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CLIMATE TRANSPARENCY



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# Kenya training on the preparation of national GHG inventories under the ETF of the Paris Agreement: introductory webinar

Part 1: 08 March 2024

**Presentation:**  
The Greenhouse Gas Inventory Process

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# What is a greenhouse gas inventory?

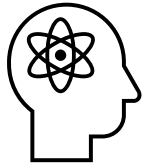
- Quantifications of the GHGs emitted into and removed from the atmosphere over a given territory in amounts per unit of time (e.g. per day or year).
- GHG inventories generally specify:
  - The chemical identity of the GHG concerned;
  - The geographic area covered;
  - The time over which the emissions and removals are estimated;
  - The sectors and activities that cause the emissions and removals.

# What is the Purpose of a greenhouse gas inventory?

Purpose:

- To quantify and understand the sources and sinks of GHGs, providing a comprehensive snapshot of a region's or country's contribution to climate change.

# Why do we need a GHG Inventory?



Gain scientific understanding



understand the link between environmental pollution and its effects



Formulate policy & implementation



Identify the sectors, sources and activities responsible for emissions



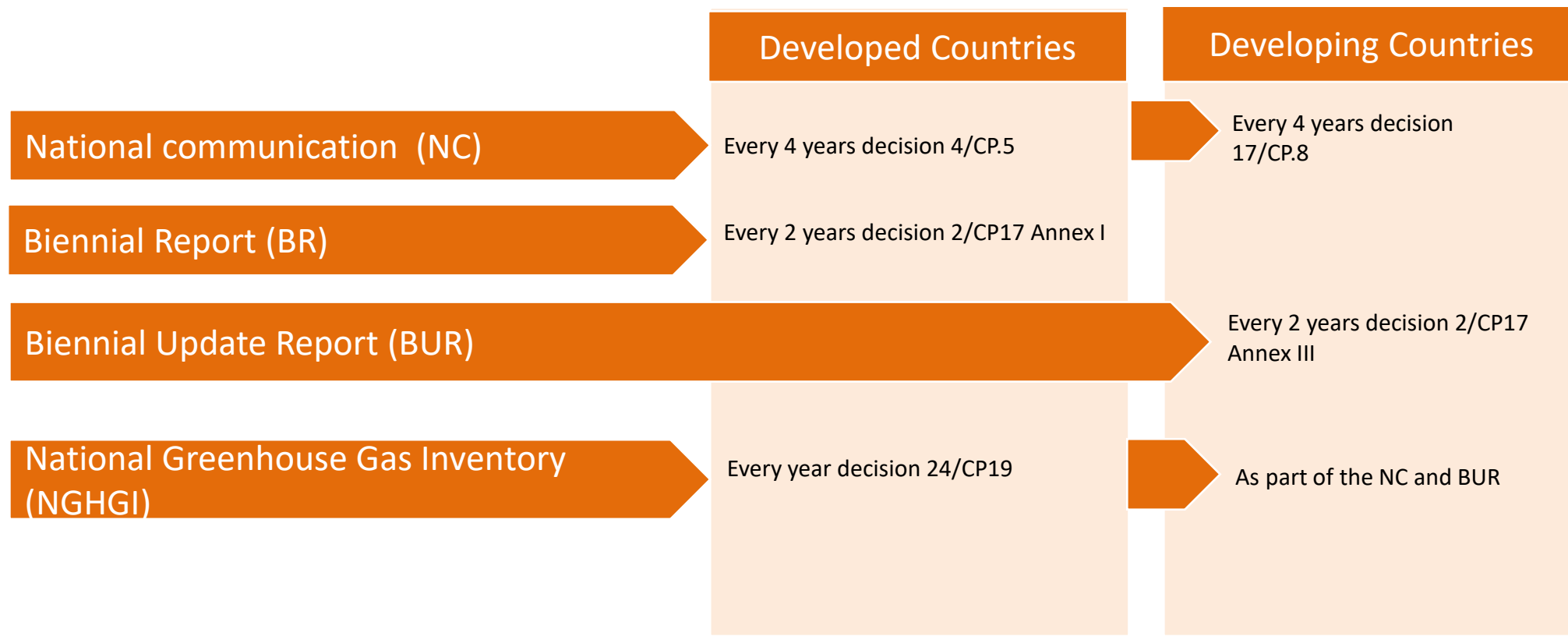
Help develop cost effective mitigation policies



Monitor progress towards policy goals

# Reporting on National Greenhouse Gas Inventory

- Under the UNFCCC, Parties are required to report information on the national anthropogenic GHG emissions and removals, as well as steps taken to address climate change and on results achieved.
- Article 4 and Article 12 of the Convention and recent COP decisions specify the national reports that must be submitted by Parties, their time frequency and also provide guidelines on how to prepare these reports.



