



Task Force on National Greenhouse Gas Inventories

# Introduction to 2006 IPCC Guidelines

Latin American Workshop on National GHG Inventories Systems

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# Emission Inventories

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# Emission Inventories

- In order to control climate change we need limit emissions of greenhouse gases
  - To control emissions they must be measured
  - Any international agreement to limit or reduce emissions needs an agreed method to measure emissions
- However, national emissions and removals cannot be directly measured.
- Emission Inventories are estimates of national greenhouse gas emissions and removals
  - The TFI produces guidelines on compiling these estimates in a standardised way to ensure consistency and comparability between parties.

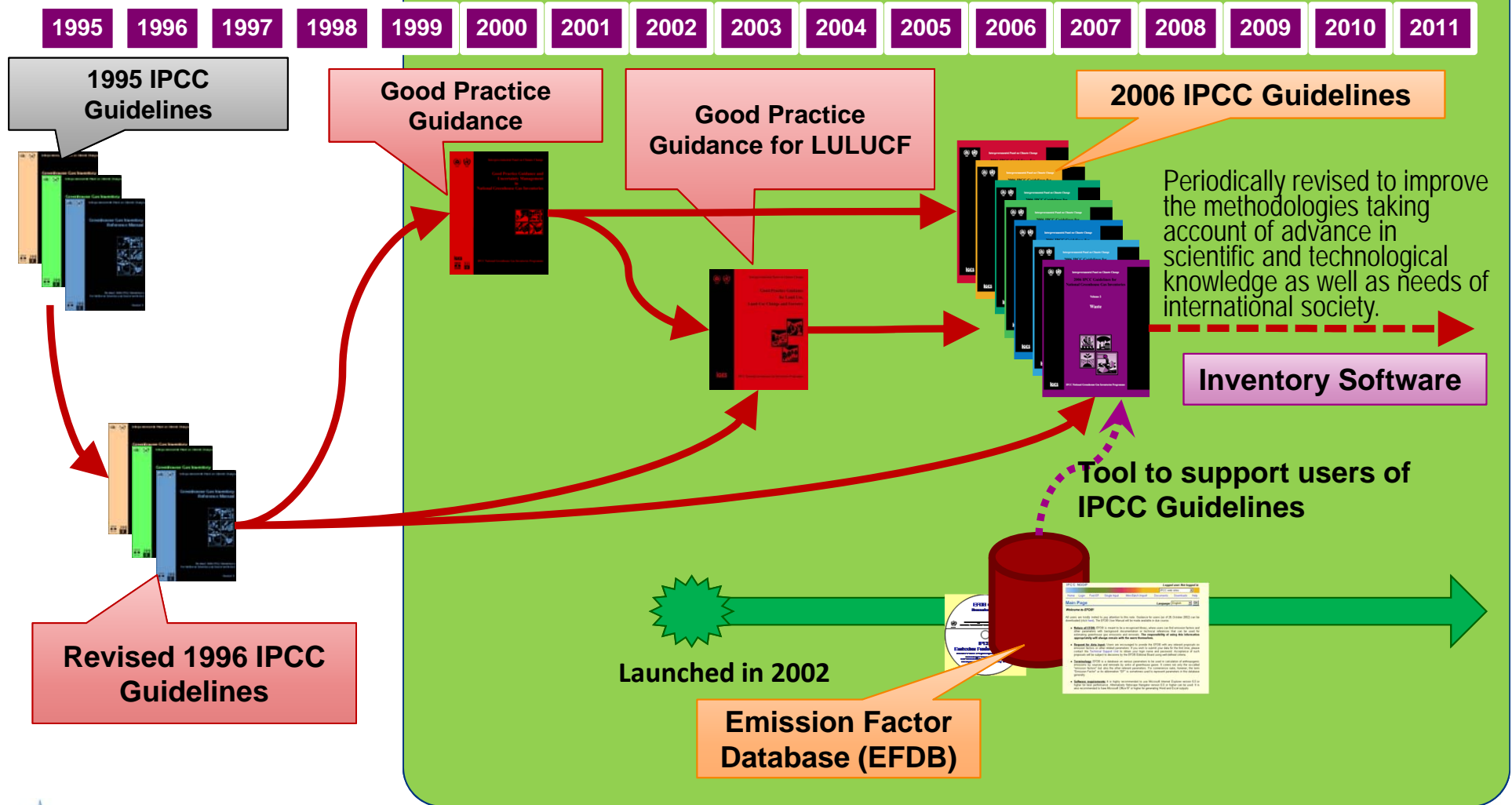
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# Guidelines

- The IPCC Guidelines are intended to be used by all parties to the UNFCCC
  - They provide default data and methods
  - They focus resources where they will do most good
  - They allow the use of more sophisticated methods if countries wish to use them and they are consistent with the guidelines
- Use of the IPCC guidelines is mandatory for annex I parties (developed countries) and recommended for other countries.
- Until now the Revised 1996 Guidelines have been used, for estimates for 2013 onwards the 2006 Guidelines should be used by annex I parties

# Evolution of IPCC Guidelines

TFI TSU has been supported by Government of Japan since 1999.



