

## Japan's National System and Tasks of Greenhouse Gas Inventory Office

**For TGO (Thailand), 31 August 2011**

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## What is National System ?

➢ Kyoto Protocol requires each Annex I Party to have National System for **Green House Gas Inventory Preparation** (Decision 19/CMP.1 - Guidelines for National System)

➢ **National System: Everything relevant to National GHG Inventory Preparation**

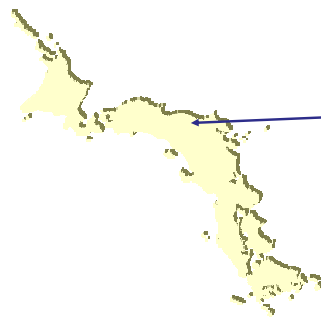
- (1) Institutional Arrangements
- (2) Inventory Compilation Process
- (3) Quality Assurance and Quality Control (QA/QC) of Inventory
- (4) Inventory Improvement Plan



## What is GIO?

➢ **Greenhouse Gas Inventory Office of Japan (GIO)** was established in June 2002 mainly for preparation of annual GHG inventory.

➢ **GIO** is in the **Center for Global Environmental Research (CGER)** of the **National Institute for Environmental Studies (NIES)**, located at Tsukuba city in Ibaraki Prefecture.



GIO/CGER/NIES



## What are the tasks of GIO?

### Domestic

- Prepare (estimate and compile) GHG Inventory of Japan
  - Collect and archive information and data
  - Implement quality assurance/control (QA/QC) activities
  - Improvement of estimation methods
  - Public relations regarding the Inventory
- <http://www-gio.nies.go.jp/index.html>

## What are the tasks of GIO?



### International

- Report Annual GHG Inventory of Japan to UNFCCC Secretariat
- Responding to inventory reviews by technical experts
- Support international negotiations regarding
  - <sup>1</sup> COP: Conference of the Parties to the UNFCCC
  - <sup>2</sup> COP/MOP: Conference of the Parties to the UNFCCC serving as the meeting of the Parties to the Kyoto Protocol
  - <sup>3</sup> SBI: Subsidiary Body for Implementation
  - <sup>4</sup> SBSTA: Subsidiary Body for Scientific and Technological Advice
- Support capacity building of Asian countries' Inventories

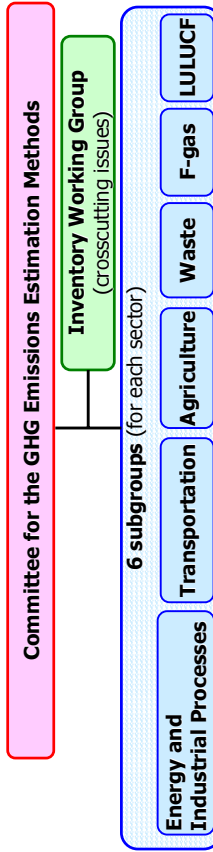


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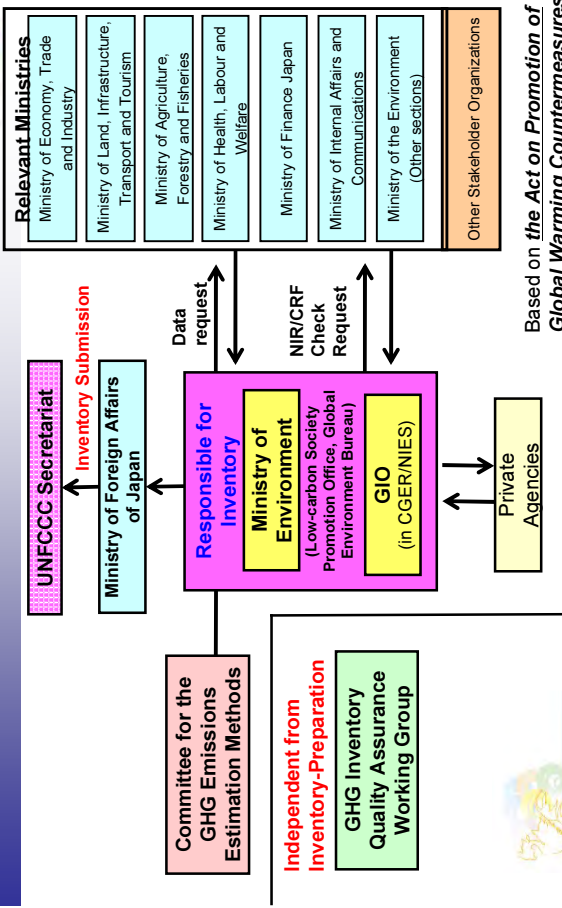
## What is “Committee for the GHG Emissions Estimation Methods” in Institutional Arrangement?



- Members: Experts with different scientific background (Researchers, Representatives from Industrial Organizations, etc.)
- Decision: Wrap-up meeting to decide final methodology-change is held by the end of fiscal year



## What is “Institutional Arrangement” in National System ?



Based on the Act on Promotion of Global Warming Countermeasures

## What is “Inventory Compilation Process” in National System ?



Process	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
1 Discussion of improvement												
2 Holding the meeting of the Committee for the GHG Emissions Estimation Methods												
3 Collection of data												
4 Preparation of draft of CRF												
5 Preparation of draft of NIR												
6 QC activity by relevant ministries												
7 Correction of drafts of CRF and NIR												
8 Submission and official announcement												
9 Meeting of the QA-WG												



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## What is “Quality Assurance/Quality Control” in National System ?

