

# Introduction

IPCC Expert Meeting on Use of Models and  
Measurements in GHG Inventories

9-11 August 2010,  
Sydney, Australia

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INTERGOVERNMENTAL PANEL ON climate change



# Aim

- To provide a meeting report to supplement the 2006 IPCC Guidelines by providing additional suggestions on how to document and report Tier 3 approaches, models and emission measurements and how to demonstrate their consistency with the IPCC Guidelines (not just AFOLU but across all sectors).
- The meeting will focus on two main areas –
  - Use, validation, review and documentation of models (e.g. NCAS, COPERT, the nitrogen cycling model used in the EC, or splitting HFC components)
  - Facility level data and how this is incorporated into complete national inventories, including the use of measurements at facilities.
- This meeting is NOT to assess each of the models presented, or to compare them or to argue which is better.

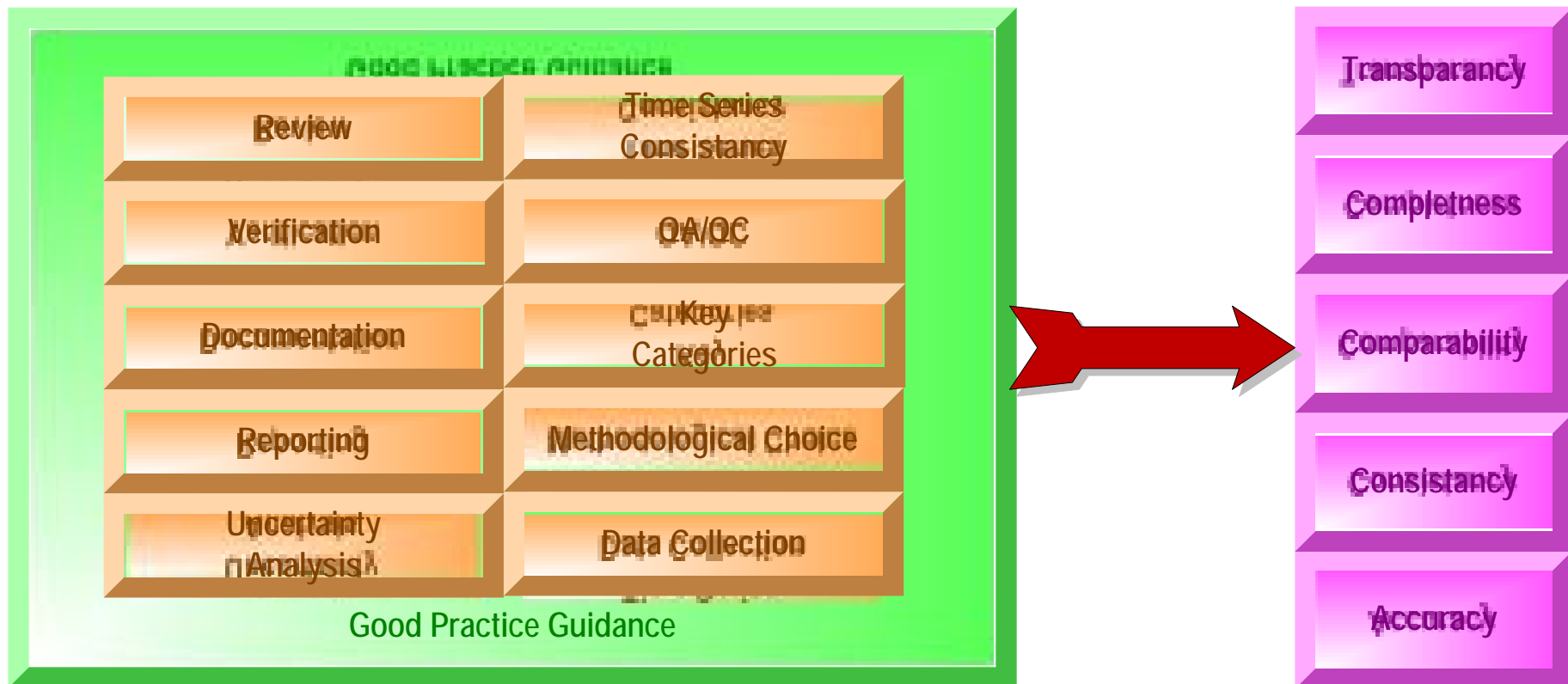
# Background

- The 2006 IPCC Guidelines focus on providing guidance on simple, widely applicable, methods leaving nationally specific more complex approaches (generally “Tier 3”) to national inventory compilers to design and document.
- This meeting will consider:
  - Complex models: how they should be reported and documented and how they could, in general be validated, i.e. demonstrate consistency with guidelines;
  - Inclusion of facility level data, both estimates and measurements
  - Ensuring inventories can track mitigation efforts in a transparent way

