Deforestation- and conversion-free supply chains and land use change emissions: A guide to aligning corporate targets, accounting, and disclosure

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Accountability Framework

In partnership with:

GREENHOUSE GAS PROTOCOL

SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

This guide is provided by the Accountability Framework initiative (AFi) to help companies and other users apply the Accountability Framework. This product is intended to be advisory only and is not intended to serve as a legal opinion or legal advice on the matters treated.

This is version 1.0 of this guidance. A revised version may be released following the release of the final version of the GHG Protocol Land Sector and Removals Guidance in 2023. Please provide any feedback on this document to Leah Samberg.

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Contents

Summary

This document guides companies on how to take an integrated approach to managing and monitoring deforestation, ecosystem conversion, and greenhouse gas emissions from land use change. It details how companies can use the Accountability Framework along with guidance from the Greenhouse Gas Protocol (GHG Protocol) and the Science-Based Targets initiative's Forest, Land and Agriculture (SBTi FLAG) project to set goals, measure land use change and related emissions, and disclose performance. It is designed to support companies in using these three references in concert so that they can simultaneously address land use change and associated GHG emissions related to agriculture and forestry production and trade in a credible manner.

This guide covers the following topics:

- SECTION 1 introduces the need for this guidance and describes each of the three references on which it is based.
- SECTION 2 explains key concepts related to supply chains and land use change that are relevant throughout this document, and on which the three initiatives have worked to align.
- SECTION 3 details the process of **target setting** for deforestation and conversion (following the Accountability Framework) and land use change emissions (following SBTi FLAG).
- SECTION 4 outlines methods used in **accounting** for deforestation and conversion in supply chains (following the Accountability Framework) and for scope 1 and scope 3 land use change emissions (following the GHG Protocol).
- SECTION 5 provides guidance on **reporting** on deforestation, conversion, and land use change emissions.

Introduction

The land sector, including agriculture and forestry, is responsible for more than a fifth of human-caused GHG emissions, half of which comes from carbon dioxide (CO_2) released during deforestation and conversion of other ecosystems for agricultural or forestry production.[1] This occurs via burning and decomposition of trees and other vegetation, release of soil carbon through plowing, and emissions released in draining of wetlands and peatlands.

The land sector has the potential to provide up to 30% of the climate change mitigation potential needed to limit global warming to 1.5 or 2°C, and the reduction of deforestation and forest degradation is one of the most effective mitigation activities available. In its Sixth Assessment Report, the IPCC therefore emphasizes the urgency for effort by all stakeholders to reduce land sector emissions. At the same time, because forests and other natural ecosystems are also essential for biodiversity, ecosystem services, and livelihoods, halting their conversion is also an essential step toward meeting targets for nature and sustainable development.

Companies that produce or source agricultural or forestry commodities are essential actors in the global effort to halt deforestation and ecosystem conversion and to reduce associated GHG emissions. For this reason, policymakers, investors, consumers, and civil society are increasingly asking companies to account for and reduce negative impacts associated with the products they produce, trade, and purchase.

New guidance from the Greenhouse Gas Protocol (GHG Protocol) and Science Based Targets initiative Forest, Land and Agriculture project (SBTi FLAG) released in September 2022 allows companies to account for impacts related to land use change (LUC) emissions in an accurate and standardized way.

> **The purpose of this document is to clarify how companies can use new guidance on land sector emissions in concert with the Accountability Framework's guidance on deforestation-and conversion-free supply chains to integrate their efforts to address land use change associated with agriculture and forestry.**

1 IPCC Sixth Assessment Report, 2022. https://www.ipcc.ch/assessment-report/ar6/

1. Integrated guidance on land use change in supply chains

This section describes each of the three references on which this guidance is based, and the ways in which they can be used in concert to support companies in setting targets, accounting for land use change, and disclosing progress.

1.1 Bringing together forest, ecosystem, and climate goals

Companies that produce or source agricultural and forestry commodities face a growing set of requirements and expectations from regulators, commodity buyers, investors, and civil society to address land use change in their operations and supply chains. These include:

- expectations that commodity production and trade do not contribute to deforestation or other ecosystem conversion; and
- expectations to measure, disclose and reduce emissions arising from land use change in their operations (scope 1 emissions) and supply chains (scope 3 emissions) as part of an overall corporate emissions reduction strategy.

These two sets of expectations were previously quite distinct, each carrying its own sets of rules and conventions. However, both require companies to follow the same set of processes:

- setting goals and targets to eliminate land use change associated with their operations and supply chains;
- measuring and accounting for that land use change at multiple scales; and
- disclosing performance and progress.

This document serves align expectations and methods on these three actions across deforestation/conversion and emissions reduction (see Figure 1). In doing so, it supports companies to manage for land use change and emissions reductions in an integrated and synergistic manner, with confidence that their efforts will be acceptable to their stakeholders.

Figure 1. What should companies do?

Summary of the integrated approach to target-setting, accounting, and reporting for land use change and associated GHG emissions associated with companies' agricultural and forestry supply chains.

	SET TARGETS Section 3	**ACCOUNT** Section 4	**REPORT** Section 5
Deforestation and ecosystem conversion	**Set no-deforestation/ no-conversion commitments** Guidance: • Accountability Framework When: • As soon as possible	**Account for Deforestation/ conversion in operations and supply chains** Guidance: • Accountability Framework When: • As soon as possible	**Report on progress toward deforestation/ conversion-free production and trade** Guidance: • Accountability Framework • This guide When: • As soon as possible using CDP Forests • 2023 using GRI 13
Land use change emissions	**Set land sector emissions targets** Guidance: • SBTi-FLAG When: • Targets required beginning April 2023	**Account for LUC emissions in operations and supply chains** Guidance: • GHG Protocol Land Sector and Removals Guidance When: • Pilot period: Q4 2022 • Final guidance: Q2 2023	**Report on land sector emissions** Guidance: • GHG Protocol Land Sector and Removals Guidance When: • As soon as possible, using current accounting methods. • 2023 guided by pilot process • 2024 using final guidance

1.2 Aligning three key sources of guidance for companies

To help achieve this needed alignment, a process of technical integration was conducted in 2021 and 2022 by the AFi, GHG Protocol, and SBTi to create strong interoperability between three pieces of guidance for companies working to address land use change and associated GHG emissions related to agriculture and forestry. Following is an overview of these three pieces of guidance.

The Accountability Framework

The Accountability Framework provides principles and guidance for achieving agricultural and forestry supply chains that are free of deforestation, conversion of other natural ecosystems, and human rights abuses. It is intended to support all companies that produce or source agricultural or forestry commodities in target setting, risk assessment, traceability, supplier management, monitoring, and reporting to achieve these goals. Its Core Principles, Operational Guidance, definitions, and tools and resources are all freely available for use by companies and other stakeholders.

The Framework was developed and is supported by a broad coalition of civil society organizations, and brings together accepted international norms, recognized best practices, and the expectations of commodity buyers, investors, and civil society into a single integrated resource to guide effective action.

Accountability Framework

View Guidance

The Greenhouse Gas Protocol Land Sector and Removals Guidance

The GHG Protocol Land Sector and Removals Guidance defines standardized best practices to account for GHG emissions from land use change and land management, as well as CO_2 removals, in companies' operations and supply chains. This guidance builds on the GHG Protocol's corporate GHG inventory standards to support companies that have land sector activities in their operations or supply chains in measuring, reporting, and managing progress toward meeting climate targets.

The Guidance was developed through an inclusive, multi-stakeholder process, led by the Greenhouse Gas Protocol, a partnership between World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) that establishes comprehensive global standardized frameworks to measure and manage GHG emissions. The draft guidance is available for review and piloting beginning in September 2022.

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The Science Based Targets initiative's Forest, Land, and Agriculture guidance

New guidance from the SBTi's Forest, Land, and Agriculture (SBTi FLAG) project allows companies to set science-based targets to reduce land sector emissions, including eliminating emissions from land use change, in operations and/or supply chains in line with the Paris Agreement climate goals to limit warming to 1.5°C or to "well below 2°C."

SBTi FLAG builds upon existing guidance from the SBTi in order to provide requirements and recommendations for science-based targets that apply to a company's forest, land, and agriculture related emissions, including CO_2 emissions associated with land use change.

The SBTi provides two approaches to FLAG target-setting to enable companies to define GHG reduction targets in line with the Paris Agreement:

- the FLAG sector approach for companies with diversified FLAG emissions; and
- the FLAG commodity approach for companies whose emissions are concentrated in one or more of eleven key commodities: beef, leather, chicken, dairy, corn/maize, palm oil, pork, rice, soy, wheat, and timber and wood fiber.

The SBTi is a partnership between CDP, the United Nations Global Compact, World Resources Institute (WRI) and the World Wide Fund for Nature (WWF), and the FLAG guidance was developed via a consultative process, including expert review groups, with key stakeholders.

Guidance for setting SBTi FLAG targets was published in September 2022 and is available for company use.

