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Proceedings of the 10th Workshop on Greenhouse Gas Inventories in Asia (WGIA10)

- Capacity building for measurability, reportability and verifiability -

10-12 July 2012, Hanoi, Vietnam

Greenhouse Gas Inventory Office of Japan (GIO), CGER, NIES

Center for Global Environmental Research

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Foreword

The 4th Assessment Report published by the Intergovernmental Panel on Climate Change (IPCC) in 2007 stated that the human-induced climate change is taking place in reality and the increase in anthropogenic greenhouse gas (GHG) concentrations in the atmosphere is "very likely" the cause. Since then, all of us on the globe have been making more efforts than ever to address this issue in both scientific and political fields. At the 16th Conference of the Parties (COP 16) under the United Nations Framework Convention on Climate Change (UNFCCC), the Cancun Agreements created a foundation to go forward by taking into account the "below two degrees Celsius", and by formally anchoring targets of Annex I Parties and actions of Non-Annex I Parties in the Copenhagen Accord. In the Cancun Agreements, the submission of Biennial Update Reports (BUR) including the updated GHG inventory and information on mitigation actions by all Parties was also decided. At the COP17 (Durban), it was agreed that the first BUR should be submitted by December 2014 and also that National Communication (NC) should be submitted once every four years.

The National Institute for Environmental Studies (NIES) has been organizing the "Workshop on GHG Inventories in Asia" (WGIA) annually since November 2003 with the support of the Ministry of the Environment of Japan (MOEJ). The Greenhouse Gas Inventory Office of Japan (GIO), affiliated with the Center for Global Environmental Research (CGER), NIES, has functioned as the Secretariat for this workshop since its first session. This workshop supports government officials, compilers, and researchers to develop and improve their GHG inventories through enhancing regional information exchange.

The CGER has been engaged in global environmental issues including climate change since its foundation in 1990. CGER conducts environmental monitoring, maintains global environment databases, and acts as a focal point for a number of international and domestic innovative environmental research projects. Moreover, CGER publishes reports on its research findings and activities regularly.

This CGER report serves as the proceedings of the 10th WGIA, which was held on July 10-12, 2012, in Hanoi, Vietnam. We hope that this report will be useful for all those who work in the field of GHG inventory as well as climate change and will contribute to the further progress of inventory development in Asia.

Yasuhiro Sasano

Director
Center for Global Environmental Research
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Preface

As awareness in regards to global warming is increasing, the GHG inventories are being more and more accepted as being valuable, since the inventories support implementing the national mitigation actions in a measurable, reportable and verifiable manner. Furthermore, frequent reporting as stated in the Cancun and Durban Agreements (i.e., biennial reports) also encourages all Parties to consider improving the inventory quality and developing appropriate institutional arrangements and inventory processes.

Since its first session in 2003, WGIA has been held ten times so far in order to support the WGIA-member countries in developing and improving their national GHG inventories through enhancing the regional information exchange by strengthening the experts' network in Asia.

This time, the 10th WGIA (WGIA10) was held from 10 to 12 July, 2012 in Hanoi, Vietnam as a capacity building workshop for Measurability, Reportability and Verifiability (MRV). The items set out for this workshop by taking into consideration the current situation of the member countries were all essential for the improvement of their inventories.

The outcomes of the WGIA10 are summarized in the present Proceedings. It is our hope that this report will be found useful and will contribute to the further improvement of the GHG inventories in the WGIA-member countries.

In conclusion, we would like to express our sincere appreciation to the members of the local host organization, the Ministry of Natural Resources and Environment of Vietnam, for their excellent support and kind hospitality in hosting the WGIA10. We would also like to thank all the attendees for their participation and active contribution to the success of the workshop.

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List of Acronyms and Abbreviations

AD	Activity Data
AFOLU	Agriculture, Forestry and Other Land Use
AIM	Asia-Pacific Integrated Model
ALU	Agricultural Land Use
BR	Biennial Reports
BUR	Biennial Update Reports
CDM	Clean Development Mechanism
CGE	Consultative Group of Experts
CGER	Center for Global Environmental Research
CH_4	Methane
CO_2	Carbon dioxide
COP	Conference of the Parties
CS-EF	Country-Specific Emission Factor
DCCEE	Department of Climate Change and Energy Efficiency, Australia
DMHCC	Department of Meteorology Hydrology and Climate Change, Vietnam
DNDC Model	DeNitrification-DeComposition Model
EF	Emission Factor
EFDB	Emission Factor Database
F gases	Hydrofluorocarbons, Perfluorocarbons, and Sulphur hexafluoride
FOD	First Order Decay
GEF	Global Environmental Facility
GHG	Greenhouse Gas
GIO	Greenhouse Gas Inventory Office of Japan
GIS	Geographic Information System
GPG	Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories
GPG-LULUCF	Good Practice Guidance for Land Use, Land-Use Change and Forestry
HFCs	Hydrofluorocarbons
IGES	Institute for Global Environmental Strategies, Japan
INC	Initial National Communication
IPCC	Intergovernmental Panel on Climate Change
IPCC-EFDB	IPCC Emission Factor Database
IPCC TFI-TSU	IPCC, Task Force on National GHG Inventories, Technical Support Unit
IPPU	Industrial Processes and Product Use
JICA	Japan International Cooperation Agency
KP	Kyoto Protocol
LDC	Least Developed Countries
LEAD Program	USAID Low Emissions Asian Development Program
LUCF	Land Use Change and Forestry
LULUCF	Land Use, Land Use Change and Forestry

MOEJ	Ministry of the Environment of Japan
MONRE	Ministry of Natural Resources and Environment, Vietnam
MURC	Mitsubishi UFJ Research and Consulting Co., Ltd., Japan
MRV	Measurability, Reportability, and Verifiability
MSW	Municipal Solid Waste
NAI	Non Annex I
NAMA	Nationally Appropriate Mitigation Action
NC	National Communication
N_2O	Nitrous oxide
NIES	National Institute for Environmental Studies
MCF	Methane Correction Factor
PFCs	Perfluorocarbons
QA	Quality Assurance
QC	Quality Control
REDD	Reducing Emissions from Deforestation and forest Degradation in developing countries
Revised 1996 IPCC Guidelines	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories
RoK	Republic of Korea
RS	Remote Sensing
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SEA GHG Project	Regional Capacity Building Project for Sustainable National Greenhouse Gas Inventory Management Systems in Southeast Asia
SF_6	Sulphur hexafluoride
SIDS	Small Island Developing Countries
SNC	Second National Communication
SPM	Summary for Policymakers
SUR	Suuri-Keikaku Co., Ltd.
SWDS	Solid Waste Disposal Site
SWGA	Workshop on Improvement of Solid Waste Management and Reduction of GHG Emissions in Asia
TNC	Third National Communication
TOR	Terms of References
UA	Uncertainty Assessment
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
WGIA	Workshop on Greenhouse Gas Inventories in Asia
2006 IPCC Guidelines	2006 IPCC Guidelines for National Greenhouse Gas Inventories

Photos of the Workshop

Welcome Address

Mr. Shinsuke Oda

Welcome Address

Mr. Nguyen Khac Hieu

Overall Chairperson

Dr. Yukihiro Nojiri

Main Room for Opening Session, Session I,III and Wrap-up

Tea Break and Lunch

Session II-1 (Energy/IPPU)

Session II-1 (Waste)

Session II-2

Mutual Learning on Agriculture

Mutual Learning on Waste

Mutual Learning on Energy

Mutual Learning on Industrial Processes

Closing Remarks

1. Executive Summary of WGIA10

1. Executive Summary of WGIA10

The Ministry of the Environment of Japan (MOEJ) and the National Institute for Environmental Studies (NIES), jointly with the Ministry of Natural Resources and Environment of Vietnam (MONRE), convened the 10th Workshop on Greenhouse Gas (GHG) Inventories in Asia (WGIA10) on 10-12 July 2012 in Hanoi, Vietnam, as a capacity building workshop for Measurability, Reportability and Verifiability (MRV). Ever since 2003 the workshops have aimed at supporting Non Annex I (NAI) Parties in Asia to develop and improve their GHG inventories. The 10th workshop was attended by 130 experts from thirteen WGIA-member countries (Cambodia, China, India, Indonesia, Japan, the Republic of Korea, Lao P.D.R., Malaysia, Mongolia, Myanmar, Philippines, Thailand, and Vietnam), as well as the United Nations Framework Convention on Climate Change (UNFCCC), the Technical Support Unit of the Task Force on National Greenhouse Gas Inventories of the Intergovernmental Panel on Climate Change (IPCC TFI TSU), the United States Environmental Protection Agency (USEPA), the Regional Capacity Building Project for Sustainable National Greenhouse Gas Inventory Management Systems in Southeast Asia (SEA GHG Project), the U.S. Agency for International Development (USAID), Department of Climate Change and Energy Efficiency of Australia (DCCEE), and Japan International Cooperation Agency (JICA). The Greenhouse Gas Inventory Office of Japan (GIO) at the Center for Global Environmental Research (CGER) of NIES functioned as the WGIA10 Secretariat.

The objectives of the workshop were:

- to have mutual learning,
- to report on the latest national communications (NCs) submitted to the UNFCCC Secretariat,
- to discuss decisions by the Conference of the Parties (COP) and future activities of WGIA,
- to discuss sector-specific issues,
- to have hands-on training using the IPCC Inventory Software, and
- to discuss the activities of international organizations.

On 10th July, the mutual learning, in-depth methodological discussion between two countries by means of studying the partner country's latest inventory in advance, was conducted for a limited number of participants. A SEA GHG Project meeting for Phase II was also held as a side event of WGIA10.

In the Opening Session on 11th July, the welcome address was delivered by Mr. Shinsuke Oda, Officer of the Low-Carbon Society Promotion Office, MOEJ, followed by the welcome address delivered by Mr. Nguyen Khac Hieu, Deputy Director General of the Department of Meteorology Hydrology and Climate Change (DMHCC) under MONRE. Dr. Yukihiro Nojiri, Manager of GIO under NIES acted as the overall chairperson.

In the morning of 11th July, the latest non-Annex I National Communications and COP decisions were discussed followed by review and proposal of WGIA-activity (Session I).

In the afternoon of 11th July, a hands-on training using the IPCC Inventory Software (Session II-1) and discussion on Agriculture, Forestry and Other Land Use (AFOLU) (Session II-2) were held.

In the morning of 12th July, the experiences and plans of JICA, USEPA, USAID, and DCCEE for inventory capacity building programs in Southeast Asia were shared (Session III). As the final presenter, NIES presented its achievement relating to emission projection in Asia.

After the wrap-up of all sessions, the workshop was closed with closing remarks by Mr. Nguyen Khac Hieu, Deputy Director General of DMHCC and by Dr. Yukihiro Nojiri, Manager of GIO.

The experts discussed various subjects of interest to Asian countries, including the recent progress made by member countries, possible future activities in each member country and the WGIA itself, and sector-specific issues. Through the discussions and lessons, all attendees reaffirmed the importance of the inventory as a key tool for mitigation actions. Those who joined the mutual learning and hands-on training found these activities useful and supported their continuation. All attendees agreed to continue WGIA.

The outcomes of the discussions about each subject are summarized below.

Mutual Learning

Mutual Learning (ML) was conducted in order to improve the individual countries' inventories through exchanging inventories between two countries to learn from each other. The target sectors in this workshop were: Energy (Cambodia and Thailand), Industrial Processes (Indonesia and Japan), Agriculture (Indonesia and Vietnam), and Waste (China and the Republic of Korea). Before the meeting, 1) worksheets used for estimating emissions and reports describing details of methodologies, 2) comments on good points as well as issues of the partner country, and 3) questions and answers were exchanged. In the discussions in the meeting, the participants identified further problems relating to not estimated sources, and realized the importance of developing a consolidated national system to compile a sustainable inventory. Also, they recognized clearly the necessity of improving methodology and documentation-archive. The participants were encouraged to follow-up the issues pointed out in the discussions, and all participants of WGIA10 agreed to continue ML in future WGIAs.