# 2006 IPCC Guidelines for National Greenhouse Gas Inventories



- Overview
- Vol 1: General Guidance and Reporting
- Vol 2: Energy
- Vol 3: Industrial Processes and Product Use (IPPU)
- Vol 4: Agriculture, Forestry and Other Land use (AFOLU)
- Vol 5: Waste

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# Estimates should be credible

- Estimates need to be credible, as well as consistent and comparable between countries
- The concept of “Good Practice” has been defined in order to
  - reduce uncertainties as far as practical
  - improve the reliability of the results through Quality Assurance and Quality Control
  - ensure consistency and comparability
  - improve credibility through documentation and reporting - transparency

# Credibility Requires:

## Transparency

- The numbers and their derivation can be clearly understood
- Provides credibility that numbers estimated correctly

## Completeness

- All sources and sinks within the national territory should be covered

## Consistency

- Numbers consistent within inventory over time so time series is good estimate of trend

## Comparability

- Different parties use similar methods
- Numbers can be compared between countries

## Accuracy

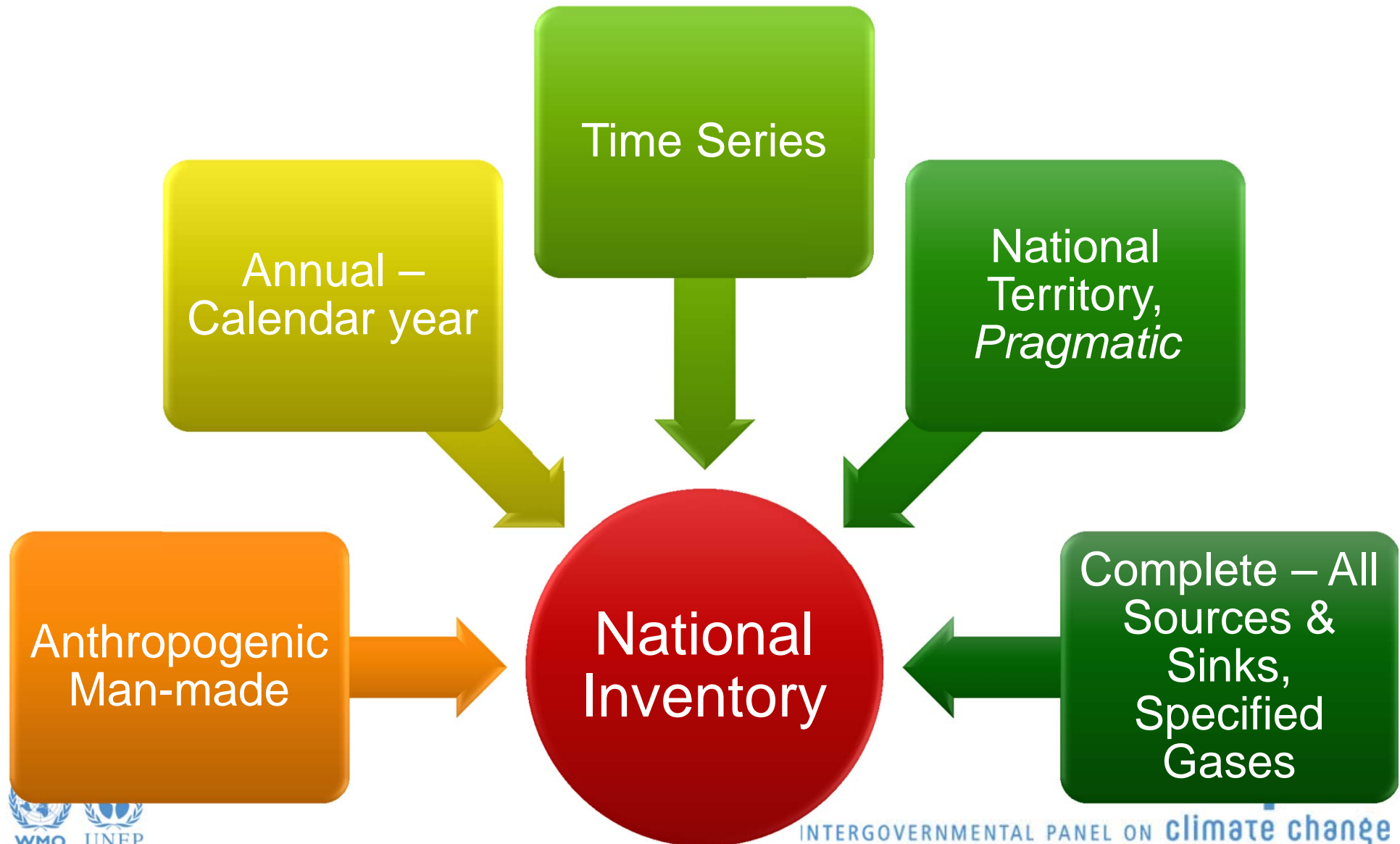
- Numbers should be unbiased, not over- or under-estimates
- As far as practical with limited resources



