



CoCo2

Prototype system for a
Copernicus CO₂ service

User Requirement Document

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(CMCC)

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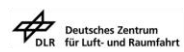
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1. Introduction

In the context of providing recommendations for the implementation of an observation-based operational anthropogenic CO₂ emissions Monitoring and Verification Support capacity (CO₂MVS) within the Copernicus programme, one of the main objectives of CoCO₂ is to provide inputs to the Global Stocktake (GST) process in time for the 1st GST in 2023, as well as more comprehensive inputs for the subsequent five-year GST cycles.

Specifically, it is foreseen that CoCO₂ will already provide appropriate CO₂ anthropogenic emission products for the 1st GST, at a spatial scale consistent with GST requirements. For the longer term, research developments within other CoCO₂ work packages will be channelled into building a comprehensive multi-scale prototype that will serve as the basis for the pre-operational Copernicus CO₂ service, with the view of delivering CO₂ emission and removals estimates on time for the 2nd GST with the best possible accuracy.

Task 6.2 of the CoCO₂ project is therefore aimed at identifying relevant needs for the periodic Global Stocktake through the development of a User Requirement Document (URD), as the starting point to define the prototype functionalities for a timely support of the GST. This deliverable (D6.3) represents an update of the URD developed under the VERIFY project (VERIFY, 2019; Perugini et al. 2021), with several integrations taking into account the needs of the GST process and the latest COP26 outcomes.

The challenge that the CoCO₂ project is facing is the creation of a system that is compatible with the multilateral process within the UNFCCC. This means being able to develop products that can adequately support countries in improving their reporting over time, in line with the methodologies and requirements under the Convention and the Paris Agreement, including transparency arrangements under the new Enhanced Transparency Framework (ETF) and the GST process, which will continue being the frameworks guiding countries' efforts over the next decades.

This URD is structured as follows: **Chapter 2** provides a detailed overview of the policy framework to monitor implementation of the Paris Agreement, with **Section 2.1** putting emphasis on the Enhanced Transparency Framework (ETF), including its principles and modalities, procedures and guidelines (MPGs) and requirements for GHG inventories; and **Section 2.2** analysing the Global Stocktake (GST) process, including its sources of input and modalities. **Chapter 3** explains how the CoCO₂ project could provide inputs to the GST process, with **Section 3.1** highlighting what could be relevant inputs, and their purpose, for the period cycles of the GST, while **Section 3.2** suggesting specific inputs, vehicles and deadlines for the provision of data for the 1st GST.

2. Policy framework to monitor implementation of the Paris Agreement

The adoption of the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC) set a turning point in the multilateral climate negotiations, guided by the urgent need to enhance climate ambition so as to ensure the global temperature increase remains well below 2°C, pursuing efforts to 1.5°C, above pre-industrial levels. Achieving this goal will require “rapid, deep and sustained reductions in global greenhouse gas emissions, including reducing global carbon dioxide emissions by 45 per cent by 2030 relative to the 2010 level and to net zero around midcentury, as well as deep reductions in other greenhouse gases” (UNFCCC, 2021).

In this context, communicating climate action is vital to unlocking the full potential of the Paris Agreement. Regularly updating the global community on actions being taken to meet Nationally Determined Contributions (NDCs), on data regarding Greenhouse Gas (GHG) emissions levels, on flows of finance to support climate action, and on climate change impacts and adaptation enables countries to share best practice as well as to build mutual confidence and trust towards the multilateral regime.

To achieve its goals in a globally evolving context, the Paris Agreement in its Article 13 provided for the establishment of an **Enhanced Transparency Framework (ETF)** for action and support, which shed a new light on the importance of all countries to act and report transparently. Moreover, Article 14 of the Paris Agreement established the **Global Stocktake (GST)**, a facilitative process aimed at taking periodical stock of the implementation of the Agreement by assessing collective progress towards the achievement of its long-term goals, considering mitigation, adaptation and means of implementation and support (UNFCCC, 2015). In short, while the ETF will guide monitoring, reporting and review efforts of individual Parties in the context of the Paris Agreement, the GST will look at aggregate data and assess collective progress to ensure the world remains on track to meet its long-term goals. In practice, GST will not consider any regional or subregional component of the emission status and trends, avoiding to singling out countries and their level or ambition, following the bottom-up approach of the Paris Agreement. The GST assessment will be based on aggregated data and will inform the Parties on the status of collective achievement of climate goals, leaving to each country's judgment the best pathways to increase their nationally determined contribution (to be updated after 2 years from the GST), in consideration of their specific national circumstances.

In the following paragraphs, the two processes (ETF and GST) are presented and described in detail, to facilitate understanding of their modalities and requirements and best guide the relevant deliverables to be prepared under the CoCO2 project.

2.1. The Enhanced Transparency Framework (ETF)

The ETF is essential for the implementation of the Paris Agreement, providing the foundations for monitoring, reporting, and review of key information while ensuring a common system that facilitates ambition and improvements over time. The primary purpose of the ETF is to build mutual trust and confidence, by providing a clear understanding of Parties' GHG emissions and removals, including their trends, as well as of efforts in tackling climate change both through action (for mitigation and adaptation) and support (provided and received).

The ETF was designed with the view of building upon and further enhancing the experiences of MRV arrangements within the UNFCCC Convention, which have guided Parties' transparency efforts since the early phase of the climate negotiations. Nevertheless, the ETF marked a shift in the rules and their applicability: differentiated requirements and guidelines between developed and developing country Parties, which characterized the Convention and the Kyoto Protocol's regimes, were largely replaced by new common rules and formats applicable to all Parties (ISPRA, 2021), with the provision of specific, built-in flexibilities for those developing countries who need them in the light of their capacities. This means that flexibility provisions cannot be applied indiscriminately: their use must be explicitly provided for and associated capacity constraints shall be clarified.

With the overarching rules and principles for the ETF being agreed in 2015 (COP21, Paris), the development and adoption of more specific operational details for Parties to meet their reporting requirements, and thus ensure a full implementation of the ETF, was mandated to

the Subsidiary Body for Scientific and Technological Advice (SBSTA) as part of the so-called “Paris Rulebook”. The first part of this work was finalized in 2018 (COP24, Katowice), when the Conference of the Parties serving as the meeting of the Parties under the Paris Agreement (CMA) adopted the “**Modalities, Procedures and Guidelines**” (MPGs) for the ETF. The outstanding elements included within the “**Guidance operationalizing the MPGs for the ETF**”, namely the development of common reporting tables for GHG inventories, the common tabular formats for tracking progress of NDCs and for support information, and the outlines of the transparency reports, as well as the development of the training programme for experts that will participate in the Technical Expert Review (TER) under the Paris Agreement, were finalized and adopted in 2021 (COP26, Glasgow) at the end of intense negotiations among Parties.

2.1.1. Modalities, Procedures and Guidelines (MPGs) for the ETF

The MPGs provide all specific requirements, principles and elements to be taken into account by all Parties in fulfilling their reporting obligations under the ETF. This marks a significant shift from the current MRV arrangements, which generally provided for differentiated sets of guidelines for Annex I and non-Annex I Parties. Nevertheless, in the MPGs, specific flexibility provisions are explicitly provided for those developing country Parties who need it in the light of their capacities; and further specific discretion is in some cases granted to the Least Developed Countries (LDCs) and the Small Islands Developing States (SIDS), in recognition of their special circumstances.

Among the key principles embodied by the MPGs, are:

- (i) The promotion of the so-called “**TACCC principles**”, namely transparency, accuracy, completeness, consistency and comparability. These principles are essential to ensure the quality and robustness of reported data and information, also to facilitate their aggregation to take stock of the collective status of implementation at the global level. Further details are provided in Table 1 below.

Table 1 – TACCC principles for GHGIs. Definitions based on UNFCCC Decision 24/CP.19, Ch. I.B, Annex I

TACCC principles for GHG inventories	
Transparency	Data sources, assumptions and methodologies used for inventories should be clearly explained for facilitating replications, reviews and assessments of the inventories by users.
Accuracy	Emission and removal estimates should be systematically neither over nor under true emissions or removals, as far as can be judged, and that uncertainties are reduced as far as practicable.
Completeness	An annual GHG inventory covers at least all sources and sinks, as well as all gases, for which methodologies are provided in the 2006 IPCC Guidelines (or supplementary methodologies). The full geographical coverage of the sources and sinks of a Party should be considered too.
Consistency	All the GHG inventory elements across sectors, categories and gasses should be consistently reported for all the year of the time-series. An inventory is consistent if the same methodologies are used for the base and all subsequent years and if consistent data sets are used to estimate emissions or removals from sources or sinks.
Comparability	Emission and removal estimates reported by [Annex I] Parties in their inventories should be comparable among the other [Annex I] Parties. Therefore, these Parties should use the methodologies and formats agreed by the COP for making

(ii) The “**no-backsliding**” provision: all Parties are required to maintain at least the same level of reporting (in terms of frequency and quality) in accordance with their own obligations under the Convention. For developed country Parties in particular this means that, regardless of the level of detail and granularity of new common requirements set by the MPGs, they will not be allowed to decrease reporting efforts compared to their current practice.

(iii) The facilitation of an **improved reporting over time**. This principle generally applies to all Parties and circumstances. However, it is also embodied in the framework for flexibility: when any of such provisions is used by a developing country Party who needs it in the light of its capacities, the Party also needs to clarify associated capacity constraints and estimated time frames for improvement.

All new requirements introduced by the MPGs will supersede the existing MRV arrangements upon the submission of the final Biennial Reports (BR) by developed country Parties (due by 31st December 2022) and the final Biennial Update Reports (BUR) by developing country Parties (due by 31st December 2024). This means that by the end of 2024, the new requirements introduced by the Paris Agreement will be applicable to all Parties.

In terms of structure, reporting elements in the MPGs include a **national inventory report of GHG emissions and removals**; information necessary to **track progress of NDCs**; **climate change impacts and adaptation**; **support provided and mobilized**; and **support needed and received**. The main reporting vehicle for Parties to report this information under the new regime will be the “**Biennial Transparency Report**” (BTR), which all Parties will be required to submit to the UNFCCC every two years, with the first submission due by 31st December 2024.

