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DEVELOPING THE PHILIPPINE GHG INVENTORY: OPPORTUNITIES, CHALLENGES AND NEXT STEPS

18TH ASIA-PACIFIC SEMINAR ON CLIMATE CHANGE
"BUILDING AN ARCHITECTURE OF AN EFFECTIVE FUTURE REGIME"

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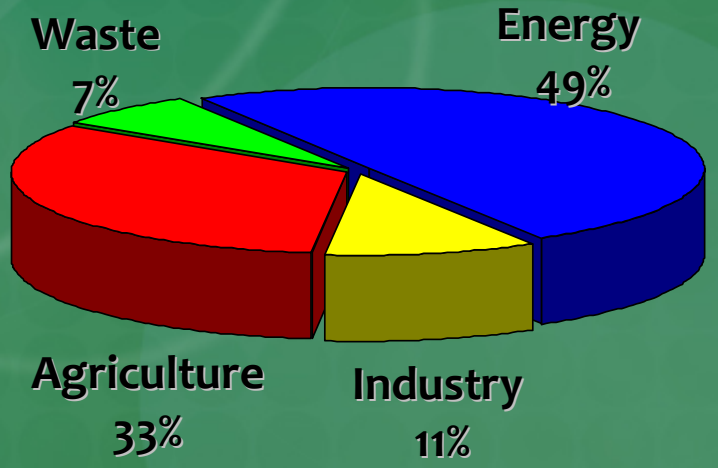
GHG Inventory

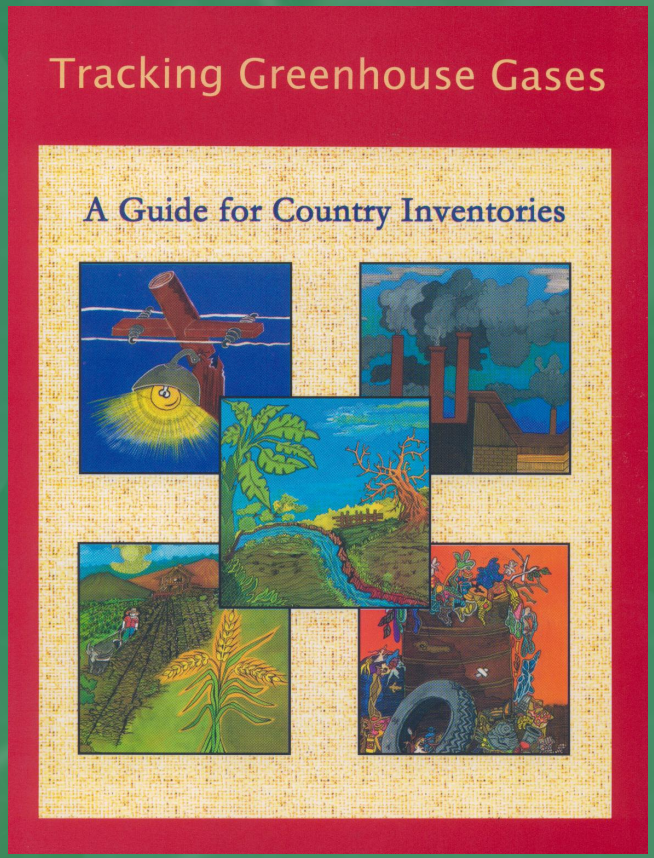
- The inventory is an indispensable tool in identifying sources and sinks of GHGs associated with a country's development trajectory
- 2 national inventories
  - 1990 per US Country Studies Program
  - 1994 per Revised 1996 IPCC Guidelines (2000 Initial National Communication)
- Default emission factors were mainly used

Sector	CO_2 Emissions (Gg x 10^3)
Energy	50.0
Agriculture	33.1
Industry	10.6
Waste	7.1
Total	100.8



