GREENHOUSE GAS PROTOCOL

Corporate Standard Technical Working Group

Subgroup 3, Meeting #13

GHG Protocol Secretariat team:
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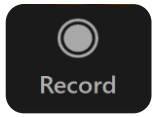
March 31st, 2026

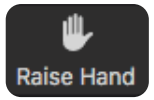
WORLD RESOURCES INSTITUTE

World Business Council for Sustainable Development

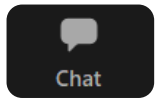
Meeting information



This meeting is **recorded**.



Please use the **Raise Hand** function to speak during the call.



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 disaggregated reporting and land emissions	40 minutes
Follow-up on global warming potential	40 minutes
Indirect climate forcers	20 minutes
Wrap-up and next steps	10 minutes

GREENHOUSE GAS PROTOCOL

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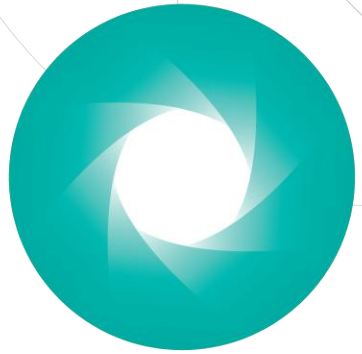

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Today's objectives

1. Consider disaggregating **scope 1 by activity type** and **land emissions category**
2. Continue discussing **global warming potential**
3. Introduce the topic of **indirect climate forcers**

Today, we will focus on scope 1 disaggregation, global warming potential, and indirect climate forcers.

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)

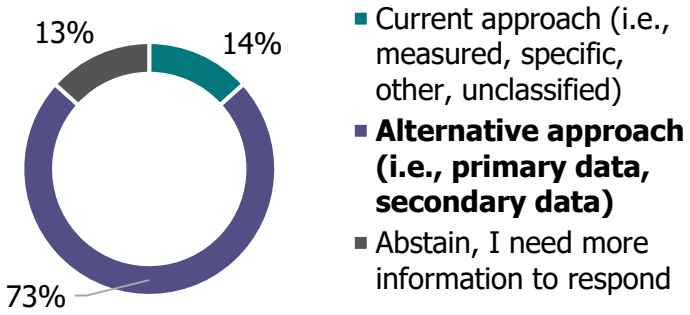
Meeting type	#	Date	Time	Topics
Full TWG	5	January 20th, 2026	Session 1: 08:00 ET / 14:00 CET / 21:00 CHN Session 2: 16:00 ET / 22:00 CET / 05:00 CHN	• Review preliminary Subgroup 1 phase 2 outcomes • Review preliminary Subgroup 3 phase 2 outcomes
Task Force	3	January 27th, 2026	09:00 ET / 15:00 CET / 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 12th, 2026	09:00 ET / 14:00 CET / 21:00 CHN	• Task Force to report out on calculation methods, emission factors, and disclosure requirements
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 1 phase 2 outcomes (tracking emissions over time)
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 3 phase 2 outcomes (data and calculation methodology)

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

Subgroup 3 meeting 12 indicative poll results: Data quality

Data quality tiers

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



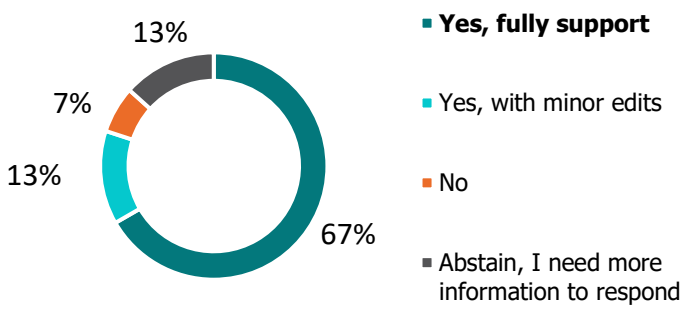
15 responses

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.**

Data quality draft text

Majority support for the **draft text on data quality.**



15 responses

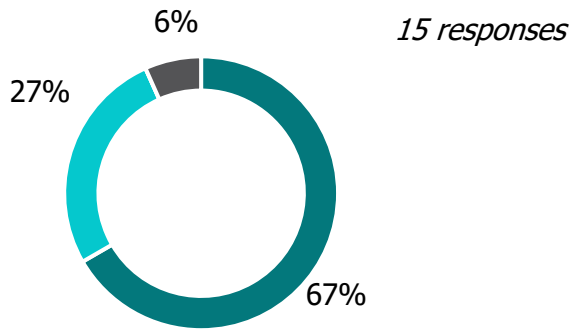
TWG member feedback:

- Clarify that the term "data" applies to both activity data and emission factors
- "Best available data" should be clearly defined.
- Change recommendation to a requirement (e.g., "Companies shall use the best available data…"

Improving data quality draft text

Majority support for the **draft text on improving data quality over time.**

15 responses

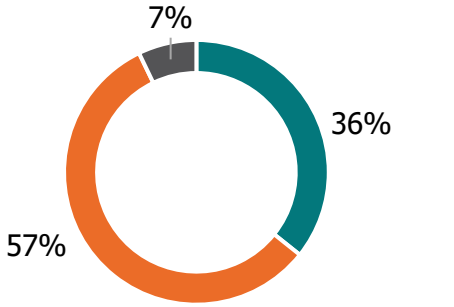


Note: Poll results combine live meeting polls and follow-up survey

Subgroup 3 meeting 12 poll results: Required GHGs

Scope 3 reporting by GHG

Split opinions on whether to require scope 3 GHGs to be individually reported, with the most support for continuing to require only total CO2e.

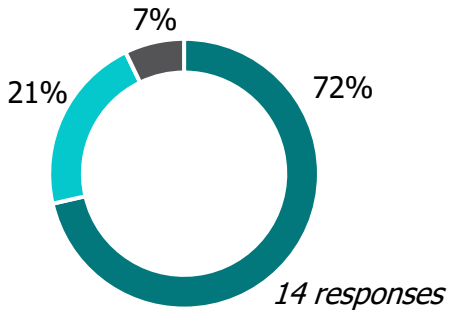


- Yes
- **No (require only total CO2e) – status quo**
- Abstain, I need more information to respond

Next step: Scope 3 TWG will consider this question.

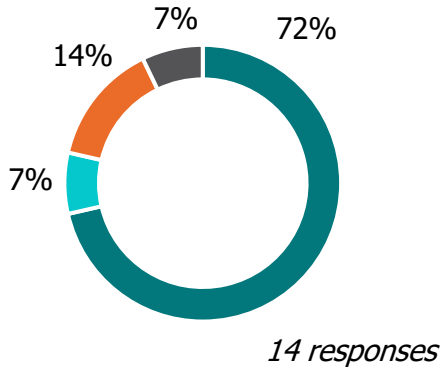
Other GHGs

Majority support for maintaining a **recommendation** to report other GHGs.



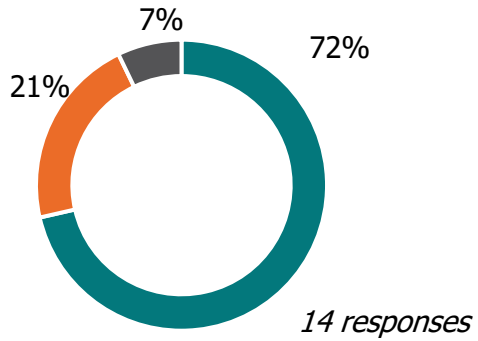
- **Recommend reporting of all other GHGs ("should" statement) – status quo**
- Make reporting of other GHG's optional ("may" statement)
- Abstain, I need more information to respond

Majority support for continuing to recommend **all other GHGs.**



- **All other GHGs – status quo**
- Only GHGs covered by the Montreal Protocol
- Other (define specific GHGs)
- Abstain, I need more information to respond

Majority support for continuing to recommend that other GHGs be **reported separately.**



- **Other GHGs should be reported separately – status quo**
- Other GHGs should be reported as part of the main GHG inventory
- Abstain, I need more information to respond

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

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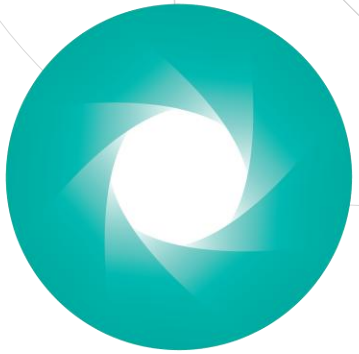

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GHG Protocol context: Scope 1 reporting by activity type

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.

External programs: Scope 1 reporting by category

Name	Disaggregation of scope 1 emissions?	Full text on scope 1 disaggregation
ISO *14064-1 2018* *(CCF)*	TBD	The following categories are defined: • Direct emissions from **stationary combustion** • Direct emissions from **mobile combustion** • Direct **process emissions** and removals from industrial processes • Direct **fugitive emissions** from the release of GHGs in anthropogenic systems • Direct emissions from **land use**, land use change and forestry (LULUCF)
GRI *102 Climate Change 2025*	**No**	102-5.a. Report gross Scope 1 GHG emissions in metric tons of CO_2 equivalent.

IFRS S2	Yes, but only for the **consolidated accounting group and other investees**
	
	No disaggregation by scope 1 category
		• 29(a)(i). disclose its absolute gross greenhouse gas emissions generated during the reporting period, expressed as metric tonnes of CO2 equivalent, classified as: Scope 1 greenhouse gas emissions
		• 29(a)(iv). for Scope 1 and Scope 2 greenhouse gas emissions disclosed in accordance with paragraph 29(a)(i)(1)–(2), disaggregate emissions between:
		  • (1) the consolidated accounting group (for example, for an entity applying IFRS Accounting Standards, this group would comprise the parent and its consolidated subsidiaries); and
		  • (2) other investees excluded from paragraph 29(a)(iv)(1) (for example, for an entity applying IFRS Accounting Standards, these investees would include associates, joint ventures and unconsolidated subsidiaries);

ESRS E1	**No** Requirement to report % of scope 1 from the EU ETS	Requirement E1-8. The undertaking shall disclose absolute gross GHG emissions generated during the reporting period, expressed as metric tonnes of CO2eq classified as: • (a) (44(a) amended) scope 1 GHG emissions, including the percentage of scope 1 GHG emissions from the EU Emission Trading System (EU ETS) if it has emissions from this system;
SBTi *CNZS draft v2.0*	**No**	CNZS-C30. Annual progress reporting: Gross scope 1 emissions

Activity types defined in the Corporate Standard

Activity type	Corporate Standard definitions*	Examples of scope 1 sources
Stationary combustion	Burning of fuels to generate electricity, steam, heat, or power in stationary equipment such as boilers, furnaces etc.	• Natural gas combustion in a boiler • Coal combustion in a power plant
Mobile combustion	Burning of fuels by transportation devices such as cars, trucks, trains, airplanes, ships etc.	• Diesel combustion in a truck • Jet fuel combustion in an airplane
Process emissions	Emissions generated from manufacturing processes, such as the CO_2 that is arises from the breakdown of calcium carbonate ($CaCO_3$) during cement manufacture.	• Emissions from cement calcination
Fugitive emissions	Emissions that are not physically controlled but result from the intentional or unintentional releases of GHGs. They commonly arise from the production, processing transmission storage and use of fuels and other chemicals, often through joints, seals, packing, gaskets, etc.	• Equipment leaks from joints, seals, packing, and gaskets • Methane emissions from coal mines and venting • Hydrofluorocarbon (HFC) emissions during the use of refrigeration and air conditioning equipment • Methane leakages from gas transport.

