GREENHOUSE GAS PROTOCOL

Corporate Standard Technical Working Group

Subgroup 3, Meeting #14

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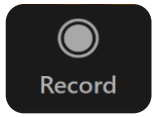
May 19th, 2026

WORLD RESOURCES INSTITUTE

World Business Council for Sustainable Development

Meeting information



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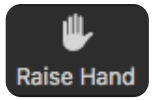

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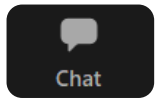

You can also use the **Chat** function in the main control.

Recording, slides, and meeting minutes will be shared after the call.

Agenda

Introduction and housekeeping	10 minutes
Scope 1 calculation methods and emission factors	50 minutes
Indirect climate forcers	40 minutes
Other phase 2 pending items	40 minutes
Wrap-up and next steps	10 minutes

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Today's objectives

1. Consider proposal from Subgroup 3 Task Force on **scope 1 methods and emission factors**
2. Continue discussing **indirect climate forcers**
3. Address **phase 2 pending items**, including scope 1 disaggregation and data quality tiers

Today, we will work towards outcomes on all remaining Subgroup 3 phase 2 topics in preparation for the Full TWG meetings in June and July

Housekeeping: Guidelines and procedures

- We want to make **TWG meetings a safe space** – our discussions should be open, honest, challenging status quo, and 'think out of the box' in order to get to the best possible results for GHG Protocol
- Always **be respectful**, despite controversial discussions on content
- TWG members should **not disclose any confidential information** of their employers, related to products, contracts, strategy, financials, compliance, etc.
- In TWG meetings, **Chatham House Rule** applies:
  - "When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed."
- **Compliance and integrity** are key to maintaining credibility of the GHG Protocol
  - Specifically, all participants need to follow the **conflict-of-interest policy**
  - **Anti-trust rules** have to be followed; please avoid any discussion of competitively sensitive topics*

* Such as pricing, discounts, resale, price maintenance or costs; bid strategies including bid rigging; group boycotts; allocation of customers or markets; output decisions; and future capacity additions or reductions

Zoom logistics and recording of meetings

Zoom Meetings

- All participants are muted upon entry
- Please turn on your video
- Please include your full name and company/organization in your Zoom display name

Raise your hand in the participants feature and unmute yourself to speak

Use the chat function to type in your questions

Meetings will be recorded and shared with all TWG members for:

- Facilitation of notetaking for Secretariat staff
- To assist TWG members who cannot attend the live meeting or otherwise want to review the discussions

Recordings will be available for a limited time after the meeting; ***access is restricted to TWG members only.***

UPDATE: Recordings will be available upon request only. Please email Allison.Leach@wri.org to request the recording.

Schedule of upcoming Subgroup 3 and Full TWG meetings (tentative)

Meeting type	#	Date	Time	Topics
Full TWG	5	January 20th, 2026	Session 1: 08:00 ET / 14:00 CET / 21:00 CHN Session 2: 16:00 ET / 22:00 CET / 05:00 CHN	• Review preliminary Subgroup 1 phase 2 outcomes • Review preliminary Subgroup 3 phase 2 outcomes
Task Force	3	January 27th, 2026	09:00 ET / 15:00 CET / 22:00 CHN	• Continue calculation methods; emission factors
Subgroup 3	12	February 10th, 2026	09:00 ET / 15:00 CET / 22:00 CHN	• Global warming potential
Subgroup 3	13	March 31st, 2026	09:00 ET / 15:00 CET / 22:00 CHN	• Continue GWP; other climate forcers
Task Force	4	April 7th	09:00 ET / 15:00 CET / 22:00 CHN	• Calculation methods + emission factors
Subgroup 3	**14**	**May 19th, 2026 (TODAY)**	**09:00 ET / 14:00 CET / 21:00 CHN**	• **Task Force to report out on calculation methods, and emission factors; phase 2 wrap-up**
Full TWG	6	June 30th, 2026	Option 1: 08:00 ET / 14:00 CET / 20:00 CHN Option 2: 16:00 ET / 22:00 CET / 04:00 CHN	• Review Subgroup 3 phase 2 outcomes (data and calculation methodologies)
Full TWG	7	July 17th, 2026 (Thursday)	Option 1: 08:00 ET / 14:00 CET / 20:00 CHN Option 2: 16:00 ET / 22:00 CET / 04:00 CHN	• Review Subgroup 2 phase 2 outcomes (verification and assurance)
Full TWG	8	July 28th, 2026	Option 1: 08:00 ET / 14:00 CET / 20:00 CHN Option 2: 16:00 ET / 22:00 CET / 04:00 CHN	• Review Subgroup 1 phase 2 outcomes (tracking emissions over time)

Notes: Dates were revised for SG3 meetings 13 and 14; meeting 15 canceled. Full TWG 6, 7, and 8 dates revised.

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Summary of Subgroup 3 Task Force process and recommendations

Task force process

- Convened in October 2025
- 5 meetings were held, including a kick-off
- 13 Subgroup 3 members participated
- 6 members provided support, including research, note taking, and co-facilitating

Key recommendations from Task Force:

- **Calculation method guidance for scope 1** was developed, building on the approach in chapter 6 of the Corporate Standard titled Identifying and Calculating GHG Emissions.
- **Draft text** was prepared on the topics of identifying and calculating GHG emissions; guidance for selecting scope 1 data; requirements/guidance for scope 1 activity data units; and calculation disclosure requirements/recommendations.
- Calculation methods and emission factors were **defined**.
- **Calculation method hierarchy** was developed by activity type.

Pre-read: Subgroup 3 Task Force Proposal

Task Force recommendations will be discussed today

Calculation methods and emission factors: Draft text

Identifying and calculating scope 1 GHG emissions

1. *The organization **should** undertake an exercise to identify its scope 1 emission sources in the following activity types: stationary combustion, mobile combustion, process emissions, fugitive emissions, [and land emissions].*
2. *The organization **should** identify the appropriate scope 1 calculation method using the best available data.*
3. *The organization **should** select activity data and emission factors, as applicable, that are the most representative in terms of technology, time, and geography; most complete; and most reliable.**
4. *The emission factor **shall** match the units of the activity data and the calculation method selected.*
5. *The organization **should** use site-specific data.*
6. *The organization **may** use accessible data.*

Changes since Subgroup 3 Meeting 12

- Added provisions 1 and 2 on identifying sources and methods
- Clarified the types of data for provision 3
- Added statement 5 on site-specific data
- Added provision 6 on accessible data
- Minor editorial changes
- **Draft text had majority support in the Subgroup 3 Task Force****

Definitions:

- **Site-specific data** is primary data obtained within the organizational boundary. Site-specific data can be collected from a facility/equipment or can be averaged across facilities/equipment that have similar functions. They can be measured or modeled. *(Source: ISO 14064-1:2018)*
- **Best available data** are the most representative in terms of technology, time, and geography; most complete; and most reliable.
- **Accessible data**: Publicly available; free to use; and from a credible source (such as a government agency, system operator, or recognized registry).

Discussion: What do you think of the draft text?

*Data quality indicators from Scope 3 Standard are used to define "representative"
**See Appendix for full Subgroup 3 Task Force poll results

Polls: Scope 1 draft text on calculation methods

Poll questions

Questions	Draft text	Options
1. Do you support the **proposed approach and draft text** for guidance on identifying and calculating GHG emissions?	*The organization **should** undertake an exercise to identify its scope 1 emission sources in the following activity types: stationary combustion, mobile combustion, process emissions, fugitive emissions, [and land emissions].* *The organization **should** identify the appropriate scope 1 calculation method using the best available data.* *The organization **should** select activity data and emission factors, as applicable, that are the most representative in terms of technology, time, and geography; most complete; and most reliable.* *The emission factor **shall** match the units of the activity data and the calculation method selected.*	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain
2. Do you support the definition for "**best available data**"?	***Best available data** are the most representative in terms of technology, time, and geography; most complete; and most reliable.*	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain
3. Do you support adding a "should" statement and definition for **site-specific data**?	*The organization **should** use site-specific data.* ***Site-specific data** is primary data obtained within the organizational boundary. Site-specific data can be collected from a facility/equipment or can be averaged across facilities/equipment that have similar functions. They can be measured or modeled. (Source: ISO 14064-1:2018)*	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain
4. Do you support adding a "may" statement and definition for "**accessible data**"?	*The organization **may** use accessible data.* ***Accessible data**: Publicly available; free to use; and from a credible source (such as a government agency, system operator, or recognized registry).*	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain

Draft text shown above received majority support in Subgroup 3 Task Force

Monetary activity data and spend-based emission factors

Monetary activity data:

- Reports the consumption of a resource in monetary units rather than physical units
- **Can be converted to physical units** with reasonable accuracy using conversion factors that are geographically and temporally representative
- Examples:
  - USD$ on natural gas
  - Euro spent on petrol
  - Japanese yen spent on fuel oil

Spend-based emission factor:

- Emissions generated per monetary unit
- Usually on a **life cycle basis**
- Examples:
  - kg CO2 / USD spent on natural gas
  - kg CO2 / euro spent on petrol
  - kg CO2 / yen spent on fuel oil

Task Force poll results

1. Should companies collect scope 1 **activity data in physical units**?
   - 2 of 9: Shall collect scope 1 activity data in physical units / shall not collect monetary scope 1 activity data
   - **7 of 9: Should collect scope 1 activity data in physical units / may collect monetary scope 1 activity data**
   - 0 of 9: Abstain, I need more information to respond

2. If allowed, how should companies use scope 1 **monetary activity data**?
   - **5 of 8: Shall convert scope 1 monetary activity data to physical units**
   - 3 of 8: Should convert scope 1 monetary activity data to physical units

3. Should companies use **spend-based scope 1 emission factors**?
   - 2 of 8: Shall not use spend-based emission factors for scope 1
   - **5 of 8: Should not use spend-based emission factors for scope 1**
   - 1 of 8: Abstain, I need more information to respond

Note: There are internal inconsistencies

Monetary activity data and spend-based emission factors for scope 1

Option A: **Physical units only**	Option B: **Allow** monetary activity data **Prohibit** spend-based emission factors	Option C: **Allow** monetary activity data **Allow** spend-based emission factors
• *The organization **shall** collect scope 1 activity data that is in physical units.*	• *The organization **should** collect scope 1 activity data that is in physical units.*	• *The organization **should** collect scope 1 activity data that is in physical units.*
• *The organization **shall not** collect monetary scope 1 activity data.*	• *The organization **may** collect monetary scope 1 activity data.*	• *The organization **may c**ollect monetary scope 1 activity data.*
• *Spend-based emission factors **shall not** be used to calculate scope 1 emissions.*	• *If scope 1 activity data is collected in monetary units, then it **shall** be converted to physical units.*	• *If scope 1 activity data is collected in monetary units, then it **should** be converted to physical units.*
	• *Spend-based emission factors **shall not** be used to calculate scope 1 emissions.*	• *Spend-based emission factors **should not** be used to calculate scope 1 emissions.*
		Note: Spend-based EFs are often on a life cycle basis and not appropriate for scope 1

Decision-making criteria:
Scope 1 monetary activity data and spend-based emission factors

Criteria	A. Physical units only	B. **Allow** monetary activity data **Prohibit** spend-based emission factors	C. **Allow** monetary activity data **Allow** spend-based emission factors
Scientific integrity	**Pros**: Reflects the physical quantity for activity data	**Pros**: After conversion, reflects the physical quantity for activity data	**Cons**: Introduces uncertainty and can apply incorrect system boundaries for scope 1 emissions
GHG accounting and reporting principles	**Pros**: Promotes accuracy	**Pros**: Promotes accuracy, assuming the use of representative conversion factors	**Cons**: Hinders accuracy
Support decision-making that drives ambitious global climate action	**Pros:** Accurate emissions data supports informed decision-making	**Pros:** Accurate emissions data supports informed decision-making	**Cons**: Uncertain emissions data hinders decision-making
Support programs based on GHG Protocol and uses of GHG data	**Pros**: Supports users of the data, especially value chain partners that would have more accurate data for their scope 3 reporting Interoperable with external programs.	**Pros**: Supports users of the data, especially value chain partners that would have more accurate data for their scope 3 reporting Interoperable with external programs.	**Pros**: Interoperable with external programs. **Cons**: Reduces support to users, especially value chain partners that would have less accurate data for their scope 3 reporting
Feasibility to implement	**Cons**: Some reporters may not be able to collect all activity data in physical units	**Pros:** Can use monetary activity data **Cons**: Additional conversion factors must be collected to accurately convert monetary activity data to physical units	**Pros**: Feasible for all companies

Discussion: What do you think of these options?

