Training Workshop: Preparation and Reporting of Results of National GHG Inventories under the ETF of the Paris Agreement

Kigali, Rwanda 25-27 June 2024

Cross sectorial issues: methodologies, parameters, and data; key category analysis; time-series consistency and recalculations; uncertainty assessment; assessment of completeness and notation keys

Sekai Ngarize
Climate Transparency and Forestry Advisor
sngarize47@gmail.com

Supported by:
on the basis of a decision by the German Bundestag

Provisions of MPGs

I. National inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases

- A. Definitions (17)
- B. National circumstances and institutional arrangements (18-19)
- C. Methods
  1. Methodologies, parameters and data (20-24)
  2. Key category analysis (25)
  3. Time-series consistency and recalculations (26-28)
  4. Uncertainty assessment (29)
  5. Assessment of completeness (30-33)
  6. Quality assurance/quality control (34-36)
- D. Metrics (37)
- E. Reporting guidance (38)
  1. Information on methods and cross-cutting elements (39-46)
  2. Sectors and gases (47-56)
  3. Time series (57-58)

Definitions

Para 17. The definitions used for the principles of inventories **shall** be the definitions provided for in the 2006 IPCC Guidelines, Volume 1, Chapter 1, Section 1.4

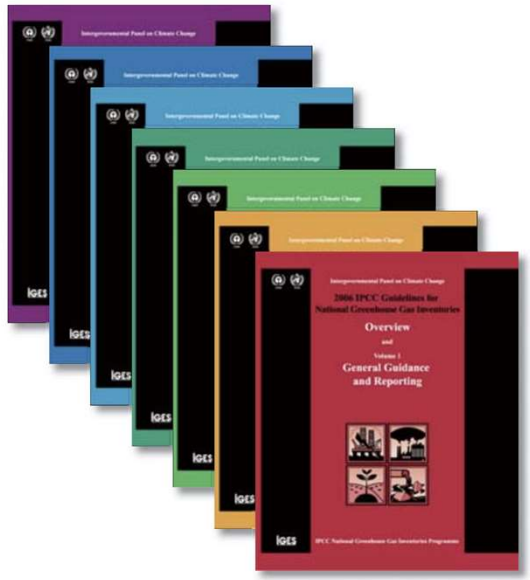
Transparency	**There should be clear and sufficient documentation to enable individuals or groups other than the inventors to understand how the inventory was produced.**
Completeness	Estimates should be declared for all relevant source and sink categories, and GHGs, across the country's entire territorial coverage.
Consistency	Estimates for different years, gases and categories should be made in such a way that differences between years and categories reflect actual differences in the emissions balance and should reflect actual annual fluctuations in emissions or removals, without being subject to changes resulting from methodological differences.
Comparability	Inventory should be reported in a way that allows comparison with inventories for other countries.
Accuracy	should not contain excessive or insufficient estimates, to the extent that it can be judged. This means investing all the effort needed to eliminate bias in estimates.

Provisions of MPGs

I. National inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases

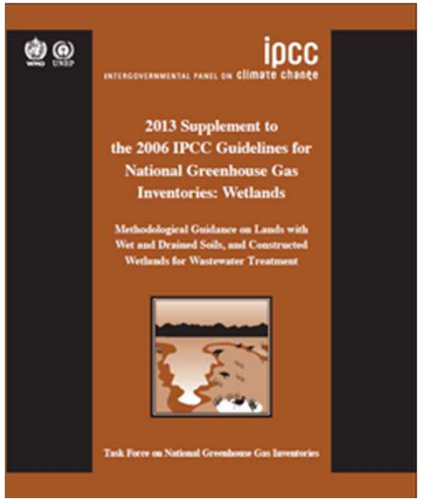
- A. Definitions (17)
- B. National circumstances and institutional arrangements (18-19)
- C. Methods
  1. Methodologies, parameters and data (20-24)
  2. Key category analysis (25)
  3. Time-series consistency and recalculations (26-28)
  4. Uncertainty assessment (29)
  5. Assessment of completeness (30-33)
  6. Quality assurance/quality control (34-36)
- D. Metrics (37)
- E. Reporting guidance (38)
  1. Information on methods and cross-cutting elements (39-46)
  2. Sectors and gases (47-56)
  3. Time series (57-58)

Methodologies, parameters and data



Para 20. Each Party **shall** use *the **2006 IPCC Guidelines*** and any subsequent versions or refinements of the guidelines approved by the COP/HR.

