

Policy Brief: WMO Global Greenhouse Gas Watch

World Meteorological Organization (WMO)

1. Introduction: scope and purpose of the Global Greenhouse Gas Watch

The overall purpose of the Global Greenhouse Gas Watch (GGGW), endorsed by the 19th World Meteorological Congress, is to strengthen the information made available to Parties to the UNFCCC to support their climate change mitigation efforts. Such efforts aim to reduce net anthropogenic greenhouse gas emissions and/or directly remove greenhouse gas (GHGs) from the atmosphere. Atmospheric concentrations of the main GHGs (CO₂, CH₄ and N₂O) are still exhibiting unabated growth, as illustrated by the example provided in Fig. 1.

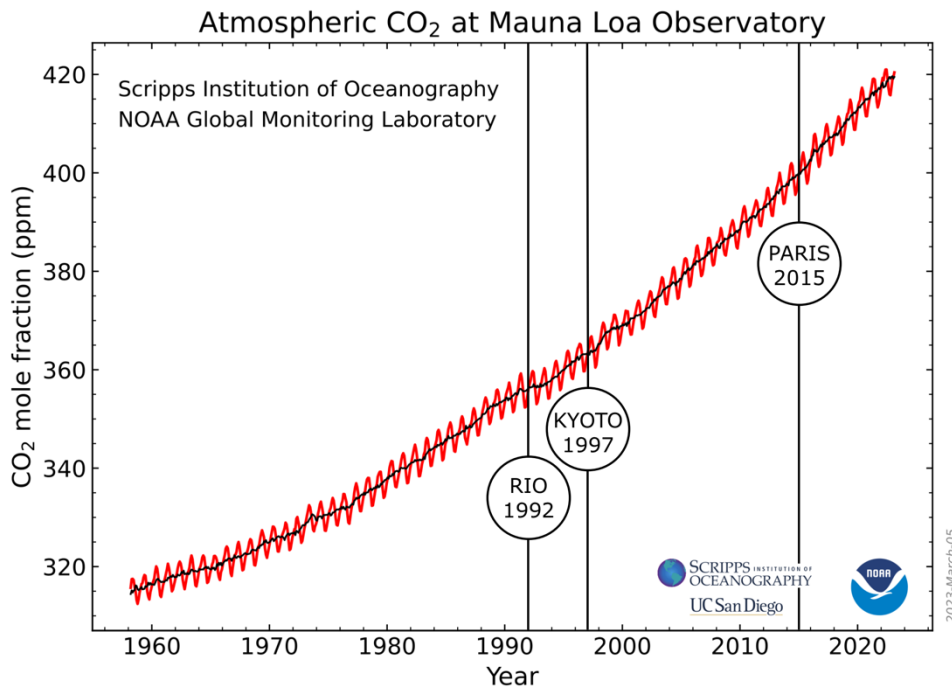


Figure 1. More than 60 years of accelerated growth of atmospheric background CO₂ concentrations measured at Mauna Loa (Scripps Institute of Oceanography).

Currently, mitigation efforts are not proceeding at a pace that will allow Parties to reach the main goal of the Paris Agreement of the UNFCCC, namely to limit the mean global average temperature to a well below 2.0 deg C above pre-industrial levels, let alone the stretch ambition of staying within 1.5 deg C (see Fig. 2).

Reducing net anthropogenic greenhouse gas emissions has proven difficult, and so has verifying claims about emission reductions. The key problem is that all national reporting on GHG emissions and emission reductions are based on bottom up methodologies (emission inventories calculated based on activities data and emission factors). Bottom up emission estimates cannot directly be reconciled with atmospheric growth rates, since the former are incomplete by definition, partly due to a lack of reporting by many countries, and partly due to lack of accounting for many natural sources and sinks of

GHGs. This leads to continued uncertainty about the actual anthropogenic emissions, and about the emission reduction targets that will be needed to meet the goals of the Paris Agreement.

