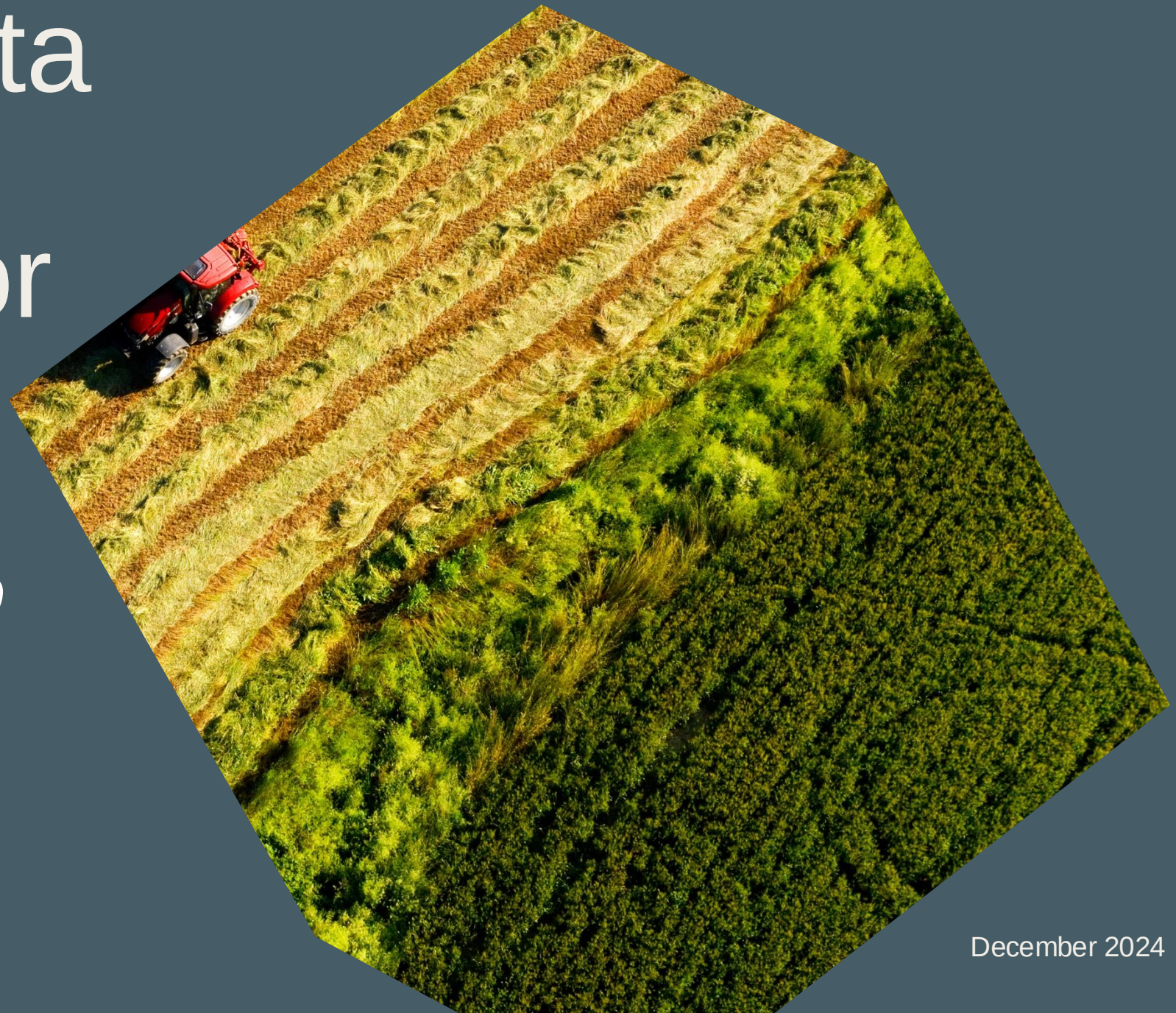
Scope 3 Data and MRV Guidance for Agri-food

Exploring measurement, reporting and verification (MRV) for land-based action in agri-food value chains



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Contents

Objectives of this guidance

- **Educate** business on the current MRV ecosystem and approaches in agri-food value chains
- **Equip** WBCSD members with a decision framework, Greenhouse Gas Protocol (GHGP) compliance checklist and guidance in order to enact and account for scalable agricultural practice change

Introduction

It is critical for agri-food businesses to **drive effective sustainability action** if they are to meet climate commitments, respond to external expectations and address climate risks. To do so, agri-food businesses need to put into practice and account for scalable agricultural practice change.

How to buy and sell agri-food products with a lower environmental footprint and comply with voluntary and mandatory regulations are strategic needs across agri-food businesses. It is extremely challenging to bridge the gap between the realities of the agri-food system and accounting for company-specific outcomes. Farmers and other professionals face more data to collect and companies face the challenge of needing to engage with complex agricultural systems. To balance sustainability and commercial performance, corporate sustainability programs need to deliver scientifically relevant outcomes through pragmatic implementation and find ways to finance climate action that is commercially relevant.

To account for the impacts of agricultural practice change, the **measurement, reporting and verification (MRV)** of key sustainability metrics across corporate value chains is crucial. This includes measuring climate and greenhouse gas (GHG) outcomes, as well as wider nature- and social-related outcomes. However, with service providers and internal corporate programs to manage aspects of MRV proliferating, various accounting scenarios are coming into action that may or may not align with scope 3 guidance.

This guidance aims to support businesses in navigating the emerging world of MRV for agri-food scope 3 GHG accounting, harmonizing how they report supply chain GHG emissions and removals through consistent methodologies and datasets in MRV tools.

Proliferation of services that cover aspects of monitoring, reporting and verification (MRV), non-exhaustive list:

Agreena, Blonk, CAP'2ER, CarbonSpace, Chloris Geospatial, CFT, COMET Farm, EARTHOPTICS, ecometric, eqo terra, FARM, Field to Market, GENESIS, indigo, NATURE METRICS, Perennial, Acorn Rabobank, regrow, SIMEOS AMG, SUSTAINCERT, VERRA

Key questions to answer before building a scalable MRV approach

1. ***Roles, responsibilities and business models***
   - Who provides the needed services (e.g., implementation, GHG accounting, chain of custody model)?
   - What is the business model to fund this work perpetually?
2. ***System harmonization***
   - How do you ensure alignment and interoperability between different internal systems and other systems in place for MRV, e.g., through suppliers or a third party?
3. ***Data sharing and ownership***
   - Who owns what data?
   - What is necessary to share collaboratively to tackle sustainability issues?
   - Are there ways to share data in a confidential way?
4. ***Incentives***
   - How do you ensure the respect, recognition and appropriate incentivization of farmers and other supply chain actors as they act to improve both data collection and on-the-ground action?
5. ***Pragmatism and streamlining***
   - How do you leverage existing platforms and overlaps in data needs to not make additional work in data collection and processing?
   - How do you build continuous MRV improvements?

WBCSD's Scope 3 land-based emissions workstream

This guidance complements a broader suite of resources in the WBCSD Agriculture & Food Scope 3 Toolkit:

1. *Scope 3 Navigator for Agriculture and Food (A&F)*

   Purpose: Ensure carbon accounting standards and frameworks are robust and pragmatic and align with clear adoption pathways for business.

2. Scope 3 Data and MRV Guidance

   Purpose: Identify data and monitoring, reporting and verification (MRV) approaches to accelerate the adoption of standards and practices.

3. ***Financing mechanisms for land-based action* & *Co-financing case studies***

   Purpose: Drive consensus on financing models for collective value chain investment that prioritizes farmer equity in scope 3 interventions.

Click here to access further scope 3 resources for agri-food

1.

What is MRV?

Explaining measurement, reporting and verification (MRV)

MRV is a process enabling decision-making and scope 3 action and building trust.

Although companies face mandatory reporting requirements, the full MRV process is not a requirement. MRV can ease the burden of farm data collection, enable better decisions on scope 3 action and builds trust and confidence in corporate accountability.

In the following sections, we define each component of MRV and explore why and in which context a company may choose to follow an MRV process.

Used together, MRV can help track progress on farm-level agricultural emissions reductions and removals

Summary of key dimensions of MRV tools

MEASUREMENT

- Data collection (primary & secondary)
- Performance assessment (tracking progress)
- Activity tracking (performance justification)
- Indicator selection (GHG and beyond)

REPORTING

- Data documentation (quantitative & qualitative)
- Stakeholder engagement (iteration & feedback)
- Alignment with standards & frameworks (credibility & consistency)
- Completeness & continuity (long-term relevancy)

VERIFICATION

- Quality control (confidence building)
- Auditing (requirement checking)
- Scaling to need (business case building)
- Audience (who to verify for)

M for measurement

Measurement is **systematic data collection that enables estimating emissions reductions and removals (ERRs) through time.** ERRs are increasingly important to tracking scope 3 progress.

Primary & secondary data

Gather information to represent emissions and removals. Use primary data or calibrated Tier 3 models (more detailed models) for removals, where lower tier (more simple models) are acceptable for emissions accounting. Farmer surveys or remote sensing can help identify relevant farm activities.

Tracking progress

Measure and assess the outcomes of the activities in relation to projected or baseline scenarios. Work to track progress between the data points created using the same methods and data sources. Take into account the uncertainties and variabilities when tracking progress.

Performance justification

Document the activities or practices implemented as part of the carbon removal or reduction project or program to justify observed performance. Activities include machine use, agricultural practices and location.

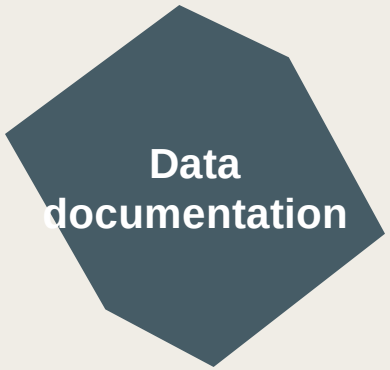
GHG and beyond

Chose relevant indicators to describe the effect of activities. Indicators beyond GHG emissions and removals could include those that measure biodiversity, water and social outcomes.

Key challenges: Ensuring the easy collection of data and its relevance over time, that it represents the scale of activities (e.g., through sampling a small number of farms to represent a larger number of farms) and can indicate key sustainability concerns.

R for reporting

Reporting is **documenting and sharing ERR information with relevant stakeholders**, including regulatory bodies, certifying agencies, investors or markets. This step is crucial for the recognition, transparency, accountability and overall success of accounting strategies.



Quantitative & qualitative

Document relevant information, including quantitative data and qualitative information, e.g., on the methodologies used, data sources, years of relevancy, etc. Registries and internal data repositories help manage data.

Iteration & feedback

Engage stakeholders by soliciting their feedback, answering their questions and iterating to ensure reporting meets the needs and expectations of all relevant parties. Iterating and soliciting feedback builds trust.