Each Party is **encouraged** to use the *2013 Supplement to the 2006 IPCC Wetlands Guidelines*.



Methodologies, parameters and data

Para 21. Each Party **shall** use **methods from** the IPCC guidelines […].

Each Party **should** make every effort to use a **recommended method (tiers)** for the main categories according to the IPCC guidelines.

The equation for the Tier 1 method for estimating CH_4 and N_2O from road vehicles may be expressed as:

EQUATION 3.2.3
TIER 1 EMISSIONS OF CH_4 AND N_2O

$$Emission = \sum_{a} [Fuel_a \bullet EF_a]$$

Where:

Emissions = emission in kg
EF_a = emission factor (kg/TJ)
$Fuel_a$ = fuel consumed, (TJ) (as represe
a = fuel type a (e.g., diesel, gasoline

The emission equation for Tier 2 is:

EQUATION 3.2.4
TIER 2 EMISSIONS OF CH_4 AND N_2O

$$Emission = \sum_{a,b,c} [Fuel_{a,b,c} \bullet EF_{a,b,c}]$$

Where:

Emission = emission in kg.
$EF_{a,b,c}$ = emission factor (kg/TJ)
$Fuel_{a,b,c}$ = fuel consumed (TJ) (as represented by fuel sold) for a give
a = fuel type (e.g., diesel, gasoline, natural gas, LPG)
b = vehicle type
c = emission control technology (such as uncontrolled, catalyt

The emission equation for Tier 3 is:

EQUATION 3.2.5
TIER 3 EMISSIONS OF CH_4 AND N_2O

$$Emission = \sum_{a,b,c,d} [Distance_{a,b,c,d} \bullet EF_{a,b,c,d}] + \sum_{a,b,c,d} C_{a,b,c,d}$$

Where:

Emission = emission or CH_4 or N_2O (kg)
$EF_{a,b,c,d}$ = emission factor (kg/km)
$Distance_{a,b,c,d}$ = distance travelled (VKT) during thermally stabilized engine operation phase for a given mobile source activity (km)
$C_{a,b,c,d}$ = emissions during warm-up phase (cold start) (kg)
a = fuel type (e.g., diesel, gasoline, natural gas, LPG)
b = vehicle type
c = emission control technology (such as uncontrolled, catalytic converter, etc.)
d = operating conditions (e.g., urban or rural road type, climate, or other environmental factors)

Methodologies, parameters and data

Para 22. Each Party **may use nationally appropriate methodologies** if these better reflect national circumstances and conform to IPCC guidelines.

- In such cases, each Party **shall** transparently explain the selected national parameters, data or methods.

Methodologies, parameters and data

Para 23. If, due to a lack of resources, a Party is unable to adopt a higher-level approach for a particular principal category, the Party concerned **may use a tier 1 approach**.

In that case, the reason why the methodological choice did not respect the relevant decision tree of the IPCC guidelines shall be clearly documented.

For future improvements, the Party should prioritise those main categories where the good practice approach developed in the IPCC guidelines cannot be used.

Methodologies, parameters and data

Para 24. Each Party is encouraged to use country-specific emission factors and activity data, if available, or to propose plans to develop them, in accordance with good practice as described in the IPCC guidelines.

Analysis of key categories

Para 25. Each Party **shall** identify key categories for the first and last year for which it reports, as provided for in Chapter II.E.3, including and excluding LULUCF categories, using approach 1, for both the level and trend assessment, by conducting an analysis of key categories in accordance with the IPCC guidelines.

Flexibility: Parties […] will be able to identify their key categories using a threshold of not less than 85% instead of the 95% threshold in the IPCC guidelines, allowing them to focus on improving fewer categories and prioritising their resources.