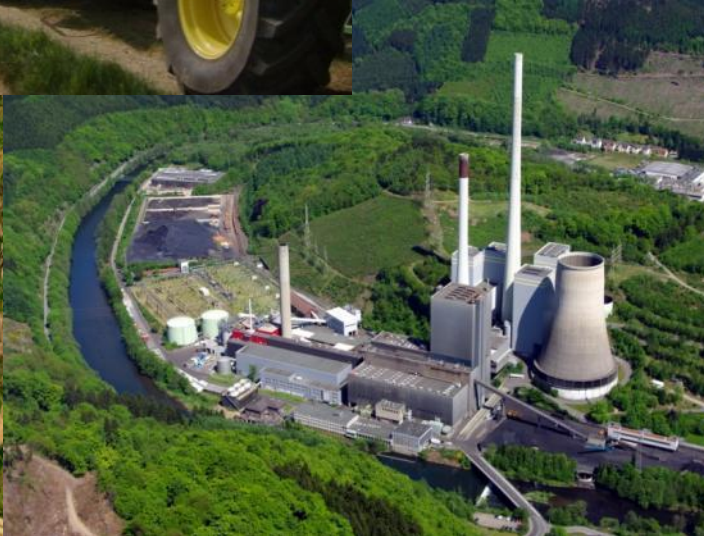
# National Greenhouse Gas Inventories

*The IPCC Guidelines in Practice*

# National GHG Inventories

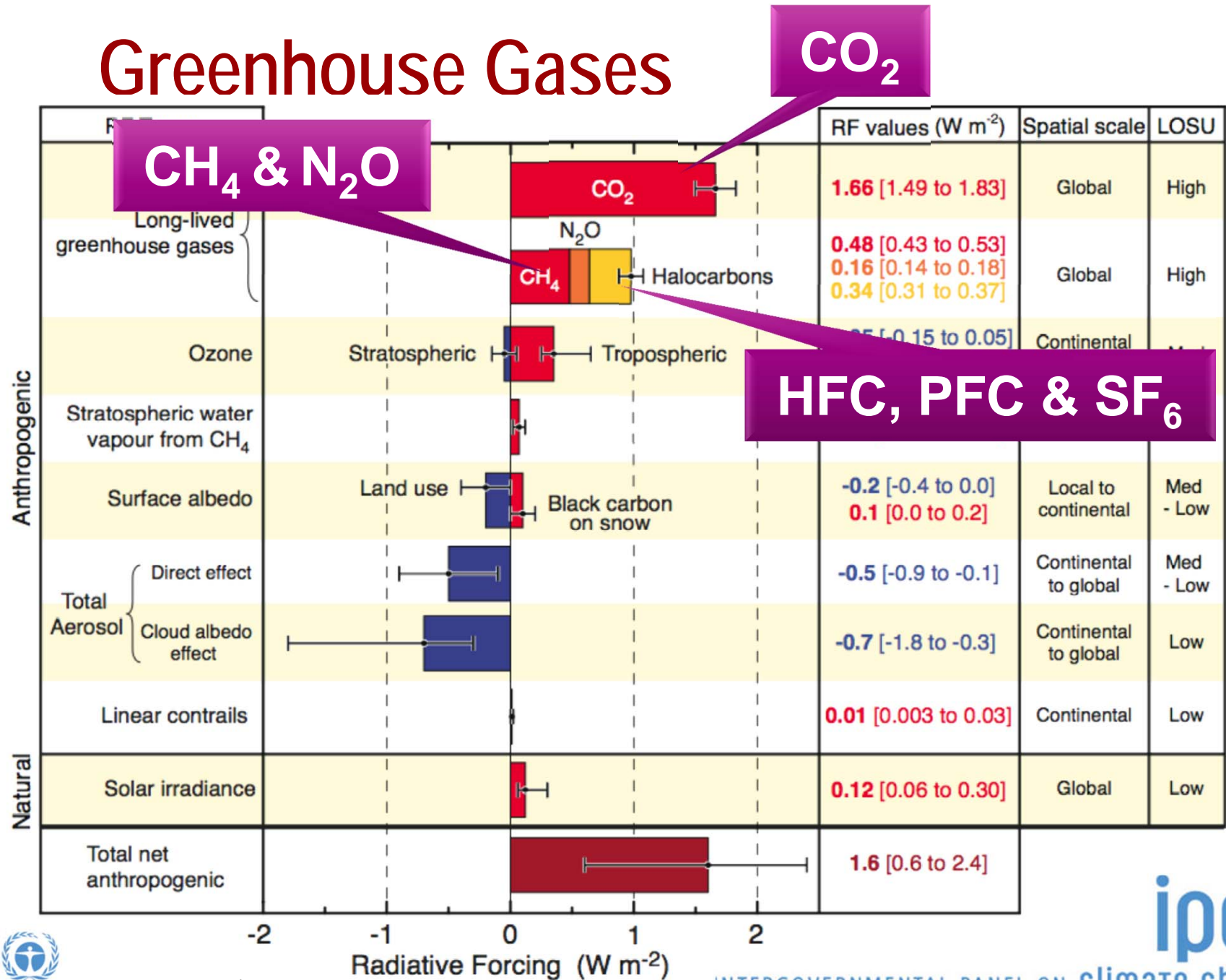








# Greenhouse Gases



# "New" gases in 2006 Guidelines

## – Sources Identified in 2006 Guidelines

**Sources only in IPPU Sector**

By-product & fugitive emissions

	Electronics Industries	Magnesium production	Halogenated Compounds Production	GWP in TAR	GWP in AR4
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> )	✓		✓	✓	✓
CF <sub>3</sub> I, CH <sub>2</sub> Br <sub>2</sub> , CHCl <sub>3</sub>			✓	✓	
C <sub>7</sub> F <sub>16</sub> , CH <sub>2</sub> Cl <sub>2</sub> , CH <sub>3</sub> Cl			✓	✓	✓
C <sub>3</sub> F <sub>7</sub> C(O)C <sub>2</sub> F <sub>5</sub>		✓	✓		
C <sub>4</sub> F <sub>6</sub> , C <sub>5</sub> F <sub>8</sub> , c-C <sub>4</sub> F <sub>8</sub> O	✓		✓		

# Main Sources

Carbon Dioxide  
(CO<sub>2</sub>)

- Fuel Combustion
- Deforestation

Methane (CH<sub>4</sub>)