Polls: Scope 1 monetary activity data and spend-based emission factors

Poll questions

Questions	Options
1. Which approach do you support for **scope 1 monetary activity data and spend-based emission factors**?	a. Allow **physical units only** for scope 1 (i.e., **prohibit** monetary activity data and **prohibit** spend-based emission factors) **b. Allow** monetary activity data and **prohibit** spend-based emission factors **c. Allow** monetary activity data and **allow** spend-based emission factors d. Abstain
2. If allowed, should companies **disclose conversion factors** used to convert scope 1 monetary activity data to physical units?	**a. Shall** disclose monetary conversion factors **b. Should** disclose monetary conversion factors **c. May** disclose monetary conversion factors **d. Stay silent** e. Abstain

Calculation methods and emission factors: Disclosure and specific topics

Draft text

Accounting requirement:

- *The organization **shall** use fuel consumption activity data and emission factors that are on the same heating value basis.*

Reporting requirements:

- *The organization **should** disclose whether lower heating values (LHV; also known as net calorific value) or higher heating values (HHV; also known as gross calorific value) were used to calculate its scope 1 emissions.*
- *The organization **[shall / <u>should</u> / may / stay silent]** disclose the oxidation factors used to calculate its scope 1 emissions.*
- *The organization **shall** disclose whether it used artificial intelligence (AI) to calculate its emissions, including what tools were used and how they were used.*

Subgroup 3 Task Force poll results

Majority support for draft text on heating values

Majority support for recommendation to disclose which heating value was used

Majority support for remaining agnostic on LHV vs. HHV

Split opinions on a disclosure requirement for oxidation factors, with the **most support for "should"**

Majority support for defining oxidation factors

Majority support for disclosure requirement for the use of AI

Discussion: What do you think of the draft text? Is anything missing?

See Appendix for full Subgroup 3 Task Force poll results

Polls: Scope 1 specific questions on calculation methods

Poll questions

Questions	Draft text	Options
1. Do you support the draft text and approach on **heating values**?	*The organization **shall** use fuel consumption data and factors that are on the same heating value basis.* *The organization **should** disclose whether lower heating values (LHV; also known as net calorific value) or higher heating values (HHV; also known as gross calorific value) were used to calculate its scope 1 emissions.* Approach: Corporate Standard to remain agnostic on lower heating value versus higher heating values	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain
2. Do you support the draft text and approach on **oxidation factors**?	*The organization **should** disclose the oxidation factors used to calculate its scope 1 emissions.* Note: **Split opinions** in Task Force, with the most support for "should"	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain
3. Do you support the draft text on the **use of artificial intelligence (AI)**?	*The organization **shall** disclose whether it used artificial intelligence (AI) to calculate its emissions, including what tools were used and how they were used.*	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain

Unless otherwise noted, draft text received majority support in Subgroup 3 Task Force

Scope 1 calculation methods: Calculation approaches

Subgroup 3 Task Force defined the following scope 1 methods, which were mapped to LSRS **calculation approaches**

Scope 1 methods	LSRS calculation approaches	Calculation approach definitions
• Direct measurement	Measurement-based calculation approach	A calculation approach that directly quantifies GHG emissions, removals, or associated carbon stock changes, using **direct measurement** of GHG pools and fluxes
• Mass balance calculation method • Stoichiometry method	Model-based calculation approach	A calculation approach that uses **mathematical modeling techniques** to estimate emissions, removals, or carbon stock changes using input variables and fixed parameters calibrated to the specific model applications
• Fuel carbon content method • Fuel energy content method • Fuel-based method • Distance-based method • Process-specific method • Fugitive emission rate method • Spend-based method	Factor-based calculation approach	Methods that multiply activity data by an **emissions factor** or carbon stock change factor to determine emissions, removals, or other accounting category values for a given process
• Remote sensing method*	Remote sensing-based calculation approach	A calculation approach that uses **satellite or aerial information** to collect activity data to estimate emissions, removals, or carbon stock changes

*New scope 1 method proposed by Secretariat
Source: GHGP Land Sector and Removals Standard

Scope 1 calculation methods: Draft definitions, 1 of 3

Measurement and modeling methods

Any feedback on these definitions?

Method	Activity types	GHG	Proposed definitions	Examples
Direct measurement	Stationary, mobile, process, fugitive	Any	Quantification of GHG emissions or removals, or associated carbon stock changes, using physical direct monitoring/measurement of GHG fluxes.	• Continuous Emissions Monitoring System (CEMS) • Periodic sampling with sensors, scaled to annual emissions 
Mass balance calculation method*	Stationary, mobile, process, fugitive	Any	Model-based calculation approach based on the conservation of mass in which a quantity can be estimated with the inputs, outputs, generation, consumption, and accumulation of a product within a system	• Refrigerant leakage can be calculated based on the storage inventory, purchases and sales of refrigerants, and any changes in refrigerant equipment capacity 
Stoichiometry method	Stationary, mobile, process, fugitive	Any *Not suitable for emissions that are a byproduct of the chemical reaction (e.g., N_2O and CH_4 emissions from fossil fuel combustion)*	Model-based calculation approach based on chemical reaction equations in which emissions are quantified using the atomic mass of the reactants and products *Note: The stoichiometry method assumes perfect conversion, but system efficiencies can be applied separately*	• Calculate the amount of CO_2 combusted based on the carbon content of natural gas. $CH_4+O_2 \rightarrow CO_2+H_2O$ • Calculate the amount of CO_2 released during the calcination step of cement production, where $CaCO_3$ decomposes into CaO and CO_2 

*The revised LSR Standard defines mass balance in the context of a chain-of-custody model, which is not relevant to the mass balance method for calculating emissions

Sources: GHG Protocol Guidance on Stationary Combustion, GHG Protocol HFC Tool, EPA GHG Inventory Guidance: Direct Emissions from Stationary Combustion Sources, EPA Direct Fugitive Emissions

Scope 1 calculation methods: Draft definitions, 2 of 3

Factor-based fuel combustion methods

Any feedback on these definitions?

Method	Activity types	GHGs	Proposed definitions	Examples
Fuel carbon content method	Stationary, mobile	CO_2	Factor-based calculation approach for quantifying CO_2 emissions based on the carbon content of the fuel *Note: Fuel carbon content method is a type of stoichiometry method.*	• Calculate the amount of CO_2 emitted based on the carbon content of natural gas with a carbon content factor (e.g., kg C/mmBTu coal) and a heat content (e.g., MMBTu/tonne)
Fuel energy content method	Stationary, mobile	CO_2, CH_4, N2O	Factor-based calculation approach for quantifying CO_2, CH_4, or N_2O emissions based on the energy or heat content of the fuel	• Calculate the amount of CO_2 emitted based on the energy content of natural gas (kg CO_2/mmBTu)
Fuel-based method Fuel quantity method? Fuel consumption method?	Stationary, mobile	CO_2, CH_4, N_2O *Mobile: Preferred method for CO_2*	Factor-based calculation approach for quantifying CO_2, CH_4, or N_2O emissions based on the amount of fuel combusted in physical units (e.g., mass, volume) and an emission factor	• Calculate the amount of CO_2 emitted based on the mass or volume of fuel with an average emissions factor from a database.
Distance-based method	Mobile	CO_2, CH_4, N2O *Mobile: Preferred method for CH_4, N_2O*	Factor-based calculation approach for quantifying CO_2, CH_4, or N_2O emissions based on the distance traveled by a vehicle and an emissions factor	• Calculate the amount of CH_4 emitted based on the kilometers traveled by a vehicle (kg CH_4/kilometer)

Sources: GHG Protocol Guidance on Stationary Combustion, GHG Protocol HFC Tool, EPA GHG Inventory Guidance: Direct Emissions from Stationary Combustion Sources, EPA Direct Fugitive Emissions

Scope 1 calculation methods: Draft definitions, 3 of 3

Other factor-based methods and remote sensing

Any feedback on these definitions?

Method	Activity types	GHGs	Proposed definitions	Examples
Process-specific method	Process	Any	Factor-based calculation approach for quantifying process GHG emissions using an emission factor for specific technology/equipment	• Calculate the emissions from aluminum production that uses the Søderberg Process versus the Prebake Anode Process. These two technologies/approaches have different emission factors.
Fugitive emission rate method	Fugitive	Any	Factor-based calculation approach for quantifying fugitive emissions using an average fugitive emission rate for specific technology/equipment. *Note: This applies to the calculation of fugitive emissions with an emission factor, such as the emission of refrigerants based on an average leakage rate.*	• Calculate refrigerant leakage based on the refrigerant capacity and an average annual leakage rate for that equipment. • *Note: Highly uncertain; EPA recommends for screening only*
Remote sensing method	Fugitive	Any	Remote sensing-based calculation approach for quantifying fugitive emissions with the use of satellites or aerial imagery.	• Measure CH_4 leakage from oil and gas facilities, coal mining operations, and landfills. • Measure N_2O volatilization from fertilizer application, wastewater treatment, and manure lagoons.
Spend-based method	Any	Any Often CO_2e	Factor-based calculation approach for quantifying GHG emissions based on the monetary spend of a product or service and a spend-based emission factor *Note: Not recommended/allowed (TBD) for scope 1. Emission factors are often on a lifecycle basis*	• Calculate upstream emissions from purchased food using USD spent and an EEIO emissions factor in units of kg eCO_2/USD

Sources: GHG Protocol Guidance on Stationary Combustion, GHG Protocol HFC Tool, EPA GHG Inventory Guidance: Direct Emissions from Stationary Combustion Sources, EPA Direct Fugitive Emissions

Scope 1 calculation method hierarchy by activity type

Activity type	Scope 1 direct measurement hierarchy *Note: Only preferred over calculation methods if already available*	Scope 1 calculation method hierarchy *Use the first method for which primary activity data is available*
Stationary combustion 	1. Continuous Emissions Monitoring System (CEMS) 2. Periodic sampling with sensors, scaled to annual emissions	1. Fuel carbon content method (CO_2 only) 2. Fuel energy content method 3. Fuel-based method
Mobile combustion 	1. Continuous Emissions Monitoring System (CEMS) 2. Periodic sampling with sensors, scaled to annual emissions	**Carbon dioxide:** 1. Fuel carbon content method (CO_2 only) 2. Fuel energy content method 3. Fuel-based method 4. Distance-based method* **Methane and nitrous oxide**: 1. Distance-based method* 2. Fuel-based method
Process emissions 	1. Continuous Emissions Monitoring System (CEMS) 2. Periodic sampling with sensors, scaled to annual emissions	1a. Mass balance calculation method 1b. Stoichiometry method 2. Process-specific method
Fugitive emissions 	1. Continuous Emissions Monitoring System (CEMS) 2. Periodic sampling with sensors, scaled to annual emissions	1a. Remote sensing method 1b. Mass balance calculation method 2. Fugitive emission rate method

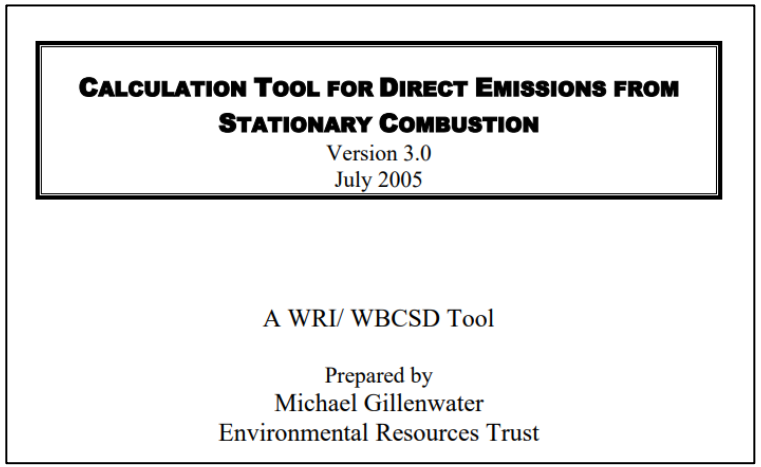
What feedback do you have on the scope 1 methods hierarchy? How should it be implemented (e.g., "should" statement)?

*Distance-based method for mobile combustion is only applicable for on-road vehicles (e.g., cars, trucks, trains).
Note: Land emissions activity type is not yet considered here

Guidance on direct measurement versus calculation methods

Should the following guidance from the GHG Protocol Stationary Combustion Guidance be adapted and applied for the scope 1 calculation method hierarchy for all stationary and mobile combustion emissions?

- **Recommend calculation-based approaches** over direct measurement unless the organization already has direct measurement technology (e.g., CEM).
- **If already collecting direct measurement data**, these results should be used in the GHG inventory for consistency.



