CHAPTER 4.

Setting the inventory boundary

This chapter provides requirements and guidance for setting the GHG inventory boundary, including setting the organizational and operational boundaries. It also defines required and optional accounting categories for land sector and removal activities.

4.1 Overview

Land sector companies and companies reporting CO_2 removals are required to conform with existing GHG Protocol standards to establish their inventory boundary and account for all fossil fuel and industrial emissions (Requirement 3).

Companies organize their GHG inventory into accounting categories that represent distinct impacts to the climate resulting from the activities occurring within the company's inventory boundary.

The inventory boundary is defined based on the following components:

- **Organizational boundary**: This determines what operations, lands, or other assets the company owns or controls.
- **Operational boundary**: This determines which scope (i.e., scope 1, scope 2, or scope 3) emissions, removals, or other metrics are reported in.
- **Accounting categories**: These represent the unique impacts a company's activities have on the climate (see Table 4.1 for details).

Table 4.1 Accounting category descriptions within the inventory boundary

Accounting category	Description	Examples
Physical GHG inventory		
Fossil fuel and industrial emissions	An accounting category representing the release of GHGs into the atmosphere from sources other than land emissions, including stationary combustion, mobile combustion, fugitive emissions, and process emissions.	GHG emissions from the combustion of fossil fuels.[a]
Land emissions	A land sector accounting category representing the release of GHGs into the atmosphere from the land and biogenic products, including the following subcategories: • Land use change emissions • Land management net biogenic CO_2 emissions • Land management production emissions • Biogenic product emissions[b]	GHG emissions from clearing land for agricultural production; GHG emissions from livestock manure management; GHG emissions from combusting fossil fuels.[c]
Removals	A land sector and technological removals accounting category representing the net transfer of CO_2 from the atmosphere to storage within a non-atmospheric pool. This category includes the following accounting subcategories: • Land management CO_2 removals • Captured biogenic CO_2 with geologic storage • Technological CO_2 removals with geologic storage	The net land carbon stock increases or net CO_2 removed through increases in soil organic carbon; CO_2 removed by direct air capture facilities and stored in geologic reservoirs.
Additional accounting categories		
Land use	A land sector accounting category representing the amount of agricultural land occupied by the company for products it produces or sources. This accounting category includes the following accounting subcategories: • Land occupation • Carbon opportunity cost of land use	Area of land needed to produce soy sourced by a company; the total amount of carbon lost from plants and soils on land used by agriculture relative to native carbon stocks.
Land carbon leakage	A land sector accounting category representing a specific type of leakage resulting from corporate actions that displace food or feed production to locations beyond the lands in their operations or value chain, leading to agricultural expansion and land use change. Such leakage is driven by increased demand for agricultural products and a fixed amount of global land.	GHG impacts from agricultural expansion linked to the diversion of crops for non-food, non-feed use.
Total emissions	The sum of: • Fossil fuel and industrial emissions • Land use change emissions • Land management net biogenic CO_2 emissions • Land management production emissions • Biogenic product CH_4 and N_2O emissions • CO_2 removals (if relevant) • Land carbon leakage	

Table 4.1 Accounting category descriptions within the inventory boundary (cont.)

Accounting category	Description	Examples
Additional accounting categories (cont.)		
Gross CO_2 fluxes	A land sector and technological removals accounting category representing the sum of one-directional transfers of CO_2 or its constituent carbon from one carbon pool to another. This accounting category includes the following accounting subcategories: • Biogenic product CO_2 emissions[b] • Gross biogenic land CO_2 emissions • Gross biogenic land CO_2 removals • TCDR-based product CO_2 emissions • Gross CO_2 emissions from geologic storage • Gross technological CO_2 removals	Gross CO_2 emissions from combusting biofuels; fugitive CO_2 emissions from CO_2 that was captured and transferred to geologic reservoirs; gross CO_2 removals from direct air capture facilities.
Product carbon storage	A land sector and technological removals accounting category representing changes in carbon stored in product carbon pools during the use stages of the product life cycle, including recycling and reuse, from carbon derived from biogenic or technological CO_2 sinks. This accounting category includes the following accounting subcategories: • Biogenic product carbon storage • TCDR-based product carbon storage	Changes in carbon stored in direct air capture CO_2-cured cement, sold by the manufacturer.
Reversals	A land sector and technological removals accounting category representing an emission from a carbon pool that stores carbon associated with a removal or CO_2 capture that was previously reported by the reporting company, in cases where the carbon pool is no longer within the company's operations or value chain. This accounting category includes the following accounting subcategories: • Reversals of land management CO_2 removals • Reversals of CO_2 removals with geologic storage • Reversals of CO_2 capture with geologic storage	Net carbon stock losses within soil carbon pools associated with removals previously reported by a company that are located in a sourcing region that the company no longer sources from.

Notes: a. Reported under "fossil fuel and industrial emissions" where data permits, or under "land management production emissions" if not; b. Refer to Requirement 17 for the required biogenic product emissions accounting and reporting approach; c. Refer to Chapter 10 for the recommendation on accounting for land sector fossil fuel and industrial emissions.

Land sector companies are required to include the accounting categories and subcategories outlined in Requirement 4 and further detailed in Part 2.1. This *Standard* also includes recommended and optional accounting categories and subcategories with specific requirements detailed in Parts 2.2 and 2.3.

Figure 4.1 summarizes the required and optional accounting categories and subcategories for companies that own or control land or operate in land sector value chains. See the glossary for definitions of accounting subcategories and Section 4.4.3 in the *Guidance* for examples of corporate activities that fall into each land sector accounting subcategory.

Figure 4.1 Required and optional accounting categories and subcategories for land sector value chains

	Physical GHG inventory					
	Emissions					Removals
Accounting category	Fossil fuel and industrial emissions[a]	Land emissions				Removals
Accounting subcategory		Land use change emissions[b]	Land management net biogenic CO_2 emissions	Land management production emissions	Biogenic product emissions[c]	Land management CO_2 removals
Scope 1						
Scope 2[d]						
Scope 3						
Reference	Corporate & Scope 3 Standards	Chapter 7	Chapter 9	Chapter 10	Chapter 11	Chapter 12 & 13

	Additional accounting categories							
Accounting category	Land use	Land carbon leakage	Total emissions	Gross CO_2 fluxes			Product carbon storage	Reversals
Accounting subcategory	Land occupation			Biogenic product CO_2 emissions[c]	Gross biogenic land CO_2 emissions	Gross biogenic land CO_2 removals	Biogenic product carbon storage	Reversals of land management CO_2 removals
Scope 1								
Scope 2[d]								
Scope 3								
Reference	Chapter 8	Chapter 8	Chapter 20	Chapter 11	Chapter 9	Chapter 13	Chapter 15	Chapter 12

Required categories Optional categories Not applicable

Notes: a. Refer to Chapter 10 for the recommendation on accounting for land sector fossil fuel and industrial emissions; b. This accounting subcategory quantifies land use change emissions as measured by a dLUC or sLUC calculation approach. Land use change emissions driven by increased land use or leakage are accounted for in the "land use" and "land carbon leakage" accounting categories; c. Refer to Requirement 17 for the required biogenic product accounting and reporting approach; d. Scope 2 is not relevant to many land sector and removals accounting categories because these categories are not directly related to the process of generating electricity, heating, cooling, or steam and are instead related to the life cycle of such processes and therefore reported in scope 3, category 3.