Credibility & consistency

Align reporting according to legal and voluntary needs, for example to follow recognized standards such as those from the International Organization for Standardization (ISO), certifications, the GHG Protocol and the Science Based Targets initiative (SBTi). Following standards and frameworks can help build credibility and consistency.

Long-term relevancy

Check its completeness and the plan for continuity and that it reflects relevant aspects of corporate sustainability action. Report at regular intervals and in a timely manner to ensure that the information is relevant and up-to-date.

Key challenges: Resources needed for credible reporting against the proliferation of reporting frameworks – both voluntary (e.g., Science Based Targets initiative, SBTi) and regulatory (e.g., the EU Corporate Sustainability Reporting Directive, CSRD) – and the need for harmonization in frameworks.

V for verification

Verification is a **quality control mechanism.** It provides **confidence to stakeholders that reported ERR information reflects actual activities, the correct calculation of ERRs and that they align with any relevant standards or frameworks.** Where models may need validation or calibration to ensure their accuracy, conduct verification by a third party or an internal review of reported outcomes.

Confidence building

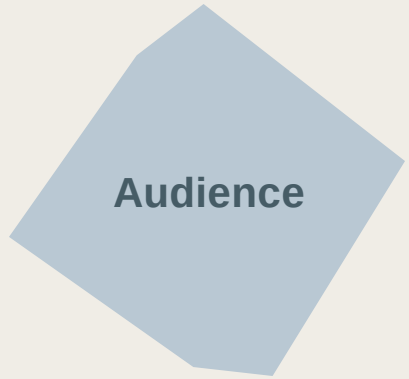
Often through a qualified third-party, ensure the quality control of the measurement and reporting to ensure it reflects reality, is free of calculation errors and is accurate and unbiased – and do not make the errors outlined in the *myths* in chapter 2.

Requirement checking

Often through a qualified third-party, use an audit to check that the measurement and reporting follows a documented method, standard or protocol. This process can also check if the reporting fulfils the requirements of those documents.

Building the business case

Consider scaling the verification need to the risk associated with the reporting (e.g., voluntary or regulatory), cost and scalability. The GHG Protocol recommends (does not require) verification; the SBTi has a verification process.



Who to verify for

Depending on the business needs, tailor the verification to build trust with key internal and external stakeholders (the board, shareholders, customers, consumers, regulators).

[a] **Key challenges: A lack of time, funds and trained human resources for the high-quality verification of a project site, calculations, reporting standards and a lack of viable verification pathways and accessibility.**

2.

Busting GHG accounting myths

Exploring misconceptions about tracking scope 3 progress in agriculture

Barriers to entry & myths about scope 3 in agri-food

Scope 3 GHG accounting is an engineering approach to representing the GHG emissions of a company's supply chain outside of direct operations. Because companies purchase goods and services that come from production systems (e.g., energy or farming systems), there has been wide development of technical approaches stemming from the research field of life cycle assessment (LCA) over past decades to define the system boundaries and ways to fairly **attribute and allocate** the emissions of production systems to their various outputs.

Technical allocation approaches help answer questions like: *if a farm produces 4 crops that lead to 10 different products, what are the GHG emissions that are fair to report for each of these products*? Generally, the spirit of allocation is to proportion the impacts according to the drivers of the production system, for example to the products with the highest economic value.

In the context of agri-food systems, **some technical accounting challenges include:**

1) how to pragmatically assess the GHG emissions of food across the supply chain (from farm to consumer) .

2) how to carry the GHG emissions information through the entire supply chain in which many different entities process, mix and pass commodities through a chain of custody.

Understanding and addressing these challenges requires extensive technical experience. **Bridging the gap between a technically optimal scope 3 approach and what businesses need has led to a variety of myths, misconceptions and creative accounting approaches** that range in credibility and alignment. Generally, new accounting approaches aim to navigate several issues such as:

(a) Traceability information missing along a supply chain.

(b) The need to transition a full system when only a portion of it goes to any one company's supply chain. For example, agri-food companies often only purchase derivatives of a commodity (e.g., lactose powder, gluten), meaning allocated scope 3 emissions will not capture the entirety of a farm-level action put in place by agri-food companies. Additionally, input providers do not own farms, but supply to one portion of the goods produced from a farm.

(c) Not all agricultural product buyers are accounting or acting on scope 3, meaning that not all the impacts (i.e., reduction or removals) of a land-based action are on a company's GHG balance sheet.

In the following slides, we walk through some myths sustainability practitioners encounter in their day-to-day work.

Myth 1

Switching to primary data will always show a GHG benefit.

Myth buster

The use of primary data aims to understand reality and can show higher or lower GHG emissions compared to using industry averages.

A common misconception is that switching to primary data or supplier-specific data will automatically lead to GHG benefits appearing as scope 3 reductions. The community has not yet established a correlation between companies that provide primary data and their actual performance. Businesses may then ask “why should we switch to primary data if we don’t expect to see a climate benefit?”

Companies should switch to primary data when there is a (long-term) strategy that links the primary data collection with environmental (or other) outcomes. This would improve the **identification of “hotspots” or areas of high concern,** or it would **track progress**. Investing in primary data collection for scope 3 progress tracking should be **strategic** and only when **actions have been – or will be – put in place** with the anticipation of lowering GHG emissions. This does not have to be (and is often not) specific to the intention of lowering GHG emissions but may be, for example, in relation to closing the yield gap in developing countries or optimizing the use of agricultural residues or waste to lower costs.

An agricultural GHG emissions calculation carries **large uncertainty** due to both data and methodological issues, as well as due to **real annual variability in practices and yields** (depending on local weather or pest conditions). Therefore, it is only possible to track true progress over multiple harvests over time (e.g., >3 years). Companies should not assume that suppliers that provide primary data have improved GHG emissions factors; if the suppliers do, **collecting data over years is the only way to know**. They can design primary data sampling plans, for example stratifying farmer groups into archetypes of practices, to use primary data from a subset of farms to represent emissions on a larger group of farms.

Solution

Companies need to think through the M and V in MRV. **Why is a business collecting primary data?** What verifiable evidence is there that suppliers have put actions in place to lower emissions? By assessing how the data collection approach fits into a long-term strategy, companies can prioritize primary data collection.

See chapter 3 for when and how companies use MRV

An emissions factor (EF) is the GHG intensity of a material, product or service. Primary or secondary data can represent it and usually have the unit of metric tons of carbon dioxide equivalent per metric ton of material (e.g., a crop, ingredient or product).

Myth 2

It is possible to compare emissions factors from different sources and between two years to track progress.

Myth buster

Data collection and methods strongly influence results. If the calculation of two values uses different data sources or methods, do not expect the possibility of comparing values.

A common misconception is that it is possible to compare emissions factors from various sources to track progress or choose suppliers, e.g., if they all follow the GHG Protocol. It can be a **wild west* of data collection and GHG accounting methods.** Many companies and service providers have their own tool. Differences between tools include: the global warming potential (GWP) value for different GHGs, background emissions factors for fertilizer production, models for on-field fertilizer GHG emissions, system boundaries (e.g., transport, processing and logistics) and the calculation of removals. Therefore, unless data collection is consistent and processed using the same tool (or at least a minimum set of criteria such as the same GWP values) the results may not be comparable.

Furthermore, agricultural practices and yields vary year-on-year due to weather, pest and other conditions. Simply comparing two years will not be robust enough to truly detect a comparable difference.

Solution

Evaluate your monitoring approach. Is your company **comparing apples to apples and collecting data over several harvests**? Mixing and matching tools to build a more complete picture may be necessary. Nevertheless, in all cases, ensure the consideration of the calculation of the comparison of results (e.g., to make procurement or marketing decisions) is consistent in terms of year-on-year variation. For instance, how many years of data are required to detect a difference?

**Wild west implies here free of regulation, governance and controls*

Myth 3

It is possible to subtract intervention- or project-based accounting results from inventory results.

Myth buster

It is almost never possible to subtract project-based GHG emissions reductions and removals from a GHG inventory.* There are many ways to calculate the inventory and project GHG emissions reductions and are generally not comparable.

See accounting scenario 2 in chapter 5 for more details.

A common misconception is that it is possible to **subtract** those emissions reductions or removals calculated from an agricultural project (e.g., as an inset or book and claim credit or certificate) **from a GHG scope 3 inventory**.

Calculate the scope 3 inventory for a purchased product by multiplying an emissions factor (metric ton carbon dioxide equivalent (CO_2e) emitted per metric ton of product in a year) with the amount of purchased product in a year. The calculation often uses generic databases and proxies (e.g., sugar beet at a global scale).

A project-based emissions reduction or removal often carries the units of metric ton CO_2e **reduced or removed per project** that is specific to a project location, a project period (e.g., multiple years), for multiple crop products and often compared to a hypothetical counter-factual (i.e., what would have happened without the project). This means that **subtracting a *project emissions reduction* value from an inventory *emissions per crop in a year* value has no physical meaning and can lead to misleading results.**

Solution

Evaluate your monitoring approach – is your company **comparing apples with apples and subtracting numbers that have physical meaning**? Mixing and matching tools to build a more complete picture may be necessary; nevertheless, in all cases, ensure the **calculation** of the results to compare (e.g., to make procurement or marketing decisions) **is consistent**.

3.

When and how agri-food companies use MRV

The role of MRV in supporting scope 3 action and accounting

Scope 3 accounting overview

MRV can be an enabler for enhanced scope 3 accounting

Basic scope 3 accounting (category 11: purchased goods & services), guided by the GHG Protocol, typically includes 3 steps:

1. Obtain an internal list of corporate purchased goods and services and associated physical volumes (e.g., metric tons)
2. Match list to a database of generic emissions factor data
3. Multiply purchased volumes with the emissions factor (i.e., metric ton of CO_2eq/metric ton of product)

It is possible to use a similar process for **scope 3, category 11** (use of sold products) for agricultural input providers.

Basic scope 3 reporting **shows progress on changes in the purchased portfolio** (e.g., dairy to plant based, fossil to solar energy) but **does not help track progress on agricultural practices through time** (because it uses generic factors).