CALCULATION TOOL FOR DIRECT EMISSIONS FROM STATIONARY COMBUSTION
Version 3.0
July 2005

A WRI/ WBCSD Tool

Prepared by
Michael Gillenwater
Environmental Resources Trust

More detailed text from GHG Protocol Stationary Combustion Guidance:

- *Both direct measurement and calculation-based approaches are acceptable ways to estimate CO_2 emissions from stationary combustion.*
- *Given similar levels of data quality and quality control **both** direct measurement and calculation-based approaches are capable of producing **accurate CO2 emission estimates**.*
- *However, the **extra cost of a direct measurement approaches** such as CEM systems typically cannot be justified for the purpose of estimating CO2 emissions alone.*
- *For cost and practicality reasons this **guidance recommends the use of a calculation-based method** for estimating CO2 emissions from stationary combustion sources.*
- *Most companies with large stationary combustion units already collect emissions-related data and some of that data is already reported to national or other governmental agencies. Companies should strive to **maintain consistency in their greenhouse gas inventory with data reported to government agencies**.*

Emission factor definitions: Examples

EF type	Sub-type	Activity types	Gases	Calculation and definition (source: adapted from EPA)
Fuel emission factors	Carbon content (CC)	Stationary, mobile	CO_2	Emissions = Fuel x CC x 44/12 x OF Fuel = Mass or volume of fuel combusted CC = Fuel carbon content, in units of mass of carbon per mass or volume of fuel 44/12 = ratio of molecular weights of CO_2 and carbon
	Energy/heat content	Stationary, mobile	CO_2, CH_4, N_2O	Emissions = Fuel x HV x EF x OF* Fuel = Mass or volume of fuel combusted HV = Fuel heat content (as lower or higher heating value), in units of energy per mass or volume of fuel EF = CO_2, CH_4, or N_2O emission factor per energy unit OF* applicable for CO_2 only
	Physical units (e.g., mass, volume)	Stationary, mobile	CO_2, CH_4, N_2O	Emissions = Fuel x EF x OF* Fuel = Mass or volume of fuel combusted EF = CO_2, CH_4, or N_2O emission factor per mass or volume unit OF* applicable for CO_2 only
	Distance-based	Mobile	CO_2, CH_4, N_2O	Emissions = Distance x EF Distance = Vehicle distance traveled EF = CH_4 or N_2O emission factor per distance unit
Process emission factors	Product: Cement clinker	Process	Any GHG	Calculate annual clinker emissions based on monthly clinker production and monthly kiln-specific emissions factor calculated from the monthly carbonate and non-carbonate content of the clinker (measurement required)
Fugitive emission factors	Refrigerant leakage rate	Fugitive	Any GHG	Emissions from Operation = C × (x/100) x T x GWP C = refrigerant capacity of the piece of equipment x = annual leak rate in percent of capacity T = time in years used during the reporting period Note: Highly uncertain; EPA recommends for screening only
	Fertilizer**	Fugitive	N_2O	N_2O emissions per kg fertilizer applied as nitrogen
	Animals**	Fugitive	N_2O, CH_4	Emissions from ruminant enteric fermentation (CH_4) and manure management (CH_4, N_2O)
Spend-based emission factors	Spend	Any	Any; often CO_2e	Emissions per monetary unit

The emission factors list is not intended to be comprehensive and instead provides examples of common emission factors.
**Addressed in GHG Protocol Land Sector and Removals Standard and Guidance

Polls: Scope 1 calculation method definitions and hierarchy

Poll questions

Questions	Options
1. Do you support the draft definitions for each of the **scope 1 calculation methods**? • Direct measurement • Mass balance calculation method • Stoichiometry method • Fuel carbon content method • Fuel energy content method • Fuel-based method • Distance-based method • Process-specific method • Fugitive emission rate method • Spend-based method • Remote sensing method	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain
2. Do you support the draft **scope 1 calculation method hierarchy** for each scope 1 category? • Stationary combustion • Mobile combustion • Process emissions • Fugitive emissions	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain
3. Do you support the approach of **recommending calculation-based approaches** (over direct measurement when measurement technology is not already available) for scope 1?	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain
4. Do you support the **emission factor examples defined** in the Task Force proposal?	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain

Agenda

Introduction and housekeeping	10 minutes
Scope 1 calculation methods and emission factors	50 minutes
Indirect climate forcers	**40 minutes**
Other phase 2 pending items	40 minutes
Wrap-up and next steps	10 minutes

GREENHOUSE GAS PROTOCOL

Scope of work and background on indirect climate forcers

Scope of work: F.6. Accounting for indirect climate forcers including radiative forcing in aviation.

What are indirect climate forcers?

Gases and phenomena that are not themselves GHGs but have an impact on the climate, such as:

- Precursors to GHGs (e.g., NOx)
- Precursors to gases that have a climate cooling effect, such as through reflectivity

Examples of indirect climate forcers	Definition and climate effect	GWP-20	GWP-100	Effect
Contrails from aviation	Condensation trails that form behind aircraft cruising at altitude; absorb solar radiation	2.32	0.63	
Black carbon	Soot; particulate matter from incomplete combustion; absorbs solar radiation	4288	1166	
Nitrogen oxides	By-product of combustion that reacts to form ozone, which is a GHG	619	114	
Sulfur dioxide	Emitted from combustion; forms sulfate aerosols, which cause cooling through reflectivity	-832	-226	
Volatile organic compounds	Precursor to ground-level ozone. Sources vary, including fossil fuel combustion and household products.	*	*	
Albedo	Reflectivity, which causes cooling	*	*	

Source: GWPs from Lee et al. 2021 in aviation context; calculated from IPCC effective radiative forcing
*Not provided in Lee et al. 2021

Aviation and radiative forcing

GHG emissions

- CO_2 and N_2O emitted from combustion of jet fuel*

Contrails

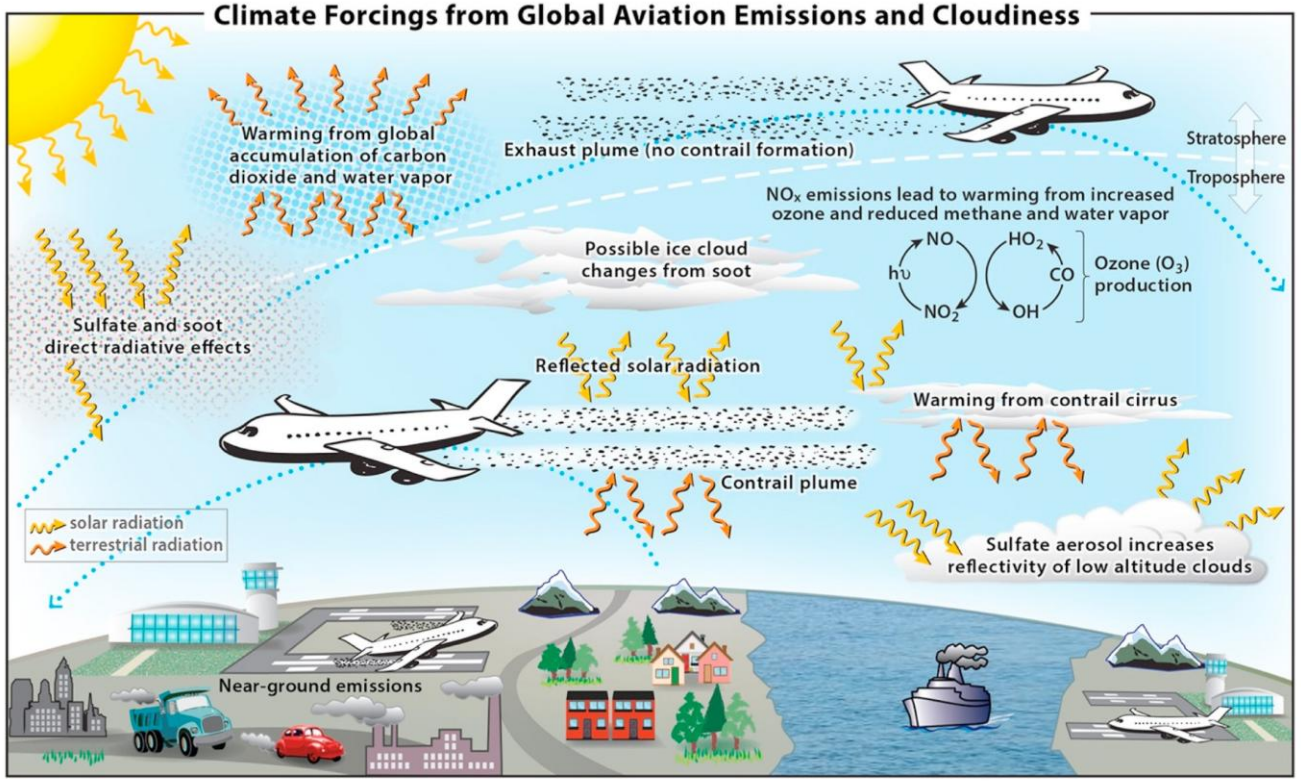
- Condensation trails that form behind aircraft cruising at altitude.
- Whether contrails form depends on climate conditions (e.g., temperature, humidity) and the aircraft itself (e.g., engine efficiency)
- Because of the many variables, estimating the warming effect from contrails is highly uncertain

Nitrogen oxide emissions

- Pre-cursor to ozone (GHG), but also cooling effects from methane reduction

Aerosols

- Warming from black carbon / soot and cooling from SO_2



Source: Lee et al. 2021

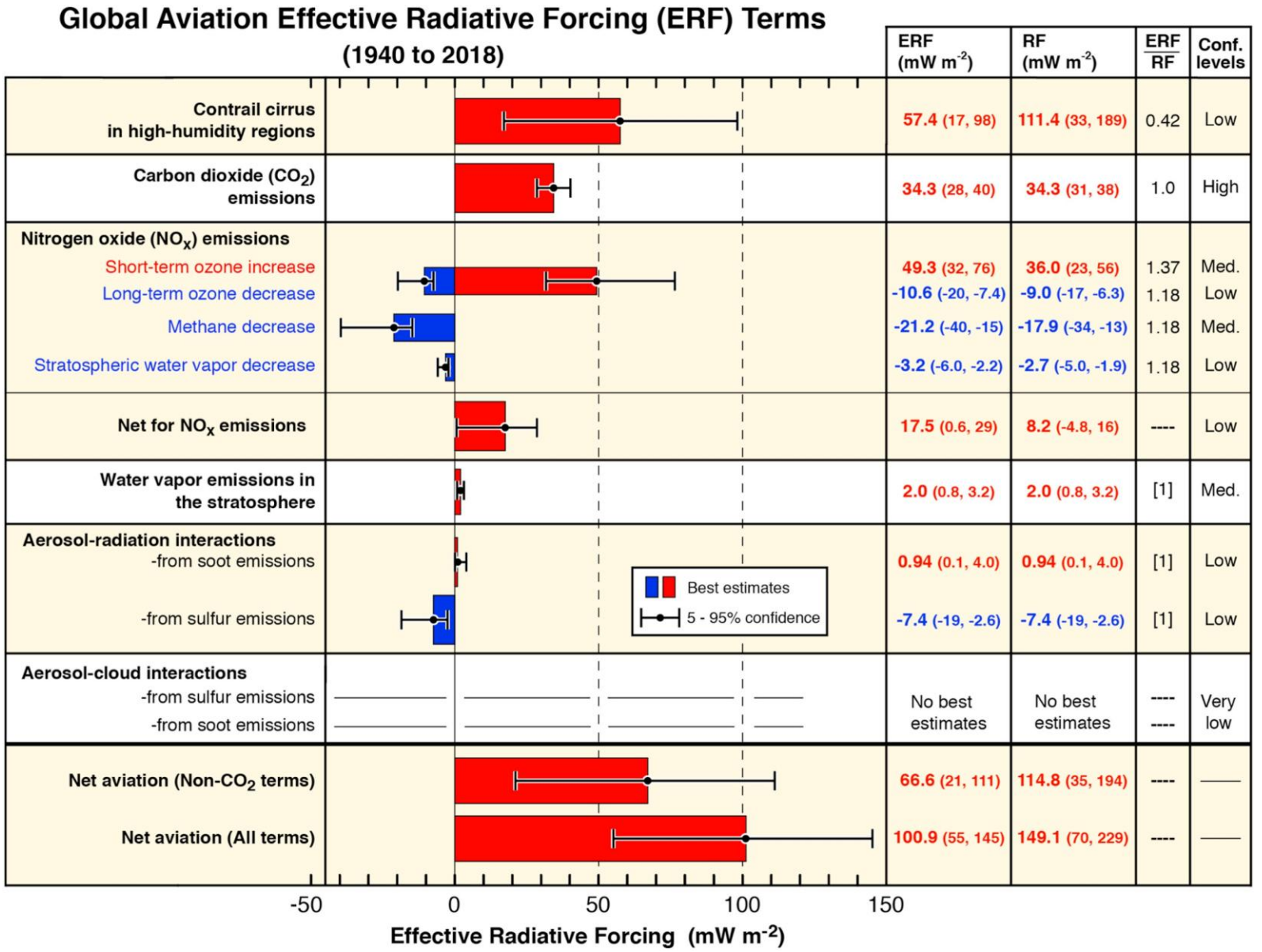
*"*Aviation: Methane (CH4) may be emitted by gas turbines during idle and by older technology engines, but recent data suggest that little or no CH4 is emitted by modern engines.*" –IPCC 2006 Guidelines for National GHG Inventories

Aviation and radiative forcing: Uncertainty

- Aviation does have additional radiative forcing beyond CO_2 emissions
- However, there is **high uncertainty** associated with the estimates
- Lee et al. (2021) report high confidence for estimates of CO_2 emissions, but low to medium confidence for all other key drivers of aviation radiative forcing

Revised draft GHG Protocol guidance on accuracy and conservativeness:

*"**Accuracy** should be pursued as far as possible, but once uncertainty can no longer be practically reduced, **conservative estimates** should be used."*



	ERF (mW m^{-2})	RF (mW m^{-2})	ERF / RF	Conf. levels
Contrail cirrus in high-humidity regions	57.4 (17, 98)	111.4 (33, 189)	0.42	Low
Carbon dioxide (CO_2) emissions	34.3 (28, 40)	34.3 (31, 38)	1.0	High
Nitrogen oxide (NO_x) emissions				
Short-term ozone increase	49.3 (32, 76)	36.0 (23, 56)	1.37	Med.
Long-term ozone decrease	-10.6 (-20, -7.4)	-9.0 (-17, -6.3)	1.18	Low
Methane decrease	-21.2 (-40, -15)	-17.9 (-34, -13)	1.18	Med.
Stratospheric water vapor decrease	-3.2 (-6.0, -2.2)	-2.7 (-5.0, -1.9)	1.18	Low
Net for NO_x emissions	17.5 (0.6, 29)	8.2 (-4.8, 16)	----	Low
Water vapor emissions in the stratosphere	2.0 (0.8, 3.2)	2.0 (0.8, 3.2)	[1]	Med.
Aerosol-radiation interactions				
-from soot emissions	0.94 (0.1, 4.0)	0.94 (0.1, 4.0)	[1]	Low
-from sulfur emissions	-7.4 (-19, -2.6)	-7.4 (-19, -2.6)	[1]	Low
Aerosol-cloud interactions				
-from sulfur emissions	No best estimates	No best estimates	----	Very low
-from soot emissions			----	
Net aviation (Non-CO_2 terms)	66.6 (21, 111)	114.8 (35, 194)	----	----
Net aviation (All terms)	100.9 (55, 145)	149.1 (70, 229)	----	----