Japan's climate change policy

The decreasing rate of emissions considering forest carbon sinks and the Kyoto mechanism credit is -10.9% on average (FY 2008-2010). Excluding Industrial Processes and Waste Products, the remaining 94% of CO_2 emissions are related to energy consumption. Household Emissions, including personal vehicles and municipal waste, comprise approximately 20% of the emissions. The remaining 80% is from the Business and Public Sectors. Japan's targets for GHG reduction are "Mid-term target (2020): -25% from 1990" and "Long-Term Target (2050): -80% from 1990"[1]. The global warming countermeasures are "Carbon tax", "Feed-in Tariff for renewable energy", "Legislations (Top Runner System)", "Grant for eco-point system", "Environmental Assessment Law", "Mandatory reporting and accounting", and "Forest Management" etc.

Introduction of Mitigation Options for GHG emissions in Vietnam

Emissions from the Energy, Agriculture and LULUCF Sectors are projected to be 169.2, 300.4, and 515.8 Tg CO_2 eq. in 2010, 2020, and 2030, respectively. The Energy Sector accounts for 91.3% of the projected total emissions for 2030. GHG mitigation options were developed for three main sectors: Energy, Agriculture and LULUCF. The current difficulties that Vietnam is still struggling with are "Insufficient information and data on long-term

[1] Prime Minister Hatoyama's speech at United Nations General Assembly in Sep. 2009

planning", "Some IPCC emission factor (EF) defaults for energy technologies may not be suitable, but the national EFs have not been well-developed yet", "Technical capacity in the development of mitigation options", "Limited information about know-how techniques", and "Insufficient investment and technical expertise for transferring and applying modern, environmentally sound technologies". To improve these negative circumstances, we agreed about the importance of WGIA to find out various potentials for co-operation and technical support.

Report on the latest NCs (inventories) recently submitted

India and the Republic of Korea reported an overview of their 2nd and 3rd NCs focusing on GHG Inventory. Their reports were improved in completeness and accuracy compared with their 1st and 2nd NCs. Because both India and the Republic of Korea have matured in their experience of preparing inventories, other countries' motivation to improve their inventories seemed to be enhanced.

Discussion relating to COP decisions

UNFCCC and GIO reported updated information relating to NAI National Communications. COP16 had already decided that NAI parties must submit Biennial Update Reports (BUR). COP17, which was held in Durban in December 2011, agreed that the first BUR should be submitted by December 2014 and also that NC should be submitted once every four years. The reporting requirements including "frequency" issues of the NCs and BURs and financial matters drew the participants' attention. The establishment of institutional arrangements is crucial for frequent inventory preparation.

Review of the past and Proposal for the future of WGIA-activities

GIO reviewed the past activities of WGIA and proposed a future plan with the draft of Terms of Reference (TOR). The number of participants has become larger and reached a maximum number of 130 in this WGIA10, since the interest in Climate Change has been increasing year by year. WGIA-activities have been also changing from in-situ information-exchange to E-mail discussions, sector-specific meetings, hands-on training, and mutual learning in accordance with the member countries' needs. Aiming at hosting more effective and fruitful WGIA in the future, the WGIA Secretariat proposed new TOR.

Hands-on Training using the new IPCC Inventory Software

To help NA I countries to prepare for their national GHG inventories, a hands-on training using the new IPCC Inventory Software was implemented. After an overview of the software by IPCC TFI TSU, the attendees split into two groups, one on Energy/Industrial Processes and the other on Waste, followed by trial calculations using laptop PCs with the pre-installed software. Even though currently F-gases are not "shall be reported" gases, the attendees agreed about the importance of F-gases emissions and the effectiveness of the software to be able to calculate the actual emissions. Also, the strength of the software which can estimate the First Order Decay (FOD) of Solid Waste Disposal on Land (SWDL) was recognized by the participants. Some countries agreed to use this software after going back to their countries even though some bugs should be improved by IPCC TFI TSU.

Discussion on AFOLU

After the introductory presentation by GIO, seven presentations followed by active discussions were made, 1) ”Initial NC Project in Myanmar” by Dr. Khin Lay Swe, 2) Inventory and Mitigation for Methane Emissions from Livestock in Indonesia” by Dr. Idat Galih Permana, 3) ”Greenhouse Gases Inventory in the Agriculture Sector of Thailand” by Mr. Worapong Waramit, 4) ”Greenhouse gas emissions from China cropland” by Dr. Shenghui Han, 5) ”Philippines’ Second NC: Gaps, Challenges and Improvements for the GHG Inventory of the AFOLU Sector” by Dr. Damasa Magcale Macandog, 6) ”Monte Carlo Simulation of Uncertainty Analysis for National GHG Inventories” by Dr. Kyeong-hak Lee (Korea), and 7) ”Developing a Sustainable AFOLU GHG System” by Dr. Elizabeth M.P. Philip (Malaysia). Considering the fact that AFOLU (Agriculture and LULUCF) sector includes significant emission/removal sources in many of the member countries, to hold continuous discussions on this sector in WGIA11was agreed. The attendees proposed some subjects which are expected to be discussed in WGIA11, 1) Exchange of experiences about institutional arrangements, 2) Check of the progress of each country, 3) IPCC- Emission Factor Database (EFDB), 4) Wetlands supplementary guidelines, 5) Uncertainty assessment, and 6) Reducing Emissions from Deforestation and forest Degradation in developing countries (REDD+).

Presentations by donors and international organizations

Experiences and plans of JICA, USEPA, USAID and DCCEE for inventory capacity building programs in Southeast Asia were shared. At the same time, GIO reported on its achievement relating to studies of emission projections in this region. Five presentations were made, 1) ”Challenges in the development of GHG-Inventory: Experiences from JICA technical cooperation” by Mr. Naoki Mori (JICA Vietnam), 2) ”Update on SEA GHG Project Phase II” by Ms. Mausami Desai (USEPA), 3) ”Overview of US Government Programs and the LEAD Program” by Mr. Orestes Anastasia (USAID), 4)”Inventory systems and carbon markets - the Australian story” by Mr. Rob Sturgiss (DCCEE), and 5) ”Future Low-Carbon Society Scenarios in Vietnam and Asia” by Dr. Junichi Fujino (NIES). Most projects were relatively new, reflecting the rapidly growing demand for MRV in developing countries. The importance of donor coordination for efficient support and some other issues were discussed.

2. Introductory Notes of WGIA10

2. Introductory Notes of WGIA10[1]

2.1 Background

The parties to the UNFCCC are required to prepare and submit GHG inventories as a part of NCs to the COP. Inventories are important for all Parties, as they show a Party's status of emissions/removals and become a basis for the mitigation measures for that Party. The frequency of inventory submission is different for AI and NAI Parties in accordance with the principle of "common but differentiated responsibilities" as stated in the Convention.

The importance of inventories has been recognized more and more in the international negotiation process since 2007, as they are crucial to measurable, reportable and verifiable Nationally Appropriate Mitigation Actions (NAMAs). Assuming that all Parties submit biennial reports in the future, which include information on inventory and mitigation actions (Cancun Agreement, 2010), and that these reports would become a basis for reporting and verifying NAMAs, the improvement of inventories as well as the development of appropriate institutional arrangements for that within a country need to be considered and enhanced.

MOEJ and NIES have been organizing the "Workshop on GHG Inventories in Asia" on an annual basis since 2003[2] for NAI Parties within Asia[3]. Since its 6th session, the workshop has been held as a part of the "Kobe Initiative"[4] launched by the G8 Environmental Ministers' Meeting in May 2008. These workshops have always aimed at supporting NAI Parties in Asia to develop and improve their GHG inventories through enhancing the information flow and experience exchange as well as by obtaining the cooperation of experts from both within and outside of member countries. So far, WGIA has not only contributed to the inventory improvement of the member countries but has also developed and strengthened a regional network of experts. In the upcoming WGIA10, the agenda items listed in the following section will be discussed.

These introductory notes are intended to inform the prospective participants of the objectives and expected outcomes of the workshop as well as the details of each session.

2. 2. Major programs

- Reports of the latest NCs (inventories) recently submitted to the UNFCCC Secretariat,
- Discussions on future activities of WGIA,
- Group discussions on sector-specific issues,
- Discussions on donors' and international organizations' activities,
- Mutual learning (in-depth methodological discussion between two countries).

2.2.1 Mutual Learning for limited participants (10 July)

Objectives:

To improve our inventories through exchanging questions and comments among experts from countries involved in mutual learning activities.

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[1] The introductory notes were shared with participants prior to the workshop.

[2] (WGIA1) Phuket, Thailand on 13-14 November 2003; (WGIA2) Shanghai, China on 7-8 February 2005; (WGIA3) Manila, Philippines on 23-24 February 2006; (WGIA4) Jakarta, Indonesia on 14-15 February 2007; (WGIA5) Kuala Lumpur, Malaysia on 6-8 September 2007; (WGIA6) Tsukuba, Japan on 16-18 July 2008; (WGIA7) Seoul, Republic of Korea on 7-10 July 2009; (WGIA8) Vientiane, Lao P.D.R. on 13-16 July 2010; (WGIA9) Phnom Penh, Cambodia on 13-15 July 2011.

[3] Cambodia, China, India, Indonesia, Republic of Korea, Lao PDR, Malaysia, Mongolia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

[4] Chair's Summary, G8 Environmental Ministers' Meeting (http://www.env.go.jp/en/focus/attach/080610-a2.pdf)

Session Style: Group discussions
Overview:

This session aims at improving our next inventories by learning from other inventories including data used in their compilation, and by exchanging questions and comments with experts from two member countries. The target sectors and participating countries for this year's activity are:

- Energy (Cambodia and Thailand)
- Industrial Processes (Indonesia and Japan)
- Agriculture (Indonesia and Vietnam)
- Waste (China and Republic of Korea)

2.2. 2 Opening Session (July 11)

Session Style: Plenary
Overview:

After introducing the workshop overview, both host countries (MONRE and MOEJ) will present their policy schemes to combat climate change.

2.2.3 Session I: NC update and discussion on WGIA activities (11 July)

Objectives:

To share experiences gained through the preparation of the latest NCs recently submitted and plans for the next inventory. In addition, to discuss future WGIA activities through reviewing COP17, past WGIA activities and a proposal for future plans of WGIA.
Session Style: Plenary
Overview:

An expert of UNFCCC will share updated information considered to be useful for the participants in inventory preparation. Experts of India and the Republic of Korea will present overviews of their NCs with a focus on the inventories. In addition, experts of GIO will share information relating to COP17 with a focus on the inventories, and will then propose future plans of WGIA.

2.2.4 Session II-1: Hands-on Training using the new IPCC Inventory Software (11 July)

Objectives:

To help NAI countries to prepare for their national GHG inventories through hands-on training.
Session Style: Group discussions
Overview:

Experts of IPCC TFI TSU will present an overview of the software and instruct participants on how to use it. Experts of GIO will present categories to focus on. The focus will be on F-gases and solid waste disposal on land. We will split into two groups and try to make calculations using the new IPCC Inventory Software pre-installed in laptop PCs. At least one PC for each country and organization, and a few PCs for the host country will be prepared.

2.2.5 Session II-2: Discussions on AFOLU (11 July)

Objectives:

To discuss AFOLU-specific issues and to exchange information.
Session Style: Group discussions
Overview:

Considering the fact that AFOLU (Agriculture and LULUCF) sector includes significant emission/removal sources in many of the member countries, continuous discussions on this

sector are needed. In this session, the member countries will give presentations and exchange information on the details of estimation methodologies and/or mitigation measures used by each country.

2.2.6 Session III: Presentations by donors and international organizations (12 July)

Objectives:

To share information gained through the activity as a donor to support capacity building for measurability, reportability and verifiability in Asia.

Session Style: Plenary

Overview:

The presentations by donors and international organizations are:

- "Challenges in the development of GHG inventory - Experiences from JICA technical cooperation" by JICA
- "Update on SEA GHG Project Phase II" by USEPA and SEA GHG Project
- "Overview of US Government Programs and the LEAD Program" by USAID
- "Inventory systems and carbon markets – the Australian story " by DCCEE
- "Future Low-Carbon Society Scenarios in Vietnam and Asia" by NIES

2.3. Wrap-up Session (12 July)

Objectives:

To wrap up the discussions of the previous days and to discuss future activities.

Session Style: Plenary

Overview:

The rapporteurs will present the outcomes of each plenary session, mutual learning session and breakout group session. Based on the outcomes, the future perspective of the WGIA member countries as well as the WGIA activities will be discussed. Also, we will discuss how to disseminate our knowledge and recommendations to other NAI Parties.