- Quality Assurance (QA) is a review done by experts, who are not involved in the Inventory preparation and compilation.
- Quality Control (QC) is done mainly by inventory compilers.
- Archiving is one of the important tools for QA/QC. All Inventory-related electronic information is saved in electronic media. Books containing statistics, data and other source materials in printed form are also archived in GIO.



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## Reporting Requirements

- All the Parties under the United Nations Framework Convention on Climate Change (UNFCCC) must prepare and submit their National GHG Inventory Reports.

### For Annex I Parties

- (1) Need to submit GHG Inventory (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFC and SF<sub>6</sub>) and Common Reporting Format (CRF) every year
- (2) Need to use the 1996 Revised IPCC Guidelines and IPCC Good Practice Guidances (GPGs)

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## Why do we need Inventory?

Green House Gases have been increasing due to human activities

Climate changes on a global scale: Averaged surface-temperature rises, sea-level rises and global precipitation-pattern changes etc.

Developing and Implementing Mitigation Measures are necessary, and *GHG Inventory provides data for Developing Mitigation Measures and Reviewing Implementation-Results*

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## Reporting Requirements

### For Non Annex I Parties:

- (1) Need to submit GHG Inventory (CO<sub>2</sub>, NH<sub>4</sub>, NO<sub>2</sub>) periodically (typically, every 4 – 6 years) as part of national communications
- (2) Need to use the 1996 Revised IPCC Guidelines
- (3) Encouraged to use GPGs

- National GHG Inventory should be: **Transparent, Consistent, Comparable, Complete and Accurate**

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**【Annually】**

- ◆ National GHG Inventory Report (NIR)
- ◆ Common Reporting Format (CRF)
- Report on Japan's Supplementary Information on LULUCF activities
- Japan's Information Required under Article 7, Paragraph 1 of the Kyoto Protocol

**【Periodically】**

- ◆ Japan's National Communication

- ◆ Under UNFCCC
- Under Kyoto Protocol



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**Reported Items:**

- GHG Emission/Removal from 1990 until the latest submission year
- National System (including QA/QC Plan)
- Methodology, Used Data, References, Recalculation, Uncertainty Assessment, Key Category Analysis

(By both English and Japanese)

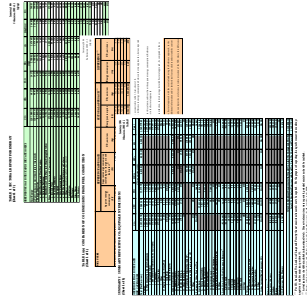


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**Common Reporting Format (CRF)**

**EXCEL spreadsheets**

- Standardized format for each Sector (Categories) and for each year
- Filled with all numeric data and information on estimation methodologies (Reference of NIR)
- CRF enhances Data-Comparison among Annex I Parties



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**Gases/Sectors to be reported**

- Only anthropogenic (human-originated) emissions
- Gases that are not controlled by the Montreal Protocol and have Global Warming Potentials listed in the 2<sup>nd</sup> Assessment Report
- Within national territory

GHG	
CO <sub>2</sub>	HFCs
N <sub>2</sub> O	PFCs
CH <sub>4</sub>	SF <sub>6</sub>
Indirect GHGs such as NO <sub>x</sub> , CO, NMVOCs and aerosol precursor (SO <sub>2</sub> ) can also be reported	

Sector	
1	Energy
2	Industrial Processes
3	Solvent and other Product Use
4	Agriculture
5	Land Use, Land Use Change and Forestry
6	Waste
7	Other



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$$\text{Emission} = \text{AD} \times \text{EF}$$

AD: Activity Data  
EF: Emission Factor

- EF-Data are available in
  - IPCC Guidelines and GPGs (Default Values)
  - Published Statistics
  - Published Results in Japanese Scientific Articles
- The Country-Specific data (EFs) decided by “Committee for the GHG Emissions Estimation Methods” are better than Default Values, since they reflect Japan’s condition more precisely.



### Uncertainty Assessment



- Evaluation of accuracy of the GHG Inventory
- For clarification of methodologies that have to be revised
- Combination Value of Emission-Factor and Activity-Data Uncertainties.
- Methods are given in GPG (2000) and GPG-LULUCF

Net GHG Emissions in Japan in 2009 was 1,138 Million t-CO<sub>2</sub> and the Uncertainty was estimated as 2%.