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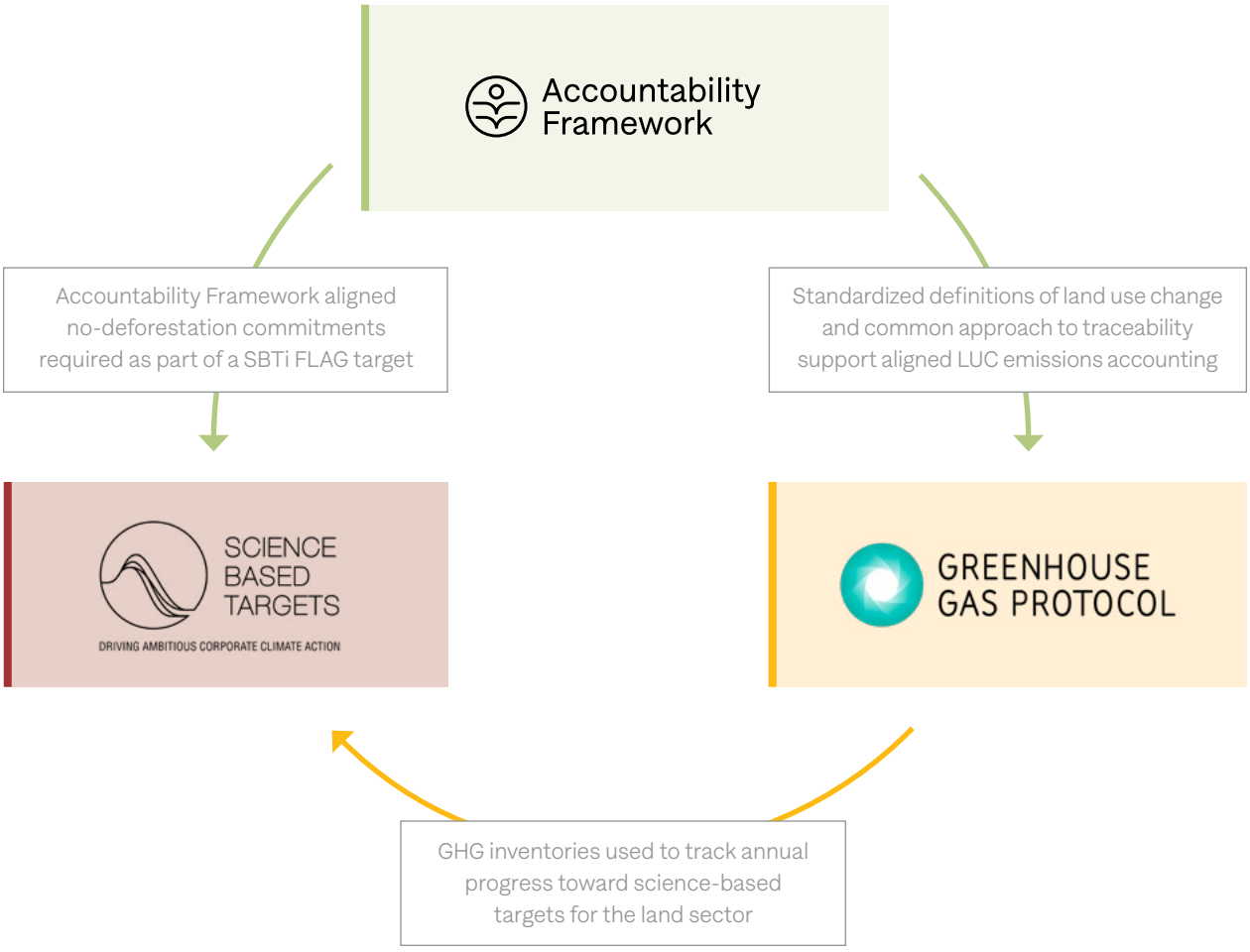
Relationship among these three references

These three pieces of guidance are designed to be use in concert with each other (see Figure 2). Specifically:

- The Accountability Framework supports the process of defining a SBTi FLAG target by specifying details for commitments to eliminate land use change, which SBTi FLAG requires.
- The Accountability Framework supports the GHG Protocol's emissions accounting process by defining the types of land use change that should be included and by specifying details for traceability and risk assessment mechanisms to document and assess supply chain footprints.
- The GHG Protocol Land Sector and Removals Guidance instructs users on how to carry out emissions inventories needed to set valid SBTi FLAG targets and to monitor progress toward meeting them.

Figure 2. Relationship among the three pieces of guidance



2. Alignment of key concepts

This section explains how key concepts have been aligned between the Accountability Framework, GHG Protocol, and SBTi FLAG guidance in the following areas:

- guidance for different supply chain actors based on their position in the supply chain and level of supply chain traceability (Section 2.1); and
- definitions of land use/land cover types and of land use change events such as deforestation and ecosystem conversion (Section 2.2).

Due to emissions accounting rules, one important aspect on which the GHG Protocol and SBTi FLAG guidance differ from the Accountability Framework is assessment period for accounting for deforestation and conversion. These differences and their ramifications are explained in Section 2.3.

2.1 Supply chain position and traceability

The Accountability Framework, GHG Protocol Land Sector and Removals Guidance, and SBTi FLAG guidance all apply to companies at every stage of the supply chain, from producers through retailers. The way in which companies set targets, account for land use change, and report impacts will differ based on their location in the supply chain and the level of traceability of purchased or embedded products. Therefore, each of these pieces of guidance provides differentiated guidance for companies given their role.

- **Companies that own, control, or manage production sites** for agricultural or forestry products should set targets and account for deforestation and ecosystem conversion in these production units, and emissions from these sites should be included in their scope 1 inventory and targets (see Box 1).
- **Companies that buy or source agricultural or forestry products** should set targets and account for deforestation or ecosystem conversion associated with materials in in their supply chains, and emissions from production units or sourcing areas in these supply chains should be included in their scope 3 inventory and targets (see Box 1).

Companies that have their own production operations and also purchase materials from suppliers should account for deforestation and conversion via both pathways, and should include both scope 1 and scope 3 emissions in their GHG targets and accounting mechanisms, according to the guidance in this document.

Box 1: Emissions scopes

The GHG Protocol classifies a company's GHG emissions into three scopes according to the company's relationship to the source of emissions. Scope 1 emissions are direct emissions from sources that the company owns or controls. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.

Traceability

For companies that purchase agricultural or forestry commodities, traceability is necessary to determine the origin of the materials in their supply chains and ascertain when land use change took place in these locations of origin.

Traceability may be facilitated by internal company systems, business-to-business disclosure by suppliers, third-party certification programs[2], or other methods for attaching information about origins to product volumes. Traceability to the production unit of origin is preferable in most cases and allows for the highest level of supply chain control and the most precise land use change accounting. However, recognizing that full traceability to production units is not always available, and that in some context a sourcing area or jurisdiction may be the most relevant scale for managing deforestation and conversion risks, this guide also explains how deforestation/conversion and associated emissions can be estimated at an area level (see Section 4.4).

2.2 Definitions of land use change

The GHG Protocol and SBTi FLAG have aligned their definitions and terminology related to land use change with the Accountability Framework to ensure that land use change scenarios are defined and treated consistently across target setting, measurement, and reporting on deforestation, conversion, and LUC emissions. The definitions in Box 2 are used across all three initiatives.

Land use change is a transition from one land use category to another, such as from forest to cropland. Land use change includes *deforestation* along with any other type of *natural ecosystem conversion* as defined by the Accountability Framework (see Box 2). Transitions between different agricultural systems, changes in management with agricultural systems, and transitions that increase rather than decrease carbon storage (for example, reforestation) are not considered land use change events by these three initiatives. Land use change considered by all three initiatives also includes the transition between natural and modified ecosystems in subcategories of land use, such as from natural forest to planted forest or from a natural grassland to an improved pasture.

Land use change (LUC) emissions are the emissions associated with such a transition, including CO_2 emissions associated with carbon stock losses as well as other GHG emissions that occur during land use change. The GHG Protocol's guidance on land use change and SBTi FLAG target pathways include emissions from deforestation and forest degradation, conversion of coastal wetlands, conversion of savannas and grasslands, and peatland burning. Figure 3 indicates the land use change transitions considered by the GHG Protocol, including sub-category land use change.

2 Not all certified materials or certification programs provide traceability to production units of origin. Typically, traceability to production units of origin is provided as part of segregated and identity-preserved chain-of-custody systems. However, mass balance and credit systems (e.g., book-and-claim systems) do not provide full traceability to origin.

Box 2: Accountability Framework definitions on land use and land use change

Forest: Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or other land use. Quantitative thresholds (e.g., for tree height or canopy cover) established in legitimate national or subnational forest definitions may take precedence over the generic thresholds in this definition.

Natural ecosystem: An ecosystem that substantially resembles—in terms of species composition, structure, and ecological function—one that is or would be found in a given area in the absence of major human impacts. This includes human-managed ecosystems where much of the natural species composition, structure, and ecological function are present.

Natural Forest: A forest that is a natural ecosystem. Natural forests include primary forests, regenerated forests, managed forests, and forests that have been partially degraded. Natural forests do not include tree plantations.

Deforestation: Loss of natural forest as a result of: i) conversion to agriculture or other non-forest land use; ii) conversion to a tree plantation; or iii) severe and sustained degradation. Loss of natural forest that meets this definition is considered to be deforestation regardless of whether or not it is legal.

Conversion: Change of a natural ecosystem to another land use or profound change in a natural ecosystem's species composition, structure, or function. Deforestation is one form of conversion (conversion of natural forests). Conversion includes severe degradation or the introduction of management practices that result in substantial and sustained change in the ecosystem's former species composition, structure, or function. Change to natural ecosystems that meets this definition is considered to be conversion regardless of whether or not it is legal.

Figure 3: Land use change transitions considered in the GHG Protocol Land Sector and Removals Guidance

Yellow boxes indicate types of conversion that are included in calculation of land use change emissions. Subcategory land use changes included in LUC emissions calculation are also shown here, with transition within forest categories (red box) and within grassland and wetland (purple box) categories shown below.

Pre-Conversion Land Use Category	Post-Converesion Land Use Category: Forest Land	Grassland	Cropland	Wetland	Settlement	Other Land
Forest Land	F → F	F → G	F → C	F → W	F → S	F → O
Grassland	G → F	G → G	G → C	G → W	G → S	G → O
Cropland	C → F	C → G	C → C	C → W	C → S	C → O
Wetland	W → F	W → G	W → C	W → W	W → S	W → O
Settlement	S → F	S → G	S → C	S → W	S → S	S → O
Other Land	O → F	O → G	O → C	O → W	O → S	O → O

Forest Subcategories	Natural Forest	Planted Forest
Natural Forest	NF → NF	NF → PF
Planted Forest	PF → NF	PF → PF

Grassland & Wetland Subcategories	Natural Ecosystem	Intensively Managed Land
Natural Ecosystem	NE → NE	NE → IML
Intensively Managed Land	IML → NE	IML → IML

Land use change with carbon stock losses (included in calculation)

Land management and/or land use change with carbon stock gain (not included in calculation)

Forest Subcategories

Grassland & Wetland Subcategories

Notes: "Planted forest" is a synonymous with "tree plantation" as defined by the Accountability Framework initiative

"Other land" includes bare soil, rock ice, and all unmanaged land areas that do not fall into any other the other five categories (IPCC 2003).