Figure 4.2 summarizes the required and optional accounting categories and subcategories for companies with technological CO_2 removals, CO_2 capture with geologic storage, or removals with geologic storage in their operations or value chain.[1] See the glossary for definitions of accounting categories and Section 4.4.3 in the *Guidance* for examples of corporate activities that fall into each technological CO_2 removal accounting subcategory.

Figure 4.2 Required and optional accounting categories and subcategories for technological CO_2 removal (TCDR) value chains

	Physical GHG inventory			Additional technological removals accounting categories				
	Emissions	Removals						
Accounting category	Fossil fuel and industrial emissions[a]	Removals		Gross CO_2 fluxes			Product carbon storage	Reversals
Accounting subcategory		Captured biogenic CO_2 with geologic storage	Technological CO_2 removals with geologic storage	TCDR-based product CO_2 emissions[b]	Gross CO_2 from geologic storage	Gross technological CO_2 removals	TCDR-based product carbon storage	Reversals of geologic storage
Scope 1								
Scope 2[c]								
Scope 3								
Reference	Corporate & Scope 3 Standards	Chapter 12 & 14	Chapter 12 & 14	Chapter 11	Chapter 14	Chapter 14	Chapter 15	Chapter 12 & 14

Required categories Optional categories Not applicable

Notes: a. Refer to Chapter 14 for inclusion of captured CO_2 that does not meet the geologic storage requirements and net carbon losses from geologic reservoirs; b. Refer to Requirement 18 for the required TCDR-based product accounting and reporting approach; c. Scope 2 is not relevant to many accounting categories because these categories are not directly related to the processes of generating electricity, heating, cooling, or steam and instead relate to the life cycle of such processes, and therefore are reported in scope 3, category 3.

4.2 Requirements

REQUIREMENT 3

Conformance with other GHG Protocol standards

Corporate GHG inventory accounting: Companies reporting a GHG inventory in conformance with the *Land Sector and Removals Standard* **shall** also follow and meet all the requirements of the GHG Protocol *Corporate Standard* and *Scope 3 Standard,*[2] including:

- **Organizational boundary**: Select a consolidation approach to define the organizational boundary (following the *Corporate Standard*) that determines which lands are owned or controlled by the reporting company. Disclose the consolidation approach selected.
- **Operational boundary**: Account for and report all scope 1, scope 2, and scope 3 emissions, including emissions from the 15 scope 3 categories (following the *Scope 3 Standard*).
- **GHG emissions**: Account for and report emissions of the following GHGs: CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, and NF_3.
- **Global Warming Potential (GWP) values**: Apply 100-year GWP values provided by the IPCC and report the source of the GWP values.
  - Companies **should** use GWP values from the most recent IPCC Assessment Report.[3]

- **Disclose exclusions**: Disclose and justify any exclusions of any scope 3 categories, accounting categories, gases, sources, or sinks from the GHG inventory.
- **Reporting period**: Disclose the reporting period covered by the GHG inventory.
- **Scope 3 minimum boundary**: Account for all life cycle GHG emissions specified in the *Scope 3 Standard* and meet or exceed the minimum boundary requirements for each scope 3 category. For land sector value chains, this specifically includes:
  - **Product life cycle GHG emissions**: Emissions in the life cycle of products associated with producing agricultural products purchased by the reporting company and/or bioenergy feedstocks associated with bioenergy products purchased or consumed by the reporting company. Such products include animal feed, fertilizers, pesticides, herbicides, and other agricultural inputs.
  - **Emissions from food loss and waste**: Emissions and other metrics associated with losses and waste of agricultural products that occurred prior to purchase by the reporting company.

Product life cycle accounting: Companies preparing a scope 3 GHG inventory **may** follow the *Product Standard* to account for product-level GHG emissions. When applying the *Product Standard*, companies **shall** apply the accounting and reporting requirements in the *Land Sector and Removals Standard* for land emissions, removals, land use, land carbon leakage, gross CO_2 fluxes, product carbon storage, and reversals when accounting for and reporting a product life cycle inventory report for a specific product.

REQUIREMENT 4
Required accounting categories

Companies **shall** account for all of the following:

- **Scope 1, scope 2, and scope 3 emissions**
  - Fossil fuel and industrial emissions (Chapter 10, 14)
- **Scope 1 and scope 3 land emissions**[4]
  - Land use change emissions (Chapter 7)
  - Land management net biogenic CO_2 emissions (Chapter 9)
  - Land management production emissions (Chapter 10)
- **Scope 1 and scope 3 land use** (Chapter 8)
- **Scope 1 and scope 3 land carbon leakage**, when applicable (Chapter 8)
- **Scope 1, scope 2, and scope 3 biogenic product emissions** (Chapter 11)
  - This includes CH_4, N_2O, and in some cases CO_2 (see Requirement 17 in Chapter 11)
- **Scope 1, scope 2, and scope 3 gross CO_2 emissions**
  - Biogenic product CO_2 emissions, when applicable (see Requirement 17 in Chapter 11)
  - TCDR-based product CO_2 emissions, if relevant (Chapter 11)
  - Gross CO_2 emissions from geologic storage, if relevant (Chapter 14)
- **Scope 1 and scope 3 reversals**, when applicable (Chapter 12)

Companies **shall** separately report these categories by accounting category for scope 1, scope 2 (if relevant), and scope 3 for each scope 3 category (see Requirements 31 and 32 for details).

4.3 Recommendations and options

Recommended and optional accounting categories

The following accounting categories can also be included in the company's GHG inventory:

- **Removals**: Companies **should** account for and report "removals" if relevant and applicable, subject to meeting all requirements in part 2.2.
- **Product carbon storage**: Companies **may** account for and separately report "product carbon storage" if relevant and applicable, subject to meeting all requirements in part 2.3.
- **Additional gross CO_2 fluxes subcategories**: Companies **may** account for "gross CO_2 fluxes" and disaggregate into accounting subcategories:
  - Companies **should** account for and separately report "gross biogenic land CO_2 emissions" (e.g., gross CO_2 emitted from fires, other disturbances, and soil respiration) disaggregated by scope 1, and scope 3 gross emissions for each scope 3 category.
  - Companies **may** account for and separately report "gross biogenic land CO_2 removals" (e.g., gross CO_2 removed via plant growth) disaggregated by scope 1, and scope 3 gross removals for each scope 3 category.
  - Companies **may** account for and separately report "gross technological CO_2 removals" (e.g., gross CO_2 removed via direct air capture) disaggregated by scope 1, and scope 3 gross removals for each scope 3 category.