- Oil and Gas Leakage
- Livestock

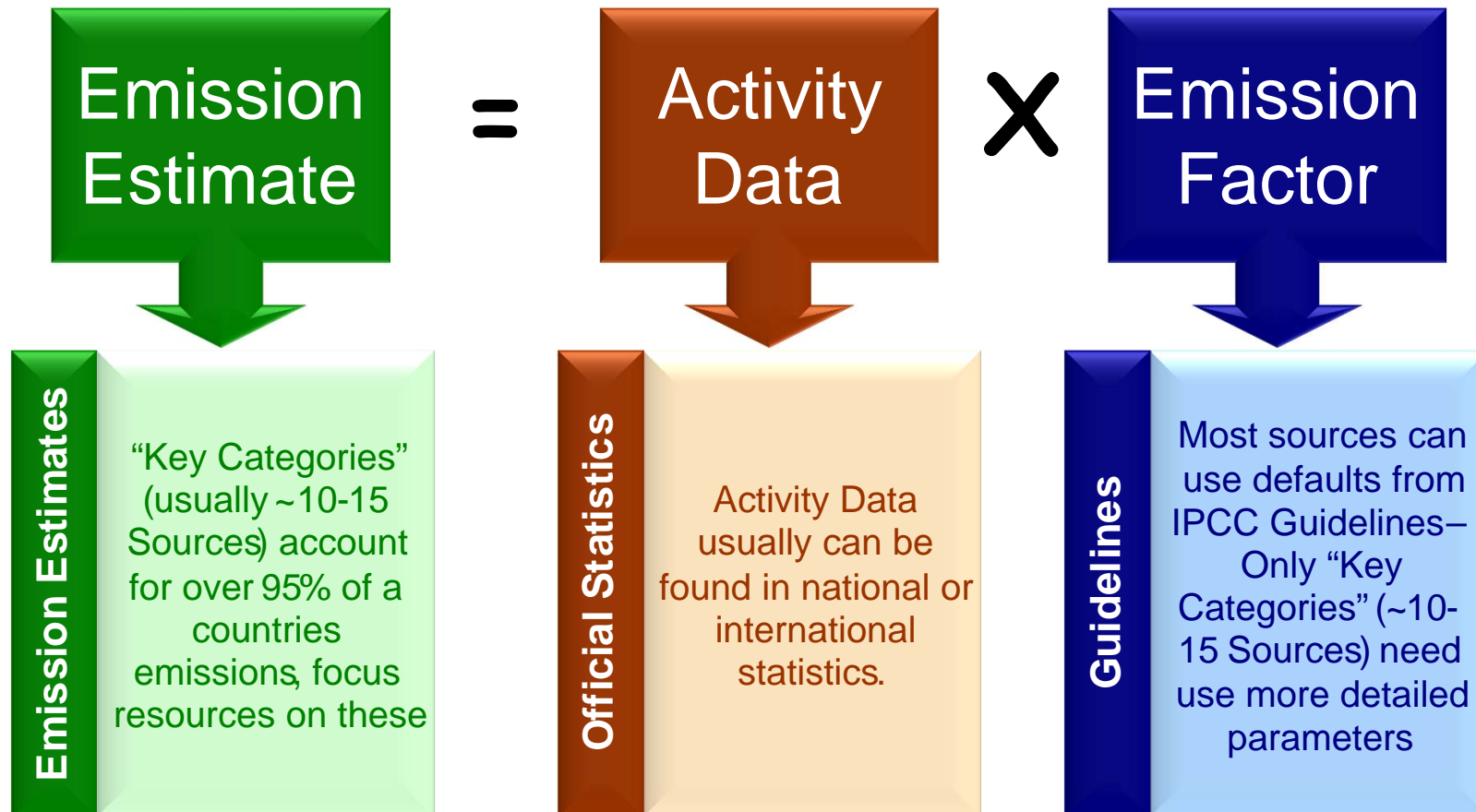
Nitrous Oxide  
(N<sub>2</sub>O)

- Industrial Sources
- Fertiliser Use

Fluorinated gases  
(HFC, PFC, SF<sub>6</sub>)

- Industrial Processes
- Refrigeration and Fire Extinguishers

# Basic Method



# E.g. Calculating Emissions of CO<sub>2</sub>

- Often simple calculations can be used. For example:
  - CO<sub>2</sub> from combustion comes from the carbon in the fuel
  - In efficient combustion nearly all (>>99%) of the carbon in the coal is converted into CO<sub>2</sub>.



C emitted as CO<sub>2</sub>  
Also SO<sub>2</sub>, NO<sub>x</sub> etc.

Incomplete combustion leads to  
CO, PM, CH<sub>4</sub>, NMVOC etc.





# Fuel Combustion Example

- Emissions from fuel use,  $E$  (kTonne).
  - Fuel Burnt (GJ) (= Activity data) ,  $A$
  - Emission Factor,  $EF$ 
    - Amount of carbon in fuel (Gg/GJ),  $C$
    - Fraction carbon oxidised,  $U$
    - $\frac{44}{12}$  Converts Carbon to  $CO_2$  (= 3.667)

$$EF = \left[ C \times U \times \frac{44}{12} \right]$$

$$Emission = EF \times A$$

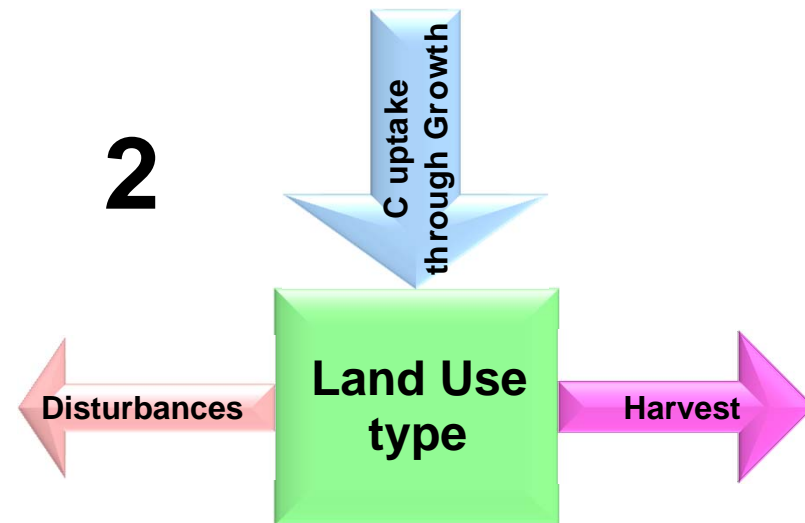
# Land Use: Estimating Carbon Stock Changes

