

Climate MRV for Africa – Phase 2 Development of National GHG Inventory: Introduction To Methodology For GHG Inventories – IPCC 2006 Guidelines



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Project of the European Commission DG Climate Action

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Team Leader and Key Experts

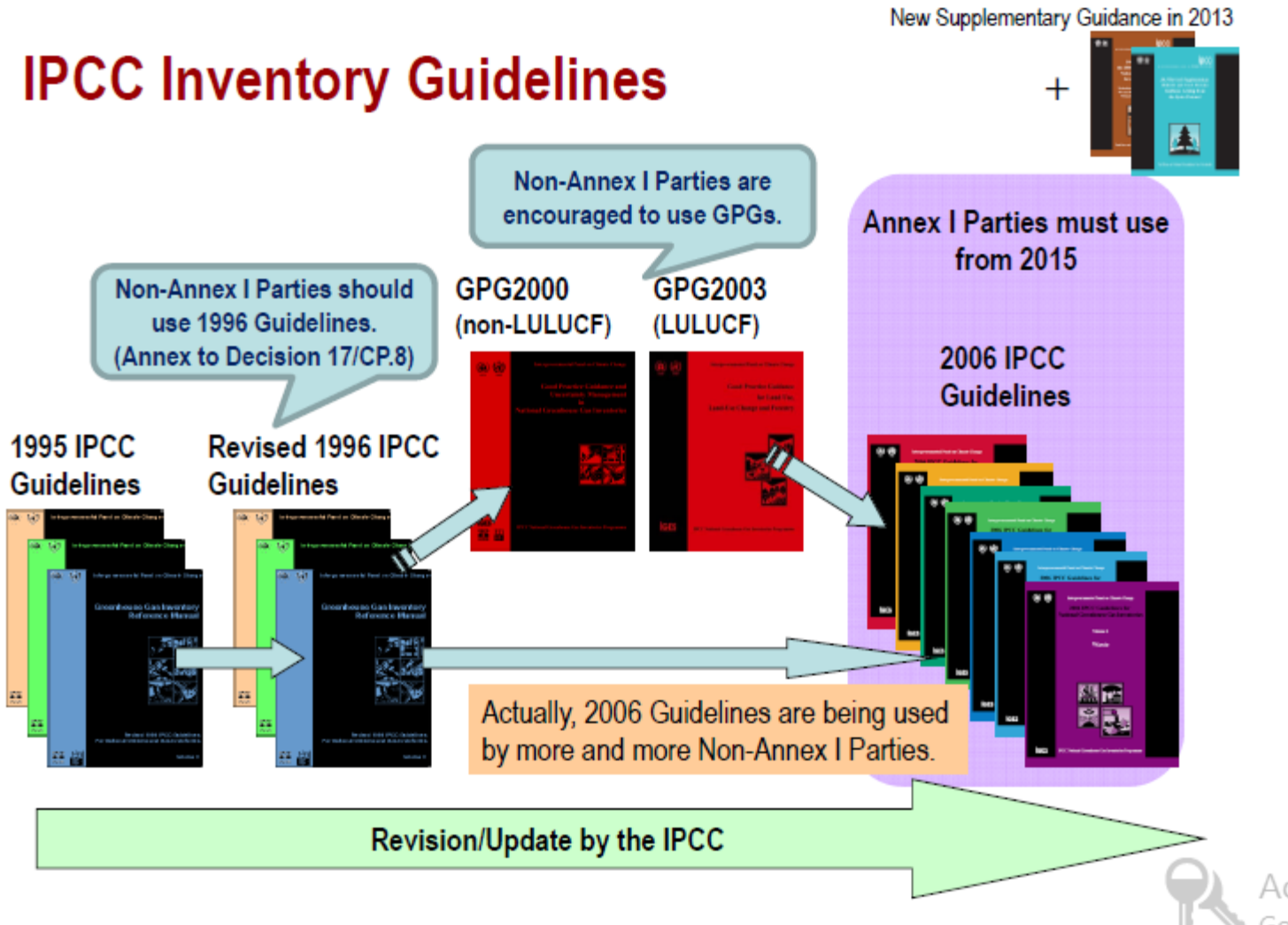
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Agenda

- Overview of Guidelines
- What are the changes between the 1996 and 2006 IPCC Guidelines?
- GHG Inventory – Elements, Principles, Cycles

IPCC Guidelines Development

IPCC Inventory Guidelines



- Refinement of 2006 guidelines will be ready in 2019

Source: IPCC

IPCC Revised 1996 Guidelines



Volume 1: the reporting instructions

Provides directions for assembling, documenting and transmitting completed national inventory data consistently, regardless of the method used to produce the estimates.