Ministries/ Organizations	Statistics & Data
MOE	Statistics for waste, etc.
METI	General Energy Statistics, Census of Manufactures, etc.
MLIT	Annual of Land Transport Statistics, etc.
MAFF	Crop Statistics, Livestock Statistics, etc.
MHLW	Statistics of Production by Pharmaceutical Industry
Federation of Electric Power Companies	Amount of Fuel Used by Pressurized Fluidized Bed Boilers
Japan Coal Energy Center	Coal Production
Japan Cement Association	Amount of clinker production, etc.
Japan Iron and Steel Federation	Emissions from Coke Oven Covers, etc.
Japan Paper Association	Amount of RPF incineration, etc.
Local public entity	Carbon Content of Waste by Composition

Relevant Ministry

Relevant Organization



### Key Category Analysis

- Level and Trend Analysis compared with 1990
- For clarification of category that should be focused on
- Tier 1: Using absolute amount of emission/removal
- Tier 2: Using absolute amount multiplied by its uncertainty
- Methods are given in GPG (2000) and GPG-LULUCF

In 2009, concerning both Level and Trend, No.1 key category was “Stationary Combustion”.



- Annex-I countries' Inventories are reviewed annually by expert review teams coordinated by the UNFCCC Secretariat
- Objectives:
  - To assess whether the Annex-I countries' submitted Inventories are transparent, accurate, consistent, comparable, and complete
  - To assist Annex I countries to improve the quality of their GHG Inventories



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*Support capacity building of Asian countries' Inventories (Other International Task)*

- For Non-Annex I countries, GHG Inventories with reliable time series data should be **Measurable, Reportable and Verifiable (MRV)** indices for **Nationally Appropriate Mitigation Actions (NAMA)**
- GIO and Ministry of the Environment of Japan support **capacity building** of other Asian countries' Inventory preparation by holding "Annual **Workshop on GHG Inventories in Asia**" since 2003



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- Attending the conferences (SBs, COP, CMP) as members of the Japanese delegation and providing support in the negotiations on inventory-related items

- Inventory-related items
  - ✓ reporting and review of inventory information
  - ✓ gases and sources for the next commitment period
  - ✓ national communications



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*Workshop on GHG Inventories in Asia (WGIA)*

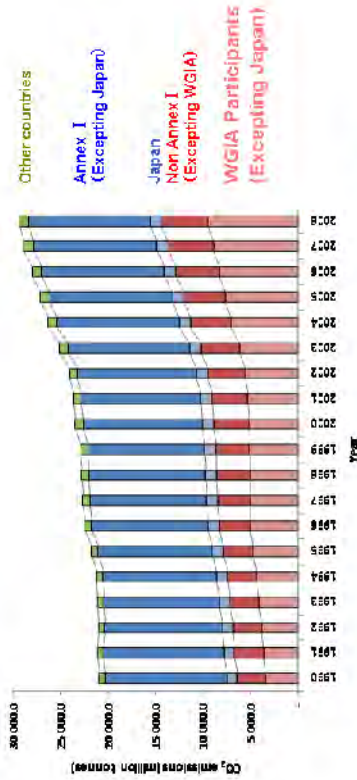
- Funding: Ministry of the Environment of Japan
- Organizers: GIO/Host Country
- Participating Countries: Cambodia, China, India, Indonesia, Japan, the Republic of Korea, Lao PDR, Malaysia, Mongolia, Myanmar, Philippines, Singapore, Thailand and Vietnam
- Participating Organizations: UNFCCC Secretariat, IPCC, USEPA



The 9<sup>th</sup> WGIA held in Cambodia July 13-15, 2011



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WGIA Participants are main contributors to GHG emissions

Working Group 1 (Waste)

- It was pointed out that searching for statistics by the collaboration of departments in charge of waste, regional offices and technical experts was needed.
- Also, regarding emission factors, enhancement of information-sharing through the WGIA and IPCC database was recommended.



Major themes of WGIA9

- Sharing the latest GHG Inventories in National Communications being submitted to the UNFCCC Secretariat and discussing future activities
- Clarifying the relationship between Inventory and Mitigation Measures
- Group discussions on the sector-specific or cross-section issues
- Mutual learning between 2 or among some countries



Working Group 2 (Non-CO<sub>2</sub> gases)

- As CH<sub>4</sub> from the Agriculture sector is the most significant emission source, it was recognized that continuous discussions on improving estimation methodologies and on mitigation measures was needed.
- For those countries which have not reported F-gases yet, it was recommended that they should estimate HFCs used as refrigerant, by Tier 1 method given in the 2006 IPCC Guidelines.



### Working Group 3 (Transportation)



- With the increasing number of automobiles in Asian countries, CO<sub>2</sub> emission from Transportation has been rapidly increasing.
- For better contribution to future mitigation work, it was recognized that generating more precise and real-time Inventories was necessary.



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### Mutual Learning 1 (Energy)



Participants: Indonesia, Mongolia and Japan



- Several issues and good practices were pointed out and not solved issues will be re-examined.
- Indonesia has the potential to provide the country-specific emission factor.
- Mongolia made close discussion between the inventory authority and related ministries or agencies.



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### Working Group 4 (QA/QC)



- Some activities were confirmed to function as QA/QC practically, even though those activities had not been recognized as QA/QC activities.
- Also, experts reaffirmed the importance of documenting and archiving these activities, and confirmed that these activities could become the basis for official QA/QC plans in the future.