3. Workshop Report

3. Workshop Report

Please note that all presentation materials can be downloaded from the website of GIO:
http://www-gio.nies.go.jp/wgia/wg10/wg10index-e.html

3.1. Mutual Learning (ML)

Overview of the Mutual Learning

The Mutual Learning (ML) is an activity to improve the individual countries' own inventories through a series of processes; 1) exchanging inventories between two countries, 2) learning from partner's inventory, and 3) exchanging comments between each other. The primary purpose of the ML is to improve GHG inventories by providing details of methods and data between two countries. The ML is also expected to foster and strengthen a cooperative relationship among experts. Since the aim of the ML is not criticism or audit, participants can conduct a two-way communication, not a one-way communication like examiner versus examinee. The first mutual learning was held in the annual workshop on the waste sector between GIO and Korea Environment Corporation (KECO) in 2008. The Secretariat of WGIA introduced this activity in WGIA8 in 2010. With the participants' agreement, ML was introduced in the following WGIA9 as one of the sessions. In 2011, the participants of WGIA welcomed the introduction of ML into the WGIA9, and recommended conducting it successively in the WGIA10 again.

Participants

In November 2011, the Secretariat of WGIA advertised the ML to the participants of WGIA10, and received applications from 16 teams from 8 parties. Considering the requirements of the applicants, an appropriate balance among sectors and the feasibility of implementation, the Secretariat set up four pairs in January 2012. The set of pairs included first-time attempts of ML on the Industrial Processes and Agriculture Sectors.

Table 1 Participating Countries in the Mutual Learning

Sector	Country
Agriculture	Indonesia
	Vietnam
Waste	China
	Republic of Korea
Energy	Cambodia
	Thailand
Industrial Processes	Indonesia
	Japan

Preparation

A few months before the WGIA10, the chosen participants exchanged the materials of their inventory which included worksheets used for estimating emissions and reports describing details of methodologies through the Secretariat. Through studying the materials provided by the partner country, the participants found good points as well as shortcomings of the inventory of the partner country. After that, the participants exchanged the comments and questions found in the preparation process to the partner country through the Secretariat. The partner countries responded to these comments and questions before the WGIA10.

Discussions

In the WGIA 10, the participants split into four sessions (Energy, Industrial Processes,

Agriculture and Waste) to discuss sector-specific issues. In the discussion, the participants identified problems in the inventories with regard to sources not estimated and data collection activity, and realized the importance of developing a consolidated national system to compile an inventory sustainably. Also, they understood deeply the partner's inventory, and recognized clearly the necessity of improving methodology and documentation. To improve the inventory of each party, the participants of WGIA encouraged a follow-up of the issues pointed out in the discussion, and recommended the continuous implementation of the ML in future WGIAs.

The points of discussion and the outcomes of the individual ML are summarized in the following sections (3.1.1. - 3.1.4.).

3.1.1 Agriculture Sector

Sector Overview

Indonesia and Vietnam participated in the mutual learning in the Agriculture Sector. The general information of the two countries is as follows.

Table 2 Sector Overview

	Indonesia	Vietnam
National total GHG emissions ($Gg\text{-}CO_2$ eq., without LUCF)	556,499 (in 2000)	150,900 (in 2000)
GHG emissions in the Agriculture Sector ($Gg\text{-}CO_2$ eq.)	75,419 (in 2000)	65,091 (in 2000)
Responsible agency for the inventory	Ministry of Environment	Ministry of Natural Resources and Environment (MONRE)
Entity in charge of GHG emission calculation	Technical Team on Agriculture and Forestry	GHG Inventory Working Group
Origin of estimation method in the Agriculture Sector	IPCC 2006 Guidelines	Revised IPCC 1996 Guidelines
Source of activity data	Mainly *Biro Pusat Statistik*	Mainly government official statistics (for livestock)

Materials Used

In order to prepare for the mutual learning, both countries submitted their estimation documents of the sector to each other three months before the workshop. The exchanged documents are as follows.

Indonesia:

- GHG Inventory of Agriculture Sector
- Inventory Agriculture-2000 (excel)
- Inventory Livestock-2000 (excel)

Vietnam:

- Worksheet_livestock_2000 mutual (excel)
- DATA_CALCULATION_EF (excel)
- Livestock data_2000 (in Vietnamese)

Questions and Answers

After receiving the estimation documents, both countries studied them and submitted questions and comments to the partner country approximately two months before the workshop. The answers to the questions were provided prior to the workshop. The classification and the number of the questions are as follows.

Table 3 Classification of questions

Classification of question	Number of questions	
	from Vietnam to Indonesia	from Indonesia to Vietnam
Acquisition of activity data	2	2
Adoption of emission factor	4	1
Quality assurance & quality control	3	1
Responsible system structuring	4	1
Application of guideline	3	1
Mitigation plan	1	0

Outcomes of Mutual Learning

Through the mutual learning, several issues and good practices of the GHG inventory have been pointed out for both countries.

➢Issues and solutions

Although it seemed that most of the issues raised during the mutual learning were not immediately solvable, the participants stated that they would carefully re-examine those issues after returning to their countries.

The issues and solutions raised for Indonesia were as follows:

1) Indonesia used the correction factor (k(T)) to calculate the number of beef cattle, dairy cattle and buffalo, which is used to estimate emissions from enteric fermentation, etc. However, it was not clear what the correction factor actually implied. According to the explanation by Indonesia, it represented the age structure of the aforementioned animals (i.e., calf, growing, mature) and the emission intensity by the age of the animals (i.e., calf and growing cattle were of lower intensity than mature cattle). However, it was pointed out that it would be better to separate the population according to the age structure and modify the emission factor according to the emission intensity.
2) A transcription error of EF for manure management was found in the document. As a solution, Indonesia will improve the document.
3) It was not clear in the document how to apply the scaling factor of irrigated rice field for rice cultivation. It may be useful to indicate a clearer description, e.g. what is technical irrigation etc.
4) A systematic data collection flow did not exist, especially for “Urea” and “Liming”.
5) The amount of biogas from manure management was not available.
6) There was no scaling factor for each irrigation type for rice field.

In addition, experts from Indonesia stated that the emissions from beef cattle and dairy cattle were the most significant subcategories in the 4A enteric fermentation category (62.8%). Therefore, Indonesia indicated that they would try to develop country-specific emission factors.

The issues and solutions raised for Vietnam were as follows:

1) The major cattle bred in Vietnam are yellow cattle, which are smaller than cattle living in other countries. Therefore, it would be better to use a smaller emission factor of enteric fermentation for cattle in Vietnam than the IPCC default value for the Asian region. Nevertheless, Vietnam used the IPCC default value to estimate emissions in Second National Communication (SNC), since country-specific emission factors were not available. Vietnam hoped to apply Country Specific

Emission Factor (CSEF) to improve the accuracy of estimation in the future.

2) Vietnam imported live animals from abroad; however, the relevant data did not exist. Vietnam would like to collect more data about population to improve emission estimation.
3) For the manure management system, the number of biogas recovery systems has been increasing. However, the penetration rate of the biogas system in manure management is still not well understood.
4) There were some survey data (parameters) at the provincial level for manure management; however, activity data at the provincial level were not sufficient. Therefore, for the time being, integrated average parameters were used.
5) Systematic data collection was not good enough.

➢Good Practice

Some Good Practices were pointed out through the mutual learning. As for Indonesia 1) the GHG inventory was found to be in line with the IPCC 2006 Guidelines; 2) most of the EFs were IPCC defaults with corrected parameters for local conditions; 3) most sources of categories were covered for 2000-2005; 4) the Agriculture Sector inventory was found to be complete in terms of gases and geographical coverage; 5) the estimation methods were clearly described in the document, which helped the readers to understand methodologies, etc. clearly.

As for Vietnam, 1) the main activity data were from government official statistics, and data from other sources were used only for reference; 2) a trial calculation of CSEF for dairy cattle was conducted to meet the country-specific conditions; 3) there were detailed data to estimate the emissions from manure management.

➢Possible follow-up activities

Indonesia would check the activity data for dairy cattle, some of which were found to be doubtful. In addition, Vietnam and Indonesia would keep on trying to develop their data collection systems and institutional arrangements for periodical GHG inventory preparation through JICA projects. On-line (or e-mail) follow-up discussions were suggested for both countries if necessary.

➢Suggestions for future ML and WGIA

The participants' suggestions for future mutual learning were as follows:

1) More time should be put into discussions.
2) Presentations, which describe the circumstances of each country, should be made before moving on to the question session to warm up the meeting.
3) ML was a good practice for each other.
4) The length of the period to prepare for ML was sufficient.

In addition, the participants suggested sharing the progress of EF improvement in each other's country (e.g. dairy cattle and rice field) and their experiences of data collection in future WGIAs and/or ML.

Participants

Country	Name	Organization	Title
Indonesia	Dr. Idat Galih Permana	Center for Climate Risk and Opportunity Management (CCROM), Bogor Agricultural University	Researcher
	Dr. Muhammad Ardiansyah	Center for Climate Risk and Opportunity Management in Southeast Asia and Pacific, Bogor Agricultural University	Executive Secretary
	Mr. Prasetyadi Utomo	Directorate for Mitigation and Atmospheric Function Preservation, Ministry of the Environment, Republic of Indonesia	Technical Staff
	Mr. Hiroshi Ito (Rapporteur)	Capacity Development for Developing National GHG Inventories, JICA	Long-Term Expert
Vietnam	Mr. Mong Cuong Nguyen	Research Center for Climate Change and Sustainable Development	Expert
	Mr. Khac Tich Nguyen	Center of Asia Biotechnology	Expert
	Mr. Ly Viet Hung	VEA, MONRE	Researcher
	Mr. Quach Tat Quang	Ozone Layer Protection Centre, DMHCC, MONRE	Acting Director
	Ms. Nguyen Ihanh Hai	DMHCC, MONRE	Official
	Ms. Tran Thi Bich Ngoc	DMHCC, MONRE	Official
	Ms. Nguyen Thi Thu Huong	Center Consultant of Technology and Environment, VEA, MONRE	Researcher
	Ms. Takako Ono	Project for Capacity Building of National Greenhouse Gas Inventory in Vietnam, JICA	Chief Technical Advisor
Secretariat	Dr. Junko Akagi (Chair)	GIO	GHG Inventory Expert
	Mr. Kohei Sakai(Co-Chair)	GIO	GHG Inventory Expert
	Mr. Naofumi Kosaka	GIO	GHG Inventory Expert
	Mr. Takashi Morimoto	Environment and Energy Dept., Mitsubishi UFJ Research & Consulting Co., Ltd., Japan	Chief Analyst

3.1.2 Waste Sector

Process Overview

After completing the application process including determining a partner country, the Mutual Learning (ML) for the Waste Sector was implemented between China and the Republic of Korea (RoK). This year's ML for the Waste Sector was conducted along the time-line indicated below.

May 15th - June 25th, 2012

Exchanging inventory materials to be studied and interacting with each other by filling in and exchanging the Study Sheet in three stages.

July 10th, 2012

Implementing a three and a half-hour ML Session focusing on the issues and points of interest raised in the Study Sheet

When starting the ML, the Secretariat of ML-Waste Sector provided the participating countries with inventory materials received along with sheets of Process Overview, Process Time-line, and Study Sheet as guidance. Each paper explained the key factors and important features in each stage and affirmed a shared awareness and common understanding of what the Secretariat and the participants intended to achieve through the ML programme. In particular, the Process Overview covered an outline of key elements for the participants to be aware of, including confidentiality of information, as well as instructions on how to organize findings all along the line of the programme.

Material Used

The first stage was intended for exchanging actual inventory materials, such as a national inventory report (Waste Sector), reporting tables in a common reporting format (CRF), any other background documents, data, or spreadsheets used for actual emission estimates. The inventory materials exchanged between China and the RoK are shown in Table 4.

Table 4 Material used for Mutual Learning-Waste Sector

Country	Inventory report or documents	Spreadsheets
China	Document about methodology used during the inventory compiling, sources of activity data, and emission factors (update results of the 2008 inventory)	N/A
RoK	RoK Greenhouse Gas Inventory in the Waste Sector 1990-2009, May, 2012 (KECO, 2012)	UNFCCC CRF Tables for the 2009 Inventory

Being in the process of officially submitting their SNC, China was not able to share their actual inventory materials with RoK (for this reason, the Sector Overview of each country is excluded from the report of ML-Waste Sector). Although bearing in mind the sensitiveness of the issue of providing information before the official submission of SNC, some concerns on the availability of information were raised, since one of the important key factors for the success of the ML programme was to exchange actual inventory materials among participating countries well in advance. However, China responded to meet their partner's reasonable learning needs with their best cooperative efforts in order to achieve the best outcome under such circumstances.