Tracking progress on agricultural practices through time is where **MRV becomes an enabler.**

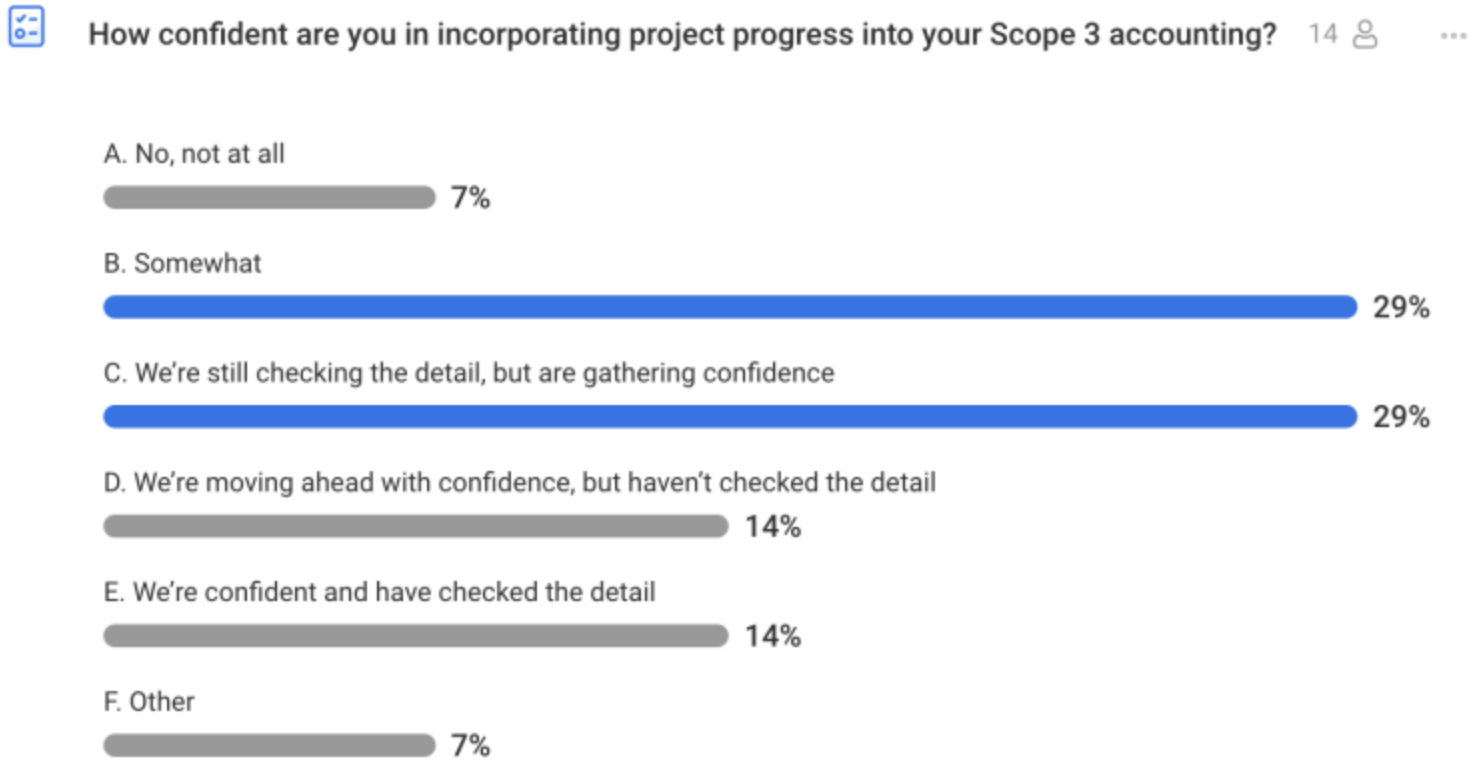
Enhanced scope 3 accounting (for example with an MRV system) typically begins with key measuring steps to account for agricultural practices:

1. Choose the location (align with needed requirements such as traceability systems) of projects or interventions for relevant scope 3 goods and implement action
2. Collect annual data on the project area (e.g., a dairy farm)
3. Convert annual data from the project area – including any processing steps post-farm – to an emissions factor (i.e., emitted or removed metric ton of CO_2eq/metric ton of product) for a volume of the good purchased (e.g., lactose)
4. Multiply purchased volumes with the emissions factor

Current state of play

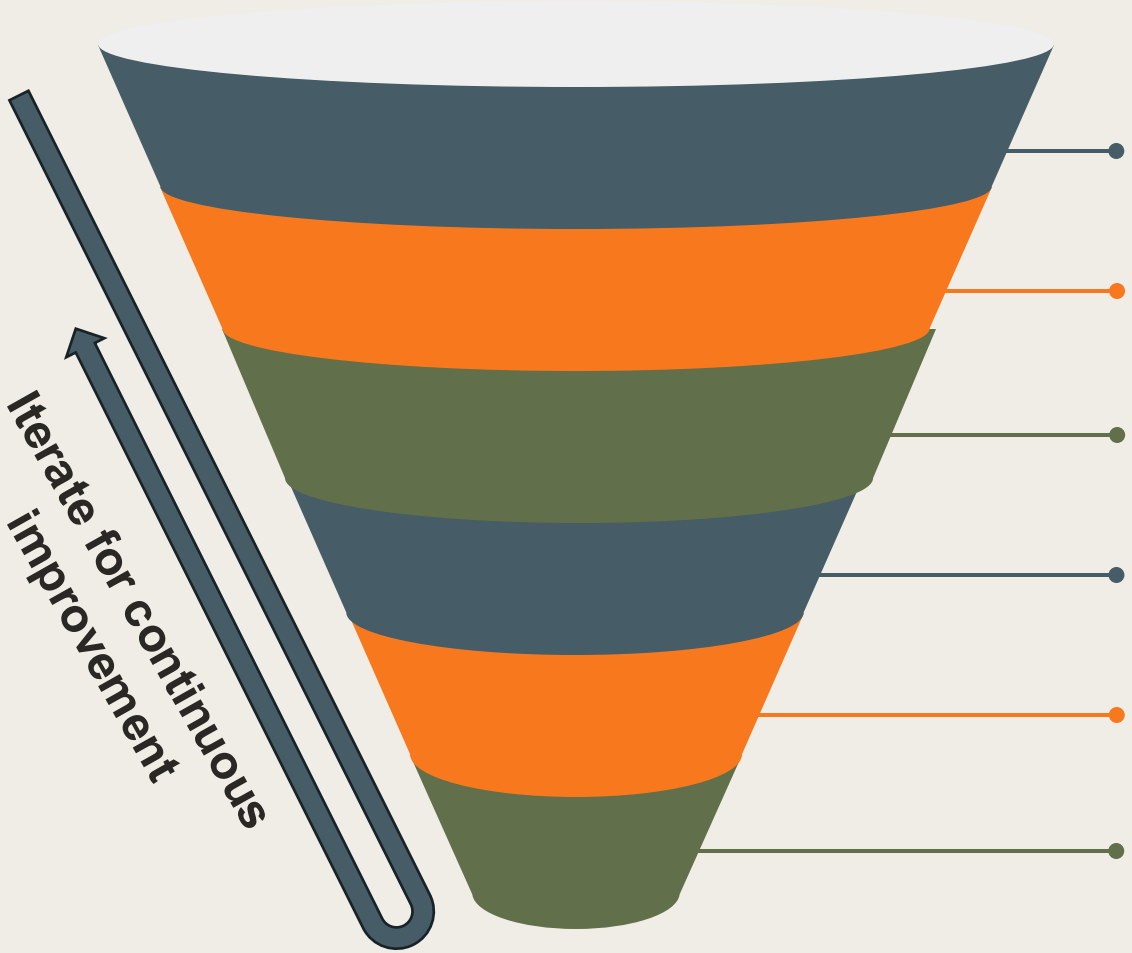
Incorporating progress into scope 3 accounting is a key challenge for companies: MRV can be an enabler

Survey results from WBCSD members*



** Survey conducted on 14/4/24; 14 participants*

How MRV can accelerate scope 3 emissions reductions and removals



M: Improve scope 3 precision and accuracy (e.g., incorporating primary data and remote sensing)

M: Identify hotspots and key footprint contributors and opportunities for reduction and removals

R: Synthesize and document information

R: Communicate to stakeholders and regulators

V: Verify measurement and reporting to build confidence

Continue to make decisions – put actions in place

The GHG Protocol and most regulatory frameworks have not made a full MRV mandatory but they do require some MRV aspects

What is **mandatory** and **recommended** to align with GHG Protocol for agri-food businesses:

M - Measurement

Capture **primary data** or use calibrated models using primary data to **report removals.**

Track progress only on data measured in the same way (e.g., don't compare generic deforestation data to remote sensing data).

Ensure there is a **traceability system that measures and provides an administrative link between** fields with removals and the volume of product purchased from the fields (forms of mass balance likely accepted); this is also essential when measuring direct land-use change (dLUC).

Monitor (measure or track key activities) removals through time to ensure no reversals.

Primary data to track progress on **agricultural land management activities (e.g., yield, fertilizer application).**

Primary data on deforestation, i.e., through satellite imagery measurement of dLUC.

R - Reporting

Report **complete scope 3** inventory, including all required reporting categories and GHG splits (e.g., removals separate from emissions).

Report reversed removals (e.g., as GHG emissions in relation to trees that may have died).

V - Verification

General recommendations specify third-party verification of results (can also include certifications).

We've based this analysis on the interpretation of the current GHGP LSRG draft as of August 2024. It does not represent an endorsement from the organizations behind the GHG Protocol.

How to decide if your company needs to use MRV

Decision statements to consider

	Decision statement on where MRV could be helpful	Example: How companies use MRV
M	We need **better data** to identify hotspots where we need to act.	Nitrogen emissions vary greatly with respect to timing of fertilizer application and local weather conditions. We use MRV to gather more granular data on N_2O emissions than those in generic databases to prioritize where to put in place N_2O reduction strategies.
	We want **to track the continuous improvement of programs or initiatives**.	We are putting training and fertilizer management systems in place to optimize N application and want to track progress through time in reducing N surplus application and associated emissions.
	We need to monitor the **permanency of removals**.	We put tree and hedge planting in place in 2023 and use MRV to identify the reversing of the removals, re-emitting the CO_2 to the atmosphere.
	We want **to track the use of our products** by our customers.	We are not sure how our customers are using our new plant-based alternative and use MRV to identify whether it leads to the reductions we expect and there is no re-bound effect.
R	We are **obliged by law** to report GHG emissions.	We are a large, publicly listed company located in the EU and use MRV to inform regular reports on the social and environmental risks we face and on how our activities impact people and the environment.
	We report to **communicate** the details of our GHG emissions.	We use MRV to ensure credible communication to our board of directors, our shareholders and our senior management on how we are (or are not) improving our GHG emissions in alignment with the Paris agreement.
	We report to **drive** internal support for key programs **forward**.	We use MRV to ensure our direction aligns with our mission and progress against internal frameworks and KPIs.
V	We don’t have a large internal sustainability team and need external assurance to bring **credibility and rigor and reduce the greenwashing risk**.	We have done our GHG corporate footprinting using an external consultancy and have asked another consultancy to review and verify the work.
	We want to make specific claims about our products and company and **build trust** in our commitments.	We use MRV to support communication on our website about how much we have reduced our GHG footprint and to put labels on certain products.
	We need to ensure the **quality of the data** we receive from suppliers.	We have received supplier data that do not align with our expectations and use MRV to verify these numbers before using them for decision-making and reporting.