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### Mutual Learning 2 (LUCF)



Participants: Lao P.D.R. and Japan



- Estimation methods of carbon stock changes in forest land, data collection scheme and archiving were discussed and good practice / issues of each other's inventory were pointed out.
- Lao P.D.R. was recommended to check detail of Plantation-Area and to implement Country Specific carbon stock.



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Participants: Cambodia, Indonesia, Republic of Korea and Japan



- Institutional arrangements, data collection system, and the use and/or development system of emission factors in each country were exchanged.
- Explored the possibility of applying the useful findings to the improvement of their own future national inventories.



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## Summary

- GIO's primary task is to estimate National GHG emissions/removals and to compile the Inventory in accordance with the UNFCCC requirements.
- GIO should improve Transparency, Consistency, Comparability, Completeness and Accuracy of National Inventory continuously.
- GIO supports capacity building of other Asian countries' Inventory preparation by holding "Annual Workshop on GHG Inventories in Asia".

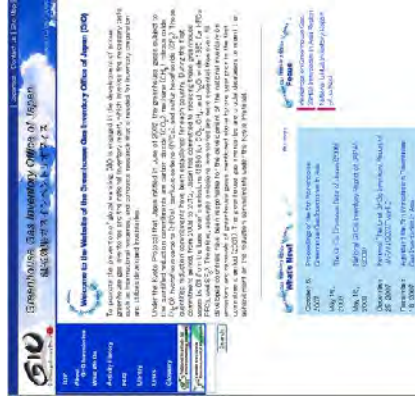


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## Annex



**GIO Website:**

<http://www-gio.nies.go.jp/index.html>

**NIR of Japan:**

<http://www-gio.nies.go.jp/aboutghg/nir/nir-e.html>

**WGIA:**

<http://www-gio.nies.go.jp/wgia/wgiaindex-e.html>



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# ขอบคุณ มาก ครับ

วันที่สามสิบเอ็ดสิงหาคม



# Thailand National Inventory

Wasinee Cheunban  
GHG Information Center

องค์การบริหารจัดการก๊าซเรือนกระจก (องค์การมหาชน)  
Thailand Greenhouse Gas Management Organization (Public Organization)



# GHG Inventory

- Non-Annex I
  - Voluntary basis on GHG emission
  - Temporary report as National Communication (NC)
- UNFCCC requested IPCC to provide methodology to estimate National GHG Inventory (NGI) to be reported with the same standard for both Annex I and Non-Annex I



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# History of GHG Inventory in Thailand

- Thailand's Initial National Communication under the United Nations Framework Convention on Climate Change.
  - 1st in 1994**
    - Followed the 1996 IPCC Revised Guidelines.
    - by Office of National Environmental Policy and Planning (ONEPP)
  - 2nd in 2000**
    - Followed
    - Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories
    - 2000 IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories
    - 2003 Good Practice Guidance for Land Use, Land-Use Change and Forestry
    - by Office of National Environmental Policy and Planning (ONEPP)



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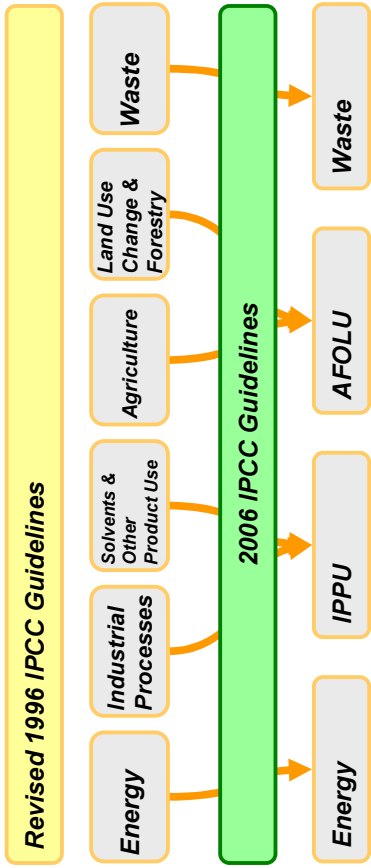
# IPCC GHG Guidelines

- Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories
  - Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (2000)
  - Good Practice Guidance for Land Use, Land-Use Change and Forestry
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories



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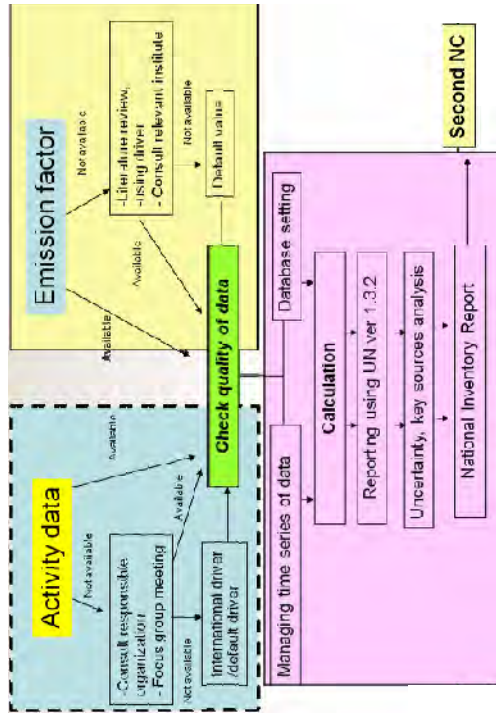
# IPCC Guidelines



