

# Issues arising from the UNFCCC Inventory Review Process from the Use of Plant-Specific Data and Complex Models

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***Astrid Olsson, Programme Officer***  
UNFCCC secretariat, RDA

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# Introduction (I)

- Revised 1996 IPCC Guidelines
  - a) Countries may use more detailed methodologies, emission factors or activity data where these are compatible with IPCC source categories, and can be shown to give consistent and accurate results. Default emission factors and activity data also provide useful points of comparison for national assumptions. If a country's data vary significantly from the default data, the IPCC asks that the difference be explained.
- IPCC Good Practice Guidance
  - a) Consistency with *good practice* means that inventories should contain *neither over nor underestimates so far as can be judged*, and the uncertainties in these estimates should be *reduced as far as practicable*
  - b) K *Good practice* provides guidance on
    - Choice of estimation method within the context of the *IPCC Guidelines*
    - *good practice guidance* on the choice of estimation method at the source category level by means of decision trees
    - The decision trees formalise the choice of the estimation method most suited to national circumstances



## Introduction (II)

- UNFCCC reporting guidelines for Annex I Parties
  - a) In accordance with the IPCC Guidelines, Annex I Parties may use different methods (tiers) included in those guidelines, giving priority to those methods which, according to the decision trees in the IPCC good practice guidance, produce more accurate estimates. In accordance with the IPCC Guidelines, Annex I Parties may also use national methodologies which they consider better able to reflect their national situation, provided that these methodologies are compatible with the IPCC Guidelines and IPCC good practice guidance and are well documented and scientifically based.
  - b) For categories that are determined to be key categories, in accordance with IPCC good practice guidance, and estimated in accordance with the provisions in paragraph 13 below, Annex I Parties should make every effort to use a recommended method, in accordance with the corresponding decision trees of the IPCC good practice guidance. Annex I Parties should also make every effort to develop and/or select emission factors, and collect and select activity data, in accordance with the IPCC good practice guidance.



## Coverage of Plant-specific Data in Annex I Parties' inventories

- Plant-specific (PS) data more common in GHG inventories over time
  - a) 33 out of 42 Annex I Parties use PS data in their 2010 submissions
  - b) Mostly used in energy and industrial processes sectors
  - c) Sometimes also in waste sector
- Most PS data used in the preparation of GHG inventories are coming from a form of reporting (e.g. environmental reporting, EU ETS etc.)
- However, not all PS data reported as PS data are “real” PS data



## Derivation of Plant-specific Data

- Measured emission data for a specific plant
- Estimate based on plant-specific EF
- Data reported as PS data are not necessarily PS data
  - a) Could be based on PS AD coupled with a “general” EF (e.g. IPCC default or country-specific)
  - b) Averaged data based on a cluster of plants

## Use and Reporting of Plant-specific Data

- Use of PS data
  - a) Directly (as emission estimate)
  - b) Partially (AD and/or EF and/or other parameter) used to derive an emission estimate
  - c) Quality assure an estimate
- Reporting of PS data
  - a) Require quite detailed information in the NIR to understand
    - What PS data are used in the reporting
    - How the PS data are used in the inventory
  - b) Detail and depth of information provided differs among Parties



## Problem(s) identified with Plant-specific Data in Annex I Parties' Inventories

- Transparency – “THE” problem
  - a) NIR needs to include enough information to understand
    - How PS data are derived
      - Measured emissions, PS EF, averaged data
      - Data that not really are PS
    - How PS data are used in the inventory
    - What is the quality assurance (QA) of the PS data (especially if the data are directly used in the inventory)
      - Specific/independent verification
      - Control/check by the inventory agency
    - QA in line with IPCC good practice guidance
- Time-series consistency





## Some examples of issues raised by review teams with PS data from 2009 review cycle (I)

- Common recommendations from ERTs to Parties which have used PS data
  - a) ERT concluded that the Party has not provided sufficient information in its NIR, to allow the ERT to verify:
    - Whether these data have been prepared and incorporated into the inventory submission in line with the IPCC good practice guidance
    - Whether these data have been subjected to quality assessment (QA) and/or verification and how this relates to corresponding QA and/or verification procedures set out in the IPCC good practice guidance
    - How time-series consistency has been ensured when using these data in the inventory, and the effect of the use of these data on the trend in emissions.



## Some examples of issues raised by review teams with PS data from 2009 review cycle (II)

- Parties that use verified PS data directly in the inventory (i.e. the verified emission estimates)
  - a) PS data rarely covers whole category
    - How are non-PS data covered in the category?
    - How does Party ensure that whole category is covered (no double counting and no omission of emissions)?
  - b) On what basis are data reported as being PS data derived (measured emissions/EF, “general” EF)?
    - “general” EF can be outdated or no longer relevant
    - For non-PS sources a Party mixed verified emissions data (based on “general” – outdated EF) with estimates based on AD\*EF (newer EF used)
  - c) ERT conclusion
    - More detailed and transparent information to be provided
    - Party only to use measured emissions/EF as PS data



## Higher tier methods and models (I)

- More common in Annex I Parties' inventories
- Mostly used for transport, agriculture and LULUCF
- Does use of higher tier method/model directly improve quality and certainty of emission estimates?
  - a) Can only be determined if the following information is available in the NIR or additional information
    - Basis of the higher tier method/model
    - Assumptions and make-up of method/model
    - Quality of data in or derived by the model
    - Verification (e.g. ground-truthing)
    - Calibration of model
    - Validation



## Higher tier methods and models (II)

- Does use of higher tier method/model directly improve quality and certainty of emission estimates?
  - b) Input data, EFs, parameters, assumptions etc. can be outdated or not representative
    - E.g. transport sector
      - N<sub>2</sub>O EFs for road transportation
      - Aviation estimates based on average of aircraft engine types and LTO cycle information

## Expert Review Team Challenges with Higher Tier Methods and Models

- Transparency – “THE” problem when reviewing higher tier methods and models
  - a) Impossible to review during a centralized review (especially complex models)
    - NIR does not always contain all necessary information (assumptions, parameters, etc.)
    - Expert does not have direct access to the model itself
  - b) Almost impossible to review during an in-country review
    - If there is a lot of literature describing the model in detail
    - Model often a “black box”



## Some examples of issues raised by review teams with PS data from 2009 review cycle

- Recommendations from ERTS:
  - a) Party to compare tier 3 model estimates with a tier 2 method/model and prove information on the sensitivity analysis, model calibration and accuracy assessment
  - b) Party to describe the source and manner of application of the N<sub>2</sub>O EFs in the model used and include the time-series of the nationally-averaged EFs in the NIR
  - c) Implement the additional quality checking of all outputs from the model in its next submission, and document these quality checks in its NIR and ensure the CRF tables are completed without errors for the next submission
  - d) Due to constant changes in model parameters and inputs of the model, Party should include a more thorough validation of and more detailed documentation for the estimates, in the NIR of its next submission



## Conclusions (I)

- Transparency is “THE” issue when it comes to reporting and reviewing plant-specific data and higher tier methods and models
  - a) Plant-specific data
    - How are PS data derived?
    - How are PS data used in the inventory?
    - What is the quality assurance (QA) of the PS data (especially if the data are directly used in the inventory)?
    - QA in line with IPCC good practice guidance?
    - Time-series consistency



## Conclusions (II)

- Transparency is “THE” issue when it comes to reporting and reviewing plant-specific data and higher tier methods and models
  - b) Higher tier methods and models
    - Basis of the higher tier method/model
    - Assumptions and make-up of method/model
    - Quality of data in or derived by the model
    - Verification (e.g. ground-truthing)
    - Calibration of model
    - Validation