1



Difference between carbon stocks gives emission/removal

2



Emission/removal from sum losses and gains

Approach assumes the emission = total stock changes

# IPCC Land Classification



## Forest land

- All woody vegetation according to national definitions



## Cropland

- Crops including rice and agro-forestry not included above



## Grassland

- All rangelands and pastures not included above



## Settlements



## Wetlands

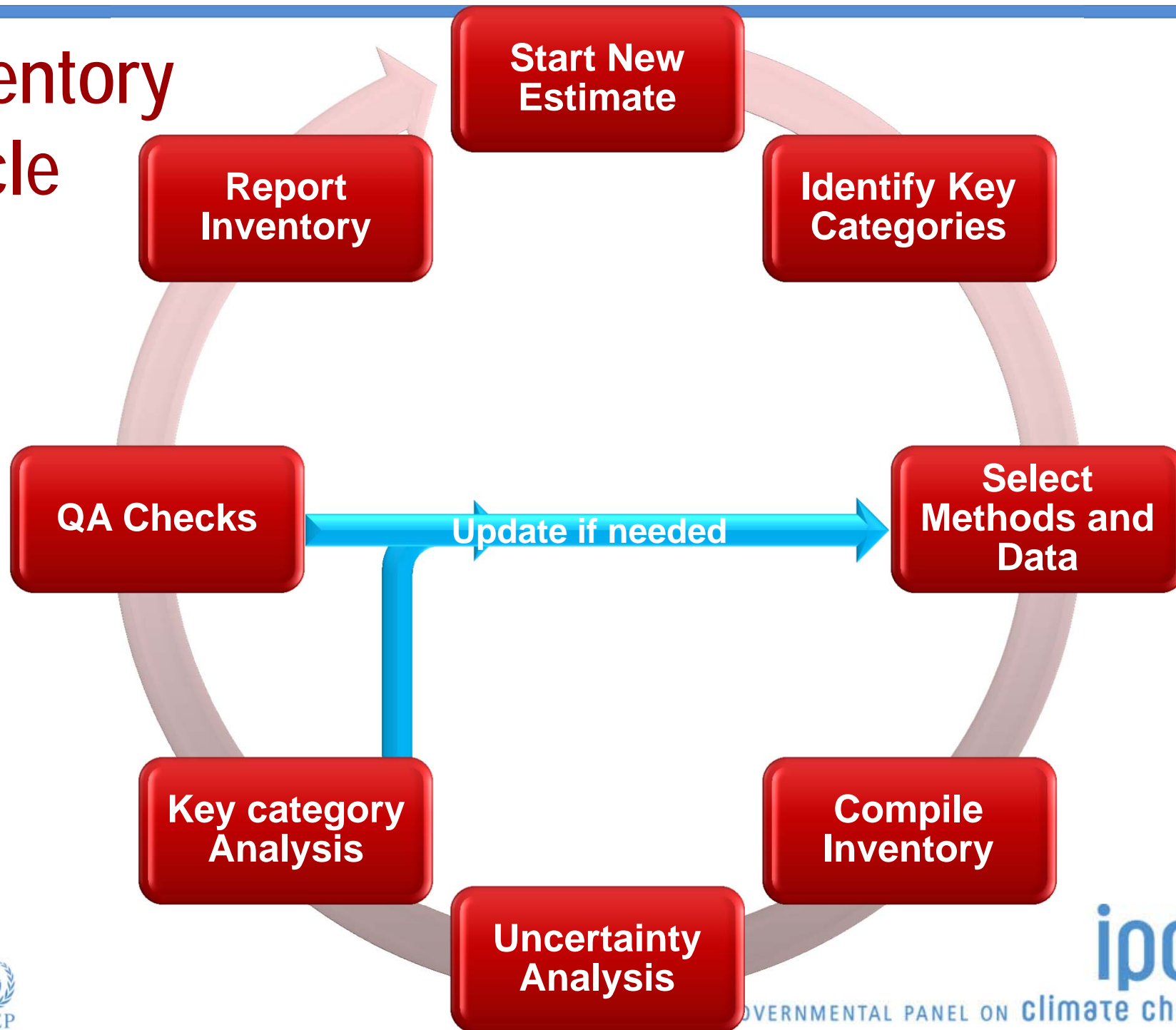
- Wetlands not included above (peat use and flooded lands)



## Other Lands

- Includes bare soil, rock, ice and lands not included above

# Inventory Cycle



# Data Collection – a Key Activity

## Collecting Activity Data

- Socio-Economic Statistics
- Remote Sensing

## Emission Factors

- Small sources use IPCC defaults
- Large source need country data

## Considerations

- Time Series Consistency
- Uncertainty Assessment

## Plant Specific Data

- Measurements
- Models

# Three methodological Tiers

## Tier 3: Higher order methods

detailed modeling and/or inventory measurement systems  
data at a greater resolution