4.

How to align MRV with standards

Ensuring the alignment of MRV with the GHG Protocol, SBTi and beyond

How to ensure the MRV approach aligns with standards

provide standardized guidance for corporate accounting of land-based emissions and removals, the GHG Protocol is developing the Land Sector d Removals Guidance (LSRG), with the final draft expected in early 2025. **This is the key guidance for companies to assess and report cope 3 emissions in land-based value chains**.

ith the extensive and technical LSRG still in draft form, it can be challenging for companies to know at a glance if their MRV or accounting amework aligns with this guidance.

this section, we summarize considerations in terms of requirements to align MRV for reduction and removal accounting with GHGP LSRG.

This is not a fully exhaustive list but will help guide companies toward alignment.

We've based the list on the interpretation of the current draft as of August 2024; it does not represent an endorsement from the World Resources Institute and WBCSD behind the GHG Protocol.

How to check alignment with the GHG Protocol, SBTi and beyond

Topic	Description	Checklist	Examples
Annual accounting inventory	To align with the GHG Protocol, account for GHG emissions (required) and removals (optional) on an annual basis, i.e., scope 3 inventory represents one year. Inventory is thus the representation of total yearly emissions of the full system(s) under scope 3 and removals are the difference between the stock of this year and year before (not the total stock).	❑ Has the company accounted for emissions (required) and removals (optional) following an annual inventory approach?	Non-aligned examples: • The estimate of methane emissions from dairy cows • The carbon stock of an orchard Aligned examples: • The full emissions of a dairy system attributed to the dairy a company purchased • The two-year difference in an orchard's carbon stock where a company has put a permanent removals project in place
Reductions	To align with the GHG Protocol, reductions represent the difference over time of each accounting year's inventory. Account for full inventory and not a *reduction unit* or reduced amount of GHGs between years.	❑ Has the business estimated reductions by the difference between two annual inventories and are the full annual inventories available?	Non-aligned examples: • The project put in place reduced 100 metric tons of CO_2 • The project put in place avoided 100 metric tons of CO_2 Aligned example: • The 2023 inventory was 3,000 metric tons of CO_2 and the 2024 inventory 2,900 metric tons of CO_2; therefore, the intervention led to 100 metric tons of CO_2 reduced
Removals	To align with the GHG Protocol, removals: • Represent the difference between this year's and last year's carbon stocks • Are intended as permanent • Are estimated using primary data or models calibrated using primary data for the region and cultivation type • Are monitored (and reversals reported) • Report on uncertainty	❑ Are removals an annual C-stock gain? ❑ Does the company intend for removals to be permanent? ❑ Has it estimated removals using primary data or a calibrated model? ❑ Does the company monitor and report removals if reversed in the future? ❑ Has it evaluated the uncertainty?	Non-aligned examples: • Removals estimated approximately 10 kgCO_2/tree/year • The company sold seedlings but there is no monitoring plan for future tree growth Aligned example: • Annual results reported from a long-term farmer program. The business estimates soil organic carbon (SOC) using primary data; if the results demonstrate a reversal or loss of SOC, the company reports this; it has documented the uncertainty of the SOC measurements and sampling plan to be 20%
Traceability	To align with GHG Protocol for dLUC and removal reporting, there must be a physical link between the emissions or removal and the purchased or sold good subject to scope 3. This will likely require a chain of custody model.	❑ Is there a chain of custody model in place?	Non-aligned example: • The company purchases a carbon credit from a farm supplying a good that falls under scope 3 inventory in the country of sourcing Aligned example: • A chain of custody model is in place that traces a good from a farm to the collection facility that produces a good that falls under scope 3 inventory

Bridging the gap between inventory and project accounting (1)

What is inventory and project accounting?

Inventories aim to capture the annual emissions associated with the scope of an entity (e.g., a company, organization or country).

Projects focus on specific actions aiming to lead to reductions or removals of emissions in comparison to no project.

A story to explain inventory and project accounting

It is New Year's eve 🥂 and I'm talking to a friend who has a bike and I want to tell her how much money I have saved on my car this year because I bought a bike. 🚲♀

If I follow the spirit of an inventory approach, I would calculate:
1) The amount of money **I spent** on my car last year (2023 *inventory*)
2) The amount of money **I spent** on my car and my bike this year (2024 *inventory*)
3) The amount I saved using the difference in the expenses for the last two years (*reduction* between 2023 and 2024).

But let's say I don't know how much money I spent this year but my friend says she calculated how much she saved on transport by having her bike. In the spirit of a project accounting approach, we take her **savings amount** (*cost reduction from the project of having a bike*) and subtract it from my car **expenses last year** (2023 *inventory*) and we get a negative number: -$10,000! But this means I saved more than I spent – which is not possible. We then look into her savings calculation…

First of all, she never had a car. Second, she had considered data over 4 years. So she had calculated:
1) The amount of money **she would have spent** if she had bought a car and used it over the **past 4 years** (e.g., considering statistics on the price of the average car – the *counterfactual*);
2) The amount of money **she actually spent** on her bike over the past 4 years (the *project scenario*);
3) The subtraction of the 4 years of spending on her bike from how much she would have spent on a car – and this is the savings she had told me to subtract from my car expenses.

Although the original logic was understandable because I didn't know how much I spent this year, it led to a very misleading value, for example that I saved more than I spent last year! Both calculations are correct but determining a sum using both does not help me understand and communicate my savings.

The same calculation errors can happen when subtracting the *emissions reduction* values of a project from a year's *inventory value*. Ideally, a company would simply get the inventory data (i.e., emissions) for both years, which would capture the emissions reduction (the difference between the two years).

If a company cannot get inventory data, work to put a system in place that does so credibly, instead of subtracting project values from inventory.

See GHG Protocol LSRG draft, chapter 13 for a further explanation of project vs inventory (e.g., Figure 13.1)

Bridging the gap between inventory and project accounting (2)

Differences and recommendations

Challenge	Issue	Recommendations
Timescale	Project-based accounting is often over a **project time period**, whereas inventory accounting is **annual**.	• Align time periods for the reporting need, e.g., annual inventory. • Ensure the procurement of a good matches the project time period in relation to that good, if possible.
Comparison with a counterfactual	Project-based accounting is often a comparison with a counterfactual of *no project,* whereas inventory is **a snapshot in time**.	• Ensure the reporting of inventory emissions and removals does not include avoided emissions or comparisons to a project counterfactual. • Ensure the reporting of progress as a difference between two years calculated using the same method.
Calculation as inventory units not project units	The calculation of the inventory considers the **emissions factor of a good** (metric ton of CO_2e emissions per metric ton of product), whereas the calculation of project emissions considers **a project** that can include many product outputs (e.g., a crop rotation).	• Ensure the reporting of inventory emissions considers the correct units (i.e., per unit of good related to scope 3). • Avoid adding or subtracting inventory and project-based values.
Allocation to products	In inventory accounting, emissions factors for goods are **allocated** using a consistent key, e.g., from a database. Project accounting tends to not include allocation.	• Update scope 3 accounting infrastructure to easily calculate allocation. • Avoid adding or subtracting inventory and project-based values. • Reconsider allocation – find a new approach that does not require allocation.

What if a company wants to account for a project in scope 3 inventory? An inventory can account for projects if the company assesses them using an inventory approach:

- Do consider **total emissions and removals in each year**.
- **Do not subtract *project reduction units*** from a generic inventory; this is physically meaningless and will lead to unreliable results.
- Do not play with allocation; **use the same allocation methods as used for normal inventory** (i.e., if allocating 10% of emissions from a farm to a product, allocate 10% of removals and 10% of emissions reductions).
- Ensure alignment with scope 3, especially with **proof of sourcing**.

5.

Accounting scenarios

Understanding different approaches in accounting for farm-level emissions and removals

Navigating alignment with the GHG Protocol: perspectives on accounting scenarios

To account for agricultural emissions reductions and removals in a scope 3 footprint, **the GHG Protocol has set the rules.** A variety of ***accounting scenarios*** **have emerged as companies seek to bridge the gap between accounting and project implementation (e.g., through carbon credit methods previously used for offsets), viable business models and MRV systems.** This is a nascent space where companies try to find their way. We detail observations on the various accounting scenarios implemented in practice or in theory by agri-food companies. Each of these approaches has different data and MRV considerations. This list is non-exhaustive.

Description of the scenarios:

Scenario	Description
1. Classic scope 3 inventory	*Consideration of scope 3 reductions and removals following the* inventory *approach (i.e., net emissions and removals in a year).*
2. Scope 3 inventory + no traceability system	*Consideration of scope 3 reductions and removals following the* inventory *approach. However, there is no chain of custody and traceability system in place. The company knows the farmer group where action takes place but it is not possible to trace the volumes coming from the farm to a corporate purchase.*
3. Scope 3 inventory + sourcing region	*Consideration of scope 3 reductions and removals following the* inventory *approach. There is no farm-specific chain of custody system in place and the company considers a sourcing region for accounting.*
4. Subtraction method (in value chain credits)	*The company subtracts or substitutes a project credit for a scope 3 inventory.*
5. Other allocation approaches	*A variety of approaches deviate from the classic mass or economic allocation system when partitioning the emissions and removals of a farm-level project to all the products produced by the farm.*

Understanding the alignment of each accounting scenario with the draft GHGP LSRG

We have considered 4 key aspects when evaluating the alignment of different accounting scenarios with the GHG Protocol

Approach	Description	GHG Protocol requirement
Emissions (inventory emissions factor or project-based emissions)	Describes **how an emission is represented**: is it an **inventory emissions factor,** which represents kilogram or metric ton of CO_2e per kilogram or metric ton of product, or a **project emissions** estimation, which could represent the difference in the CO_2e of a farm before and after the implementation of a project?	GHG Protocol aligned scope 3 accounting requires inventory accounting
Transfer mechanism (traceability systems)	Describes **the passing of emissions information along a value chain**: is it through a physical traceability system (i.e., chain of custody) where an emissions factor is linked with a physical good or is it a market mechanism such as a credit or book and claim system where the emissions information ties with a project?	GHG Protocol aligned scope 3 accounting likely to require physical traceability
Conversion	Describes **the transformation of farm-level emissions information into a scope 3 product**: are the processing, waste or water weight gains or losses through drying and wetting accounted for?	GHG Protocol aligned scope 3 accounting requires accounting for conversion
Allocation	Describes **the allocation (proportioned) of farm-level emissions information to all co-products** produced from the farm system (e.g., corn germ, corn bran, gluten, corn stover).	GHG Protocol aligned scope 3 accounting requires best practice life cycle assessment (LCA) based methods for co-product allocation

Based on the interpretation of the GHG P LSRG draft as of August 2024, we have evaluated the following accounting scenarios as follows:

🟢 Strong evidence of alignment.