# Reporting on National Greenhouse Gas Inventory

- The Enhanced Transparency Framework (ETF) was established through the Paris Agreement
- The ETF builds on the existing reporting processes of the Convention

The Biennial Transparency Report (BTR) was introduced for both Developed and Developing countries. From 2024 it will replace the Biennial Reports and Biennial update reports



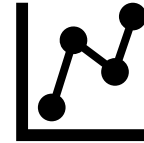
Submission of the four yearly NC remains unchanged, but in years where both are due, **the NC and BTR may be combined into a single report**, with supplemental chapters provided to include information unique to the NCs

# National Greenhouse Gas Inventory (NGHGI)

- **Measurements of all emissions and removals of greenhouse gases** from given **sources or sinks** in a country over a specific period of time.
- **Compilation of all background information** including:

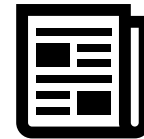


**Description of the inventory**  
**Geographic boundary and time period**



## **Data on Emissions**

- Greenhouse gases (GHG)
- GHG emission sources
- GHG emission by category



## **Information on Methodologies and Data Quality**

- Methodologies used to calculate or measure emissions
- An assessment of data quality for activity data and emission factors used

# What sectors are reported?

Industrial Process and Product Use (IPPU)

Energy

Waste

Agriculture

Land Use, Land Use Change and Forestry



These two sectors are simply referred to as Agriculture, Forestry and Other Land Use (AFOLU) and are estimated using these name in the IPCC 2006 Guidelines



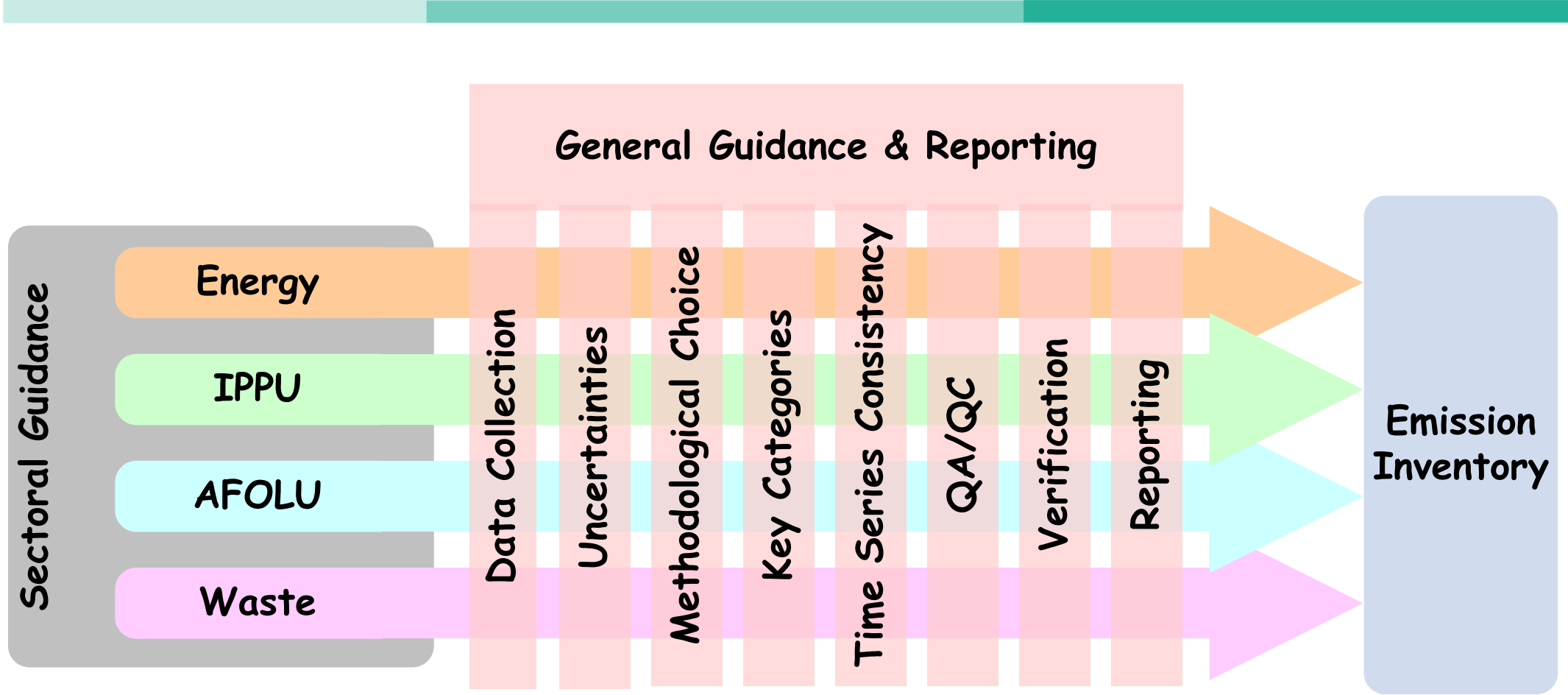
# Methodologies for Estimating GHG Inventories