➢Interacting with Each Other with Study Sheet

After exchanging inventory materials, the participating countries interacted with each other by filling in and exchanging the Study Sheet in MS Word format and the Study Sheet Summary in Excel format that the Secretariat of ML-Waste Sector had developed prior to the start of the programme. Therefore, with these two sheets, both countries could list and

organize all the findings, such as questions and answers, identified issues, good practice, solutions and suggestions, and possible follow-up activities. The participating countries were encouraged to ask any question or make any comment that they thought appropriate to help a constructive discussion on the partner country's inventory, bearing in mind that this was not intended for auditing, criticizing or official review.

➢Session Agenda

Based on the Process Overview-2 as guidance for the said session, which was provided to the participants in advance, a three and a half-hour ML session was conducted on July 10th back-to-back with WGIA10 following the agenda shown below. The session focused specifically on the issues raised in the Study Sheet to be clarified, and on exchanging suggestions or recommendations.

Table 5 Session Agenda of ML-Waste Sector

Time	Discussion on
8:30-8:40	Introducing each other
8:40-10:10	Inventory of RoK
	・ Issues to be further discussed as identified on the Study Sheet ・ Benefits obtained from actually participating in ML
10:10-10:20	Break
10:20-11:40	Inventory of China
	・ Issues to be further discussed as identified on the Study Sheet ・ Benefits obtained from actually participating in ML
11:40-11:50	Break
11:50-12:30	Possible follow-up activities and suggestions for future ML

Questions and Answers

Table 6 summarizes the points of focus to learn on national greenhouse gas (GHG) inventories of both countries based on the results of the Study Sheet exchanged with each other. The focus was placed mainly on finding out country-specific circumstances, especially on determining activity data, developing emission factors, and conducting uncertainty assessment. The differences in the circumstances between the two countries became apparent through the interactions.

Table 6 Points of Focus to Learn on National GHG Inventories of Both Countries

On National GHG Inventory of China Identified by RoK	On National GHG Inventory of RoK Identified by China
6A: Solid Waste Disposal Site (SWDS)	
・ Determining activity data (waste type and waste composition including 50 years of historical data) ・ Developing country-specific emission factors (methane correction factor, degradable organic component)	・ Determining and categorizing activity data ・ Developing country-specific emission factors (degradable organic component) ・ Estimating combined uncertainty ・ Presenting information in Common Reporting Format tables ・ Providing editorial suggestions for inventory report
6B: Wastewater Handling (WWH)	
・ Developing country-specific emission factors (maximum methane producing capacity, methane conversion factor)	・ Determining and categorizing activity data ・ Determining methodology including methane conversion factor and unit of activity data (biochemical oxygen demand, chemical oxygen demand) ・ Presenting information in Common Reporting Format tables

	・ Providing editorial suggestions for inventory report
6C: Waste Incineration	
・ Determining activity data (filling data gaps) ・ Estimating N_2O emissions	・ Determining and categorizing activity data ・ Developing country-specific emission factors (CO_2, N_2O emissions) ・ Estimating CO_2 emissions from biogenic wastes ・ Providing editorial suggestions for inventory report
General Issues	
・ Applying different versions of the IPCC Guidelines ・ Identifying key source categories ・ Estimating emissions from biological treatment ・ Conducting associated uncertainty assessment in country-specific emission factor	・ Estimating overall uncertainty for waste sector ・ Providing details of expert judgment across sub-categories

Outcomes of Mutual Learning

National GHG Inventory of China

➢Issues and Solutions

A summary of issues and findings concerning China's inventories identified during the session is listed below.

- 6A: Solid Waste Disposal Site (SWDS)

  Due to the difficulty in determining activity data in rural areas, the possibility of underestimating CH_4 emissions was discussed.
- 6B: Wastewater Handling (WWH)

  The country-specific maximum methane producing capacity (B_0) for domestic and industrial wastewater are determined and applied on the basis of years of accumulated expert's experience and judgment. A suggestion of determining B_0 based on actual measurements was made based on experience and practice in RoK.
- General Issues

  Uncertainty assessment was conducted for the first time using the IPCC default values. China intends to conduct it with country-specific method in the future.

➢Good Practice

A summary of good practice in China's inventories identified during the session are listed below.

- 6A: Solid Waste Disposal Site (SWDS)
  - ・ Unavailable historical statistical activity data such as waste generation before 1991, necessary for the First Order Decay (FOD) method, were estimated with driving force (population and GDP) to improve its accuracy. The treated amount and types of Municipal Solid Waste (MSW) over 666 cities of 32 provinces were determined from the statistical yearbook published by the government. The composition of MSW was determined by dividing the period 1956- 2005 into three different periods based on historical surveys, literature, and expert judgment.
  - ・ A substantial improvement has also been made in estimating activity data since 2005. China is in the process of establishing a national statistical system including activity data and parameters to develop emission factors to be eventually used as normalized statistical indexes for GHG emission estimates. Designing a national survey plan towards the preparation for their Third National Communications (TNC) has also

been undertaken. Much scientific research, examining research results and literature, and obtaining expert judgment were conducted in order to cover China's vast land and large population.

- Methane correction factors (MCFs) are periodically reviewed and determined in order to reflect the country-specific waste management practice in China progressing over time based on scientific research, literature, statistical data, and expert judgment. MCFs were developed by dividing the period 1956-2005 into four periods reflecting the actual conditions of all the waste disposal sites. MCFs for all the seven regions divided by administration will be determined in the future.
- Historical and current data of degradable organic carbon (DOC) were developed based on the results of scientific research conducted mainly in typical cities (almost 200 cities) in the south and north regions of the country, in order to reflect the differences in characteristic of regional climate and living habits.

- General Issues

Overall, the methodologies have improved in each sub-category since the 1994 national inventory of China included in their initial National Communications (INC). Emissions from incineration were estimated for the first time for the inventories included in their SNC. Regardless of the fact that the said emissions still remain a small amount, the country-specific parameters for this sub-category are planned to be improved.

National GHG Inventory of RoK

➢Issues and Solutions

A summary of issues and findings on RoK's inventory identified during the session is listed below.

- 6A: Solid Waste Disposal Site (SWDS)

Because of the lack of scientific knowledge and findings about uncertainties, the IPCC default values have been applied. Since the importance of better uncertainty assessment for identifying sources to be improved was reaffirmed through the discussions, the use of country-specific uncertainties was suggested.

- 6B: Wastewater Handling (WWH)

Only national statistics of biochemical oxygen demand (BOD) are currently available in the RoK. After learning about how China and Japan selected the unit of activity data for their inventories, efforts to estimate CH_4 emissions on the basis of chemical oxygen demand (COD) for industrial wastewater according to the IPCC Guidelines were suggested.

- 6C: Waste Incineration

In the RoK, a pilot project is planned for monitoring emissions from fossil-fuel as well as biogenic CO_2 emissions from incinerator with ^{14}C isotope at about 60 facilities across the country as a part of mitigation strategies rather than for the use for national GHG inventories. Seeking the possibility of utilizing these data as a part of the MRV tool for Korea's GHG inventories was suggested by China. Also, since Japan is in the process of planning similar projects, it was suggested that information of project updates between the RoK and Japan would be exchanged as the situation in each country develops.

- General Issues

Since there have been extensive waste incineration practices in the RoK and Japan, the consideration of contribution to the future IPCC Guidelines by providing scientific findings on waste incineration gained in the RoK was discussed.

➢Good Practice

A summary of good practice on RoK's inventories identified during the session is listed below.

- 6A: Solid Waste Disposal Site (SWDS)

  Advanced efforts have been made to annually calculate country-specific DOC based on waste composition with annual national statistics, and also carbon content surveyed every five years.
- 6B: Wastewater Handling (WWH)

  Advanced efforts have been made to determine the emission factor for industrial wastewater by wastewater treatment facilities based on the various results of chamber measurements conducted by treatment processes.
- 6C: Waste Incineration

  In China, since an incineration practice, such as building incineration facilities adjacent to residential areas, has been set forward because of the need to prepare for a foreseen shortage of landfill sites, the difficulties in obtaining public understanding and cooperation has become an issue to be addressed. RoK shared their encouraging experiences with China on how they resolved the same issue, such as the government's taking initiative to decree regulations for a community to treat waste generated within the community, and the public eventually accepted it by receiving its benefits such as waste heat utilization.

Issues and Findings - Common Circumstances for Both Countries

- Decision making process and institutional arrangement
  - Decision making organizations tend to give more priority to policy matters than to scientific matters (policy over science), and this seems to apply to many countries.
  - China explained that it was unable to publish or share inventories completed many months ago without the approval of the decision making organizations for policy matters.

Other Benefits Obtained from ML

A summary of the benefits obtained from the ML is provided below. Evidently, it reflects the participants' full recognition of the ML program as a practical and direct approach reaching out to the WGIA member countries to help them to fulfill their needs for workable solutions to improve their national GHG inventories. The session also served to affirm that the purpose of the ML programme has been met at this time of substantially increased importance and necessity of improvement as well as the use of national GHG inventory in each country under the UNFCCC.

- The use of different versions of the IPCC Guidelines in neighboring countries was recognized.
- Useful information and knowledge on case-specific applications of methodologies, activity data, and emission factors in neighboring countries' inventories were found to be informative.
- As a consequence of the rapid changes and progress of the NAI Parties' domestic situation, not only the benefit of studying the most recent national inventory in neighboring countries, but also the effectiveness and advantage of learning with a focus on different issues each time they apply for the programme (multiple participations in the ML program) was affirmed, particularly by the RoK which was a second-time participant.
- The benefit of utilizing the information and suggestions actually gained from the ML for improving inventories was affirmed. For instance, RoK has worked for applying a higher tier of the IPCC Guidelines because of being encouraged by the findings from the previous ML conducted in 2011 that RoK took part in.

- The ML programme fosters and strengthens the participating countries' motivation, encouragement, and cooperation to improve their national GHG inventories together among NAI Parties.

Benefits obtained from ML - Point of view of observer from Vietnam

One of the feedbacks on the previous ML-Waste sector conducted in 2011 was to encourage as many national inventory experts and compilers in the local host country as possible to participate in the program in order for them to fully take advantage of the opportunities. Below are the comments made by an observer from Vietnam who attended the session upon obtaining the agreement of both countries.

- Observing that other countries were also facing similar issues and concerns as Vietnam, and learning about other countries' efforts for addressing issues, was encouraging.
- Useful information was obtained not only from a country with advanced domestic circumstances (RoK), but also from a country whose current situation resembles to the one in Vietnam (China).
- Getting motivated and encouraged by observing the ML session, this experience will be shared with the members of the own inventory team.

➢Possible Follow-up Activities and Suggestions for Future ML

The possible follow-up activities and suggestions for future ML discussed during the session are provided below. The Secretariat of ML intends to respond to the needs of participating countries to the extent possible.

- Exchanging more detailed information or advice received on the raised issues
- Following up on the future plans shared during the session
- Continuing to implement the Mutual Learning Program annually

Participants

Country	Name	Organization	Title
China	Dr. Qingxian GAO	Chinese Research Academy of Environmental Sciences (CRAES)	Researcher
	Dr. Zhanyun MA	Chinese Research Academy of Environmental Sciences (CRAES)	Assistant Researcher
RoK	Dr. Byong Bok JIN	Korea Environment Corporation (KECO)	Director
	Dr. Eun-hwa CHOI	Korea Environment Corporation (KECO)	Manager
	Mr. Chang Hoon LEE	Korea Environment Corporation (KECO)	Assistant Manager
	Dr. Sang Won LEE	Korea Environment Corporation (KECO)	Deputy General Manager
	Mr. An Woo NAM	Korea Environment Corporation (KECO)	Assistant Manager
	Mr. Sung Ho SHIN	Korea Environment Corporation (KECO)	Assistant Manager
Vietnam	Mr. Thang Ngoc LE	Vietnam Environment Administration (VEA)	Deputy Director of Waste Treatment Division
Japan (Facilitator)	Mr. Hiroyuki UEDA (Session Chair)	Mitsubishi UFJ Research & Consulting Co., Ltd. (MURC)	Senior Analyst
	Dr. Takefumi ODA	GIO	GHG Inventory Expert
	Ms. Masako WHITE (Rapporteur)	GIO	GHG Inventory Expert

3.1.3 Energy Sector

Sector Overview

Thailand and Cambodia participated in the mutual learning in the Energy Sector. The general information of the two countries is as follows.