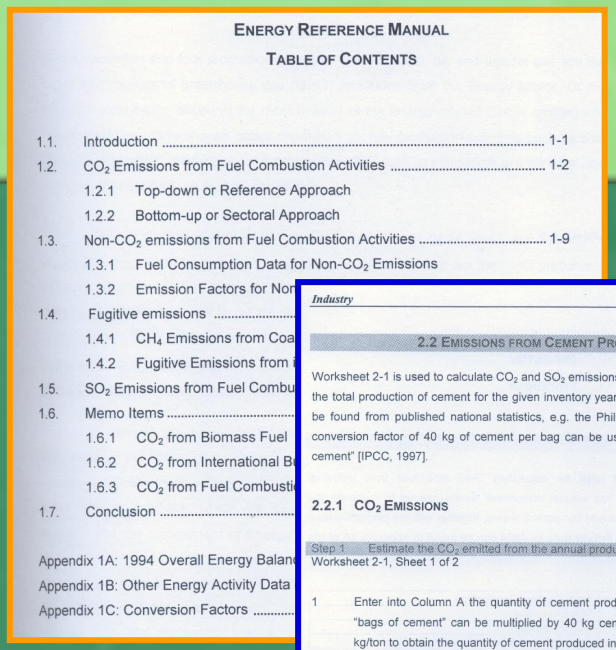
GHG Manual

- Part of the commitment of Parties to the Convention is to develop, periodically update and publish a national GHG inventory of anthropogenic emissions by sources and removals by sinks
- Came up with a reference manual and a workbook
- Methodology adopted for the calculations taken from the Revised 1996 IPCC Guidelines for National GHG Inventories



More than an accounting tally on a spreadsheet:

- A reference manual – describes technical issues and assumptions behind the calculations
- A workbook – written in recipe style to facilitate entry of figures into worksheets
- A set of worksheets – shows actual lining up of numbers that went into the inventory computation
- *As such, it enables other agencies, organizations and even countries with comparable geo-social features to conduct similar exercises*



ENERGY REFERENCE MANUAL

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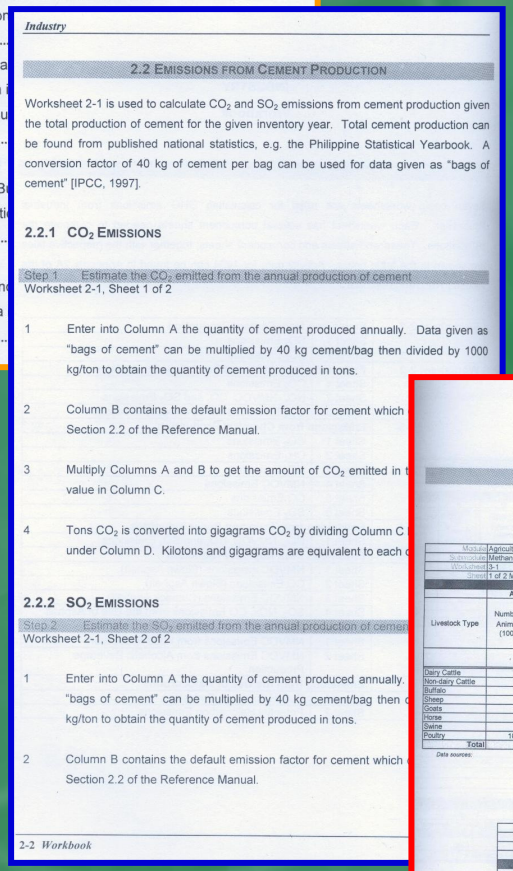


Industry

2.2 EMISSIONS FROM CEMENT PRODUCTION

Worksheet 2-1 is used to calculate CO_2 and SO_2 emissions from cement production given the total production of cement for the given inventory year. Total cement production can be found from published national statistics, e.g. the Philippine Statistical Yearbook. A conversion factor of 40 kg of cement per bag can be used for data given as "bags of cement" [IPCC, 1997].

2.2.1 CO_2 EMISSIONS

Step 1 Estimate the CO_2 emitted from the annual production of cement
Worksheet 2-1, Sheet 1 of 2

1 Enter into Column A the quantity of cement produced annually. Data given as "bags of cement" can be multiplied by 40 kg cement/bag then divided by 1000 kg/ton to obtain the quantity of cement produced in tons.