4.4 Guidance on the requirements and recommendations

The inventory boundary is a conceptual boundary that encompasses the direct and indirect emissions, removals, and other metrics that are included in the reporting company's[5] inventory. The inventory boundary is defined based on the following components: the organizational boundary, operational boundaries, and accounting categories relevant to the reporting company. Companies account for and report direct and indirect emissions, removals, land occupation and leakage, and other accounting categories associated with the operations, lands, and assets within the inventory boundary, as set forth in Requirement 4.

4.4.1 Setting the organizational boundary

The organizational boundary determines what operations, lands, or other assets the company owns or controls (i.e., the operations, lands, and assets that constitute the reporting company). The organizational boundary is determined by applying a particular consolidation approach, chosen by the reporting company (Table 4.2). Defining the organizational boundary using a consolidation approach distinguishes the reporting company from its value chain and determines how associated GHG emissions, removals, and other metrics are grouped by the reporting company into scope 1 versus scopes 2 and 3.

Choosing a consolidation approach to define the organizational boundary

The GHG Protocol *Corporate Standard* (*Revised Edition*) provides requirements and guidance on how to choose and apply a consolidation approach. This version of the *Corporate Standard* sets forth three consolidation approaches a company can apply to define its organizational boundary: operational control, financial control, and equity share (Table 4.2). Each of these consolidation approaches may be suitable for land sector GHG inventories. The choice of one consolidation approach over another depends on the type and structure of the reporting company and how the company intends to use the inventory (see Chapter 2). For further guidance on choosing a consolidation approach, companies should refer to the *Corporate Standard* (*Revised Edition*; see "Setting organizational boundaries").

At the time of publication of this *Standard* (version 1), the *Corporate Standard* (*Revised Edition*) is being revised to produce a third edition through a stakeholder development process. Requirements and guidance on consolidation approaches in the *Corporate Standard* are subject to change through the revision. The *Land Sector and Removals Standard*

(version 1) is based on the existing requirements and guidance in the *Corporate Standard (Revised Edition)*; subsequent versions of this *Standard* will be updated to align with any new requirements and guidance in the updated *Corporate Standard*.

Table 4.2 Consolidation approaches

Consolidation approach	Description
Operational control	A company accounts as direct (i.e., in scope 1) 100 percent of the GHG emissions, removals, and other metrics from operations, lands, and other assets over which it has operational control. A company has operational control if that company or one of its subsidiaries has the full authority to introduce and implement operating policies. The company does not account for GHG emissions and removals as direct emissions or removals from operations in which it owns an interest but has no operational control.
Financial control	A company accounts as direct (i.e., in scope 1) 100 percent of the GHG emissions, removals, and other metrics from operations, lands, or other assets over which it has financial control. A company has financial control if it has the ability to direct financial and operating policies with a view to gaining economic benefits from its activities. It does not account for GHG emissions and removals as direct emissions or removals from operations, lands, or other assets in which it owns an interest but does not have financial control.
Equity share	A company accounts as direct (i.e., in scope 1) those GHG emissions, removals, and other metrics from operations, lands, or other assets, according to its share of equity in the operation, land, or other asset. The equity share reflects economic interest, which is the extent of rights a company has to the risks and rewards flowing from an operation, land area, or other asset. Typically, the share of economic risks and rewards in an operation is aligned with the company's percentage ownership of that operation, land, or other asset. It does not account for GHG emissions and removals as direct emissions or removals from operations, lands, or other assets in which it has control but does not own an interest.

Note: Consolidation approach definitions are subject to change in the updated Corporate Standard, currently under stakeholder development at the time of publication of this *Standard* (version 1).

Source: Adapted from WRI and WBCSD (2004).

Alignment of the consolidation approach with multiple owners/operators

A given asset (e.g., land, facility, operation, or other type of property) can be owned or controlled by multiple companies. For instance, this arrangement can occur when:

- an asset is owned by multiple joint venture partners or by a fund with multiple investors
- an asset is owned by one or multiple parties, but control of that asset is transferred to another party through lease or service agreements

All companies that own or control a given asset should use the same consolidation approach to define their respective organizational boundaries. To clarify ownership (rights) and responsibilities (obligations) associated with a given asset, such companies should draw up contracts that specify how the ownership of emissions, removals, and other metrics, the responsibility for managing them, and the associated risks are distributed between the parties based on their selected consolidation approach. Within such contracts, companies should describe the contractual arrangement and include information on the allocation of GHG-related risks and obligations. Contracts should specify which party accounts for the scope 1 emissions and removals. As set forth in Requirement 3, all scope 1 emissions must be accounted for by at least one company (i.e., no scope 1 emissions are unaccounted for).

Leased assets and the organizational boundary

Categorizing emissions, removals, and other metrics from leased assets requires an understanding of two different types of leases: finance or capital leases and operating leases.[6]

- **Finance or capital lease**: A lease that transfers substantially all the risks and rewards of ownership to the lessee and is accounted for as an asset on the balance sheet of the lessee. Assets leased under a finance or capital lease are considered wholly owned assets by the lessee in financial accounting and are recorded as such on the balance sheet.
- **Operating lease**: A lease that does not transfer the risks and rewards of ownership to the lessee and is not recorded as an asset in the balance sheet of the lessee. Any lease that is not a finance or capital lease is an operating lease.

A common type of lease for land is a finance or capital lease. In many countries, land is leased using mid- to long-term contracts, where the lessee farms the land for a fixed fee and takes all the risks and rewards related to the operations on the land.

Government concessions (e.g., for plantations) in many countries are also based on similar contract types. Landowners and managers often use service contracts to commission another entity (e.g., another farmer, service company, etc.) to execute certain work (e.g., harvesting) on the land they own or manage, while payment is a function, for example, of the amount of worktime and/or type of machinery. However, it is possible that an operating lease contract could also be used in such a situation.

Table 4.3 summarizes whether leased assets are included in the reporting company's organizational boundary based on the selected consolidation approach. Leased assets that fall within the organizational boundary are reported in scope 1. Leased assets that do not fall within the organizational boundary are reported in scope 3, either as upstream leased assets (scope 3, category 8) or downstream leased assets (scope 3, category 13).

Table 4.3 Inclusion of leased assets in the organizational boundary, based on the selected consolidation approach

Reporting company context[a]	Are the lands included within the reporting company's organizational boundary, based on the selected consolidation approach?		
	Operational control	Financial control	Equity share
Land owner—manages the lands themselves	Yes	Yes	Yes
Land owner—the land is leased to a 3rd party under an operating lease	No	Yes	Yes
Land owner—the land is leased to a 3rd party under a finance or capital lease	No	No	No
Lessee—operating lease[b]	Yes	No	No
Lessee—finance or capital lease	Yes	Yes	Yes
Land manager—contracted by the land owner to manage the land	Yes	No	No
Service provider—contracted by the land owner/manager to perform specific tasks	No	No	No

Notes: a. These reporting company contexts can apply regardless of whether the landowner is a private company, a non-governmental organization, or a government. Agreements can take many forms and be referred to in different ways (e.g., tenure, management agreement, license, permit, concession, contract), both between jurisdictions and within a given jurisdiction. In all cases, reporting companies should consult the specific text of applicable agreements and compare against the consolidation approach definitions when deciding which organizational boundary approaches might apply to a given situation; b. The accounting approach for this row may be subject to change to ensure alignment with the most recent international financial accounting rules (e.g., IFRS and other accounting standards).