- In the context of the ETF inventories submitted by Parties as part of their BTRs must meet the requirements established by the MPGs.
- According to the UNFCCC reporting guidelines and the MPGs, the methods to estimate GHG emissions and removals shall be those of the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for national GHG inventories, but Parties may use the IPCC 2019 Refinement to the 2006 IPCC Guidelines on a voluntary basis (Decision 5/CMA.3).
- The 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines) provide methodologies for estimating national inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases.



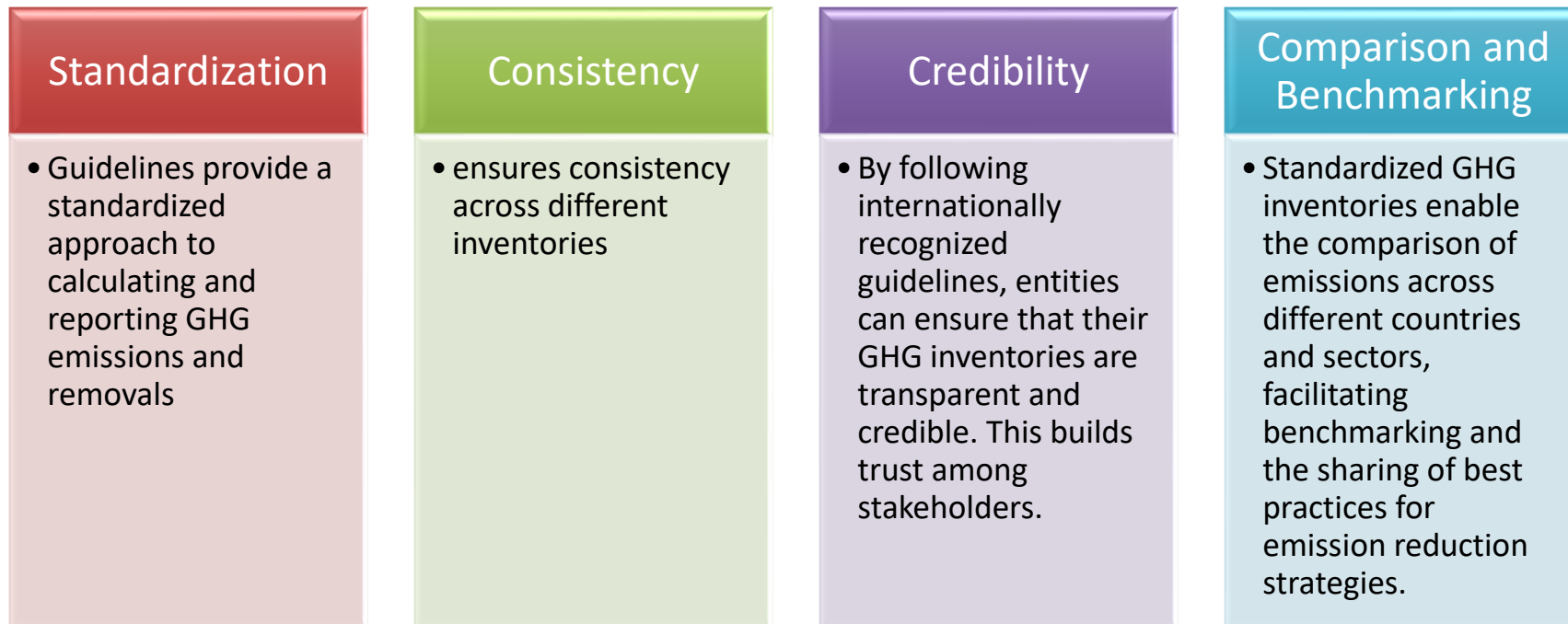
There are **five volumes** of the 2006 guidelines:

- 1 General Guidance and Reporting
- 2 Energy
- 3 Industrial Processes and Product Use
- 4 Agriculture, Forestry and Other Land Use
- 5 Waste



# Why do we need inventory guidelines?

- Currently, most national emissions can only be estimated, not measured and so we need a consensus on the best way of doing this.