2 Column B contains the default emission factor for cement which Section 2.2 of the Reference Manual.

3 Multiply Columns A and B to get the amount of CO_2 emitted in t value in Column C.

4 Tons CO_2 is converted into gigagrams CO_2 by dividing Column C under Column D. Kilotons and gigagrams are equivalent to each

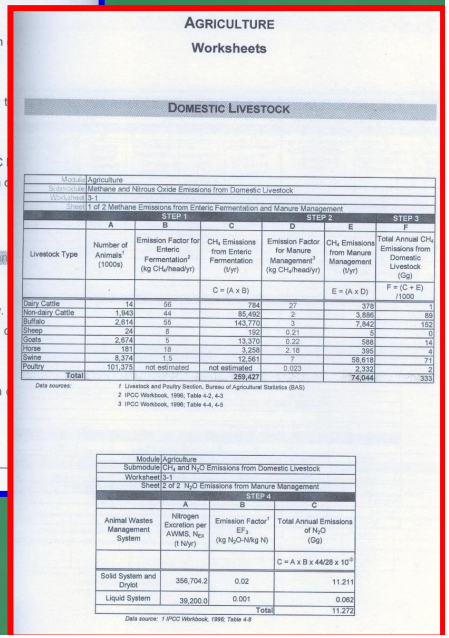
2.2.2 SO_2 EMISSIONS

Step 2 Estimate the SO_2 emitted from the annual production of cemer
Worksheet 2-1, Sheet 2 of 2

1 Enter into Column A the quantity of cement produced annually. "bags of cement" can be multiplied by 40 kg cement/bag then kg/ton to obtain the quantity of cement produced in tons.

2 Column B contains the default emission factor for cement which Section 2.2 of the Reference Manual.

2-2 Workbook



AGRICULTURE

Worksheets

DOMESTIC LIVESTOCK

Module: Agriculture
Submodule: Methane and Nitrous Oxide Emissions from Domestic Livestock
Worksheet: 3-1
Sheet: 1 of 2 Methane Emissions from Enteric Fermentation and Manure Management

	STEP 1		STEP 2			STEP 3
	A	B	C	D	E	F
Livestock Type	Number of Animals[1] (1000s)	Emission Factor for Enteric Fermentation[2] (kg CH_4/head/yr)	CH_4 Emissions from Enteric Fermentation (Gg)	Emission Factor for Manure Management[3] (kg CH_4/head/yr)	CH_4 Emissions from Manure Management (Gg)	Total Annual CH_4 Emissions from Domestic Livestock (Gg)
			C = (A x B)		E = (A x D)	F = (C + E) /1000
Dairy Cattle	14	56	784	27	378	
Non-dairy Cattle	1,943	44	85,492	2	3,886	89
Buffalo	2,614	55	143,770	3	7,842	152
Sheep	24	8	192	0.21	5	0
Goats	2,674	5	13,370	0.22	588	14
Horse	181	18	3,258	2.18	395	4
Swine	8,374	1.5	12,561	.7	58,618	71
Poultry	101,375	not estimated	not estimated	0.023	2,332	2
Total			259,427		74,044	333

Data sources: 1 Livestock and Poultry Section, Bureau of Agricultural Statistics (BAS)
2 IPCC Workbook, 1996, Table 4-2, 4-3
3 IPCC Workbook, 1996, Table 4-4, 4-5

Module: Agriculture
Submodule: CH_4 and N_2O Emissions from Domestic Livestock
Worksheet: 3-1
Sheet: 2 of 2 N_2O Emissions from Manure Management

	STEP 4		
	A	B	C
Animal Wastes Management System	Nitrogen Excretion per AWMS, N_{ex} (t N/yr)	Emission Factor[1] EF_3 (kg N_2O-N/kg N)	Total Annual Emissions of N_2O (Gg)
			C = A x B x 44/28 x 10^{-6}
Solid System and Drylot	356,704.2	0.02	11.211
Liquid System	39,200.0	0.001	0.062
		Total	11.272

Data source: 1 IPCC Workbook, 1996, Table 4-8

Opportunities

- The GHG inventory can be instrumental in
  - influencing financial and investment flows as well as formulating rational, relevant policies and measures in the pursuit of sustainable development by providing substantive science-based inputs
  - further enhancing public awareness on the state of emissions at the country and sector level and
  - effectively guiding and encouraging the public to take meaningful and sustainable action to address climate change

