Outline

- Inventories for different users
  - Scientists:
    - Understanding air pollution
    - Input to (atmospheric) models
  - Policy makers:
    - Monitor progress of environmental policy
    - Proving compliance with national & international protocols
- Quality aspects depend on inventory application
- Verification
- Validation (IPCC Good Practice Guidelines definition)

Verification
Verification refers to the collection of activities and procedures that can be followed during the planning and development, or after completion of an inventory that can help to establish its reliability for the intended applications of that inventory.

Typically, methods external to the inventory are used to check the truth of the inventory, including comparisons with estimates made by other bodies or with emission and uptake measurements determined from atmospheric concentrations or concentration gradients of these gases.

Validation
Validation is the establishment of sound approach and foundation.

In the context of emission inventories, validation involves checking to ensure that the inventory has been compiled correctly in line with reporting instructions and guidelines. It checks the internal consistency of the inventory. The legal use of validation is to give an official confirmation or approval of an act or product.
# Perspectives on Data Quality and Intended Use of the Data

<table>
<thead>
<tr>
<th>Role</th>
<th>Perspective</th>
<th>High Quality</th>
<th>True</th>
<th>Agreed</th>
<th>Convincing</th>
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Verification & Validation

Real world emissions

Guidelines applied?
Validation

True?
Verification

Emission inventory
**Verification**

- indicates truth, reliability and credibility of the data reported.
- external checking

**Validation**

- the establishment of sound approach and foundation
- internal checking

**True?**

**Agree?**
Verification

Methods:
- Error propagation
- Independent checks
- Measurements and models

Objectives:
- Accuracy (no systematic error)
- Precision (no random error)

Validation

Methods:
- Country comparisons
- Quality control
- Auditing
- Feedback

Objectives:
- Transparency
- Comparability
- Completeness
- Consistency
- Accuracy

Uncertainties in Emission Inventories
### Sources of unreliability

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- **Insufficient documentation**
- **Different methods for different years**
- **Incomplete reporting**
- **Deviations of sector split and fuel defs**
- **Deviations in sector grouping**
- **Incomplete reporting**
- **Omissions of sources and/or pollutants**
- **See below**
**Sources of inaccuracy**

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<td>✓ Extrapolation error</td>
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<td>✓ Incompleteness</td>
<td>✓ Measurement error</td>
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<td>✓ Mathematical formulation error</td>
<td>✓ Unknown developments</td>
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<td>✓ Reporting error</td>
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Assessing uncertainty

Emission Inventory

Uncertainty Analysis

Reliability
• Meets user defined quality criteria?

Accuracy
• Identification and quantification of uncertainties

Evaluation
Identify improvements in reliability and accuracy

Uncertainties in Emission Inventories 06/05/02 9
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FRamework for the Assessment of Uncertainty in Large scale Emission Inventories
Discussion and conclusions

• Uncertainty can be discussed from different perspectives:
  • Scientific Accuracy and precision
  • Policy oriented Reliability TCCCA

• Depending on the perspective different tools should be used:
  • Scientific Identification, quantification of uncertainties
  • Policy oriented Auditing

• In the end inventories in policy applications do not need to be “the best”. They need to be “good enough”.

Thank you