Table 7 Sector Overview

	Thailand	Cambodia
National total GHG emissions (Gg-CO_2 eq., without LUCF)	236,948 (in 2000)	24,783 (in 2000)
GHG emissions in the Energy Sector (Gg-CO_2 eq.)	159,382 (in 2000)	3,443 (in 2000)
Responsible agency for the inventory	Ministry of Natural Resources and Environment	Ministry of Environment
Entity in charge of GHG emission calculation	Office of Natural Resources and Environmental Policy and Planning	GHG Inventory Office, Climate Change Department
Origin of estimation method in the Energy Sector	Revised 1996 IPCC Guideline and 2000 IPCC Good Practice Guideline	Revised 1996 IPCC Guideline, complemented by 2000 IPCC Good Practice Guideline
Source of activity data	Statistical reports from relevant agencies	Import data of fossil fuel by Ministry of Commerce, and fuel or energy consumption data from various industrial entities

Materials Used

In order to prepare for the mutual learning of the workshop, both countries submitted their estimation documents of the sector to each other three months before the workshop. The exchanged documents are as follows.

Thailand:

- Second National Communication (February 2011)
  - Ghg_energy_agriculture (word)
  - Overview (excel)

Cambodia:

- Second National Communication Technical Report Draft (August 2009)
  - Overview (excel)
  - Module 1 (excel)
  - Trend (excel)
  - Summary result-15-July-09 (excel)

Questions and Answers

After receiving the inventory documents, both countries studied them and submitted questions and comments to the partner country approximately two months before the workshop. The answers to the questions were submitted prior to the workshop. The classification and the number of the questions are as follows

Table 8 Classification of questions

Classification of question	Number of questions	
	from Cambodia to Thailand	from Thailand to Cambodia
Activity data	4	5
Estimation method	2	5
Transparency	0	4
Responsible system structuring	1	2
Quality assurance & quality control	1	1
Emission factor	1	1
Uncertainty	1	0

Outcomes of Mutual Learning

Through the mutual learning, several issues and good practices of the GHG inventory have been pointed out for both countries.

➢Issues and solutions

The main issue raised for Thailand was that the country-specific emission factor has not been prepared for the emissions from the energy industry which is classified as the major key category. The solution for this issue is described below as a good practice.

The issues raised for Cambodia were; 1) The lack of funding disables continuous activity data collection and survey, 2) A country-specific emission factor is not prepared, and 3) A stable organization for inventory is not established yet. As one solution for these issues, the institutional arrangement is now in draft plan for discussion with the top management level of the government. However the lack of funding issue may remain unsettled.

➢Good Practice

Several good practices were pointed out for both countries through the mutual learning.

The government of Thailand is developing the country-specific emission factor for the energy industry in order to mitigate GHG emissions by understanding the actual emissions. Also Thailand seeks to develop the estimation method for key sectors to a higher tier. Basically, Thailand has a good national policy and system for collecting activity data.

As for Cambodia, the provided material was so transparent that the attendees of the mutual learning easily understood the emission estimate. Also Cambodia has an ideal institutional arrangement plan for the near future, which was introduced during the mutual learning.

➢Possible follow-up activities

At the end of the mutual learning an attendee made the following suggestion relating to the possible follow-up activities in the future; “Let us keep in touch for sharing and updating new information and experiences in order to improve the existing results”.

Participants

Country	Name	Organization	Title
Cambodia	Mr. Va Chanmakaravuth	Industrial Environmental Office, Ministry of Industry, Mines and Energy	Vice Chief Office
Thailand	Ms. Nilapha PAEMANEE	Environmental Division, Electricity Generating Authority of Thailand	Scientist
	Ms. Anchalee NATIKOOL	Environmental Division, Electricity Generating Authority of Thailand	Scientist
Japan	Dr. Yuriko HAYABUCHI	Division of Earth Environment Dynamics, Research Institute for Applied Mechanics, Kyushu University	Research Assistant Professor
	Mr. Akira OSAKO	GIO	GHG Inventory Expert
	Mr. Kohei SAKAI	GIO	GHG Inventory Expert
	Mr. Takashi MORIMOTO	Environment and Energy Dept., MURC	Chief Analyst
	Ms. Kana SUZUKI	Environment and Energy Dept., MURC	Analyst

3.1.4 Industrial Processes Sector

Sector Overview

Indonesia and Japan joined the mutual learning for the Industrial Processes Sector. The general information of the two countries is as follows.

Table 9 Sector Overview

	Indonesia	Japan
National total GHG emissions (Gg-CO_2 eq., without LULUCF)	48,733 (in 2005)	65,898 (in 2010)
Agency responsible for the inventory	Ministry of Environment	Ministry of the Environment
Entity in charge of GHG emission estimation	Ministry of Environment	GIO
Applied guidelines and estimation methods in the IP Sector	2006 IPCC Guidelines, Tier 1	1996 IPCC Guidelines, GPG Country-specific, Default, Tier 1,Tier 2
Source of activity data	National statistics, Ministry of Energy and Mineral Resources, Industry organizations, etc.	National statistics, Ministry of Economy, Trade and Industry, Ministry of Health, Labour and Welfare, Japan Cement Association, Japan Iron and Steel Federation, etc.

Materials Used

In order to prepare for the mutual learning of the workshop, the two countries provided their estimation documents for the sector to each other ten weeks before the workshop. The exchanged documents are as follows.

Indonesia:

-Chapter II National GHG Inventory, Indonesia Second National Communication under the United Nations Framework Convention on Climate Change (June 2010)

-2006 IPCC Guidelines (GLs) worksheets, Summary GHG Inventory worksheets

Japan:

- National Inventory Report of Japan (of FY2010, submitted in April 2012)
- Common Reporting Format Tables (of FY2010, submitted in April 2012)

Questions and Answers

After receiving the inventory documents, both countries studied them and submitted questions and comments to the partner country approximately five weeks to several days before the workshop. The answers to the questions were provided prior to the workshop. The classification and the number of the questions were as follows.

Table 10 Classification of questions

Classification of question	Number of questions	
	from Indonesia to Japan	from Japan to Indonesia
Acquisition of activity data	6	6
Adoption of emission factor	5	3
Quality assurance & quality control	0	0
Institutional arrangements	1	0
Others	12	1

Outcomes of the Mutual Learning

➢Issues and solutions

The participants noted that currently no emissions were reported for HFCs, SF_6, and that the coverage of PFCs might not be sufficient in Indonesia's inventory. They acknowledged that the solution might be to first correctly identify the sources of HFC, PFC, and SF_6, and following that, to use a Tier 1 method from the 2006 IPCC Guidelines for F-gas use. It was also noted that CO_2 recovered for urea production was deducted from the emissions from ammonia production, but the down-stream use of urea might not be accounted for. The participants acknowledged that coordination across inventory sectors was necessary.

Regarding data collection, Indonesia is embarking on a complex scheme, with the Presidential Regulation No. 71 coming into effect. This regulation determines that local/provincial governments are to prepare emissions estimations, and this is to be incorporated into the national inventory. Large and middle-size companies will also provide emission data to provincial/national governments. The participants acknowledged that ensuring consistency and avoiding omissions/double-counting may become an issue, and that careful coordination was necessary. However, they also noted that it could be an opportunity for cross-checking between emission data submitted by different entities.

Regarding inter-ministerial coordination, Indonesia faces insufficient commitment from relevant ministries to inventory preparation. Participants acknowledged that the Japanese experience of engaging relevant ministries/agencies and industrial associations in some parts of the estimation process might offer a solution. Indonesia also faces hesitance from relevant ministries/organizations/companies to provide confidential data. It was noted that 1) providing

an explanation that reporting in the inventory will be done by aggregation, therefore confidential data will not be disclosed, and 2) involving relevant entities in the estimation process so that they know that the data will be treated correctly might be useful in this regard.

➢Outstanding Issues

The participants from Indonesia pointed out that Japan reported certain Industrial Processes-related emissions under the Energy Sector. The Japanese participants acknowledged this as an outstanding remaining issue, since Japan uses an Energy Balance Table to balance all fuel use in the country, which sometimes makes it difficult to take out portions to report under the IP Sector. It was also noted by the participants that there were no special written arrangements for data provision/treatment in Japan, which might pose problems when personnel changes.

The participants noted that some of the outstanding issues for Indonesia were finding ways: 1) to involve appropriate stakeholders in Activity Data (AD) acquisition and EF development, 2) to conduct QC for AD, in light of a complex data collection scheme starting-up, 3) to coordinate among ministries/other entities, and clarify who decides on the roles of each.

Participants

Country	Name	Organization	Title
Indonesia	Dr. Retno Gumilang Dewi	Institut Teknologi Bandung	Head of the Center for Research on Energy Policy
	Mr. Agus Gunawan	Ministry of Environment	Head of Sub Division for the Development of Mitigation Instruments
	Ms. Rias Parinderati	Institut Teknologi Bandung	Researcher
	Mr. Hiroshi Ito	Capacity Development for Climate Change Strategies in Indonesia, JICA	Long Term Expert (Sub-project 3)
Japan	Ms. Elsa Hatanaka	GIO	GHG Inventory Expert
	Dr. Keizo Hirai	GIO	GHG Inventory Expert
	Mr. Takeshi Nakashima	MURC	Consultant
	Mr. Takuji Terakawa	MURC	Analyst

3.2. Opening Session

The opening session was chaired by the overall workshop chair, Dr. Yukihiro Nojiri (NIES), and the rapporteur was Mr. Luong Quang Huy (DMHCC).

The welcome address was delivered by Mr. Shinsuke Oda, officer of the Low-Carbon Society Promotion Office, MOEJ, followed by the welcome address delivered by Mr. Nguyen Khac Hieu, Deputy Director of DMHCC under MONRE.

Mr. Shinsuke Oda (MOEJ) welcomed everyone and expressed his gratitude to Mr. Nguyen Khac Hieu (DMHCC) and MONRE for co-hosting this workshop. He stressed the importance of inventories and the significance of the workshop for both Annex I and NAI countries.

Mr. Nguyen Khac Hieu (MONRE) also welcomed all participants. Then he introduced the role of MONRE as the focal point agency on climate change in Vietnam and stressed the importance of GHG inventory and capacity building.

Dr. Keizo Hirai (GIO) gave an overview of WGIA and introduced the objectives, participants and the agenda of WGIA10.

The objectives of the workshop were:

- To have mutual learning,
- To report on the latest national communications (NCs) submitted to the UNFCCC Secretariat,
- To discuss decisions by the Conference of the Parties (COP) and future activities of WGIA,
- To discuss sector-specific issues,
- To have hands-on training using the IPCC Inventory Software, and
- To discuss the activities of international organizations.

Mr. Shinsuke Oda (MOEJ) made a presentation on Japan's climate change policies. He introduced the current situation, targets and actions taken in Japan to struggle against climate change. The decreasing rate of emissions considering forest carbon sinks and the Kyoto mechanism credit is -10.9% on average (FY 2008-2010). Excluding Industrial Processes and Waste Products, the remaining 94% of CO_2 emissions are related to energy consumption. Household emissions, including personal vehicles and municipal waste, comprise approximately 20% of the emissions. The remaining 80% is from the Business and Public Sectors. Japan’s targets for GHG reduction are “Mid-term target (2020): -25% from 1990” and “Long-term target (2050): -80% from 1990”. Global warming countermeasures are “Carbon tax”, “Feed-in Tariff for renewable energy”, “Legislations (Top Runner System)”, “Grant for eco-point system“, “Environmental Assessment Law”, “Mandatory reporting and accounting”, and “Forest Management” etc.

