



GHG Inventories: Their Importance to Monitor Progress in Climate Change Mitigation

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Outline

- GHG Inventories: Why they are important
- GHG inventory guidelines
- How do we ensure credibility of GHG inventory information?
- Summary

GHG Inventories: Why They Are Important

What are GHG Inventories?

- Estimates of all emissions and removals of greenhouse gases (GHG) from given sources or sinks from a defined region in a specific period of time.
- Here we are dealing with:
 - Greenhouse Gases
 - National Estimates
 - Annual Estimates

GHG emissions/removals occur from a variety of sources/sinks



Why are GHG inventories important?

Scientific understanding

Policy formulation & implementation

Input to models

Understand link between environmental pollution and effects to sources of pollution

Identify the sectors, sources, and activities responsible for greenhouse gas emissions

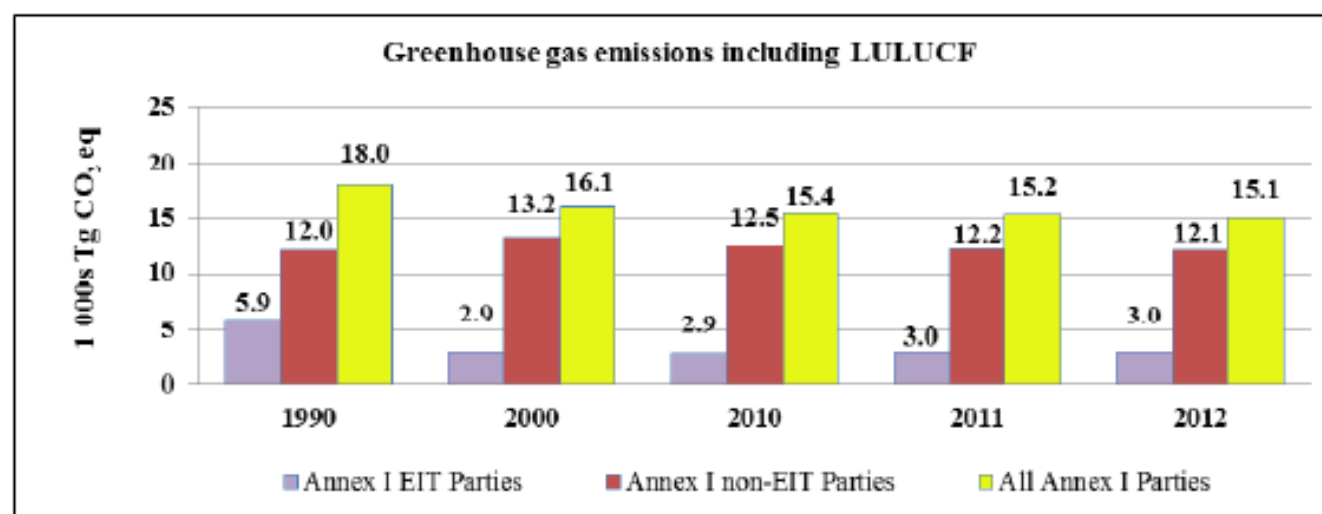
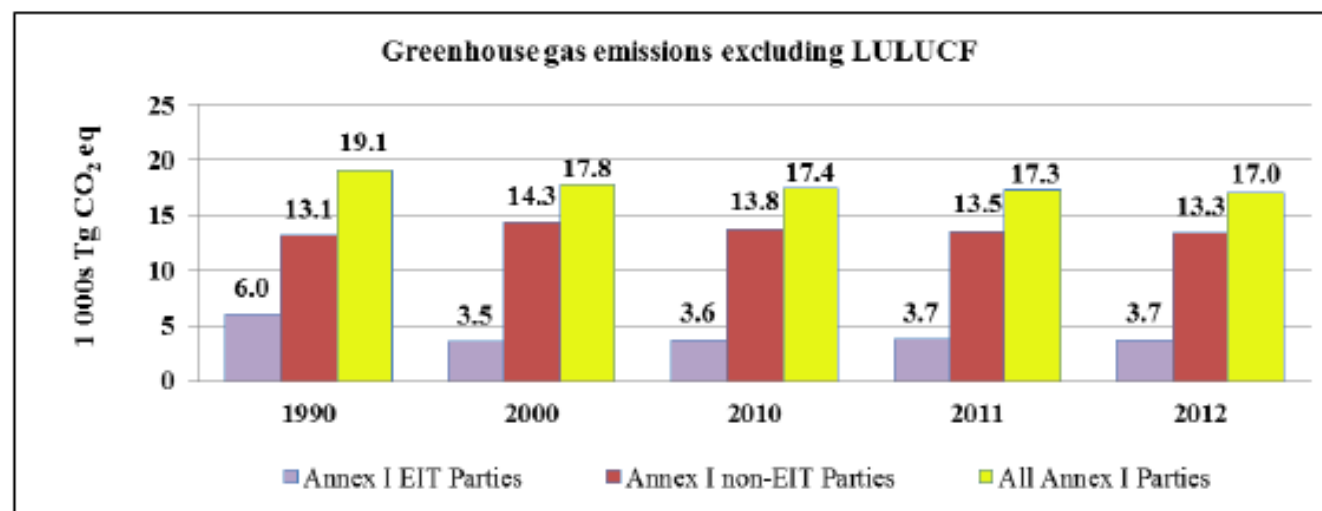
To understand the emission and removal trends