At COP26 in Glasgow, Parties adopted the **outline for the BTR** (Annex I), which in addition to the reporting elements highlighted in the MPGs will also include National Communications chapters not covered by the MPGs, namely “Vulnerability assessment, climate change impacts and adaptation measures”; “**Research and systematic observation**” (RSO); and “Education, training and public awareness”.

For the CoCO₂ project, the most relevant elements to take into consideration in the BTR structure are represented by the **national inventory reports of GHG emissions and removals**, as being particularly relevant to the data that the project aims to produce; and information to be submitted on **RSO**, as it may accommodate information on the scientific and technical methodologies applied within CoCO₂.

2.1.2. Features and principles for GHG inventories in the ETF

The MPGs adopted in Katowice established that specific and common methods, metrics and guidance will have to be followed by Parties in preparing their GHG inventory (to be submitted as part of the BTR or as a standalone report), which should therefore be taken duly into account in the preparation of CoCO₂ relevant deliverables. These include, among others:

- **Guidelines:** each Party shall use the 2006 IPCC Guidelines, and any subsequent version or refinement of the IPCC guidelines (2019) agreed upon by the CMA. To date, no further version or refinement was adopted by the CMA. Nevertheless, in the MPGs Parties were encouraged to use the “2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands”; and in the “Guidance operationalizing the

MPGs” adopted at COP26 in Glasgow, it was noted that Parties may use on a voluntary basis the 2019 IPCC Refinement.

- **Time series:** each Party shall report consistent annual time series starting from 1990 (with flexibility for those developing countries who need flexibility due to their capacities to start from the reference year/period of its NDC) until two years prior to the submission of its national inventory report (three years prior to the submission for those developing countries who need flexibility due to their capacities).
- **Metrics:** to express the aggregated emissions and removals in CO₂ equivalent (CO₂eq.), Parties shall use the 100-year time-horizon global warming potential (GWP) values from the IPCC 5th Assessment Report (or subsequent reports agreed upon by the CMA).
- **Sectors and categories:** mandatory reporting of energy, industrial processes and product use (IPPU), agriculture, LULUCF and waste sectors. Moreover, Each Party shall report estimates of emissions and removals for all categories, gases and carbon pools considered in the GHG inventory throughout the reported period on a gas-by-gas basis in units of mass at the most disaggregated level, in accordance with the 2006 IPCC guidelines, noting that a minimum level of aggregation is needed to protect confidential business and military information.
- **Greenhouse gases (GHGs):** mandatory reporting of carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆) and nitrogen trifluoride (NF₃) (with flexibility for those developing countries who need it in the light of their capacities to report only CO₂, CH₄ and N₂O unless any of the F-gases are included in the Party’s NDC, are covered by an activity under Article 6 of the Paris Agreement or were previously reported).
- **Key category analysis:** the concept of key category is used to identify the categories that have a significant influence on a country’s total inventory of GHGs in terms of the absolute level of emissions and removals, the trend in emissions and removals, or uncertainty in emissions and removals. Key Categories should be the priority for countries during inventory resource allocation for data collection, compilation, quality assurance/quality control and reporting. In the MPGs, it is stated that each Party shall identify key categories for the starting year and the latest reporting year, including and excluding land use, land-use change and forestry (LULUCF) categories, using approach 1, for both level and trend assessment, by implementing a key category analysis consistent with the 2006 IPCC guidelines, which provide a threshold for key categories of 95% of the national total emissions (85% for those developing countries applying flexibility due to their capacities).
- **Uncertainty assessment:** the 2006 IPCC Guidelines define uncertainties as “the lack of knowledge of the true value of a variable that can be described as a probability density function (PDF) characterizing the range and likelihood of possible values”. Uncertainty depends on the analyst’s state of knowledge, which in turn depends on the quality and quantity of applicable data as well as knowledge of underlying processes and inference methods. The quantitative uncertainty analysis is performed by estimating the 95 percent confidence interval of the GHG emissions/removals for the individual process, category, sectors, and for the total inventory as well. In the MPGs, it is established that each Party shall quantitatively estimate and qualitatively discuss the uncertainty of the emission and removal estimates for all source and sink categories, including inventory totals, for at least the starting year and the latest reporting year of the inventory time series. Each Party shall also estimate the trend uncertainty of emission and removal estimates for all source and sink categories, including totals, between the starting year and the latest reporting year of

the inventory time series. Such assessments shall be made in line with the IPCC 2006 Guidelines, which suggest (Vol. 1, Ch. 3) two methods for the error propagation: Approach 1 and Approach 2 (see Verify's URD for further details).

- **Quality Assurance (QA)/Quality Control (QC):** it is a key aspect of a GHGI, as it enables its quality assessment and thus improvement over time (see VERIFY's URD for further details). The MPGs require Parties to elaborate an inventory QA/QC plan in accordance with the IPCC Guidelines.

At COP26, Parties ultimately finalized the development of the outstanding elements of the "Paris Rulebook" related to the ETF, including all necessary components for the submission of National Inventory Reports (NIR) of GHG emissions and removals. These included the adoption of the Common Reporting Tables (CRTs) and the outline of the National Inventory Document (NID), which together will compose the NIR submissions of Parties.

Concerning the CRTs¹, it is worth noting that they generally reflect the structure of the current Common Reporting Formats (CRFs) for Annex I Parties, with a few changes. CRTs include summary, sectoral, cross-cutting and background tables, which will be mandatory for all Parties. Nevertheless, specific arrangements for the implementation of flexibility are foreseen for those developing countries who will need it in the light of their capacities, mainly through the use of an ad hoc notation key ("FX") and the collapsing of selected rows, columns and/or tables where all cells do not contain data due to the use of flexibility, which will be in any case accessible for display purposes. In Annex II, a summary of the CRT's reporting categories and respective codes as adopted in Glasgow is provided.

2.2. The Global Stocktake (GST)

2.2.1. Background and sources of input

The Global Stocktake (GST) process was established by Article 14 of the Paris Agreement, with the aim of taking stock of its implementation and assess the world's collective progress towards achieving its purpose and long-term goals. The GST has thus no individual country focus, but rather includes non-policy prescriptive considerations of collective progress that Parties can then use to inform the updating and enhancing, in a nationally determined manner, of their actions and support including NDCs.

At COP24 in Katowice, Parties adopted a decision outlining both the sources of input and the modalities of the GST². In that text, the sources of input of the GST are presented by illustrating, in a distinct manner:

- (i) The non-exhaustive **list of information** to be considered at a collective level by the GST³, which are summarized in Table 1 below, including an assessment of their relevance to the CoCO₂ project. At COP26, the SBSTA agreed that in addition to the lists of sources of input for the GST agreed in Katowice, further sources and types of information pursuant to **equity and best available science**; and **response measures and loss & damage**⁴ will also serve as a basis for the sources and types of information for the first GST with a view to informing the technical assessment component.

¹ Available for download here: <https://unfccc.int/documents/311076>












² UNFCCC Decision 19/CMA.1

³ according to paragraph 36 of Decision 19/CMA.1

⁴ as in paragraph 2 and paragraph 6(b), respectively, of decision 19/CMA.1

It should be noted that in Table 2 below, CoCO2 relevance was assessed based on the combination of two factors: thematic relevance and likelihood of influencing the respective process. On this basis, later in this report (Table 5) a more detailed and straightforward analysis will be made on the elements deemed relevant for CoCO2 (identified as points (a) and (b), highlighted in green) and those deemed potentially relevant for CoCO2 (points (f) and (g), highlighted in yellow); and an explanation of the respective referenced articles of the Paris Agreement will also be provided.

Table 2 – Sources of input for the global stocktake: non-exhaustive list of information to be considered at a collective level (paragraph 36, Decision 19/CMA.1).













Sources of input for the global stocktake: non-exhaustive list of information to be considered at a collective level (paragraph 36, Decision 19/CMA.1)	CoCO2 relevance   
(a) The state of greenhouse gas emissions by sources and removals by sinks and mitigation efforts undertaken by Parties, including the information referred to in Article 13, paragraph 7(a), and Article 4, paragraphs 7, 15 and 19, of the Paris Agreement;	
(b) The overall effect of Parties' nationally determined contributions and overall progress made by Parties towards the implementation of their nationally determined contributions, including the information referred to in Article 13, paragraph 7(b), of the Paris Agreement;	
(c) The state of adaptation efforts, support, experience and priorities, including the information referred to in Article 7, paragraphs 2, 10, 11 and 14, of the Paris Agreement, and the reports referred to in Article 13, paragraph 8, of the Paris Agreement;	
(d) The finance flows, including the information referred to in Article 2, paragraph 1(c), and means of implementation and support and mobilization and provision of support, including the information referred to in Article 9, paragraphs 4 and 6, Article 10, paragraph 6, Article 11, paragraph 3, and Article 13, in particular paragraphs 9 and 10, of the Paris Agreement. This should include information from the latest biennial assessment and overview of climate finance flows of the Standing Committee on Finance;	
(e) Efforts to enhance understanding, action and support, on a cooperative and facilitative basis, related to averting, minimizing and addressing loss and damage associated with the adverse effects of climate change;	
(f) Barriers and challenges, including finance, technology and capacity-building gaps, faced by developing countries;	
(g) Good practices, experience and potential opportunities to enhance international cooperation on mitigation and adaptation and to increase support under Article 13, paragraph 5, of the Paris Agreement;	
(h) Fairness considerations, including equity, as communicated by Parties in their nationally determined contributions.	

(ii) The non-exhaustive **list of sources** to be used by the GST⁵. This should not be interpreted only as a list of available “vehicles” to submit input information, but also as defining, *de facto*, additional input information for the GST. For instance, matters related to research and systematic observation (RSO), while not being explicitly mentioned as part of the “list of

⁵ According to paragraph 37 of Decision 19/CMA.1

information” to be considered at a collective level by the GST, may find a way to the GST process when included as part of “reports and communications from Parties” (included in the “list of sources”). Indeed, domestic reports such as National Communications require the provision of information related to RSO. The list is summarized in Table 3 below, with an indication of sources’ relevance to the CoCO₂ project. In this sense, it should be noted again that CoCO₂ relevance was assessed based on the combination of two factors: thematic relevance and likelihood of influencing the respective process.