Volume 2: the workbook

It is intended to help experts in as many countries as possible to start developing inventories. Provides steps for developing inventories



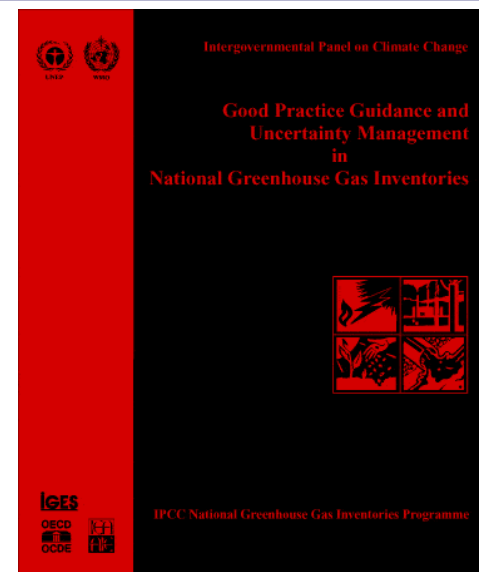
Volume 3: the reference manual

It provides summaries of the scientific basis for the inventory methods recommended and gives extensive references to the technical literature.

IPCC Good Practice Guidance (GPG)

- Provide additional guidance on:
 - Choice of estimation methodology
 - Improvements of the methods
 - Estimation of uncertainties
 - Time series consistency, QA & QC

- Assist countries in producing inventories *that contain neither over- nor underestimates so far as can be judged, and in which uncertainties are reduced as far as is practical*



IPCC 2006 Guidelines

- Update to the *Revised 1996 Guidelines* and associated *good practice guidance*
- Put into consideration the experiences from the UNFCCC technical inventory review process
- Used by countries to estimate greenhouse gas inventories to report to the UNFCCC
- Consists of 5 Volumes



[Volume 1 General Guidance and Reporting](#)



[Volume 2 Energy](#)



[Volume 3 Industrial Processes and Product Use](#)



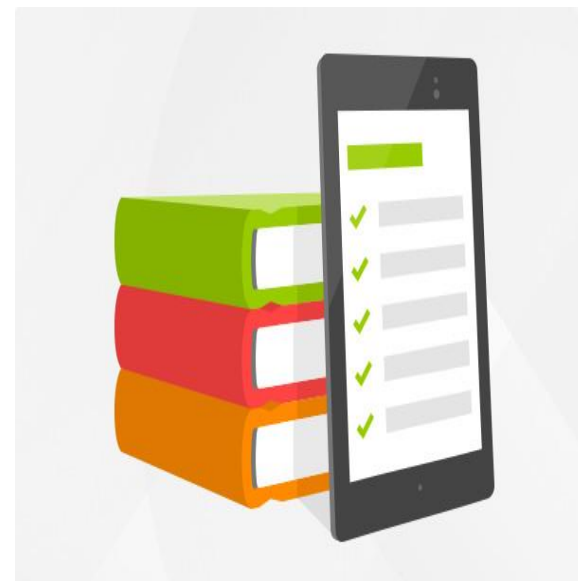
[Volume 4 Agriculture, Forestry and Other Land Use](#)



[Volume 5 Waste](#)

IPCC 2006 Guidelines – Structure

- Volumes
- Chapters
- Annexes
- Appendices
- Worksheets
- Reporting tables



IPCC 2006 Guidelines – Structure (Cont'd)

➤ Reporting Tables



Table B Short Summary Table (1 of 2)