To help develop cost-effective mitigation policy

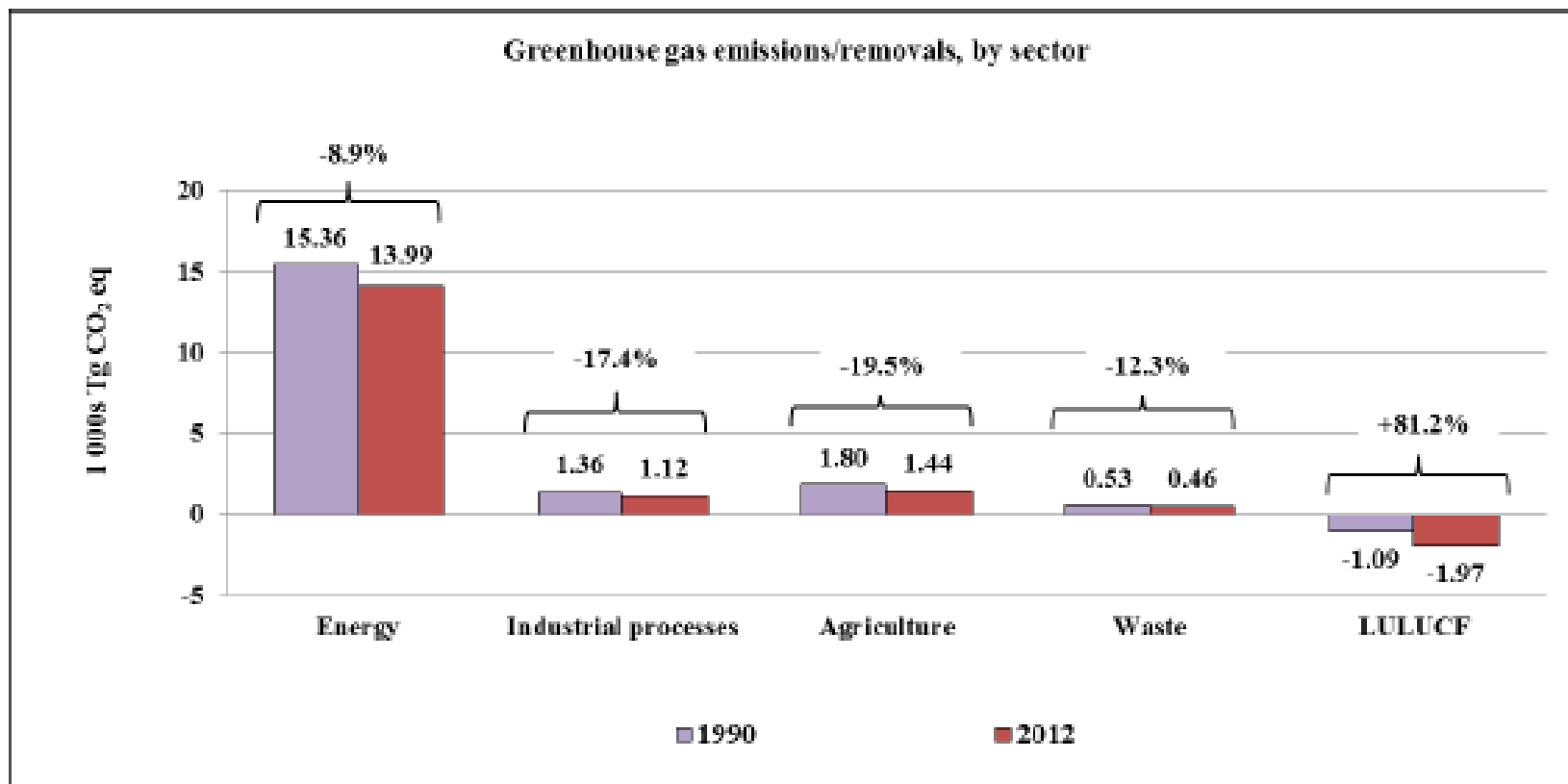
To monitor progress towards policy goals