# Models and Measurements

- The IPCC guidelines provide for methods in a wide range of complexity described as Tier1, 2 or 3: models show a similar range
- General good practice requirements apply to all approaches from the most simple to the most complex methods
- Models and Measurements can be used in any sector
  - Model for CH<sub>4</sub> from landfills
  - F-gas estimates
  - CO<sub>2</sub> emissions from large power plant
  - Forest and Land Use models
- Complex approaches need to be “reviewable” to be credible – i.e. transparency is important!

# Good Practice Guidance



# Transparency

- Documentation is important
  - Inventory reports but consider others – e.g. peer reviewed literature, manuals etc.
- Can the methods be understood by reviewers? What are the assumptions?
  - Are assumptions and model structure well documented?
- How has the model been tested, calibrated and validated?
- Is there a QA/QC plan?
- For models what input data is needed? Is this compatible with model time and spatial scales?
- For measurements – is there a clear sampling scheme/plan? How are national estimates made from sample measurements?
- What is the uncertainty?

# Consistency

- Need to produce results consistent over time: results should provide a realistic time-series
- How are these results integrated with remainder of inventory (e.g. measurements may not cover the same sources every year)
- Are model outputs really for the same sources/sinks as Guideline sectors?
- Are time and spatial scales consistent throughout?

# Comparability, Completeness, Accuracy

- Will the results be comparable with estimates made by other countries?
  - Reporting categories
  - Definitions
  - Time scales
- Will the results be comparable with lower tier estimates?
- How has completeness been ensured?
  - measurements may not cover all sources
- Uncertainties can, and should, be assessed.
  - How has Tier 3 improved the results for the category?
- How has this been documented?