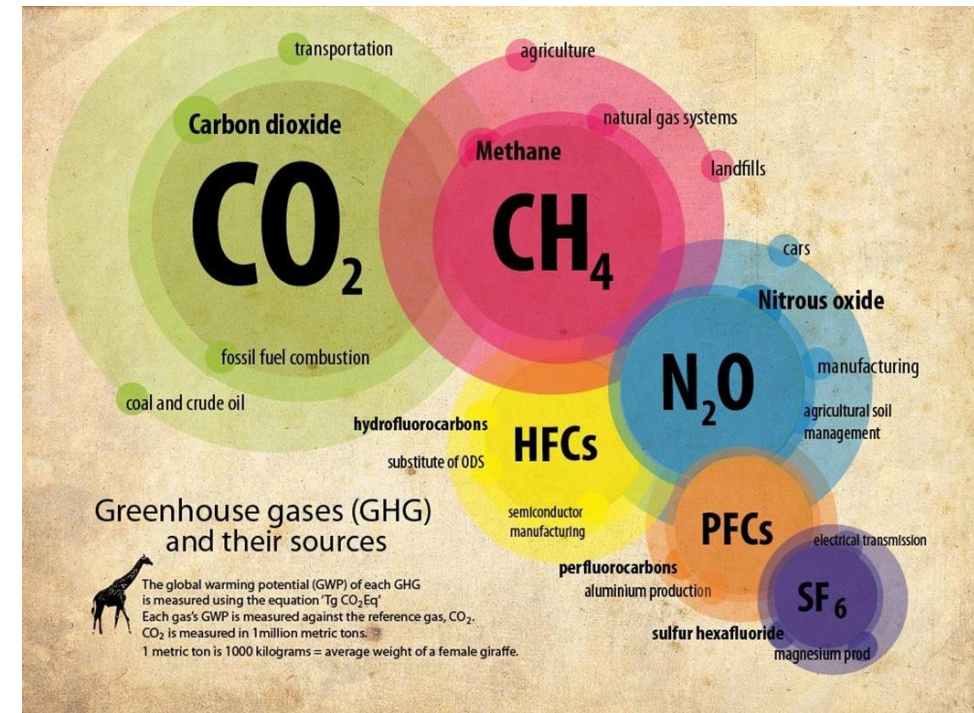
# Greenhouse gas covered in the IPCC Guidelines

The IPCC Guidelines cover a range of significant greenhouse gases that contribute to climate change.

- Carbon dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous oxide (N<sub>2</sub>O)
- Hydrofluorocarbons (HFCs) Perfluorocarbons (PFCs) Sulphur hexafluoride (SF<sub>6</sub>) Nitrogen trifluoride (NF<sub>3</sub>) Trifluoromethyl Sulphur pentafluoride (SF<sub>5</sub>CF<sub>3</sub>) Halogenated ethers (e.g., C<sub>4</sub>F<sub>9</sub>OC<sub>2</sub>H<sub>5</sub>, CHF<sub>2</sub>OCF<sub>2</sub>OC<sub>2</sub>F<sub>4</sub>OCHF<sub>2</sub>, CHF<sub>2</sub>OCF<sub>2</sub>OCHF<sub>2</sub>)
- Other halocarbons not covered by the Montreal Protocol including CF<sub>3</sub>I, CH<sub>2</sub>Br<sub>2</sub>, CHCl<sub>3</sub>, CH<sub>3</sub>Cl, CH<sub>2</sub>Cl<sub>2</sub>.

## Global Warming Potentials (GWPs)

- Each covered gas has an associated GWP, indicating its relative impact on global warming compared to CO<sub>2</sub>.