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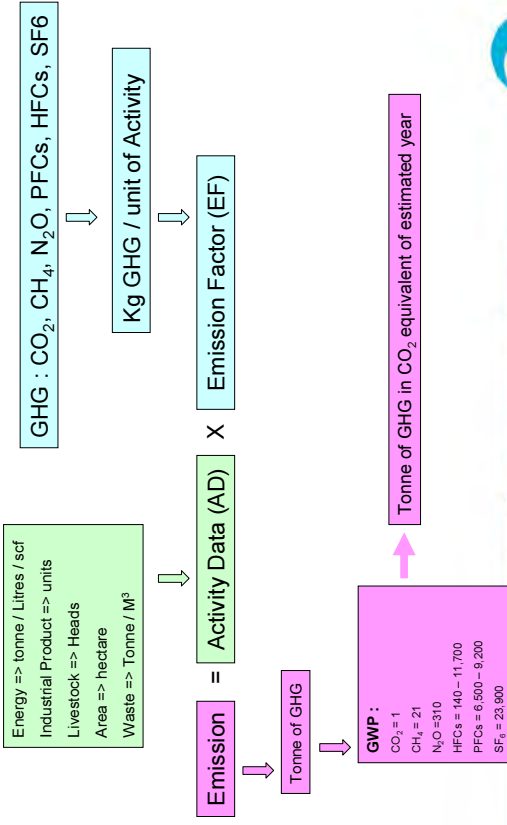
# Conceptual framework of GHG estimation



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# Emission Calculation



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# Level of Methodology

- Tier 1 : Default Emission Factor**  
 $GHG\ Emission = \{AD\} \times \{Default\ Emission\ Factor\}$
- Tier 2 : Country Specific Emission Factor**  
 $GHG\ Emission = \{AD\} \times \{Country\ Specific\ Emission\ Factor\}$
- Tier 3 : Specific Factor of each Technology**



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# Thailand's GHG Inventory

The tier setting situation

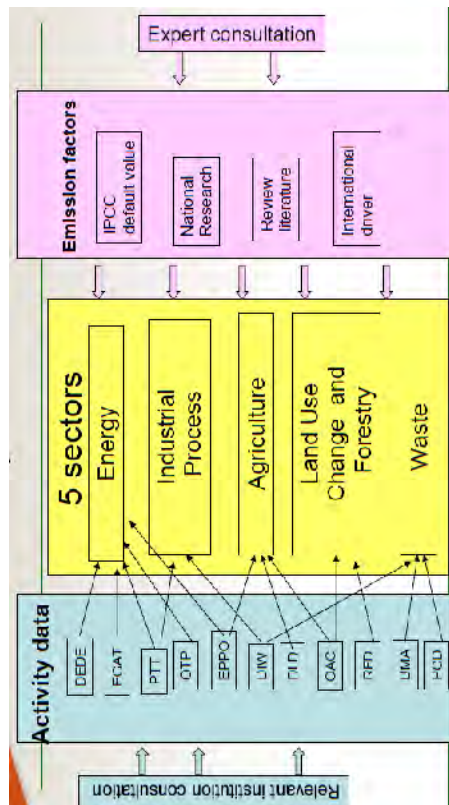
1. Energy	Tier
1A1 Energy Industries	1
1A2 Manufacturing industries and construction	1
1A3 Transport	1
1A4a Other sectors - a. Commercial/Institutional	1
1A4b Other sectors - b. Residential	1
1A4c Other sectors - c. Agriculture/Forestry/Fishing	1
1B1 Solid fuels	1
1B2 Oil and natural gas	1
2. Industrial	
2A Mineral products	1
2B Chemical industry	1
2C Metal production	1
2D Other production	1

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# Thailand National GHG Inventory Calculation



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# Thailand's GHG Inventory

The tier setting situation

4. Agriculture	Tier
4A Enteric Fermentation	2
4B Manure Management	2
4C Rice Field	2
4D Agricultural soils	1
4E Prescribed burning of savannahs	-
4F Field burning of agricultural residues	1
5. Land-use change and forestry	
5A Changes in forest and other woody biomass stocks	2
5B Forest and grassland conversion	2
5C Abandonment of managed lands	1
5D CO2 emissions and removals from soil	1
6. Waste	
6A Solid waste disposal on land	1
6B Waste-water handling	1
6C Waste incineration	1

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# The situation of Thailand?