To inform the public

Greenhouse gas emissions of Annex I Parties, 1990, 2000, 2010, 2011 and 2012

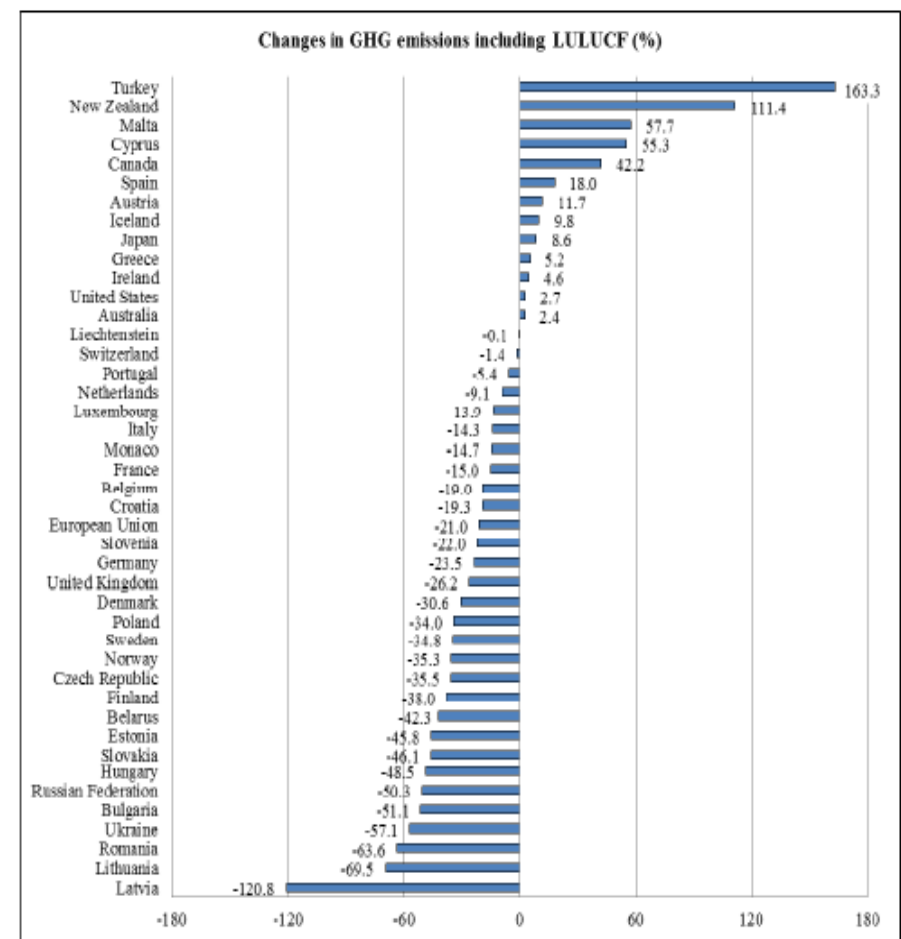
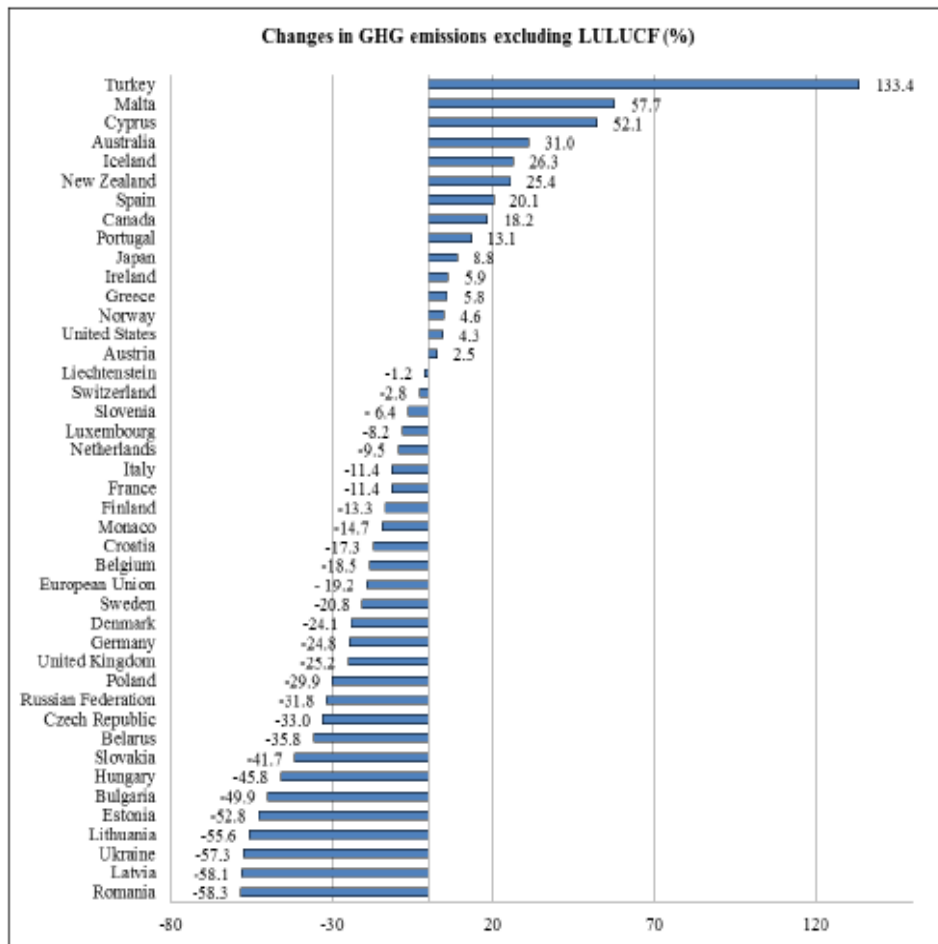


