

Indicators for monitoring global action to address climate change in the context of sustainable development goals (SDGs): The WMO-UNFCCC proposal

Context:

In the present format of sustainable development goals (SDGs), addressing the problem of climate change is covered by **Goal 13 “Take urgent action to combat climate change and its impacts”**, with the particular note **“Acknowledging that the UNFCCC is the primary international, intergovernmental forum for negotiating the global response to climate change”**.

The negotiations under the UNFCCC are currently ongoing, with the expectation that a major new agreement would be concluded in December 2015 at the annual UNFCCC conference. The uncertainty about the content of that agreement represents a challenge for developing SDG indicators relating to climate change. Still, based on the nature of the UNFCCC process since 1994 and the experience from the follow-up on the Millennium Development Goals (MDGs), some suggestions can be formulated. One can expect that it will be more difficult to define target values than the indicators as such.

It is appropriate to recall that in accordance with Article 2 of the UNFCCC **“The ultimate objective of this Convention ... is to achieve ... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”**.

Methodological considerations:

It is very easy to propose dozens, or more, of various indicators relating to climate change because of the cross-cutting nature of the climate change problem and because indicators can relate to any part of the well-known chain from the sources to the impacts of the problem:

- 1) cause (anthropogenic GHG emissions) =>
- 2) impact on the atmosphere (GHG concentrations in the atmosphere) =>
- 3) impact on climate (temperature change) =>
- 4) impact on bio-systems (many, with varying vulnerability) =>
- 5) actions to reduce GHG emissions & actions to adapt to the impacts of climate change

Much work has been already conducted to define various climate change indicators and the main challenge may be not to design new indicators but rather to select and refine those that would be best in fitting the purposes of the SDG process while remaining measurable and practical; this challenge is serious.

Another challenge is to distinguish between indicators required to monitor the issue at the global level (they cannot be too many) and the indicators that could be used to analyze the problem from various angles (these can be very many and would depend on the purpose of the analysis).

Finally, it is useful to note a difference between two types of indicators: indicators measuring the “status” of global climate and indicators measuring the “action” to address climate change. Both are important and should be part of the SDG framework: measuring the “state” without measuring “action” would not allow seeing what is actually being done; measuring the “action” without measuring “state” would not allow seeing if the action taken makes an impact.

1. Proposed indicators

The proposal below has been formulated jointly by the secretariats of the WMO and UNFCCC. It is based not only on the views of these two organizations but also on the suggestions received from the following organizations: ITU, UNDP, UNECA, UNICEF, UNFF, UN Women, UNOCHA, the World Bank group, and WHO. It is understood that the selection of indicators from those suggestions was made by the WMO and UNFCCC without prejudging the final outcome of the indicator selection process where proposals from all organizations should be considered.

	Type of indicator (status / action)	Comments
Goal 13 "Take urgent action to combat climate change and its impacts"		
Indicator CC-1: Global annual CO2 emissions: net amount of anthropogenic CO2 emissions emitted annually as a result of human activities	Status	Used in MDG process
Indicator CC-2: Annual global CO2 emissions per unit of economic activity: global CO2 emissions divided by the global economic output (global gross domestic product (GDP))	Status	Used in MDG process
Indicator CC-3: Average global concentrations of GHGs in the atmosphere	Status	Directly linked to UNFCCC's ultimate objective
Goal 13, target 13.1 "Strengthen resilience and adaptive capacity to climate related hazards and natural disasters in all countries"		
Indicator CC-4: # of countries that report having progressed from a perceived low to an intermediate or from an intermediate to a high level of adaptive capacity in relation to a two-degree world	Action	
Indicator CC-5: # of casualties and amount of economic losses	Status	
Indicator CC-6: % of exposed people and assets affected in 2030	Status	
Goal 13, target 13.2 "Integrate climate change measures into national policies, strategies, and planning"		
Indicator CC-7: # of countries which have formally communicated the establishment of integrated low-carbon, climate-resilient, disaster risk reduction development strategies (e.g. a national adaptation plan process)	Action	
Goal 13, target 13.3 "Improve education, awareness raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning"		
Indicator CC-8: # of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula	Action	
Indicator CC-9: % of population with increased knowledge on climate change, disaggregated by sex and age	Status	
Goal 13, target 13.a "Implement the commitment undertaken by developed country Parties to the UNFCCC to a goal of mobilizing jointly USD100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible"		
Indicator CC-10: Mobilized amount of USD per year starting in 2020 accountable towards the USD 100 billion commitment	Action	Linked to already existing UNFCCC decision
Indicator CC-11: % of GCF funded projects finalized and sustained afterwards through national funding to produce climate neutral solutions	Action	
Goal 13, target 13.b "Promote mechanisms for raising capacities for effective climate change related planning and management, in LDCs, including focusing on women, youth, local and marginalized communities"		
Indicator CC-12: # of LDCs that are receiving specialized support for mechanisms for raising capacities for effective climate change related planning and management, including focusing on women, youth, local and marginalized communities	Action	

* Acknowledging that the UNFCCC is the primary international, intergovernmental forum for negotiating the global response to climate change

2. Tentative “methodology sheets” for some indicators

For the SDG monitoring process to function, it is important to ensure that each indicator is well defined, is relevant to the related SDG goal or target, is sound methodologically, can be measured and/or calculated and is understandable to all stakeholders. The three sub-sections below try to assess, for 3 selected indicators, their measurability and practicality in this sense. This should be understood as an example rather than a comprehensive presentation of the indicators.