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

**Source: Corporate Standard glossary*

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

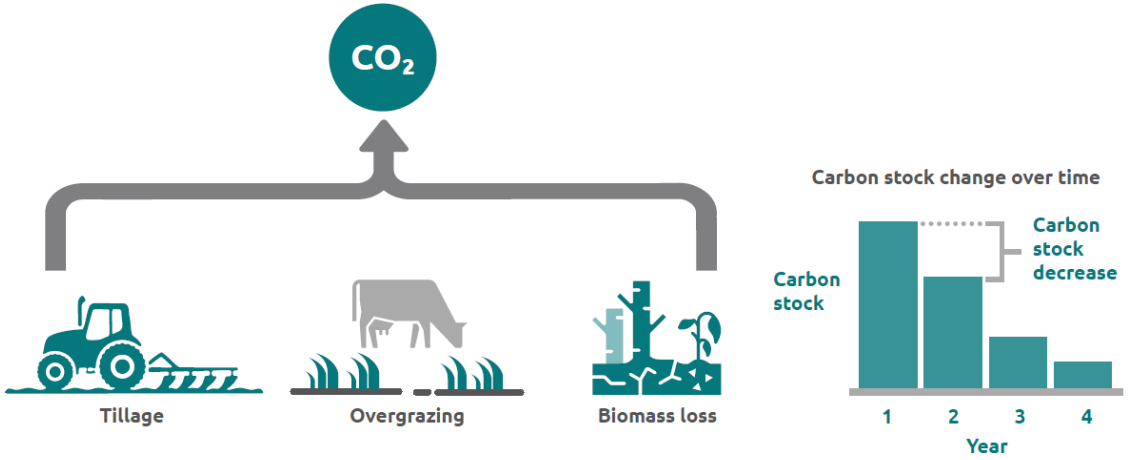
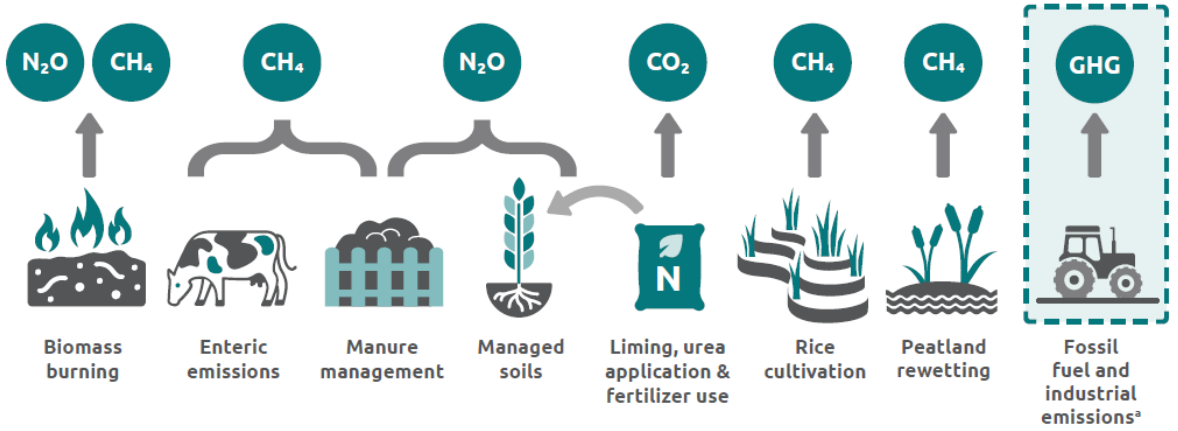


Figure 10.1 Examples of land management production emission sources



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

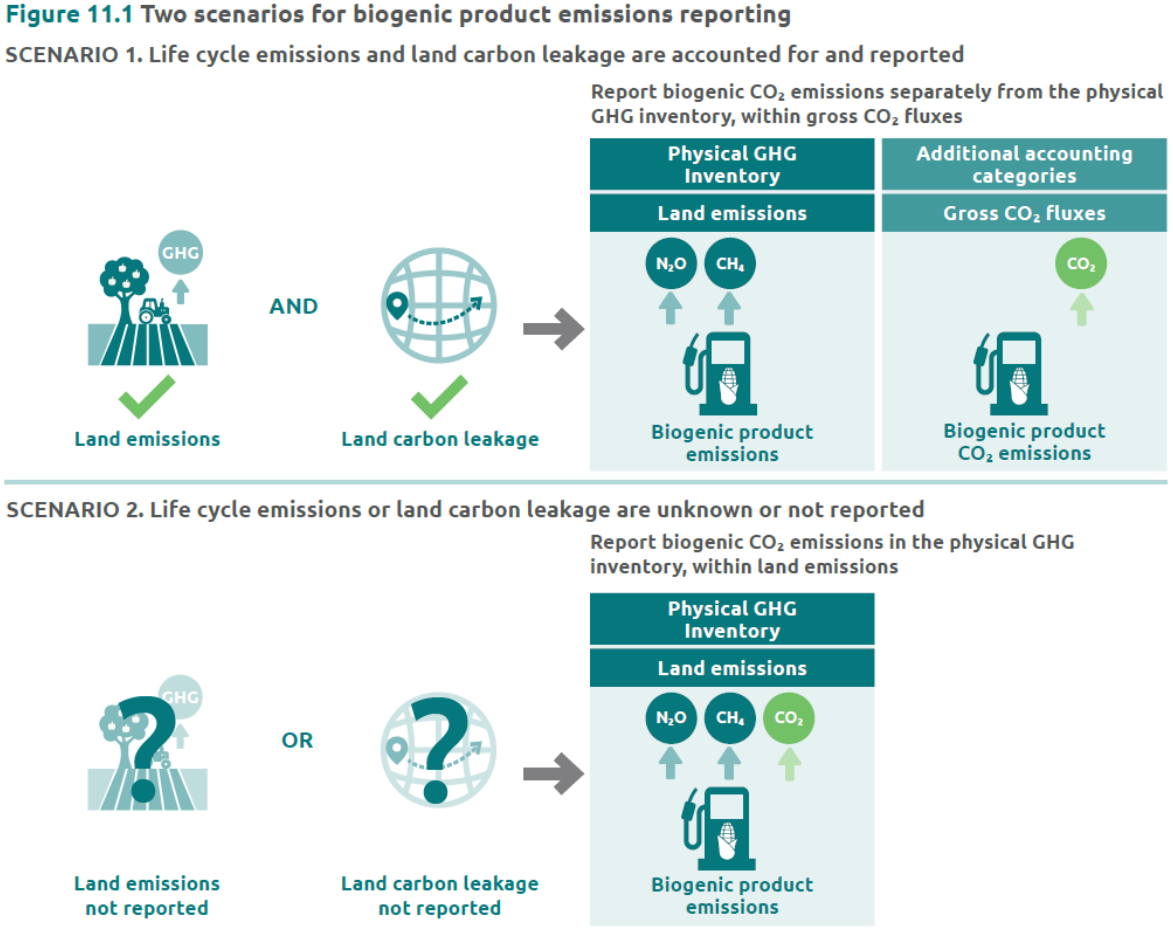
- Always reported **within the physical GHG inventory**
- Reported in **land emissions category**

CO_2

Biogenic product CO_2

- Reported **outside 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

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

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 questions

1. Should "**Land emissions**" activity type be incorporated for scope 1 activity types?
2. 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

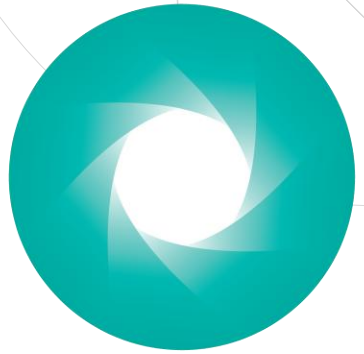
Poll questions

Topic	Questions	Options
Scope 1 disaggregated reporting	1. Should companies be required to report scope 1 emissions **disaggregated by activity type**?	a. Companies **shall** disaggregate scope 1 emissions by activity type b. Companies **should** disaggregate scope 1 emissions by activity type c. Companies **may** disaggregate scope 1 emissions by activity type
	2. Should the **category "Land Emissions"** be added to the activity types for scope 1 emissions?	a. Yes, **fully support** b. Yes, **with minor edits** **c. No**
	3. Should companies that are not subject to the LSR report **land emissions subcategories**?	a. Companies **shall** report land emission subcategories (i.e., Land use change emissions, land management net biogenic CO2 emissions, land management production emissions, biogenic product emissions) b. Companies **should** report land emissions subcategories c. Companies **may** report land emissions subcategories **d. Stay silent**
Biogenic product emissions	4. 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

Note: All poll questions also have the follow option: Abstain, I need more information to respond

Agenda

Introduction and housekeeping	10 minutes
Scope 1 disaggregated reporting and land emissions	40 minutes
Follow-up on global warming potential	**40 minutes**
Indirect climate forcers	20 minutes
Wrap-up and next steps	10 minutes



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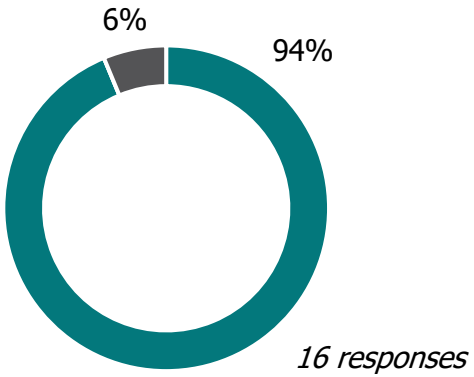
Subgroup 3 meeting 12 poll results: Global warming potential

100-year GWP

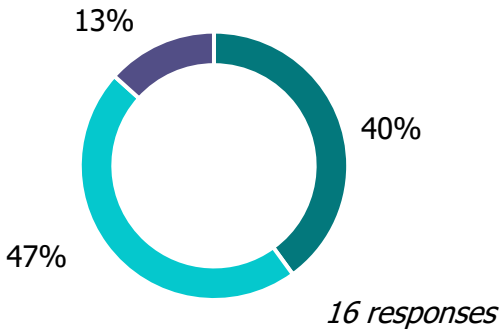
Majority support for continuing to **require** reporting with the 100-year time horizon.



