Indonesia's Experiences in Developing of Time Series Estimates and Projections

(Inluding Evaluation of Impacts of Policies and Measures)

The 6th Workshop on GHG Inventories in Asia (WGIA6)

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OUTLINE

1. Practical aspects of uncertainty assessment and key category analysis in GHG inventory
2. Indonesia experiences with time series estimates & projections
3. Possible improvements to the data collection in Agriculture, LULUCF and Waste sectors
4. Possible ways of enhancing cooperation among Japan, the US, European countries and Asian countries to promote inventory-related work in Asian countries taking the Bali Action Plan and other recent international agreements into account

Practical Aspects of Uncertainty Assessment and Key Category Analysis in GHG Inventory

1. Existing data concerning GHG sources & sinks of Indonesia are those given in GHG Inventory of INC → in the INC the term 'Key' category of GHG sources & sinks have not been yet analysed.
2. The most up-dated data regarding key source & sink categories analysis for GHGs of Indonesia is currently under preparation by a national working group administered by Ministry of Environment & other relevant institutions that will produce the Second National Communication (SNC).
3. In preparing 'Key' sources & sinks, IPCC 1996 guidelines relevant to the methodology & computational procedures for determining Key category of sources & sinks is used. In addition, IPCC Good Practice Guidance (IPCC, 2000) and the IPCC Good Practice Guidance for LULUCF (IPCC, 2003) are used in identifyng of key categories of emissions and removal.

4. Furthermore, the SNC will assess possible impacts of the changes of government structure from centralized to decentralized (regional autonomy) to the SNC reporting coverage.
5. Indonesia is grouping the source & sink categories into 6 sectors: energy, industrial process, agriculture, LUCF, waste, coastal.
   - energy sector: the national inventory only covers emission from fuel combustion, in which the fugitive emissions are not included in SNC
   - At the moment, the inclussion of solvent and other products in the national inventory are difficult to be achieved (but not for the years when the relevant activity data are available)
   - SNC will include the emisions from antrophogenic activity in coastal area and the coastal potential as emisions sink.
   - SNC will cover emissions from various wastes (waste sector in INC only cover domestic solid waste). The SNC are carying out sensitivity & uncertainty analyses for some waste categories.

Key Source & Sink categories

	SECTORS	DESCRIPTION OF ACTIVITIES INCLUDED
1	Energy	Total emission of all greenhouse gases from stationary and mobile energy activities (fuel combustion as well as fugitive fuel emissions).
2	Industrial Process	Emissions within this sector comprise by-product or fugitive emissions of greenhouse gases from industrial processes. Emissions from fuel combustion in industry will be reported under Energy. Emissions should, wherever possible, be reported according to the ISIC Group or Class within which they occur.
3	Solvent & Other Product Use	Not covered
4	Agriculture	Describes all anthropogenic emissions from this sector, except for fuel combustion & sewage emissions, which are covered in energy and waste modules.
5	LUCF	Emissions & removals from forest & landuse change
6	Waste	Emissions from waste management
7	Coastal/Ocean	GHG emissions & removals from ocean activities.

6. Completeness of SNC inventory will be improved by including sources that were not included in INC. The SNC will include more sources of emissions, sinks, and GHG components as mandated in 17/CP8 Kyoto Protocol. The new data of estimated HFCs, *PFCs* and SF_6 emissions are included in SNC while in INC only cover CO_2, CH_4, and N_2O. If necessary, NOx and CO components will be included as written in the IPCC guideline (revised 1996) and Indonesia's document on the INC.
7. The IPCC (1996) Inventory Guidelines will be adopted in developing the GHG inventory for the SNC. However, if the emission factors are not available, the National GHG Inventory Team will assess the use of the 2006 or 1996 IPCC guidelines. The assessment aims to see potential problems, barriers and approach to remove the barriers if the 2006 IPCC guideline will be adopted in future national communications
8. Differing interpretations of source & sink categories, or other definition, unit, assumption, etc will be main causes of uncertainty → SNC are preparing key categories analysis as well as uncertainty analysis for some of key categories.