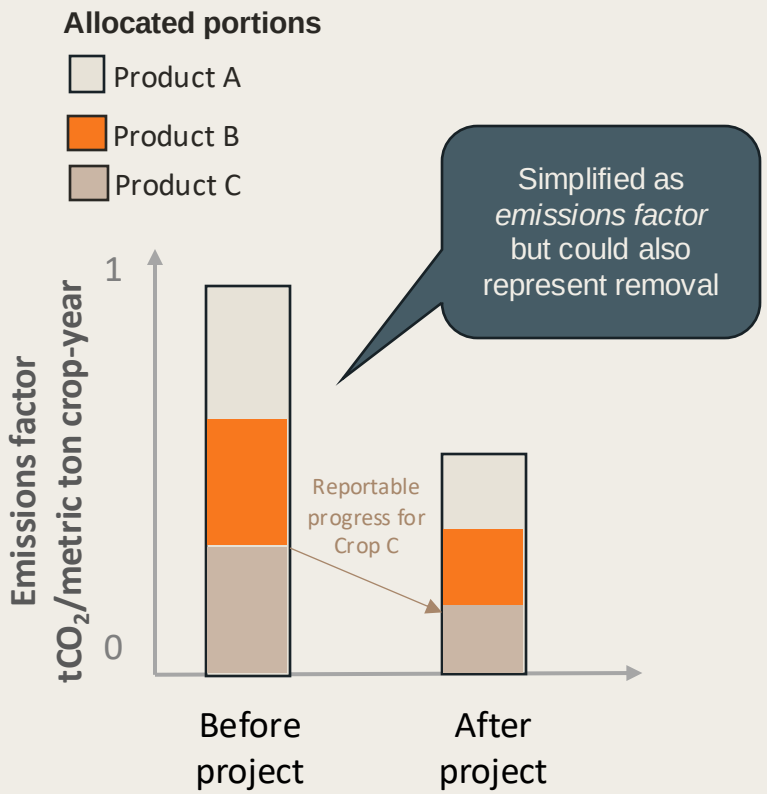
🟠 Further consideration needed for alignment.

We've based this analysis on the interpretation of the current GHGP LSRG draft as of August 2024. It does not represent an endorsement from the organizations behind the GHG Protocol.

Scenario 1: Classic scope 3 GHG inventory (via emissions factor)

Calculation view

Example: Companies implement different regenerative agriculture projects on groups of farms that sell multiple co-products (products A, B, C). They establish physical traceability (through a group-level mass balance chain of custody) and all buyers obtain a correctly calculated emissions factor adjusted for conversion and allocation tied to their purchased volumes.



Approach	Description	GHG P alignment	Explanation
Emissions/removal calculation	Inventory	●	Annual net emissions calculated for scope 3 goods
Traceability system	Physical traceability	●	A chain of custody system tracking volumes with associated emissions factors (see supply chain view diagram)
Conversion	Primary data	●	Supplier-specific data used to calculate the conversion of a crop product to a scope 3 ingredient
Allocation	Economic	●	Farm-level impacts partitioned according to the economic value of the various products produced by the farm

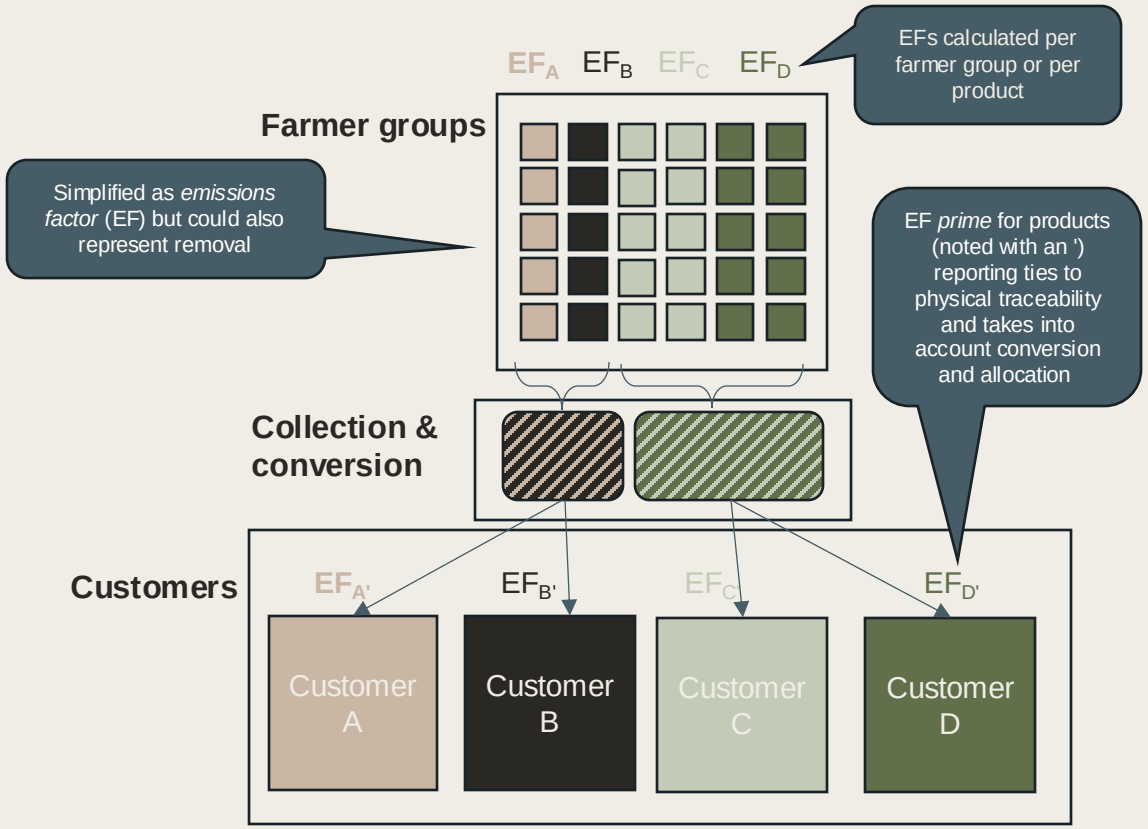
Business implications

- Works well with as many buyers at the table as possible to **avoid stranded assets**
- Setting up **traceability systems** – e.g., through mass balance chain of custody models – requires an administrative system but does not usually require reconfiguring supply chains
- Ideal system that requires sophisticated technical expertise
- More viable for supply chains with direct or vertical farmer integration

We've based this analysis on the interpretation of the current GHGP LSRG draft as of August 2024. It does not represent an endorsement from the organizations behind the GHG Protocol.

Scenario 1: Classic scope 3 GHG inventory (via emissions factor)

Supply chain view



The calculation view (previous diagram) is one perspective on accounting scenarios. With the need for improved traceability to make supply chain-specific claims, what is increasingly important is the supply chain view. In the following accounting scenarios, we explore the calculation and supply chain view depending on what is most relevant.

Business implications

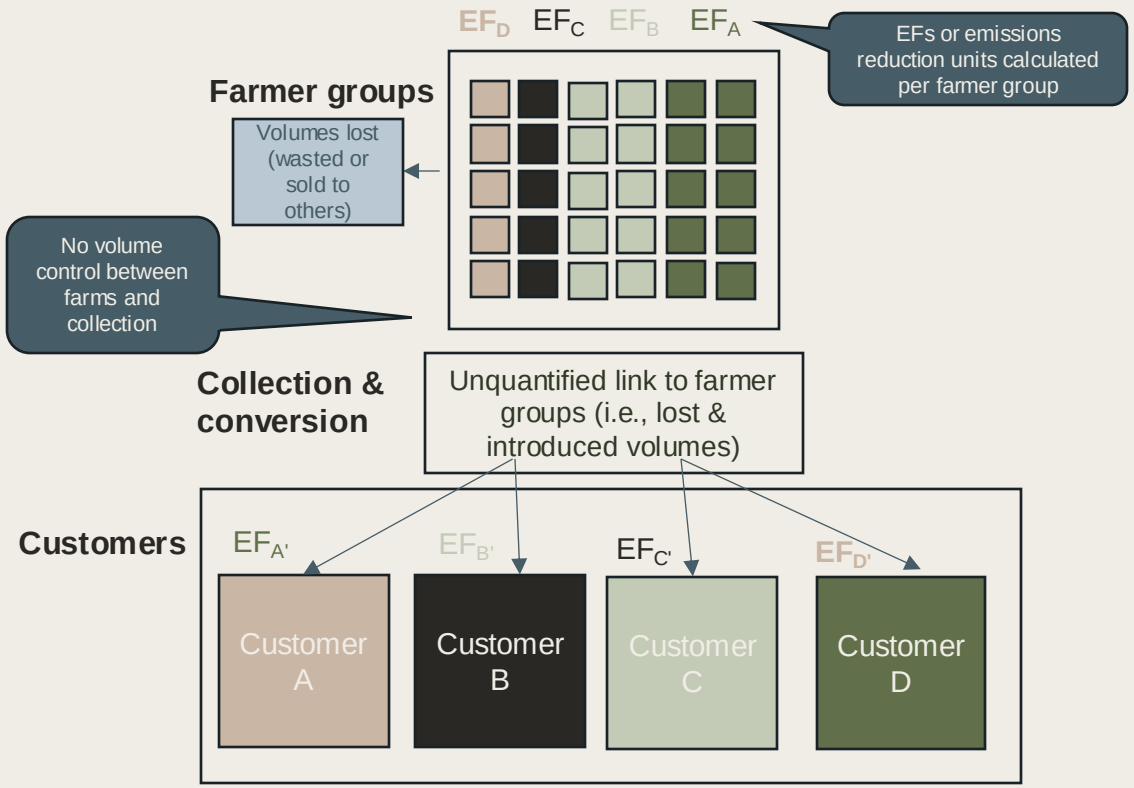
- A **chain of custody model** documents the volume of a farmer group's production that enters into collection and companies reconcile the volume with what customers purchase considering actual conversion data (i.e., if farmers sell to other buyers, the buyer considers and documents this).
- Companies fund specific farmer groups or crops and can build a relationship.
- Due to variability in yields, production conversions, farmer group overlaps and market dynamics, the companies of any single customer will likely need to *over fund* farmer groups, as **they cannot guarantee a single farmer group's harvest can match demand**.

We've based this analysis on the interpretation of the current GHGP LSRG draft as of August 2024. It does not represent an endorsement from the organizations behind the GHG Protocol.

Scenario 2: Scope 3 inventory + no traceability system

Supply chain view

Example: Companies fund various projects with farmer groups that are associated with certain emissions factors; but there is no chain of custody model in place to track the farmer group production volumes of various crops associated with the emissions factors. They are missing data on conversions from the crop products to sold ingredients.