Greenhouse gas emissions and removals of Annex I Parties by sector, 1990 and 2012^a

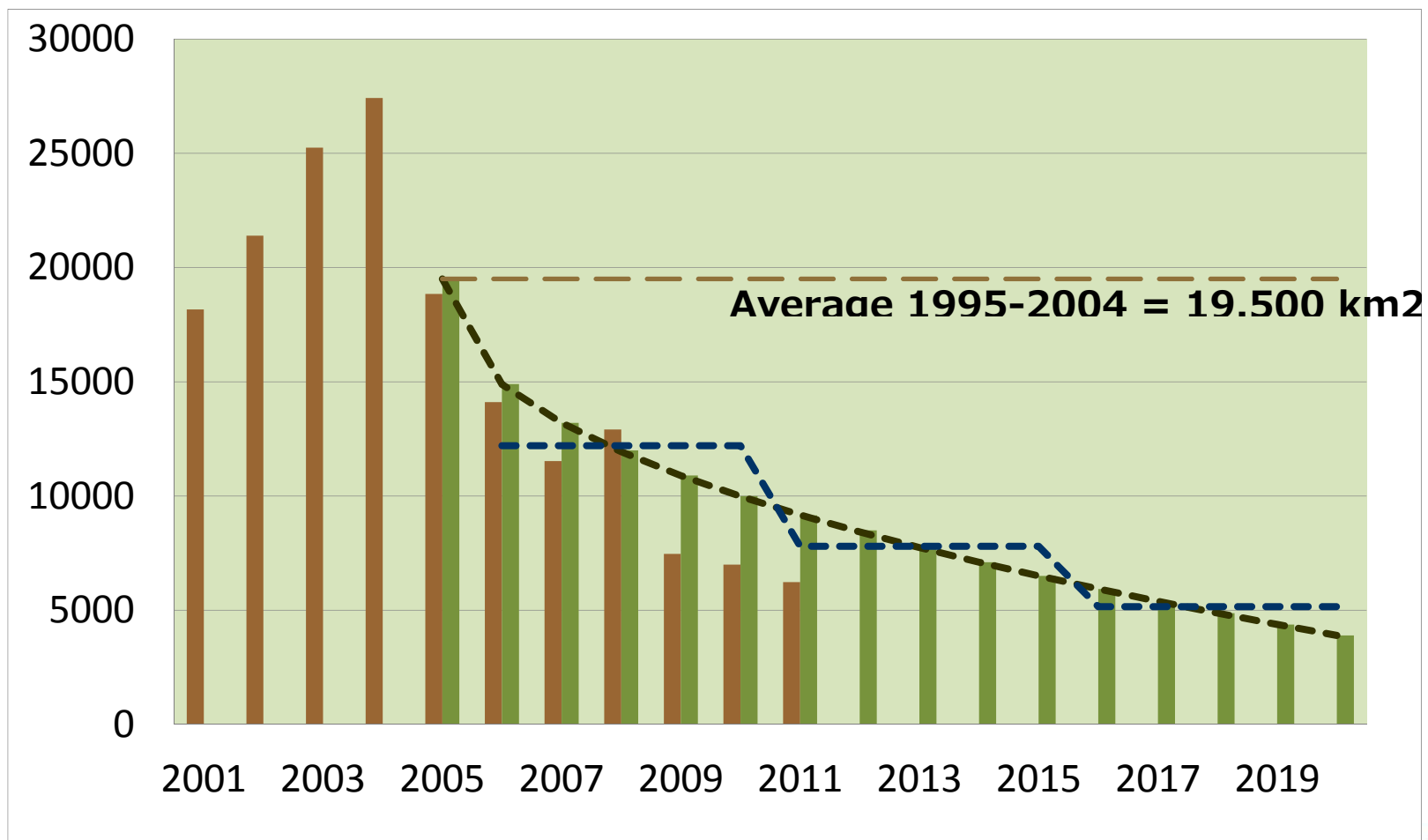


Changes in total aggregate emissions

Changes in total aggregate emissions of individual Annex I Parties, 1990–2012



An example of national monitoring...



GHG Inventory Guidelines

Why do we need GHG inventory guidelines?

- Any international agreement to limit climate change must set emission limits/targets/aims and monitor progress in an open and transparent way.
- Currently, most national emissions can only be estimated, not measured and so we need a consensus on the best way of doing this.
- To do this we need reliable, generally accepted methods and guidelines.