Source: IPCC (2003); IPCC (2019), Table 1.1.

2.3 Assessment period

All target setting and measurement related to deforestation, conversion, and LUC emissions requires specifying the time period over which land use change events are considered. This topic is treated differently between deforestation/conversion and LUC emissions.

Assessment period for deforestation and conversion

The Accountability Framework specifies that no-deforestation and no-conversion policies and commitments should include a *cutoff date*, which is the date after which deforestation or conversion on a given site renders the materials produced on that site non-compliant with the policy. Cutoff dates should align with existing sectoral or regional cutoff dates where they exist, such as the Amazon Soy Moratorium. The Framework states that cutoff dates for deforestation should not be later than 2020.

Cutoff dates should be used as the reference for assessing deforestation and conversion. When companies do not have cutoff dates associated with policies or commitments, a fixed reference date should be specified that is not later than 2020 and is recommended to be at least five years previous to the reporting year. All guidance in this document related to cutoff dates applies to those reference dates as well.

Assessment period for land use change emissions

In contrast to the cutoff date approach outlined above, LUC emissions accounting and target setting (guided by the GHG Protocol and SBTi FLAG, respectively) requires companies to measure land use change and corresponding emissions based on a retrospective assessment period of 20 years or longer, starting from the reporting year and looking back in time. If products have a crop cycle or rotation period greater than 20 years, then the assessment period should be at least as long as the rotation period. The length of the assessment period reflects the time that it takes for carbon stocks to reach a new equilibrium following land use change and in consideration of diverse land use change trajectories.

The GHG Protocol and SBTi FLAG guidance allow for flexibility in the approach used to allocate the total LUC emissions over the assessment period. Specifically, companies may choose to apply either linear discounting or equal discounting over time. See Chapter 7 of the GHG Protocol Land Sector and Removals Guidance for more detail.

Implications

These different approaches to defining the timeframe over which land use change is considered mean that production sites or sourcing areas with no deforestation or conversion since an appropriate cutoff date may still contribute to land use change emissions that are included in accounting. This may be the case when land use change events took place within the emissions assessment period but prior to the cutoff date (see Box 3).

Box 3: Example of calculations with two different assessment time frames

In this example, a company is preparing a 2022 report that includes in its scope palm oil sourced from a plantation that was established following the clearance of forested land in 2005. If the company uses a 2010 deforestation cutoff date, then palm oil from that plantation could be considered deforestation-free since the deforestation event in 2005 occurred before the cutoff date. However, the company would still need to account for LUC emissions since the land use change event in 2005 occurred within the 20-year assessment period for the reporting year of 2022. However, because emissions from LUC events are allocated across the assessment period, annual emissions accounting in 2022 for this conversion 17 years prior would only carry 1.75% (using linear discounting) or 5% (using equal discounting) of the total emissions associated with the establishment of the plantation.

3. Setting commitments and targets

Commitments and time-bound targets to halt land use change associated with commodity production and trade play an important role in communicating intention, accelerating progress, and supporting accountability for corporate action. The process of target setting requires companies to understand their current levels of performance and to determine the appropriate level of ambition for their policies. The Accountability Framework provides guidance on setting goals and commitments to eliminate deforestation and ecosystem conversion from commodity supply chains while SBTi FLAG provides guidance on targets for reducing emissions associated with forest, land, and agriculture.

3.1 No-deforestation/no-conversion commitments

The Accountability Framework states that all companies that produce or source agricultural or forestry commodities should have a commitment to eliminate deforestation and ecosystem conversion across all of their operations and supply chains. This expectation is also reflected in the policies or positions of numerous commodity buyers, investors, and industry and multi-stakeholder initiatives, among others. A commitment to no-deforestation and no-conversion operations and/or supply chains communicates a company's intentions to its customers, financiers, investors, and other stakeholders, and provides the basis for ongoing assessment of progress.

To foster clarity and consistency in how no-deforestation and no-conversion supply chains are defined and implemented, the Accountability Framework details the following elements of strong no-deforestation and no-conversion commitments.

Commitments should be comprehensive, in that they:

- apply across all segments of the company's business for which agricultural and forestry commodities pose environmental or social risks, including all sourcing origins
- apply to all supplies, including those produced in the company's own operations and those sourced from direct and indirect suppliers; and
- apply to all activities that finance or support commodity production, processing, and associated infrastructure.

Commitments should cover both deforestation and the conversion of all other natural ecosystems. Companies may either establish separate no-deforestation and no-conversion commitments, or they may set a broad no-conversion commitment that addresses natural forests as well as other natural ecosystems.

Commitments should be timebound, with an ambitious target date and timebound milestones. The AFi recommends that companies set or strengthen commitments to no-deforestation and no-conversion supply chains to include a target date that is as early as possible and no later than 2025.

Commitments should include a cutoff date, specifying the date after which deforestation or conversion renders materials non-compliant. The Accountability Framework states that cutoff dates should align with existing sectoral cutoff dates where possible, and that for no-deforestation commitments they should not be later than 2020.

Commitments should include or be accompanied by commitments to respect human rights, including the rights of Indigenous Peoples and local communities and the rights of workers.

3.2 SBTi Forest, Land, and Agriculture (FLAG) targets

Science-based targets (SBTs) specify how much and how quickly a company needs to reduce its greenhouse gas emissions to contribute to meeting the goals of the Paris Agreement, commensurate with the size and nature of the company's business and emissions profile and in line with current climate science.

Companies that have land use-intensive activities in their value chain are required to set FLAG targets as part of their broader SBT setting process in order to effectively include and address land-related emissions in their operations and supply chains. This requirement applies to companies engaged in food production, forest and paper products, food and beverage processing, and food and staples retailing, as well as other companies whose FLAG-related emissions comprise more than 20% of their total overall emissions.

FLAG targets are distinct from other SBTi targets which cover all fossil and industrial GHG emissions. SBTi FLAG guidance addresses a company's near-term FLAG targets; that is, targets to achieve reductions in the next ten years. Net-zero or long-term SBTi targets should also cover FLAG emissions and removals where relevant following the general SBTi Net-Zero Standard and guidance.

The SBTi provides the following guidance on the scope of a company's near-term FLAG targets relative to the scope of its operations and supply chains:

- FLAG targets must cover at least 95% of FLAG-related scope 1 and 2 emissions and 67% of FLAG-related scope 3 emissions. Scope 3 targets are not required to cover all scope 3 emissions in recognition that scope 3 emissions are influenced by but not directly controlled by the target-setting company. However, for science-based net-zero targets, the requirement for coverage of scope 3 emissions rises to 90%, in recognition of the need to reduce all emissions in order to have a credible net-zero target.
- A scope 3 target (for FLAG and non-FLAG emissions) is required if a company's scope 3 emissions are 40% or more of total emissions across all categories, including FLAG and non-FLAG emissions. For companies that meet this criteria, FLAG and non-FLAG emissions must be separated and each category covered at 67%: 67% of scope 3 FLAG emissions, and 67% of scope 3 non-FLAG emissions.

Companies that meet the above criteria for FLAG targets and do not yet have SBTs should set FLAG targets by April 2023. Companies have a pre-existing SBTs and that meet FLAG criteria are required to update their SBT to include a FLAG target by the end of 2023 or the end of 2024, depending on when their prior target was set. This phase-in period recognizes that some companies that issued SBTs under prior guidance may need to evolve their approach to address the FLAG requirements published in 2022.

The following sections provide additional detail regarding the treatment of land use change and the inclusion of a no-deforestation commitment as part of FLAG targets.

3.2.1 Land use change in SBTi FLAG emissions targets

Emissions from land use change are a primary component of emissions addressed through FLAG target setting, Emissions and removals from land management are also included in FLAG targets but are not addressed here.

LUC emissions considered in FLAG target setting includes emissions associated with:

- deforestation and forest degradation, including conversion of natural forest to plantation
- conversion of coastal wetlands (mangroves, seagrass and marshes);
- conversion, draining, and burning of peatlands; and
- conversion of savannas and natural grasslands.

When setting FLAG targets, land use change emissions should be assessed following the GHG Protocol Land Sector and Removals Guidance. Land use change may be assessed using the direct land use change methodology (based on production unit-level information) and/or estimated using the statistical land use change methodology (based on area-level calculations), depending on the available levels of traceability (see Section 4.1). In either case, assessments should follow the GHG Protocol Land Sector and Removals Guidance regarding the assessment period and allocation of total LUC emissions over this period.

Land management emissions and removals should also be calculated in accordance with the GHG Protocol Land Sector and Removals Guidance (see Section 4.5 of this guide).

3.2.2 SBTi FLAG requirement for a no-deforestation commitment

In addition to a science-based target for FLAG-related emissions reductions, the SBTi requires the publication of no-deforestation commitments as a complementary part of the FLAG target-setting and validation process. Because reducing emissions from deforestation is one of the highest priorities across FLAG decarbonization pathways, and to ensure that companies do not slow or delay their efforts to achieve deforestation-free operations and supply chains, companies setting FLAG targets are required to publicly commit to eliminating deforestation from their operations and supply chains.

No-deforestation commitments should take the following form: **"[Company X] commits to no deforestation across its primary deforestation-linked commodities, with a target date of [year, no later than 2025]."** Each company's no-deforestation commitment will be posted on the SBTi website alongside its FLAG SBT.

The SBTi recommends that companies follow the Accountability Framework to help meet their no-deforestation commitment and to extend such commitment to include no conversion of other natural ecosystems in accordance with current good practice.