Categories	Net CO ₂ (1) (2)	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Other halogenated gases with CO ₂ equivalent conversion factors (3)	Other halogenated gases without CO ₂ equivalent conversion factors (4)	NO _x	CO	NMVOCs	SO ₂
	(Gg)	CO ₂ equivalents (Gg)					(Gg)	(Gg)				
Total National Emissions and Removals												
1 ENERGY												
1A Fuel Combustion Activities												
1B Fugitive Emissions from Fuels												
1C Carbon Dioxide Transport and Storage												
2 INDUSTRIAL PROCESSES AND PRODUCT USE												
2A Mineral Industry												
2B Chemical Industry												
2C Metal Industry												
2D Non-Energy Products from Fuels and Solvent Use												
2E Electronics Industry												
2F Product Uses as Substitutes for Ozone Depleting Substances												
2G Other Product Manufacture and Use												
2H Other												
3 AGRICULTURE, FORESTRY AND OTHER LAND USE												
3A Livestock												
3B Land												
3C Aggregate Sources and Non-CO ₂ Emissions Sources on Land												
3D Other												
4 WASTE												
4A Solid Waste Disposal												
4B Biological Treatment of Solid Waste												

IPCC 2006 vs. 1996

- Same basic methodological approaches used in 1996, GPG, and 2006 guidelines
- Improved guidance in some areas and new coverage, more and improved default data
 - Wider coverage of data
 - Additional sources covered
 - All estimates now are of actual emissions (not potential)
 - Categories clarified and simplified in some areas

IPCC 2006 vs. 1996

- Energy largely unchanged
 - Improved defaults of fossil fuel combustion
 - Some additional categories e.g. CCS, road transport urea catalyst, uncontrolled burning of coal dumps
 - Fugitive emissions clarified and simplified
- IPPU
 - More process emissions identified
 - Chemical production and use coverage clarified

IPCC 2006 vs. 1996

➤ AFOLU

- Integrating agriculture with Land Use change avoids double counting
- Maintains basic structure, definitions and methods of LULUCF GPG

➤ Waste

- Significant improvement to default method for landfills
- Addition of biological treatment and open burning
- Uncategorized waste is a separate category

IPCC 2006 vs. 1996 – New Sources

Fuel Combustion

CO₂ -Transport and Storage
 Urea-based Catalysts (Road Transport)

Fugitive Emissions from Fuels

Abandoned Underground Mines

Mineral Industry

Glass Production
 Ceramics
 Non Metallurgical Magnesia Production

Chemical Industry

Caprolactam, Glyoxal & Glyoxylic Acid
 Titanium Dioxide Production
 Petrochemical and Carbon Black Production

Metal Industry

Lead Production
 Zinc Production

Electronics Industries

Integrated Circuit or Semiconductor
 TFT Flat Panel Display
 Photovoltaics
 Heat Transfer Fluid

Other Product Manufacture and Use

Electrical Equipment
 Military Applications
 Accelerators
 Medical Applications
 Propellant for Pressure and Aerosol Products

Substitutes for Ozone Depleting Substances

Land Use

Complete, consistent treatment of fires
 Liming
 Settlements remaining Settlements
 Some wetlands categories
 Urea Application
 Indirect N₂O Emissions from Manure
 Harvested Wood Products

Waste

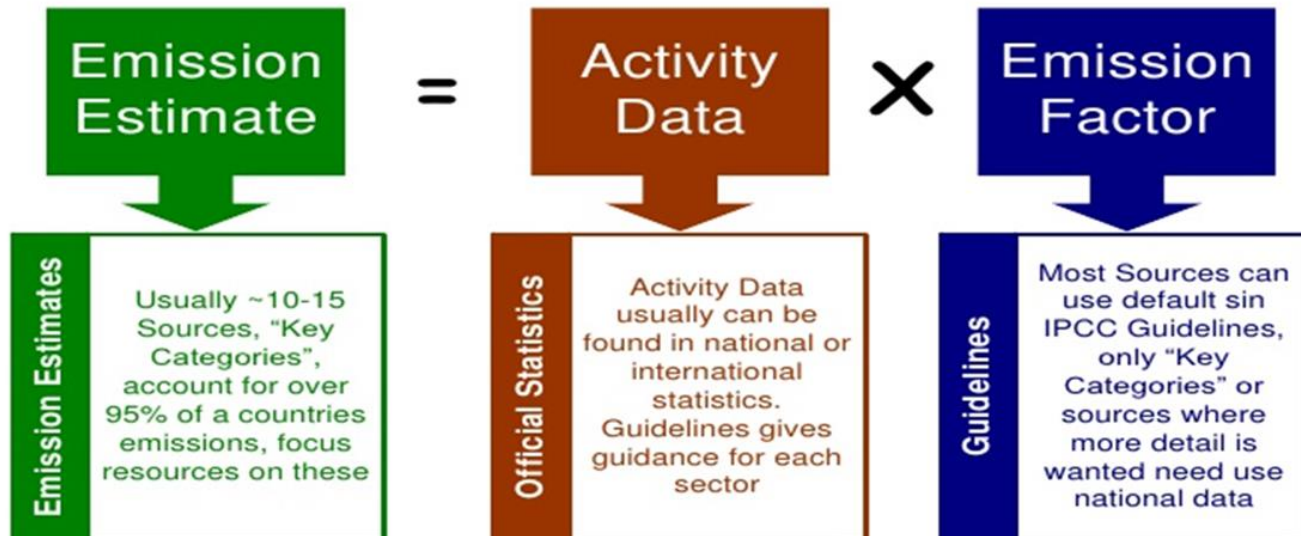
Open Burning of Waste
 Biological Treatment of Solid Waste