Table 3 – Sources of input for the global stocktake: non-exhaustive list of sources (paragraph 37, Decision 19/CMA.1)

Sources of input for the global stocktake: non-exhaustive list of sources (paragraph 37, Decision 19/CMA.1)	CoCO ₂ relevance   
(a) Reports and communications from Parties, in particular those submitted under the Paris Agreement and the UNFCCC Convention	
(b) The latest reports of the Intergovernmental Panel on Climate Change, pursuant to UNFCCC Decision 1/CP.21, paragraph 99	
(c) Reports of the subsidiary bodies, pursuant to UNFCCC Decision 1/CP.21, paragraph 99	
(d) Reports from relevant constituted bodies and forums and other institutional arrangements under or serving the Paris Agreement and/or the Convention	
(e) The synthesis reports by the secretariat referred to in paragraph 23 of UNFCCC Decision 19/CMA.1	
(f) Relevant reports from United Nations agencies and other international organizations, which should be supportive of the UNFCCC process	
(g) Voluntary submissions from Parties, including on inputs to inform equity considerations under the global stocktake	
(h) Relevant reports from regional groups and institutions	
(i) Submissions from non-Party stakeholders and UNFCCC observer organizations	

This list will be updated with the guiding questions for the technical assessment component that are being developed by the Chairs of the Subsidiary Bodies (SBs).

2.2.2. Process and modalities

The modalities of the GST include three different phases: (i) Information collection and preparation; (ii) Technical assessment; and (iii) Consideration of outputs. A GST cycle will take place over the course of two-three years and five UNFCCC sessions, as described in Figure 1. Specific timelines for the 1st GST, which will take place from 2021 to 2023, are illustrated in Figure 2. In the paragraphs (i)-(iii) below, a more extensive description of the three phases of the GST process is provided, with an indication of both general timelines and specific arrangements for the 1st GST.

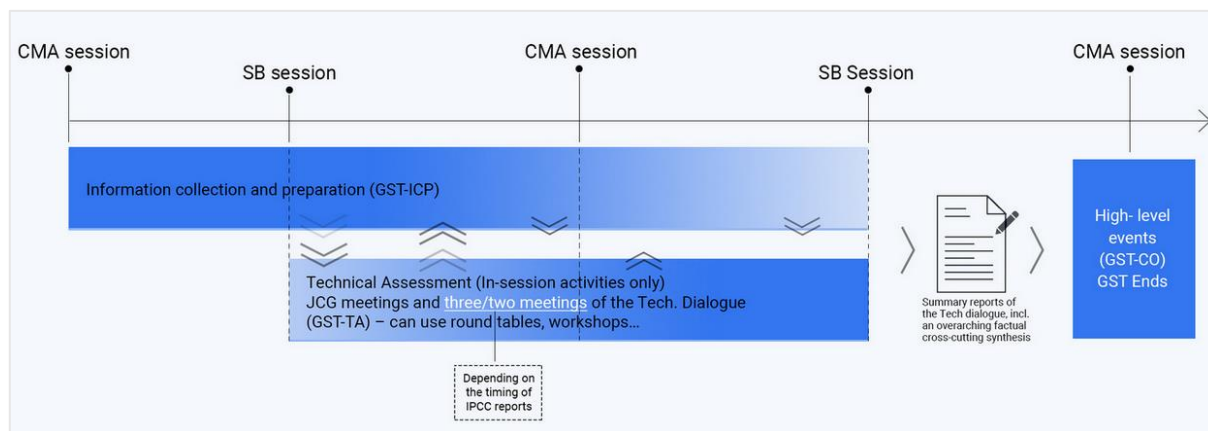


Figure 1 – Modalities for the GST process. Source: UNFCCC

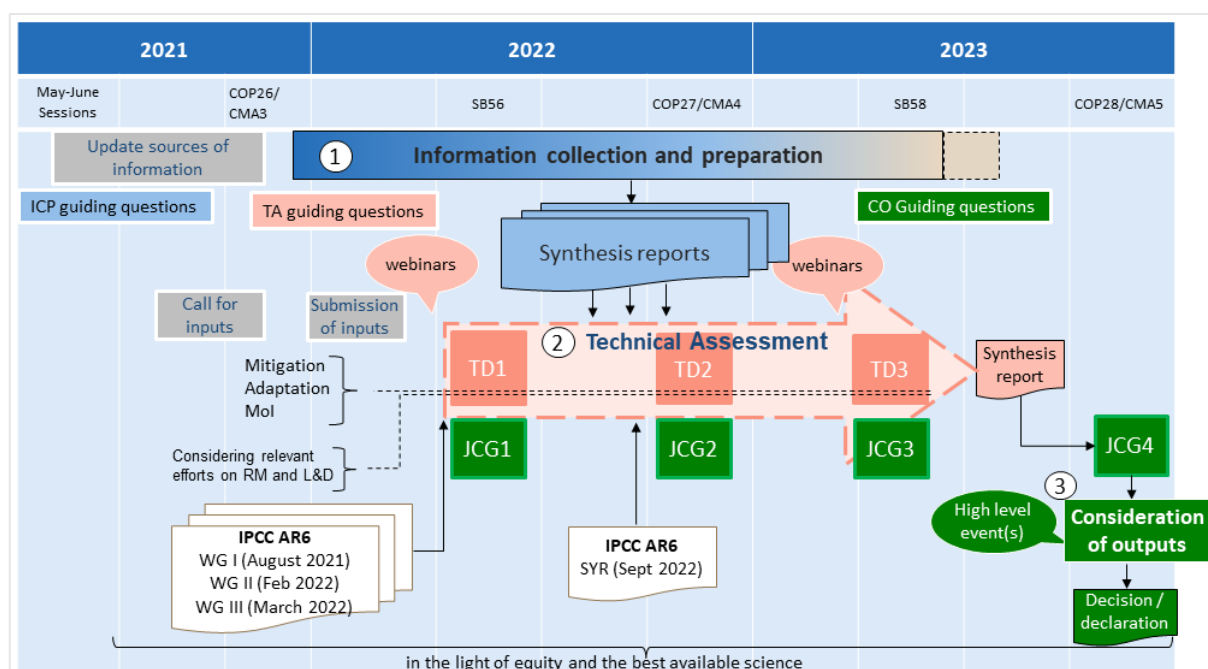


Figure 2 – Modalities for the 1st GST cycle (2021-2023). Source: UNFCCC

(i) **Information collection and preparation:** in this phase, all information provided and collected by the sources of input (as described in paragraph 2.2.1 above) will be gathered, compiled and synthesized with the view of preparing the technical assessment component. During this phase, the UNFCCC Secretariat will be requested to prepare at least four synthesis reports on: the state of **greenhouse gas emissions by sources and removals by sinks** and **mitigation efforts** undertaken by Parties; the overall effect of **NDCs** and the overall progress made by Parties towards their implementation; the state of **adaptation** efforts, support, experience and priorities; the **finance flows** and **means of implementation and support**, and **mobilization and provision of support**. Moreover, constituted bodies and forums and other institutional arrangements, with the assistance of the Secretariat, are invited to prepare synthesis reports on the four themes above and, in addition, on: efforts to enhance understanding, action and support, on a cooperative and facilitative basis, related to **averting, minimizing and addressing loss and damage** associated with the adverse effects of climate change; **barriers and challenges**, including finance, technology and capacity-building gaps, faced by developing countries; **good practices, experience and potential opportunities to enhance international cooperation** on mitigation and adaptation and to increase support;

and **fairness considerations, including equity**, as communicated by Parties in their NDCs (Figure 3).

This phase will start one session of the SBs before the technical assessment and end one SB session before the CMA session tasked with the conclusion of the GST cycle. For the 1st GST, this phase has started at the CMA.3 session of COP26 in Glasgow (November 2021), and will conclude at the SB58 session (June 2023).

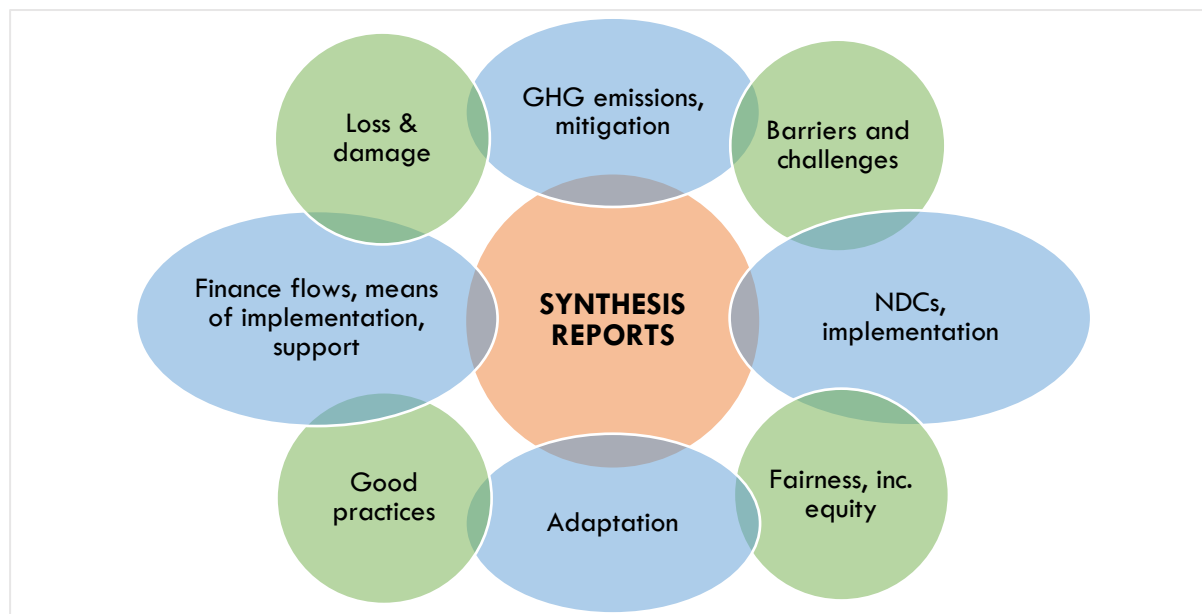


Figure 3 – Summary of synthesis reports to be produced by the UNFCCC Secretariat (in blue) and other UNFCCC bodies (in green) to inform the technical assessment phase of the GST

(ii) **Technical assessment:** this phase will assess information collected from the previous phase (to which it will largely overlap), with the view of assessing collective progress towards achieving the purpose and long-term goals of the Paris Agreement. Among the various sources to be considered, the IPCC Assessment Reports to be released over time will play a prominent role in the various cycles of the GST, with the possibility of adjusting the timing of this GST phase to ensure such scientific evidence can be included for consideration. To facilitate an open and transparent exchange on the scientific findings, dialogues and special events will take place through an ad hoc IPCC-SBSTA Joint Working Group. In the lead-up to this phase under the 1st GST, the guiding questions being developed by the Chairs of the Subsidiary Bodies will be made available in due time. As a preliminary arrangement, during 2021 the SBs Chairs have considered and proposed draft guiding questions⁶, released just ahead of COP26, organized by theme: mitigation, adaptation, finance flows and means of implementation, response measures and loss & damage, and cross-cutting. In Table 4 below, the ones most relevant to matters related to GHG emissions, science and technical support are reported, along with a brief explanation on how they could be relevant to the CoCO2 project.