- **Yes, require 100-year GWP – status quo**
- No, 100-year GWP should be reconsidered
- Abstain, I need more information to respond

20-year GWP

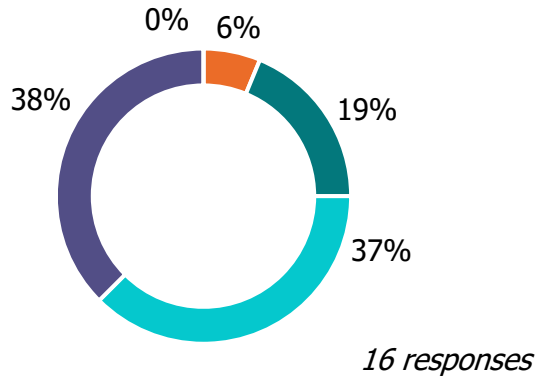
Split opinions on the 20-year GWP, with the **most support for recommending** reporting with the 20-year time horizon.



- Require 20-year GWP ("shall" statement)
- **Recommend 20-year GWP ("should" statement)**
- **Provide 20-year GWP as an option ("may" statement)**
- Stay silent on 20-year GWP – status quo
- Abstain, I need more information to respond

Other metrics (e.g., GTP, GWP*)

Split opinions on other metrics, with the **most support** for providing other metrics as an **option.**



- Require other metrics in addition to GWP
- Recommend other metrics in addition to GWP
- **Provide other metrics as an option ("may" statement)**
- **Stay silent on other metrics – status quo**
- Abstain, I need more information to respond

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

Global warming potential: 20-year GWP

Subgroup 3 Meeting 12

Subgroup 3 Meeting 12 poll result:

Split opinions on the 20-year GWP, with the most support for:

Option	Level of support
Recommending reporting with the 20-year time horizon ("should" statement)	**40%** SG3 members
Providing 20-year GWP as an **option** ("may" statement)	**47%** SG3 members

Feedback from members

- Recommend 20-year GWP for **methane-intensive sectors**, such as oil & gas and agriculture
- Incorporate **guidance** on the importance of the 20-year GWP
- Providing 20-year GWP as an option **balances scientific relevance with feasibility**
- **Feasibility concerns** - Not all companies would benefit from reporting with a 20-year time horizon
- GHG Protocol **should not be silent** on the 20-year GWP given the importance of the next two decades for climate change

Revised options

We will focus in on the following options:

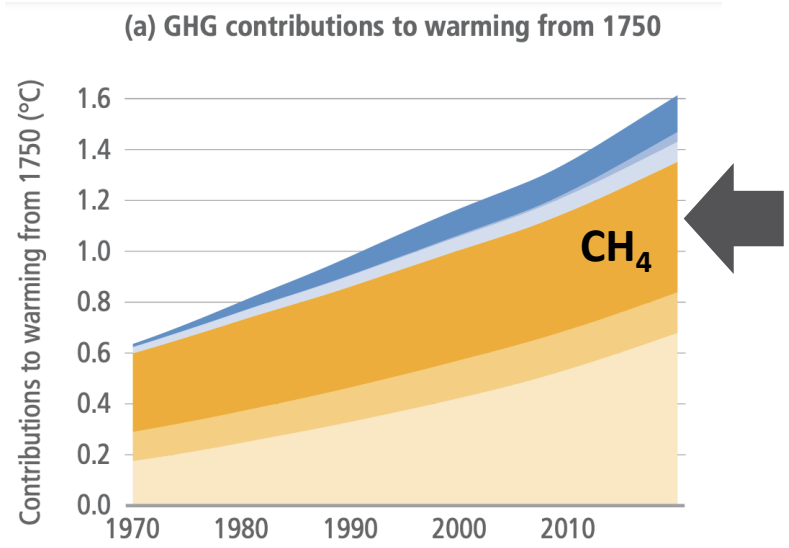
A. Recommend 20-year GWP ("should" statement) for **all reporters**

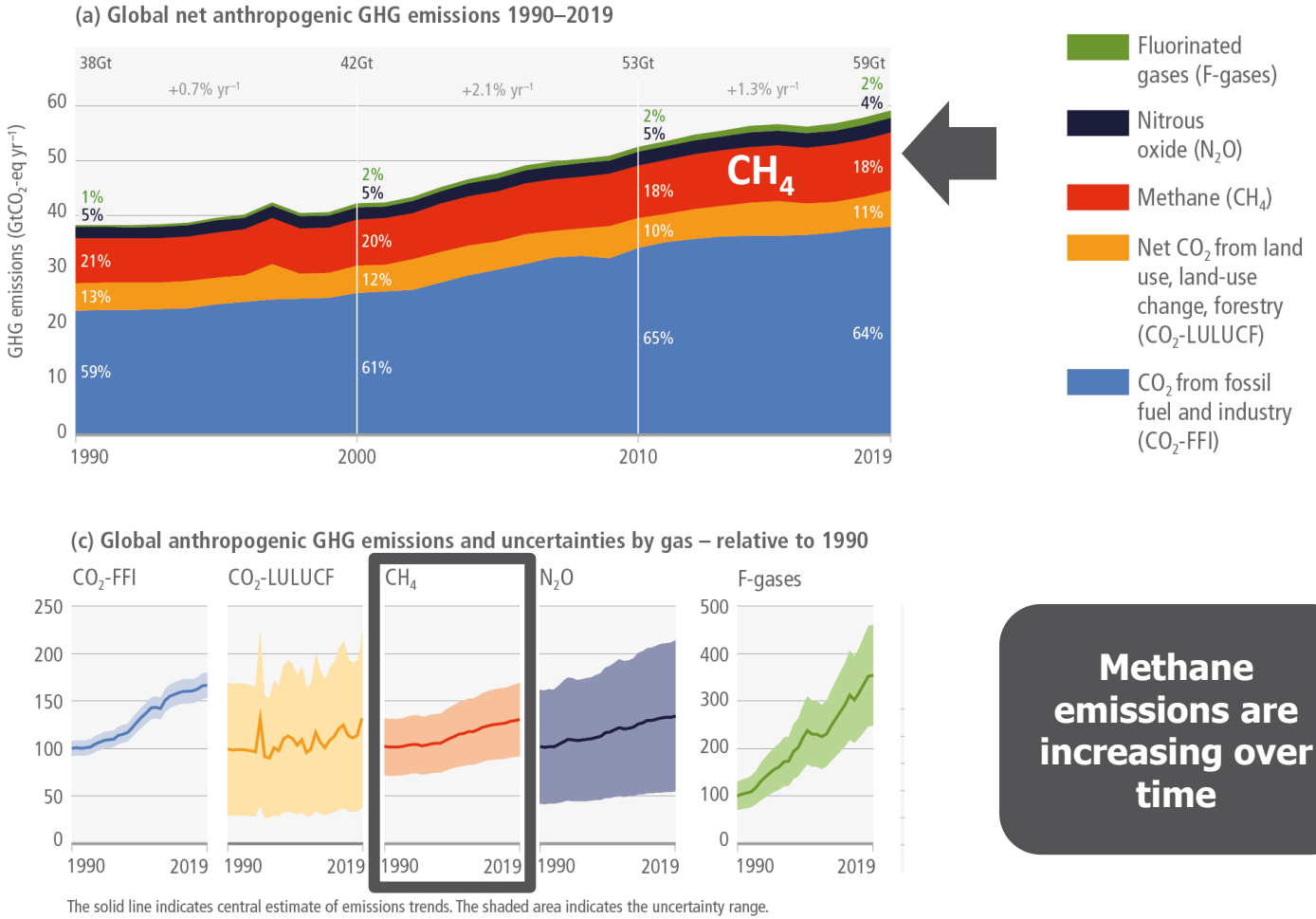
B. Recommend 20-year GWP ("should" statement) for **reporters with significant methane emissions (new)**

C. Recommend 20-year GWP ("should" statement) for **specific sectors** (e.g., certain industry, agriculture) **(new)**

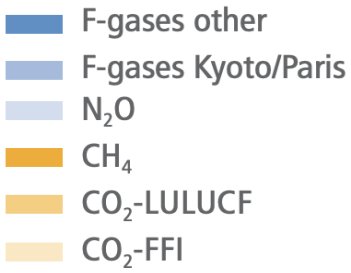
D. Provide 20-year GWP as an **option** ("may" statement)

Global warming potential: Methane emissions contribution to warming





Methane is a significant contributor to warming



Methane emissions are increasing over time

**CO2-LULUCF = CO2 from land use, land use change, and forestry*
***CO2-FFI = CO2 from fossil fuel and industry*

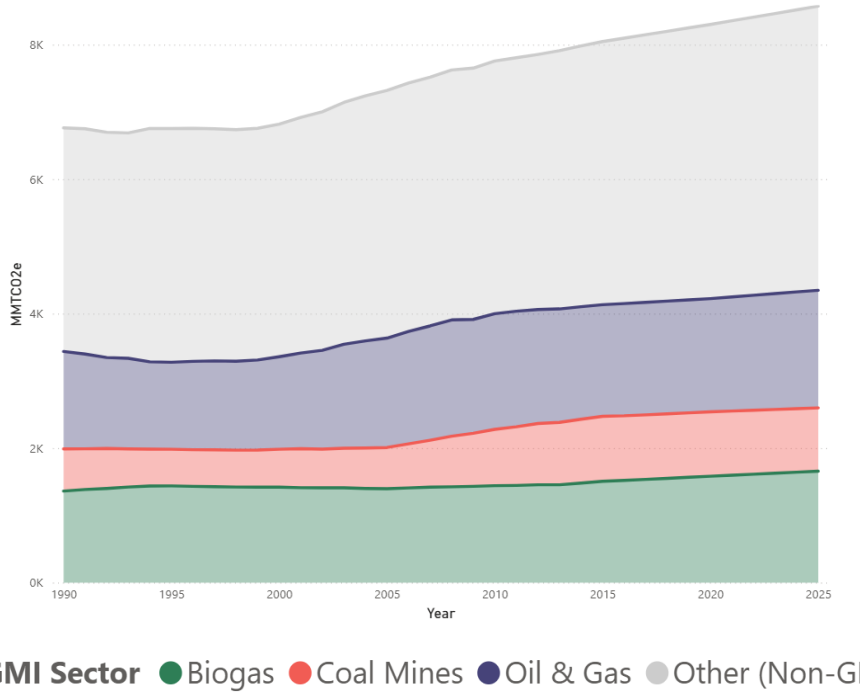
Source: IPCC AR6 Chapter 2: Emissions trends and drivers

Global warming potential: Methane emissions by industry

Which industries/sectors would a specific recommendation apply to?