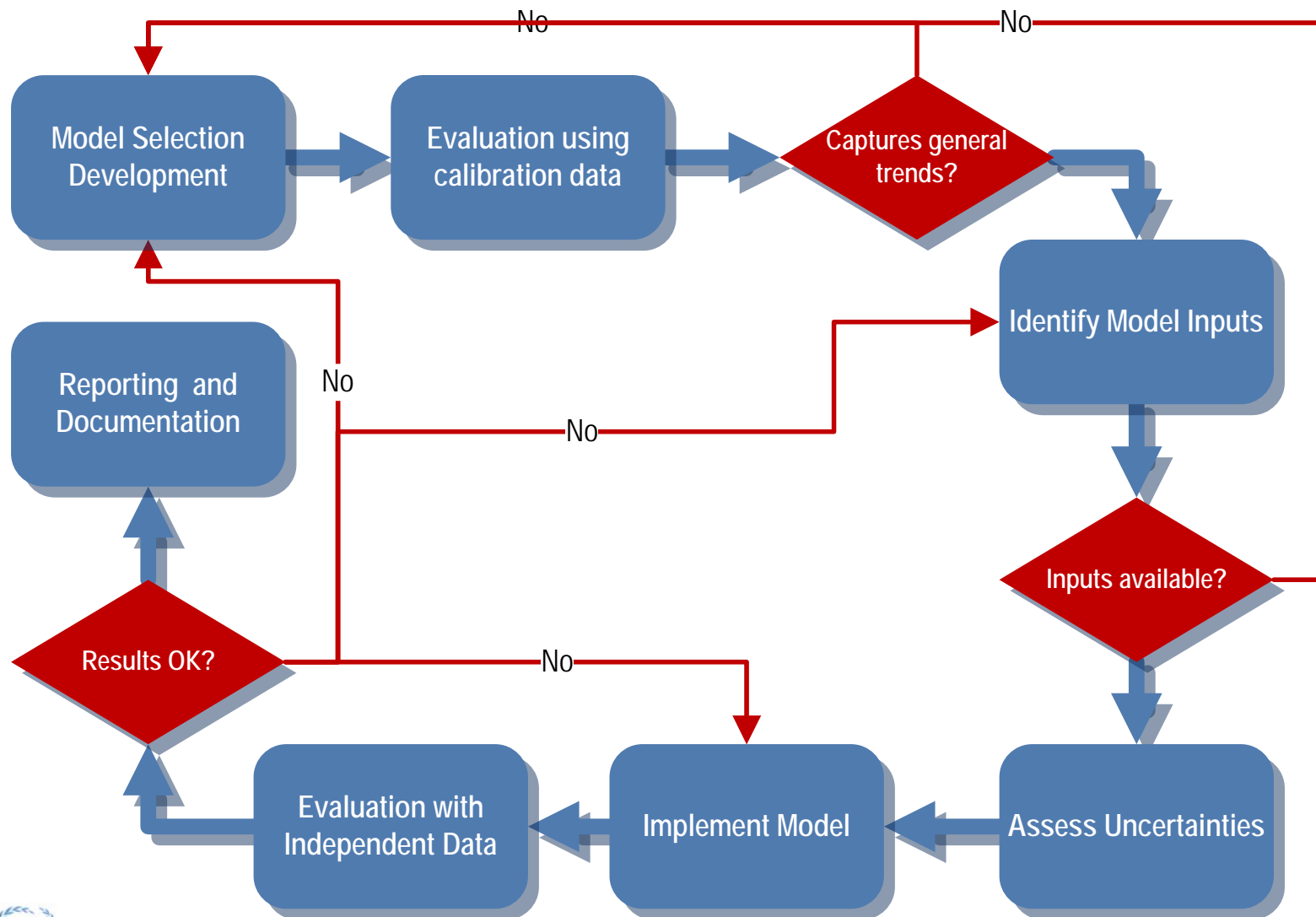
# Tier 3 Measurements

1. Develop Sampling scheme
  - Methodology handbook
2. Select Sampling sites
3. Collect initial sample
  - Document measurements and environmental conditions
  - Establish & document measurement protocols
4. Re-sample the monitoring network on a periodic basis
5. Analyse data and infer national emissions/removals and uncertainties
  - management practices and environmental conditions
6. Reporting and documentation
  - complete and document QA/QC as well

# Tier 3 Models

1. Select/develop model
  - Consider input data and resource needs
2. Evaluation with calibration data
  - Model responds correctly and is consistent with reporting requirements
3. Gather spatio-temporal data needed for model
  - Input data consistent with scale of model
4. Quantify uncertainties
5. Implement model
6. Evaluation with independent data
7. Reporting and Documentation
  - Document key assumptions

# Tier 3 Model Development



# UNFCCC Lead Reviewers

- the LRs noted that the IPCC good practice guidance provides a good basis for the review of emission estimates.
- that there is a need for further work on good practice for the transparent reporting of tier 3 methods and models used for GHG inventory estimates in order to facilitate reviews by ERTs,
- and recognized that this additional good practice could involve further work by the IPCC.

# Lead Reviewers - Considerations for Reviews

- ... detailed and transparent information on the method used ...;
- ... focus on input data, key assumptions, the type of model used and the parameters used therein, and on output data, in order to ascertain whether or not the model is sufficiently robust;
- ... information is provided ... on whether sensitivity analysis, calibration and validation of the model have been conducted, quality assurance/quality control (QA/QC) activities have been undertaken, and model outputs have been verified (e.g. comparison with a tier 2 method and any differences transparently explained);
- ... publication and peer review of models/methods used;

# Format of This Meeting

- Invited presentations
  - Relationship of measurement/model to methods in the Inventory Guidelines
  - Benefit of measurement/model Tier 3 over Tier 2 approach
  - How measurement/model are validated, documented and made transparent and reviewable
  - How measurement/model data is integrated with IPCC Guidelines methods
  - Specific examples of problems, issues and, if possible, good practice, as well as raising questions for later discussion
- Break-out Group Discussions
- Plenary Sessions

Thank you



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