Source: WRI and WBCSD (2016). Note that the GHG Protocol Agricultural Guidance is superseded by this *Standard* (see Section 1.5).

Addressing unclear land rights

In some geographical areas, land rights are unclear. Land may be held collectively under customary tenure arrangements, and national laws might not recognize community land or customary tenure, particularly if this tenure is not properly documented with the state or if the tenure is contested. This challenge may arise particularly for rural communities and smallholder landowners. As the reporting company defines the land(s) in its organizational boundary, conflicts could arise regarding the rights and responsibilities related to emissions, removals, and other impacts due to activities on the land in question.

These issues should be addressed fairly and transparently, as any contract between the reporting company and land managers has the potential to impact (positively or negatively) on the land access and livelihoods of communities that depend on the land in question. Certain communities may be less able to assert their rights than the company preparing a GHG inventory. Companies should follow the "recommendation for free, prior, informed consent; equity; and landholder rights" set forth in Section 5.3 in the *Standard* when determining their organizational boundary. Specialized organizations offer guidance on how to responsibly navigate the issue of unclear land rights and best practices in the context of different types of leases or contracts.[7]

4.4.2 Setting the operational boundary

The operational boundary determines whether emissions, removals, and other relevant metrics associated with operations, lands, and other assets owned or controlled by the reporting company are classified as direct or indirect. As defined in the *Corporate Standard*, direct GHG emissions (i.e., scope 1) are emissions from sources that are owned or controlled by the company. Indirect GHG emissions (i.e., scope 2 and scope 3) are emissions that are a consequence of the activities of the company, but which occur at sources owned or controlled by another company.

This same boundary approach is applied to the required and optional accounting categories in this *Standard*, as shown in Tables 4.4 and 4.5.

Table 4.4 Definitions for scope 1, scope 2, and scope 3 land emissions and removals categories, reported in the physical GHG inventory

Scope	Land emissions	Removals
Scope 1 (direct)	Land emissions from operations or lands owned or controlled by the reporting company	Removals for which the reporting company owns or controls **both** the sink (that transfers CO_2 from the atmosphere) **and** the pool (that stores the CO_2 or carbon)
Scope 2 (indirect)	Biogenic product emissions associated with the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company *(see "Operational boundary and scope 2 accounting" in this section and Requirement 17 for details)*	Not applicable *(see "Operational boundary and scope 2 accounting" in this section for details)*
Scope 3 (indirect)	Land emissions that are a consequence of the activities of the reporting company and occur in the reporting company's value chain, but which occur from operations or lands owned or controlled by another company	Removals that are a consequence of the activities of the reporting company and occur in the reporting company's value chain, but where the reporting company does not own or control **both** the sink (that transfers CO_2 from the atmosphere) **and** the pool (that stores the CO_2 or carbon)

Table 4.5 Definitions for scope 1, scope 2, and scope 3 additional land sector categories, reported separately from the physical GHG inventory

Scope	Land use	Land carbon leakage	Total emissions	Gross CO_2 fluxes	Product carbon storage
Scope 1 (direct)	Land use on land owned or controlled by the reporting company	Land carbon leakage occurring outside the reporting company's value chain, which is due to actions that reduce or divert food or feed production on land owned or controlled by the reporting company	The total of scope 1 fossil fuel and industrial emissions, land emissions, and land carbon leakage	Gross CO_2 fluxes from operations or land owned or controlled by the reporting company	Not applicable; Product carbon storage is only accounted for in scope 3
Scope 2 (indirect)	Not applicable	Not applicable	Not applicable	Biogenic product or TCDR-based product CO_2 emissions associated with the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company	Not applicable; Product carbon storage is only accounted for in scope 3
Scope 3 (indirect)	Land use that is a consequence of the activities of the reporting company and occurs in the reporting company's value chain on land owned or controlled by another company	Land carbon leakage occurring outside the reporting company's value chain, which is a consequence of the activities of the reporting company that reduce or divert food or feed production, on land that is owned or controlled by another company in the reporting company's value chain	The total of scope 3 fossil fuel and industrial emissions, land emissions, and land carbon leakage	Gross CO_2 fluxes that are a consequence of the activities of the reporting company and occur in the reporting company's value chain from operations or land owned or controlled by another company	Product carbon storage, which is a consequence of the activities of the reporting company and occurs in the reporting company's value chain

Companies following this *Standard* are required to account for all scope 3 emissions, including emissions from the 15 scope 3 categories, following the GHG Protocol *Scope 3 Standard* (see Requirement 3). Companies must disclose and justify any exclusions. Refer to the *Scope 3 Standard* (Chapter 6) for more information. Box 4.1 discusses why scope 3 accounting is particularly relevant to the land sector and removals accounting.

Box 4.1 Importance of scope 3 accounting and reporting in the land sector and for removals accounting

For many companies, land impacts are located in scope 3. Scope 3 accounting enables GHG and other climate impacts in land-based value chains to be accounted for by companies that do not otherwise own or control land. In this way, complete scope 3 accounting provides a means of incentivizing improved land management practices to reduce emissions, enhance removals, and manage land use and leakage impacts across a land-based value chain.

Scope 3 accounting is used to estimate net biogenic CO_2 emissions (or removals) across the lifecycle of agricultural products in their value chain. Life cycle emissions (or removals) that are reported in the physical GHG inventory are based on estimates of land use change emissions, land management impacts on carbon stocks on lands producing the agricultural products, and the emissions from growing, harvesting, processing, distributing, and consuming those products. Accounting for life cycle GHG emissions for agricultural products is necessary to accurately implement the stock-change accounting approach set forth in this *Standard* to account for biogenic CO_2 emissions in the physical GHG inventory.

This *Standard* also introduces removals accounting within the GHG inventory. If a company reports removals within the physical GHG inventory, the company needs to report all life cycle GHG emissions related to those activities, in line with the principles of completeness and conservativeness. For example, if a company in a direct air capture and geologic storage value chain reports removals, the company must report all life cycle GHG emissions (e.g., GHG emissions associated with the energy required to remove CO_2 from the atmosphere) to determine the total GHG impact assessed across all processes. Similarly, a company in a bioenergy carbon capture and geologic storage value chain needs to report all life cycle GHG emissions and other relevant impacts of the bioenergy feedstocks (e.g., land use change emissions, land management emissions, land use, and land carbon leakage) to determine the total GHG impact of the feedstocks. These life cycle impacts are most often located in scope 3.