Global methane emissions

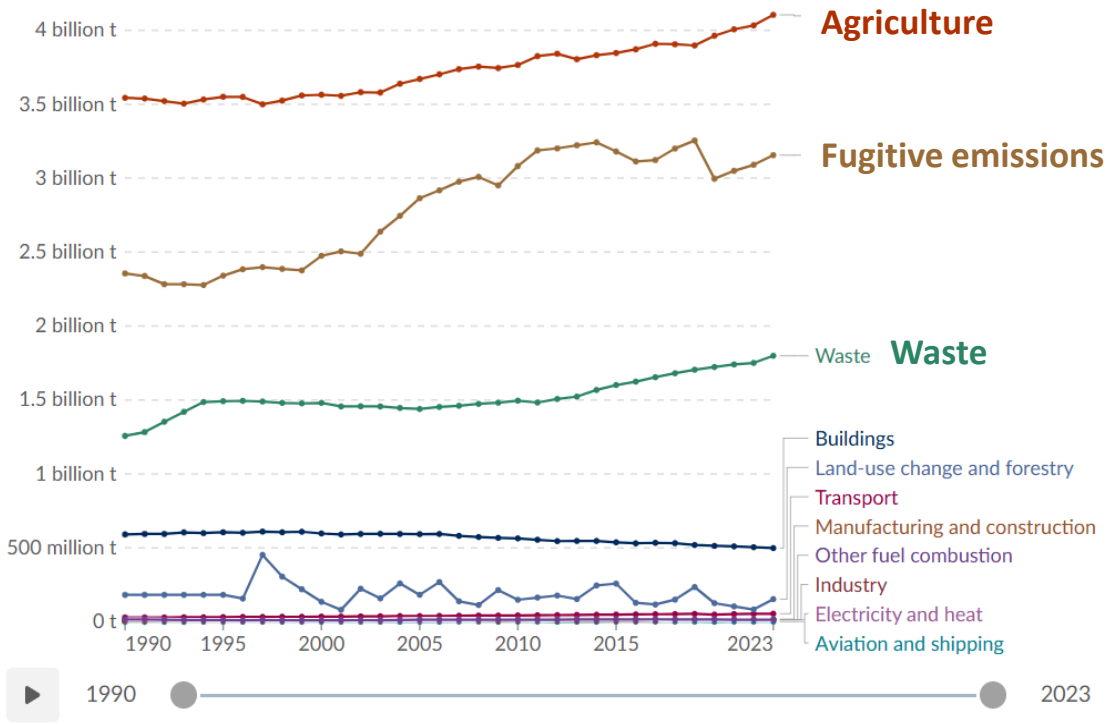
Measured in tonnes of carbon dioxide-equivalents.
Global Methane Initiative



Where agriculture sector is split across biogas (manure management) and other non-GMI (e.g., enteric fermentation, rice cultivation)

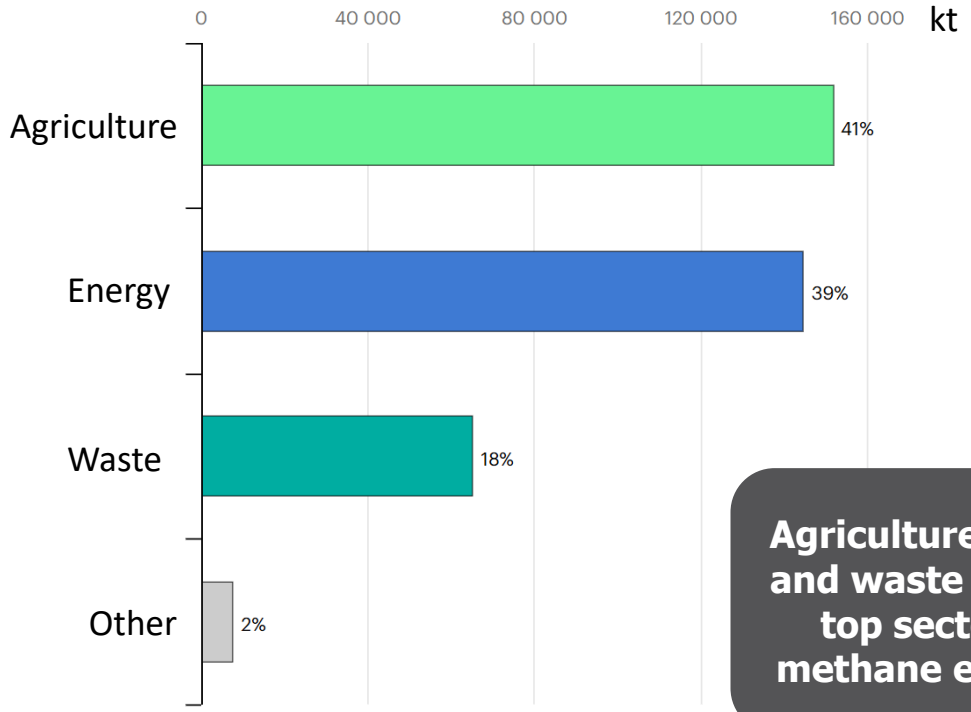
Methane emissions by sector, World

Measured in tonnes of carbon dioxide-equivalents.
Our World in Data



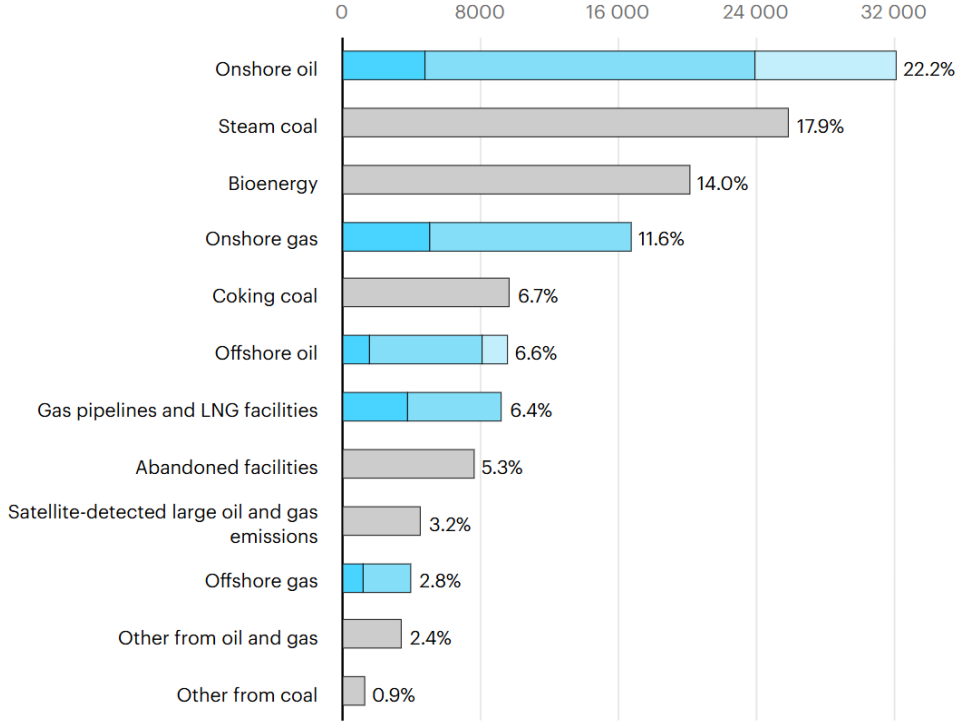
Global warming potential: Methane emissions by industry

World methane emissions from all sources (2024)
IEA estimate from available datasets



Agriculture, energy, and waste are the 3 top sectors for methane emissions

World methane emissions from energy sources (2024)
IEA estimate from available datasets



IEA 2026; World methane emissions from all sources, IEA estimate from available datasets, https://www.iea.org/data-and-statistics/data-tools/methane-tracker, License: CC BY 4.0.