Source: Lee et al. 2021

Aviation and radiative forcing

Radiative forcing index / multiplier

- **Radiative Forcing Index (RFI) =** ***"the ratio of total radiative forcing to that from CO2 emissions alone.*** *Total radiative forcing induced by aircraft is the sum of all forcings, including direct emissions (e.g., CO2, soot) and indirect atmospheric responses (e.g., CH4, O3, sulfate, contrails)."* –IPCC 1999
- RFI are **used inconsistently** in emission factors (e.g., UK DESNZ offers EFs with and without RFI) and GHG inventory preparation
- RFI **multipliers vary**:

Radiative forcing index	Source
1.7	Lee et al 2021 Used by DESNZ
1.9	Sausen et al. 2005
2.0	Lee et al. 2009
2.7 (2.2 – 3.4 for all scenarios analyzed)	IPCC 1999

Calculation of UK DESNZ's radiative forcing factor

Effective radiative forcing term	CO2-eq (TG CO2/yr) for 2018, using 100-year GWP
CO2	1034
Contrail cirrus (Tg CO2 basis)	652
Net NOx	163
Soot emissions	11
SO2 emissions	-84
Water vapor emissions	23
Total CO2-eq / CO2	**1.7**

All values are summed and divided by the CO2 GWP to calculate the radiative forcing value of 1.7

Source: UK DESNZ 2025 methodology paper and Lee et al. 2021

GHG Protocol context: Indirect climate forcers

Corporate Standard

Corporate Standard does not comment directly on any indirect climate forcers.

Optional information:

- *Emissions from GHGs not covered by the UNFCCC/Kyoto Protocol (e.g., CFC, NO_X) reported separately from the scopes.*
- *A list of any optional GHGs included in an inventory shall be reported.*

- GHG Protocol Amendment on Required GHGs

Scope 3 Technical Guidance

Scope 3 Technical Guidance notes that multipliers for radiative forcing are optional:

- *Note: For air travel emission factors, multipliers or other corrections to account for radiative forcing **may be applied** to the GWP of emissions arising from aircraft transport.*
- *If applied, companies **should disclose** the specific factor used.*

- Scope 3 Technical Guidance for categories 4, 6, and 7

Scope 3 Standard does not comment directly on other indirect climate forcers.

Indirect climate forcers: External programs

Other standards

Standard	Aviation radiative forcing	Other indirect climate forcers
ISO **14064-1:2018** **Corporate carbon footprint**	**No requirements**; only reference to aviation radiative forcing is in a note: • *NOTE Aircraft GHG emissions under certain circumstances in high altitudes have additional climate impacts as a result of physical and chemical reactions with the atmosphere. For more information on GHG emissions from aircraft, see IPCC guidelines.*	No reference to other indirect climate forcers
ISO **14067:2018** **Product carbon footprint**	• *Aircraft transportation GHG emissions shall be included in the CFP [carbon footprint of a product] and documented separately in the CFP study report.* • *Where an **aviation multiplier** is used, the **effect of this multiplier shall not be included in the CFP and shall be reported separately** together with the source.*	• *Note 3 on GHG definition: The focus of this document is limited to long-lived GHGs and it therefore **excludes climate effects due to changes in surface reflectivity (albedo) and short-lived radiative forcing agents (e.g. black carbon and aerosols).***

SBTi
CNZS v1.0
Aviation Pathway
	• Aviation indirect radiative forcing **specifically excluded** from target setting
	• *"The impact of aviation non-CO_2 factors on warming is **acknowledged but not included** in quantitative target setting due to scientific uncertainty and lack of mitigation solutions"*
	• *"Nonetheless, the SBTi recognizes that aviation **non-CO_2 induced Effective Radiative Forcing will likely need to be addressed** to deliver the ultimate goal of limiting warming to well-below 2°C"*
	• Disclosure requirements:
	  • *Aviation target formulation and communication must explicitly **state that targets are exclusive of non-CO_2 factors***
	  • *Targets must include a footnote stating that non-CO_2 factors which may also contribute to aviation-induced warming are not included in this target and **whether the company has publicly reported or commits to publicly report its non-CO2 impacts**.*
		No reference to other indirect climate forcers

Note: GRI 102 Climate Change 2025 does not appear to have any reference to indirect climate forcers

Indirect climate forcers: External programs
Climate disclosure rules and other programs

	Name	Aviation radiative forcing	Other indirect climate forcers
IFRS	**IFRS S2**	No reference to aviation radiative forcing	No reference to other indirect climate forcers
	ESRS E1 Climate Change Nov 2025 draft	No reference to aviation radiative forcing	*ESRS E2 Pollution addresses ozone-depleting substances (ODS), nitrogen oxides (NOx) and sulphur oxides (SOx), among other air emissions, that are connected to climate change*
	ESRS E2 Pollution Nov 2025 draft	No reference to aviation radiative forcing	• *The sustainability statement shall include information in relation to **ESRS E2 Pollution** if this topic relates to **material impacts, risks and opportunities** to cover all the reporting areas listed in paragraph 5 of **ESRS 1 General Requirements**.* • *14. (28(a) amended) The undertaking **shall disclose the amounts of material emissions of pollutants** to air, water and soil from its own operations, including due to environmental accidents, in the reporting period.* • Entity **reports material pollutants**, including those "*…listed in Annex II of Regulation (EC) No 166/2006 (E-PRTR), Regulation (EU) 2024/1244 (IEPR)…, together with other pollutants that the undertaking measures or monitors.* • Examples of pollutants: NOx, SOx, total N, total P, heavy metals, pesticides
ipcc	**IPCC**	• **Defines Radiative Forcing Index** (RFI) and provides first estimate (2.7) • Uncertainty and need for more analysis noted - Special Report on Aviation (1999) Note: Guidelines for national inventories do not have specifications on non-CO2 aviation radiative forcing	• Short-lived climate forcers include aerosols (e.g., sulphate, nitrate) and chemically reactive gases (e.g., CH4, ozone, NOx) • Provides latest understanding of climate forcing effects (cooling and warming) - IPCC AR 6, chapter 6: Short-lived climate forcers
	ICAO CORSIA*	Focus is on CO2 emissions. No mention of multipliers.	*Not applicable*
CLEVER	**CLEVER**	Draft transport emissions methodology in Europe Includes optional high altitude aviation emissions	Draft transport emissions methodology in Europe Includes optional indirect climate forcers (e.g., black carbon)

Note: The following do not mention other indirect climate forcers: CDP and California Health and Safety Code section 38532
**ICAO CORSIA = International Civil Aviation Organization Carbon Offsetting and Reduction Scheme for International Aviation*

GHG Protocol stakeholder survey feedback: Indirect climate forcers

Other indirect climate forcers

Corporate Standard stakeholder survey feedback

- Revise guidance to include **black carbon**

Corporate Standard stakeholder proposals

- Consideration of **indirect warming effects**, such as that from hydrogen's interactions in atmospheric chemistry

Aviation radiative forcing

Scope 3 stakeholder survey feedback

- E.2.6 – Specify **uniform emission factors for air-travel** (category 6) and air-freight (category 4 and category 9) and account for radiative forcing (refer to E.3 here for more).
- E.3.4 – Explicitly **specify whether radiative forcing and contrails (and other non-GHG climate forcers) should be factored into air-travel or air-freight**. Some respondents asserted that there is too much optionality regarding using multipliers for radiative forcing which may skews results.

Scope 3 stakeholder proposals

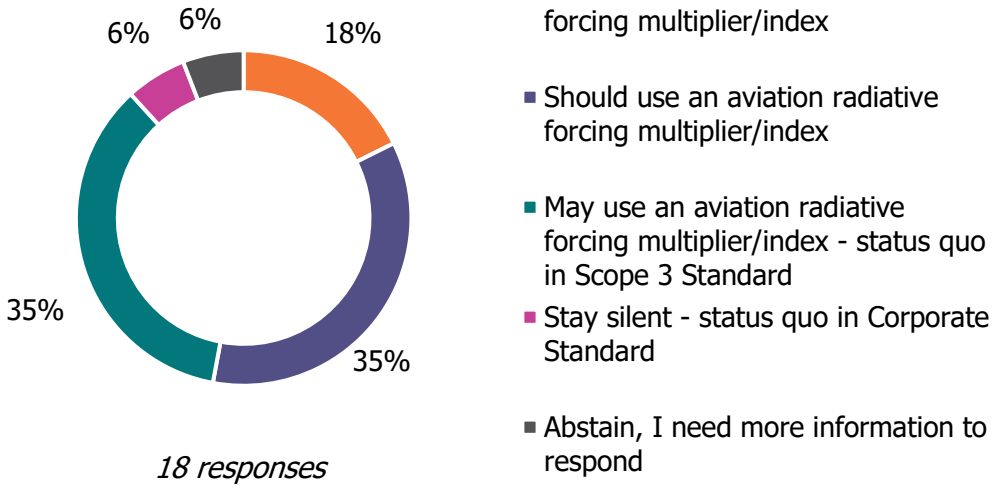
- 2.2.3 – Consider making the inclusion of **aviation indirect radiative forcing mandatory.** Provide clear aviation radiative forcing calculation guidance, including emission factor selection requirements.

Subgroup 3 Meeting 13 poll results: Indirect climate forcers

Aviation radiative forcing multiplier

Should companies use an aviation radiative forcing multiplier/index?

Split opinions, with the most support for **"should"** and **"may"**



18 responses

Feedback from TWG members

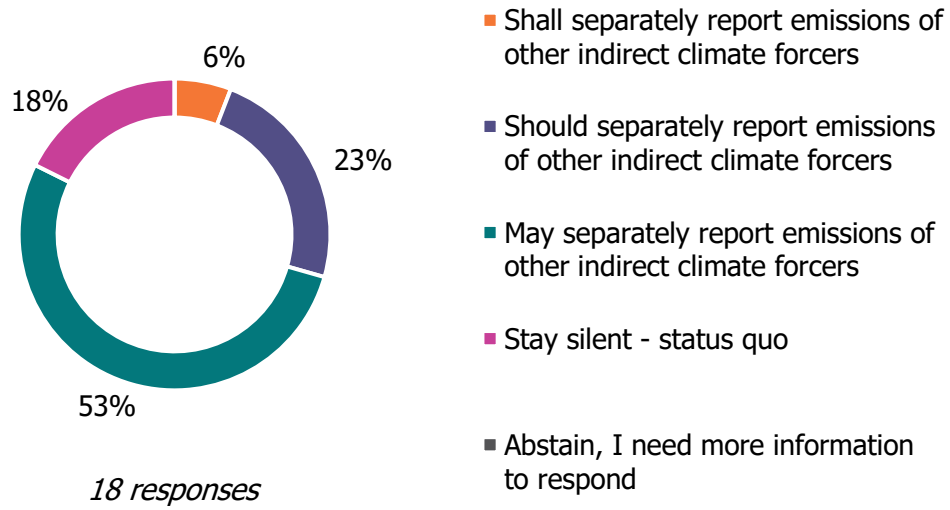
- Support requiring because air travel is a **major form of transportation** and significant portion of global GHG emissions
- Activity data is already being collected and radiative forcing index **values are available**
- Only recommend for companies with **significant emissions from aviation**
- Companies should report indirect climate forcing from aviation **separately**
- **"May"** strikes an appropriate balance between relevance and feasibility.
- The **same approach** should be taken for aviation radiative forcing and other indirect climate forcers (e.g., "may" for both)

Subgroup 3 Meeting 13 poll results: Indirect climate forcers

Other indirect climate forcers

Should companies separately report the emissions of other indirect climate forcers (e.g., black carbon)?