Overall Challenges

- A national scale activity: hardly the effort of a single institution
- Availability, Reliability and Variability of Activity Data and Emission Factors
  - *Collection of activity data*
  - *data gaps*
  - Some are *highly variable* because of continuous updates
  - Some data are *outright unreliable*
  - *default factors are not representative* of the country's actual situation
- Sustainability, Institutionalization and Linkages
  - *dearth of manpower* to regularly produce the inventory
  - inventory is *not included in their regular functions and mandates*
  - *No coherent statistical framework and database information system*

Resources for QA / QC:

- Conduct of sensitivity analysis and data verification to lower the uncertainties
- Generation of local statistics through researches and field studies to be participated in by concerned agencies and entities, esp. for national EFs
- Establishment of a linkage mechanism to enable academe to continuously feed into the database information system
- Peer review process

Sector-Specific Challenges

Problems/Issues/Concerns	Recommendation(s)
* Deficiency on country-specific factors and data. Default factors not representative of country's actual situation	* Generate local statistics by conducting researches and surveys to be participated in by concerned agencies such as BAS, BAI, IRRI, PhilRice, etc.
* Institutionalization	* Establish a statistical framework and a database information system for the inventory
Domestic Livestock * Present data on distribution of animal manure among animal wastes management systems are estimations only.	* Ascertain actual distribution of animal manure among the animal wastes management systems
Prescribed Burning of Savanna * Lack of country-specific statistics (biomass density of savanna, fraction of exposed biomass that is burned, etc.) necessary for the estimation of emission	* Undertake research studies, with the DA/FMB as lead agencies
Burning of Agricultural Residues	* Conduct research/survey on cultural practices of local farmers to generate data on crop residue
Agricultural Soils Management * No country-specific factors	

- *Agriculture*
- *Other issues:*
  - *Categorization of data*
  - *Emissions in areas with organic amendments not defined*
  - *Validation and verification of data and assumptions used required*
  - *Sustainability problem*

Problems/Issues/Concerns	Recommendation(s)
* No country specific data; specifically on local emission factors	* Study local fuel types, particularly composition and develop local emission factors
* Institutionalization of the Overall Energy Balance (OEB)	* OEB adapted in such a way that it will contain all the necessary information necessary for the computations of GHG emissions in the energy sector.
* Data needed readily available from the DOE but are highly variable due to continuous updates in fuel consumption and allocation	* Link data in the OEB with the GHG emissions calculations to reflect instantaneously any changes resulting from the new set of values.
* Incomplete database on household consumption of biomass fuels such as wood/woodwaste, charcoal, agriwaste and other biomass/waste. * Data available is only for the year 1989 and projections made for the years 1995 and 2000 from the study made by the UNDP-ESMAP. The DOE commenced its Household Energy Consumption Study (HECS) only in 1995. Data gathered are not yet complete to date.	* Institutionalize/regularize surveys and studies on household fuel consumption not only biomass fuels, but all other conventional and nonconventional fuel types.
* Major data gaps in the transportation subsector constrains a more accurate GHG emission computation: * Type and technology of registered vehicles; VTEC, fuel injection, etc. * No. of kilometers travelled per year (annual mileage) * Year and make of car.	* Institutionalize a complete and comprehensive registration process containing all the necessary and important information for each registered vehicle in every LTO registration branch
* Institutionalization	* Develop close linkage with the DOE specifically with the Demand Analysis and Planning Division (DAPD), main data center of the department, and the Environment Division with computes and projects national CO_2 emissions from the energy sector.