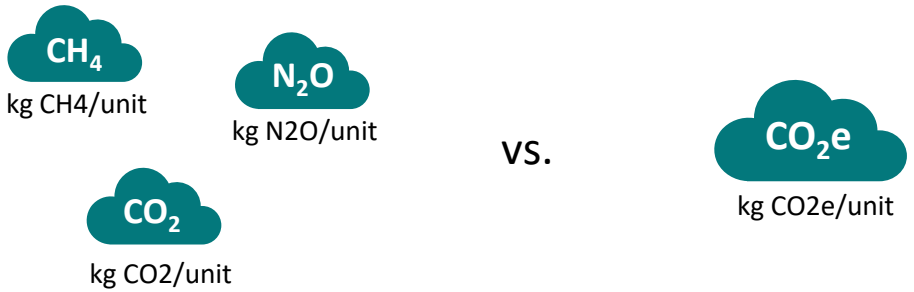
20-year global warming potential: Feasibility implications for scope 3

Scope 3 emission factors are often aggregated as carbon dioxide equivalents (CO2e)

Aggregated CO2e EFs have the following built in:

- IPCC Assessment Report
- Global Warming Potential

Aggregated CO2e EFs are typically not possible for the reporter to split apart into constituent GHGs



Examples of aggregated emission factor databases only available in CO2e:

- GLEC (for transport)
- DESNZ: Waste, all well-to-tank EFs (e.g., WTT fuels, bioenergy), water treatment, material use, etc.
- Many LCA results (e.g., waste EFs)

The following emission factor databases are available by greenhouse gas:

- EXIOBASE
- US EPA EEIO factors

Decision-making criteria: 20-year Global Warming Potential

Note: All options are in addition to requiring the 100-year GWP

Criteria	A. **Recommend 20-year GWP** ("should" statement) for **all reporters***	B. '**Recommend 20-year GWP** ("should" statement) for **specific sectors** (e.g., certain industry, agriculture)	C. **Provide 20-year GWP as an option** ("may" statement)
Scientific integrity	**Pros**: Accounts for near-term effects of short-lived GHGs (e.g., CH4)	**Pros**: Accounts for near-term effects of major sources of CH4	**Cons**: Misses near-term effects of short-lived GHGs (e.g., CH4)
GHG accounting and reporting principles	**Pros**: Promotes relevance, transparency **Cons**: Could hinder consistency over time	**Pros**: Promotes relevance, transparency **Cons**: Could hinder consistency over time	**Pros**: Neutral **Cons**: Could hinder relevance, transparency
Support decision-making that drives ambitious global climate action	**Pros:** Encourages action that reduces short-term warming. Supports achievement of Global Methane Pledge.	**Pros:** Encourages action that reduces short-term warming. Supports achievement of Global Methane Pledge.	**Cons**: Disincentivizes actions that would reduce short-term warming but not long-term warming. Global Methane Pledge could be harder to achieve
Support programs based on GHG Protocol and uses of GHG data	**Pros**: Supports users of the data Interoperable with external programs.	**Pros**: Somewhat supports users of the data Interoperable with external programs.	**Pros**: Aligned with external programs **Cons**: Does not support users of the data
Feasibility to implement	**Cons**: Additional calculation step and reporting burden. Could be very challenging for aggregated scope 3 emission factors	**Cons**: Additional calculation step and reporting burden. Could be very challenging for aggregated scope 3 emission factors Specific reporter types would need to be defined and could create confusion.	**Pros**: Feasible for all companies

*Analysis is the same for all reporters and for reporters with significant methane emissions

Discussion: What do you think of these options?

GWP: "Fossil" and "non-fossil" methane

Starting in Assessment Report 5, the IPCC differentiated methane into fossil methane and non-fossil methane

Guidance currently in GHG Protocol document titled: 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]

GHG	AR4 100-year GWP	AR5 100-year GWP	AR6 100-year GWP
CH4 **non-fossil**	25	28	27.0
CH4 **fossil**	NA	30	29.8

Discussion:

Should GHG Protocol provide guidance on fossil and non-fossil methane in the Corporate Standard?

Or is the guidance in the GHGP GWP document sufficient?

For most corporate inventory reporters, non-fossil methane GWP is applicable

Fossil methane GWP only applies for select process emissions and industrial processes

Source: IPCC GWP Values, compiled by GHGP

GWP: Global Temperature change Potential (GTP)

Global Temperature change Potential (GTP)

=

change in global mean surface temperature at a specific point in time in response to an emission pulse, *relative to CO2*

GHG	Atmospheric lifetime (years)	GTP-50	GTP-100
CO2	Multiple	1	1
CH4 non-fossil	11.8	13.2	7.5
CH4 fossil	11.2	10.4	4.7
N2O	109	290	233

GTP goes a step further than GWP, making it more complex and uncertain

- GWP is a measure of heat absorbed
- GTP is a measure of the temperature change

GTP is an end-point metric

- Specific to a particular year; could be suitable for target-setting

However…

UNFCCC, IPCC, climate rules, and other climate programs use GWP to standardize GHG emissions

And…

There are other proposed metrics (e.g., GWP*)

Discussion:

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

a. Provide other metrics as an **option** ("may" statement)

b. Stay silent on other metrics – *status quo*

Source: IPCC AR6 Chapter 7 | Climate Change 2021: The Physical Science Basis

Global Warming Potential: Time horizon poll questions

Poll questions

Questions	Options
1. What guidance should the Corporate Standard provide on the **20-year GWP**?	**a. Recommend** 20-year GWP ("should" statement) for **all reporters** **b. Recommend** 20-year GWP ("should" statement) for reporters with **significant methane emissions** **c. Recommend** 20-year GWP ("should" statement) for **specific reporters** (e.g., certain industry, agriculture) d. Provide 20-year GWP as an **option** ("may" statement)
2. Should the Corporate Standard provide any guidance on **fossil and non-fossil methane** GWP values?	**a. Yes, guidance should be provided** in the CS on the use of fossil and non-fossil methane **b. Yes**, but just to bring the issue to reporters' attention and **refer them elsewhere** (e.g., GHGP Global-Warming-Potential-Values.docx) **c. No, stay silent** on the issue in the CS
3. What guidance should the Corporate Standard provide on **other metrics** (e.g., GTP, GWP*)?	a. Provide other metrics as an **option** ("may" statement) **b. Stay silent** on other metrics – *status quo*

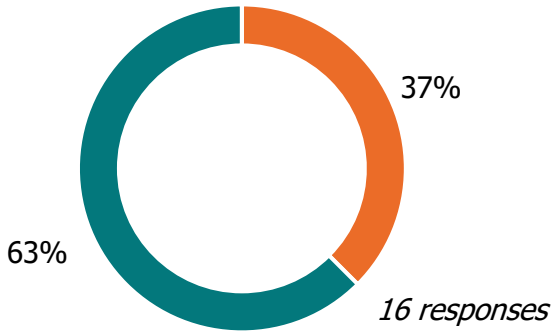
Options were refined from Meeting 12 to reflect the most supported options

Note: All poll questions also have the follow option: Abstain, I need more information to respond

Subgroup 3 meeting 12 poll results: GWP and IPCC Assessment Reports (AR)

Which Assessment Report to use

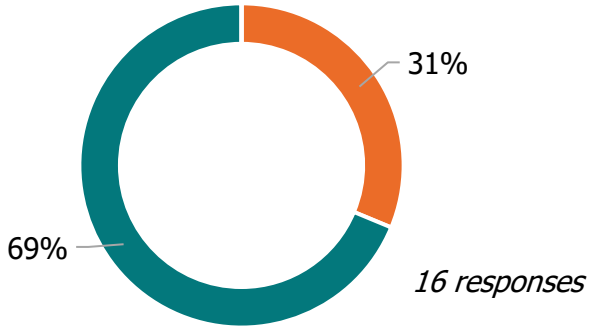
Majority support for continuing to recommend the use of the **most recent IPCC AR**.



- Shall use the most recent IPCC Assessment Report
- **Should use the most recent IPCC Assessment Report – status quo**
- Abstain, I need more information to respond

AR across the inventory

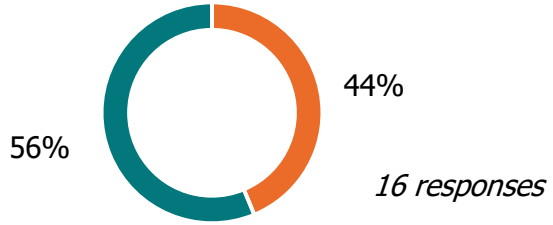
Majority support for continuing to **require** the same AR across the inventory, **where possible**.



- Shall use GWPs from a single AR for any one inventory
- **Shall use GWPs from a single AR for any one inventory, where possible – status quo**
- Should use GWPs from a single AR for any one inventory
- Abstain, I need more information to respond

AR for the base year

Split opinions on the AR for the base year, with the most support for continuing to recommend that the **same GWP values** be used for the **inventory and the base year**.



- **Require that the same GWPs are used for the inventory and base year**
- **Recommend that the same GWPS are used for the inventory and base year – status quo**
- Abstain, I need more information to respond

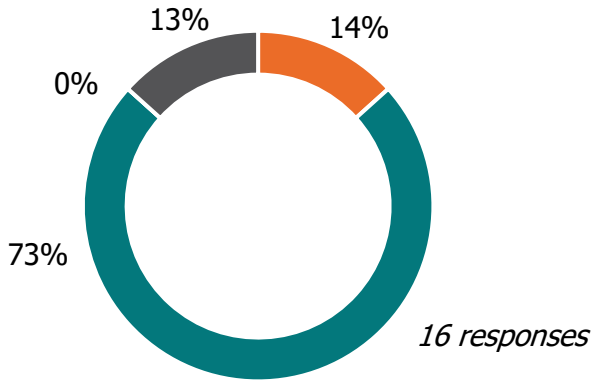
Next step: Subgroup 1 will consider this question.

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

Aggregated emission factors and GWP

Aggregated emission factors

Majority support for **recommending that the same AR be used** for aggregated emission factors.



- Shall use the same IPCC AR for aggregated emission factors
- **Should use the same IPCC AR for aggregated emission factors**
- May use the same IPCC AR for aggregated emission factors
- Abstain, I need more information to respond

IFRS S2 takes the following approach to aggregated emission factors:

- Required to use representative EFs
- **If EFs are aggregated, <u>not required</u> to disaggregate and recalculate with latest IPCC 100-year GWPs**
- If EFs are NOT aggregated, the entity is required to use the latest IPCC 100-year GWPs

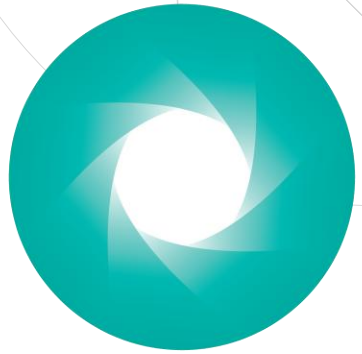
Discussion:

- Should the IFRS approach be considered?
- What should be prioritized when there are tradeoffs: Representativeness or the IPCC AR version?

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

Agenda

Introduction and housekeeping	10 minutes
Scope 1 disaggregated reporting and land emissions	40 minutes
Follow-up on global warming potential	40 minutes
Indirect climate forcers	**20 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?