Indonesia Experiences with Time Series Estimates & Projections

- The estimation of GHG Inventory in SNC uses 2000 as base year with the time series 5 years (INC base line 1994 and time series 5 years). The projection of the GHG source & sink potentials of the SNC is up to 2025 (INC is also 2025) → KEN (National Energy Policy of Indonesia), i.e. estimation data in energy sector is up to 2025.
- In estimating GHGs from sectors in the SNC, Indonesia uses as much as possible local emission factors that are already available, particularly from agriculture and forestry sector. However, not all sectors covered in the GHG inventory have local emission factors.
- The emission factors used in INC are default value as provided in the IPCC guideline (revised 1996) while in the SNC, some of those factors are revised according to recent Indonesia's circumstances, particularly those that are not available in the INC document i.e. agriculture & forest sectors.

Methods Applied for Time Series Estimation & Projection

- Energy sector: Model for projection will depend on that are already used in energy sector (PUSDATIN and BPPT). ALGAS project (1997) used Dynamic Model. Components of dynamic model that are not included in Markal :
  - Delay of impacts when a certain policy is implemented.
  - Markal uses econometry base since dynamic model uses dynamic base in which feed back is important;
  - Markal (new version) uses specific program (BPPT) since Dynamic uses common program, i.e. Powersym, Vensym, Stella, etc
- **Industry & Waste Sectors**: Econometry model seems promissing for GHG estimation and projection in the SNC inventory, however, for future inventory dynamic model can be considered.
- **AFOLU**:

  Agriculture
  - Estimating: Satelite images and local emission factor.
  - Proyection: BAU scenario target is based on the projection demand and other scenarios will include mitigation optins.
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Forestry

- For estimating forest covers: using Satelite images ('Citra Landsat)'.
- Two sources of data / information might be applied:
    a. Main source: Ministry of Forestry;
    b. Second sources: MoE ('Towards Greener Indonesia' Program), as well as other institutions (National Aeronautics and Space Agency)
- Projection: BAU scenario target is based on the projection demand and other scenarios will include mitigation options.
- Assessments of GHGs mitigation options in forestry sector show that cost effectiveness and mitigation potential of the same option vary among studies (primarily due to the change in input data) [INC] → Identify mitigation activities in forestry and estimates their cost-effectiveness & carbon mitigation potential using the most recent available data and analyzed the impact of mitigation options on national carbon stock. [SNC]

GHG Inventory and Emission Factors

- In the SNC, total emissions from energy sector are estimated with topdown (reference) approach and compared with those obtained from bottom-up (sectoral) approach. Other sectorS → topdown
- The various emissions from the energy system are organised in two main categories: namely fuel combustion emissions and fugitive emissions generated from energy production systems (coal mining, oil and gas production facilities, refinery, fuel transportation, etc).
- The methododology for estimating the gases from energy sector will apply Tier 3, except for fuel combustion (bottom-up): are divided in Tiers encompassing different levels of activity and technology detail. While, other sectors (including AFOLU): Tier 1.
- Local emission factors are going to be used, particularly for energy, forest, Agriculture (rice field), and waste sectors. Other sectors use default factors (as listed in IPCC guideline 1996) that are internally consistent and it is essential to preserve this consistency when replacing the default by local values so that total emissions of carbon (for example) do not exceed the carbon available in the fuel.

Gaps & Priorities of GHG Inventory:

a. INC GHG Inventory covers CO_2 & CH_4 in energy, industrial process, agriculture, waste, LUCF sectors (IPCC Guidelines 1996 with the base year 1994)

b. Experience from INC - :
   - main problems: gaps & uncertainty of some data, and non-availability of related local emission factors)
   - identified needs: strengthen institutional capacity to collect & collate data, and establish local emission factors
   - recommendation: the need to reduce uncertainties, verification & interpretation of collected data, and develop user-friendly database system for future updating.