⁶ “Draft guiding questions by the SB Chairs for the Technical Assessment component of the first Global Stocktake”.

Table 4 – Analysis of the draft guiding questions relevant for CoCO2 for the 1st GST

Analysis of the draft guiding questions relevant for CoCO2 for the 1st GST	
Mitigation	
Draft questions	<p>1. <i>What is the collective progress made towards achieving the long-term temperature goal in Article 2.1(a) of the Paris Agreement, in the light of equity and the best available science?</i></p> <p>2. <i>What is the collective progress made towards achieving the long-term mitigation goal in Article 4.1 of the Paris Agreement, in the light of equity and the best available science?</i></p> <p>3. <i>What are the projected global GHG emissions and what actions are Parties undertaking to achieve a balance between anthropogenic emissions by sources and removals by sinks of GHGs, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty (Article 4.1 Paris Agreement, Decision 19/CMA.1, paragraph 36(b))?</i></p>
Analysis of relevance for CoCO2	<p>The questions above are related to the achievement of the long-term temperature and mitigation goals within the Paris Agreement. It can be expected that collective progress, at the time of the 1st GST in particular, will be assessed as being not yet sufficient to meet such goals. Accordingly, enhanced action will be required by Parties to raise their ambition very rapidly. This will require the provision of robust and updated data in a timely manner, which are essential requirements to drive rapid policy-making decisions. In this sense, methodologies and data such as those proposed by CoCO2 could bring in a relevant contribution.</p>
Cross-cutting	
Draft questions	<p>16. <i>To achieve the purpose and long-term goals of the Paris Agreement (mitigation, adaptation, and finance flows and means of implementation, as well as loss and damage, response measures), in the light of equity and the best available science, taking into account the contextual matters in the preambular paragraphs of the Paris Agreement:</i></p> <p style="padding-left: 40px;">a. <i>What are the good practices, barriers and challenges for enhanced action?</i></p> <p style="padding-left: 40px;">c. <i>What are the needs of developing countries related to the ambitious implementation of the Paris Agreement?</i></p>
Analysis of relevance for CoCO2	<p>These questions relate to the good practices, barriers and challenges and the needs faced by developing countries to implement the Paris Agreement and enhance action. It can be expected that several developing countries, in particular, will emphasize the technical and capacities challenges in producing and collecting robust data. In this sense, methodologies and data such as those proposed by CoCO2 could be proposed as instruments available to countries in the preparation and/or verification of their GHG inventories.</p>

For the 1st GST cycle, this phase will take place from SB56 (June 2022) to SB58 (June 2023). The results of the technical assessment will then be condensed into summary reports for each thematic area (mitigation, adaptation and means of implementation and support), to be prepared by the co-facilitators of the technical dialogue.











(iii) Consideration of outputs: the third and last phase of the GST process will consist of high-level events featuring a presentation and discussion of the summary reports on the findings of the technical assessment. The outcome of this phase will include the identification of collective opportunities and challenges in enhancing action and support, as well as possible measures, good practices and cooperation opportunities, in relation to each thematic area. Key political messages from this activity will be summarized and recommendations for strengthening action and support will be drawn accordingly, to be ultimately referenced in a CMA Decision or declaration. For the 1st GST cycle, this phase will take place at CMA.6 (November/December 2023).

3. Providing inputs to the Global Stocktake (GST)

3.1. Identifying relevant inputs for the GST periodic cycles

Based on the elements identified and discussed in the previous chapter as possible sources of input to the GST (see Table 2), a more detailed description of the sources that could be relevant for the CoCO2 project is presented in Table 5 below. Specifically, it provides a disaggregation and more practical explanation of the requirements and references to the relevant articles of the Paris Agreement, with the view of clarifying further which sub-sources could represent relevant subject matters for CoCO2.

Table 5 – Disaggregation and practical explanation of GST’s sources of input possibly relevant for CoCO2.

Sources of input	Articles of the Paris Agreement	Topic	CoCO2 relevance   
(a) The state of greenhouse gas emissions by sources and removals by sinks and mitigation efforts undertaken by Parties, including the information referred to in: (see next column “Articles of the Paris Agreement”)	Article 13, paragraph 7(a)	National inventory report of GHG emissions and removals	
	Article 4, paragraphs 7	Mitigation co-benefits resulting from Parties' adaptation actions and/or economic diversification plans	
	Article 4, paragraphs 15	Concerns of Parties with economies most affected by the impacts of response measures, particularly developing country Parties	
	Article 4, paragraphs 19	Long-term low GHG emission development strategies	
(b) The overall effect of Parties' nationally determined contributions and overall progress made by Parties towards the implementation of their nationally determined contributions, including the information referred to in: (see next column “Articles of the Paris Agreement”)	Article 13, paragraph 7(b)	Information necessary to track progress made in implementing and achieving its NDC	
(f) Barriers and challenges, including finance, technology and capacity-building gaps, faced by developing countries (see next column “Articles of the Paris Agreement”)	[Article 10]	Technology Development and Transfer	
(g) Good practices, experience and potential opportunities to enhance international cooperation on mitigation and adaptation and to increase support under: (see next column “Articles of the Paris Agreement”)	Article 13, paragraph 5	Including clarity and tracking of progress towards achieving Parties' individual NDCs, and Parties' adaptation actions, including good practices, priorities, needs and gaps	

From Table 5, it can be drawn that only some of the references included in point (a) of the GST sources of input may be relevant for CoCO₂, namely those related to national inventory reports of GHG emissions and removals and long-term low GHG emission development strategies. On the contrary, information related to mitigation co-benefits of adaptation and to the impacts of response measures appear beyond the scope of this project. Further possible sources of input that could be potentially relevant for CoCO₂ are represented by point (f), i.e. the barriers and challenges faced by developing countries when it comes to technology development and transfer; and by point (g), i.e. the good practices, experience and potential opportunities to enhance international cooperation. Nevertheless, the concrete relevance of these last two sources of input with the CoCO₂ deliverables will have to be explored further, as it will depend on the approach adopted.

In the next paragraphs, an attempt will be made to detail the concrete possible inputs that the CoCO₂ project and its result could regularly bring to the GST process over the various cycles. Due to the time constraints, a specific subset of information to be provided for the 1st GST is illustrated in paragraph 3.2.

3.1.1. Inverse modelling verification as a methodology to improve GHG inventories

All Countries, under the UNFCCC reporting requirements, are requested to improve over time their estimates of emissions by sources and removals by sinks, in line with the 2006 IPCC Guidelines for GHG inventories and the TACCC principles. Historically, the most notable advances in the quality assurance and verification of inventories have been achieved in the application of inverse models of atmospheric transport for estimating emissions at the national scale. Generally, an ideal condition for verification is the use of fully independent data as a basis for comparison. Measurements of atmospheric concentrations meet this requirement, and recent scientific advances allow using such data as a basis for emission modelling through the inverse modelling. The approach is particularly valuable as it can be largely independent of standard estimation method drivers, such as sector activity data and implied emission factors. The scale of such models can be designed around local, regional, or global boundaries and can provide information on either levels or trends in emissions (Vitullo, Bonasoni et al., 2020).

A growing number of countries are currently using atmospheric measurements to provide useful quality assurance of the national GHG emission estimates, with several studies reporting the results of comparisons with bottom-up estimates (see e.g., Bergamaschi et al., 2015; Bruhwiler et al., 2017; Graziosi et al., 2017; Stohl et al., 2009; Thompson et al., 2014) and related uncertainties.

The application of inverse modelling to verify GHGs produced following the UNFCCC requirements (IPCC Guidelines) leads to different results depending on the gases considered, as illustrated in Table 6 below. A common challenge for many top-down methods, such as the atmospheric inversion models, is that while using the bulk changes in atmospheric concentrations, cannot effectively separate the exact source sectors as request by the IPCC Guidelines. This is mainly due to the constraints that models have regarding the scale of atmospheric transport and the sampling of the atmosphere by atmospheric in situ stations or satellites (Peters et al., 2017). This therefore results a common challenge for all GHGs. Another limitation to the application of the inversion model for the verification purpose are linked to system boundaries and source attribution. For example, air flow crosses national borders may make it difficult to separate national contributions by inverse modelling technique (Vol.1, Ch.6 – IPCC, 2019a) in areas with high emission densities from multiple countries.

Overcoming such an obstacle may be possible with a dense network of atmospheric observations (from in situ and/or remote sensing), which is able to separate out a ‘dirty’ variable background airflow coming from a neighbouring country. Alternatively, atmospheric data from multiple countries could be aggregated and verified at the continent (e.g., EU) level rather than the country level (Perugini et al., 2021).