Operational boundary for removals

A removal is defined as a process that includes two distinct elements (see Section 3.4.1):

1. **Sink:** A biogenic or technological process, activity, or mechanism that removes greenhouse gases from the atmosphere.
2. **Pool:** A physical reservoir or medium where a GHG or its constituent elements are stored.

Both parts of the removal process are relevant for categorizing a removal as direct or indirect from the perspective of the reporting company. The sink and associated pools in a removal process can be owned or controlled by the same or different entities. In contrast, the categorization of emissions depends only on which entity owns or controls an emission source.

Direct (scope 1) removals are those where the reporting company owns or controls both the sink that transferred CO_2 from the atmosphere and the pool where the carbon is stored. Indirect (scope 3) removals are those where the reporting company does not own or control both the sink and the associated storage pools. To be reported as either scope 1 or scope 3, removals must meet the requirements for reporting removals set forth in Chapter 12.

Table 4.6 summarizes how removals are accounted for by scope, depending on which entity removes the CO_2 from the atmosphere and which entity owns or controls the pools. The types of ownership of biogenic sinks with land-based carbon storage, and of technological sinks with geologic carbon storage, can differ. Table 4.7 provides guidance on how the operational boundary for removals can be applied to different carbon pools.

Table 4.6 Defining scope 1 and scope 3 removals based on ownership or control of the sink and storage

	Which entity owns or controls *the pool* where carbon is stored?		
Which entity owns or controls *the sink* that removes CO_2 from the atmosphere?	**Reporting company**	**Another company in the value chain**	**Storage is not occurring**
Reporting company	**Scope 1 removal**	**Scope 3 removal**	**Does not meet removal definition**
Another company in the value chain			
CO_2 is not removed from the atmosphere			

Table 4.7 Defining scope 1 and scope 3 removals with storage in land-based or geologic pools

Storage pool	Guidance
Land-based carbon pools	Removals with storage in land-based carbon pools are categorized as scope 1 removals by the company that owns or controls the relevant land (which is both the sink and pool). With land-based carbon pools, the sinks and pools are owned or controlled by the same entity. Removals with storage in land-based carbon pools on lands owned or controlled by another company, but that are in the reporting company's value chain, are categorized as scope 3 removals.
Geologic carbon pools	Removals with geologic storage are accounted for as scope 1 removals by the company that owns or controls both the sink (e.g., a direct air capture facility) and the pool (e.g., a geologic reservoir). For scope 1 removals with geologic storage, ownership or control can be defined either as direct ownership or control, or as contractual ownership or control where no single entity owns or controls the sink and the storage pool (e.g., through contracts between a direct air capture facility and geologic storage reservoir operator for CO_2 storage-as-a-service). Removals with storage in geologic reservoirs owned or controlled by another company, but that are in the reporting company's value chain, are categorized as scope 3 removals.

Operational boundary and scope 2 accounting

Scope 2 emissions are indirect emissions associated with the generation of electricity, steam, heating, and cooling purchased and consumed by the reporting company. Scope 2 emissions include all fossil fuel and industrial GHG emissions, as well as all CH_4 and N_2O emissions from biogenic (or TCDR-based) products released from the generation process.

There are no scope 2 land emissions (noting the exception for biogenic product emissions accounting below), land management CO_2 removals, land use, land carbon leakage, gross biogenic land CO_2 emissions, or gross biogenic land CO_2 removals, as these accounting (sub)categories are not directly associated with the generation of electricity, steam, heating or cooling; instead, these accounting (sub)categories are indirectly associated with the life cycle of these processes. Land use change emissions, land management net biogenic CO_2 emissions, land management production emissions, land management CO_2 removals, land occupation, land carbon leakage, gross biogenic land CO_2 emissions, gross biogenic land CO_2 removals, and removals with geologic storage associated with purchased bioenergy are accounted for and reported in scope 3, category 3.

Biomass, biofuels, or alternative fuels derived from CO_2 removal technologies may be combusted as part of the generation of purchased electricity, steam, heating, and cooling consumed by the reporting company. These emissions are accounted for as biogenic product emissions or technological carbon dioxide removal (TCDR)-

based product CO_2 emissions. As set forth in Requirements 17 and 18, such biogenic or TCDR-based product CO_2 emissions released from the generation process are required to be separately reported as gross CO_2 fluxes if all life cycle GHG emissions and other relevant information are accounted for. If such life cycle impacts are not accounted for, the biogenic (or TCDR-based) product CO_2 emissions are included with other scope 2 emissions as land emissions (or fossil fuel and industrial emissions). Chapter 11 provides further guidance on accounting for and reporting scope 2 biogenic and TCDR-based product emissions.

As set forth in Requirement 31, companies must separately account for and report fossil fuel and industrial emissions and biogenic product emissions in scope 2 by determining the grid-average emission factors for fossil versus biogenic CO_2 emissions associated with purchased electricity, steam, heating, and cooling sourced from an electricity grid or other distribution system. Companies report each portion separately (fossil and biogenic), following Requirement 31.

Companies account for and report all emissions upstream of the energy generation process in scope 3, category 3 (fuel- and energy-related activities not included in scope 1 or scope 2). This scope 3 category includes the extraction, production, and transportation of fuels consumed in the generation of electricity, steam, heating, and cooling consumed by the reporting company. Examples include emissions from coal mining; the extraction, refining, and distribution of petroleum products and natural gas; and land use change, land use, land management, processing, and distribution of biomass/biofuels.

Relationship between the scope 1, scope 2, and scope 3 inventory

Scope 1, scope 2, and scope 3 are designed to be mutually exclusive categories from the perspective of the reporting company, so that no double counting of emissions, removals, or other metrics occurs between the scopes within the reporting company's inventory. For example, a company's scope 3 inventory does not include any emissions or removals accounted for as scope 1 by that same company.

Scope 1 and scope 2 boundaries are defined to ensure that two or more companies do not account for the same emissions within scope 1 or scope 2. However, two different companies could account for the same emission or removal within their scope 1 inventories if land is owned by one entity but operated by another, and the two entities apply different consolidation approaches. Companies should strive to avoid this form of double counting, especially for removals, by following the guidance in Section 4.4.1 (see "Alignment of consolidation approach with multiple owners/operators").

By definition, scope 3 emissions, removals, and other metrics are a consequence of the activities of the reporting company and occur in the reporting company's value chain, but occur from operations or land (i.e., sources, sinks, or pools) owned or controlled by another company (see Tables 4.4 and 4.5). As a result, it is expected that across different reporting entities' scope 1 and scope 3 inventories, a given emission, removal, or other metric will be counted more than once across the inventories of multiple reporting companies (i.e., as one entity's scope 1 emissions and another entity's scope 3 emissions).

Counting the same emission, removal, or other metric between scopes is an inherent design element of the scopes framework that requires companies to account for both direct and indirect impacts in their GHG inventory. For example, a farmer reports emissions they directly produce from farm operations as scope 1, while the consumer of agricultural products from that farm reports those same emissions (indirectly produced through their purchasing of that product) under scope 3, category 1. Accounting for direct and indirect impacts enables a broader range of companies to take accountability for emissions, removals, and other metrics and to look for opportunities to reduce emissions, enhance removals, and reduce land use and land carbon leakage across the value chain.