Approach	Description	GHG P alignment	Explanation
Emissions/removal calculation	Inventory	🟢	Annual net emissions calculated for scope 3 goods
Traceability system	Market mechanism (book & claim or credit)	🟠	Missing chain of custody system that tracks volumes with associated emissions factors
Conversion	Low-quality secondary data used	🟠	Proxy data from a database used to calculate the conversion of a crop product to a scope 3 ingredient
Allocation	Economic allocation	🟢	Farm-level impacts partitioned according to the economic value of the various products produced by the farm

*Could be possible to redefine as a group-level mass balance if controls are in place. GHG Protocol rules are vague for book & claim (B&C) certificates that are 1) aligned with inventory accounting approaches and 2) used to track land management emissions reductions. It is likely B&C will not be allowed. Currently, LUC or removals cannot use B&C.

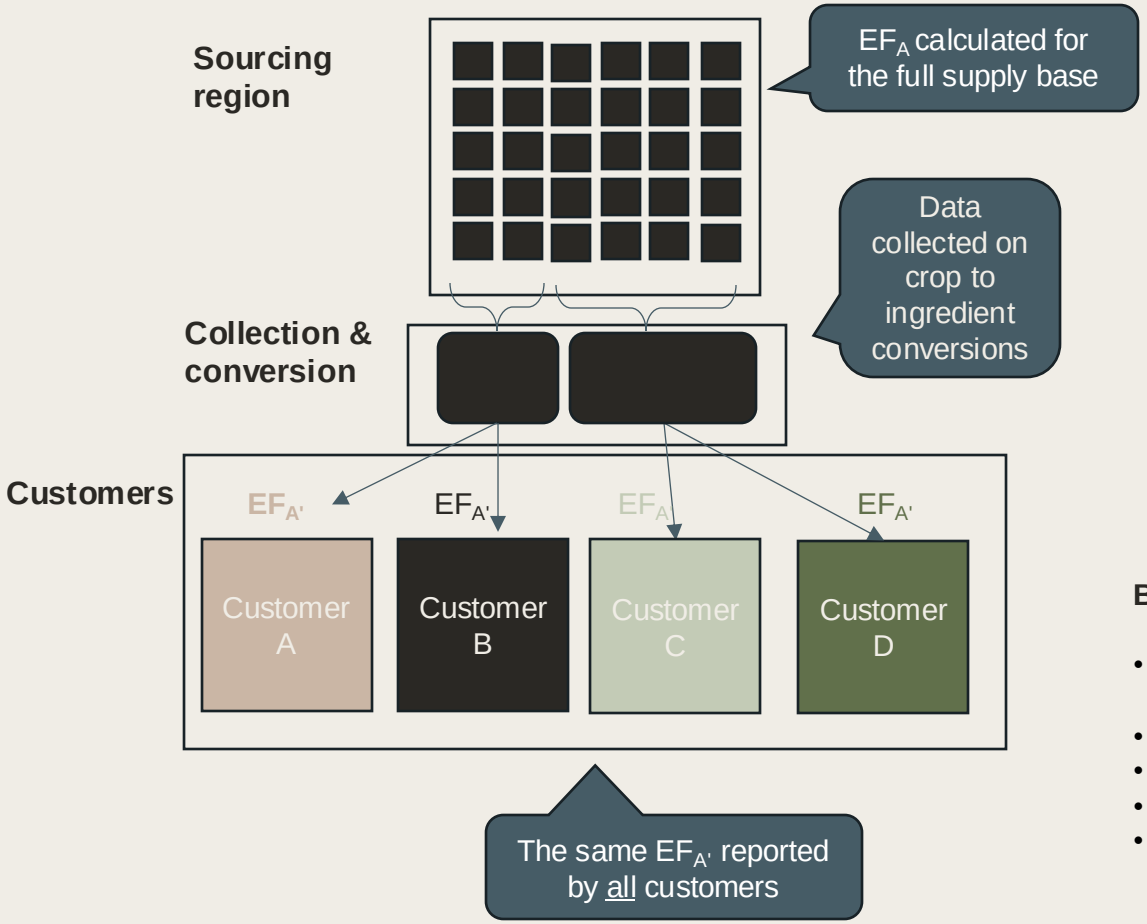
Business implications

- **No chain of custody is in place and thus volume control is not rigorous**.
- A need to control the collection, conversion and allocation from farm to output product volumes in order to align this with GHG Protocol.
- Companies fund specific farmer groups and can build a relationship.
- Due to variability in yields, production conversions, farmer group overlaps and market dynamics, companies **can guarantee that a single farmer group's harvest can match demand**
- **Pricing model** would need to **protect against the risk that farmers** cannot continue practices if demand from customer changes

Scenario 3: Scope 3 inventory + sourcing region

Supply chain view

Example: Companies collectively fund changes in a sourcing region associated with certain emissions factors. They collect data on the volumes sourced from the farms and their conversion into sold ingredients.



Approach	Description	GHG P alignment	Explanation
Emissions/removal calculation	Inventory	●	Annual net emissions calculated for scope 3 goods
Traceability system	Physical traceability through sourcing region	●	Missing chain of custody system that tracks volumes with associated emissions factors
Conversion	Supplier data	●	Supplier-specific data used to calculate the conversion of a crop product to a scope 3 ingredient
Allocation	Economic allocation	●	Farm-level impacts partitioned according to the economic value of the various products produced by the farm

Business implications

- No need to put custom-made traceability systems or book and claim systems that link farms or farmer groups with customers in place as the target is the whole sourcing region.
- Companies can streamline data collection and make it more efficient.
- Moving the needle for scope 3 requires larger scale change across the full farm shed.
- Less or no difficulty in matching production with demand.
- Outcomes not dependent on a single customer.

Scenario 4: Subtraction method (in value chain credits*)

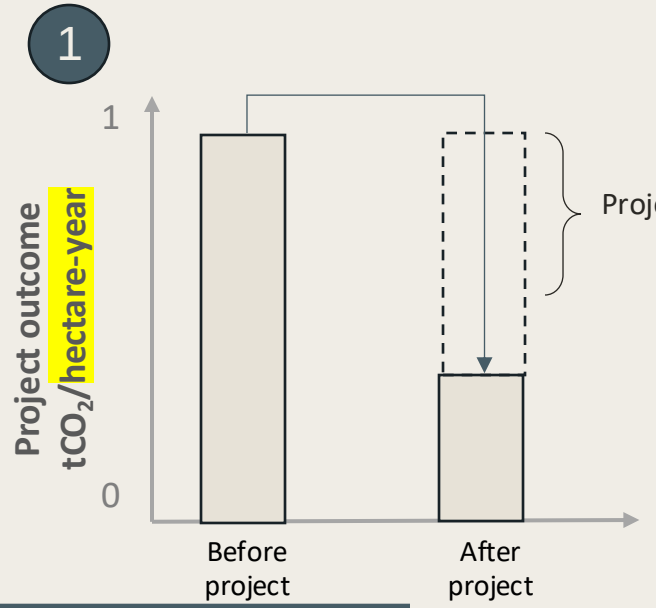
Calculation view

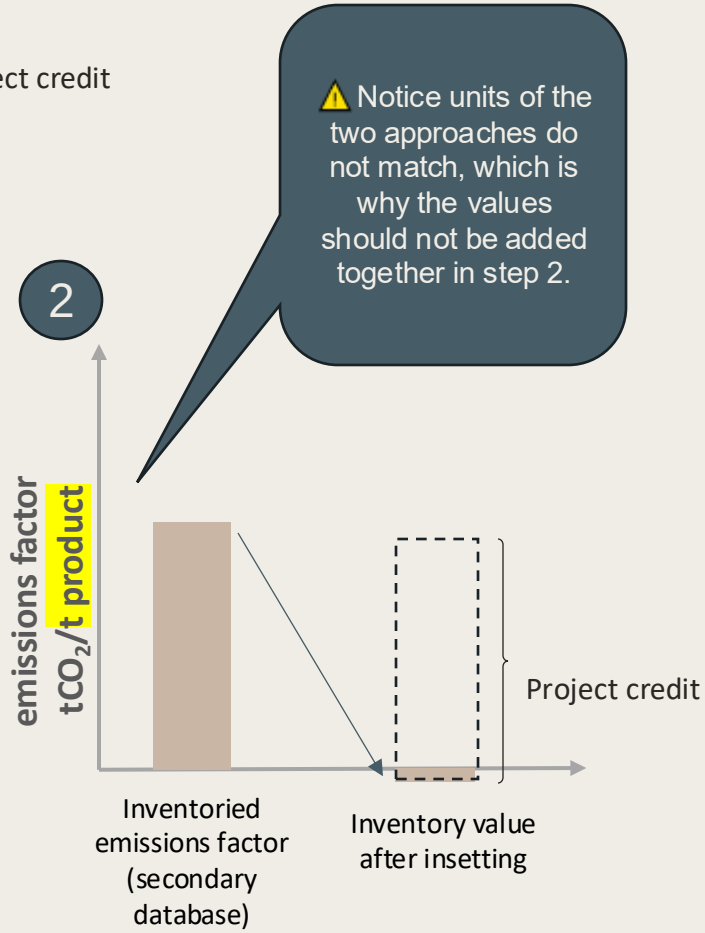
Example

1) Regenerative agriculture implemented on a farm that sells multiple co-products to various suppliers. Removals and emissions reduction credits* result from from several years of the project.
2) A company sourcing from one of the suppliers buys the credits and subtracts it from their scope 3 inventory.

Business implications

- Traceability is not needed so relatively easy to put in place.
- Mathematically loses meaning, i.e., project emissions and removals are due to a system producing many products the credit buyer does not purchase and credit buyer subtracts the full project value from the inventoried emissions of what they do buy).
- Not aligned with current standards and protocols.





Approach	Description	GHG P alignment	Explanation
Emission/removal calculation	Project	●	No inventory calculated; emissions and removals are associated with a project time period
Traceability system	Market mechanism (credit)	●	No physical association of the farm's emissions or removals with a volume of product
Conversion	Not accounted for	●	No accounting for the conversion of the crop to a scope 3 ingredient
Allocation	Not accounted for	●	No partitioning of farm-level impacts to various products produced by the farm

Examples include SustainCert "Impact units" and Verra Scope 3 "Intervention Units".

We've based this analysis on the interpretation of the current GHGP LSRG draft as of August 2024. It does not represent an endorsement from the organizations behind the GHG Protocol.

