual gas
- Emissions of any GHGs other than CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆ whose 100-year GWP values have been identified by the IPCC to the extent they are emitted in the company's value chain (e.g., CFCs, HCFCs, NF₃, NOX, etc.) and a list of any additional GHGs included in the inventory
- Historic scope 3 emissions that have previously occurred, reported separately from future scope 3 emissions expected to occur as a result of the reporting company's activities in the reporting year (e.g., from Waste generated in operations, Use of sold products, End-of-life treatment of sold products)
- Qualitative information about emission sources not quantified
- Information on any GHG sequestration or removals, reported separately from scope 1, scope 2 and scope 3 emissions
- Information on project-based GHG reductions calculated using the project method (e.g., using the *GHG Protocol for Project Accounting*), reported separately from scope 1, scope 2, and scope 3 emissions
- Quantitative assessments of data quality
- Information on inventory uncertainty (e.g., information on the causes and magnitude of uncertainties in emission estimates) and an outline of policies in place to improve inventory quality
- The type of assurance performed (first or third party), the relevant competencies of the assurance provider(s), and the opinion issued by the assurance provider
- Relevant performance indicators and intensity ratios
- Information on the company's GHG management and reduction activities, including scope 3 reduction targets, supplier engagement strategies, product GHG reduction initiatives, etc.
- Information on supplier/partner engagement and performance
- Information on product performance
- A description of performance measured against international and external benchmark
- Information on purchases of GHG reduction instruments, such as emissions allowances and offsets from outside the inventory boundary
- Information on reductions at sources inside the inventory boundary that have been sold/transferred as offsets to a third party
- Information on any contractual provisions addressing GHG-related risks or obligations
- Information on the causes of emissions changes that did not trigger a scope 3 base year emissions recalculation
- GHG emissions data for all years between the scope 3 base year and the reporting year (including details of and reasons for recalculations, if appropriate)
- Additional explanations to provide context to the data



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