c. GHG inventory for SNC:
   - Main focus on CO2, CH4, N2O, and other gases (PFC, SF6, HFC) where possible (depending on data availability) with base year 2000
   - Uses IPCC Revised Guidelines (1996), IPCC Good Practice Guidance and Uncertainty Management for National GHG Inventories (2000), Good Practice Guidance for LULUCF (2003)
   - Sectors: energy, industrial processes, agriculture, waste, land-use & forestry, and coastal
   - Consider the New governmental structure

e. Key Sources of GHG emissions/removals:

- Energy – combustion in energy industries, manufacturing industries, transportation, residential & commercial, & agriculture; fugitive emissions from coal mining & handling, and oil & gas operations; burning of biomass fuels
- Industrials processes – cement production; lime production (mineral products); ammonia/fertiliser & petrochemicals (chemical industries); iron & steel, and aluminium productions (metal products)
- Agriculture – enteric fermentation in domestic livestock; manure management; flooded rice cultivation; field burning of agriculture
- Land-use change & forestry – changes in forest & other woody biomass stock; forest & grassland conversion; abandonment of managed lands; emissions & removals from soil; on-site burning of forest
- Waste – landfills; domestic & commercial wastewater treatment; industrial wastewater treatment
- Coastal: Antropogenic activitIies in the coastal area

Proposed Improvements of the National GHG Inventory

ITEM	INC	Needs of improvement
Type of GHG emissions	CO_2, CH_4, N_2O	Inclusion of other GHGs under IPCC 1996 guideline
Emissions sources	Energy sector	Improve all sources as fuel combustion as well as fugitives
	Industrial Processes (mineral, chemical, metal)	More detail for emission sources in industrial processes (by type of industry)
	Agriculture (domestic livestock, rice cultivation, prescribed burning of savanna, field burning of agricultural residues, agriculture soils) Land Use Change and Forestry (LUCF)	Completing all emissions from all sub-sectors of Agriculture since in INC not all emissions of these sources were covered. In addition, the SNC will use more local emission factors. Improve sources of LUCF (changes in forest & other woody biomass stocks, CO2 from forest & grassland conversion, on site burning of forest, e.g. emissions of non-CO2 trace gases, abandonment managed lands, CO2 emissions or uptake by soil from land-use change & management) In the SNC, agriculture & LUCF will be merged as AFOLU
	Waste (landfill) and other wastes	Inclusion of emissions from various wastes (domestic and commercial/Industry WWT)
Inventory Methodology	Referring to IPCC (revised 1996) Methodology	Full mplementation of the 1996 IPCC Methodology
Methodology to calculate GHG emissions	Energy sector (fuel combustion) - IPCC reference approach - IPCC Tier 1 methodology or sectoral approach	Energy Sector: - IPCC reference approach - Detailed Methods (IPCC Tiers 2/3): Emission estimations are based on detailed fuel information covering stationary and mobile sources
Emission factors	Default value of the 1996 IPCC	Local emission factors (if available) otherwise use IPCC 1996 default value

Possible improvements to the data collection in Agriculture, LULUCF and Waste sectors

- Waste Sector: the inclussion of domestic & commercial wastewater treatment; industrial wastewater treatment;
  - improving local emission factors and taking into consideration the implementation of mitigation projects in a number of large industrial companies.
  - Establishment of regional dumpsites will increase the potential of waste to energy projects, especially in urban cities
- LUCF: improving activity data through the use of GIS/satellite assessment, emission and removal factors through the use of NFI and researches and adding new sources (emission from wetlands, particularly from peatlands)
- Agriculture: improving emission factors for rice and cattle and taking into consideration the implementation of mitigation projects

Potentially Identified activities for cooperation

- Strengthen institutional capacity to collect & collate data, and establish local emission factors
- Enhancing capability of Indonesia to reduce uncertainty of emission inventory data through:
  - Developing local emission factor that may have implication to availability of sampling and measurment laboratory
  - Upadating land use change and forest cover map
  - carry out research on the assessment of local emission factors for forestry (peat), agriculture, waste sectors
  - GHG emissions and removal potential of Anthopogenic activities in coastal areas
- Establishing National CC data center (including inventory data/information) that have to support with national capacity in dealing with the CC
- Developing Indonesia climate model concerning emission projection and analysis of the impact of policy and measures to the emission projection

Thank you