Note that while the same emission, removal, or other metric may be accounted for by more than one company in scope 3, the 15 scope 3 categories are designed to group emissions, removals, and other metrics based on where they occur in the reporting company's value chain. Therefore, the same emission, removal, or other metric may be accounted for by each company in a different scope 3 category. For example, emissions from a food processing facility would be accounted for in scope 3 category 11 by collectives that sell the raw materials to the food processing facility, and in scope 3 category 1 by retailers purchasing food products from that facility. Companies should consult the definitions for scope 3 categories in the *Scope 3 Standard* to avoid overlap between scope 3 categories.

4.4.3 Accounting categories in this Standard

This *Standard* builds on existing GHG Protocol standards by providing new or updated accounting categories and subcategories specific to the land sector and removal activities. Accounting categories are broadly classified as emissions, removals, land use, land carbon leakage, gross CO_2 fluxes, product carbon storage, and reversals (Figures 4.1 and 4.2 and Table 4.1). Each accounting category has distinct accounting and reporting requirements, recommendations, and data, methods, and calculation guidance. Each accounting category is separately reported relative to a company's operational and organizational boundary as scope 1, scope 2 (where applicable), or scope 3.

Table 4.8 provides an overview of these new required and optional accounting categories in the *Land Sector and Removals Standard* (see also Requirement 4) and how they compare to the required and optional accounting categories covered in the *Corporate Standard* and *Scope 3 Standard*. As set forth in Requirement 1, companies reporting a corporate- or organization-level GHG inventory in conformance with the GHG Protocol must follow the *Land Sector and Removals Standard* and *Guidance* if the company has significant[8] land sector activities in its operations or value chain, and/or if the company chooses to account for and report CO_2 removals.

Table 4.8 Required and optional accounting categories by GHG Protocol standard

		GHG Protocol standards and guidance		
Accounting category		**Corporate Standard (*Revised Edition, 2004*)**	**Scope 3 Standard (*First Edition, 2011*)**	**Land Sector and Removals Standard (*Version 1, 2026*)**
Fossil fuel and industrial emissions		Required for scope 1 and 2 emissions, at a minimum	Required for scope 1, 2, and 3 emissions	Required for scope 1, 2, and 3 emissions
Land emissions		Not fully addressed	Not fully addressed	Required
Removals		Optional; reported separately	Optional; reported separately	Optional; reported if requirements are met
Land use		Not addressed	Not addressed	Required
Land carbon leakage		Not addressed	Not addressed	Required, if relevant
Total emissions		Not addressed	Not addressed	Optional; required if aggregating or netting values
Gross CO_2 fluxes	**Biogenic product CO_2 emissions**	Required for direct biogenic product CO_2 emissions; reported separately	Required for direct and indirect biogenic CO_2 emissions; reported separately	Required for scopes 1, 2, and 3; reported separately from the physical GHG inventory if requirements are met
	TCDR-based product CO_2 emissions	Not addressed	Not addressed	Required, if relevant
Product carbon storage		Not addressed	Not addressed	Optional; reported if requirements are met
Reversals		Not addressed	Not addressed	Required, if relevant

Each accounting category can, in turn, be disaggregated into accounting subcategories. Accounting subcategories provide disaggregated information by the type of emission source or removals sink, GHG flux (i.e., net or gross fluxes), carbon storage, or accounting approach. Table 4.9 provides descriptions and examples of the types of impacts accounted for across each accounting subcategory. Companies are required to report disaggregated accounting subcategories to ensure transparency in the GHG inventory, as set forth in Requirement 31.

Table 4.9 Accounting subcategory descriptions

Accounting category	Accounting subcategory	Description	Examples
Physical GHG inventory			
Emissions	**Land use change emissions**	Emissions (primarily from carbon stock losses) due to recent land conversion	Carbon stock losses from the conversion of forest to grassland or cropland (deforestation), the conversion from natural to plantation forest, or the conversion of natural grasslands or wetlands to productive grasslands or wetlands
	Land management net biogenic CO_2 emissions	Net biogenic CO_2 emissions resulting from net land carbon stock losses due to ongoing land management practices	Carbon stock losses on croplands and forest lands remaining in the same land use, CO_2 emissions from cropland soil degradation
	Land management production emissions	CH_4, N_2O, and non-biogenic CO_2 emissions due to ongoing land management practices	Livestock CH_4 emissions, manure CH_4 and N_2O emissions, fertilizer N_2O emissions, CH_4 emissions from rice and other flooded crops, agricultural residue burning CH_4 and N_2O emissions
	Biogenic product emissions[a]	Gross CH_4, N_2O, and, if applicable, CO_2 emissions from combustion, biodegradation, or other losses from biogenic product carbon pools to the atmosphere	Gross CH_4 and N_2O emissions from combustion of biomass, biofuels, or biogas; includes CO_2 emissions from combustion if carbon stock changes due to biomass harvesting are not accounted for and reported as land emissions and land carbon leakage is not accounted for, if relevant
Removals	**Land management CO_2 removals**	Net biogenic CO_2 removals resulting from net land carbon stock increases due to ongoing land management practices; all land management CO_2 removals are from biological sinks	The net land carbon stock increases or net CO_2 removed through tree growth and ongoing storage in agroforestry systems
	Captured biogenic CO_2 with geologic storage	Net CO_2 removals resulting from annual net increases to carbon stored in geologic carbon pools from carbon derived from biological sinks	CO_2 removed through biomass growth, captured at a bioenergy facility, and stored in a geologic reservoir (BECCS), or other biomass carbon capture and storage
	Technological CO_2 removals[b] **with geologic storage**	Net CO_2 removals resulting from annual net increases to carbon stored in geologic carbon pools from carbon derived from technological sinks	CO_2 removed by direct air capture facilities and stored in geologic reservoirs (DACCS)
Additional accounting categories			
Land use	**Land occupation**	The amount of agricultural land occupied in the reporting year to produce a product, measured in hectares, and optionally disaggregated by land use type	Area of land needed to produce an agricultural product (e.g., soybeans)
	Carbon opportunity cost of land use	The total amount of carbon lost from plants and soils on land occupied by agriculture relative to native vegetation, measured in arbon dioxide equivalent (CO_2e)	The total amount of carbon lost from plants and soils on land used for soy production relative to native carbon stocks

Table 4.9 Accounting subcategory descriptions (cont.)