While no-conversion commitments are not required by FLAG, the FLAG sector pathway includes emissions reductions from eliminating the conversion of all types of natural ecosystems, including wetlands, peatlands, savannahs, and grasslands. Thus, companies will need to take action to eliminate ecosystem conversion from their operations and supply chains in order to fulfill FLAG targets, whether or not they have established a no-conversion commitment.

4. Accounting for deforestation, conversion, and land use change emissions

In order to effectively set and achieve targets to reduce deforestation, conversion, and LUC emissions from operations and supply chains, companies must measure and account for land use change in credible and consistent ways. This section explains how to do so, based on the following references:

- This document, and other materials from the Accountability Framework, provide detailed guidance on accounting for deforestation and conversion associated with commodity production and sourcing.
- The GHG Protocol Land Sector and Removals Guidance provides best practice on accounting for scope 1 and scope 3 GHG emissions from land use change.

In all cases, the results of this land use change accounting should be disclosed using common indicators, such as those described in Section 5, for the full scope of a company's operations and supply chains.

This section addresses the following topics:

- SECTION 4.1 provides guidance on the scale at which to account for land use change and associated emissions.
- SECTION 4.2 details how deforestation and conversion can be converted into LUC emissions.
- SECTION 4.3 outlines requirements for land use change accounting at the level of the production unit.
- SECTION 4.4 outlines requirements for land use change accounting at an area level.
- SECTION 4.5 describes how land use change relates to other types of land sector emissions accounting.
- SECTION 4.6 provides guidance on accounting for deforestation- and conversion-free commodity volumes in a company's operations or supply chain.

4.1 Scale at which to assess land use change and associated emissions

Deforestation, conversion, and resulting LUC emissions may be assessed at different scales depending on the ability of the company to trace products through the supply chain to their origin, the extent to which that origin is associated with risk of deforestation or ecosystem conversion, and the appropriate scale of management given the context of production and sourcing.

There are three primary scales at which land use change may be assessed:

1. **Traceability to the production unit of origin** means that companies are able to trace[3] commodity volumes to specific mapped production unit(s), such as farms, ranches, plantations, or forest management units. The Accountability Framework defines a production unit as a discrete land area on which a producer cultivates crops, manages timber, or raises livestock[4]. A production unit will generally be a contiguous land area or proximate group of plots managed by the same owner, regardless of any internal subdivisions. Production units should be demarcated by geo-referenced boundaries (i.e., polygons), with the exception of small sites (e.g., less than 10 ha), for which one point coordinate near the center of the production may be sufficient.

3 Traceability to the production unit includes traceability carried out by the company itself as well as traceability achieved through the use of certification programs, service providers, or suppliers who are able to furnish property-level origin information to the company buying the product.

4 Production units may also be called land management units, which are defined by the GHG Protocol Land Sector and Removals Guidance as a predefined, spatially explicit area of a given land use, managed according to a clear set of objectives according to a single land management plan.

2. **Traceability to the sourcing area** means that products are traceable to a known area or region where the material was produced, but that the specific production unit of origin is not known. Sourcing area-level boundaries could include a sourcing radius from a first point of collection or processing facility (e.g., a radius from a palm oil mill), a defined production landscape (e.g. the area covered by a smallholder cooperative), or a subnational jurisdiction (e.g. municipality).

3. **Limited or no traceability** means that product can only be traced to a country of origin or that the origin of products is unknown. For these volumes, deforestation and conversion cannot be effectively calculated, but LUC emissions should be estimated using national or global boundaries (see Section 4.4.4). In all cases, companies should disclose these volumes as described in Section 5 and seek to improve traceability.

Emissions accounting based on level of traceability

As described in the GHG Protocol Land Sector and Removals Guidance, the way in which LUC emissions are calculated differs depending on the level of traceability. These different approaches are called direct and statistical land use change, respectively.

- **Direct land use change (dLUC)** refers to emissions (primarily from carbon stock losses) due to recent land conversion directly on the area of land that a company owns/controls or on specific lands in the company's value chain.
- **Statistical land use change (sLUC)** refers to emissions (primarily from carbon stock losses) due to recent land conversion within a landscape or jurisdiction. sLUC can serve as a proxy for dLUC where specific sourcing lands are unknown or when there is no information on the previous states of the sourcing lands. As the specific lands associated with production are unknown, sLUC metrics inherently contain some land use change emissions that may be driven by factors outside of commodity production relevant to a company's value chain (considered to be 'indirect land use change', see Section 4.5 for additional details) including conversion for other commodities or for subsistence farming.

Table 1: Appropriate measures of land use change and associated LUC emissions based on the company's supply chain position and on the available level of traceability

Level of traceability and monitoring	Position in the supply chain	Unit of analysis	Accounting metrics & methods for...	
			deforestation and conversion (disaggregated by commodity)	emissions from land use change
Production unit (Section 4.3)	Own operations (scope 1 emissions)	Own farms/ plantations	• Hectares of deforestation or conversion in operations since cutoff date • % of total ha owned or managed that this represents	Scope 1 dLUC (tons CO_2 equivalent)
	Supply chain (scope 3 emissions)	Known supply chain farms/ plantations	• Hectares of deforestation or conversion on production units in supply chain since cutoff date • % of total ha on known farms that this represents	Scope 3 dLUC (tons CO_2 equivalent)
Sourcing area (Section 4.4.1 and 4.4.2)	Supply chain (scope 3 emissions)	Known sourcing (e.g. mill sourcing radius, production landscapes, or subnational jurisdictions)	Hectares of natural ecosystem conversion in sourcing area since cutoff date that may be attributed to the company	Scope 3 sLUC (tons CO_2 equivalent)
Limited or no traceability (Section 4.4.3)	Supply chain (scope 3 emissions)	Country of origin	Volume of materials (and proportion of total) sourced from each country*	
		Unknown origin	Volume of materials (and proportion of total) sourced for which origin is unknown*	

* When there is limited to no traceability, hectares of deforestation and conversion cannot be estimated.

4.2 Converting deforestation and conversion into land use change emissions

Whatever scale of analysis is used, accounting for deforestation and ecosystem conversion is an essential input into accounting for LUC emissions. Companies should first identify the amount and location of known or estimated deforestation and ecosystem conversion in their operations and supply chains, and should disclose this information as detailed in Section 5.

Companies should then calculate the amount of GHG emissions associated with this deforestation and conversion within the relevant site- or area-level spatial boundaries over the assessment period. Emissions calculations should include:

- the difference between pre-conversion and post-conversion carbon stocks, including in aboveground biomass, belowground biomass, dead organic matter, and soil carbon (including peat soils)[5]
- any other relevant GHG emissions associated with the land use change event, such as methane (CH_4) and nitrous oxide (N_2O) emissions from biomass burning and N_2O emissions from cultivation of peat soils.

LUC emissions from these sources should be quantified as tons of CO_2 equivalent and reported per GHG source (e.g., CO_2, CH_4, and N_2O) and summed across all sources. These subtotals and totals should include emissions from all land sector sources in scope 1 and/or scope 3, as applicable.

Chapter 17 and 18 of the GHG Protocol Land Sector and Removals Guidance detail best practice for estimating carbon stocks using ground-based inventories, modeling, remote sensing, or hybrid approaches. Conversion factors and other data to support accounting may also be drawn for other sources including:

- The *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories Volume 4 on Agriculture, Forestry and Other Land Use*
- National GHG inventories and peer-reviewed scientific literature
- IPCC Assessment Report 6, which provides factors for converting CH_4, N_2O, and other greenhouse gases into CO_2 equivalent emissions

5 Carbon stock losses are converted to CO_2 emissions by multiplying by 44/12, which is the ratio of mass between a carbon atom and a CO_2 molecule into which carbon is converted upon burning or decomposition. For instance, one kilogram of biomass carbon will convert into 3.67 kilograms of CO_2 after that biomass is burned or aerobically decomposes.

4.3 Accounting for land use change at the level of the production unit

Monitoring land use change at the level of production units (e.g. farms, plantations, and forest management units) provides the greatest amount of precision about the impact of commodities in company operations and supply chains and is the best way to determine whether products are linked to recent[6] deforestation or conversion. Accounting for land use change at this level requires known and mapped locations of the given production units, demarcated by geo-referenced boundaries.

The role of any given company in monitoring and accounting for land use change at the site level may differ depending on its position(s) in the supply chain. Upstream supply chain actors (i.e., producers, primary processors, and traders with visibility to the production unit) are in the position to monitor on-the-ground conditions. They should directly monitor and document land use change and furnish downstream buyers with information about land use change associated with the products being sold. Downstream companies that purchase commodities or derived products may assess recent deforestation and conversion at the site level by gathering data collected by their suppliers, monitoring known production sites directly using spatially explicit remote sensing data, or using third-party certification schemes with chain of custody models that provide traceability to origin.

When accounting for deforestation and conversion at the site level, all conversion in the production unit that has occurred since the cutoff date (for deforestation/conversion) or during the assessment period (for LUC emissions) must be included, regardless of the current use of that land (i.e., whether it is used to cultivate the commodity of interest, to cultivate another commodity, has not yet been cultivated, or is not currently being cultivated).This inclusive approach is necessary to

- ensure that emissions accounting accurately reflects the actions of the producer, as the production unit is typically a single economic unit in which management decisions about the commodities of interest are interdependent with other land uses and land use change within the production unit; and
- account for management practices such as crop rotations and fallows as well as progressive conversion trajectories, such as from pasture to cropland or logging followed by plantation establishment.

Companies accounting for land use change emissions at the level of the production unit will use the direct land use change (dLUC) method to account for emissions from production units that the company owns/controls (scope 1 emissions) or that are known to be in the company's supply chain (scope 3 emissions).

6 'Recent' describes conversion since the cutoff date or within the assessment period.