Other

Indirect N₂O Emissions from the Atmospheric
 Deposition of N (excluding agriculture)

Most Common Estimation Method

Basic Method



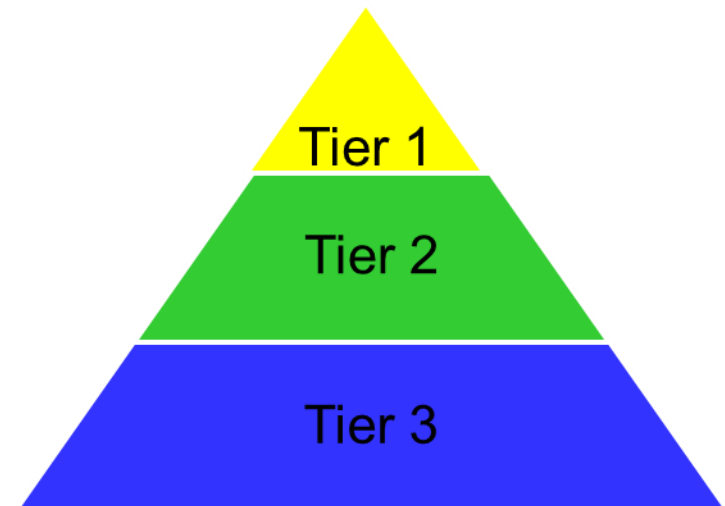
Choice of Methodology

Methodological Tiers – define the level of accuracy

Tier 1: sector-level data - default parameters

Tier 2: sub-sector activity data- country-specific factors

Tier 3: facility-level data - technology-specific parameters



Choice of Methodology – Example

Three tiers to estimate emissions from stationary combustion:

Tier 1:

- Data on the amount of fuel combusted in the source category
- A default emission factor

Tier 2:

- Data on the amount of fuel combusted in the source category
- A country-specific emission factor for the source category and fuel for each gas.

Tier 3:

- Splitting the fuel combustion statistics based on (fuel type, technology, age of equipment, operating conditions, quality of maintenance)
- Using emission factors that are dependent upon these differences

Key Categories & Methodological Tiers

- A key category is one that is prioritized because it significantly influence the country's total GHG inventory.
- Key categories are the categories which cumulatively constitute 95% of the country's total GHG emissions.