Accounting category	Accounting subcategory	Description	Examples
Additional accounting categories (cont.)			
Land carbon leakage	**Land carbon leakage**	A land sector accounting category representing the GHG impacts driven by increased demand for agricultural products and a fixed amount of global land, that occurs when corporate actions displace food or feed production to locations beyond the lands in their operations or value chain, leading to agricultural expansion and land use change	GHG impacts from agricultural expansion linked to the diversion of crops for non-food, non-feed use
Total emissions	**Total emissions**	The sum of: • Fossil fuel and industrial emissions • Land use change emissions • Land management net biogenic CO_2 emissions • Land management production emissions • Biogenic product CH_4 and N_2O emissions • CO_2 removals (if relevant) • Land carbon leakage	Total emissions to the atmosphere due to the consumption of soy-based renewable diesel
Gross CO_2 fluxes	**Biogenic product CO_2 emissions**[a]	Gross CO_2 emissions from combustion, biodegradation, or other losses from biogenic product carbon pools to the atmosphere	Gross CO_2 emissions from combustion of biomass, biofuels, or biogas
	Gross biogenic land CO_2 emissions	Gross CO_2 emissions from combustion, biodegradation, or other losses from land-based carbon pools to the atmosphere	Gross CO_2 emissions from land degradation or fire
	Gross biogenic land CO_2 removals	Gross CO_2 removals from atmospheric CO_2 transferred via biological sinks to land-based carbon pools	Gross CO_2 removals from photosynthesis in trees in a forest or plants on croplands
	TCDR-based product CO_2 emissions	Gross CO_2 emissions from the combustion, degradation, or other losses from TCDR-based product carbon pools to the atmosphere	Gross CO_2 emissions from the combustion of a fuel containing CO_2 removed through direct air capture
	Gross CO_2 emissions from geologic storage	Gross CO_2 emissions from fugitive CO_2 emissions or other CO_2 losses to the atmosphere from a geologic reservoir containing captured and stored CO_2	Gross CO_2 emissions from a geologic reservoir in a BECCS or DACCS value chain
	Gross technological CO_2 removals	Gross CO_2 removals from atmospheric CO_2 transferred via technological sinks to TCDR-based product carbon pools or geologic carbon pools	Gross CO_2 removals from direct air capture facilities
Product carbon storage	**Biogenic product carbon storage**	Annual or annualized changes in carbon stored in biogenic product carbon pools during the use stage of biogenic products associated with the reporting company's value chain	Changes in carbon stored in bioplastics

Table 4.9 Accounting subcategory descriptions (cont.)

Accounting category	Accounting subcategory	Description	Examples
Additional accounting categories (cont.)			
Product carbon storage (cont.)	**TCDR-based product carbon storage**	Annual or annualized changes in carbon stored in TCDR-based product carbon pools during the use stage of TCDR-based products associated with the reporting company's value chain	Changes in carbon stored in direct air capture CO_2-cured cement
Reversals	**Reversals of land management CO_2 removals**	Net carbon stock losses of previously reported land management net CO_2 removals	Net carbon stock losses in soil due to degradation, located on land that the reporting company no longer supplies from (i.e., outside the inventory boundary) but that was previously reported as a removal when the company supplied from those lands *Note: If such land was still within the inventory boundary, report as land emissions*
	Reversals of CO_2 removals with geologic storage	Net carbon losses from geologic reservoirs associated with previously reported CO_2 removals with geologic storage, and that are no longer within the inventory boundary	Fugitive emissions of captured CO_2 from a geologic reservoir, for a reporting company that previously reported technological CO_2 removals with geologic storage, and that geologic reservoir is no longer in their inventory boundary
	Reversals of CO_2 capture with geologic storage	Net carbon losses from geologic reservoirs storing captured CO_2 associated with previous GHG inventories that are no longer within the inventory boundary	Fugitive emissions of captured CO_2 from a geologic reservoir, for a reporting company that previously did not report fossil emissions associated with CO_2 capture and geologic storage, and that geologic reservoir is no longer in their inventory boundary. If the captured CO_2 is lost from the geologic reservoir and that reservoir is no longer in the inventory boundary, this is reported as a reversal *Note: If the geologic reservoir is still within the inventory boundary (i.e., the company continues to store CO_2 captured from its facilities or value chain in the reporting year in that reservoir), this is reported as fossil fuel and industrial emissions*

Note: a. Refer to Requirement 17 for the required biogenic product accounting and reporting approach; b. Detailed guidance on accounting for removals due to enhanced rock weathering is not provided in version 1 of this *Guidance* due to the need for additional research and methodological development at the time of publication.

4.4.4 Determining the time boundary

Scope 1 emissions are annual (or annualized) and reflect emissions and activities that occur in the reporting year (noting the exceptions for land use change and land carbon leakage accounting below). The time boundary for scope 3 emissions depends on the life cycle associated with the relevant activities of the reporting company in the reporting year. For product-related or service-related scope 3 categories (i.e., scope 3 categories 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, and 12), life cycle emissions associated with the products or services purchased or sold by the reporting company in the reporting year can occur in other years or periods (past or future). For other non-product-related scope 3 categories (i.e., scope 3 categories 8, 13, 14, and 15), emissions in the value chain associated with the company's activity occur in the reporting year.

This same time boundary for emissions based on the relevant scope or scope 3 category applies to removals and other accounting categories, as summarized in Table 4.10. For more information on the time boundary of emissions in scope 3 accounting, refer to Chapter 5 in the GHG Protocol *Scope 3 Standard*.[9]

- **Land emissions:** Guidance on the the temporal boundary for each land emission subcategory is provided below. For more information, refer to Chapters 7, 9, 10, and 11.
  - **Land use change (LUC) emissions** in scope 1 and scope 3 are accounted for relative to the retrospective LUC assessment period, 20 years or greater, prior to and inclusive of the reporting year (see Chapter 7 for additional guidance). For example, a company sourcing cacao in 2025 would need to evaluate whether land use change associated with the lands producing the cacao occurred over a 20-year period from 2006–2025.
  - **Land management net biogenic CO_2 emissions** in scope 1 and all scope 3 categories are accounted for using an annual (or annualized) time boundary and reflect net carbon stock decreases that occur in the reporting year (see Chapter 9 for additional guidance). For example, a company that accounts for soil carbon stock changes would account for the annual net soil carbon stock gains or losses in the reporting year.
  - **Land management production emissions** in scope 1 and non-product-related scope 3 categories are accounted for using an annual time boundary. In comparison, land management production emissions for product-related scope 3 categories are evaluated based on the life cycle GHG emissions associated with the relevant activities of the reporting company in the reporting year. For example, a company that purchases beef in 2022 would need to account for all upstream life cycle emissions from the relevant livestock production system, even if they occurred in years prior to 2022.
  - **Biogenic product emissions** in scope 1 and non-product-related scope 3 categories have an annual time boundary, while biogenic product emissions in product-related scope 3 categories are evaluated based on the life cycle GHG emissions associated with the relevant activities of the reporting company in the reporting year. For example, a company that sells a raw material (e.g., biofuel feedstocks) in 2022 would need to account for all downstream lifecycle emissions related to the processing, use (e.g., combustion), and end-of-life of that material, even if those emissions occur in future years.
- **Land use**: Guidance on the the temporal boundary for each land use subcategory is provided below. For more information, refer to Section 8.4.2.
  - **Land occupation**: In scope 1, land occupation is accounted for using an annual temporal boundary. Scope 3 land occupation (in hectares) is evaluated based on the life cycle associated with the relevant activities of the reporting company in the reporting year (e.g., a company that purchases maize in 2025 would need to account for the upstream land occupation attributed to that maize, even if the maize was grown in a year [or years] previous to the reporting year).