Steps for land use change accounting at the level of the production unit

Companies should apply the following steps to account for land use change and associated emissions at the scale of the production unit:

1. Identify the spatial boundaries of production units owned or managed by the company or known to produce materials in a company's supply chain.
2. Identify land use change events that occurred within the spatial boundary since the cutoff date and during the emissions assessment period (see Section 2.3).
    - Deforestation and conversion identified since the cutoff date should be reported through appropriate indicators (see Section 5).
    - If there has been no deforestation or conversion on a production unit since the cutoff date, then product volumes from that production unit may be considered deforestation/conversion free (see Section 4.6).
3. Calculate LUC emissions based on carbon stock losses and other GHG emissions associated with land use change within the production site boundary (see Section 4.2).
4. Allocate LUC emissions over the time of the assessment period using linear discounting or equal discounting to determine the level of land use change emissions that must be accounted for in each given reporting year (see Section 2.3).
5. For companies sourcing from production units that produce multiple products, allocate LUC emissions by year to products produced within the spatial boundary using physical allocation by mass or volume, economic allocation, or area-time allocation to determine LUC emission factors per year and product type. See Chapters 7 and 17 of the GHG Protocol Land Sector and Removals Guidance for more information.
6. Calculate LUC emissions in the reporting year for the production unit (scope 1) or products sourced from the production unit (scope 3) based on dLUC emissions allocated by year and product type. See Chapters 7 and 17 of the GHG Protocol Land Sector and Removals Guidance for more information.
    - For scope 1, report dLUC emissions allocated to the reporting year for all LUC occurring within the assessment period and spatial boundary
    - For scope 3, multiply dLUC emissions factors allocated by year and product type by the volume of each product sourced from the production site in the reporting year.

4.4 Accounting for land use change at an area level

As described in Section 4.1, it is sometimes not possible or appropriate to assess land use change at the scale of specific production units in a company's supply chain.

In these cases, both supply chain deforestation/conversion and scope 3 land use change emissions may be accounted for at the scale of a sourcing area in which production units are located. Depending on the location, production context, and commodity, a sourcing area may be the supply-shed of a processing facility (such as a radius surrounding a palm oil mill), a production landscape (such as the area encompassing a smallholder cooperative), or a subnational jurisdiction.

When sourcing areas are not known, LUC emissions may be estimated at national or global scales.

Assessments at an area level serve as a proxy for direct land use change, and emissions accounting uses statistical land use change (sLUC) methods. By providing an estimate of land use change potentially allocated to a given product, sLUC inherently also considers some amount of *indirect land use change* – that is, pressure by expansion of one commodity that may lead to LUC for another commodity (see Section 4.5).

4.4.1 When land use change may be assessed at the level of a sourcing area

Accounting for deforestation and conversion associated with agricultural and forest commodities at the scale of a sourcing area may be appropriate in a range of circumstances, including when:

- Downstream companies do not have physical traceability to the production unit level and may therefore need to monitor land use change at the sourcing area level as the best available option. In this case, the sourcing area should be the smallest geographic area from which commodity volume is known to originate, and companies should also take steps to increase traceability of these volumes.
- A sourcing area is the most relevant scale for managing deforestation and conversion risk, for example where:
    - Upstream companies such as primary processors source commodity volumes from a specified radius or source-shed around their facilities without maintaining long-term buying relationships with specific producers.
    - Companies source from smallholder producers whose materials are aggregated at the level of a co-op or collection point and where further traceability is not possible.
- Companies source from jurisdictions or landscapes where it can be shown that there has been no or negligible recent conversion. In these cases, companies may find it cost-effective to monitor deforestation/conversion at the level of such areas. Doing so requires regular monitoring to assess or confirm the risk status of these jurisdictions and identify any changes in risk status.

4.4.2 Methods to allocate land use change in a sourcing area to commodity volumes

There are many approaches to allocating area-level data on land use change to commodity volumes sourced from that area, and improved data and methodologies are rapidly being developed. All such methods utilize remote sensing data repeated over the relevant time frames as well as statistics about agricultural production and land use in the area.

Land use change included in the allocation process

It is recommended that, when allocating land use change at an area level to specific commodity volumes, all land use change that may be related to agriculture (for crop or livestock products) or forestry (for forest products) is included in the analysis. Consideration of all agriculture- or forestry-related land use change allows companies and others to best account for varied land use change trajectories or indirect land use change pressures, providing an appropriately conservative approach to allocation.

Time frame of land use change included in the allocation process

When accounting for LUC emissions, the 20-year or longer assessment period should be used to calculate land use change to be allocated.

When accounting for deforestation and conversion, the cutoff date should be used to calculate the land use change to be allocated. When a sectoral or commitment cutoff date does not exist, a fixed reference date should be specified that is not later than 2020 and is recommended to be at least five years previous to the reporting year.

Possible allocation approaches

The GHG Protocol provides two recommended approaches for allocating land use change in a given area:

1. allocation based on land occupation
2. allocation based on commodity expansion

Table 2 provides descriptions of these two approaches, and Chapters 7 and 17 of the GHG Protocol Land Sector and Removals Guidance for additional detail on applying allocation methods to LUC emissions.

Table 2: Approaches to allocation of land use change at the level of a sourcing area

Basis for allocation	Method	Data needs specific to allocation approach	Data needs common to both allocation approaches
Relative land occupation *Called 'shared responsibility approach' by GHG Protocol*	Allocate recent land use change across products based on the relative land area occupied by each product	Total land area in agriculture and/or forestry in sourcing area Amount of land area in production for commodity of interest in sourcing area	Area of LUC in sourcing area • deforestation/conversion associated with agriculture and/or forestry since cutoff date • associated LUC emissions for each year of assessment period Quantity of commodity of interest produced in the area Quantity of commodity of interest sourced by the company from the area
Relative product expansion *Called 'product expansion approach' by GHG Protocol*	Allocate recent land use change across products based on the relative area of expansion for each product	Total area of expansion of agriculture and/or forestry production since cutoff date and in each year of the assessment period Expansion of production area of commodity of interest since cutoff date and in each year of the assessment period	

Other allocation methods may be used if they meet the above criterion of considering all agricultural or forestry related land use change in the sourcing area. Especially when commodities are a relatively small component of land use in an area, other more context-specific approaches may be warranted.

Allocation approaches based on product-specific conversion – those which only consider land use change on land currently used for the production of a given commodity – may not effectively account for land use change trajectories in a sourcing area and therefore may not be credible. Such methods may be assessed through the piloting process of the GHG Protocol Land Sector and Removals Guidance, and determination of whether this approach (called 'spatially explicit sLUC approaches' by the GHG Protocol) will be acceptable for LUC emissions accounting will be made following that period.

In all cases, the method and data sources used to allocate land use change and associated emissions to products within a sourcing area should be clearly disclosed.

Steps for land use change accounting at the level of a sourcing area

Companies should apply the following steps to account for land use change and associated emissions at the level of a sourcing area. See Section 4.4.3 for guidance on commodity volumes for which traceability to this level does not exist.

1. Select an appropriate spatial boundary based on physical traceability of the product to a given area, for example a sourcing region or subnational jurisdiction.
2. Use suitable data products to identify all areas within the spatial boundary where land use changed from a forest or other natural ecosystem to agriculture or plantation forestry since the cutoff date (for deforestation/conversion accounting) and within the assessment period (for LUC emissions accounting).
3. Allocate deforestation and conversion identified since the cutoff date to product volumes, using one of the approaches identified in Table 2 or a similar credible method.
    - Deforestation/conversion footprint should be reported through appropriate indicators (see Section 5), along with information on allocation methods and data sources.
    - If no land use change is identified within a given sourcing area, then volumes sourced from that area may be considered deforestation/conversion free (see Section 4.6).
4. Calculate LUC emissions based on carbon stock losses and other GHG emissions associated with the land use change in the spatial boundary (see Section 4.2).
5. Allocate LUC emissions over the time of the assessment period using linear discounting or equal discounting to determine LUC emissions that must be accounted for in each given reporting year (see Section 2.3)

6. Allocate LUC emissions to products produced within the spatial boundary using one of the two methods presented in Table 2 to determine LUC emission factors per year and product type, and disclose and explain the approach selected. Chapters 7 and 17 of the GHG Protocol Land Sector and Removals Guidance provides details for applying allocation methods.
7. Calculate LUC emissions for products sourced from the area by multiplying sLUC emissions factors allocated by year and product type to the volume of each product sourced from the area in the reporting year.

4.4.3 Land use change accounting at the national or global level

When the origins of materials are known only to the level of a country, or not at all, there is no way to estimate the amount of potential deforestation/conversion linked to these volumes, or to claim them as deforestation- or conversion-free. In these cases, such volumes should be disclosed transparently as volumes from a known country or as unknown volumes, respectively (see Section 5).

In contrast, LUC emissions from these volumes may be estimated and reported using national or global level LUC emissions factors. For commodity volumes that can only be traced back to a country of origin, companies should multiply such volumes by a country-specific LUC emission factor, specific to the product type and reporting year, to estimate LUC emissions. For volumes of unknown origin, a global LUC emission factor should be used, specific to the product type and reporting year. LUC emission factors should be from published peer-reviewed sources that follow the area level sLUC methods described in Section 4.4.3 using a national or global spatial boundary to calculate LUC emissions and allocate LUC emissions to products.