Country	Total GHG Emissions in 2000 (Excludes land use change)	GHG per person (t)	% of GHG per person
China	4,574.1 (2)	10.2 (2)	14.0%
USA	18,481.3 (3)	34.3 (20)	47.5%
UK	3,036.8 (4)	4.7%	6.5%
Japan	3,529.3 (5)	4.0%	5.5%
Germany	1,753.9 (7)	2.7%	3.7%
Brazil	510.3 (9)	0.8%	1.1%
India	451.8 (10)	0.8%	1.1%
Russia	572.9 (11)	1.2%	1.6%
France	230.1 (12)	0.4%	0.5%
Italy	223.1 (13)	0.4%	0.5%
Spain	215.1 (14)	0.4%	0.5%
Australia	539.3 (15)	1.1%	1.5%
Indonesia	483.3 (17)	1.4%	1.9%
USA (re)	4,574.1 (2)	10.2 (2)	14.0%
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Source : CAIT, WRI (The Climate Analysis Indicators Tool, World Resources Institute)

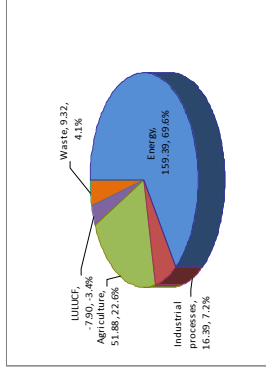
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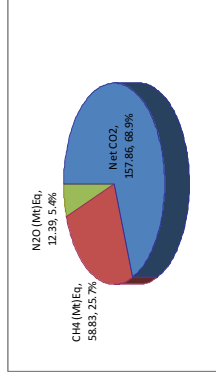


Total Emission (included LULUCF) = 229.08 Mt CO<sub>2</sub> eq

- GHG emission in 2000 (Mt CO<sub>2</sub> eq, %) - by sector



- GHG emission in 2000 (Mt CO<sub>2</sub> eq, %) - by Gas Type



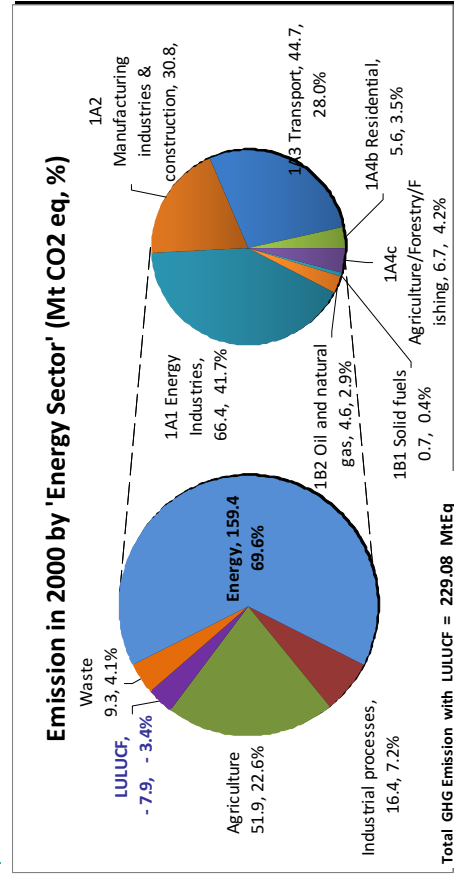
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## Thailand National Emission in 2000



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Emission in 2000 of Energy Sector (Mt CO<sub>2</sub> eq, %)

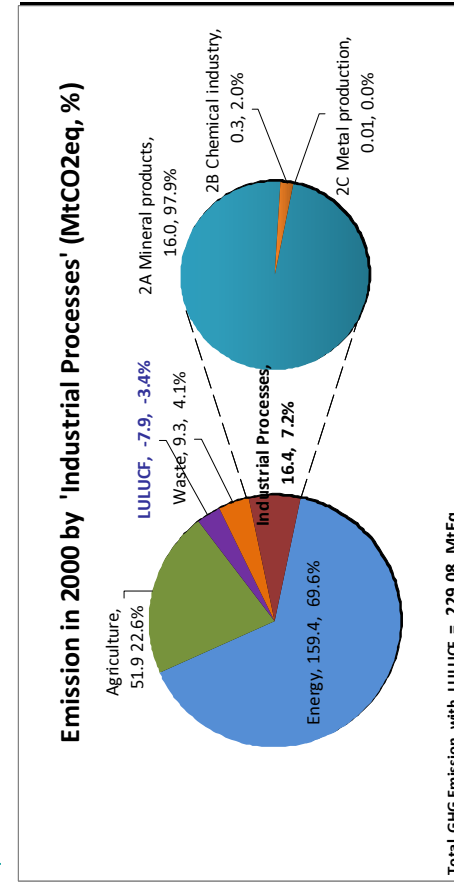


Total GHG Emission with LULUCF = 229.08 MtEq



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Emission in 2000 of Industrial Process (Mt CO<sub>2</sub> eq, %)