Split opinions, with the most support for **"may"**



18 responses

Feedback from TWG members

- Corporate Standard should **remain silent** on indirect climate forcers given their **uncertainty, small impact, and lack of information**
- **Recommendation** ("should" statement) allows for comprehensive climate impact reporting while acknowledging the high uncertainty and variability across conditions
- **Consistency across standards** within GHG Protocol is critical
- Only recommend for companies with **significant emissions** from other indirect climate forcers
- **Feasibility concerns**: Companies may not already be collecting data on these other indirect climate forcers, and emission factors are more limited
- **"May"** strikes an appropriate balance between relevance and feasibility
- **Verification/validation** would be difficult due to limited knowledge and uncertainty

Indirect climate forcers: Preliminary poll questions

Discussion

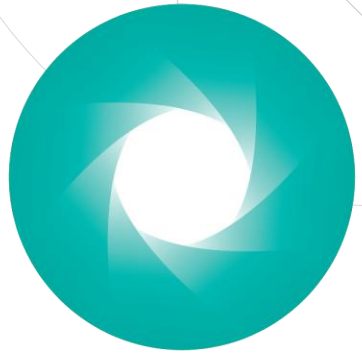
Poll questions

Questions	Options
1. Should companies use an **aviation radiative forcing** multiplier/index?	**a. Shall** use an aviation radiative forcing multiplier/index **b. Should** use an aviation radiative forcing multiplier/index **c. May** use an aviation radiative forcing multiplier/index – *status quo in S3* **d. Stay silent** – *status quo in CS*
2. How should aviation emissions from indirect radiative forcing be **reported**?	**a. Within** the physical GHG inventory **b. Separately** from the physical GHG inventory
3. Should GHG Protocol recommend a **specific aviation radiative forcing multiplier/index**?	a. Yes, **state value in the CS** b. Yes, but **state in separate guidance** **c. No**, this is beyond the scope of GHGP
4. Do you support the following **disclosure requirement** on the use of an aviation radiative forcing multiplier/index? *Companies **shall** disclose if an aviation radiative forcing multiplier was used, and if so, the specific factor used.*	a. Yes, fully support b. Yes, with minor edits c. No
5. Do you support the following on **other indirect climate forcers:** *Companies **may** separately report emissions of other indirect climate forcers*	a. Yes, fully support b. Yes, with minor edits c. No

Note: All poll questions also have the follow option: Abstain

Agenda

Introduction and housekeeping	10 minutes
Scope 1 calculation methods and emission factors	50 minutes
Indirect climate forcers	40 minutes
Other phase 2 pending items	**40 minutes**
Wrap-up and next steps	10 minutes



GREENHOUSE GAS PROTOCOL

Pending Subgroup 3 Phase 2 topics

Global Warming Potential

- 20-year time horizon
- Fossil and non-fossil methane

Data quality tiers

- Whether to include an "unclassified" option

Scope 1 disaggregation

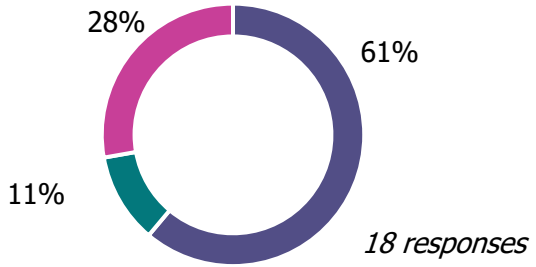
- Whether disaggregation should be a "shall" or "should"

GWP: 20-year time horizon

Subgroup 3 poll results

What guidance should the Corporate Standard provide on the 20-year GWP?

Majority support for reporters with **significant methane emissions**



- Recommend 20-year GWP ("should" statement) for all reporters
- Recommend 20-year GWP ("should" statement) for reporters with significant methane emissions
- Recommend 20-year GWP ("should" statement) for specific reporters (e.g., certain industry, agriculture)
- Provide 20-year GWP as an option ("may" statement)

TWG member feedback

- 20-year GWP should not be linked to methane emissions
- Recommending 20-year GWP for reporters with significant methane emissions appropriately balances scientific relevance and feasibility while avoiding unnecessary burden for reporters where methane is not material
- 20-year GWP should be separately reported from 100-year GWP
- 100-year GWP should still be the required time horizon

Defining "significant methane emissions"

How should "significant methane emissions" be defined?

Proposal: Land Sector and Removals Standard definition of "significant":

Significant = *When an estimated emission, removal, or other metric's value has a **sufficiently large influence** on a company's total inventory to be worthy of attention, considering their business goals and the intended uses of inventory data. This can be determined based on its **magnitude** relative to total emissions, removals, or other metrics in terms of the **absolute level, the trend, or the uncertainty**.*
–LSRS page 121

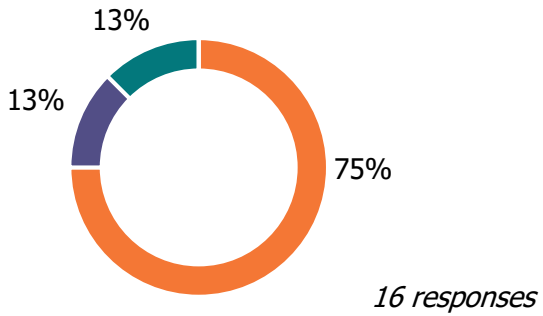
Do you agree with the LSRS definition of "significant" for defining "significant methane emissions"?

GWP: Fossil and non-fossil methane

Subgroup 3 poll results

Should the Corporate Standard provide any guidance on fossil and non-fossil methane GWP values?

Majority support for providing **guidance**



TWG member feedback

- A **simple statement** clarifying that methane can be derived from either fossil or biogenic sources/feedstocks is likely sufficient.
- Reporting of methane should be **differentiated between fossil and biogenic CH4**, where possible.
- **Clear guidance in the Corporate Standard** on the use of fossil and non fossil methane GWP values is strongly warranted, as this is a practical source of confusion for reporters and assurance providers

GWP: Fossil and non-fossil methane

Draft guidance for fossil and non-fossil methane

GHG Protocol IPCC Global Warming Potential Values:

Methane GWP Instructions

The IPCC AR6 provides multiple GWP values for methane:

- Methane - fossil
- Methane – non-fossil

The **Methane - fossil** GWP value should be used for methane emissions from fossil fuel fugitive emission sources (e.g., oil & gas systems, coal mining) and industrial processes where carbon in methane is of fossil origin (e.g., carbide production, ethylene production). This GWP value includes the added radiative forcing effect from CO_2 that is formed from the oxidation of methane, which occurs at the end of a methane molecule's atmospheric lifetime and then persists for the remainder of the 100-year time horizon.

All other sources of methane emissions, including from combustion of fossil fuels, should use the **Methane - non-fossil** GWP value. The "non-fossil" GWP does not include the oxidation to CO_2 effect as the carbon at issue is either deemed not to be a net addition to the carbon cycle (i.e., of biogenic origin) or already accounted for in CO_2 emissions from the same source. The "non-fossil" GWP should be used for combustion emissions (i.e., mobile and stationary combustion), as the GWP also does not include the methane oxidation to CO_2 as this radiative forcing is typically already accounted for through the estimation of combustion CO_2 emissions for the same emission source; therefore, it would be double counting to apply the higher fossil GWP value.[ii]

Draft table summarizing sources

Methane GWP	Example sources
Fossil methane GWP	Fossil fugitive emission sources • Oil & gas leakage • Coal mining leakage Industrial processes with fossil origin methane • Carbide production • Ethylene production
Non-fossil methane GWP	Combustion of fossil fuels • Stationary combustion • Mobile combustion Biogenic methane All other methane sources

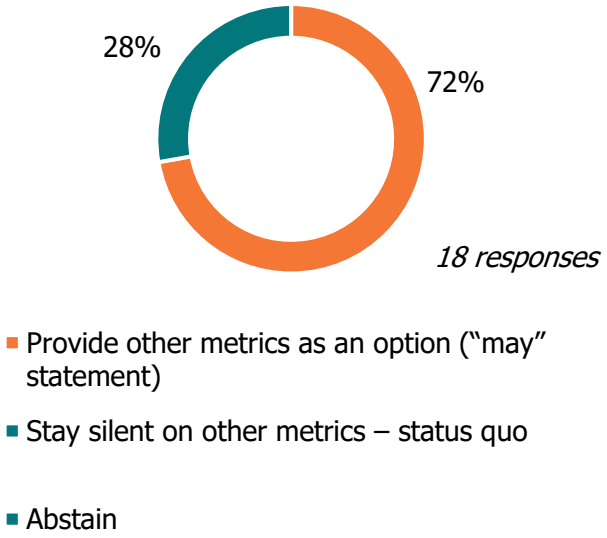
Do you agree with using this draft language and table on fossil and non-fossil methane GWP from the GHGP document IPCC Global Warming Potential Values in the Corporate Standard?

Subgroup 3 Meeting 13 poll results: GWP other metrics

Other metrics

What guidance should the Corporate Standard provide on other metrics (e.g., GTP, GWP*)?

Majority support for **"may"** statement for other metrics



TWG member feedback

- GTP is better for long-term temperature impacts but more complex; **guidance needed on which to prioritize** for near-term vs. net-zero reporting.
- **Guidance for interpreting** GTP and different GWPs in combination should be provided
- Other metrics (e.g., GTP, GWP*) can be valuable for specific analytical or target setting purposes, but they are **not yet sufficiently standardized** for inclusion in core corporate inventories. Making these metrics available as optional disclosures preserves flexibility for advanced users while maintaining the Corporate Standard as a robust, comparable baseline.
- Should we consider stating "These other metrics **should not be used at this time**"?

Poll questions: Global Warming Potential

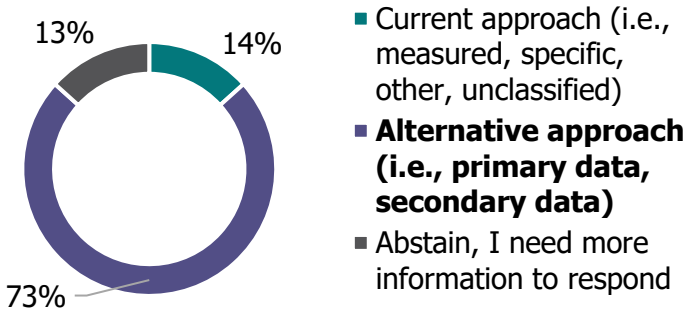
Poll questions

Topic	Questions	Draft text	Options
20-year GWP	1. Do you agree with using the LSRS definition of "significant" for defining "**significant methane emissions**"?	***Significant*** *= When an estimated emission, removal, or other metric's value has a* ***sufficiently large influence*** *on a company's total inventory to be worthy of attention, considering their business goals and the intended uses of inventory data. This can be determined based on its* ***magnitude*** *relative to total emissions, removals, or other metrics in terms of the* ***absolute level, the trend, or the uncertainty****. -LSRS*	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain
Fossil and non-fossil methane	2. Do you agree with the **draft guidance and table** on fossil and non-fossil methane?	See previous slides	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain

Data quality tiers for scope 1

Data quality tiers

Majority support for the **alternative approach to data quality tiers** (i.e., primary data, secondary data).



15 responses

TWG member feedback:

- Support for **terms commonly used** by practitioners (i.e. primary, secondary data)
- **Examples** should be provided to help reporters categorize emissions
- Should disaggregation into tiers be **by GHG or by total eCO2**? For transport, the preferred method for CH4 and N2O uses secondary data (distance traveled).
- Guidance needed on level of specificity/representativeness of **emission factors.**

"Unclassified" tier

The organization **shall** disaggregate and report Scope 1 emissions into three tiers by data source using the following classification:

- **Calculated using primary data**. Primary data is a quantified value of a process or an activity obtained from a direct measurement or a calculation based on direct measurements. When calculated, primary scope 1 emissions are quantified using estimation methods based on primary activity data and [representative] emission factor(s), expressed in physical or functional units.
- **Calculated using secondary data**. Secondary data is data obtained from sources other than primary data
- **Unclassified** may include emissions from the above tiers if a organization is unable or unwilling to disaggregate.

The organization **shall not** double-count emissions across data sources, and figures shall be expressed in mass units of CO2e (e.g., t CO2e), rather than percentages (%). When calculated, primary data used in scope 1 emissions **shall** be quantified using estimation methods based on primary activity data and [representative] emission factor(s), expressed in physical or functional units. Unclassified emissions **may** include emissions from primary or secondary data if the organization is unable or unwilling to disaggregate.

Should an "unclassified" tier be available for scope 1?

Note: Poll results combine live meeting polls and follow-up survey

Poll questions: Data quality tiers for scope 1

Poll questions

Questions	Draft text	Options
1. Should an **"unclassified" tier** be available for scope 1 data quality tiers?	Scope 1 data quality tiers: • Calculated using primary data • Calculated using secondary data • **Unclassified (TBD)**	**a. Yes**, include "unclassified" tier **b. No**, only provide "primary data" and "secondary data" tiers **c. Abstain**
2. Should reporting by scope 1 data quality tiers be a **requirement or a recommendation**?	NA	**a. Shall** report scope 1 data quality tiers **b. Should** report scope 1 data quality tiers **c. Abstain**

GHG Protocol context: Scope 1 reporting by activity type

Current requirements

Corporate Standard:

Required information:

- Report **TOTAL scope 1** emissions
- Disaggregate scope 1 emissions **by GHG**

Optional information:

- *Emissions data **further subdivided**, where this aids transparency, by business units/facilities, country, **source types (stationary combustion, process, fugitive, etc.)**, and activity types (production of electricity, transportation, generation of purchased electricity that is sold to end users, etc.). –CS page 63*

Scope 3 Standard:

- Companies are required to report emissions disaggregated **by scope 3 category**

Activity types

The Corporate Standard identifies the following types of activities that generate emissions:

- **Stationary combustion**
- **Mobile combustion**
- **Process emissions**
- **Fugitive emissions**

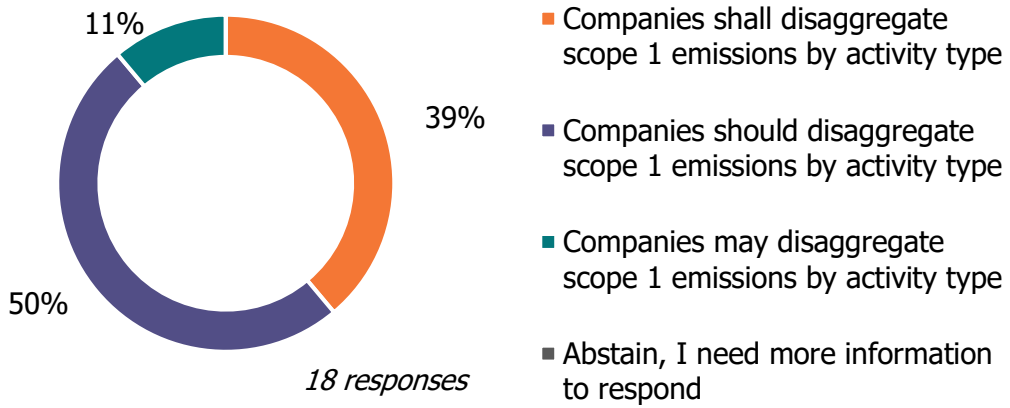
Note that these activity types are relevant for all scopes.