This issue around emission scenarios and CO₂ removals was identified in the Synthesis Report by the co-facilitators on the Technical Dialogue of the First Global Stocktake, which highlights the following information gaps (FCCC/SB/2023/9, para. 227):

a) Information gaps exist in relation to emissions scenarios in which the global warming temperature temporarily exceeds and then returns to below 1.5 °C above preindustrial levels. Further research on such scenarios could determine the extent of CO₂ removal measures needed, improve understanding of potential economic and non-economic loss and damage during a period of overshoot and identify proactive adaptation options for managing that potential loss and damage;

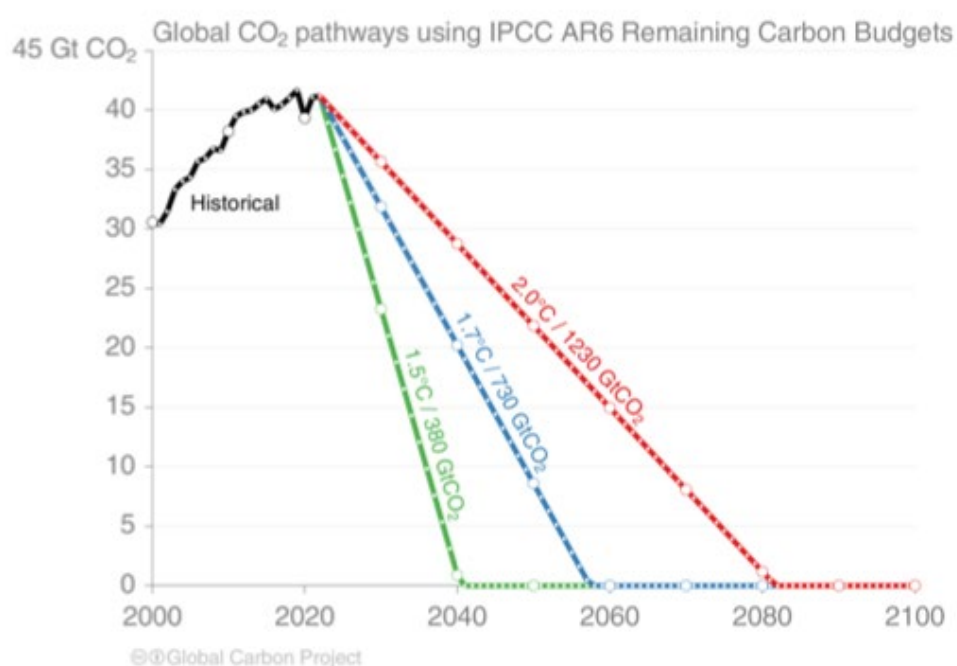


Figure 2. Future Emissions Pathways required to stay below 1.5 deg (green), 1.7 deg (blue) and 2.0 deg (red) mean global warming (Global Carbon Project, 2022).

In order to address these issues, the GGGW will generate and make available authoritative, internationally vetted information about greenhouse gas fluxes everywhere on the globe in near-real time. This will facilitate decision-making on climate mitigation action and enable direct assessment of its effectiveness. The latter currently is not done at the global level in a way that links mitigation action directly to its impact on atmospheric GHG concentrations. However, the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories recognizes in Chapter 9 that atmospheric observations can be used as a powerful tool for emission verification:

"An ideal condition for verification is the use of fully independent data as a basis for comparison. Measurements of atmospheric concentrations provide such datasets, and recent scientific advances allow using such data as a basis for emission 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."

Per the Concept Note endorsed by the 19th World Meteorological Congress (Resolution 5), the main components of the GGGW will be:

- (1) A comprehensive sustained, global set of surface-based and satellite-based observations¹ of CO₂, CH₄ and N₂O concentrations, total column amounts, partial column amounts, vertical profiles, and fluxes and of supporting meteorological, oceanic, and terrestrial variables, internationally exchanged as rapidly as possible, pending capabilities and agreements with the system operators;
- (2) Prior estimates of the GHG emissions based on activity data and process-based models;
- (3) A set of global high-resolution Earth System models representing GHG cycles;
- (4) Associated with the models (item 3), data assimilation systems that optimally combine the observations with model calculations to generate products of higher accuracy.

2. 19th WMO Congress and SBSTA-58

In recent years there has been a growing recognition of the essential role played by systematic observation to underpin action taken to mitigate and/or adapt to climate change and to monitor the effectiveness of action taken.

In the COP27 cover decision (Sharm el-Sheikh Implementation Plan, par. 48), Parties emphasized *the need to address existing gaps in the global climate observing system, particularly in developing countries, {...} as well as the need to enhance coordination of activities by the systematic observation community and the ability to provide useful and actionable climate information for mitigation, adaptation and early warning systems {...}*.