Table 6 – Inverse modelling verification of GHGs: benefits and challenges modified from: Vitullo, Bonasoni et al. (2020)

Inverse modelling verification of GHGs: benefits and challenges	
CO₂ (carbon dioxide)	<p>Benefits:</p> <ul style="list-style-type: none"> - CO₂ inverse modelling can substantially facilitate a better definition of the contributions of forests and natural sinks, as grassland, highlighting the key role of wildfires (LULUCF sector). <p>Challenges:</p> <ul style="list-style-type: none"> - Difficulties for comparison due to the generally very low uncertainty of fossil fuels CO₂ emissions’ estimates in national inventories in developed countries (energy sector). - Difficulties to establish a strict correlation with anthropogenic sources and sinks, due to the large impacts of natural sources and sinks on atmospheric measurements. To be comparable with GHG inventories, only data on managed land should be detected from inversion models.
CH₄ (methane)	<p>Benefits:</p> <ul style="list-style-type: none"> - Fit for inverse modelling verification due to the generally high uncertainty in CH₄ emissions’ estimates in national inventories, and the strong atmospheric signal to noise ratio of measurements. <p>Challenges:</p> <ul style="list-style-type: none"> - Influences by natural sources.
N₂O (nitrous oxide)	<p>Benefits:</p> <ul style="list-style-type: none"> - Fit for inverse modelling verification due to the large uncertainties associated with some of the N₂O emissions reported in national inventories (especially from agricultural soils). <p>Challenges:</p> <ul style="list-style-type: none"> - Absence of N₂O column retrievals from satellites.
Fluorinated gases	<p>Benefits:</p> <ul style="list-style-type: none"> - Particularly fit for inverse modelling verification due to virtual absence of natural source interference in the atmospheric measurements, the generally considerable uncertainties in national inventory methods, the very long atmospheric lifetime and the good knowledge on loss mechanisms.

In the framework of the Paris Agreement, national and global assessments of the state of greenhouse gas emissions will continue to take place through the compilation, submission and synthesis of domestic inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases. As already described in Chapter 2, the specific (and mostly mandatory) provisions for the compilation of inventories were agreed through the adoption of the MPGs for the ETF, also including methods, metrics and guidance to be used. All Parties shall include a national inventory report either as part of their biennial transparency reports (BTRs), or as a standalone report, with discretion granted to LDCs and SIDS. Inventories will have to reflect the TACCC principles and to follow the 2006 IPCC Guidelines and any subsequent version or refinement to be agreed upon by the relevant UNFCCC bodies.

It is therefore widely acknowledged that Parties’ reporting of GHG emissions will continue to be based on national inventory reports and related methodologies agreed within the UNFCCC process in line with the relevant IPCC Guidelines, and that such arrangements will not be replaced any time soon. Nevertheless, previous paragraphs have shown concrete opportunities to present inverse modelling verification methodologies developed within the

CoCO₂ project as a useful instrument to gradually improve the quality of GHG inventories, in addition to the comparison between the sectoral and reference approach that is usually made in inventories especially from developed country Parties.

3.1.2. Provision of country-specific datasets to support developing country Parties' efforts

Developing countries, especially the LDCs and SIDS, have historically experienced difficulties in producing up to date, complete, accurate and consistent GHG emissions data and time series. This has been due to several challenges, including technical and technological constraints, limited expertise and capacity, lack of funding and limited coordination among national institutions. In the framework of the Paris Agreement, it will be essential for developing countries to significantly improve their capacities to be able to meet their transparency obligations. Among others, as all other Parties they will be required to produce a GHG inventory every two years, with consistent and annual time series (although some flexibility provisions are provided for developing countries who need it in the light of their capacities, and some discretion is granted for SIDS and LDCs).

On this basis, there could be an opportunity to support developing countries who need it in the effort of gathering data and statistics needed in a timely and constant manner, with the provision of specific dataset that could be developed at a national and/or local scale to with the use of inverse modelling. This could enable some developing countries to significantly improve their GHG inventories in line with TACCC principles, and facilitate timely and compliant to the UNFCCC.

3.1.3. Innovation in climate change research and systematic observation efforts (RSO)

As explained in previous paragraphs, the “list of sources” to the GST not only provides for a list of the possible channels or vehicles to be used to submit information for the consideration of the GST; in fact, it also provides indirectly for additional relevant information to be considered by the process. Among these types of information are those related to research and systematic observation (RSO). In line with the UNFCCC Convention, Parties “shall promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system, as well as in their full, open and prompt exchange”. Such activities also need to be reported by Parties through specific provisions established as part of UNFCCC transparency arrangements, namely National Communications. Further developments in RSO practices would also be key for international institutions, including UNFCCC and IPCC, to be able to have sufficient data and information to undertake and periodically update accurate estimates on the status of GHG emissions and removals globally, as well as on the status and effectiveness of efforts to reduce emission levels.

Since countries will continue to be required to report information on RSO, there is therefore an opportunity for CoCO₂ to share its methodological approach to contribute to the global improvement of research and systematic observation activities, with a particular focus on GHGs emissions and fluxes. This could be primarily addressed to countries benefiting from supporting tools or products developed under the CoCO₂ project (e.g. inverse modelling verification, and inverse modelling provision of data), for them to report and further elaborate on such activities.

3.2. Opportunities to provide inputs for the 1st GST

Decisions adopted under the UNFCCC process by the CMA established that any inputs shall be submitted at least three months ahead of their consideration by the technical assessment (TA)⁷. Since the TA component of the 1st GST will take place over the course of one year, from June 2022 to June 2023 (with three main sessions taking place during the meeting of the SBs in June 2022, November 2022 and June 2023), this means that there will be three main deadlines for the provision of inputs and their respective consideration. A first call for inputs was issued in September 2021, requesting the provision of inputs by February 2022 at the latest⁸. Based on the available information, it can be assumed that two additional call for inputs will be issued during 2022, setting deadlines for the provision of information by August 2022 and by February 2023, respectively.

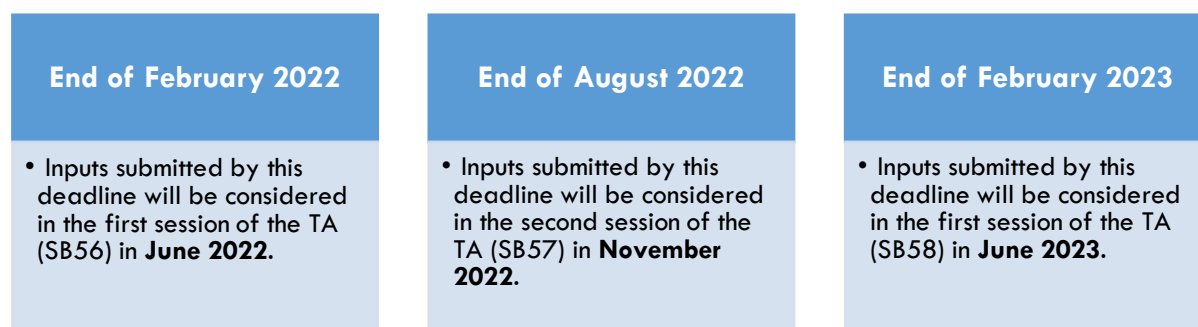


Figure 4 – Deadlines for inputs submission for the technical assessment (TA) sessions of the GST









On the basis of all information outlined above and in previous paragraphs, including on the sources of input agreed by the CMA, the elements that could be relevant for CoCO₂ to provide inputs and expected deadlines to do so, a summary of available options and vehicles that could be pursued in time for the 1st GST is shown in Table 7 and further elaborated in the paragraphs below.

Table 7 – Summary of available options for CoCO₂ to provide inputs for the 1st GST. * The deadline for NC8 is “as early as the annual greenhouse gas inventory submission for inventory year 2020 is provided to the UNFCCC, but no later than 31 December 2022”.

Sources of input	Available options	Report own submission deadline	GST available deadlines		
			End of February 2022 (1 st call for inputs)	End of August 2022 (2 nd call for inputs)	End of February 2023 (3 rd call for inputs)
(a) Reports and communications from Parties	Annex I Parties' National Inventory Reports (NIR 2022)	April 15, 2022	✘	✔	✔

⁷ Decision 19/CMA.1, paragraph 19: “Requests the Chairs of the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation to issue a call for the inputs referred to in paragraphs 36 and 37 below, **taking into account that such inputs should be submitted at least three months before their consideration in the technical assessment**”.

⁸ Joint message from the Chairs of the Subsidiary Bodies: “The First Global Stocktake - Call for inputs from Parties and Observer States to the Paris Agreement”.

	Annex I Parties' 8 th National Communications (NC8)	April 15 - December 31, 2022*			
(g) Voluntary submissions from Parties	EU / Member State(s) submission(s)	Open			
(i) Submissions from non-Party stakeholders and UNFCCC observer organizations	Registered observer organizations	Open			

3.2.1. Annex I Parties' 2022 National Inventory Reports (NIR 2022)

Annex I Parties to the Convention are still required, under the MRV arrangements, to prepare a National Inventory Report (NIR) of GHG emissions by sources and removals by sinks on an annual basis, and to submit it to the UNFCCC by 15 April each year. This obligation will continue under the Paris Agreement regime in the light of the “no-backsliding” principle, despite the MPGs requiring Parties to the Agreement to submit a GHGI as part of their BTR (i.e. every two years)⁹.

In their NIR submissions, Parties shall include “a description of the national inventory arrangements”, covering – inter alia – quality assurance, quality control and verification plan. Available data from the CoCO2 project concerning verification activities of the inventory by inverse modelling, at a spatial scale of the EU and/or any of its Member States, could be reported in the NIR of the EU and/or its Member States, respectively, following the specific reporting requirements foreseen for Annex I Parties (Table 8).

Following the NIR(s) submission to comply with inventory requirements, the relevant reports should also be uploaded to the GST online portal to provide them as inputs to the process. This would provide an opportunity for the methodology and data developed under this project to be considered by the GST process in an aggregate manner, particularly in the development of the synthesis report on the state of greenhouse gas emissions by sources and removals by sinks.