Scope 1 disaggregation

Subgroup 3 poll results

Should companies be required to report scope 1 emissions disaggregated by activity type?

Split opinions, with the most support for a **"should"** statement



TWG member feedback

- Disaggregation requirement could **hinder feasibility** by increasing complexity and cost
- Scope 1 **categories must be standardized**
- **Clear guidance** on categorization is needed, especially on how to report biogenic CH4 and N2O emissions
- Requiring disaggregation of scope 1 reporting would **align with ISO** draft revisions
- Scope 1 disaggregation improves **transparency and decision-usefulness** by clarifying emission sources and supporting mitigation efforts.
- **Recommendation** for scope 1 disaggregation encourages the practice while preserving flexibility and feasibility

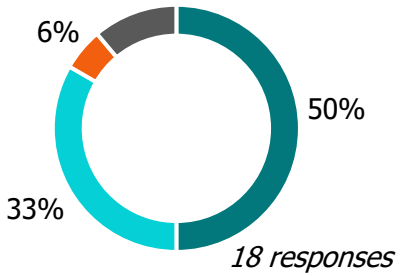
Should scope 1 disaggregation be a requirement or recommendation?

Subgroup 3 Meeting 13 poll results: Land emissions

Land emissions category

Should the category "Land Emissions" be added to the activity types for scope 1 emissions?

Majority support for adding land emissions category to scope 1



- Yes, fully support
- Yes, with minor edits
- No
- Abstain, I need more information to respond

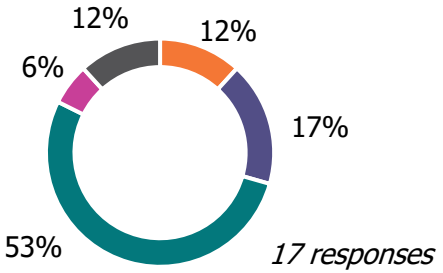
TWG member feedback

- Land emissions activity type is conceptually sound and improves alignment with LSRS
- Clarifications are needed on applicability of land emissions activity type
- LSRS is out of scope of the GHGP-ISO partnership

Land emissions subcategories

Should companies that are not subject to the LSR report land emissions subcategories?

Split opinions, with the most support for a **"may"** statement



- Companies shall report land emissions subcategories
- Companies should report land emissions subcategories
- Companies may report land emissions subcategories
- Stay silent
- Abstain, I need more information to respond

TWG member feedback

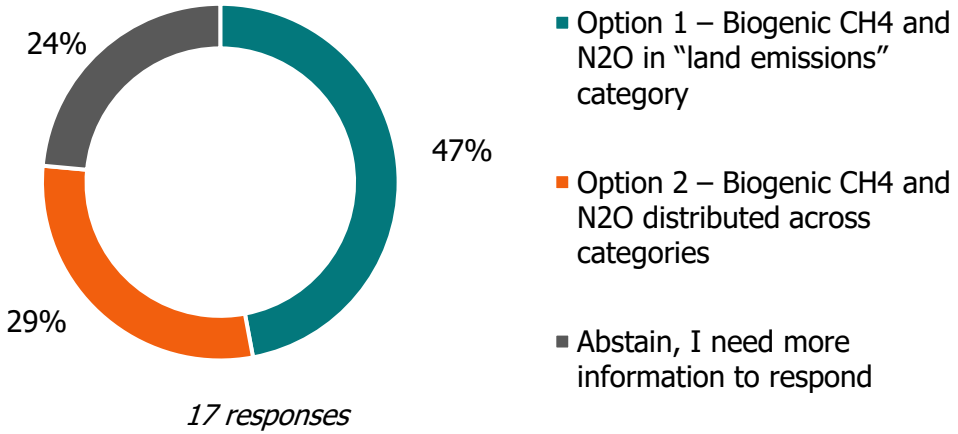
- Land emissions subcategories should remain optional in the CS because these categories would often be immaterial for companies not subject to the LSRS

Subgroup 3 Meeting 13 poll results: Biogenic CH4 and N2O

Biogenic CH4 and N2O

Should the category "Land Emissions" be added to the activity types for scope 1 emissions?

Split opinions, with the most support for **option 1**



17 responses

TWG member feedback

- **Clear guidance** is needed on how biogenic CH4 and N2O emissions should be reported if scope 1 emissions are to be disaggregated
- Option 2 would support **alignment with ISO**
- Support for option 1 to **align with the Land Sector and Removes Standard**

Options for allocating scope 1 land emissions across activity types

	Activity type	Option 1: Report biogenic CH4 and N2O in land emissions	Option 2: Report biogenic CH4 and N2O across categories
Scope 1 emissions (physical GHG inventory)	**Stationary combustion**	Fossil fuel and industrial emissions only	Fossil fuel and industrial emissions **Biogenic CH_4 and N_2O**
	Mobile combustion	Fossil fuel and industrial emissions only	Fossil fuel and industrial emissions **Biogenic CH_4 and N_2O**
	Process emissions	Fossil fuel and industrial emissions only	Fossil fuel and industrial emissions **Biogenic CH_4 and N_2O**
	Fugitive emissions	Fossil fuel and industrial emissions only	Fossil fuel and industrial emissions **Biogenic CH_4 and N_2O** (e.g., fertilizer, enteric fermentation, rice cultivation)
	Land emissions* (this is LULUCF in ISO)	Subcategories: • Land use change emissions • Land management net biogenic CO2 • Land management production emissions • **All biogenic CH_4 and N_2O** • **Biogenic product CO_2 emissions****	Subcategories: • Direct land use change
Additional accounting categories	**Biogenic emissions** *Note: This is a subset of additional accounting categories related to land use*	**Biogenic product CO_2 emissions****	**Biofuel combustion CO_2 emissions**
		Option 1 is based on LSR approach	*Option 2 is based on ISO approach*

Discussion question

1. Which emissions **categorization option** should we adopt for biogenic CH_4 and N_2O?

Note: Biogenic CH_4 and N_2O are typically very small relative to biogenic CO_2

*LSR uses the category name "Land emissions." ISO uses the category name "LULUCF" which stands for land use, land use change, and forestry
In the LSR, **biogenic product CO_2 emissions are only reported outside the inventory if land emissions and land carbon leakage are reported
Note: The LSRS v1.0 does not include land management activities on forests.

When is a reporter required to follow LSR?

→ If the company has SIGNIFICANT land sector activities in its operations or value chain

LSR REQUIREMENT 1: Applicability of the Land Sector and Removals Standard and Guidance

*Companies reporting a corporate- or organization-level GHG inventory in conformance with the Greenhouse Gas Protocol **shall** follow the Land Sector and Removals Standard and Guidance if the company has **significant*** land sector activities in its operations or value chain and/or if the company chooses to account for and report CO2 removals or CO2 capture with geologic storage in the current year or has done so in previous years.*

*Companies with land sector activities in their operations or value chain that do not follow and report in conformance with the Land Sector and Removals Standard and Guidance **shall** disclose and justify why those activities are not significant.*

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 scope 1, 2, and 3)."*

Examples when company must apply LSR

Table 1.2 Intended audience of the Land Sector and Removals Standard, version 1.0

Sector	Relevant chapters	Example companies
Agriculture and other land-based sectors	1–20	• Companies that own or control significant areas of land (e.g., agricultural producers or land developers) • Companies that purchase, consume, process, or sell significant amounts of food, fiber, feed, bioenergy, or other agricultural products (e.g., food and beverage companies, consumer goods companies, bioenergy producers and consumers, biomaterial producers and consumers, retailers, or food service companies) • Companies that supply significant amounts of products to agricultural producers • Companies that manage significant areas of land to increase carbon stored in biomass or soil

Significant = When an estimated emission, removal, or other metric's value has a **sufficiently large influence** on a company's total inventory to be worthy of attention, considering their business goals and the intended uses of inventory data. This can be determined based on its **magnitude** relative to total emissions, removals, or other metrics in terms of the **absolute level**, the **trend**, or the **uncertainty**. – *LSR glossary, pg 21*

Next step: Guidance for **non-significant land emissions** in the Corporate Standard

Source: LSR Standard, page 9
Note: Version 1.0 of LSR does not apply to forestry or non-productive land uses

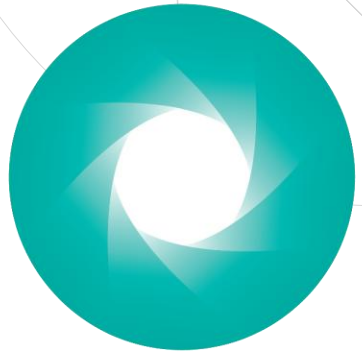
Poll questions: Disaggregated reporting by activity type and land emissions

Poll questions

Topic	Questions	Options
Scope 1 disaggregated reporting	1. Should companies be required to report scope 1 emissions **disaggregated by activity type**?	**a. Shall** disaggregate scope 1 emissions by activity type **b. Should** disaggregate scope 1 emissions by activity type c. Abstain
	2. Do you agree with the following text: *Companies **may** report land emissions subcategories*	a. Yes, fully support b. Yes, with minor edits c. No d. Abstain
Biogenic product emissions	3. How should **biogenic product CH4 and N2O emissions** be categorized in scope 1?	**a. Option 1** – Biogenic CH4 and N2O in "land emissions" category **b. Option 2** – Biogenic CH4 and N2O distributed across categories c. Abstain

Agenda

Introduction and housekeeping	10 minutes
Scope 1 calculation methods and emission factors	50 minutes
Indirect climate forcers	40 minutes
Other phase 2 pending items	40 minutes
Wrap-up and next steps	**10 minutes**



GREENHOUSE GAS PROTOCOL

Next steps

Meeting type	#	Date	Time	Topics
Full TWG	6	June 30th, 2026	Option 1: 08:00 ET / 14:00 CET / 20:00 CHN Option 2: 16:00 ET / 22:00 CET / 04:00 CHN	• Review Subgroup 3 phase 2 outcomes (data and calculation methodologies)
Full TWG	7	July 17th, 2026 (Thursday)	Option 1: 08:00 ET / 14:00 CET / 20:00 CHN Option 2: 16:00 ET / 22:00 CET / 04:00 CHN	• Review Subgroup 2 phase 2 outcomes (verification and assurance)
Full TWG	8	July 28th, 2026	Option 1: 08:00 ET / 14:00 CET / 20:00 CHN Option 2: 16:00 ET / 22:00 CET / 04:00 CHN	• Review Subgroup 1 phase 2 outcomes (tracking emissions over time)

Note: Stay tuned for updated fall meeting dates.

Items to be shared by GHG Protocol Secretariat:

- Final slides, minutes, and recording from this meeting
- Feedback survey on meeting 14 topics

TWG member action items:

- **Review** meeting materials
- Fill out post-meeting **feedback survey**, due date TBD

GREENHOUSE GAS PROTOCOL

Thank you!

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Appendix

Subgroup 3 Task Force poll results

Relevant slides from Meeting 13 (indirect climate forcers and scope 1 disaggregation)

GREENHOUSE GAS PROTOCOL

Subgroup 3 Task Force poll results: Linking activity data and emission factors

Question	Draft text	Outcome
Do you support the proposed approach and draft text for guidance on identifying and calculating GHG emissions?	*The organization **should** undertake an exercise to identify its scope 1 emission sources in the following activity types: stationary combustion, mobile combustion, process emissions, fugitive emissions, [and land emissions].* *The organization **should** identify the appropriate scope 1 calculation method using the best available data.* *The organization **should** select representative emission factors and conversion factors, as applicable. The emission factor shall match the units of the activity data and the calculation method selected.*	**7 of 8: Yes, fully support** 1 of 8: Yes, with edits 0 of 8: No 0 of 8: Abstain
Do you support the proposed definition for "best available data"?	***Best available data** are the most representative in terms of technology, time, and geography; most complete; and most reliable.*	**6 of 8: Yes, fully support** 2 of 8: Yes, with edits 0 of 8: No 0 of 8: Abstain
Do you support the new provision on "site-specific data"?	*The organization **should** use site-specific data for scope 1.* Where "site-specific data" is defined as primary data obtained within the organizational boundary (ISO 14064-1:2018).	**6 of 8: Yes, fully support** 2 of 8: Yes, with edits 0 of 8: No 0 of 8: Abstain
Do you support changing "data" to "emission factors" in the draft text?	*The organization **should** select [data → emission factors] that are the most representative in terms of technology, time, and geography; most complete; and most reliable.*	**4 of 8: Yes, fully support** **4 of 8: Yes, with edits** 0 of 8: No 0 of 8: Abstain
Do you support adding a "may" statement for "accessible data"?	*The organization **may** use accessible data.* ***Accessible data**: Publicly available; free to use; and from a credible source (such as a government agency, system operator, or recognized registry).*	**6 of 8: Yes, fully support** 1 of 8: Yes, with edits 1 of 8: No 0 of 8: Abstain
Do you support the draft text for matching emission factor and activity data attributes?	*The emission factor **shall** match the units of the activity data and the calculation method selected.*	**6 of 7: Yes, fully support** 1 of 7: Yes, with edits 0 of 7: No 0 of 7: Abstain

Majority support outcomes identified with **bold orange text**

Subgroup 3 Task Force poll results: Monetary activity data and spend-based emission factors

Question	Draft text	Outcome
Should companies collect scope 1 activity data in physical units?	*The organization [**shall / should**] collect scope 1 activity data that is in physical units.* *The organization **[shall not / may]** collect monetary scope 1 activity data*	2 of 9: Shall collect scope 1 activity data in physical units / shall not collect monetary scope 1 activity data **7 of 9: Should collect scope 1 activity data in physical units / may collect monetary scope 1 activity data** 0 of 9: Abstain, I need more information to respond
If allowed, how should companies use scope 1 monetary activity data?	*If scope 1 activity data is collected in monetary units, then it [**shall / should**] be converted to physical units.*	**5 of 8: Shall convert scope 1 monetary activity data to physical units** 3 of 8: Should convert scope 1 monetary activity data to physical units 0 of 8: Abstain, I need more information to respond
Should companies use spend-based scope 1 emission factors?	*Spend-based emission factors [**shall not / should not**] be used to calculate scope 1 emissions.*	2 of 8: Shall not use spend-based emission factors for scope 1 **5 of 8: Should not use spend-based emission factors for scope 1** 1 of 8: Abstain, I need more information to respond

Note: These outcomes are internally inconsistent and are instead presented as packages in this meeting.