Time series consistency and recalculations

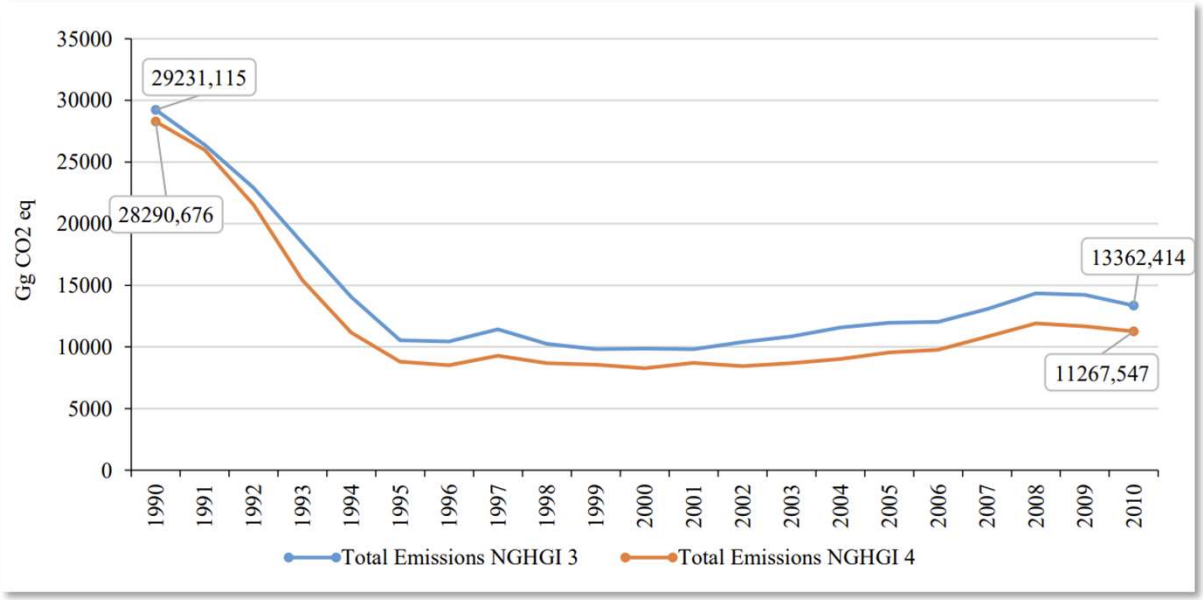
Para 26. In order to **ensure the consistency of the time series**, each Party **should** use the same methods and a consistent approach for activity data and emission factors used for each reporting year.

Para 27. To the same end, each Party **should** use surrogate data, extrapolation, interpolation and other methods consistent with the **splicing techniques** contained in the IPCC guidelines, in order to estimate missing emission values resulting from a lack of activity data, emission factors and other parameters.

Time series consistency and recalculations

Para 28. Each Party **shall** perform its **recalculations** in accordance with IPCC guidelines, ensuring that changes in emission trends are not introduced as a result of changes in methods or assumptions across the time series.

Figure 9.1 The difference in the assessments of the 3rd and 4th NGHGIs of the total GHG emissions of Kyrgyzstan in the period 1990-2010[25]



Assessment of uncertainty

29. Each Party **shall quantitatively estimate and qualitatively discuss the uncertainty** of estimates of emissions and removals for all categories, including inventory totals, at least for the first and last year of the time series referred to in paragraphs 57 and 58.

Each Party **shall** also estimate the **trend uncertainty of emission and removals** estimates for all categories, including totals, between the start year and the last year of the time series, using at least method 1 as stipulated in the IPCC guidelines.

Flexibility: Parties **may** submit, at a minimum, a qualitative uncertainty analysis of the main categories, using the IPCC guidelines, where quantitative input data are not available to quantitatively estimate the uncertainties; they are encouraged to submit a quantitative uncertainty estimate for all inventory categories.

Assessment of completeness

Para 30. Each Party **should** indicate the sources and sinks (categories, pools and gases) **that are not considered** in the national inventory report even though the IPCC guidelines contain methods for doing so, and explain the reasons why they have not been taken into account.

Assessment of completeness

Para 31. When completing CRTs, each Party **shall** use **notation keys** when numerical data are not available, indicating the reasons why information on emissions and removals and related data for specific sectors, categories, subcategories or gases is not reported.

Assessment of completeness

Para 31. These notation keys include:

Notation Key	Definition	Explanation
NE	Not estimated	Emissions and/or removals occur but have not been estimated or reported, but for which a corresponding activity may occur within a Party.
IE	Included elsewhere	Emissions and/or removals for this activity or category are estimated and included in the inventory but not presented separately for this category. The category where these emissions and removals are included should be indicated (for example in the documentation box in the correspondent table).
C	Confidential information	Emissions and/or removals are aggregated and included elsewhere in the inventory because reporting at a disaggregated level could lead to the disclosure of confidential information
NA	Not applicable	The activity or category exists but relevant emissions and removals are considered never to occur. Such cells are normally shaded in the reporting tables.
NO	Not occurring	An activity or process does not exist within a country.