- **Carbon opportunity cost (COC) of land use**: Optionally reporting scope 1 and scope 3 land use in CO_2e terms by applying a COC factor is evaluated relative to an annualization period. Companies are recommended to annualize the COC of land use values, with many researchers using annualization periods in the 20–35-year range.

- **Land carbon leakage**: Scope 1 and scope 3 land carbon leakage is evaluated relative to a COC annualization period. Companies are recommended to use a 20-year annualization period, which corresponds to the IPCC default period for land transition. Researchers, however, have used other annualization periods to annualize leakage values, with many in the 20–35-year range. For more information on the temporal boundary for land carbon leakage accounting, refer to Section 8.4.3.
- **Removals**: The time boundary of scope 1 and scope 3 removals is annual (or annualized) and reflects net carbon stock increases occurring in the reporting year. The time boundary for reversals is also annual and reflects net carbon stock decreases occurring in the reporting year. For more information on the temporal boundary of removals and reversals accounting, refer to Chapters 12, 13, and 14.

Table 4.10 Time boundaries of accounting categories

Accounting category	Accounting subcategories	Scope 1	Scope 2	Scope 3
Fossil fuel and industrial emissions	**Fossil fuel and industrial emissions**	Annual	Annual	Depends on scope 3 category[a]
Land emissions	**Land use change emissions**	Amortized over the LUC assessment period (20 years or greater)	N/A	Amortized over the LUC assessment period (20 years or greater)
	Land management net biogenic CO_2 emissions	Annual (or annualized depending on the monitoring frequency)		Annual (or annualized depending on the monitoring frequency)
	Land management production emissions	Annual		Depends on scope 3 category[a]
Removals	**Land management CO_2 removals**	Annual (or annualized depending on the monitoring frequency)	N/A	Annual (or annualized depending on the monitoring frequency)
	Captured biogenic CO_2 with geologic storage	Annual		Annual
	Technological CO_2 removals with geologic storage			
Land use	**Land occupation (ha)**	Annual	N/A	Annual
	Carbon opportunity cost of land use (CO_2e)	Annualization recommended		Annualization recommended
Land carbon leakage	**Land carbon leakage**	Annualized over COC annualization period (20 years recommended)		Annualized over COC annualization period (20 years recommended)

Table 4.10 Time boundaries of accounting categories (cont.)

Accounting category	Accounting subcategories	Scope 1	Scope 2	Scope 3
Gross CO_2 fluxes	**Biogenic product CO_2 emissions**	Annual	Annual	Annual or depends on scope 3 category[a]
	Gross biogenic land CO_2 emissions		N/A	
	Gross biogenic land CO_2 removals		N/A	
	Gross technological CO_2 removals			
	TCDR-based product CO_2 emissions		Annual	
	Gross CO_2 emissions from geologic storage		N/A	
Product carbon storage	**Biogenic product carbon storage**	N/A	N/A	Annual
	TCDR-based product carbon storage			
Reversals	**Reversals of land management CO_2 removals**	Annual (or annualized depending on the monitoring frequency)	N/A	Annual (or annualized depending on the monitoring frequency)
	Reversals of removals with geologic storage	Annual		Annual
	Reversals of CO_2 capture with geologic storage	Annual		Annual

Note: a. For some scope 3 categories, emissions occur simultaneously with the activity, but for some categories, emissions may have occurred in previous years or are expected to occur in future years because the activities in the reporting year have long-term emissions impacts. Upstream product-related scope 3 categories (categories 1, 2, 3, 4) are evaluated across years associated from cradle-to-gate; waste, downstream product-related scope 3 categories, and investments (categories 5, 9, 10, 11, 12, 15) are evaluated across years associated from gate-to-grave; emissions from other scope 3 categories (categories 6, 7, 8, 13, 14) are evaluated on an annual basis.

4.4.5 Identifying relevant scope 3 emissions, removals, and other metrics, by scope 3 category

Landowners, land managers, agricultural product processors, and consumers have diverse upstream and downstream scope 3 impacts that will be accounted for across different scope 3 categories. For product-related scope 3 categories, the scope 3 boundary for purchased and sold products includes all attributable processes in the life cycle of the product, following the scope 3 category boundaries defined in Chapter 5 of the *Scope 3 Standard* and relevant scope 3 minimum boundaries specified in Requirement 3. Table A.2 in the Annex provides a description and examples of scope 3 impacts in land sector value chains for each scope 3 category.

Endnotes

1 Companies seeking to account for captured biogenic CO_2 and geologic storage in their operations or value chain must account for and report both land sector and technological CO_2 removals–related accounting categories.

2 The GHG Protocol plans to update and align the *Corporate Standard*, *Scope 2 Guidance*, *Scope 3 Standard*, and *Land Sector and Removals* Standard where any differences exist.

3 For more details, see the 2013 GHG Protocol amendment "Required Greenhouse Gases in Inventories," and Version 2.0 (2024) of GHG Protocol's "IPCC Global Warming Potential values."

4 There are no scope 2 land use change emissions, land management net biogenic CO_2 emissions, or land management production emissions. Instead, such land emissions in the life cycle of generating electricity, heating, cooling, or steam (e.g., related to bioenergy feedstocks, hydropower, or other energy infrastructure) are reported in scope 3, category 3 by the company purchasing or acquiring the electricity, steam, heating, and cooling. The company providing the electricity, steam, heating, and cooling reports land emissions relative to their organizational boundaries, according to the consolidation approach selected.

5 Throughout this *Standard* and *Guidance*, the term "company" is used as a shorthand to refer to the entity (i.e., company or other organization) developing a GHG inventory.

6 These lease definitions are based on those in the GHG Protocol *Corporate Standard (Revised Edition)*. Note that these definitions are subject to change in the updated Corporate Standard, currently under stakeholder development at the time of publication of this Standard (version 1).

7 For example, the Voluntary Guidelines on the Responsible Governance of Tenure provided by the Food and Agriculture Organization of the United Nations (FAO) is available at: https://www.fao.org/tenure/voluntary-guidelines/en/.

8 The GHG Protocol makes no specific recommendations as to what constitutes a "significant" exclusion threshold. However, some GHG programs do specify numerical significance exclusion thresholds (e.g., SBTi requires companies to set a Forest, Land and Agriculture [FLAG] target if their FLAG-related emissions are 20 percent or more of overall emissions across scopes 1, 2, and 3).

9 Available at https://ghgprotocol.org/standards/scope-3-standard.

Photo Credits

Pg. 33, YiChuan Li; Pg. 39, Ivan Cheremisin; Pg. 40, Markus Spiske; Pg. 42, Isuru Ranasinha; Pg. 44, tommao wang; Pg. 49, JSB Co