- **Article 4 - Commitments**

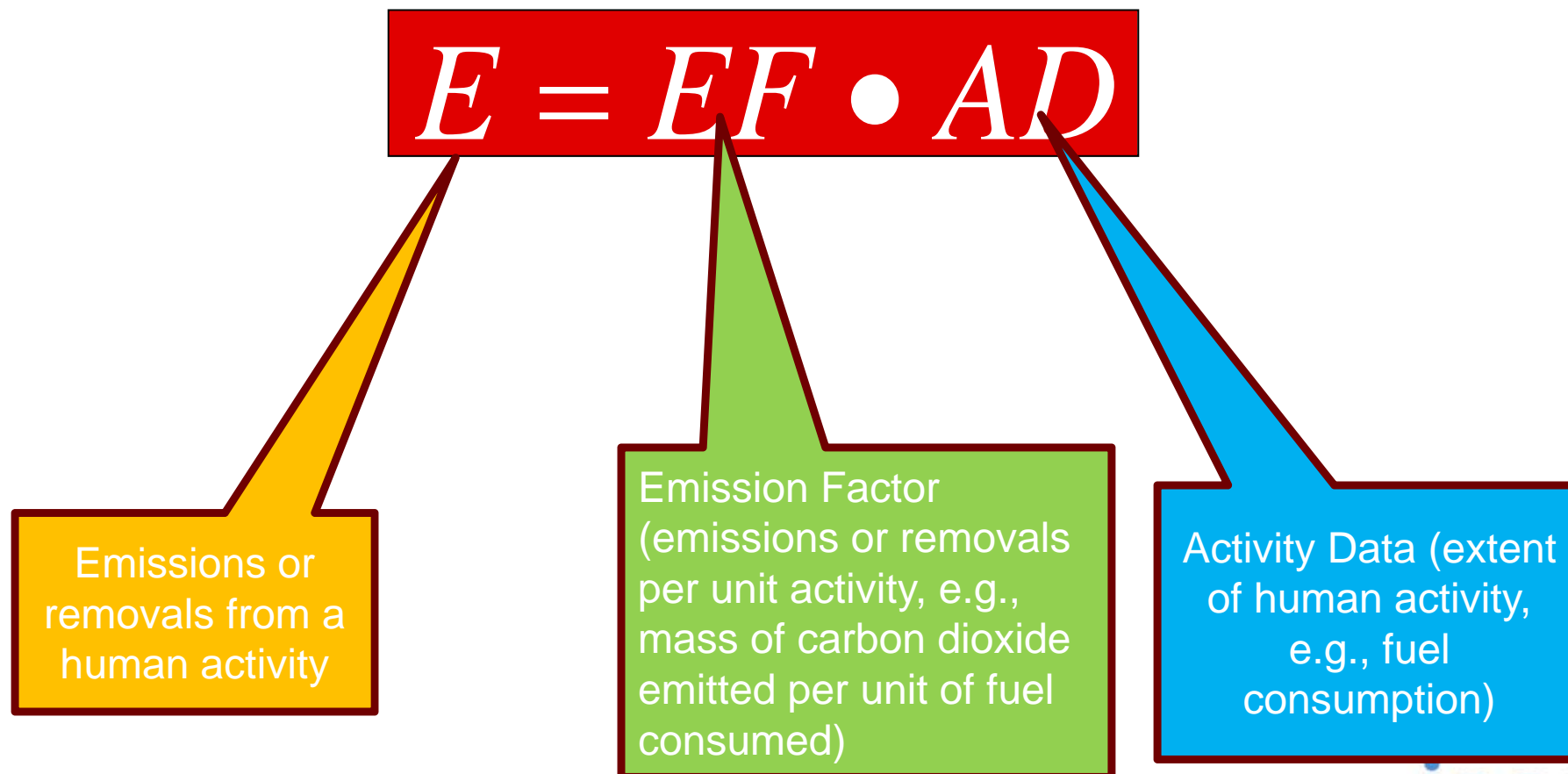
1. All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall:

- (a) *Develop, periodically update, publish and make available to the Conference of the Parties, in accordance with Article 12, national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies to be agreed upon by the Conference of the Parties*

Why do we need GHG inventory guidelines? (2)

- We cannot measure all sources:
 - It would be impractical for many sources and sinks (e.g., road transport, land-use change);
 - Measurement by top-down techniques (e.g., remote sensing techniques) are not available for reliable national-level monitoring.
- It makes sense to make estimates based on parameters associated with emission rates:
 - CO₂ from fuel combustion depends on carbon in fuel
 - CH₄ from livestock is based on feed intake
 - Changes in stocks of carbon in forests give emissions (or removals) of CO₂

The basic idea



Example

- Emissions from fuel use, E (Gg).
 - Activity Data = Fuel Burnt (GJ), B
 - Emission Factor
 - Amount of carbon in fuel (Gg/GJ), C
 - Fraction of carbon oxidised, U
 - Factor to convert carbon to CO_2 (44/12)

$$E = \left(C \cdot U \cdot \frac{44}{12} \right) \cdot B$$

A variety of methods for various category types

- Some categories include measured emissions.
- Some calculations can include many parameters (e.g., land categories)
- Some emissions continue over a period of years: e.g., landfills (solid waste disposal sites) & harvested wood products (HWP)
 - IPCC guidelines provide simple spread-sheet based models for some of these categories (SWDS, HWP).

How Do We Ensure Credibility of GHG Inventory Information?

Credibility of GHG inventory estimates

- GHG inventory estimates need to be **credible**.
- The quality and credibility of GHG inventories depends on the integrity of the methodologies used, the completeness of reporting, and the procedures for compilation of data.
- In order to promote the development of high quality and credible national greenhouse gas inventories a collection of methodological principals, actions and procedures have been defined in the IPCC guidelines and collectively referred to as *good practice*.
- This has achieved general acceptance amongst countries as the basis for development of credible inventories.