Subgroup 3 Task Force poll results: Specific questions

Question	Draft text	Outcome
What guidance should be in GHG Protocol on oxidation factors?	Not written at time of meeting	**5 of 8: Define oxidation factors and include in equations** 1 of 8: Stay silent - status quo 2 of 8: Abstain, I need more information to respond
Should there be a disclosure requirement for oxidation factors?	Not written at time of meeting	***Split opinions*** 2 of 8: Shall disclose oxidation factors 4 of 8: Should disclose oxidation factors 1 of 8: Stay silent – status quo 1 of 8: Abstain
Do you support the following draft text on heating values?	*The organization **shall** use fuel consumption data and factors that are on the same heating value basis*	***Split opinions*** **3 of 8: Yes, fully support** **2 of 8: Yes, with edits** 1 of 8: No 2 of 8: Abstain
Should companies be required to disclose whether they use LHV or HHV?	Not written at time of meeting	2 of 8: Shall disclose whether LHV or HHV were used **5 of 8: Should disclose whether LHV or HHV were used** 0 of 8: Stay silent - status quo 1 of 8: Abstain
Should GHG Protocol require/recommend LHV or HHV?	Not written at time of meeting	**6 of 8: Remain agnostic on LHV vs. HHV – status quo** 0 of 8: Require/recommend LHV 0 of 8: Require/recommend HHV 2 of 8: Abstain
Should GHG Protocol have any requirements or recommendations on the use of AI to calculate emissions?	Not written at time of meeting	**6 of 8: Disclosure requirement for the use of AI** 2 of 8: Remain silent on the topic of AI - status quo 0 of 8: Abstain

Majority support outcomes identified with **bold orange text**

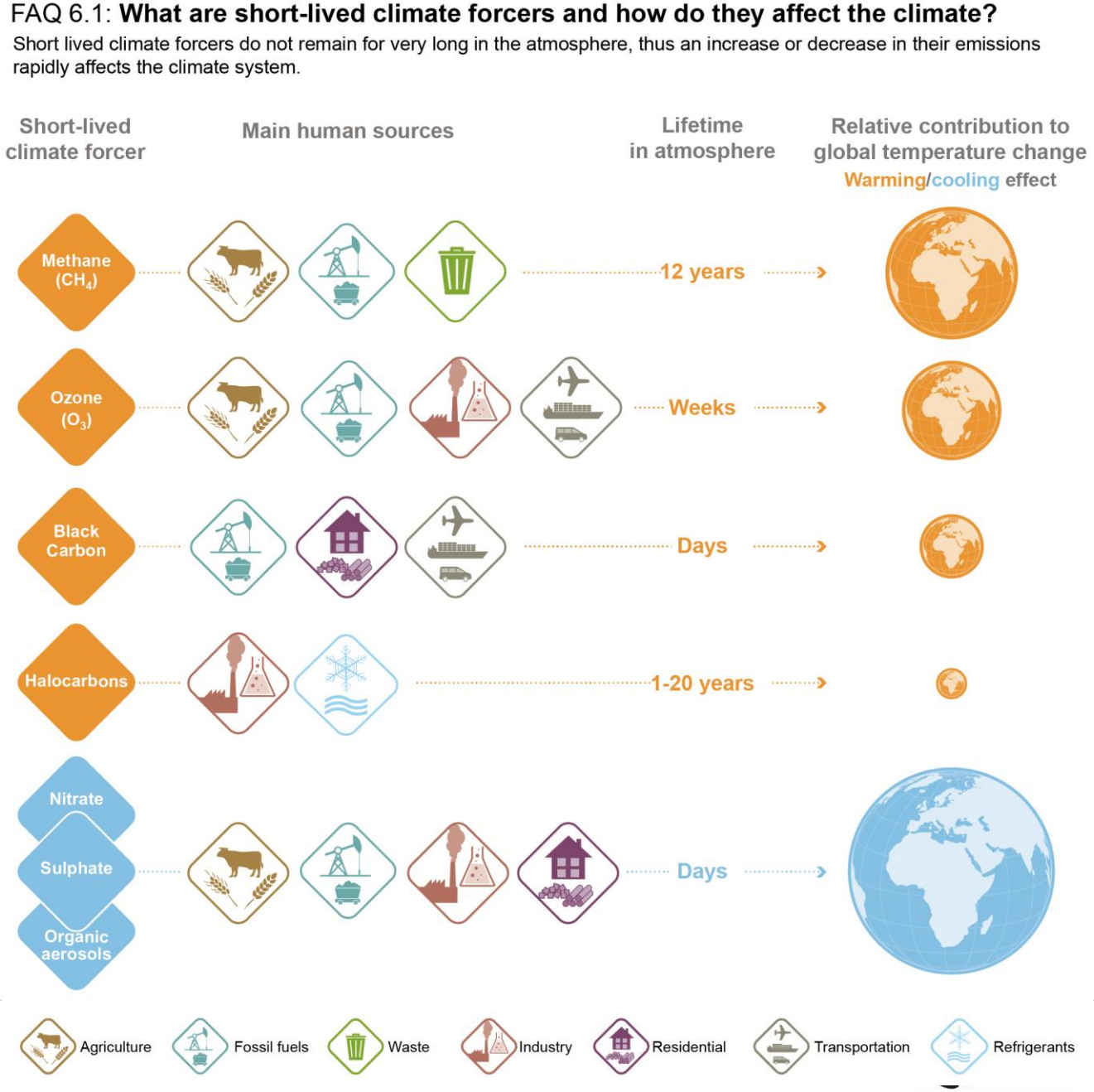
Short-lived climate forcers (SLCF)

Short-lived climate forcers (SLCFs) = compounds that warm or cool the Earth's climate over shorter time scales (days to years)

- **SLCF effects vary across regions** and change rapidly due to short lifetime
- **SLCFs also impact air quality**; efforts to improve air quality have resulted in SLCF reductions

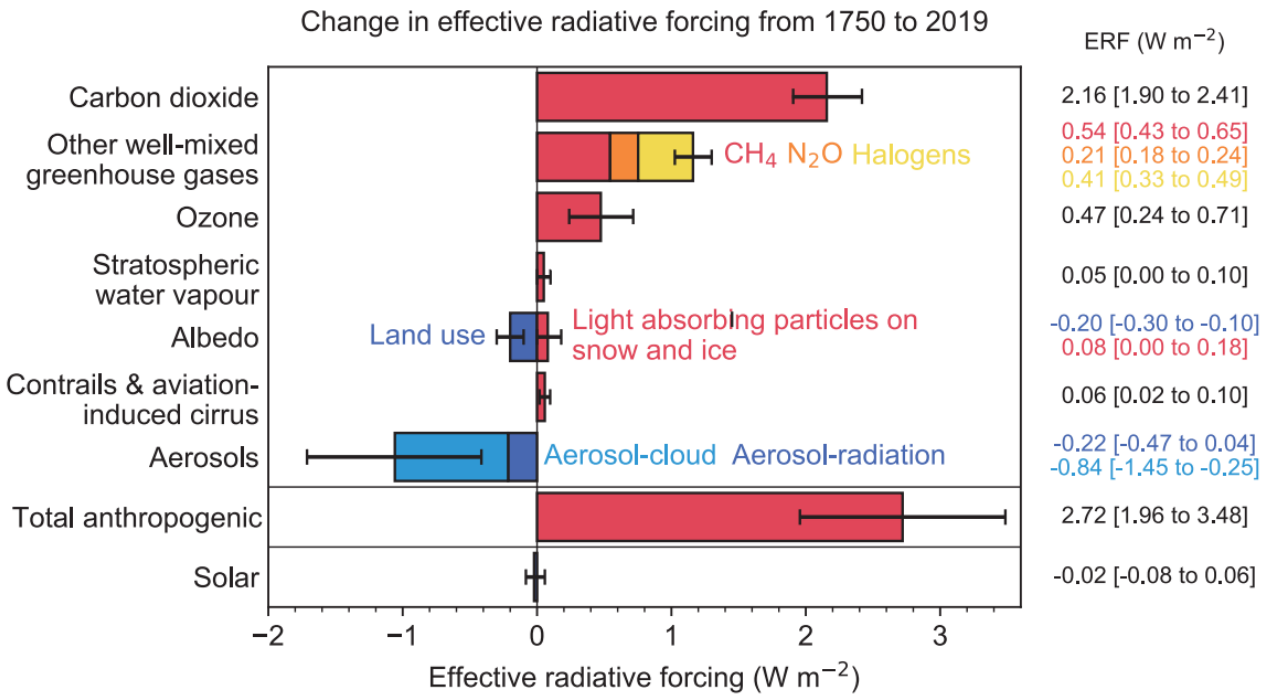
Source: IPCC AR6 Chapter 6 FAQ 6.1

Many indirect climate forcers are also SLCFs



FAQ 6.1, Figure 1 | Main short-lived climate forcers, their sources, how long they exist in the atmosphere, and their relative contribution to global surface temperature changes between 1750 and 2019 (area of the globe). By definition this contribution depends on the lifetime, the warming/cooling potential (radiative efficiency), and the emissions of each compound in the atmosphere. Blue indicates cooling and orange indicates warming. Note that, between 1750 and 2019, the cooling contribution from aerosols (blue diamonds and globe) was approximately half the warming contribution from carbon dioxide.

Types and scale of impact of indirect climate forcers



Source: IPCC AR6 Chapter 7

Climate forcer	Radiative efficiency (mW/m^2 Tg)
Methane (GHG)	0.20
Nitrous oxide (GHG)	0.358
Black carbon	71.6
Sulfur dioxide	-6.8

Source: Global Heat Reduction Radiative Forcing Protocol

Land Sector and Removals Standard: A new emissions category

LSRS covers emissions related to agricultural land use and land management in the following categories for the **physical GHG inventory***

- Land use change emissions
- Land management net biogenic CO_2 emissions (Fig 9.1)
- Land management production emissions (Fig 10.1)
- Biogenic product emissions

LSR introduces a new accounting category to categorize these sources:

Land emissions

***Physical GHG inventory** = An inventory of GHG emissions and removals occurring within the reporting company's operations and value chain using inventory accounting methods, without double counting by the same entity, and independent of any GHG trades such as purchases or sales of allowances, offsets, and credits. – *LSRS glossary*