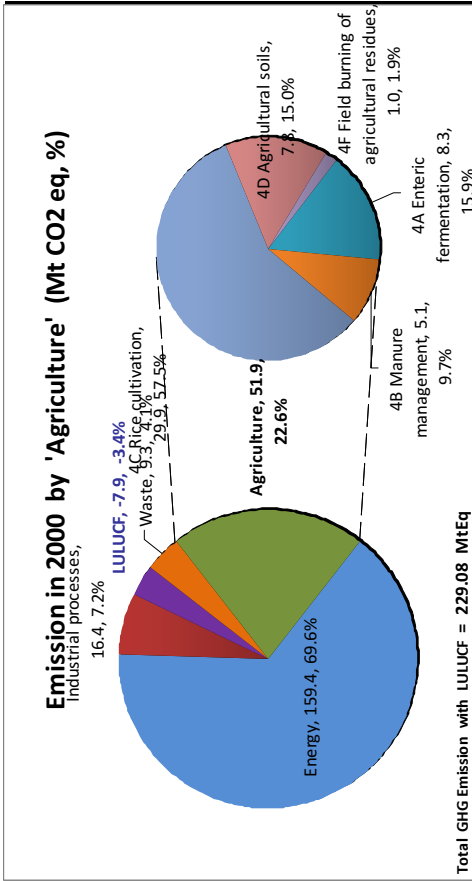


Total GHG Emission with LULUCF = 229.08 MtEq



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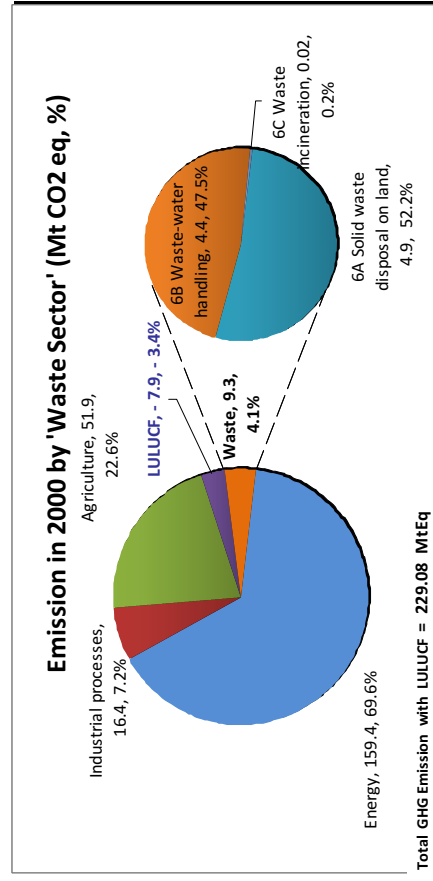
### Emission in 2000 of Agriculture (Mt CO<sub>2</sub> eq, %)



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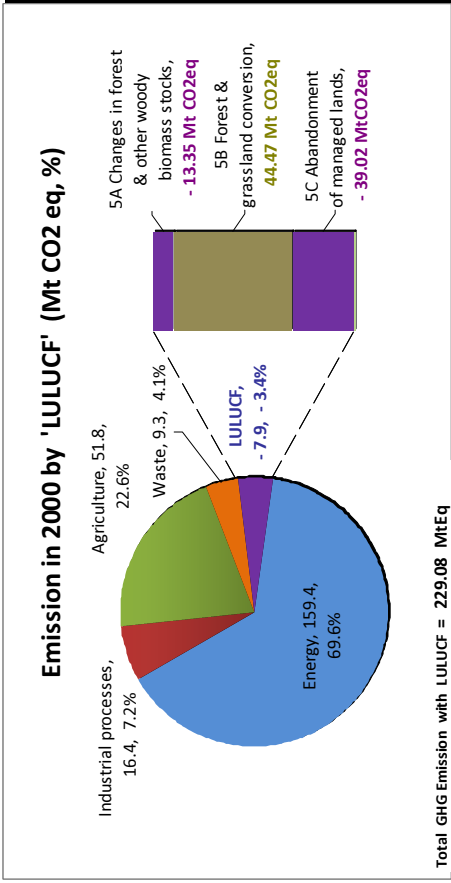
### Emission in 2000 of Waste Sector (Mt CO<sub>2</sub> eq, %)



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### Emission in 2000 of LULUCF (Mt CO<sub>2</sub> eq, %)



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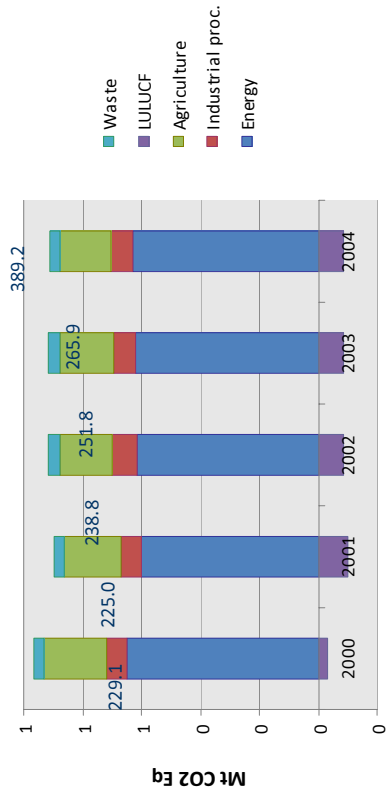
## National Emission in Time Series 2000 – 2004



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Total GHG Emission (Mt CO<sub>2</sub> eq) with LULUCF / with F-gases