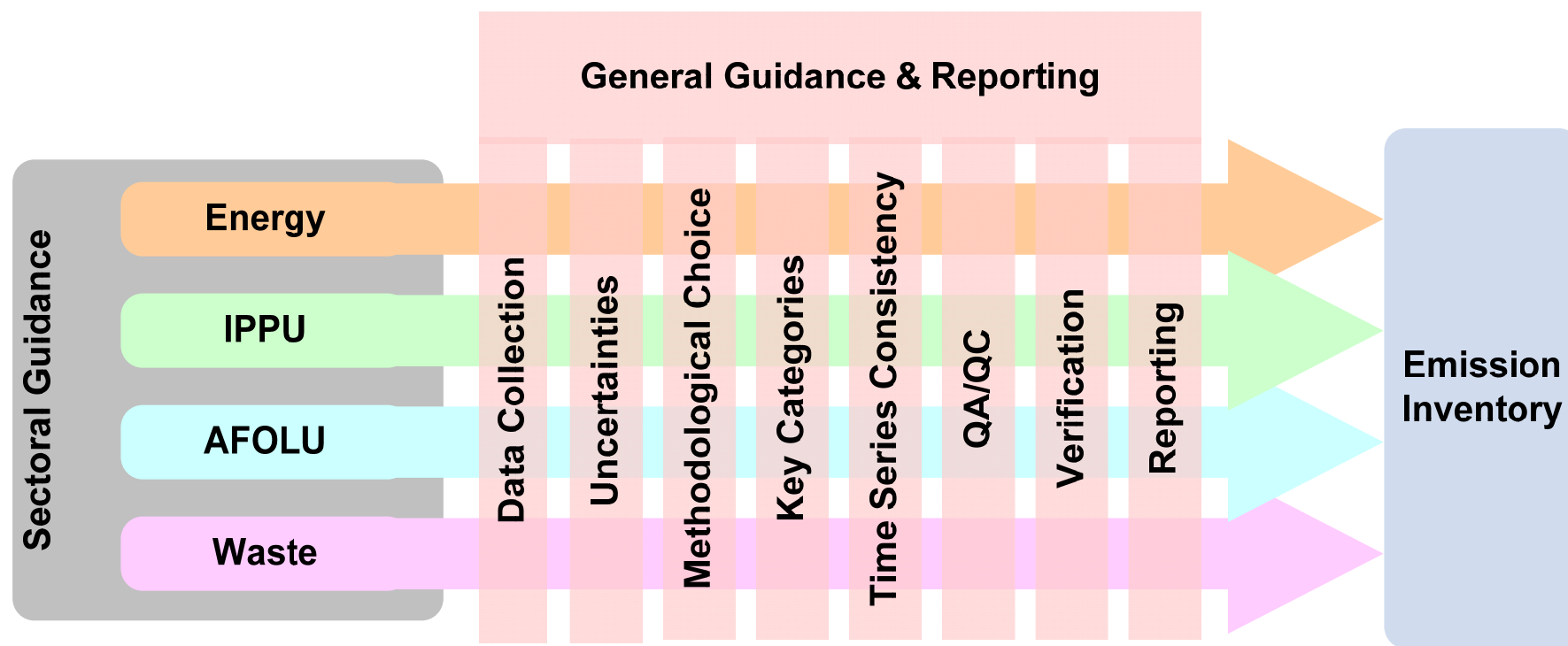
Good Practice

Assists countries in producing inventories that are accurate in the sense of being *neither over nor underestimates* so far as can be judged, and in which uncertainties are *reduced as far as practicable*.

Good practice inventories



GPG & methodologies



Verification

- Verification refers to the collection of activities and procedures conducted during the planning and development, or after completion of an inventory that can help to establish its reliability for the intended applications of the inventory.
- In the IPCC guidelines, verification refers specifically to methods external to the inventory and apply independent data, including comparisons with inventory estimates made by other bodies or through alternative methods (e.g., remote sensing and ambient measurements):
 - Comparisons with independent methods broadly indicate the correctness of methods (within large uncertainties);
 - There are few truly independent estimates for comparisons;
 - Estimating uncertainties will give idea of reliability of estimate.

Summary

- GHG inventories have a variety of uses
 - They help understand the magnitude of the problem and are a key to policy development as well as reporting and monitoring progress towards targets.
- GHG Inventories are only estimates & cannot be completely measured.
- Inventory management and *good practice* are important to ensure the quality and credibility of GHG inventory estimates.



ありがとうございます。!

Obrigada!

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