Mr. Nguyen Minh Bao (DMHCC) also presented the current situation and mitigation options for GHG emissions in Vietnam. Emissions from the Energy, Agriculture and LULUCF Sectors are projected to be 169.2, 300.4, and 515.8 Tg CO_2 eq. in 2010, 2020, and 2030, respectively. The Energy Sector accounts for 91.3% of the projected total emissions for 2030. GHG mitigation options were developed for three main sectors: Energy, Agriculture and LULUCF. He also talked about the limitation or difficulties that Vietnam is struggling with concerning climate change. These are “Insufficient information and data on long-term planning”, “Some IPCC emission factor (EF) defaults for energy technologies may not be

suitable, but the national EFs have not been well-developed yet", "Technical capacity in the development of mitigation options", "Limited information about know-how techniques", and "Insufficient investment and technical expertise for transferring and applying modern, environmentally sound technologies". To improve these negative circumstances, we agreed about the importance to find out various potentials for co-operation and technical support and to implement their outcomes.

3.3 Session I: NC updating and discussion on WGIA- activity

This session was chaired by Mr. Takahiko Hiraishi (IGES) and the rapporteur was Dr. Junko Akagi (GIO).

The session was held for considering the future activities of WGIA member countries and the WGIA Secretariat through reviewing the outcomes of COP16, 17, SBs, etc., the progress made by the WGIA member countries and WGIA-activities since 2003. In addition, the latest news in regard to the completion of SNC and TNC were reported by India and the Republic of Korea, respectively.

Mr. Dominique Revet (UNFCCC) shared updated information on the UNFCCC negotiations with a focus on NAI NCs since the WGIA9 in July 2011. The following topics were covered: CGE, financial & technical support, article 12.5 of the Convention ("frequency"), biennial update reports (BURs) and international consultation and analysis (ICA).

Ms. Elsa Hatanaka (GIO) supplemented Mr. Revet's presentation with background information for the enhanced reporting requirements for both AI and NAI Parties. She also explained the new requirements determined for AI Parties, such as biennial reports (BRs), international assessment and review (IAR), and AI Inventory Reporting Guidelines for reference.

Among others, the reporting requirements including "frequency" issues of the NCs and BURs and financial matters drew the participants' attention. The outcomes of the discussions following the presentations were as follows:

- ➢Submission of NC is every four years according to the decision 1/CP.16, paragraph 60 (b). The base year for the reporting of the next NC has not been determined, and may be different depending on country situations.
- ➢Submission of BUR is every two years according to the decision 2/CP.17, paragraph 41 (f). The BUR guidelines for NAI Parties states that the 1st BUR submission should be done by December 2014 and it shall cover, at a minimum, the inventory for the calendar year no more than 4 years prior to the date of submission, or more recent years if information is available. Least Developed Countries (LDCs) and Small Island Developing States (SIDS) may submit at their discretion.
- ➢The establishment of institutional arrangements is crucial for frequent inventory preparation.
- ➢According to the guidelines for NAI NCs (Dec. 17/CP.8), the use of the Revised 1996 GLs is a minimum requirement for NAI Parties to prepare their inventories. The two GPGs and the latest GLs are encouraged to be used. This is up to the Party's decision.
- ➢The UNFCCC Secretariat encouraged the WGIA member countries to apply for funding for the next NCs before the completion of the current NCs to avoid the lack of

continuity.

➢For the e-learning program, it is likely that the updated CGE training materials (available on the web) will be used, although it has not been decided yet. For establishing institutional arrangements, the materials should provide hints.

➢The summary table in the CP8's guidelines is getting old. An update of the table will be considered in future COPs.

➢The application for funds (including those for BURs) is simple and straightforward. See the URL for GEF policy guidelines for the financing of biennial update reports for NAI Parties (http://www.thegef.org/gef/guideline/biennial_update_reports_parties_UNFCCC).

Dr. Sumana Bhattacharya (India) and Dr. Sangwon Lee (RoK) informed that India had submitted its SNC and the RoK had submitted its TNC in 2012, and presented an overview of the reports with a focus on the inventory chapter (see also Table 11). Both countries improved their reporting especially in terms of completeness (e.g., categories, gases and time-series data) compared to their previous NCs. Now that the institutional arrangements for the inventory preparation as well as the inventory management have been well organized, both countries seemed to be almost ready for the inventory preparation in a two-year cycle.

Dr. Junko Akagi (GIO), as a representative of the WGIA Secretariat, reviewed the WGIA activities on the occasion of its 10th anniversary and also assessed the improvements of NCs of the WGIA participating countries by comparing their initial and second NCs. According to the key category analysis conducted by the WGIA Secretariat for the countries that had submitted their SNCs, Energy, Agriculture and LUCF were found to be still the major sectors. She also proposed a draft TOR for the workshop in order to make the WGIA more meaningful for the participating countries and to run the workshop in a more efficient manner beyond the WGIA10. She asked everyone to contact the WGIA Secretariat by the end of October 2012 if they had comments on the draft TOR.

In the discussions, it was suggested that the WGIA Secretariat included a brief description of the history of WGIA or provided such information as a preamble or an annex to the draft TOR, as it should be informative for particularly those who are not familiar with the WGIA activities. With regard to the text of the draft TOR, it was suggested that the objectives of WGIA could be more elaborated and other words for the WGIA approach such as "(information) exchange" rather than "assist (member countries)" could be used. Furthermore, it was expressed that the increase in the number of entities (i.e., organizing committee and advisory board proposed in the draft TOR) for running the WGIA might slow down the preparation process. These comments will be considered by the WGIA Secretariat together with any additional comments provided by the member countries by the end of October 2012. After that date, the final TOR will be shared with the participants of WGIA10.

It was also suggested that the WGIA Secretariat re-considered the way to run the tools developed by them, such as the WGIA mailing list and the roster of regional experts, which have not been actively used or are currently not available for participants. The WGIA Secretariat will consider these matters as well.

3.4 Session II-1: Hands-on Training using the new IPCC Inventory Software

This session was chaired by Dr. Simon Eggleston (IPCC TFI TSU) and the rapporteur was Dr. Keizo Hirai (GIO).

To support NA I countries in preparing for their national GHG inventories, a hands-on training using the new IPCC Inventory Software was implemented. After an overview focusing on the strong points of the new software by Dr. Eggleston (IPCC TFI TSU), the attendees split into two groups, one on Energy/Industrial Processes (IP) and the other on Waste, followed by trial calculations using laptop PCs with the pre-installed software.

3.4.1 Energy/IP

Over 50 experts joined this session from Cambodia, India, Indonesia, the Republic of Korea, Malaysia, Mongolia, Myanmar, Philippines, Thailand, USEPA, the US LEAD Program, the SEA-Project, Australia, JICA-Indonesia, Kyushu Univ., MURC, SUR, and JICA Vietnam.

Dr. Keizo Hirai (GIO) presented focused sub-categories and the rationale. Mr. Kiyoto Tanabe (IPCC TFI TSU) presented how to set up the software. They acted as instructors for using the software and all attendees started to calculate the actual CO_2-eq. emissions of Hydro Fluoro Carbons (HFCs) from refrigerators and air-conditioners based on prepared dummy-data. Currently HFCs or F-gases are not “shall be reported” gases for NAI countries. However, as Dr. Keizo Hirai presented at the Non-CO_2 gases Working Group in WGIA9, two participating countries were found that they had already estimated the “potential emissions of F-gases” in their NCs because they had recognized that F-gases (HFCs) emissions were a very important emission source. The attendees of the WG showed interest in estimating the actual F-gases (HFCs) emissions because the potential emissions are likely to be overestimated. IPCC TFI TSU suggested at the WG using the Tier.1 method of the “2006 Guidelines (NOT the Revised 1996GL)” for calculating the actual F-gas emissions. This IPCC Inventory Software implements the 2006 GL but can also be used for reporting under the Revised 1996 GL. One strong point of this software is that it “can calculate the actual emissions of F-gases even if time-series data are not complete”.

Some countries were encouraged to try to estimate the actual F-gas emissions. Also it was praised that this software could be used as a data base which could be shared among different Ministries and/or Agencies. However, it was also pointed out that this software on “F-gases” should be more user-friendly, some remaining bugs should be eliminated and excel data should be input easily.

3.4.2 Waste

In the Waste Sector Working Group of the WGIA 8 and the WGIA 9, the participants reported the status of their inventory compilation, methodology and data collection on the waste sector in each party’s latest National Communications. These reports made it clear that quite a few parties had not introduced the First Order Decay (FOD) method in their inventory although Solid Waste Disposal Site (SWDS) is one of key sources in most countries.

The FOD method is an appropriate approach to estimate emissions from SWDS. Although this method includes a little complicated procedure which needs historical data of waste-disposal for the last 50 years, the 2006 IPCC Guidelines encourage the application of FOD since it provides a better estimation by using actual emissions than by using potential emissions. The newly released IPCC software compliant with the 2006 IPCC Guidelines

provides a convenient way to apply the FOD method. Therefore, the hands-on training to calculate the emissions from SWDS using dummy data was conducted focusing on the FOD method

Dr. Takefumi Oda (GIO) made an introductory presentation of the Hands-on Training on the Waste Sector. After an overview of the FOD method, he emphasized the importance of its application in the estimation. He also presented the correct answer to the homework related to the FOD method assigned to the participants prior to the meeting. The exercises related to the comparison between actual and potential emissions, the comparison in emissions from respective disposal types with varied Methane Correction Factors, and the analysis of contribution of past disposal amount.

Dr. Baasansuren Jamsranjav (IPCC TFI TSU) made a presentation on the operational instruction for the Hands-on Training with dummy data of SWDS. She explained how to use the spreadsheet related to the estimation of emissions from SWDS with the IPCC software; parameters setup, function to estimate activity data depending on data availability, manner to report the results and so on. She also mentioned about the flexibility of reporting format; the software can report the results not only on the form of the 2006 IPCC Guidelines, but also on the form of the revised 1996 IPCC Guidelines.

At the first operation on the software, referring to the dummy data the participants set up major parameters of the FOD method such as Methane Correction Factors, fraction of Degradable Organic Carbon, k values, and so on. Then, the participants exercised an interpolation of a series of historical population data to estimate the disposal amount from limited information. After that, they input a series of obtained historical population, and got estimation results of actual emissions by the FOD method. To exchange the results with each other, reports of an annual estimation were printed out.

Most of the participants have been favorably impressed by the IPCC software. Since the new IPCC software provides previously input default parameters, a number of participants made positive comments that the software is very useful for beginner compilers to try the FOD method. Participants who considered introducing the FOD method into their future inventory expressed that they would like to get more familiar with the software.

The participants also pointed out some bugs on the software inherent in newly released programs. Some experts found inflexibility in setting the parameters such as climate zone and waste composition, and made a constructive suggestion to improve the software and its operational manner.

It is hoped that the IPCC software will support the parties trying to introduce the FOD method in their inventory compilation.

Annex (Participants for Waste)

Participants:	Dr. Qingxian GAO	(China)
	Dr. Zhanyun MA	(China)
	Dr. Sumana BHATTACHARYA	(India)
	Dr. Retno Gumilang DEWI	(Indonesia)
	Mr. Sung Ho SHIN	(Korea)
	Mr. Chang Hoono LEE	(Korea)
	Mr. An Woo NAM	(Korea)
	Mr. Mone NOUANSYVONG	(Lao, PDR)
	Mr. Mohd Famey YUSOFF	(Malaysia)
	Dr. Batimaa PUNSALMAA	(Mongolia)
	Mr. Sein THET	(Myanmar)
	Ms. Lucille Joanna Santos BORLAZA	(Philippines)
	Ms. Dung Thi Phuong ANH	(Vietnam)
	Ms. Nguyen Thi Van ANH	(Vietnam)
	Mr. Le Ngoc THANG	(Vietnam)
	Ms. Tran Thi THANH	(Vietnam)
	Ms. Heather COOK	(Australia)
	Mr. Shinsuke ODA	(MOEJ)
	Mr. Hiroyuki UEDA	(MURC)
	Ms. Masako WHITE	(GIO)
Instructor	Dr. Baasansuren JAMSRANJAV	(IPCC TFI TSU)
	Dr. Takefumi ODA	(GIO)

3.5 Session II-2 AFOLU Sector Working Group

Introduction

Considering the fact that the AFOLU (Agriculture and LULUCF) Sector includes significant emission/removal sources in many of the member countries, continuous information sharing and discussions on this sector are desirable. In this session, the member countries gave presentations and exchanged information on the details of estimation methodologies and/or mitigation measures used by each country.