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## Problem and Barriers

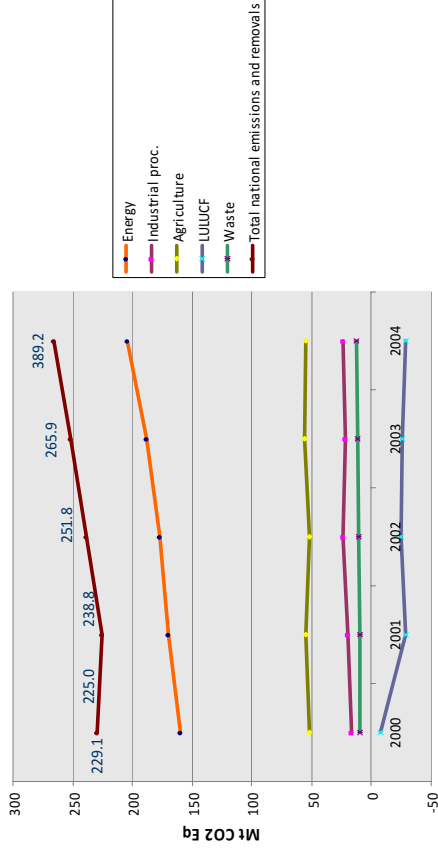
- Uncertain and discontinuous data
- Data Incompatibility
- Difference Definition
- Not Publish
- Lacks in deep details of data e.g. time, spatial, technology (not supporting for calculating with the high precision)



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Total GHG Emission (Mt CO<sub>2</sub> eq) with LULUCF / with F-gases



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## Problem and Barriers

### 5A Forest

- Dispersions forest plantation in the government sectors
- Lacks of details in species, amount, spatial extents and time of cultivation
- Rate of growth and Carbon content for an individual species
- Lacks of Carbon composition in soil both in the overview and individual forest type
- **Lack of** biomass and Rate of composition in the mix plantation forest
- Annual growth rate for specific species in plantation forest



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## Problem and Barriers

### 5B Forest and grassland conversion

- Discontinuous measured and recorded in all forest types, Thailand
- Different scale of forest map (during 1998 - 1999 using 1: 250 000 after 2000 1:50 000 is replaced) leading to the incompatible comparison
- Due to differences in method to classify the forest covers, trend analysis of forest areas is trouble
- Differences in details and definition
- Biomass estimations not cover all of forest types in Thailand
- After the forest changes or land use changes, amount of biomass not yet was estimated
- Lacks of die biomass (ปริมาณชีวมวลที่ตายแล้วและอัตราการย่อยสลายในพื้นที่ต่างๆ)



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## Problem and Barriers

### 5C Abandonment of managed lands

- Accuracy of carbon estimation depends on the definition of secondary forest
- INC defines that the all of outside conserved forests are the secondary forest
- Discontinuous survey of bare soil / secondary forest, so interpolation technique is used
- Categorize of <20 and 20-100 years according to the IPCC guideline is not yet possibly because annual rate of above ground biomass growth is greatly different
- Don't have Primary data of Annual rate aboveground biomass growth



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## Problem and Barriers

### Agriculture

- Statistic data in details for agriculture activities still not collected
- Some livestock activities cannot identify e.g. span of age, feed pattern -- > influence to the emission calculations

- Data source: Livestock reports from Department of Livestock
- Data source: Statistic of agriculture from Office of Agriculture Economics



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## Problem and Barriers

### Energy

#### Lacks of

1. Country Specific Emission Factor
2. Onsite Specific Emission Tier 2 Factor (for each Technology)



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## Problem and Barriers

### Industrial

- Industrial produce data derived from reports of The office of Industrial Economics (สำนักงานเศรษฐกิจอุตสาหกรรม)
- Collections of industrial products still not clear e.g. used activity – technology



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Thank you

Question ?



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## RISK

- Development of country
  - Amount of emission and GDP
  - Amount of emission and reduction target
- Calculations of gas emission
  - Emission origin still not cover all sections
  - Method of calculation is out of date
- Organization responsibility
  - Institutional arrangement



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# Overview of Energy Policy & Energy Conservation Act and Activities of ECCJ in Japan

September 2011  
KANEKO Kenichi

**Technical Expert,**  
Training Cooperation Department  
International Cooperation Division  
The Energy Conservation Center, Japan



## Table of Contents (1/2)

- I. Energy Policy & Energy Conservation Act
  - 1. Trend in Final Energy Consumption by Sectors
  - 2. Change of Primary Energy Intensity in Japan
  - 3. Composition of Primary Energy Supply in Japan
  - 4. Why did Japan succeed in the energy conservation ?
  - 5. Mechanism of Energy Conservation in Japan
  - 6. Energy Policy
  - 7. Energy Conservation Act
  - 8. Structure of Energy Conservation Act
  - 9. Energy Conservation Measures for Machinery & Equipment (Top Runner Program)
  - 10. Financial Supporting Measures (FY 2010)



## Table of Contents (2/2)

- II. Activities of ECCJ
  - 1. Role of ECCJ
  - 2. METI-ECCJ Collaboration Framework
  - 3. Profile of ECCJ
  - 4. History of ECCJ under Change of Energy-related Situation
  - 5. Main Activities of ECCJ by Sectors
  - 6. METI and the Related Organization in Japan



- I. Energy Policy & Energy Conservation Act