Scenario 5: Other accounting methods

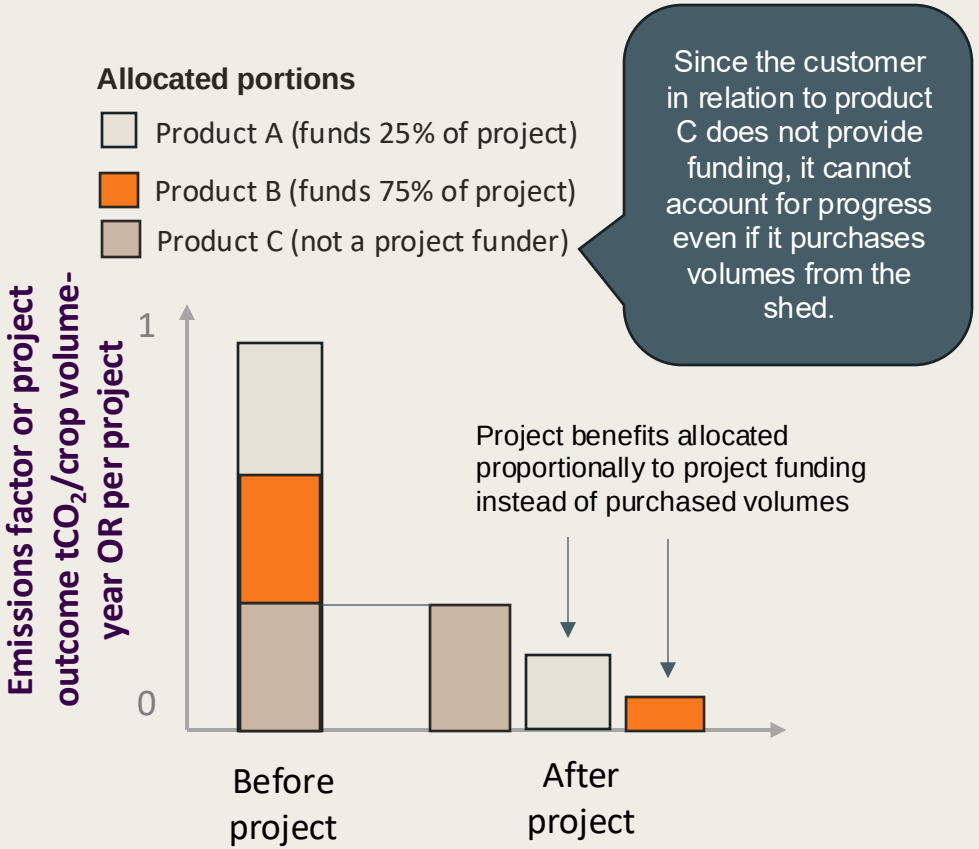
Calculation view

Example: Companies implement a regenerative agriculture project on a farm that sells multiple co-products (products A, B, C). Not all buyers fund the project. The buyers that do fund the project get the benefit proportionally.

Approach	Description	GHG P alignment	Explanation
Emissions/removal calculation	Project-based	●	No inventory calculated; emissions and removals associated with a project time period
Traceability system	Market mechanism (book and claim)	●	No physical association of the farm's emissions or removals with a volume of product
Conversion	Various ways to account for it	●	No accounting of the conversion of the crop to a scope 3 ingredient
Allocation	Based on financial contribution to a project	●	Partitioning of the benefits of the project based on financial contribution and not economic or mass allocation to the products produced by the farm

Business implications

- Project funders work to avoid free riding and want recognition for their funding contribution.
- There is an incentive to fund more.
- There is a lack of incentive to have more funders because it splits the cake into smaller pieces.
- It is unclear how the funders should account for product C and that they don't double count the benefit.
- Larger or more advanced companies in sustainability accounting have more opportunity to report benefits and can push out other companies even if they buy substantial volumes.



This is just one example of a creative allocation technique. There are many different variations of this scenario, e.g., with re-allocation and free-allocation.

**For example, see SustainCert's Challenges and Solutions for Allocating Greenhouse Gas Mitigation Outcomes.*

6. Data and MRV deep dives

Assessing data and MRV approaches in 3 contexts

Objectives and scope of deep dives

Bring the MRV guidance to life with practical examples

Determine key data and MRV considerations in specific contexts

Apply the decision-making framework

Explore when and how to use MRV in this context

Assess alignment with GHGP

Run through the GHGP alignment checklist and summarize gaps

Data and MRV deep dives

Three contexts selected based on WBCSD member interest

1.

Avoided deforestation

Agriculture-driven deforestation and conversion represent a significant share of emissions from agri-food value chains. We assessed a specific initiative driving action on this topic in the Brazilian Cerrado and the connection with scope 3 reporting.

2.

Soil organic carbon

Carbon removals are a critical part of a net zero pathway for the agri-food sector. This includes credible soil organic carbon (SOC) removals through on-farm practice changes and regenerative agriculture initiatives. MRV solutions can bridge the gap between needed accuracy and feasibility.

3.

Improved nitrogen management

Nitrogen management is a key enabler of climate progress for the agri-food sector. This requires systems to track progress consistently at the farm level.

Key findings from the deep dives

Primary data collection

In all three deep dives, companies are **collecting primary data from on-farm practices** to support the granular tracking of progress over time and an understanding of what works. Approaches include in-field data collection, direct sampling and remote sensing.

Alignment across the value chain

Metrics need to be in a format that is **exchangeable across the value chain** to allow up- and downstream companies to account for emissions reductions for removals as part of a product carbon footprint and corporate emissions inventory. This means translating outcomes into **an emissions factor** (metric ton of CO_2 emissions/removal per metric ton of agricultural product produced in a year).

Accounting in scope 3 inventory

All three deep dives face challenges in aligning the reporting of emissions with the Greenhouse Gas Protocol Land Sector & Removals Guidance, indicating the difficulty in accounting for these initiatives in corporate scope 3 inventories. The main challenges include:

- A traceability model that links purchased volumes to a specific corporate supply chain
- The allocation of emissions and removals from on-farm products to all those purchased downstream

Deep dive 1: Avoided deforestation

Farmer First Clusters

World Business Council *for Sustainable Development*

Deep dive 1: Avoided deforestation (Farmer First Clusters)

Background and scope 3 context

Description: Smart Soy Cluster in the Brazilian Cerrado – Avoiding deforestation and promoting conservation through strategic incentives

- The Farmer First Clusters (FFC) is a **collective investment from six agribusinesses** that collaborate via WBCSD's Soft Commodities Forum to establish **deforestation- and conversion-free soy supply chains in the Brazilian Cerrado**. Downstream actors, through the Consumer Goods Forum's Forest Positive Coalition, are jointly investing with the Soft Commodities Forum's (SCF) members in high-risk landscapes in the Brazilian Cerrado.
- The program invests in a range of strategic farm-level interventions, such as the **restoration of degraded land**, **financial incentives for conservation and technical assistance to producers**.
- The program serves 149 farms, 1.3 million hectares (ha) and 250,000 ha of native vegetation.
- Annual **reporting and monitoring** will start in 2024, ensured by the FFC implementing partners. The reporting mechanism will be under WBCSD through the SCF's annual disclosure.
- In the future, there is an opportunity to **quantify** benefits of the program **as GHG emissions or removals** to contribute to the scope 3 ambitions of SCF members and downstream actors.

Current MRV approach

FFC implementation partners collect data from farms engaged in the program directly. The program will evaluate the following metrics and indicators (from 2024 onwards):

- **Avoided GHG emissions** from avoided deforestation (aligned with the Innovative Finance for the Amazon, Cerrado and Chaco (IFACC) and United Nations Environment Programme (UNEP) World Conservation Monitoring Centre (WCMC) Positive Impact Indicators Directory);
- **Total C stock maintained** in protected forests (aligned with IFACC and UNEP WCMC carbon indicators);
- **Total CO_2 sequestered through restoration** (aligned with IFACC and UNEP WCMC carbon indicators).

Deep dive 1: Avoided deforestation (Farmer First Clusters)
Challenges and opportunities

Challenges and opportunities

1. The FFC has designed the program to finance action on deforestation and conversion-free (DCF)-free soy value chains, not specifically for scope 3 inventory reporting. The current data measurement approach does not yet align with scope 3 reporting:
   - The **avoided future emissions** cannot be deducted from scope 3 inventory as it violates the concept of annual inventory.
   - **Maintaining C stock** (avoided deforestation or conservation) is not part of scope 3 inventory as there is no net change in emissions or removals and it is often taking place on land that does not produce agricultural goods.
   - Generally, **C sequestration through forest restoration** is *out of scope* as it does not take place on land that produces agricultural goods.

2. To report the FFC outcomes as part of SCF members' scope 3 inventory (and therefore count towards SBTi Forest, Land an Agriculture (FLAG) targets), the key needs are:
   - **Emissions inventory:** Should include land-use change (LUC) and agriculture production -related emissions factors per metric ton of soy product multiplied by volume purchased.
   - **Removals inventory:** Net annual carbon removals ***on soy farms*** from primary data, monitoring and reversal reporting and uncertainty evaluation. The provision of data must be in a way that can allow for inventory estimation, i.e., metric ton of CO_2 removed per metric ton of soy produced in a year.
   - **Traceability through chain of custody model:** A system that links the physical volume of soy from project farms to specific supply chains beyond the current tracking of outcomes from FFC activities to specific farms through farm polygon mapping.
   - **Allocation and conversion consideration:** Emissions and removals allocated to all the purchased products downstream of the farm production (e.g., soy products as well as any other crop products).

Deep dive 1: Avoided deforestation (Farmer First Clusters)

Focus areas for alignment with scope 3 reporting requirements under GHGP

Topic	Checklist for alignment with GHGP	Focus for alignment
Inventory	Is there an annual inventory approach to account for emissions (required) and removals (optional)?	**Not yet aligned.** *There is currently no physical connection between emissions and removals of a farm and the farm's production in a way that it is possible to estimate as metric tons CO_2eq per volume of crop product per year.* *For now, the only reporting is of activity indicators (farms enrolled, area of soy production affected). Future annual FFC reporting will allow tracking year-on-year improvements.*
Reductions	Does the company estimate the reductions by the difference between two annual inventories and are the full annual inventories available?	**Not yet aligned**. *It does not yet account for emissions factors (EFs), e.g., related to land-use change and deforestation. Therefore, it is not possible to account for emissions reductions.*
Removals	1. Are removals an annual C stock gain on a farm area? 2. Does the estimation of removals use primary data or a calibrated model? 3. Is the intention for the removals to be permanent? 4. Does the company monitor and report removals if reversed in the future? 5. Has it evaluated uncertainty?	1. **Not yet aligned.** *Removals include off farm area.* 2. **Aligned.** *The program uses primary data from implementing partners measuring indicators directly on the farms, according to the FFC M&E framework.* 3. **Aligned.** *The project aims for long-term outcomes.* 4. **Aligned.** *But the monitoring of reversals is only for the duration of the incentives (1, 3 or 5 years).* 5. **Not yet aligned.** *The program does not yet evaluate uncertainty.*
Traceability	Is a chain of custody model in place?	**Not yet aligned.** *There is no clear chain of custody that tracks the physical volume of soy from various project sites to specific corporate supply chains.*
Conversion	Does the company account for the processing, waste or water weight gains or losses through drying and wetting when transforming a harvested crop to a purchased product?	**Not yet aligned.** *There is no consideration of tracking harvested soybean to the various soy derivatives and products that flow downstream in the supply chain.*
Allocation	Does the company proportion the agricultural emissions and removals measured on farms between all the products from those farms?	**Not yet aligned.** *There is no allocation of GHG emissions or removals to the products (e.g., soy and others) produced from the project farms.*

Deep dive 2: Soil organic carbon

World Business Council for Sustainable Development

Deep dive 2: Soil organic carbon

Background and scope 3 context

Description: Soil carbon removal projects in the value chain of WBCSD member companies

- We reviewed lessons learned from 4 WBCSD member projects that aim that aim to **increase soil organic carbon removals** in pursuit of scope 3 action. These projects are from a range of geographies and include practices to increase soil organic carbon, such as the introduction of cover crops, reduced till, catch crops and residue management.
- These companies are generating **inset credits** to measure, account and transfer the emissions removals.

