

Update on GHG emission factors to improve GHG statistics

XII Meeting of the Expert Group on Environment and Climate Change Statistics (EG-ECCS)

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Outline

- ✓ What is an Emission factor (EF)
- ✓ Characteristics of EF values
- ✓ Sources of EF values
- ✓ IPCC Defaults
- ✓ Calculating an EF
- ✓ IPCC Emission Factor Database

What is an Emission factor (EF)

- ✓ A coefficient that quantifies the annual emission/removal of a gas per unit activity:

$$AD * EF = E_{GHG}$$

Where AD is the Activity Data (generally from National Statistics) and E_{GHG} is the amount of the relevant GHG emitted/Removed by the source/sink category

It need to be an unbiased estimator of the GHG emission/removal for the population/sub-population [Activity Data] to which applies

Generally, the terminology EF includes ancillary parameters

Characteristics of EF values

- ✓ Unlikely collected by National Statistics
- ✓ Unlikely to vary annually, although it determines trends in emissions associated with technological changes
- ✓ Stratified to capture the main drivers of emissions within the process (e.g. carbon content, moisture, ash, sulphur and/or technology)
- ✓ Representative of the entire variability of the process and of underlying activity data

Sources of EF values

As preferred:

- ✓ Standardized measurements (e.g. quality control procedures) / Verified outputs of models
- ✓ Peer-reviewed publications
- ✓ Reports, *although not peer-reviewed but supported by Expert Judgement*
- ✓ National GHG Inventories of other countries with similar conditions
- ✓ IPCC default values

IPCC Defaults

- ✓ The average value of a distribution, together with the shape of the distribution and its 2.5 and 97.5 percentile –i.e. 95%CI– [$\text{Uncertainty} = \text{half-CI} / \text{average-value} * 100$]
- ✓ Calculated by Authors based on available dataset, for each and every source/sink category of the National GHG Inventory.
- ✓ Either a global, or a set of regional, and/or a set of technology-specific values
- ✓ Published in the IPCC methodology Reports [*i.e. EF update requires the publication of a new/refined Methodology Report*]
- ✓ Generally calculated for a population larger -i.e. larger variability- than that to which is applied

Nevertheless, it is considered good practice to use country-specific values, where practicable, rather than default IPCC values, following a progressively tiered approach across inventory cycles.

Calculating an EF [1]

Three approaches:

- A. By measurements, through a well-designed measurement programme
 - ✓ representative sample (size & design)
 - ✓ Suitable, and well documented, measurement method
 - ✓ instruments with known performance characteristics and subject to maintenance

Calculating an EF [2]

B. By models

- ✓ Conceptual design completely covers the source/sink and associated process of GHG emissions/removals
- ✓ Validation of the model within the observed variability
- ✓ Continuous verification of model's outputs by comparison with independent datasets/measurements

Calculating an EF [3]

- By statistical inference of data compiled from all available sources
 - ✓ Verify each data quality: coverage, timing, methodology, associated uncertainty
 - ✓ Collect enough data to cover all spatial and temporal variability, as well as the variability of each of the main driver of emissions [e.g. technology, activity data]
 - ✓ Build a distribution, calculate the central tendency and its 95% CI

Under any approaches: the EF calculated shall be unbiased, and the 95% CI is to be **provided**

IPCC Emission Factor Database

A repository of EF values and ancillary parameters :

- ✓ Published by the IPCC Task Force on National GHG Inventories and its Technical Support Unit
- ✓ Open to external contributions
- ✓ Aimed at supporting IPCC authors when refining IPCC default values for EF, and ancillary parameters, as well as calculate new EFs/Parameters
- ✓ Available as a source of information for inventory compilers, although the burden of the choice of the value to use remains on them
- ✓ Currently under revision in its technological infrastructure, from 2026 restarting data upload

EFDB
emission factor database

INTERGOVERNMENTAL PANEL ON climate change

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Basic search

[Select Gases](#) | [Select Fuels](#) | [Select C pools](#) | [IPCC Default Data](#) | [Other \(non-default\) Data](#) | [Regions](#) | [Countries](#)
[Choose table columns](#) | [Hide IPCC Category tree](#) | [Hide status](#)

IPCC Guidelines: 2006

- IPCC 2006 Categories
- 1 - Energy
- 2 - Industrial Processes and Product Use
- 3 - Agriculture, Forestry, and Other Land Use
- 4 - Waste
- 5 - Other

Status

- IPCC 2006 Source/Sink Category: (All)
- Gases: (All)
- Fuels: (All + NA)
- C pools: (All + NA)
- Type of parameter: (All)
- Regions: (All + NA)
- Countries: (All + NA)

Displayed records: 1 - 20 / 27419. ◀ ▶ ⏪ ⏩ Export to XLS

Filter			Select Gases	Select Fuels	Select C pools											(All)	Apply filter
Active Filters																	
EF ID	IPCC 1996	IPCC 2006	Gas	Fuel ⓘ	C pool ⓘ	Type of parameter ⓘ	Description ⓘ	Technologies / Practices ⓘ	Parameters / Conditions ⓘ	Region / Regional Conditions ⓘ	Abatement / Control Technologies ⓘ	Other properties	Value	Unit	Source of data ⓘ	Action	

<https://www.ipcc-nggip.iges.or.jp/EFDB/main.php>

Thank you

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