It should be noted that this option would require reaching out to, and coordinating with relevant inventory agencies during their preparation of the GHG inventory, to provide them with the relevant data and allow the performance of verification activities. Accordingly, arrangements should be made way ahead of the submission date of the NIR (April 15, 2022). Because the inventory submission deadline is subsequent to the cut-off date of the first call for inputs to the GST, it is extremely unlikely that such information will be considered at the first session of the technical dialogue, in June 2022. Instead, the first opportunity for its consideration appears to be the second session of the technical dialogue in November 2022, requiring the submission of information on the GST online portal by August 2022.

⁹ However, the MPGs will have to be used as guidelines for the submission of GHGIs.

Table 8 – Requirements for data provision to submit GST inputs through National Inventory Reports

National Inventory Reports	
Section	Requirements for data provision
Chapter 1.2 – Description of the national inventory arrangements	<p>In this section of the NIR, the following information can be included by Parties: Institutional, legal and procedural arrangements; Overview of inventory planning, preparation and management; Quality assurance, quality control and verification plan. In particular, Parties shall indicate:</p> <ul style="list-style-type: none"> - Quality assurance/quality control (QA/QC) procedures applied; - QA/QC plan; - Verification activities; - Treatment of confidentiality issues. <p>Among such elements, Parties could thus include information on methodologies applied for inverse observations and their specific function for QA/QC and verification purposes of their GHGI.</p>

3.2.2. Annex I Parties’ Eight National Communications (NC8)

All Parties to the Convention are required to prepare and submit a National Communication (NC) every four years. However, under the MRV system, different levels of obligations and specificity often apply to developed and developing countries in recognition of their different responsibilities and capacities. While most of the current reporting requirements will be superseded by those of the ETF from 2022 onwards¹⁰, Parties will have to continue reporting, as supplementary chapters to the BTRs, elements mandated by their applicable NC guidelines¹¹ that are not covered by the MPGs: information on research and systematic observation (RSO) and on education, training and public awareness.

Concerning RSO, Annex I Parties shall report their actions addressing both domestic and international activities and also reflect action taken to support related capacity-building in developing countries. This should focus on action taken in a summary form, avoiding the inclusion of detailed results of research studies, model runs or data analysis¹². Less detailed and prescriptive guidelines are provided for non-Annex I Parties, which are encouraged to provide information on climate change RSO, including their participation in and contribution to activities and programmes, as appropriate, of national, regional and global research networks and observing systems¹³.

In consideration of its current primary geographical focus, the CoCO2 project may provide the EU and/or any of its Member States with information on methodologies and experiences on systematic observation related to satellite observations, to be included in their respective NCs in line with the specific guidelines for Annex I Parties (Table 9).

Originally due by January 1st, 2022, the submission deadline for the upcoming National Communication (NC8) and Biennial Report (BR5) was postponed to as early as the annual greenhouse gas inventory submission for inventory year 2020 is provided to the UNFCCC, but no later than 31 December 2022, in order to provide Parties with the opportunity to include the

¹⁰ Developed country Parties will be subject to the new requirements under the Paris Agreement following the submission of their last BR, due by 31st December 2022; while for developing country Parties the new requirements will be applicable following their last BUR submission, due by 31st December 2024.

¹¹ Decisions 4/CP.5 and 17/CP.8, respectively.

¹² Annex to Decision 6/CP.25, “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications”, chapter IX.

¹³ Annex to Decision 17/CP.8, “Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention”, chapter V, paragraph B.

inventory data in these reports as being the final reports under the existing arrangements. The postponement leaves some degree of uncertainty regarding the expected submission dates of Annex I Parties' NC8, thus suggesting to follow a conservative approach by considering a similar timeline, including prior engagement efforts with governmental agencies, to the one proposed for NIRs in the previous paragraph (i.e. conceiving April 15, 2022 as likely NC8 submission deadline). Taking into consideration the above timelines, it appears unlikely that such information will be considered at the first session of the technical dialogue, in June 2022, and eventually at its second session in November 2022, since information should be received by August 2022 when only a few NCs may have been already submitted. As a result, consideration of this information appears more likely for the third session of the technical dialogue in June 2023, requiring the submission of information on the GST online portal by February 2023, when all NC submissions should already be finalized.

Table 9 – Requirements for data provision to submit GST inputs through National Communications

National Communications	
Section	Requirements for data provision
Chapter 8 – Research and Systematic Observation (RSO)	<p>In this chapter of Annex I Parties' National Communications, experiences on systematic observation related to satellite observations could be included. In particular, Parties should provide summary information on the current status of national plans, programmes and support for ground- and space-based climate observing systems, including long-term continuity of data, data quality control and availability, and exchange and archiving of data in the following areas:</p> <ul style="list-style-type: none"> - Atmospheric climate observing systems, including those measuring atmospheric constituents; - Ocean climate observing systems; - Terrestrial climate observing systems; - Cryosphere climate observing systems; - Support for developing countries to establish and maintain observing systems and related data and monitoring systems.

3.2.3. Parties' voluntary submission(s)

Submissions from Parties represent an important instrument to advance negotiations, both during and in between sessions, by illustrating countries and groups' views on specific matters that allow better understanding of mutual positions and inputs for the development of texts. Submissions can be made by Parties both in response to specific calls for submissions made by UNFCCC relevant bodies, which usually have deadlines for their consideration, and voluntarily.

For the purposes of this project, the EU and/or any of its Member States could be approached to propose the elaboration of an ad hoc submission which may cover information on methodologies applied, experiences, challenges and opportunities for inverse observations, including for instance examples of inverse modelling verification as a methodology to improve GHG inventories, arising from CoCO2 activities (Table 11).

As a voluntary submission, it could be forwarded to the UNFCCC at any time depending on the project's deliverables timeline, making it potentially suitable for any of the three windows to provide inputs to the 1st GST. For the same reason, there would not be specific requirements for data provision from this option.

Table 10 – Requirements for data provision to submit GST inputs through Parties’ voluntary submissions

Parties’ voluntary submission(s)	
Section	Requirements for data provision
N/A	A voluntary Party submission should focus on expressing the country’s support to tools and methodologies used under the CoCO2 project, for a possible future replication at the global level. If this option is pursued, it would be preferable to link the submission to the specific Party context and national inventory (e.g. inclusion of examples/experiences on concrete applications of inverse observations).

3.2.4. Non-Party stakeholders’ submission(s)

Submissions from non-Party stakeholders are recognized by the UNFCCC as a useful and inclusive instrument to further involve non-governmental organizations and other non-state actors. With regards to the GST process, such submissions were explicitly included among the possible sources of input. Submissions can generally be made by organizations both with and without observer status, however the procedures are longer in the case of the latter. For the purposes of this project, an ad hoc submission could be prepared by the CoCO2 consortium and ultimately submitted by one of such organizations with observer status to the UNFCCC. There would be no specific requirements for data provision under this option either, since there are no calls for submissions open at present. Nevertheless, the overarching requirements reflecting the nature of the GST process (e.g., collective assessments, aggregated data, replicable methodologies) should be taken into account (Table 12). In terms of deadlines, as in the previous option it would be potentially suitable for any of the three windows to provide inputs to the 1st GST.

Table 11 – Requirements for data provision to submit GST inputs through Non-Party stakeholders’ submissions

Non-Party stakeholders’ submission(s)	
Section	Requirements for data provision
N/A	A voluntary non-Party stakeholder submission should either focus on the tools and methodologies used under the CoCO2 project, with the view of supporting the GST over time, and/or on the provision of data at collective global level. Instead, due to the specific scope and nature of the GST, the provision of standalone data covering limited geographical areas without a linkage with the respective GHG inventory, or the provision of methodologies that could not be replicated at the global level, should be avoided.

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ANNEX I – Outline of the Biennial Transparency Report (BTR)

Overview chapter

- I. National inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases² (paras. 17–58 of the MPGs)**
- II. Information necessary to track progress made in implementing and achieving nationally determined contributions under Article 4 of the Paris Agreement (paras. 59–103 of the MPGs)**
 - A. National circumstances and institutional arrangements (paras. 59–63 of the MPGs)
 - B. Description of a Party's nationally determined contribution under Article 4 of the Paris Agreement, including updates (para. 64 of the MPGs)
 - C. Information necessary to track progress made in implementing and achieving nationally determined contributions under Article 4 of the Paris Agreement⁵ (paras. 65–79 of the MPGs)
 - D. Mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving a nationally determined contribution under Article 4 of the Paris Agreement (paras. 80–90 of the MPGs)
 - E. Summary of greenhouse gas emissions and removals (para. 91 of the MPGs)
 - F. Projections of greenhouse gas emissions and removals, as applicable (paras. 92–102 of the MPGs)
 - G. Other information (para. 103 of the MPGs)
- III. Information related to climate change impacts and adaptation under Article 7 of the Paris Agreement**
 - A. National circumstances, institutional arrangements and legal frameworks (para. 106 of the MPGs)
 - B. Impacts, risks and vulnerabilities, as appropriate (para. 107 of the MPGs)
 - C. Adaptation priorities and barriers (para. 108 of the MPGs)
 - D. Adaptation strategies, policies, plans, goals and actions to integrate adaptation into national policies and strategies (para. 109 of the MPGs)
 - E. Progress on implementation of adaptation (paras. 110–111 of the MPGs)
 - F. Monitoring and evaluation of adaptation actions and processes (paras. 112–114 of the MPGs)
 - G. Information related to averting, minimizing and addressing loss and damage associated with climate change impacts (para. 115 of the MPGs)
 - H. Cooperation, good practices, experience and lessons learned (para. 116 of the MPGs)
 - I. Any other information related to climate change impacts and adaptation under Article 7 of the Paris Agreement (para. 117 of the MPGs)

IV. Information on financial, technology development and transfer and capacity building support provided and mobilized under Articles 9–11 of the Paris Agreement

A. National circumstances and institutional arrangements (paras. 119–120 of the MPGs)

B. Underlying assumptions, definitions and methodologies (paras. 121–122 of the MPGs)

C. Information on financial support provided and mobilized under Article 9 of the Paris Agreement (paras. 123–125 of the MPGs)