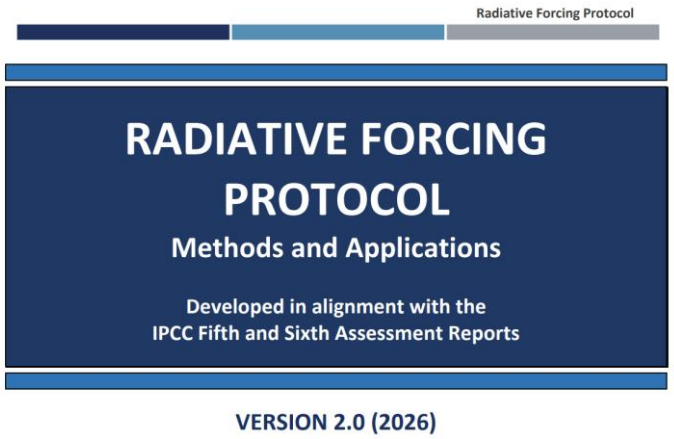
Gases and phenomena that are not themselves GHGs but have an impact on the climate, such as:

- 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

Radiative Forcing Protocol from Global Heat Reduction



"*The RF Protocol is the first climate accounting framework designed to comprehensively evaluate the radiative forcing reduction potential of* ***projects*** *by considering all emission and non-emission* ***climate forcers****,* ***both positive and negative****, over multiple timeframes of analysis.*"

Climate Forcers Contributing to Net Positive RF	*Climate Forcers Contributing to Net Negative RF*
Well-mixed greenhouse gases	**Well-mixed greenhouse gases**
Carbon dioxide (CO_2)	None
Methane (CH_4)	
Nitrous oxide (N_2O)	
Greenhouse gas categories that include both well-mixed and non-well-mixed climate forcer species [1)]	**Greenhouse gas categories that include both well-mixed and non-well-mixed climate forcer species**
Chlorofluorocarbons (CFCs)	None
Hydrochlorofluorocarbons (HCFCs)	
Hydrofluorocarbons (HFCs)	
Chlorocarbons and Hydrochlorocarbons	
Bromocarbons, Hydrobromocarbons and Halons	
Fully Fluorinated Species	
Halogenated Alcohols, Ethers, Furans, Aldehydes and Ketones	
Non-well-mixed climate forcers [2)]	**Non-well-mixed climate forcers**
Black carbon	Nitrate aerosols
Brown carbon	Organic carbon
Tropospheric ozone from non-methane precursors, including NOx [3)], CO, and VOCs	Sulfate aerosols
Miscellaneous Compounds [4)]	
Non-emission climate forcer	**Non-emission climate forcer**
Decrease in Albedo	Increase in Albedo
Waste Heat	

Source: Global Heat Reduction's Radiative Forcing Protocol

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)

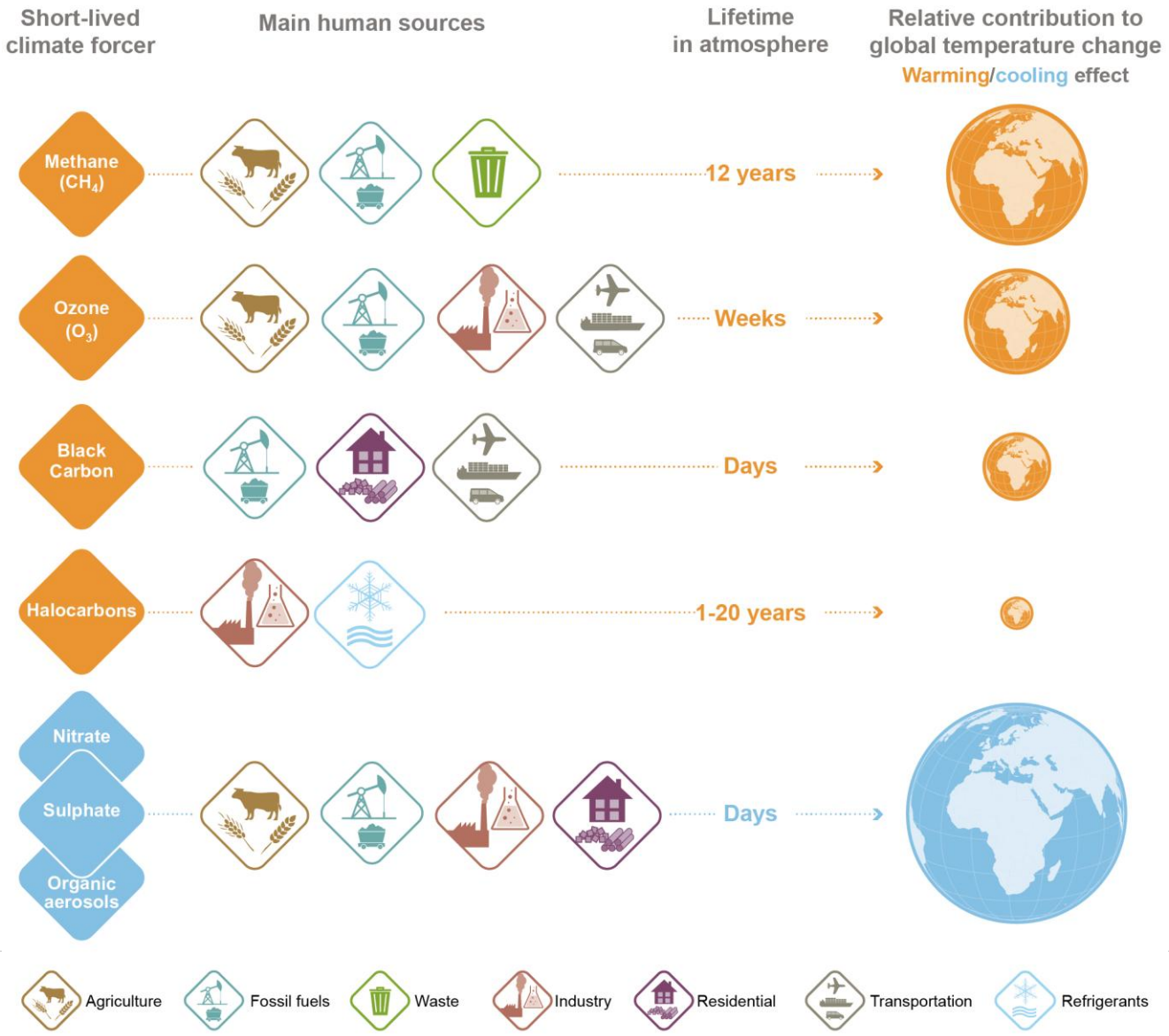
- **SLCF effects vary across regions** and change rapidly due to short lifetime
- **SLCFs also impact air quality**; efforts to improve air quality have resulted in SLCF reductions

Source: IPCC AR6 Chapter 6 FAQ 6.1

Many indirect climate forcers are also SLCFs

FAQ 6.1: **What are short-lived climate forcers and how do they affect the climate?**

Short lived climate forcers do not remain for very long in the atmosphere, thus an increase or decrease in their emissions rapidly affects the climate system.



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.

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.

Aviation and radiative forcing

GHG emissions

- CO2 and N2O emitted from combustion of jet fuel*

Contrails

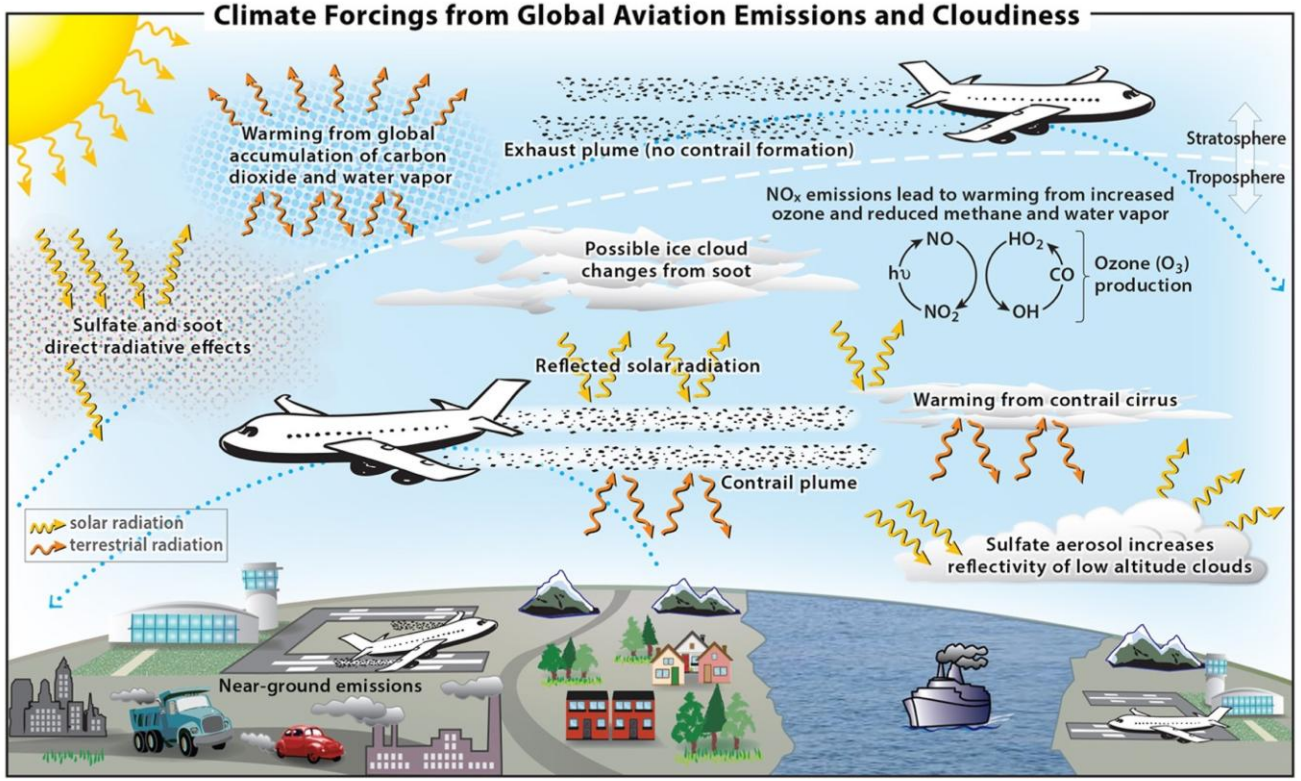
- Condensation trails that form behind aircraft cruising at altitude.
- Whether contrails form depends on climate conditions (e.g., temperature, humidity) and the aircraft itself (e.g., engine efficiency)
- Because of the many variables, estimating the warming effect from contrails is highly uncertain