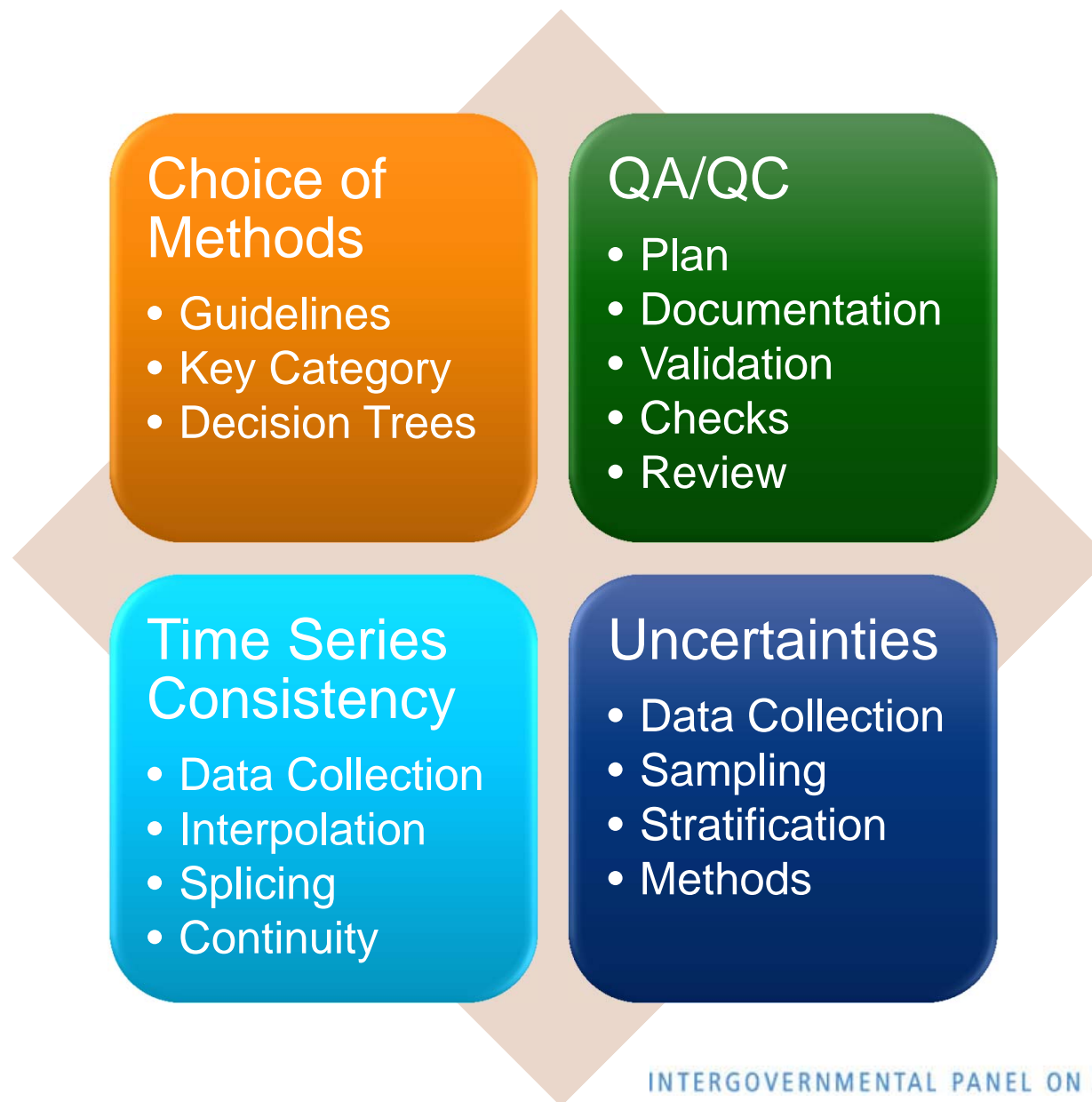
## Tier 2: A more accurate approach

Based on Tier 1 with country or region-specific values for the  
general defaults, greater stratification  
more disaggregated activity data