The AFOLU WG was attended by 29 participants from 11 WGIA-member countries (China, India, Indonesia, Japan, Republic of Korea, Lao P.D.R., Malaysia, Myanmar, Philippines, Thailand, and Vietnam) and also from Australia, USA and JICA Vietnam. The chairperson of this session was Dr. Damasa Magcale Macandog (Philippines) and the rapporteur was Dr. Khin Lay Swe (Myanmar).

Presentations and Discussions

Mr. Kohei Sakai (GIO) introduced the background information, theme and schedule of the WG.

Following the introductory presentation, Mr. Sakai also introduced the "Monsoon Asia Agro-Environmental Research Consortium (MARCO)" and the "Global Research Alliance (GRA)" on behalf of Dr. Kazuyuki Yagi (National Institute for Agro-Environmental Sciences, Japan), who is a coordinator of the MARCO and the GRA. The MARCO is an international symposium to discuss and exchange information in monsoon Asia for agro-environmental research including greenhouse gas issues such as mitigation. The GRA is a bottom-up international network for agriculture-related greenhouse gases launched in the UNFCCC COP 15.

Dr. Khin Lay Swe made a presentation entitled "Initial National Communication (INC) Project in Myanmar". Myanmar's National GHG Inventory team successfully prepared National GHG Inventories for the year of 2000 using the 2006 IPCC Guidelines. The Agriculture and LUCF Sectors had the largest share of emissions and removals, and the national total was net removal. She also introduced Myanmar's projects and activities for mitigation and adaptation.

In the Q&A session, Dr. Swe mentioned that the difficulty she had encountered was insufficient institutional arrangements in Myanmar for the preparation of INC. She also explained why Myanmar had decided to use the 2006 IPCC Guidelines to prepare the INC. This was simply because Myanmar started its inventory preparation for the INC in 2010 and the 2006 GLs, which are the latest guidelines and include the newest information, had already been available at that time.

Dr. Idat Galih Permana (Indonesia) made a presentation entitled "Inventory and Mitigation for Methane Emissions from Livestock in Indonesia". He introduced estimation methods, mitigation technologies and the projection of CH_4 emissions from enteric fermentation and manure management. According to his presentation, CH_4 emissions in Indonesia are expected to increase significantly by 2030. He also explained the priorities in mitigation technology.

In the Q&A session, he explained that Indonesia had used IPCC default EFs in their SNC.

However, actual livestock EFs in Indonesia and other Asian countries may be lower than the IPCC default EFs. Therefore, Indonesia has been trying to develop CSEFs for the next inventory.

Mr. Worapong Waramit (Thailand) made a presentation entitled "Greenhouse Gases Inventory in the Agricultural Sector of Thailand". In Thailand's SNC, the Tier 2 methods were used for enteric fermentation, manure management, rice cultivation and field burning of agricultural residues; while the Tier 1 method was used for agricultural soils. About 60% of the emissions in the Agriculture Sector were from rice cultivation. He also gave recommendations for further improvement and support required for GHG inventory.

In the Q&A session, he mentioned that his priority recommendation was to shift to a higher Tier from Tier 1. He also explained that his department, Land Development Department (LDD), supported the inventory preparation for agricultural soils and land use and was connected with the GHG inventory group (e.g. attended meetings and invited the inventory team to give training on GHG inventory).

Dr. Shenghui Han (China) made a presentation entitled "Greenhouse gas emissions from China cropland". She introduced the estimation method for CH_4 from rice paddies and N_2O from agricultural land in China. The CH_4 MOD model (Tier 3 method) was used to estimate emissions from rice paddies. For N_2O emission estimations from agricultural field, the Tier 2 method was used. In this method, the IAP-N model and CSEF developed by field observation were used to estimate the N input to agricultural field.

Dr. Damasa Magcale Macandog (Philippines) made a presentation entitled "Philippine SNC: Gaps, Challenges and Improvements for the GHG Inventory of the AFOLU Sector". In the SNC, the Philippines used the 1996 GLs and reported the GHG inventory for 2000. CH_4 emissions from rice cultivation were estimated with the Tier 2 method, and CSEF from the research findings of International Rice Research Institute (IRRI) was used. She also introduced gaps, needs and constraints and improvements from various viewpoints.

Dr. Kyeong-hak Lee (Republic of Korea) made a presentation entitled "Monte Carlo Simulation of Uncertainty Analysis for National GHG Inventories". He introduced the Monte Carlo Simulation software, which was used for uncertainty analysis of the LULUCF Sector in the Republic of Korea. He used "Monte Carlo Uncertainty Analysis Program v1.0", which is free software, and demonstrated this software with input data from forest.

Following his presentation, two questions were raised: if any other countries could do uncertainty analysis with this program, and how participants could get a copy of the program. He answered that he could share a copy upon request and anybody could use this software for the uncertainty analysis. He could also share his experience in developing the software.

Dr. Elizabeth M.P. Philip (Malaysia) made a presentation entitled "Developing a Sustainable AFOLU GHG System". She introduced the improvements made in the SNC, transition activities from SNC to TNC, and challenges. In the SNC, Malaysia improved some items of the GHG inventory including activity data, local EFs, uncertainty assessment, QA/QC, documentation, capacity building, etc. She also shared her difficulty in making appropriate land assignment, for example, whether a peatland, which was drained 30 years ago, should still be treated as "Peatland" or not.

In the Q&A session, she said that the FRIM (Forest Research Institute Malaysia) did the

final compilation job, which included some decision making, for the AFOLU (Agriculture and LUCF) Sector inventory.

Dr. Sultan Singh (India) made also a short presentation entitled "GHG Inventories of Indian Agriculture and Livestock".

Conclusions & Recommendations from the Working Group

The participants discussed future WGIA activities relating to AFOLU and suggested the following themes: (1) Exchange of experiences about institutional arrangements, (2) Check of the progress of each country, (3) IPCC-EFDB, (4) Wetlands supplementary guidelines, (5) Uncertainty assessment relating to the presentation by Dr. Lee and (6) REDD+.

Annex

Participants:	Dr. Shenghui HAN	(China)
	Dr. Sultan SINGH	(India)
	Dr. Idat Galih PERMANA	(Indonesia)
	Dr. Muhammad ARDIANSYAH	(Indonesia)
	Mr. Prasetyadi UTOMO	(Indonesia)
	Mr. Mone NOUANSYVONG	(Lao P.D.R.)
	Mr. Bouathong Thong THEOTHAVONG	(Lao P.D.R.)
	Mr. Soukanh BOUNTHABANDID	(Lao P.D.R.)
	Dr. Elizabeth M.P. PHILIP	(Malaysia)
	Dr. Khin Lay SWE	(Myanmar)
	Dr. Damasa Magcale MACANDOG	(Philippines)
	Dr. Kyeong-hak LEE	(Republic of Korea)
	Ms. Nirawan PIPITSOMBAT	(Thailand)
	Mr. Worapong WARAMIT	(Thailand)
	Dr. Arux CHAIYAKUL	(Thailand)
	Ms. Ngoc Thi Bich TRAN	(Vietnam)
	Ms. Trang Minh DAO	(Vietnam)
	Ms. Huyen Thu TRAN	(Vietnam)
	Ms. Dung Thi PHAM	(Vietnam)
	Mr. Robert STURGISS	(Australia)
	Ms. Takako ONO	(JICA Vietnam)
	Mr. Khuong Chinh TRAN	(USA)
	Mr. Orestes Ray ANASTASIA	(USA)
	Mr. Taka HIRAISHI	(Japan)
	Dr. Junichi FUJINO	(NIES)
	Mr. Kohei SAKAI	(GIO)
	Dr. Junko AKAGI	(GIO)
	Mr. Akihiro TAMAI	(GIO)
	Mr. Naofumi KOSAKA	(GIO)

3.6 Session III: Presentations by donors and international organizations

This session was chaired by Mr. Dominique Revet (UNFCCC) and the rapporteur was Mr. Akihiro Tamai (GIO).

Experiences and plans of JICA, USEPA, USAID and DCCEE for inventory capacity building programs in Southeast Asia were shared. At the same time, NIES, conducting emission projections in this region, provided information on their achievement. Most projects are relatively new, reflecting the rapidly growing demand for MRV in developing countries, e.g. BUR and REDD+.

Mr. Naoki Mori (JICA, Vietnam) made a presentation on two projects supporting capacity development for National GHG Inventory which are ongoing in Vietnam and Indonesia. Their approach is to establish a reliable and self-reliant system by human resource development from the initial stage of design and development of the inventory compilation system. He pointed out that a strong commitment by the government and cooperation mechanisms among ministries and agencies for the entire compilation process were essential for the sustainability of the system. He also mentioned that sharing the mutually benefitting information from the inventory would promote cooperation.

Ms. Mausami Desai (USEPA) made a presentation on the progress of the SEA project which is in cooperation with the UNFCCC. The project is now in Phase II and they have updated their National Inventory System Templates and ALU-software. She also reported on their activities in Papua New Guinea and the Philippines. She stressed the importance of customized institutional arrangements to support data collection, dedication from the National Inventory team and training through actual work.

Mr. Orestes Anastasia (USAID) made a presentation on projects under the concept of LEDS; Low Emission Development Strategy. He correlated the National GHG Inventories with LEDS as it helps governments assess the current conditions and improve planning associated with emission sources and options for identifying emission reductions. He introduced several programs that were starting up. The Enhancing Capacity for LEDS Initiative and the Low Emissions Asian Development Program (LEAD Program) are related to inventories as an assessment tool for decision-making, while the Lowering Emission in Asia's Forest Program and SilvaCarbon deal with AFOLU estimation research.

Mr. Robert Sturgiss (DCCEE) made a presentation on Australia's advanced inventory compilation system that is supporting the domestic carbon pricing mechanism. He pointed out the strength of DCCEE, the advanced estimation methodology and data collection system. On the back of Australia's capacity, he inducted an MRV capacity development program that has been developed. He put an emphasis on the importance of MRV in developing countries from the viewpoint of a potential carbon credit importer, since the reliability of the credit is crucial for the scheme.

Dr. Junichi Fujino (NIES) made a presentation about activities by NIES and collaborating institutes to promote developing a low-carbon society by using the Asia-Pacific Integrated Model (AIM). They have conducted future projections in Asian countries such as Vietnam, Malaysia, Indonesia and Japan. He pointed out that the network among researchers and policymakers, Low Carbon Asia Research Network (LoCARNet), was established through their project. He also referred to the importance of corporation between inventory and models.

In the discussions, Mr. Kiyoto Tanabe (IPCC TFI TSU) asked Mr. Anastasia how to ensure that trainees of the "train the trainer" program become trainers. Mr. Anastasia suggested that a regional organization for capacity development may be established and that trainers would take a post there. Mr. Agus Gunawan (Indonesia) was interested in the practice in Australia of how they prepared the company reporting scheme. He also asked if there were any support and incentives for companies to reduce emissions. Mr. Sturgiss replied that they started from an existing voluntary reporting scheme and reorganized it. Streamlining across the government for a single request for data provision was a key to persuade companies. He suggested that the opportunity to join the emission trading itself would be an incentive. Mr. Mone Nouansyvong (Lao PDR) asked about the government policy of Australia on international cooperation for credit and emission reduction, especially whether conditions of MRV to trade carbon credit would be defined by Australia. Mr. Sturgiss answered that there was no standard on MRV at the moment, but credibility would be important.

4. Abstracts

Abstracts

4.1 Opening Session

Overview of WGIA10

Keizo Hirai
Greenhouse Gas Inventory Office of Japan (GIO/CGER/NIES), Japan

Abstract

The upcoming 10th Workshop on Greenhouse Gas (GHG) Inventories in Asia (WGIA10) is to be held 10-12 July 2012 in Hanoi, Vietnam and convened by the Ministry of the Environment of Japan (MOEJ) and the National Institute for Environmental Studies (NIES), together with the Ministry of Natural Resources and Environment of Vietnam (MONRE). The annual workshops since 2003 have always aimed at supporting Non Annex I Parties in Asia to develop and improve their GHG Inventories.

Over 140 participants are expected to be present in this 10th workshop. Participants are government officials and researchers from 14 countries in Asia (Cambodia, China, India, Indonesia, Japan, Republic of Korea, Lao P.D.R., Malaysia, Mongolia, Myanmar, Philippines, Singapore, Thailand and Viet Nam) and are experts from international organizations (UNFCCC, IPCC TFI TSU, USEPA, SEA GHG Project, USAID, DCCEE of Australia, and JICA).