D. Information on support for technology development and transfer provided under Article 10 of the Paris Agreement (paras. 126–127 of the MPGs)

E. Information on capacity-building support provided under Article 11 of the Paris Agreement (paras. 128–129 of the MPGs)

V. Information on financial, technology development and transfer and capacity building support needed and received under Articles 9–11 of the Paris Agreement

A. National circumstances, institutional arrangements and country-driven strategies (para. 130 of the MPGs)

B. Underlying assumptions, definitions and methodologies (para. 131 of the MPGs)

C. Information on financial support needed by developing country Parties under Article 9 of the Paris Agreement (paras. 132–133 of the MPGs)

D. Information on financial support received by developing country Parties under Article 9 of the Paris Agreement (para. 134 of the MPGs)

E. Information on technology development and transfer support needed by developing country Parties under Article 10 of the Paris Agreement (paras. 135–136 of the MPGs)

F. Information on technology development and transfer support received by developing country Parties under Article 10 of the Paris Agreement (paras. 137–138 of the MPGs)

G. Information on capacity-building support needed by developing country Parties under Article 11 of the Paris Agreement (paras. 139–140 of the MPGs)

H. Information on capacity-building support received by developing country Parties under Article 11 of the Paris Agreement (paras. 141–142 of the MPGs)

I. Information on support needed and received by developing country Parties for the implementation of Article 13 of the Paris Agreement and transparency-related activities, including for transparency-related capacity-building (paras. 143–145 of the MPGs)

VI. Information to be reported when national communications and biennial transparency reports are submitted jointly every four years

A. Vulnerability assessment, climate change impacts and adaptation measures

B. Research and systematic observation

C. Education, training and public awareness

VII. Information on flexibility

A. Indication of (1) reporting provisions to which self-determined flexibility is applied, (2) capacity constraints in relation to the application of flexibility and (3) self-determined

estimated time frames for improvements in relation to those capacity constraints (para. 6 of the MPGs)

VIII. Improvements in reporting over time

A. Areas of improvement identified by the Party and technical expert review team in relation to Party's implementation of Article 13 of the Paris Agreement (para. 7(a) of the MPGs)

B. How the Party is addressing or intends to address areas of improvement as referred to in paragraph 7(a) of the MPGs (para. 7(b) of the MPGs)

C. Areas of improvement that are related to the flexibility provisions used (para. 7(c) of the MPGs)

D. Reporting-related capacity-building support needs identified, including those referred to in chapter VI above and any progress made, including those previously identified as part of the technical expert review in chapter VII of the MPGs (para. 7(d) of the MPGs)

E. Parties' domestic plans and priorities with regard to improved reporting pursuant to paragraph 7 of the MPGs are not subject to technical expert review, but the information may inform discussions on areas of improvement and identification of capacity-building needs between the technical expert review team and the Party concerned (para. 8 of the MPGs)

IX. Any other information the Party considers relevant to the achievement of the objective of the Paris Agreement, and suitable for inclusion in its biennial transparency report Annexes as outlined in the annex to decision 18/CMA.1

Annex 1: Technical annexes for REDD+,¹⁷ as applicable

Annex 2: Common reporting tables for the electronic reporting of the national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases

Annex 3: Common tabular formats for the electronic reporting of:

- Information necessary to track progress in implementing and achieving nationally determined contributions under Article 4 of the Paris Agreement
- Information on financial, technology development and transfer and capacity building support provided and mobilized under Articles 9–11 of the Paris Agreement
- Information on financial, technology development and transfer and capacity building support needed and received under Articles 9–11 of the Paris Agreement

Annex 4: Information in relation to the Party's participation in cooperative approaches, as applicable

ANNEX II – Summary of CRFs reporting categories and codes

Table “Summary 1 – Summary report for national GHG inventories”

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO ₂ emissions / removals	CH ₄	N ₂ O	HFCs ⁽¹⁾	PFCs ⁽¹⁾	Unspecified mix of HFCs and PFCs ⁽¹⁾	SF ₆	NF ₃	NO _x	CO	NMVO C	SO _x	Total
	(kt)	CO ₂ equivalents (kt) ⁽²⁾				(kt)							CO ₂ equivalent (kt) ⁽²⁾
Total national emissions and removals													
1. Energy													
1.A. Fuel combustion													
1.A.1. Energy industries													
1.A.2. Manufacturing industries and construction													
1.A.3. Transport													
1.A.4. Other sectors													
1.A.5. Other													
1.B. Fugitive emissions from fuels													
1.B.1. Solid fuels													
1.B.2. Oil and natural gas and other emissions from energy production													
1.C. CO ₂ Transport and storage													
2. Industrial processes and product use													
2.A. Mineral industry													
2.B. Chemical industry													
2.C. Metal industry													



2.D. Non-energy products from fuels and solvent use													
2.E. Electronic industry													
2.F. Product uses as substitutes for ODS													
2.G. Other product manufacture and use													
2.H. Other ⁽³⁾													
3. Agriculture													
3.A. Enteric fermentation													
3.B. Manure management													
3.C. Rice cultivation													
3.D. Agricultural soils													
3.E. Prescribed burning of savannahs													
3.F. Field burning of agricultural residues													
3.G. Liming													
3.H. Urea application													
3.I. Other carbon-containing fertilizers													
3.J. Other													
4.A. Forest land ⁽⁴⁾													
4.B. Cropland ⁽⁴⁾													
4.C. Grassland ⁽⁴⁾													
4.D. Wetlands ⁽⁴⁾													
4.E. Settlements ⁽⁴⁾													
4.F. Other land ⁽⁴⁾													
4.G. Harvested wood products ⁽⁴⁾													
4.H. Other ⁽⁴⁾													
5. Waste													
5.A. Solid waste disposal ⁽⁵⁾													
5.B. Biological treatment of solid waste													

5.C. Incineration and open burning of waste ⁽⁵⁾																				
5.D. Wastewater treatment and discharge																				
5.E. Other ⁽⁵⁾																				
6. Other (please specify) ⁽⁶⁾																				
Memo items: ⁽⁷⁾																				
1.D.1. International bunkers																				
1.D.1.a. Aviation																				
1.D.1.b. Navigation																				
1.D.2. Multilateral operations																				
1.D.3. CO₂ emissions from biomass																				
1.D.4. CO₂ captured																				
5.F.1. Long-term storage of C in waste disposal sites																				
Indirect N₂O																				
Indirect CO₂																				

Table 7 “Summary overview for key categories”

KEY CATEGORIES OF EMISSIONS AND REMOVALS ⁽²⁾	Gas	Criteria used for key source identification		Key category excluding LULUCF	Key category including LULUCF
		L	T		
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	CO ₂				
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	CH ₄				
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	N ₂ O				
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	CO ₂				
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	CH ₄				
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	N ₂ O				
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	CO ₂				
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	CH ₄				

1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	N ₂ O				
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	CO ₂				
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	CH ₄				
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	N ₂ O				
1.A.1 Fuel combustion - Energy Industries - Peat	CO ₂				
1.A.1 Fuel combustion - Energy Industries - Peat	CH ₄				
1.A.1 Fuel combustion - Energy Industries - Peat	N ₂ O				
1.A.1 Fuel combustion - Energy Industries - Biomass	CH ₄				
1.A.1 Fuel combustion - Energy Industries - Biomass	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Liquid Fuels	CO ₂				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Liquid Fuels	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Liquid Fuels	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Solid Fuels	CO ₂				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Solid Fuels	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Solid Fuels	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Gaseous Fuels	CO ₂				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Gaseous Fuels	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Gaseous Fuels	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Other Fossil Fuels	CO ₂				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Other Fossil Fuels	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Other Fossil Fuels	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Peat	CO ₂				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Peat	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Peat	N ₂ O				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Biomass	CH ₄				
1.A.2 Fuel combustion - Manufacturing Industries and Construction - Biomass	N ₂ O				
1.A.3.a Domestic Aviation	CO ₂				
1.A.3.a Domestic Aviation	CH ₄				

1.A.3.a Domestic Aviation	N ₂ O				
1.A.3.b Road Transportation	CO ₂				
1.A.3.b Road Transportation	CH ₄				
1.A.3.b Road Transportation	N ₂ O				
1.A.3.c Railways	CO ₂				
1.A.3.c Railways	CH ₄				
1.A.3.c Railways	N ₂ O				
1.A.3.d Domestic Navigation - Liquid Fuels	CO ₂				
1.A.3.d Domestic Navigation - Liquid Fuels	CH ₄				
1.A.3.d Domestic Navigation - Liquid Fuels	N ₂ O				
1.A.3.d Domestic Navigation - Gaseous Fuels	CO ₂				
1.A.3.d Domestic Navigation - Gaseous Fuels	CH ₄				
1.A.3.d Domestic Navigation - Gaseous Fuels	N ₂ O				
1.A.3.d Domestic Navigation - Other Fossil Fuels	CO ₂				
1.A.3.d Domestic Navigation - Other Fossil Fuels	CH ₄				
1.A.3.d Domestic Navigation - Other Fossil Fuels	N ₂ O				
1.A.3.d Domestic Navigation - Biomass Fuels	CH ₄				
1.A.3.d Domestic Navigation - Biomass Fuels	N ₂ O				
1.A.3.e Other Transportation	CO ₂				
1.A.3.e Other Transportation	CH ₄				
1.A.3.e Other Transportation	N ₂ O				
1.A.4 Other Sectors - Liquid Fuels	CO ₂				
1.A.4 Other Sectors - Liquid Fuels	CH ₄				
1.A.4 Other Sectors - Liquid Fuels	N ₂ O				
1.A.4 Other Sectors - Solid Fuels	CO ₂				
1.A.4 Other Sectors - Solid Fuels	CH ₄				
1.A.4 Other Sectors - Solid Fuels	N ₂ O				
1.A.4 Other Sectors - Gaseous Fuels	CO ₂				