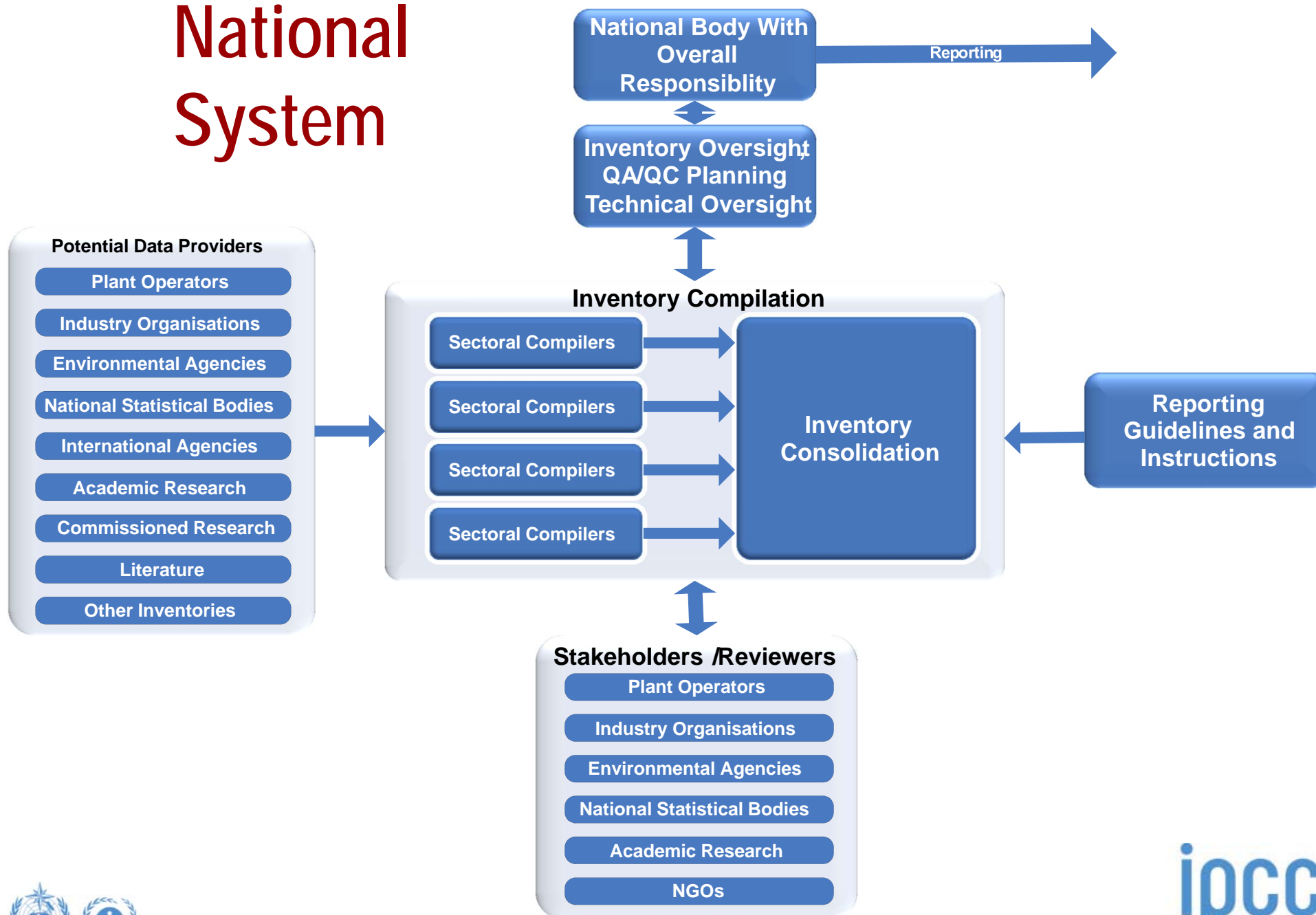
## Tier1 : Simple first order approach

default values of the parameters from the IPCC guidelines  
spatially coarse default data based on globally available data