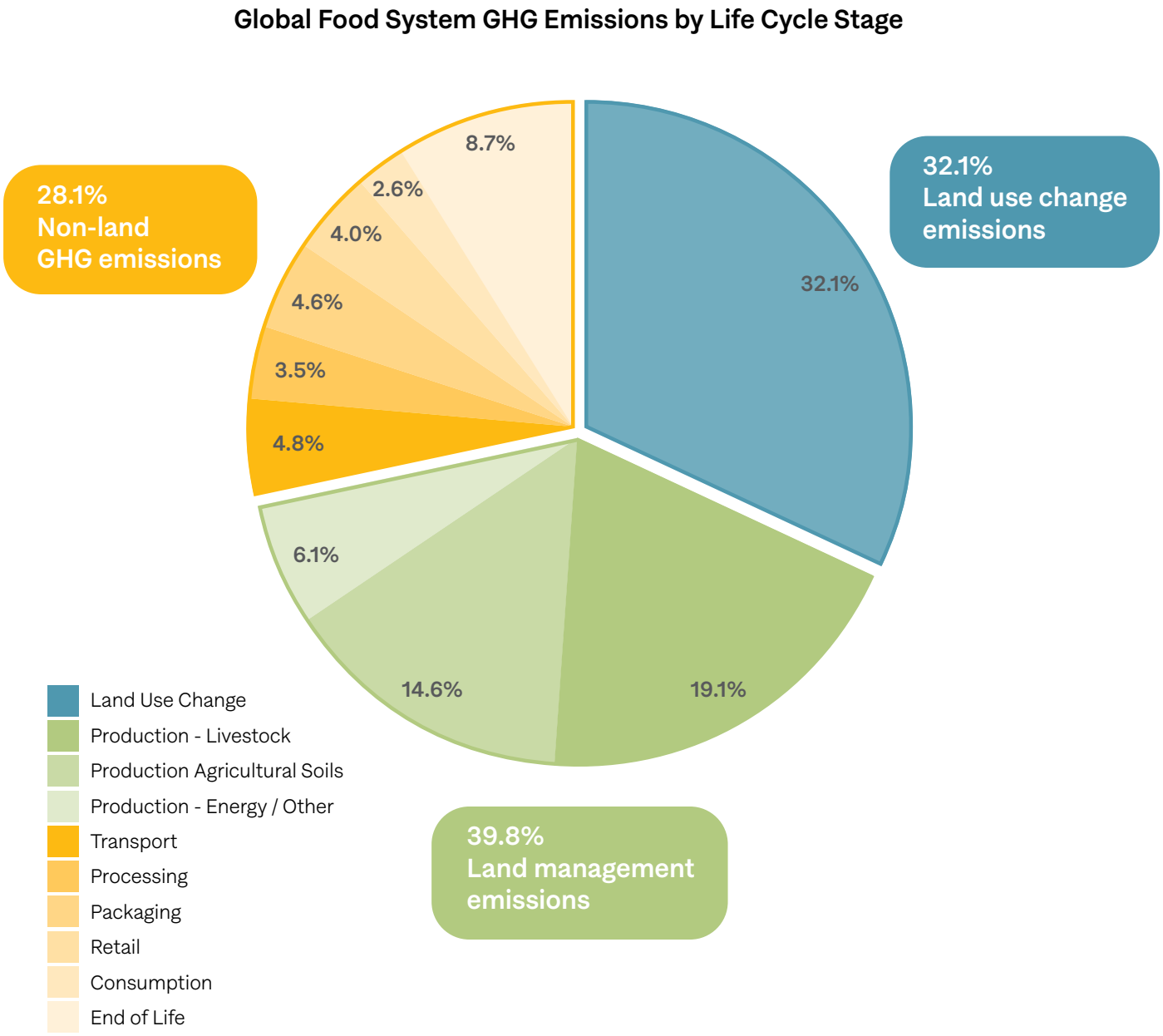
4.5 Other land sector metrics for corporate GHG inventories

Although land use change is a major source of GHG emissions from agricultural and forestry supply chains, there are several other components of land sector emissions inventories. For example, LUC emissions make up roughly one third of GHG emissions from the food system, while the other two thirds of emissions come from other processes associated with production and the product life cycle (see Figure 4). In addition to LUC emissions, companies developing corporate GHG inventories are also required to report on the following other emissions categories:

- Net CO_2 emissions and removals from land management
- Non-CO_2 GHG emissions from land management
- One or more metrics related to indirect land use change impacts
- Other lifecycle GHG emissions associated with the product

This section briefly describes these additional accounting and reporting categories, which are explained in detail as part of the corporate GHG inventory in the GHG Protocol Land Sector and Removals Guidance.

Figure 4: Share of global food system GHG emissions in 2015, broken down by product life cycle stage, adapted from Crippa et. al, 2021[7]. Total emissions from the global food system in 2015 was 17.8 gigatons of CO_2-equivalent.



7 Crippa, M., et al., 2021. Food systems are responsible for a third of global anthropogenic GHG emissions. Nature Food 2, 198-209.

Net CO_2 emissions and removals from land management

Land management emissions and removals refers to carbon stock changes that occur on lands apart from and additional to land use change. Carbon stock changes include the net change in aboveground biomass, belowground biomass, dead organic matter, and soil carbon pools.

Companies must measure annual net carbon stock changes on lands they own or manage (scope 1) or in their value chain (scope 3) to account for and report on the net CO_2 flux from land management. This includes:

- Where the net carbon stock change is decreasing (e.g. due to forest degradation or cropland soil degradation) companies report land management net CO_2 emissions; and
- Where the net carbon stock change is increasing (e.g. due to improved forest management, regenerative agriculture practices, or on-farm conservation areas and set-asides) companies that meet additional requirements and criteria have the option to report land management net CO_2 removals.

Chapters 6, 8 and 19 of the GHG Protocol Land Sector and Removals Guidance provide requirements, accounting guidance, and methods for calculating land management net CO_2 emissions or removals. These chapters also present additional requirements for ongoing monitoring of carbon storage, traceability, primary data, uncertainty, and reversals accounting to ensure robust reporting on CO_2 removals and to address non-permanence risks associated with CO_2 removals and the ongoing storage of terrestrial carbon.

Non-CO_2 emissions from land management and other lifecycle GHG emissions

Non-CO_2 emissions from land management include methane (CH_4) and nitrous oxide (N_2O) emissions from livestock (e.g. CH_4 emissions enteric fermentation and GHG emissions from manure management), N_2O and CO_2 emissions from inputs to agricultural soils (e.g. N_2O emissions from nitrogen fertilizer application and CO_2 emissions from lime and urea), GHG emissions from biomass burning (e.g. GHG emissions from crop residue burning), and CH_4 emissions from rice production. Companies are also required to account for other lifecycle GHG emissions from energy use, fuel consumption and refrigerants used during production, transportation, processing, packaging, retail, consumption and end of life treatment.

Chapters 8 and 19 of the GHG Protocol Land Sector and Removals Guidance provides requirements, accounting guidance and methods for calculating land management non-CO_2 GHG emissions. The GHG Protocol Corporate Standard and Scope 3 Standard provide general requirements and guidance for accounting for other life cycle GHG emissions.

Land tracking metrics

In addition to the emissions that result directly from a company's operations and supply chains, company activities may induce additional impacts by driving demand for land in the context of regional or global commodity markets. For example, due to the global nature of commodity markets, the demand for soy from a company that sources soy only from North America may

indirectly drive the expansion of soy production in Brazil into forests and savannahs. Similarly, this same company's demand for North American soy may displace other crops, such as corn or wheat, resulting in the expansion of these displaced crops into native grasslands.

To track such indirect impacts associated with the demand for productive land, the GHG Protocol Land Sector and Removals Guidance introduces three different land tracking metrics:

- **Indirect land use change:** Emissions due to recent land use change on lands that are not owned or controlled by the company, or within its value chain, but where land use change was induced by an increase in the supply of products produced by the company and/or the demand for products sourced by the company
- **Carbon opportunity cost:** Emissions from total historical carbon losses from plants and soils on lands productively used (this quantity also represents the amount of carbon that could be stored if land in production were allowed to return to native vegetation)
- **Land occupation:** The amount of land occupied for a certain time to produce a product

Companies following the GHG Protocol's guidance must account for at least one of these three metrics to track the impacts their operations or value chain has on global land use. However, indirect land use change does not need to be included in an SBTi FLAG target, and carbon opportunity cost and land occupation, by their nature, cannot be included in a FLAG target. Chapters 7 and 17 of the GHG Protocol Land Sector and Removals Guidance provide requirements, accounting guidance and methods for calculating each of the land tracking metrics.

4.6 Accounting for deforestation- and conversion-free volumes

In addition to measuring and reporting their deforestation and conversion footprint (using the methods described in Sections 4.3 and 4.4), companies are encouraged to assess and report the proportion of volumes in their operations and supply chains that can be considered as deforestation- and conversion-free (DCF)[8]. DCF signifies that materials did not originate on production units on which conversion from forests or other natural ecosystems occurred after a specified cutoff date. DCF volumes should always be reported in relation to the full volume of each commodity that the company produced or sourced in the reporting period.

Reporting on DCF volumes enables companies to be transparent about the progress they are making toward meeting no-deforestation or no-conversion policies. It also enables the company's business partners (e.g., buyers, financers, and investors) to make informed decisions to meet their own DCF commitments or obligations.

8 If a company has only a no-deforestation commitment, and does not yet have a commitment that includes conversion of other ecosystems, then the following guidance can be applied to deforestation-free volumes.

Box 4: DCF supplies vs. suppliers

Product-level inventories such as those of the GHG Protocol, as well as many DCF policies, focus on land use change associated specifically with the product volumes that a company currently produces or sources. This guide allows for goal-setting, accounting, and reporting according to this product- and volume-based approach.

However, past efforts to implement DCF supply chains using only a volume-based approach have revealed important limitations in that they may result in companies sourcing DCF material in the short term without significantly mitigating deforestation and conversion on the ground. This approach may also enable suppliers to sell DCF volumes to companies that demand them while continuing to engage in land clearance for other commodities, on other production units, or for volumes destined for other buyers that do not have DCF criteria.

To address limitations of the volume-based approach, the Accountability Framework strongly encourages companies also to assess and mitigate deforestation and conversion risk at the level of their suppliers (both direct and indirect) and sourcing origins (e.g., landscapes and sub-national jurisdictions). Companies should therefore engage with their suppliers to encourage or require them to adopt, implement, and report on commitments to DCF production and trade across their entire business. This may also require providing incentives and support to suppliers to implement these policies.