In part responding to the COP27 decision quoted above, the 19th World Meteorological Congress held in May/June 2023 approved Resolution 4 on the GGGW. In the text of this resolution, Congress requested inter alia, the Secretary-General *to further strengthen close collaboration and coordination with relevant United Nations agencies and other international partners engaged in greenhouse gas monitoring and modelling activities. In particular to engage with the UNFCCC to understand how the outputs could deliver actionable information that supports the Paris Agreement Global Stocktake and national government policy objectives.*

Following the approval by WMO Congress, the Global Greenhouse Gas Watch was introduced at the Side Event on Contributions from Systematic Observation to the Global Stocktake during SBSTA-58. This presentation triggered an invitation from SBSTA (SBSTA-58 Conclusions, item 7, RSO) for *WMO to report on the outcomes of the nineteenth World Meteorological Congress, held from 22 May to 2 June 2023, at SBSTA 59 (November–December 2023).*

3. WMO's GGGW ambition for SBSTA-59 and COP28

WMO's aim is to build on the recognition expressed in the COP27 Cover Decision of the role of systematic observation to underpin mitigation and adaptation efforts, and to get the GGGW recognized as a key element of the UNFCCC process and the implementation of

¹ In keeping with standard WMO terminology, the term "surface-based observations" refers to quantities derived from measurements obtained by any systems that are not deployed in space; the measurements may be in situ or remotely sensed, and they may pertain to any part of the Earth System domain (atmosphere, ocean, land, cryosphere, etc.) and to any vertical level within the respective domain.

the Paris Agreement. The ultimate goal of climate mitigation action is to reduce the atmospheric greenhouse gas loading, and without making use of atmospheric observations to unpack individual contributions to the growth shown e.g. in Fig 1., it will be difficult to design meaningful mitigation action, and it will be virtually impossible to assess its impact.

An envisaged SBSTA conclusion can build on the SBSTA-57 conclusions on the Global Climate Observing System (GCOS) Implementation Plan and the SBSTA-58 Conclusions inviting WMO to report on Cg-19. Suggested decision language (SBSTA, RSO Agenda item):

(The SBSTA...) welcomed the report from the 19th World Meteorological Congress and noted in particular the endorsement of the Global Greenhouse Gas Watch (GGGW) in response to the 2022 GCOS Implementation Plan. It noted that the GGGW will provide data that can complement existing national GHG reporting where insufficient data exist (e.g. for natural sources and sinks) and that it will be an important element in the implementation of the mitigation work stream under the Paris Agreement.

Encouraged the scientific community to address information gaps identified during the GST technical assessment, including information gaps in relation to emission scenarios that enable Parties to remain within the Paris agreement temperature goal.

COP28 decision language can build on the COP27 decision (Sharm el-Sheikh Implementation Plan, Section VII, par. 48) which emphasizes the need to enhance coordination of the efforts of the systematic observation community to provide actionable information for mitigation, adaptation and early warnings. Suggested draft decision language (COP/CMA cover decision):

The Conference of the Parties serving as the meeting of the Parties to the Paris Agreement

Welcomed the WMO endorsement of the Global Greenhouse Gas Watch as an initiative that will enhance coordination of the systematic observation community to provide actionable climate information for mitigation and adaptation, as called for in the Sharm el-Sheikh Implementation Plan and invited WMO keep Parties informed about progress in GGGW implementation.

As an alternative option, in case there will not be an overarching decision but a specific decision on the GST outcome, the following language could be considered:

The Conference of the Parties serving as the meeting of the Parties to the Paris Agreement

Emphasizes the need to address existing gaps in the global climate observing system, particularly in developing countries and the ocean and cryosphere, sustain and strengthen existing observation networks, and enhance coordination of activities by the systematic observation community and the ability to provide useful and actionable climate information for mitigation, adaptation and early warning systems.

Welcomes the outcomes from the 19th World Meteorological congress, in particular the endorsement of the Global Greenhouse Gas Watch (Resolution 5) as an initiative that will enhances coordination, of the systematic observation community to provide actionable climate information for mitigation and adaptation. It encouraged Parties and relevant organizations to support the

implementation of the GGGW and as a valuable element of the Enhanced Transparency Framework and a complement to GHG inventory reporting, particularly in developing countries. It invited WMO to report on progress, as appropriate.