# How are emissions estimated?

- Make estimates based on parameters associated with emission rates
  - CO2 from fuel depends on carbon in fuel
  - CO2 proportional to amount of fuel burnt
  - Changes on stocks of carbon in forests give emissions (or removals) of CO2

$$E = EF \cdot AD$$

Where:

- E = Emission
- EF = Emission Factor
- AD = Activity Data

# Key Principles for GHG Inventory compilation

The **TACCC** Principles represent the **quality criteria** that guides the work of GHG Inventory compilers

1

## TRANSPARENCY

The **data sources, assumptions and methodologies** used for each estimate are **clearly explained and documented**

2

## ACCURACY

The estimates are not **underestimated** nor **overestimated**.

3

## CONSISTENCY

Estimates are **calculated using the same methodology** and **consistent datasets** for **all years** of the inventory time series

4

## COMPLETENESS

An estimated category has **full geographical and temporal coverage** and that the GHG flux is estimated for all inventory categories

5

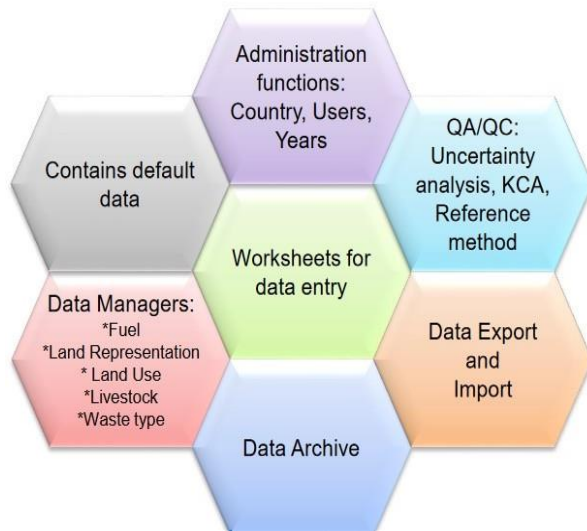
## COMPARABILITY

Estimates in **different countries** are **comparable** having been prepared according to the **IPCC guidelines**

# IPCC Inventory Software

- National GHG Inventory can be prepared by using IPCC Software or web based national GHG inventory tools or calculation worksheets manually

## Architecture



The screenshot displays the IPCC Inventory Software interface. The left pane shows a tree view of 2006 IPCC Categories, with '1.B.1.a.i.1 - Mining' selected. The right pane shows the 'Coal production from underground mines' worksheet for the year 2020. The worksheet includes a table for data entry:

Equation 4.1.3	
Subdivision	Amount of Coal Produced (tonne)
S	CP
Total	0

# IPCC Inventory Software

- IPCC Inventory Software was first released in 2012. Initially, it was designed to be a simple tool implementing only Tier 1 methods according to the 2006 IPCC Guidelines
- **The latest version, 2.89, has been released on November 28, 2023, for UNFCCC COP28**
  - All Methodological Tiers and approaches according to the 2006 IPCC Guidelines,
  - Calculation of Indirect CO<sub>2</sub> and N<sub>2</sub>O emissions according to the 2006 IPCC Guidelines and its 2019 Refinement
  - Interoperability functionality with the UNFCCC CRT Reporting tool (Energy Sector, Waste sector, Agriculture categories)



# Importance of Data in GHG Inventories

Data collection is an integral part of developing and updating a GHG inventory

Formalised data collection activities should be established, adapted to national circumstances and reviewed periodically as part of implementing *good practice*

Data collection procedures are necessary for finding and processing existing data, as well as for generating new data by surveys or measurement campaigns

Data collection should cover values and their uncertainties

# Possible sources of country-specific data

## National

- National statistics Agencies
- Sectoral experts, stakeholder organisations
- Other national experts
- Reference libraries (National Libraries)
- National Inventory Reports from Parties to the United Nations Framework Convention on Climate Change

## International

- IPCC Emission Factor Database (EFDB)
- International organisations publishing statistics e.g., United Nations, Eurostat or the International Energy Agency, OECD, FAO and the IMF (which maintains international activity as well as economic data)
- Other international experts

## Other

- Scientific and technical articles in environmental books, journals and reports
- Universities
- Web search for organisations & specialists

# Importance of Data in GHG Inventories

- Data plays a crucial role in the compilation of Greenhouse Gas (GHG) inventories
  - Quality data ensures the accuracy and reliability of GHG inventories.
  - Detailed GHG data helps identify specific sources of emissions within sectors, enabling targeted mitigation strategies.
  - Data enables the tracking of emissions over time,

# Thank you for your attention!

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