Nitrogen oxide emissions

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

Aerosols

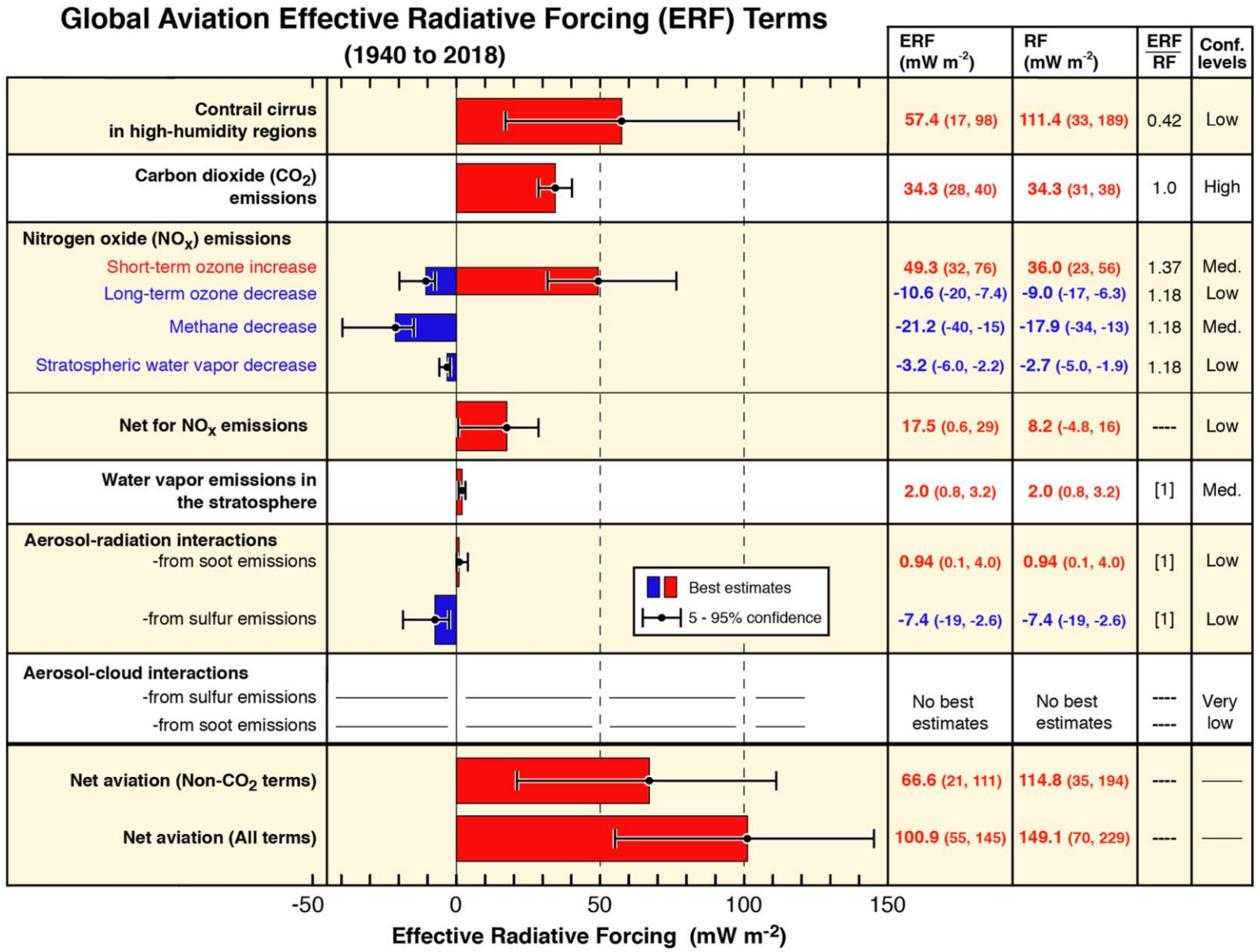
- Warming from black carbon / soot and cooling from SO2



Source: [Lee et al. 2021]

Aviation and radiative forcing: Uncertainty

- Aviation does have additional radiative forcing beyond CO2 emissions
- However, there is **high uncertainty** associated with the estimates
- Lee et al. (2021) report high confidence for estimates of CO2 emissions, but low to medium confidence for all other key drivers of aviation radiative forcing



	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

- Multipliers are sometimes applied to CO2 emissions from aviation
- Many sources do not include a radiative forcing factor in aviation emission factors
- 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	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

Indirect climate forcers: Preliminary poll questions

Discussion

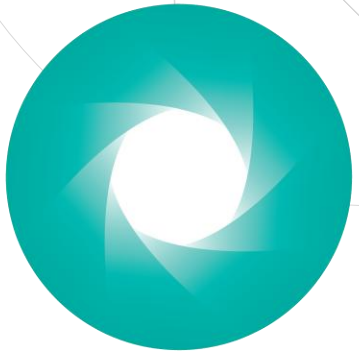
Poll questions

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. Should companies separately report the emissions of **other indirect climate forcers** (e.g., black carbon)?	**a. Shall** separately report emissions of other indirect climate forcers **b. Should** separately report emissions of other indirect climate forcers **c. May** separately report emissions of other indirect climate forcers **d. Stay silent** – *status quo*

Note: All poll questions also have the follow option: Abstain, I need more information to respond

Agenda

Introduction and housekeeping	10 minutes
Scope 1 disaggregated reporting and land emissions	40 minutes
Follow-up on global warming potential	40 minutes
Indirect climate forcers	20 minutes
Wrap-up and next steps	**10 minutes**



GREENHOUSE GAS PROTOCOL

Next steps

Next meeting:

Subgroup 3 Meeting 14 • *Other climate forcers* • *Task Force reports out on calculation methods and emission factors*	Tuesday May 12th, 2026	9:00 ET / 14:00 CET / 21:00 CHN

Note: We are revising the workplan. Stay tuned for updated fall meeting dates.

Items to be shared by GHG Protocol Secretariat:	TWG member action items:
• Final slides, minutes, and recording from this meeting • Feedback survey on meeting 13 topics	• **Review** meeting materials • Fill out post-meeting **feedback survey**, due date TBD

GREENHOUSE GAS PROTOCOL

Thank you!

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Appendix

LSR biogenic example on sustainable aviation fuel

Relevant slides from Subgroup 3 Meeting 12

More details on indirect climate forcers

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Source: LSR slide deck

Example: Sustainable Aviation Fuel (SAF) from soybean oil

Consider an airline using sustainable aviation fuel produced from soybean oil with physical traceability. They would report the following emissions and other metrics as follows:

Physical GHG Inventory

Emissions

Fossil Fuels and Industrial Emissions

- **Scope 1 emissions** from any conventional aviation fuel blended with the SAF
- **Scope 3 emissions** from the soybean oil transport, SAF production, transportation and storage
- **Scope 3 emissions** from the extraction, production, transport and storage of conventional aviation fuels

Land Emissions

- **Scope 1 biogenic N_2O and CH_4 emissions** from SAF combustion
- **Scope 3 land emissions** from the soybean oil production

Additional Land Sector Accounting Categories

Gross CO_2 Fluxes

- **Scope 1 biogenic CO_2** emissions from SAF combustion (as they accounted for lifecycle GHGs and leakage)

Land Use

- **Scope 3 land use** of the soybeans grown to produce the SAF (portion allocated to the soybean oil)

Land carbon leakage

- **Scope 3 leakage** due to the soybean crops displaced to produce the SAF (portion allocated to the soybean oil)

* Note this example is not comprehensive and only highlights the relevant accounting categories associated with the SAF

Current requirements for GWP: GHG Protocol

2. When using the Corporate Standard, companies:

a. Shall use 100-year GWP values from the IPCC.

b. Should use GWP values from the most recent Assessment Report, but may choose to use other IPCC Assessment Reports.

c. Shall use GWPs from a single Assessment Report for any one inventory, where possible. If GWPs for a particular gas are not provided in the chosen Assessment Report, companies shall select the most recent GWPs for that gas.

d. Should use the same GWPs for the current inventory period and the base year, as well as for inventories prepared according to the Scope 3 Standard, to maintain consistency across time and scopes.

e. Shall report the source of the GWP values and indicate if multiple Assessment Reports have been used.

Key points:

- 100-year GWP **required**
- Most recent AR **recommended**
- Using single AR **required**, where possible
- Using same GWPs for base year **recommended**
- GWP disclosure **required**

AR = IPCC Assessment Report

Source: GHG Protocol Amendment on required gases and GWP values

GWP: External programs – Summary

Name	100-year GWP	Latest IPCC GWP values	Other GWP time horizons	Notes
ISO 14064-1:2018 (CCF)	**Required**	**Recommended**	• May be used but reported separately	NA
ISO 14067:2018 (PCF)	**Required**	**Required**, if not otherwise stated and justified	• May be used but reported separately • Includes GTP	Notes that there is no scientific basis for choosing a 100-year time horizon compared to other time horizons
GRI *102 Climate Change 2025*	**Required**	**Required**	NA	NA
UNFCCC	**Required**	**IPCC Fifth Assessment Report**, or subsequent IPCC report		NA
IFRS S2	• Direct measurement: **Required** • Emission factors by GHG: **Required** • Aggregated (CO2e) emission factors: **Not required**	• Direct measurement: **Required** • Emission factors by GHG: **Required** • Aggregated (CO2e) emission factors: **Not required**	• Other metrics (including GTP) may be used	NA
ESRS E1	**Required**	**Required**	NA	Use of older GWPs must be justified

Note: California Health and Safety Code section 38532 does not appear to mention GWP

GWP: IPCC Assessment Reports

IPCC Global Warming Potential (GWP) values relative to CO_2

Common chemical name or industrial designation	Chemical formula	GWP values for 100-year time horizon		
		Fourth Assessment Report (AR4)	Fifth Assessment Report (AR5)	Sixth Assessment Report (AR6)
Major Greenhouse Gases				
Carbon dioxide	CO_2	1	1	1
Methane – non-fossil	CH_4	25	28	27.0
Methane – fossil	CH_4	N/A	30	29.8
Nitrous oxide	N_2O	298	265	273
Nitrogen trifluoride	NF_3	17,200	16,100	17,400
Sulfur hexafluoride	SF_6	22,800	23,500	24,300
Hydrofluorocarbons (includes unsaturated hydrofluorocarbons)*				
HFC-23	CHF_3	14,800	12,400	14,600
HFC-32	CH_2F_2	675	677	771
HFC-41	CH_3F	92	116	135
HFC-125	CHF_2CF_3	3,500	3,170	3,740
HFC-134	CHF_2CHF_2	1,100	1,120	1,260