# Good Practice



# National System



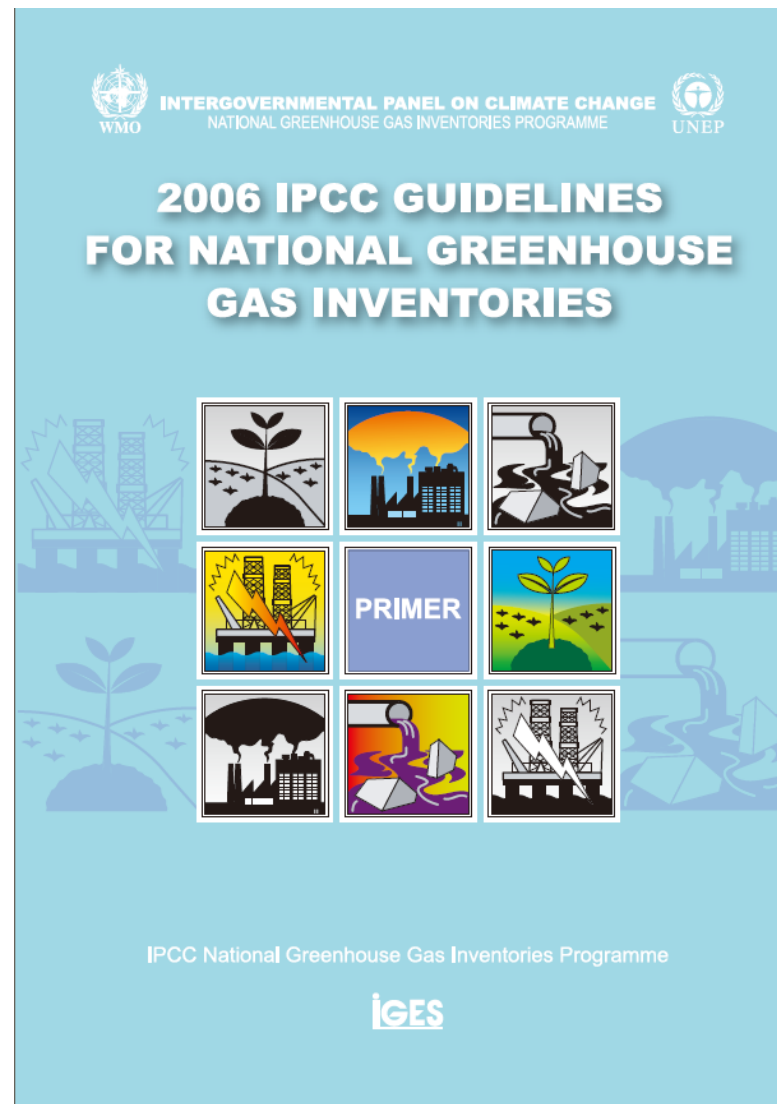


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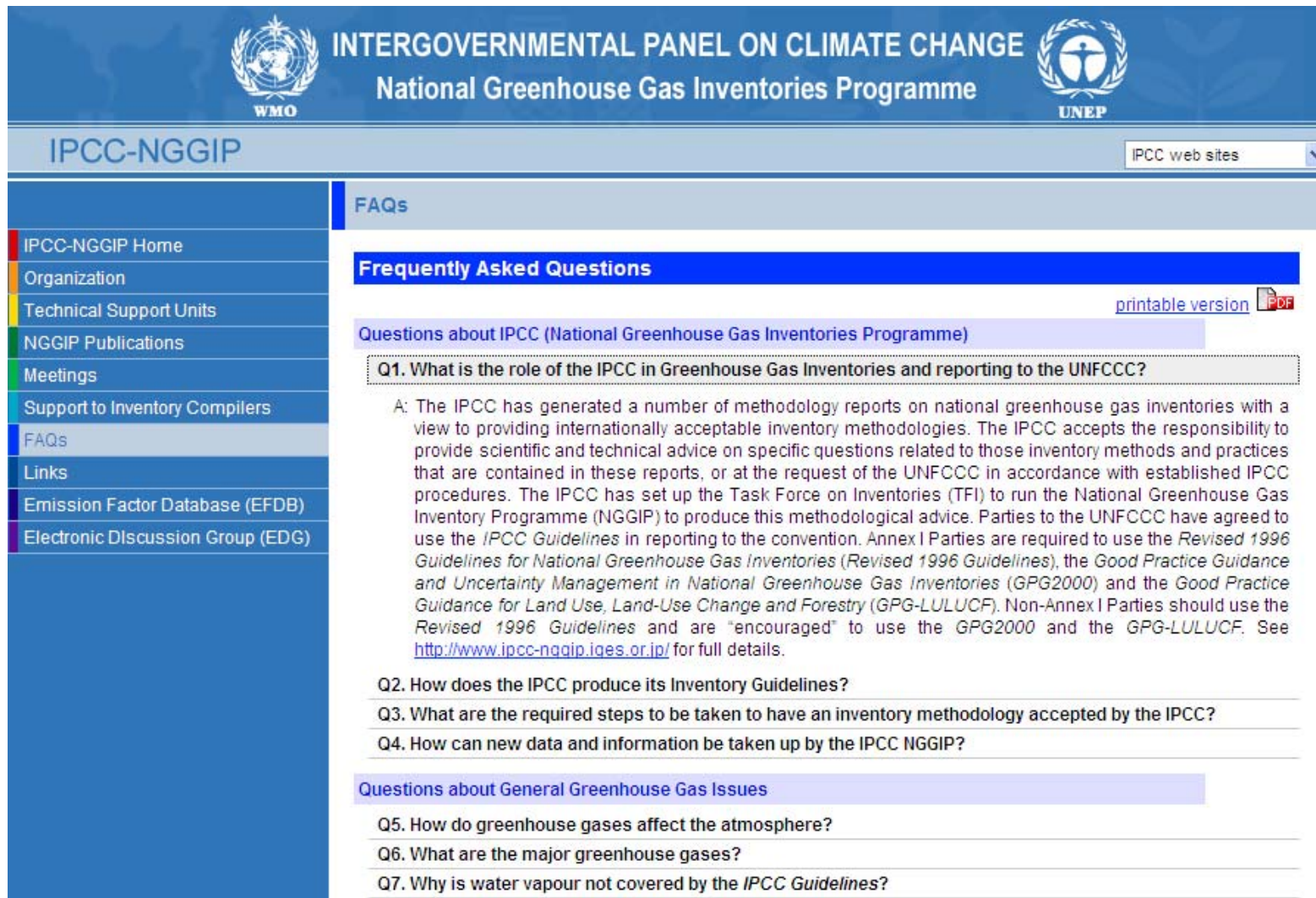
# Summary

- International agreements to limit emissions of greenhouse gases need accurate, consistent, comparable and credible estimates
  - Following the IPCC guidelines gives such estimates
- Good Practice Guidance provides transparency and ensures estimates are as accurate and credible as possible
- IPCC Guidelines focus effort on those areas of the inventory that are most significant
- Default methods and data are provided so all countries can use the guidelines, whatever their resources

# Primer to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories



# If you have any questions – see FAQs



The screenshot shows the IPCC-NGGIP website interface. At the top, it features the logos of the WMO and UNEP, along with the text "INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE National Greenhouse Gas Inventories Programme". Below this is a navigation bar with "IPCC-NGGIP" and a dropdown menu for "IPCC web sites". A left-hand navigation menu lists various sections: "IPCC-NGGIP Home", "Organization", "Technical Support Units", "NGGIP Publications", "Meetings", "Support to Inventory Compilers", "FAQs", "Links", "Emission Factor Database (EFDB)", and "Electronic Discussion Group (EDG)". The main content area is titled "FAQs" and "Frequently Asked Questions". It includes a link for a "printable version" in PDF format. The first question is: "Q1. What is the role of the IPCC in Greenhouse Gas Inventories and reporting to the UNFCCC?". The answer states that the IPCC provides internationally acceptable inventory methodologies and technical advice, and has set up the Task Force on Inventories (TFI) to run the National Greenhouse Gas Inventory Programme (NGGIP). It also lists other questions: "Q2. How does the IPCC produce its Inventory Guidelines?", "Q3. What are the required steps to be taken to have an inventory methodology accepted by the IPCC?", and "Q4. How can new data and information be taken up by the IPCC NGGIP?". Below this, there is a section for "Questions about General Greenhouse Gas Issues" with questions "Q5. How do greenhouse gases affect the atmosphere?", "Q6. What are the major greenhouse gases?", and "Q7. Why is water vapour not covered by the IPCC Guidelines?".

<http://www.ipcc-nggip.iges.or.jp/faq/faq.html>



Task Force on National Greenhouse Gas Inventories

**Thank you**



**ipcc**  
INTERGOVERNMENTAL PANEL ON climate change