The expectation for downstream companies to address DCF risk both through volume-based controls and more broadly at the supplier and origin levels has become increasingly accepted as the necessary and appropriate approach for company action on deforestation and conversion. It is reflected, for example, in the commodity roadmaps of the Consumer Goods Forum's Forest Positive Coalition, which represents 22 member companies working to leverage collective action and accelerate systemic efforts to remove deforestation, forest degradation, and conversion from key commodity supply chains. Member companies expect their suppliers to have a public DCF commitment across their entire commodity business, including a public time-bound action plan with clear milestones. Suppliers are also expected to encourage their own suppliers to transition to DCF practices company-wide, thus cascading DCF expectations upstream.

4.6.1 Approaches to assessing DCF volumes

The DCF status of commodity volumes may be assessed via any of the following three approaches:

- **Production unit level monitoring:** When a company knows the boundaries of production units in its own operations or from which it sources, DCF volumes may be assessed directly by determining whether there has been deforestation or conversion on each production unit after the relevant cutoff date. This information may also be passed from suppliers to buyers via business-to-business supply chain control mechanisms. Where suppliers are able to provide reliable data to their buyers regarding the DCF status of volumes that they are supplying, based on site-level assessment, this may greatly decrease the monitoring burden on downstream companies. However, it is incumbent upon buyers to ensure that any such information is reliable; independent verification may thus be required.
- **Certification:** Volumes may generally be considered DCF if they have been certified according to a standard whose criteria prohibit deforestation and conversion after a stated cutoff date and when using a chain of custody model that allows products to be linked to the site on which they were produced. Segregated and identity preserved mechanisms meet this criterion, while mass balance, mixed, and crediting systems generally do not. When using a certification programme to demonstrate DCF, buyers should exercise due diligence to ascertain that the both the requirements and the implementation of the certification programme are sufficiently robust to provide a high level of confidence regarding DCF status.
- **Sourcing area level monitoring:** Where companies can trace materials to a sourcing area in which no or negligible deforestation/conversion has occurred since an appropriate cutoff date, they may generally consider all volumes sourced from that area to be DCF. If using this approach, companies must continue to monitor such sourcing areas to identify any change in the occurrence or risk of deforestation or conversion. Monitoring at this scale should include all deforestation/conversion, not only land use change directly linked to the commodity of interest. If there is recent ecosystem conversion linked to agriculture or forestry in a sourcing area, regardless of the direct driver or current land use, DCF claims should not be made without further due diligence, monitoring, and assurance. This may necessitate monitoring at a finer scale and/or using data related to expansion of the commodity of interest or other publicly available information. Companies using this approach should disclose the methodology and data used.

4.6.2 Methodological considerations for calculating DCF volumes

The determination of DCF volumes depends on multiple parameters that define what constitutes DCF. When calculating DCF volumes, companies should choose appropriate parameters following the guidance below so that the reported figures are credible and interpretable to stakeholders. Companies should also disclose these methodological choices alongside their reporting on DCF volumes.

Inclusion of all origins

Reporting on DCF volumes should be done for all volumes that a company produces or sources, regardless of origin. DCF reporting should not be limited to specific regions of interest, since this could exclude important impacts associated with other sourcing regions.

Cutoff date selected

As described in Section 2.3, no-deforestation and no-conversion commitments should include a cutoff date, identifying the year after which deforestation or conversion renders the materials produced on that land non-compliant with those policies. The cutoff date provides the basis to calculate DCF volumes.

The date selected will clearly affect the proportion of supply chain volumes that can be considered DCF. Later cutoff dates, such as 2020, will implicate a smaller proportion of material than earlier dates such as 2014. This is a primary reason why the Accountability Framework recommends that companies work to align their cutoff dates with peers in their sector to provide consistency in the definition of DCF volumes within sectors and regions.

Consideration of the whole production unit

When products are traceable to the level of the production unit, determination of (and claims about) DCF volumes should be made at the level of the production unit.[9] In other words, if there has been more than a minimal level[10] of deforestation/conversion on the production unit since the cutoff date, none of the volumes from that production unit may be considered DCF. This includes cases in which conversion occurs on the same production unit but is not currently used for the commodity of interest. For example, if a company buys soy from a farm on which recently cleared land is currently being used for pasture, that soy should not be considered DCF. In some cases, it may be possible for post-cutoff date conversion to be remediated, thus bringing the production unit back into compliance and enabling materials from that production unit to be considered DCF. See the Accountability Framework Operational Guidance on Environmental Restoration and Compensation for more information.

9 See Section 4.3 for explanation of the reasons for this approach.

10 The Accountability Framework defines 'minimal level' as a small amount of deforestation or conversion that is negligible in the context of a given site because of its small area and because it does not significantly affect conservation values of natural ecosystems or the services and values they provide to people. In determining whether land use change is minimal, deforestation and conversion should be assessed cumulatively over space and time.

Box 5: Consideration of the whole production unit and the Amazon Soy Moratorium

While consideration of the whole production unit in measuring conversion and assessing DCF volumes is recommended, some existing mechanisms do not use this approach, such as the Amazon Soy Moratorium (ASM).

Specifically, the ASM applies only to land that is presently under soy production, and its requirements are assessed at the level of individual farm plots, which could be sub-units within a production unit. While the ASM has been effective in curbing soy-related deforestation at a large scale in the Amazon[11], experience since 2006 has also demonstrated the limitations of focusing only on farm plots of a single commodity. This approach has enabled owners to comply with the ASM while continuing to engage in conversion for other commodities on the same production units where ASM-compliant soy is produced[12].

To address this limitation, companies whose operations or sourcing are subject to regulatory or supply chain mechanisms that do not follow a whole-farm approach (such as the ASM) should continue to abide by those mechanisms while they shift to the whole production unit approach for managing and assessing DCF compliance.

Land ownership

Production unit-level analysis of deforestation/conversion and DCF volumes should consider all deforestation and conversion that has occurred on the production unit since the cutoff date regardless of whether land ownership has changed over this period. For example, if a soy farmer purchased pastureland to plant a new soy crop, the land use change analysis should consider whether establishment of the former pastureland involved any ecosystem conversion after the cutoff date.

11 Heilmeyr R., et al. 2020. Brazil's Amazon Soy Moratorium reduced deforestation. Nature Food volume 1, pages 801–810

12 Rajao et al., 2020. The Rotten Apples of Brazil's Agribusiness. Science Volume 369, No 6501

5. Reporting on deforestation, conversion, and LUC emissions

This section explains how information on deforestation/conversion footprint, land sector emissions, and DCF volumes (based on the methodologies described in Section 4) should be reported and disclosed. This guidance follows reporting recommendations on deforestation and conversion from the Accountability Framework and on GHG emissions from the GHG Protocol Land Sector and Removals Guidance. It also explains how key reporting platforms and standards may be used to guide disclosure in accordance with these recommendations.

- SECTION 5.1 describes good practice for reporting on each type of accounting presented in Section 4.
- SECTION 5.2 then provides a set of recommended indicators across all topics included in this document.

For more detailed information on reporting on these topics, see:

- The Accountability Framework's Operational Guidance on Reporting, Disclosure, and Claims and User Guide for Reporting
- Chapter 14 of the GHG Protocol Land Sector and Removals Guidance for a list of relevant reporting requirements to be included in a GHG inventory report.

5.1 Guidelines for reporting on land use change

This section outlines recommended approaches for companies to report on each aspect of land use change and associated GHG emissions described in Section 4.

Reporting on LUC emissions

Based on their accounting of land use change emissions, companies should report all of the following that apply to their business:

- Scope 1 LUC emissions (this should be reported separately from land management net CO_2 emissions and removals and from land management non-CO_2 emissions)
- Scope 3 LUC emissions, disaggregated by product type (this should be reported separately from land management net CO_2 emissions and removals and from land management non-CO_2 emissions)
- Data sources, methods, and assumptions used to quantify LUC emissions
- Scope 1 and 3 land tracking metric(s), as well as data sources, methods, and assumptions used to quantify land tracking metrics

Chapter 14 of the GHG Protocol Land Sector and Removals Guidance provides the full set of reporting requirements and guidance relevant to land sector emissions and removals.

LUC emissions can be reported via the CDP climate questionnaire or other platforms that allow for emissions disclosure. It may also be included in company sustainability or climate reports, in which case such reporting should follow applicable standards of the Global Reporting Initiative, particularly topic standard 305 (emissions) and GRI 13 (Agriculture, Aquaculture, and Fishing sector standard).

Reporting on deforestation and conversion in operations and supply chains

Companies should report on the deforestation and conversion footprint of their operations and of commodity volumes in their supply chains to the best of their knowledge. These footprints should be reported by commodity, and should include all volumes produced or sourced by the company. Disclosures of product footprints calculated at the sourcing area level should include a description of calculation methods and data sources (see Section 4.4). Volumes for which deforestation/conversion footprint are not known or cannot be estimated at a sourcing area level should be reported as unknown. Deforestation and conversion footprint can now be reported using the CDP forests questionnaire (see Box 6).

Reporting on DCF volumes

Companies should report on the amount and proportion of materials they produce or source that are demonstrated to be deforestation-free and/or conversion-free (DCF). DCF status may be demonstrated using any combination of the approaches outlined in Section 4.6.1. Companies should report in such a way that:

- DCF volumes are presented in relation to all supply chain volumes
- DCF volumes and proportions are disaggregated by commodity
- Methods used to assess and verify DCF status are described (see Section 4.6.1)
- Approach(es) to DCF claims, as described in Section 4.6.1, are identified
- Parameters used to define and assess DCF are described, including the cutoff date used (see Section 4.6.2).

As of 2022, DCF volumes may be reported by using the CDP forests questionnaire and by following the GRI Agriculture, Aquaculture, and Fisheries Sector Standard (see Box 6).

A sample template for comprehensive reporting on LUC emissions, deforestation/conversion footprint, and DCF volumes is provided in Table 3.

Reporting on progress for non-DCF volumes

Achieving and maintaining a supply chain that is free of deforestation and ecosystem conversion is an essential target for companies that produce or source agricultural or forestry commodities. However, doing so in a way that contributes to halting conversion on the ground – as opposed to fostering "leakage" by which conversion-linked products are simply purchased by others – may take time and participation of actors up and down the supply chain.