2a. Indicator CC-1: Global annual CO₂ emissions

Definition: The indicator is the net amount of anthropogenic CO₂ emissions emitted as a result of human activities.

Relevance: CO₂ is the main greenhouse gas (GHG) and CO₂ emissions are the main driver of the changes of GHG concentrations in the atmosphere and, subsequently, of anthropogenic climate change.

Methodological soundness: Clear methodological guidance on the calculation of this indicator is available from the work of the Intergovernmental Panel on Climate Change; the robustness of that guidance has been tested for many years during the implementation of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol.

Measurability: This indicator is not directly measurable; it has to be calculated using the methodological guidance noted above. Note that this indicator was part of the monitoring framework for the Millennium Development Goals (MDGs) and thus measurability/monitoring experience is available. The indicative sources of data are the UNFCCC secretariat, the International Energy Agency (IEA), the Food and Agriculture Organization (FAO) and the Carbon Dioxide Information and Analysis Center (CDIAC) in the United States of America; other organizations may be considered as well.

Ease to understand and communicate: The term “global CO₂ (or “carbon”) emissions” has been widely used for years, at all levels ranging from experts to policy makers, media representatives and the general public. It is easy to understand and communicate.

Possible problematic or discussion points:

- a) One can argue whether one should include or exclude other GHGs, like methane (CH₄) or nitrous oxide (N₂O), into monitoring. This would be relevant and generally possible, but would complicate the calculations, making the monitoring less practical, and would also increase the degree of uncertainty (the data for these gases are less accurate than those for CO₂).
- b) Similarly, one can discuss whether to include the emissions/removals from land use, land-use change and forestry (LULUCF) into the definition of the indicator. The inclusion would, generally, make the indicator more relevant, but the main problem is availability of such data, in particular in developing countries; where the data are available, their accuracy can be often questioned. Thus, a trade-off needs to be considered between the comprehensiveness and the practicability of the indicator.
- c) Full national CO₂ data for most developed countries are available in regular time series from 1990 as part of reporting under the UNFCCC. However, complete data series for many developing countries are not available nationally and have to be assessed at the international level; this situation is likely to continue, despite the recent changes in reporting requirements under the UNFCCC.
- d) There is usually a two-year delay in the calculation of this indicator; making this period shorter would not be easy, given the related data requirements.

2b. Indicator CC-2: Annual global CO₂ emissions per unit of economic activity

Definition: The indicator is calculated as annual global CO₂ emissions divided by the annual global economic output (global gross domestic product (GDP)).

Relevance: This indicator would measure the degree of human action to sever the link between economic growth and greenhouse gas emissions; this link has to be severed to enable a long-term solution to the climate change problem.

Methodological soundness: Adequate methodological guidance for CO₂ emissions is available (see indicator CC-1). Methodological guidance relating to GDP data and the calculation of comparable GDP values across countries is also available, first of all from the relevant work of the World Bank.

Measurability: For CO₂ emissions, see indicator CC-1. For GDP data, the World Bank supports long time series of GDP data for most world countries, including in the “international units” allowing cross-country aggregations and comparisons. Note that this indicator was part of the monitoring framework for the Millennium Development Goals (MDGs) and thus measurability/monitoring experience is available. The indicative sources of GDP data are the World Bank and the International Energy Agency (IEA).

Ease to understand and communicate: The term “CO₂ per dollar” is likely to be understood and communicated easily.

Possible problematic or discussion points:

- a) The discussion points on the CC-1 indicator are applicable.
- b) The comparability of GDPs across countries is likely to be raised as a weak point of this indicator.
- c) Somewhat on the scope of this specific indicator: the MDG framework used also the CO₂/capita indicator. This indicator may or may not be applicable to the SDG framework: an argument against would be that this indicator may relate more to the “equity” in the anthropogenic influence on climate change than to the global climate change per se; an argument for would be that CO₂/capita values differ very much across the world and having that picture monitored could be useful; both arguments are valid (and more arguments for both sides are possible).

2c. Average global concentrations of GHGs in the atmosphere

Definition: The indicator is the average concentration of GHGs in the atmosphere based on results of measurements at meteorological stations across the world.

Relevance: This indicator would measure the changes in the atmosphere as the global system that is most directly affected by the anthropogenic GHG emissions and, at the same time, directly affects the capability of the Earth to retain the energy received from the sun. It is possible to compare the current GHG concentrations with the “pre-industrial level” of those concentrations.

Methodological soundness: The indicator is measurable, with the global dimension requiring aggregation; the related methodological considerations are available, with the national meteorological organizations and with the World Meteorological Organization (WMO). Values for the “pre-industrial level” of GHG concentrations have been estimated and are available.

Measurability: Concentrations of GHGs in the atmosphere are monitored by the WMO and the results are published annually by WMO. The likely best source of data would be WMO.

Ease to understand and communicate: The WMO has been communicating the results of the observations of GHG concentrations for years; this has been successful.

Possible problematic or discussion points:

- a) If this indicator uses all GHGs whereas others (see above) use only CO₂ emissions, there will be a methodological inconsistency between the indicators (although it is questionable if that inconsistency has practical implications).
- b) One could possibly discuss the best periodicity of measurement and dissemination for this indicator: annual, monthly, weekly?
- c) One could argue if, instead of concentrations, one could use an increase in global temperature compared to the pre-industrial level as an indicator.