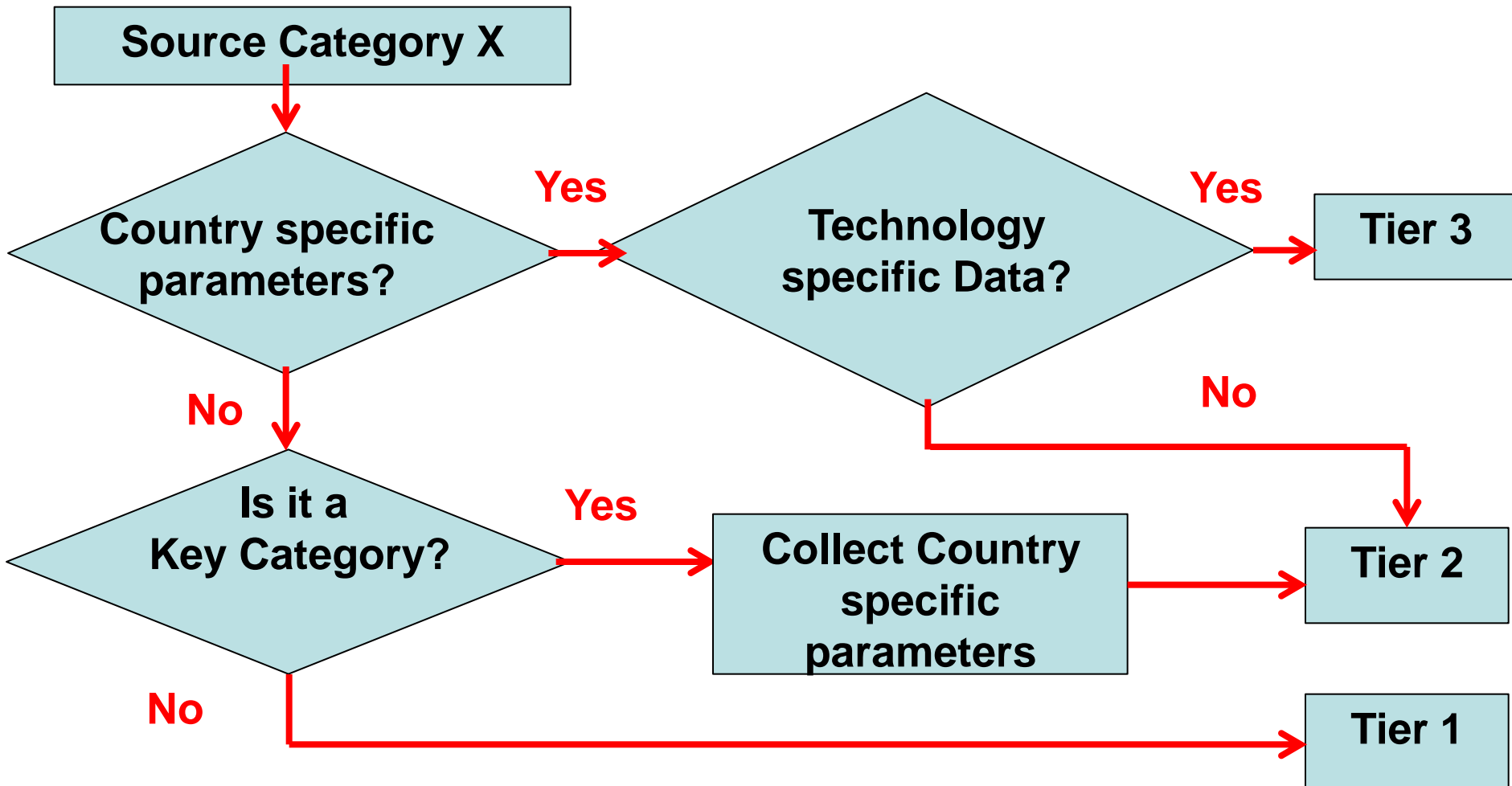


			Emission/ Removal	Absolute	Level	Cumulative
1A1	Fuel Combustion Activities - Energy Industries: Solid	CO ₂	10000	10000	47.9%	47.9%
1A3a	Fuel Combustion Activities - Transport - Civil Aviation	CO ₂	5502	5502	26.3%	74.2%
3B1a	Forest Land Remaining Forest Land	CO ₂	-2345	2345	11.2%	85.4%
1A2	Fuel Combustion Activities - Manufacturing Industries and Construction: Solid	CO ₂	1300	1300	6.2%	91.6%
3B1b	Land Converted to Forest Land	CO ₂	879	879	4.2%	95.8%
3A2	Manure Management	CH ₄	543	543	2.6%	90.4%
1A1	Fuel Combustion Activities - Energy Industries: Liquid	CO ₂	200	200	1.0%	99.4%
1A2	Fuel Combustion Activities - Manufacturing Industries and Construction: Gas	CO ₂	123	123	0.6%	100.0%
				20892		

More detailed higher tier methods should be selected for key categories !