Key changes across ARs:

Fluctuation in GWP values

- CH_4 changes by 12%
- N_2O changes by 11%

Disaggregation of CH_4 into **fossil and non-fossil** GWP

- Change made for AR5

Source: IPCC GWP Values, compiled by GHGP

GHG Protocol stakeholder survey feedback: GWP

Guidance requested:

- Clarify **which IPCC Assessment Report (IPCC AR)** should be utilized for GWP values
    - Confusion about the **discrepancies** between the latest IPCC AR and UNFCCC requirements for GWP
    - Clarify ways that **historical years can be recalculated** using GWPs from a more recent IPCC AR to ensure target tracking
- Add clarity on the use of GWPs for **refrigerants that are not covered by the UNFCCC**. Examples of such guidance already exist and can be built upon (e.g., in the U.S. entities tend to refer to California Air Resource Board source on refrigerant GWPs).
- Clarify how to proceed when **CO2e emission factors cannot be disaggregated** into constituent GHGs

Suggestions:

- **Revisit 100-year GWP** as the sole required metric
- Consider **support of a 20-year GWP**, particularly as it relates to methane and other short-lived GHGs
- Some suggested dual reporting of 100-year GWP and 20-year GWP, and others suggested replace the 100-year GWP with the 20-year GWP for reporting requirements.

GWP: Time horizon

GWP time horizon refers to the time period over which warming effects are considered

GHG	Atmospheric lifetime (years)	20-year GWP	100-year GWP	500-year GWP
CO2	Multiple	1	1	1
CH4 non-fossil	11.8	**79.7**	**27.0**	7.2
CH4 fossil	11.2	**82.5**	**29.8**	10.0
N2O	109	273	273	130

Time horizons published by IPCC

- **20-year**
- **50-year**
- **100-year**

The difference is more pronounced for shorter-lived GHGs (like methane)

20-year time horizon has been promoted because:

- Highlights the impact of **shorter-lived GHGs**
- Recognizes the **urgency** of climate action

Source: IPCC Sixth Assessment Report

GWP: External programs - Other Standards

Name	Requirements for GWP: Summary	Full text
ISO **14064-1:2018** **Corporate carbon footprint**	• **100-year GWP required** • **Latest IPCC GWP recommended** • Other time horizons may be used but reported separately	• *The organization shall convert the quantity of each type of GHG to tonnes of CO2e using appropriate GWPs.* • *The latest IPCC's GWP **should** be used. If not, justification shall be provided.* • *The GWP time horizon **shall be 100 years**.* • *Other GWP time horizons may be used, but **reported separately.***
ISO **14067:2018** **Product carbon footprint**	• **100-year GWP required** • **Latest IPCC GWP required**, if not otherwise stated and justified • Other GWP time horizons and GTP may be used but reported separately	• *In the LCIA phase of a CFP study, the potential climate change impact of each GHG emitted and removed by the product system **shall** be calculated by multiplying the mass of GHG released or removed by the **100-year GWP** given by the IPCC in units of kg CO2e per kg emission (with climate feedbacks, according to IPCC).* • *Where GWP values are amended by the IPCC, the **latest values shall be used** in the CFP calculations **if not otherwise stated and justified**.* • ***GWP for other time horizons and GTP**, as given by the IPCC, **may be used** in addition to GWP 100 but should be reported separately.* • *NOTE 2 - 100-year global warming potential (GWP 100) is used to represent shorter-term impacts of climate change, reflecting the rate of warming. 100-year global temperature potential (GTP 100) is used as an indicator for the longer-term impacts of climate change, reflecting the long-term temperature rise. **There is no scientific basis for choosing a 100-year time horizon compared to other time horizons.** The time horizon is a value judgement of international convention that weighs the effects that are likely to occur over different time horizons.*
GRI ***102 Climate change 2025***	• **100-year GWP required** • **Latest IPCC GWP required**	• *The **latest IPCC** GWP values **shall** be used.* • *The GWP time horizon **shall be 100 years**.* • *If the organization reports information for previous reporting periods calculated using different Intergovernmental Panel on Climate Change (IPCC) GWP values, it should report the values used in each reporting period.*

Note: SBTi CNZS does not appear to mention GWP

GWP: External programs – Climate disclosure rules

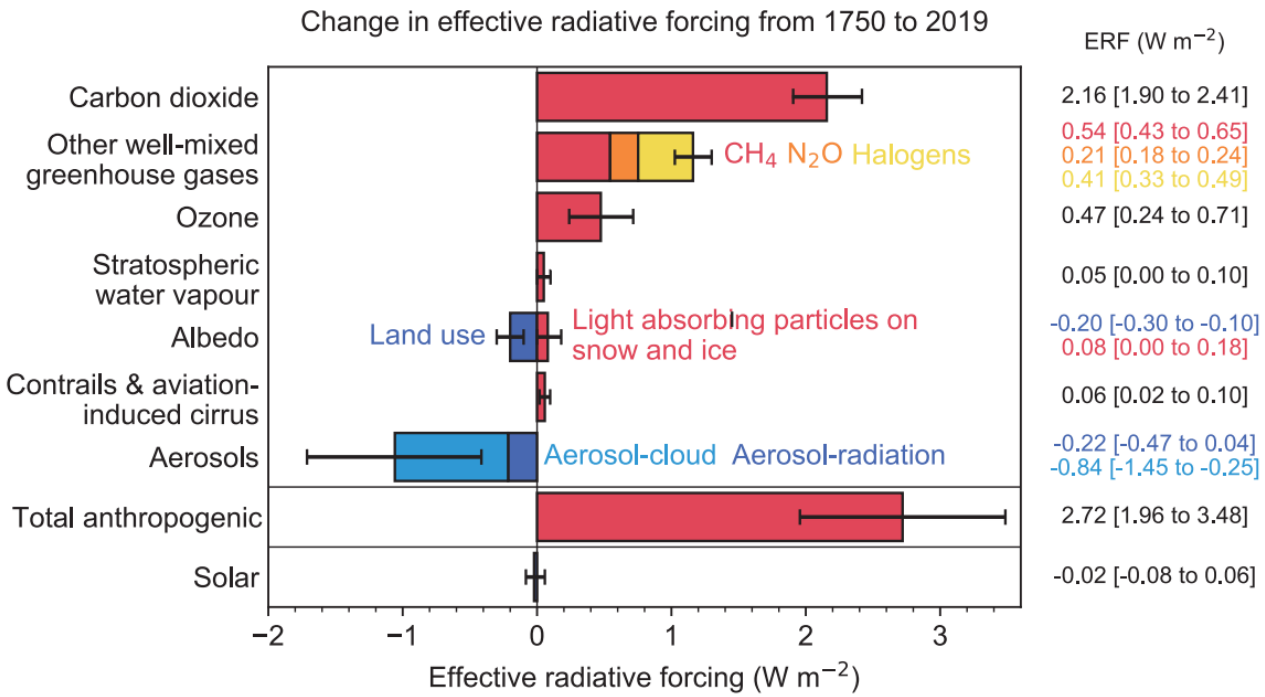
Name	Requirements for GWP: Summary	Full text
UNFCCC	• **100-year GWP required** • **IPCC Fifth Assessment Report**, or subsequent IPCC report • Other time horizons and metrics (e.g., GTP) may be used in addition	*Each Party **shall use the 100-year time-horizon global warming potential (GWP) values from the IPCC Fifth Assessment Report, or 100-year time-horizon GWP values from a subsequent IPCC assessment report** as agreed upon by the CMA, to report aggregate emissions and removals of GHGs, expressed in CO2 eq. Each Party may in addition also use other metrics (e.g. global temperature potential) to report supplemental information on aggregate emissions and removals of GHGs, expressed in CO2 eq. In such cases, the Party shall provide in the national inventory document information on the values of the metrics used and the IPCC assessment report they were sourced from.* Source: UNFCCC, decision 18/CMA.1, annex, chapter II

IFRS S2	Distinguishes between direct measurement and emissions calculated with emission factors
	• **Direct measurement**:
	  • Required to use 100-year time horizon
	  • Required to use latest IPCC AR
	• **Emission factors (EFs)**:
	  • Required to use representative EFs
	  • If EFs are aggregated, not required to disaggregate and recalculate with latest IPCC 100-year GWPs
	  • If EFs are NOT aggregated, the entity is required to use the latest IPCC 100-year GWPs
		• *(B21) If an entity uses **direct measurement** to measure its greenhouse gas emissions, the entity is required to convert the seven constituent greenhouse gases into a CO2 equivalent value using global warming potential values based on a **100-year time horizon**, from the **latest IPCC** assessment available at the reporting date.*
		• *(B22) If an entity uses emission factors to estimate its greenhouse gas emissions, the entity shall use—as its basis for measuring its greenhouse gas emissions—the emission factors that best represent the entity's activity (see paragraph B29). If these emission factors have already converted the constituent gases into CO2 equivalent values, the entity is not required to recalculate the emission factors using global warming potential values based on a 100-year time horizon from the latest Intergovernmental Panel on Climate Change assessment available at the reporting date. However, if an entity uses emission factors that are not converted into CO2 equivalent values, then the entity shall use the global warming potential values based on a 100-year time horizon from the latest Intergovernmental Panel on Climate Change assessment available at the reporting date.*

ESRS E1	• *The **latest IPCC** GWP values **shall** be used.* • *The GWP time horizon **shall be 100 years**.* • *If older GWP's are used, it should be justified in accordance with ESRS 2 GDR-M para 49.*	*"When preparing the information for reporting GHG emissions, the undertaking shall use the most recent Global Warming Potential (GWP) values published by the Intergovernmental Panel on Climate Change (IPCC) based on a 100-year time horizon to calculate CO2eq emissions of non-CO2 gases. If emission factors based on older GWP values are the most suitable or available, the undertaking can use these and explain…" (AR 39 (d) amended as AR 20 for paras. 28 and 29-(c)*

Note: California Health and Safety Code section 38532 does not specifically mention GWP. States that entities shall "measure and report its emissions of greenhouse gases in conformance with the Greenhouse Gas Protocol"

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