- ***Energy Sector***
- ***Other issues:***
  - ***Lack of training of technical staff***
  - ***Late submission of reports from companies***
  - ***Varying terms and units of data***
  - ***No mandate to include in normal workload***
  - ***Lack of funding***
  - ***Lack of manpower and necessary capacity building***
  - ***Possibility of overlapping of functions***

Problems/Issues/Concerns	Recommendation(s)
* Availability of data, this being highly dependent on what industrial firms, estates, or associations choose to provide for regulatory purposes (especially to the DENR or EMB or any such regulatory body as well as any indirectly related purpose)	* Draw in other data sources like DTI and PEZA which also issue annual permits
* Reliability of data ■ ***Industry Sector*** ■ ***Other issues:*** ■ ***Compilation of data from various agencies, associations*** ■ ***Aggregation of data: mechanism / agreement to implement the inventory*** ■ ***Improve monitoring reports*** ■ ***Data collection system not established***	* Involve NGOs like the Philippine Business for the Environment (PBE) which are pro-active in the environment awareness circles * Involve industrial associations, e.g. PISI, SPIK, PHILCEMCOR, PHINMA, etc. to increase cooperation within sectors. * Institutionalize inventory methodologies within DTI, NSCB, and EMB all of which already have most of the requisite data available. Possibly develop local emission factors for highly emissive sectors like cement and iron and steel.

Problems/Issues/Concerns	Recommendation(s)
Solid Wastes * Need for more comprehensive source(s) of data	* Data for other regions (besides the NCR) should be obtained. Data may be acquired from the LGUs * Provisions for categorizing wastes disposal by economic class, region, etc. to determine the impact of these specific categories.
Domestic/Commercial Wastewater Treatment * Need to acquire sludge data. * Need to acquire new/accurate data regarding wastewater treatment plants specially on volume of wastewater they could process, efficiency, number served, etc.-for all regions * Data on wastewater; no local BOD levels * Untreated wastewter	* More comprehensive data on sludge. May be quantified by the local sewerage entities like Maynilad Water Services Inc. *Scientific and experimental determination of local BOD levels. * Study effects of untreated waste water- on methane generated
Industrial Wastewater * No readily available data on industrial waste-water. * Data do not cover the entire nation * Data in BOD and not COD	* Conduct regular survey/study on national wastewater treatment systems. (DENR/ DTI) * Scientific study for COD levels in wastewater treatment systems

- ***Wastes Sector***
- ***Other issues:***
  - ***Non-compliance of LGUs to reporting requirements***
  - ***Lack of coordination***
  - ***Standardization of data and consistency with definitions***
  - ***Uncertainty related to migrating human populations in urban areas***

Problems/Issues/Concerns	Recommendation(s)
* Significant variability among existing data	* Conduct more field studies * Validate default data
* Deficiency in country specific data (data gaps)	* Conduct actual field studies * Validate default data
* Unrealiable data on forest area	* Determine actual forest area by reliable party using precise methods - key government institution, FMB
* Need to enhance capability of some government agencies involved in collecting relevant forest data.	
* Need to establish systematic schemes for collecting data	
* Limited resources available on carbon sequestration studies	* Institutionalize collection of data on carbon sequestration * Formulate strategies to generate more resources for carbon sequestration studies
* Data on Soil Carbon	

Philippine Forests are a net sink

- *LUCF Sector*
- *Other issues:*
  - *Accounting for illegally harvested forest products*
  - *Availability of abandoned area/ lands data*
  - *Climate change merely implied in plans and policies*
  - *Updating of data and selection of sources of information*
  - *Reliance on default values*
    - *Develop allometric equations specific to country's forest types*
  - *Uncertainty in the baseline C budget*

Next Steps

- Updating of the NGHG Inventory for Base Year 2000
- Initial Arrangements for the Institutionalization of the GHG Inventory Process
  - Initial steps under INC: In the process of compilation and evaluation, several training events were held to enable government agencies, such as the DENR, DOE, DA, etc to compile the sectoral inventory. These were continued even in the interim (or top-up) phase, in which institutionalization issues were additionally identified
  - Under the SNC:
    - Review and Revision of the Reference Manual
    - Conduct of Trainers' Training for Agencies of Direct Concern to the Inventory
      - Development of Specific Module Plans per Sector
    - Development of the legal framework for institutionalization that empowers relevant agencies to conduct the GHG inventory in a regular and systematic manner

- *Continuing efforts to sustain practical information exchange and ensure capacity development at the local, regional, national, and international levels will help to improve the quality of inventories.*
- *Political will is a crucial factor in the success of the inventory as a national policy tool.*
- *The inventory process of developing countries must be fully enabled by financing and technology.*

Maraming Salamat Po!

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