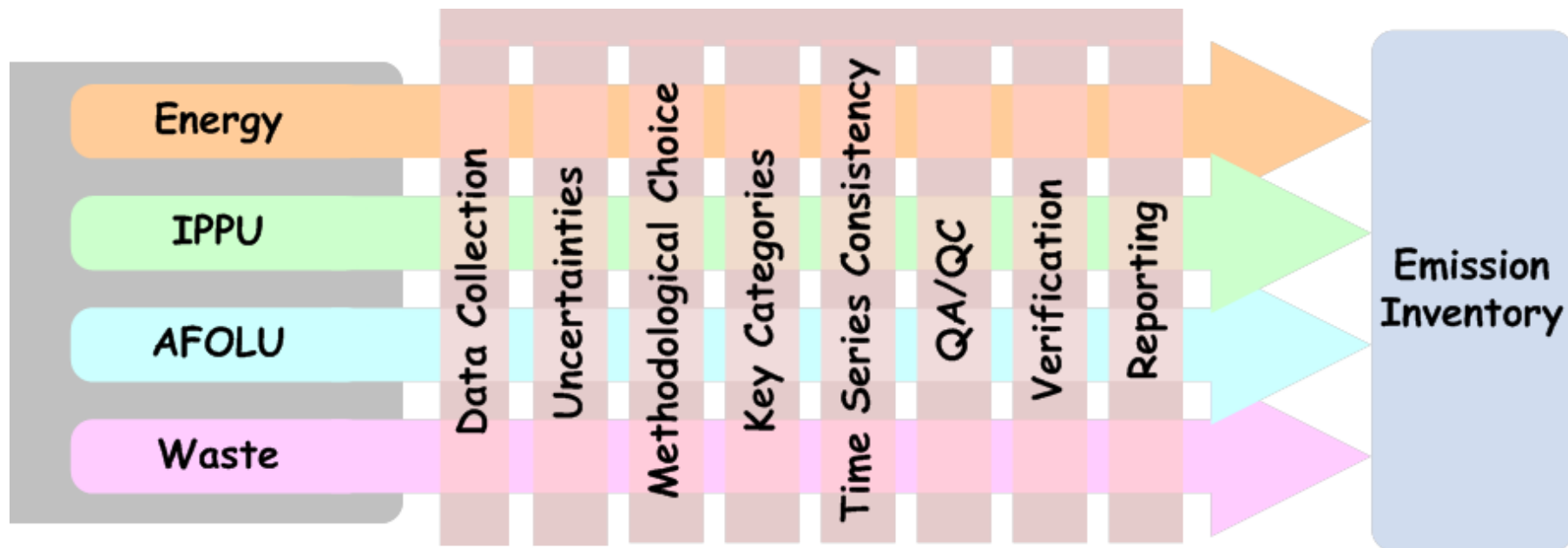
Source: IPCC

Choice of Methodology – Decision Trees



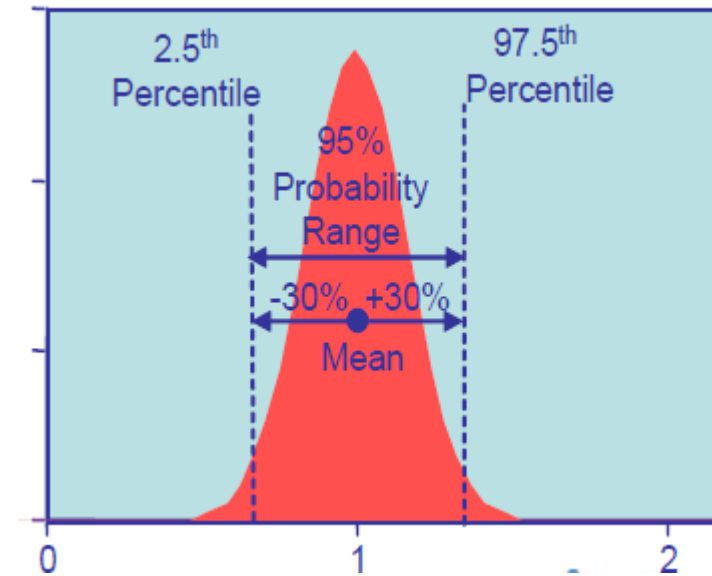
Inventory Key Elements

Steps in preparing GHG inventory

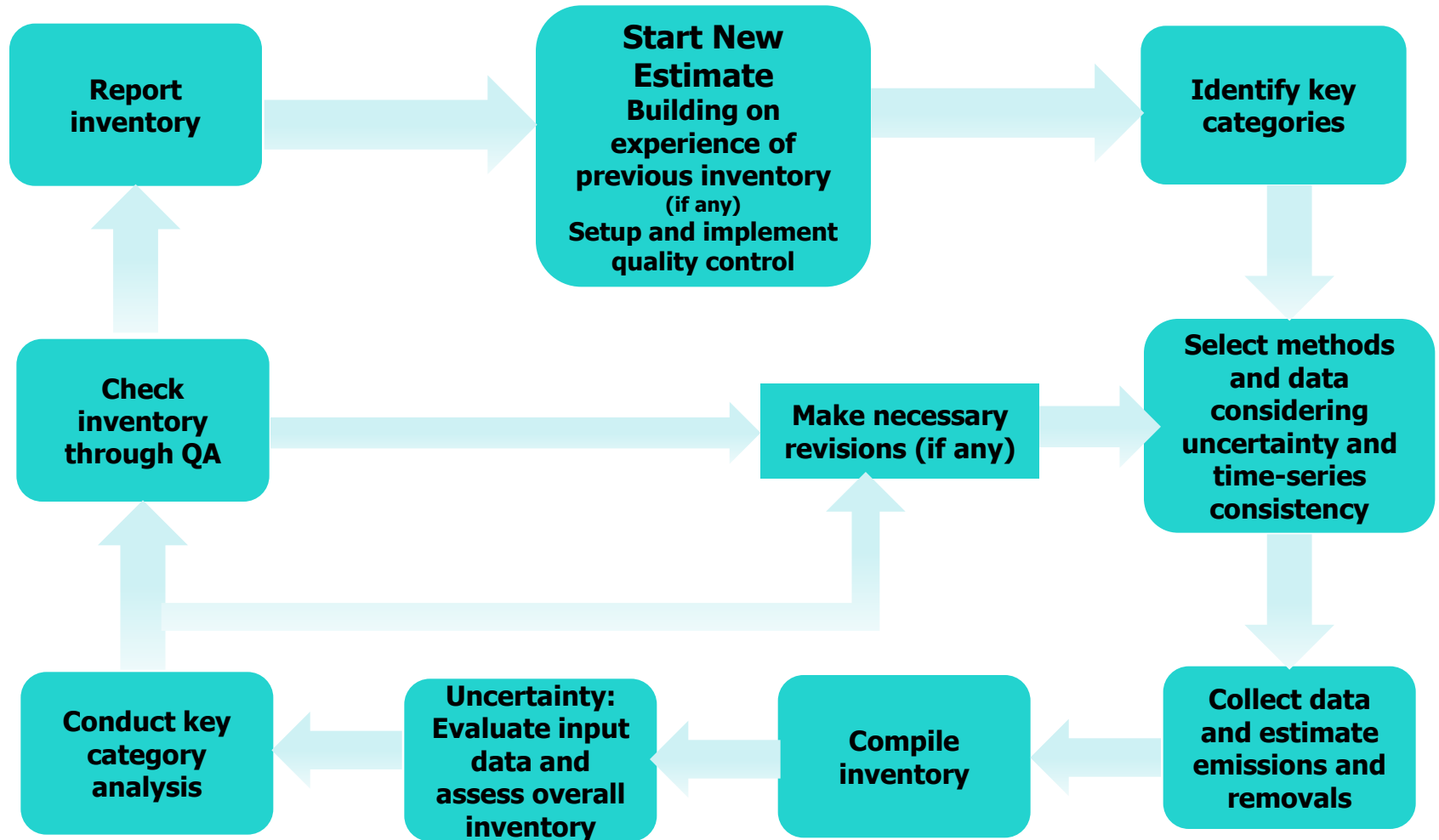


Uncertainties

- Uncertainty is the lack of knowledge of the true value of a variable.
- Main causes of uncertainty:
 - *Lack of data*
 - *Measurement Errors*
 - *Small sample size*
 - *Model accuracy*



Inventory Cycle



Inventory Key Steps

Step 1: Conduct key source category analysis

Step 2: Select the categories

Step 3: Assemble required activity data depending on tier selected from local, regional, national and global databases, including EFDB

Step 4: Collect emission/removal factors depending on tier level selected from local/regional/national/global databases, including EFDB



Inventory Key Steps

Step 5: Select method of estimation based on tier level and quantify emissions/removals for each category

Step 6: Estimate uncertainty involved

Step 7: Adopt quality assurance/control procedures and report results

Step 8: Report GHG emissions

Step 9: Report all procedures, equations and sources of data adopted for GHG inventory estimation



Inventory Principles

➤ National GHG inventories must be prepared in accordance with the TACCC principles:

- Transparency

sufficient and clear documentation

- Accuracy

lowest possible uncertainty

- Completeness

all categories and gases

- Comparability

using common reporting tables

- Consistency

estimates of different years using same method and data sources



Thank you!

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