Figure 9.1 Examples of net land carbon stock changes

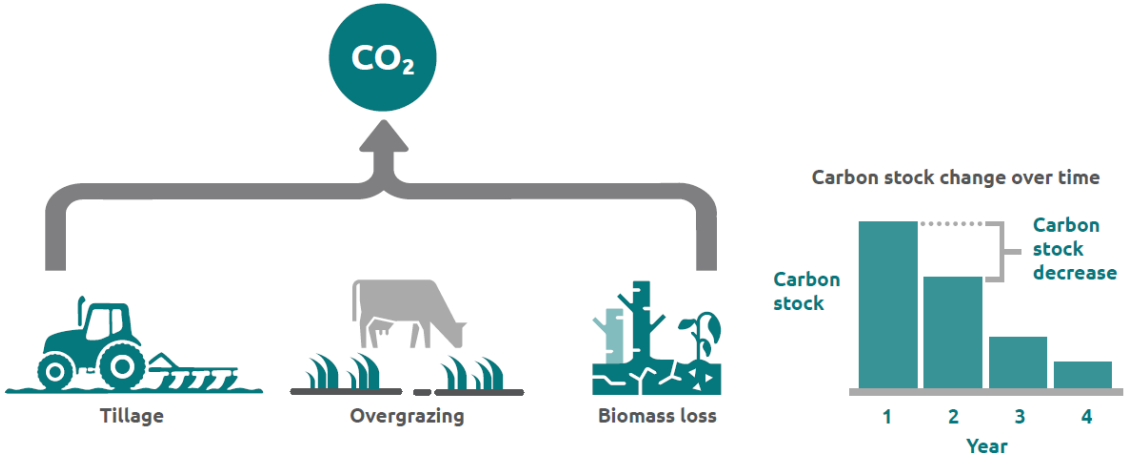
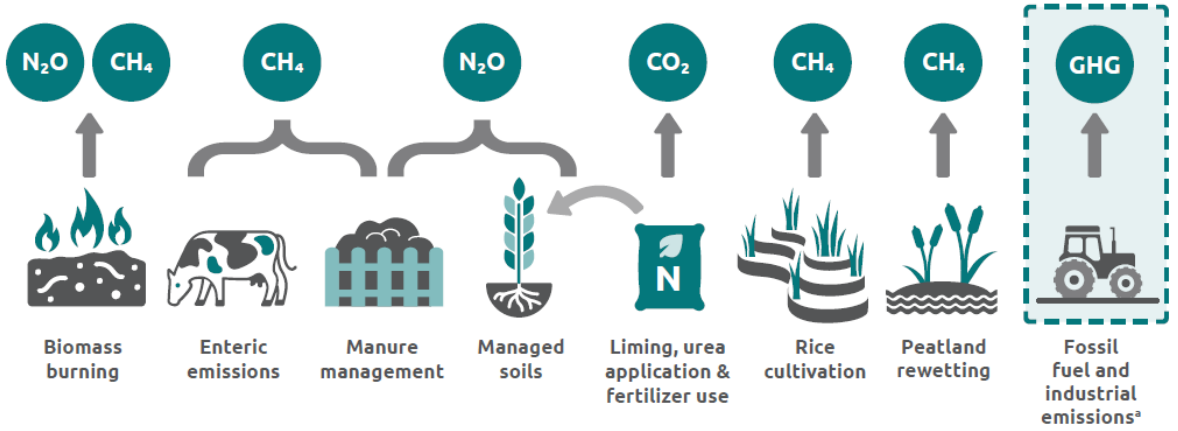


Figure 10.1 Examples of land management production emission sources



Note: a. Companies shall disclose whether emissions from on-site fuel and energy consumption, fuel combustion, air-conditioning and refrigerant use, on-site waste or wastewater management, and indirect emissions from purchased energy associated with land management are reported as land emissions or fossil and industrial emissions.

Source: Land Sector and Removals Standard | GHG Protocol

Land Sector and Removals Standard: Land emissions category

The following categories are reported WITHIN the physical GHG inventory:

	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						
Scope 3						
Reference	Corporate & Scope 3 Standards	Chapter 7	Chapter 9	Chapter 10	Chapter 11	Chapter 12 & 13

Source: LSR page 18

Activity types:

- Fossil fuel and industrial emissions are already addressed in current Scope 1 activity types
- LSR introduces "Land emissions" activity type

Land emissions category:

- **Land emissions** = The release of GHGs into the atmosphere from the land and biogenic products, including the sum of land use change GHG emissions, land management net biogenic CO2 emissions, land management production GHG emissions, and biogenic product emissions

Land emissions subcategories:

- **Land use change** = A transition from one land use category to another, such as from forest to grassland or forest to cropland
- **Land management net biogenic CO2** = Net biogenic CO2 emissions resulting from net land carbon stock losses due to ongoing land management practices
- **Land management production emissions** = CH4, N2O, and non-biogenic CO2 emissions due to ongoing land management practices (e.g., livestock manure management, fertilizer application, enteric fermentation)
- **Biogenic product** = A good or material during the use phase of the product life cycle that contains biogenic carbon

Note for fossil fuel & industrial emissions: Companies are required to report F&I emissions due to land management activities (e.g., tractor emissions under either F&I emissions (preferred) or "LM production" emissions. Must also disclose where those emissions are reported.

Land Sector and Removals Standard: Other accounting categories

The following categories are then reported OUTSIDE the physical GHG inventory:

	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

Source: LSR page 18

Note: **Actions and Market Instruments** TWG is considering a **multi-statement approach** to organize these other related information that is reported outside the physical inventory

- **Land use** = A land sector accounting category representing the amount of agricultural land occupied by the company for products it produces or sources.
- **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.
- **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.
- **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.
- **Product carbon storage** = A land sector and technological removals accounting category representing changes in carbon stored in product carbon pools during the use phases of the product life cycle, including recycling and reuse, from carbon derived from biogenic or technological CO_2 sinks.
- **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.

Biogenic product emissions

Biogenic product = A good or material during the use phase of the product life cycle that contains biogenic carbon (i.e., carbon in, or derived from, living organisms or biological processes, but not including fossilized materials or those from fossil sources).

Examples of biogenic fuels: Ethanol, biodiesel, renewable natural gas (RNG), sustainable aviation fuel (SAF), biogas

How are the combustion emissions from biogenic fuels reported?

- **Biogenic CO_2** emitted by combustion of the carbon contained in the biofuel, and is part of the short-term carbon cycle
- **CH_4 and N_2O** are also emitted at combustion, and NOT part of the short-term carbon cycle

Corporate Standard approach to biogenic emissions

Required information:

- Emissions data for **direct CO_2 emissions** from biologically sequestered carbon (e.g., CO_2 from burning biomass/biofuels), reported **separately from the scopes**.

What about biogenic CH_4 and N_2O?

- Corporate Standard does not comment specifically on CH_4 and N_2O biogenic emissions.

Scope 3 Standard approach to biogenic emissions

Required information:

- For each scope 3 category, total emissions of GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) reported in metric tons of CO_2 equivalent, **excluding biogenic CO_2 emissions** and independent of any GHG trades, such as purchases, sales, or transfers of offsets or allowances
- For each scope 3 category, any **biogenic CO_2 emissions reported separately**

What about biogenic CH_4 and N_2O?

- Scope 3 Standard clarifies guidance with the following text:
- "The requirement to report biogenic CO_2 emissions separately refers to CO_2 emissions from combustion or biodegradation of biomass only, **not to emissions of any other GHGs (e.g., CH_4 and N_2O)**, or to any GHG emissions that occur in the life cycle of biomass other than from combustion or biodegradation (e.g., GHG emissions from processing or transporting biomass)." – *Scope 3 Standard, page 62*

Non-food and non-feed biogenic product emissions: LSRS approach

These requirements only apply to **companies subject to LSR** (i.e., with significant land sector emissions)

CH_4 N_2O

Biogenic product CH_4 and N_2O

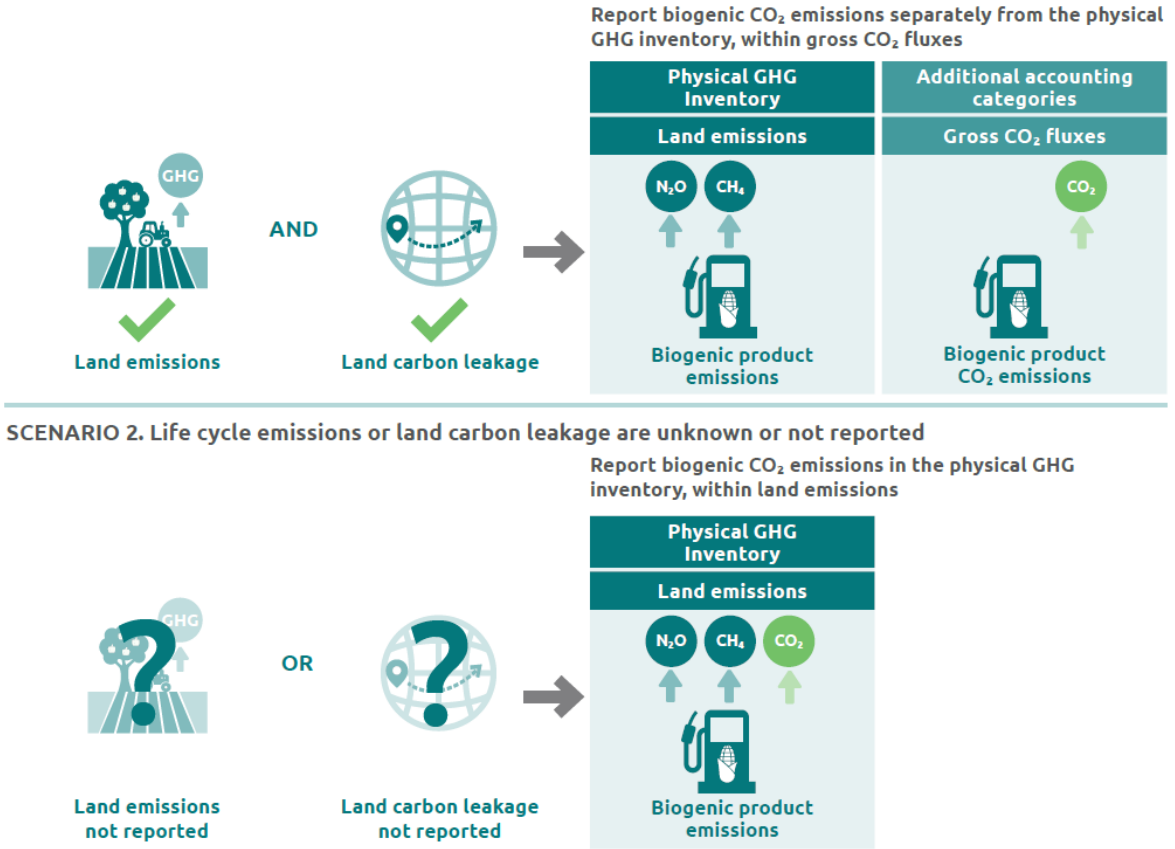
- Always reported **within the physical GHG inventory**
- Reported in **land emissions category**

CO_2

Biogenic product CO_2

- Reported **<u>outside</u> the physical GHG inventory IF:**
  - Land emissions are reported
  - Land carbon leakage is reported
- Otherwise, reported within the physical inventory

Figure 11.1 Two scenarios for biogenic product emissions reporting



Land carbon leakage = A specific type of leakage, 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.

Biogenic product emissions: ISO approach

Draft for TWG discussion

ISO uses the same approach as the Corporate Standard and Scope 3 Standard

(i.e., biogenic CH_4 and N_2O are distributed across direct emissions categories)

ISO 14064-1:2018 approach

Annex D (normative):

Treatment of biogenic GHG emissions and CO_2 removals

- ***Anthropogenic biogenic GHG emissions*** *and removals are a result of human activity. Anthropogenic biogenic GHG emissions (e.g. CO_2, CH_4 and N_2O) may result from biomass combustion as well as other processes (e.g. aerobic and anaerobic decomposition of biomass and soil organic matter).*
- ***Anthropogenic biogenic CO_2*** *emissions and removals shall be quantified and reported* ***separately from anthropogenic emissions****.*
- ***Anthropogenic biogenic emissions*** *and removals* ***of other GHGs*** *(e.g. CH_4 and N_2O) shall be quantified and reported as* ***anthropogenic****.*
- *Non-anthropogenic biogenic GHG emissions and CO_2 removals caused by natural disasters (e.g. wildfire or infestation by insects) or natural evolution (e.g. growth, decomposition) may be quantified and, if so, shall be reported separately.*

Note: ISO defines "biogenic" to include emissions from land and biogenic products. LSR more narrowly defines biogenic emissions to refer to emissions from biogenic products.

ISO categorization of direct emissions from agriculture:

Table G.1 — GHG Reporting for direct emissions from agriculture

GHG emissions sources Category – Subcategory		Examples	GHGs reported: Using units specified
Category 1: Direct GHG emissions			
1.1	**Direct emissions from stationary combustion**		
	Stationary equipment – fossil	Generators, boilers, CHP, milling, dryers, irrigation	CO_2, CH_4, N_2O, CO_2e
	Stationary equipment – biogenic	As above	CH_4, N_2O, CO_2e
1.2	**Direct emissions from mobile combustion**		
	Mobile equipment – fossil	Tilling, sowing, harvesting, transport	CO_2, CH_4, N_2O, CO_2e
	Mobile equipment – biogenic	As above	CH_4, N_2O, CO_2e
1.3	**Industrial process**	N/A	N/A
1.4	**Direct fugitive emissions arise from the release of GHGs in anthropogenic systems**		
	Refrigeration, air conditioning	Freezers, chillers, coolers	HFCs, PFCs, CO_2e
	Addition of fertilizers and amendments	Synthetic fertilizer formulations, e.g. anhydrous ammonia or ammonium nitrate, urea	N_2O, CO_2e
	Addition of livestock waste to soils	Manure	CO_2, CH_4, N_2O, CO_2e
	Addition of crop residues to soils	Corn stocks or wheat straw	CO_2, CH_4, N_2O, CO_2e
	Tillage and drainage of soils	Ploughing, tile drainage	CO_2, CH_4, N_2O, CO_2e
	Enteric fermentation	Ruminants	CH_4, CO_2e
	Addition of lime to soils		CO_2, CO_2e
	Paddy rice cultivation		CH_4, CO_2e
	Open burning of savannahs, crop residues left on fields, DOM		CH_4, N_2O, CO_2e
	Anaerobic digestion		CH4, N_2O, CO_2e
	Composting organic waste		CH_4, CO_2e
1.5	**Direct emissions and removals from land use, land use change and forestry**		
	Direct land use change (dLUC)	CO_2 emissions from the conversion of: — forests into ranch land or cropland, or — wetlands to cropland	CO_2, CH_4, N_2O, CO_2e