To help ensure that companies' policies and activities contribute to halting conversion, the Accountability Framework recommends that, in most cases, companies engage with non-compliant suppliers to address deforestation and conversion risk rather than immediately exclude such suppliers from their supply chain. One consequence of retaining and engaging with non-compliant suppliers is that companies may not be able to reach the goal of 100% DCF immediately. In such cases, it is important that companies disclose relevant information about how they are engaging with their suppliers to address deforestation and conversion, as well as levels of progress toward their DCF goals. Such disclosures should describe the specific actions and measures that companies are taking to address suppliers and supply volumes that are non-compliant or of unknown compliance, such as actions taken to increase traceability, support suppliers through improvement pathways, and participate in landscape and jurisdictional initiatives in high-risk sourcing regions. Companies can report on these topics using the CDP forests questionnaire and by describing the management approach associated with relevant GRI disclosures.

Box 6: Using CDP and GRI to report on deforestation and conversion

Companies may now report both deforestation and conversion footprint and proportion of volumes that are DCF in accordance with this guide by responding to the CDP forests questionnaire and/or by developing sustainability reports that follow the GRI's Agriculture, Aquaculture, and Fishing Sector Standard, released in 2022. Following are the disclosure questions and reporting elements in these standards that align with the guidance outlined in this section.

CDP 2022 Forests Questionnaire

Question F1.7: Indicate whether you have assessed the deforestation or conversion footprint for your disclosed commodities over the past 5 years, or since a specified cutoff date, and provide details.

- *Have you monitored or estimated your deforestation/conversion footprint?*
- *Are you reporting deforestation/conversion since a specified cutoff date or during the last five years?*
- *Known or estimated deforestation/conversion footprint (hectares)*
- *Describe methods and data sources used to monitor or estimate deforestation/conversion footprint*

Question F1.5a: *Disclose your production and/or consumption figure, and the percentage of commodity volumes verified as deforestation- and/or conversion-free.*

- *Have any of your reported commodity volumes been verified as deforestation- and/or conversion-free?*
- *% of reported volume verified as deforestation- and/or conversion-free*

GRI 13: Global Reporting Initiative Agriculture, Aquaculture, and Fisheries Sector Standard

Deforestation/conversion area

- Report the size in hectares, the location, and the type of natural ecosystems converted since the cutoff date on land owned, leased, or managed by the organization.
- Report the size in hectares, the location, and the type of natural ecosystems converted since the cutoff date by suppliers or in sourcing locations.

DCF volumes

- Report the percentage of production volume from land owned, leased or managed by the organization determined to be deforestation- or conversion-free, by product, and describe the assessment methods used.
- For products sourced by the organization, report the following by product:
    - the percentage of sourced volume determined to be deforestation- or conversion-free, and describe the assessment methods used;
    - the percentage of sourced volume which cannot be determined to be deforestation- or conversion-free, and describe actions taken to improve traceability.

5.2 Recommended reporting indicators

The following list of indicators can be used by companies to structure reporting on deforestation, conversion, and LUC emissions in a company's operations and supply chains. Regardless of which reporting platforms or formats are used, the information associated with these indicators should be included. These indicators are compatible with metrics included in CDP questionnaires and the GRI Agriculture, Aquaculture, and Fishing Sector Standard, as well as those used in assessment methodologies such as Forest 500 and ZSL SPOTT. Industry groups such as the Consumer Goods Forum are also working to align their key performance indicators with these indicators.

Reporting on all relevant items in this list will help companies ensure that their disclosures related to land use change are comprehensive, contextualized, and interpretable by stakeholders. **Companies should report separately for each relevant commodity that the company produces or sources.** Emissions from land use change should also be reported in total across all commodities following the reporting guidance of the GHG Protocol.

See Table 3 for a sample template for reporting on deforestation/conversion footprint, DCF volumes, traceability and LUC emissions for 100% of volumes for a given commodity.

A.	Land use change in own operations
	In each location (country and subnational jurisdiction) in which it operates, what is the total land area owned, managed, or controlled by the company?
	What is the land area, in hectares, of forest and/or other natural ecosystem converted on land owned, managed, or controlled by the company, by country and jurisdiction, in the time since an appropriate cutoff date?
	What are the company's scope 1 emissions from land use change on its own operations, calculated using the direct land use change (dLUC) approach and reported as tons of CO_2-equivalent)? What data sources, methods, and assumptions were used to quantify LUC emissions?

B.	Traceability of commodities in the supply chain
	What percentage of the commodity purchased, sourced, or used by the company can be traced to the level of the production unit (e.g. farm, plantation, or ranch)? (Report on land use change for these volumes using the indicators in Section C.)
	What percentage of the commodity purchased, sourced, or used by the company can be traced to the level of a sourcing area, but not to production unit? (Report on land use change for these volumes using the indicators in Section D.)
	For what percentage of the commodity purchased, sourced, or used by the company does traceability exist only to the level of the country of origin? (Report on land use change for these volumes using the indicator in Section E and LUC emissions for these volumes using the indicator in Section D.) For volumes with this level of traceability, report the percentage sourced from each country.
	For what percentage of the commodity purchased, sourced, or used by the company there no information about product origin? (Report on land use change for these volumes using the indicator in Section E and LUC emissions for these volumes using the indicator in Section D.)

C. Land use change on production units known to be in the company's supply chain

What land area, in hectares, of forest and/or other natural ecosystem has been converted on production sites which are known to be in the company's supply chain in the time since an appropriate cutoff date?

As relevant to region and context, it may be useful to disaggregate the converted area by legality of conversion, biome, vegetation type, and/or High Conservation Value (HCV) status.

What are the company's scope 3 emissions on known production units, calculated using the direct land use change (dLUC) approach and reported as tons of CO_2-equivalent), associated with this commodity? What data sources, methods, and assumptions were used to quantify land use change emissions?

D. Land use change in a sourcing area

What land area, in hectares, of forest and/or other natural ecosystem have been converted in the sourcing area (such as source-shed of a processing facility or co-op, municipality, or landscape) that can be allocated to products sourced by the company in the time since an appropriate cutoff date and/or in the past 5 years? What methodology and data sources were used to quantify attributed deforestation and conversion?

As relevant to region and context, it may be useful to disaggregate the converted area by legality of conversion, biome, vegetation type, and/or High Conservation Value (HCV) status.

What were the company's scope 3 emissions associated with land use change in sourcing area(s), and associated with volumes for which origin is known only to the country level or is unknown? This quantity should be calculated using the statistical land use change (sLUC) approach and reported as tons of CO_2-equivalent. What data sources, methods, and assumptions were used to quantify land use change emissions?

E. Volumes with unknown deforestation/conversion

For what percentage of the commodity purchased, sourced, or used by the company is deforestation or conversion not known or estimated?

F.	Deforestation - and conversion free sourcing Indicate cutoff date(s) used to define DCF status
	What percentage of total volume of the commodity produced, purchased, sourced, or used by the company in the past year is demonstrated to be deforestation-free and/or conversion-free (DCF)[13]? *This should be the sum of the following three indicators.*
	What percentage of the commodity produced, sourced, or used by the company is physically certified to a standard with Accountability Framework-aligned DCF criteria, and which certification or verification schemes are used?
	For what percentage of the commodity produced, sourced, or used by the company is deforestation/conversion monitored at the farm level on production units known to be in the company's supply chain? *Indicate method(s) and data source(s) used to monitor and assess deforestation/conversion*
	What percentage of the commodity produced, purchased, or sourced by the company is produced in areas with negligible deforestation risk, and how was that risk level determined? *Indicate method(s) and data source(s) used to monitor and assess deforestation/conversion*

G.	Engagement to achieve DCF production
	Does the company have a process for regular supplier engagement?
	Does the company have a mechanism to identify and to respond to non-compliances?
	How many noncompliant producers or suppliers are engaged through improvement plans or other processes, and what percentage of the company's non-DCF supply chain volume does that represent?
	Does the company actively participate in landscape or jurisdictional initiatives in high-risk areas from which it sources, and what percentage of the company's non-DCF supply chain volumes does this represent?
	Does the company offer support to smallholder producers to help them enter responsible supply chains and/or achieve compliance with commitments? If so, how many smallholders do they support, and what percentage does this represent of total sourcing from smallholders?
	What polices and activities are in place to improve supply chain traceability and control?

13 If the company is reporting against only a no-deforestation commitment/policy, then this and the following indicators should pertain to deforestation and deforestation-free status only. If the company is reporting against a no-conversion policy (or against both no-deforestation and no-conversion policies), then these indicators should pertain to DCF as the concept has been defined throughout this document.

Table 3: Sample template for comprehensive reporting on each commodity

The following table provides an example of how land use change in operations and supply chains may be reported to ensure inclusion of all volumes of a given commodity produced or sourced by a company. In addition to commodity-disaggregated reporting, emissions from land use change should also be reported in total across all products in the company's operations and supply chains.

		Metrics			
Scale of accounting		**Traceability; (% total supply chain volume)**	**Deforestation/ conversion (ha)**	**Deforestation/ conversion free volumes (% total supply chain volume)**	**LUC emissions**
Own operations / scope 1	**Own farms / plantations**	%	ha	% monitored directly DCF + % certified DCF	tons CO_2 equivalent (dLUC)
Supply chains / scope 3	**Production unit**	%	ha	% monitored directly DCF + % certified DCF	tons CO_2 equivalent (dLUC)
	Sourcing area (e.g. mill sourcing radius, production landscape, subnational jurisdiction)	%	ha	% from DCF sourcing area	tons CO_2 equivalent (sLUC)
	Country	%	Unknown	% from DCF country	tons CO_2 equivalent (sLUC)
	Unknown origin	%	Unknown	N/A	tons CO_2 equivalent (sLUC)
Total per commodity		100% of total supply chain volume	Total known or estimated deforestation/ conversion (ha) + % of volumes of unknown origin	% DCF	Total tons CO_2 equivalent LUC emissions

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