1.A.4 Other Sectors - Gaseous Fuels	CH ₄				
1.A.4 Other Sectors - Gaseous Fuels	N ₂ O				
1.A.4 Other Sectors - Other Fossil Fuels	CO ₂				
1.A.4 Other Sectors - Other Fossil Fuels	CH ₄				
1.A.4 Other Sectors - Other Fossil Fuels	N ₂ O				
1.A.4 Other Sectors - Peat	CO ₂				
1.A.4 Other Sectors - Peat	CH ₄				
1.A.4 Other Sectors - Peat	N ₂ O				
1.A.4 Other Sectors - Biomass	CH ₄				
1.A.4 Other Sectors - Biomass	N ₂ O				
1.A.5 Other (Not specified elsewhere) - Liquid Fuels	CO ₂				
1.A.5 Other (Not specified elsewhere) - Liquid Fuels	CH ₄				
1.A.5 Other (Not specified elsewhere) - Liquid Fuels	N ₂ O				
1.A.5 Other (Not specified elsewhere) - Solid Fuels	CO ₂				
1.A.5 Other (Not specified elsewhere) - Solid Fuels	CH ₄				
1.A.5 Other (Not specified elsewhere) - Solid Fuels	N ₂ O				
1.A.5 Other (Not specified elsewhere) - Gaseous Fuels	CO ₂				
1.A.5 Other (Not specified elsewhere) - Gaseous Fuels	CH ₄				
1.A.5 Other (Not specified elsewhere) - Gaseous Fuels	N ₂ O				
1.A.5 Other (Not specified elsewhere) - Other Fossil Fuels	CO ₂				
1.A.5 Other (Not specified elsewhere) - Other Fossil Fuels	CH ₄				
1.A.5 Other (Not specified elsewhere) - Other Fossil Fuels	N ₂ O				
1.A.5 Other (Not specified elsewhere) - Peat	CO ₂				
1.A.5 Other (Not specified elsewhere) - Peat	CH ₄				
1.A.5 Other (Not specified elsewhere) - Peat	N ₂ O				
1.A.5 Other (Not specified elsewhere) - Biomass	CH ₄				
1.A.5 Other (Not specified elsewhere) - Biomass	N ₂ O				
1.B.1 Fugitive emissions from Solid Fuels	CO ₂				

1.B.1 Fugitive emissions from Solid Fuels	CH ₄				
1.B.2.a Fugitive Emissions from Fuels - Oil and Natural Gas - Oil	CO ₂				
1.B.2.a Fugitive Emissions from Fuels - Oil and Natural Gas - Oil	CH ₄				
1.B.2.b Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas	CO ₂				
1.B.2.b Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas	CH ₄				
1.B.2.c Fugitive Emissions from Fuels - Venting and flaring	CO ₂				
1.B.2.c Fugitive Emissions from Fuels - Venting and flaring	CH ₄				
1.B.2.c Fugitive Emissions from Fuels - Venting and flaring	N ₂ O				
1.B.2.d Fugitive Emissions from Fuels - Other	CO ₂				
1.B.2.d Fugitive Emissions from Fuels - Other	CH ₄				
1.B.2.d Fugitive Emissions from Fuels - Other	N ₂ O				
1.C CO ₂ Transport and Storage	CO ₂				
1. Energy (indirect CO ₂ emissions)	CO ₂				
2.A.1 Cement Production	CO ₂				
2.A.2 Lime Production	CO ₂				
2.A.3 Glass Production	CO ₂				
2.A.4 Other Process Uses of Carbonates	CO ₂				
2.B.1 Ammonia Production	CO ₂				
2.B.1 Ammonia Production	CH ₄				
2.B.1 Ammonia Production	N ₂ O				
2.B.2 Nitric Acid Production	N ₂ O				
2.B.3 Adipic Acid Production	CO ₂				
2.B.3 Adipic Acid Production	N ₂ O				
2.B.4 Caprolactam, Glyoxal and Glyoxylic Acid Production	CO ₂				
2.B.4 Caprolactam, Glyoxal and Glyoxylic Acid Production	N ₂ O				
2.B.5 Carbide Production	CO ₂				
2.B.5 Carbide Production	CH ₄				
2.B.6 Titanium Dioxide Production	CO ₂				

2.B.7 Soda Ash Production	CO ₂				
2.B.8 Petrochemical and Carbon Black Production	CO ₂				
2.B.8 Petrochemical and Carbon Black Production	CH ₄				
2.B.9 Fluorochemical Production	Aggregate F-gases				
2.B.10 Other	CO ₂				
2.B.10 Other	CH ₄				
2.B.10 Other	N ₂ O				
2.B.10 Other	Aggregate F-gases				
2.C.1 Iron and Steel Production	CO ₂				
2.C.1 Iron and Steel Production	CH ₄				
2.C.2 Ferroalloys Production	CO ₂				
2.C.2 Ferroalloys Production	CH ₄				
2.C.3 Aluminium Production	CO ₂				
2.C.3 Aluminium Production	PFCs				
2.C.3 Aluminium Production	SF ₆				
2.C.4 Magnesium Production	CO ₂				
2.C.4 Magnesium Production	HFCs				
2.C.4 Magnesium Production	PFCs				
2.C.4 Magnesium Production	SF ₆				
2.C.4 Magnesium Production	Unspecified mix of HFCs and PFCs				
2.C.5 Lead Production	CO ₂				
2.C.6 Zinc Production	CO ₂				
2.C.7 Other	CO ₂				
2.C.7 Other	CH ₄				
2.C.7 Other	N ₂ O				

2.C.7 Other	Aggregate F-gases				
2.D Non-energy Products from Fuels and Solvent Use	CO ₂				
2.D Non-energy Products from Fuels and Solvent Use	CH ₄				
2.D Non-energy Products from Fuels and Solvent Use	N ₂ O				
2.E Electronics Industry	Aggregate F-gases				
2.F.1 Refrigeration and Air conditioning	Aggregate F-gases				
2.F.2 Foam Blowing Agents	Aggregate F-gases				
2.F.3 Fire Protection	Aggregate F-gases				
2.F.4 Aerosols	Aggregate F-gases				
2.F.5 Solvents	Aggregate F-gases				
2.F.6 Other Applications	Aggregate F-gases				
2.G Other Product Manufacture and Use	CO ₂				
2.G Other Product Manufacture and Use	CH ₄				
2.G Other Product Manufacture and Use	N ₂ O				
2.G Other Product Manufacture and Use	Aggregate F-gases				
2.H Other	CO ₂				
2.H Other	CH ₄				
2.H Other	N ₂ O				
2.H Other	Aggregate F-gases				
2. Industrial Processes and Product Use (indirect CO ₂ emissions)	CO ₂				
3.A Enteric Fermentation	CH ₄				
3.B Manure Management	CH ₄				

3.B Manure Management	N ₂ O				
3.C Rice Cultivation	CH ₄				
3.D Agricultural Soils	CH ₄				
3.D.1 Direct N ₂ O Emissions From Managed Soils	N ₂ O				
3.D.2 Indirect N ₂ O Emissions From Managed Soils	N ₂ O				
3.E Prescribed burning of savannas	CH ₄				
3.E Prescribed burning of savannas	N ₂ O				
3.F Field burning of agricultural residues	CH ₄				
3.F Field burning of agricultural residues	N ₂ O				
3.G Liming	CO ₂				
3.H Urea Application	CO ₂				
3.I. Other carbon-containing fertilizers	CO ₂				
3.J. Other	CO ₂				
3.J. Other	CH ₄				
3.J. Other	N ₂ O				
3. Agriculture (indirect CO ₂ emissions)	CO ₂				
4.A.1 Forest Land Remaining Forest Land	CO ₂				
4.A.2 Land Converted to Forest Land	CO ₂				
4.B.1 Cropland Remaining Cropland	CO ₂				
4.B.2 Land Converted to Cropland	CO ₂				
4.C.1 Grassland Remaining Grassland	CO ₂				
4.C.2 Land Converted to Grassland	CO ₂				
4.D.1.1 Peat Extraction Remaining Peat Extraction	CO ₂				
4.D.1.2 Flooded Land Remaining Flooded Land	CO ₂				
4.D.1.3 Other Wetlands Remaining Other Wetlands	CO ₂				
4.D.2 Land Converted to Wetlands	CO ₂				
4.E.1 Settlements Remaining Settlements	CO ₂				
4.E.2 Land Converted to Settlements	CO ₂				

4.F.1 Other Land Remaining Other Land	CO ₂				
4.F.2 Land Converted to Other Land	CO ₂				
4.G Harvested Wood Products	CO ₂				
4(I). Direct and indirect N ₂ O emissions from N inputs to managed soils	N ₂ O				
4(II). Emissions and removals from drainage and rewetting and other management of organic and mineral soils	CO ₂				
4(II). Emissions and removals from drainage and rewetting and other management of organic and mineral soils	CH ₄				
4(II). Emissions and removals from drainage and rewetting and other management of organic and mineral soils	N ₂ O				
4(III).Direct and indirect N ₂ O emissions from N mineralization/immobilization	N ₂ O				
4(IV) Biomass Burning	CO ₂				
4(IV) Biomass Burning	CH ₄				
4(IV) Biomass Burning	N ₂ O				
4.H Other	CO ₂				
4.H Other	CH ₄				
4.H Other	N ₂ O				
4. LULUCF (indirect CO ₂ emissions)	CO ₂				
5.A Solid Waste Disposal	CH ₄				
5.A Solid Waste Disposal	CO ₂				
5.B Biological Treatment of Solid Waste	CH ₄				
5.B Biological Treatment of Solid Waste	N ₂ O				
5.C Incineration and Open Burning of Waste	CO ₂				
5.C Incineration and Open Burning of Waste	CH ₄				
5.C Incineration and Open Burning of Waste	N ₂ O				
5.D Wastewater Treatment and Discharge	CH ₄				
5.D Wastewater Treatment and Discharge	N ₂ O				
5.E Other	CO ₂				
5.E Other	CH ₄				
5. Waste (indirect CO ₂ emissions)	CO ₂				
6. Other	CO ₂				

CoCO₂ 2021

6. Other	CH ₄				
6. Other	N ₂ O				
6. Other	Aggregate F-gases				
6. Other (indirect CO ₂ emissions)	CO ₂				

Document History

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