Current MRV approach

- Key metric: **Total CO_2 sequestered through crop rotations**
- Members are following (either closely or fully) the **Verra VCS VM0042 methodology** for improved land management practices.
- There are a variety of approaches to the monitoring and verification of interventions. Most companies rely on manual data collection, primary data, soil sampling, remote sensing and carbon quantification tools that combine data types (e.g., Climate FieldView, Farm Carbon Calculator) or models (e.g., SALUS).

Deep dive 2: Soil organic carbon
Challenges and opportunities

Challenges and opportunities

As companies are investing in MRV of soil carbon removals to reach scope 3 targets, they highlighted several areas for attention:

- **Emissions inventory:** Projects needs to provide data in a way that can allow for inventory estimation, i.e., metric ton of CO_2 removed per metric ton of agricultural product produced in a year.
- **Allocation and conversion:** To include in scope 3 inventory, information on how to proportion farm-level removals to all the products coming from the farm needs to be available.
- **Removals:** There is a need to identify the best way forward to balance primary data needs with more scalable solutions, such as remote sensing and modelling. Further, the calculations need to quantify net annual carbon removals on farm, i.e., *net gain* in carbon stock.
- **Monitoring:** It is necessary to identify how to monitor for long periods of time and report potential reversals. Many methodologies do require monitoring (e.g., across the crediting period) but the time period may not be sufficient for GHG Protocol alignment.

Deep dive 2: Soil organic carbon

Alignment with requirements for scope 3 reporting under GHGP

Topic	Checklist for alignment	Focus for alignment
Inventory	Is there an annual inventory approach to account for emissions (required) and removals (optional)?	**Not yet aligned.** *The project outcomes show as a* credit *dissociated from a physical product in scope 3. It is essential to establish a physical connection between the reported emissions and removals of a farm and the farm's production to enable the assessment of the metric tons of CO_2eq per scope 3 volume of crop purchased per year.*
Reductions	Does the company estimate the reductions by the difference between two annual inventories and are the full annual inventories available?	**Not yet aligned.** *To count reductions in scope 3 inventory, it is necessary to assess year-to-year reductions in the overall emissions associated with the purchased volume of crop. This could use multi-year averages over a longer time period and would have to include physical connection to a produced and purchased volume.*
Removals	1. Are removals an annual C stock gain on a farm area? 2. Does the estimation of removals use primary data or a calibrated model? 3. Is the intention for the removals to be permanent? 4. Does the company monitor and report removals if reversed in the future? 5. Has it evaluated uncertainty?	1. **Sometimes aligned.** *Existing SOC methods report removals as a stock gain over a project area and time period but would need to be a yearly stock gain for inventory reporting instead. This requirement is independent from the type of SOC is measurement.* 2. **Aligned.** *Most projects use calibrated models or primary data from farmers.* 3. **Sometimes aligned.** *The tendency is toward the evaluation of removals over a short project period. Various methods, e.g., Verra AFOLU Non-Permanence Risk Tool, can check permanence risks. To align with the spirit of the GHG Protocol, the removals projects should have a long-term project plan or will risk reversal reporting.* 4. **Somewhat aligned.** *Buffer pools and monitoring over a project period may be in place; however, to align with GHG Protocol, it will be essential to report reversals when observed through monitoring and when monitoring stops (e.g., at the end of the project period).* 5. **Aligned.** *There is often an evaluation of uncertainty.*
Traceability	Is a chain of custody model in place?	**Not yet aligned.** *There is no clear chain of custody that tracks the physical volume of production outputs from various project sites to specific corporate supply chains. This would require having a clear chain of custody tracking physical products from projects to the scope 3 of a company in place.*
Conversion	Does the company account for the processing, waste or water weight gains or losses through drying and wetting when transforming a harvested crop to a purchased product?	**Not yet aligned.** *Instead of considering the full project outcome, it is necessary to tie the outcome to a quantity of product that includes any kind of downstream conversion (e.g., loss, gain of water or other types of processing).*
Allocation	Does the company proportion the agricultural emissions and removals measured on farms between all the products from those farms?	**Not yet aligned.** *Instead of considering the full project outcome, there is a need to tie the outcome to a quantity of product that includes the allocation of GHG emissions or removals from the project to the products (i.e., various crops) produced from the project farms.*

Deep dive 3: Nitrogen management

World Business Council for Sustainable Development

Deep dive 3: Nitrogen management

Background and scope 3 context

Description: Improvement of outcome-based farm nitrogen indicators in the value chain of WBCSD member companies

- We reviewed lessons learned from 4 WBCSD member projects, from a range of geographies, aiming to improve nitrogen management through practices such as control-released fertilizer and nitrification inhibitors.

Current MRV approach

- Members focus on **nutrient use efficiency (NUE)** as a key metric
  - NUE is a critical climate mitigation lever to decarbonize food production. It has many co-benefits – including nature. NUE is useful in understanding a *safe operating space* and setting guidelines or goals towards which agricultural systems should strive.
  - NUE is the ratio between nitrogen inputs entering the soil and the quantity of nitrogen leaving the soil (output). Key data required to measure NUE are: the harvested grain yield (t or kg/ha), nitrogen supply and harvested grain %N content (total or adjusted by protein content).
  - NUE can be an indication of the extent to which crops are *converting* fertilizer to either biomass or harvested components. It can also help in finding the threshold for the minimum N required to maintain yield and the maximum N surplus to avoid unnecessary environmental emissions.
  - Parameters which can influence NUE include management practices that align nitrogen supply with crop demand and nutrient availability in the soil (e.g., control-released fertilizer, nitrification inhibitors, etc.),as well as inherent soil properties and climate information or increasing yield.
- NUE integrates yield and N use. It is essential to interpret it with crop carbon footprint and absolute emissions (to prevent changes in efficiency masking increases in absolute emissions). Therefore, **total N_2O emissions** is another complementary metric.

Deep dive 3: Nitrogen management
Challenges and opportunities

Challenges and opportunities

As companies deploy programs to measure and improve nitrogen fertilizer management, members highlighted several areas for attention for scope 3 accounting:

- Generally, there is a need to **align the MRV approach along the supply chain**. Specifically, metrics assessed by agricultural input providers to monitor the outcome of the use of their sold products could be useful in monitoring scope 3 outcomes for companies purchasing agricultural products.
- Although reporting on NUE is a useful indicator, it is also necessary to **translate it into an emissions factor** for incorporation into a scope 3 inventory (per metric ton of agricultural product produced from project farms x volume purchased). The EF would need to include all aspects of land use and land management, as well as life cycle emissions such as fertilizer production.
- **Allocation and conversion considerations:** It is essential to consider how to proportion farm-level emissions benefits to all the products coming from the farm to perform scope 3 accounting.

Deep dive 3: Nitrogen management

Alignment with requirements for scope 3 reporting under GHGP

Topic	Checklist for alignment	Focus for alignment
Inventory	Is there an annual inventory approach to account for emissions (required) and removals (optional)?	**Not yet aligned.** *There is no physical connection between a farm's emissions and removals and its production in a way that can companies can estimate as metric tons CO_2eq per volume of crop product per year. Before and after N_2O emissions along with NUE values represent the project outcomes.*
Reductions	Does the company estimate the reductions by the difference between two annual inventories and are the full annual inventories available? Does it calculate reduction estimates by the difference between two annual inventories and are the full annual inventories available?	**Yes, but only for N_2O for upstream scope 3 category 1 (purchased goods).** *As companies implement farm-level interventions, it is necessary to measure fertilizer-related emissions factors at year 0 and year 1 from field-level data (planting date, tillage practices, fertilizer applications, pest management and crop yield). Field measurements allow for the measuring of the response of N_2O emissions to NUE. When incorporated with yield data, this can provide insights into the emissions factor of a crop. An improvement in NUE, however, will not always result in a reduction in fertilizer use but in higher yields at current levels of N and P input. Therefore, for companies with N_2O emissions as their downstream scope 3 category 11 (i.e., use of sold products by fertilizer companies) an emissions inventory may not reflect improvements in NUE (which only captures the full volume sold).*
Removals	1. Are removals an annual C stock gain on a farm area? 2. Does the estimation of removals use primary data or a calibrated model? 3. Is the intention for the removals to be permanent? 4. Does the company monitor and report removals if reversed in the future? 5. Has it evaluated uncertainty?	**Not applicable.**
Traceability	Is a chain of custody model in place?	**Not yet aligned.** *There is no clear chain of custody that tracks the physical volume of production outputs from various project sites to specific corporate supply chains.*
Conversion	Does the company account for the processing, waste or water weight gains or losses through drying and wetting when transforming a harvested crop to a purchased product?	**Not yet aligned.** *There is no consideration of tracking harvested crops to the various crop derivatives and products that flow downstream in the supply chain.*
Allocation	Does the company proportion the agricultural emissions and removals measured on farms between all the products from those farms?	**Not yet aligned.** *The outcome (i.e., NUE improvement translated to N-related emissions reduction) would require a link to a quantity of product that includes the allocation of GHG emissions or removals from the project to the products produced by the project farm.*

Conclusion

Scope 3 accounting needs to drive on-the-ground action. MRV is an enabler to improve accountability over time. It is essential to not delay climate action in agri-food value chains while waiting for perfect data.

Measurement, reporting and verification refers to systems that help enable companies to account for sustainability action.

Credibly tracking change is a technical challenge. Putting in place initiatives that enact change is an even bigger real-world challenge.

Aligning the realities of the agri-food system and accounting standards requires technical expertise and commercial agility.

There is a proliferation of accounting approaches due to the ambiguities of accounting rules and business realities.

By bringing clarity on data MRV, the aim is to bolster on-the-ground action.

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