Assessment of completeness

Para 32. Each Party **may** use "NE" when the level of the estimates is **insignificant**.

- Emissions from one category should be considered insignificant only when the likely level is less than 0.05 % of the national total excluding LULUCF or 500 kt CO_2 eq, if this amount is lower.

The aggregate national total of estimated emissions for all gases of the categories considered negligible **shall** remain below 0,1 % of the national total excluding LULUCF.

- Parties should use approximate IPCC activity data and emission factors by default in order to obtain a likely level of emissions for the category concerned.

Flexibility: Parties may consider negligible emissions which are likely to be less than 0.1% of the national total excluding LULUCF or 1,000 kt CO_2 eq, whichever is the lower. In this case, the aggregate national total of estimated emissions for all gases of the categories considered negligible shall be less than 0.2% of the national total excluding LULUCF.

Assessment of completeness

Para 33. Once emissions or removals have been estimated for a category and if they continue to occur, each Party **shall** report them in subsequent submissions.

QA/QC Plan

34. Each Party shall elaborate an inventory QA/QC plan in accordance with the IPCC guidelines referred to in paragraph 20 above, including information on the inventory agency responsible for implementing QA/QC.

- Those developing country Parties that need flexibility in the light of their capacities with respect to this provision are instead encouraged to elaborate an inventory QA/QC plan in accordance with the IPCC guidelines referred to in paragraph 20 above, including information on the inventory agency responsible for implementing QA/QC.

35. Each Party shall implement and provide information on general inventory QC procedures in accordance with its QA/QC plan and the IPCC guidelines referred to in paragraph 20 above;

- Those developing country Parties that need flexibility in the light of their capacities with respect to this provision are instead encouraged to implement and provide information on general inventory QC procedures in accordance with its QA/QC plan and the IPCC guidelines referred to in paragraph 20 above.
- In addition, Parties should apply category-specific QC procedures in accordance with the IPCC guidelines referred to in paragraph 20 above for key categories and for those individual categories in which significant methodological changes and/or data revisions have occurred.
- In addition, Parties should implement QA procedures by conducting a basic expert peer review of their inventories in accordance with the IPCC guidelines referred to in paragraph 20 above.

Metrics

37. Each Party shall use the 100-year time-horizon global warming potential (GWP) values from the IPCC Fifth Assessment Report, or 100-year time-horizon GWP values from a subsequent IPCC assessment report as agreed upon by the CMA, to report aggregate emissions and removals of GHGs, expressed in CO2 eq.

- Each Party may in addition also use other metrics (e.g. global temperature potential) to report supplemental information on aggregate emissions and removals of GHGs, expressed in CO2 eq.

- In such cases, the Party shall provide in the national inventory document information on the values of the metrics used and the IPCC assessment report they were sourced from.

Metrics

The Global Warming Potential (GWP) was introduced in the IPCC First Assessment Report, where it was also used to illustrate the difficulties in comparing components with differing physical properties using a single metric.

The 100-year GWP (GWP100) was adopted by the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol and is now used widely as the default metric.

Global warming potential (GWP) values relative to CO2

Industrial designation or common name	Chemical formula	GWP values for 100-year time horizon		
		Second Assessment Report (SAR)	Fourth Assessment Report (AR4)	Fifth Assessment Report (AR5)
Carbon dioxide	CO_2	1	1	1
Methane	CH_4	21	25	28
Nitrous oxide	N_2O	310	298	265

Source: IPCC AR5, Greenhouse Gas Protocol

CBIT-GSP
CLIMATE TRANSPARENCY

Partnership on Transparency
in the Paris Agreement

Thank you for your attention!

gef

UN environment programme | copenhagen climate centre

UN environment programme

Supported by:
Federal Ministry for Economic Affairs and Climate Action
Federal Foreign Office
on the basis of a decision by the German Bundestag

IKI INTERNATIONAL CLIMATE INITIATIVE

REMA
OUR ENVIRONMENT OUR FUTURE