NAI Parties under the United Nations Framework Convention on Climate Change (UNFCCC) are required to prepare GHG inventories as a part of National Communications (NCs) to be periodically submitted to the Conference of the Parties (COP) under the UNFCCC.

After both host countries (MOEJ and MONRE) present their policy schemes to combat climate change in Opening Session, India and Republic of Korea report their latest inventories in Session I. In addition, NIES reviews the past WGIA-activity and then proposes future plan.

In Session II-1, participants try calculations relating Energy/IPPU/Waste-emissions using the new IPCC Inventory Software and in Session II-2, participants discuss AFOLU-specific issues and exchange their information. In Session III, the final Session, there are presentations by donors supporting capacity building for measurability, reportability and verifiability.

Access to relevant information

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

Japan's Climate Change Policies

Michihiro OI

Ministry of the Environment, Japan

Abstract

(1) GHG inventory in Japan

In accordance with the Kyoto Protocol, Japan developed a system for preparing national greenhouse gas (GHG) inventory, including institutional arrangements among related ministries and quality assurance/control process. The GHG Inventory Office (GIO) plays a key role in developing the GHG inventory annually. The Ministry of the Environment is responsible to compile the inventory by requesting relevant data and information for calculating GHGs emissions from other ministries such as the Ministry of Economy, Trade and Industry, the Ministry of Agriculture, Forestry and Fisheries, and the Ministry of Land, Infrastructure, Transport and Tourism.

Japan's GHG emission in 2010 is about 1.26 billion ton CO_2 equivalent which is slightly smaller than that in 1990, the base year of the target for the first commitment period (CP1) under the KP. Taking CO_2 absorption by forest and the Kyoto mechanisms into account, Japan achieved 10.9% reduction from the baseline in the first three years of the CP1 (2008-2010). The biggest emitting sector is industry (i.e. use of fossil fuels and electricity in factories) which occupies about 35% of total emission but the emission from industry sector has been decreasing. Emission from commercial and residential sector (the use of electricity and other energies in households and office buildings) has increased in these twenty years. Emission from transportation sector increased in 1990s but turned to decrease in 2000s.

(2) Japan's Climate Change Policy

Japan has three targets on its GHG emission in deferent time scale: 6% reduction from 1990 level in 2008-2012 based on the KP; 25% reduction in 2020 which Japan committed in accordance with the Copenhagen Accord and the Cancun Agreements; and the long-term target of 80% or more reduction by 2050 declared by the G8 leaders. To achieve the 6% Kyoto target as well as its mid-term target by 2020, Japan has been taken various measures including carbon tax and feed-in tariff (FIT) for promoting renewable energy.

A new carbon tax scheme is going to be implemented from October 2012, in which tax rate (289 Japanese Yen (JPY)) per ton of CO_2 of fossil fuels is added in the current rate of petroleum and coal tax. This rate will be introduced gradually in three years, and the revenue of carbon tax estimated about 262.3 billion JPY (3.3 billion US$) every year under the full implementation will be used for introduction of renewable energy and enhancement of energy-saving, etc. Another recent progress is FIT for renewable energy which was just entered into force from 1 July 2012. Now electricity utilities are obliged to purchase electricity from renewable sources e.g. solar photovoltaic, wind and biomass by a fixed price for a decided period. The price and period of purchase for each type of renewable energy are determined by an assessment committee, taken into consideration their cost and availability. For example, solar PV electricity is purchased by 42 JPY per kW for 20 years.

The Great East Japan Earthquake and the accident of nuclear power plants in Fukushima forced Japanese people to reconsider energy and environment policies. Before 11 March 2011, promoting nuclear power was thought of as one of key measures to address climate change,

but now most people do not wish to rely much on nuclear any more. Currently review of national strategies on energy and climate change is on-going. In the end of June 2012, the ministerial Energy and Environment Council proposed three options regarding future energy and environment of Japan in accordance with scenarios of dependency on nuclear, 0%, 15% and 20-25%, in 2030. In any scenarios, Japan will make full efforts to reduce fossil fuel use by enhancing energy efficiency and reducing total energy use as well as introducing more renewable energy than expected before March 2011. By these efforts, GHG emission in 2030 will be reduced by 23 to 25 % compared to 1990 level. Having nation-wide debates among citizens and related stakeholders based on these three scenarios, the government will decide new Strategy for Energy and Environment in August and further detailed energy plan and countermeasures on climate change by the end of this year.

Introduction to Greenhouse gas mitigation options in Viet Nam

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Abstract

Acknowledging the threats of climate change to sustainable development, the Government of Viet Nam signed the United Nations Framework Convention on Climate Change in 1992 and the Kyoto Protocol in 1994. After that, these treaties were ratified in 1998 and 2002, respectively. As a member of Non-Annex I Party, Viet Nam has submitted its Initial and Second National Communications to the UNFCCC Secretariats. The Government has issued a range of legal documents and policies for environmental protection and climate change response. In late 2008, the Government approved the National Target Program to Respond to Climate Change (NTP). The NTP lays out nine targets and main priority activities for the period of 2009-2015, including the development and implementation of GHG mitigation options.

The National GHG inventory in 2000 was conducted in accordance with the Revised Guidelines of Intergovernmental Panel on Climate Change (IPCC) show that Viet Nam's total GHG emissions for the year 2000 were 150.9 million tCO_2e, emanating from 3 key sources including agriculture, energy and LULUCF. Based on the development and master plans of these sectors, a number of mitigation options were developed.

For assessing GHG mitigation options, the Long-range Energy Alternatives Planning system (LEAP) model was used for the energy sector while the Comprehensive Mitigation Analysis Process (COMPAP) model was used for LULUCF sector. In agriculture sector, several statistical tools and methodologies in accordance with Dr J. Sathaye's Guidebook on GHG mitigation assessment were applied.

The results showed 28 mitigation options have been developed and assessed for GHG sources and sinks, including 15 for energy (including transportation), five for agriculture and eight for LULUCF. The total mitigation potential for the above-mentioned 28 solutions is 3,270.7 million tCO_2e, to which energy contributes 192.2 million tCO_2e, agriculture 56.5 million tCO_2e and LULUCF 3,022 million tCO_2e. Mitigation potential uncertainty levels are placed in order of increasing magnitudes, from energy to agriculture to LULUCF. GHG abatement and carbon sink expansion costs vary quite drastically. Costs in energy range from US$-24.9/$tCO_2$ to US$23.8/$tCO_2$, in agriculture from US$-10.9/tCO_2 and US$9.7/$tCO_2$, and in LULUCF, between US$0.4/$tCO_2$ and US$1.4/$tCO_2$.

For more effective response to climate change towards a century-long vision to form the basis for other strategies and development plans, a National Climate Change Strategy (NCCS) has been approved on 5th December 2011 by the Government. One of the NCCS objectives aimed at carrying out potential GHG mitigation options. The mitigation activities focus on application of new environmentally technologies for mitigation to Climate Change at national level. In order to facilitate implementation of NCCS in general and GHG mitigation options in particular, it is also necessary to improve education, training experts and public awareness on Climate Change at all levels.

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4.2 Session I

– Update on non-Annex I national communications –

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UNFCCC Secretariat

Abstract

A lot of important decisions were taken in the area of negotiations related to non-Annex I national communications since WGIA 9.

The Consultative Group of Experts (CGE) is continuing under its current mandate until the end of 2012. The Subsidiary Body for Implementation (SBI) also initiated; but did not conclude, consideration on the term and mandate of the CGE, and the need for the continuation of the group. A decision will need to be reached at COP 18.

With regard to financial and technical support for national communications, the Global Environment Facility (GEF) will continue to provide funds for technical support for the preparation of national communications, similar to that provided by the national communications support programme (NCSP), and report on this issue at COP 19.

The GEF, which was requested by COP 17 to make available support as early as possible in 2012, already released its policy guidelines for the financing of biennial update reports (BURs) for non-Annex I Parties. COP 17 also urged non-Annex I Parties to submit their request to the GEF for support for the preparation of their first BUR in a timely manner. The GEF will start reporting on its activities relating to the preparation of BURs at COP 18.

The issue of frequency of reporting national communications from non-Annex I Parties has been concluded: the COP decided that non-Annex I Parties should submit their national communications every 4 years (decision 1/CP.16, paragraph 60 (b)), and their BURs every 2 years (decision 2/CP.17, paragraph 41 (f)).

The UNFCCC secretariat was requested to upgrade the non-Annex I GHG inventory software and make it available by June 2013.

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Decision 1/CP.16
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Update on India's National Communication to the UNFCCC

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Abstract

India submitted its 1st national communication to the UNFCCC in 2004, the GHG inventory information provided in that report was for the year 1994. The inventory was prepared involving 19 institutions that collected the activity data mainly from the government sources. The communication reported some measured and estimated emissions factors, the important once amongst them being the CH_4 emission factors for rice cultivation, livestock, Municipal Solid Waste, N_2O from nitrous oxide manufacturing, and CO_2 from different coal types. These institutions also estimated the GHGs, namely, CO_2, CH_4 and N_2O emissions by sources and removals by sinks using the IPCC revised 1996 guidelines for sectors including Energy, Industrial Processes, Agriculture, Land Use Land Use change and Forestry and Waste.

In 2012, India submitted its 2nd National communication to the UNFCCC, wherein the GHG inventory was reported for the base year 2000. It has also reported its 2007 GHG inventory in the same report, which was published earlier in 2010. Along with the 2000 and 2007 numbers, India also has released the GHG inventory numbers for the year 2005 separately. The GHGs reported are CO_2, CH_4, N_2O, HFCs, PFCs and SF_6. With this it is clear that India is now in a position to prepare the time series of GHG emissions since 1994. About 31 institutions working in the areas of Energy, Agriculture, Forestry, Industries, and Waste management have been involved in the process.

Between 1994 and 2007, the CO_2 equivalent emissions have grown from 743 million tons to 1301 million tons, including LULUCF, indicating a compounded annual growth rate of 4.4%. In 1994, LULUCF was an emitting source, but since then, it is a net sink. A mix of 1996 and IPCC guidelines, along with IPCC Good Practice Guidance 2000 and 2003 have been applied for estimating the GHG inventory for the years 2000, 2005 and 2007. Most of the emission factors developed in the 1st National communication have been updated, including that of CO_2 from coal, CH_4 from rice cultivation and enteric fermentation, additional measurements have been made to develop plant specific CO_2 emission factors from cement manufacturing and steel and due to combustion of fuel therein.

Further methodological improvements have been made in the case of LULUCF by including Carbon pools in addition to forests, and in case of MSW, the CH_4 emissions have been made using the suggested IPCC 1st order decay method, instead of the Triangular method used in the earlier inventory. The GHG inventory was also peer reviewed and reviewed by a third Party which did not participate in the process but had the expertise.

Amongst the 64 categories covering the 5 sectors, for which GHG inventory estimates have been made, 15 categories or about 25% of the categories emit 95% of the total CO_2 equivalent emissions. This has been deduced from Key source analysis using both level and trend methods. The highest emitters being CO_2 from electricity, CH_4 from enteric fermentation and CH_4 from rice cultivation. Tier 1, uncertainty analysis indicate high levels of uncertainty associated with the CO_2 from electricity production, CH_4 from enteric fermentation and N_2O from soils are high.

The 2nd National Communication has taken the 1st step towards a more reliable GHG inventory development by building the capacity to develop/estimate a time series GHG inventory for India. However, many more steps need to be taken further, such as establishing

a national data management system, doing a recalculation for the year 1994, estimate the inventories of the rest of the 3 gases not included in the 1st inventory. A more systematic approach by bringing in the various ministries that are repositories of national activity data, to directly participate in the process and submit the time series of required activity would further reduce the uncertainties that still exist in the inventory.

The system will enable India to submit its GHG inventory estimates every two years, track its various policies towards achieving the domestic mitigation target of reducing its emission intensity by 20-25% by 2020 wrt to 2005, and make India ready to undergo the International Consultation and Assessment process that is being proposed as a review process for Non-Annex1 countries.

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Korea's Third NC and GHG Inventory in 2009

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Korea has submitted third National Communication in November 2011 as a sequel to our second NC in 2003. As Korea is one of the few Non-Annex I countries to be submitting the report for the third time, we believe this demonstrates our strong, voluntary commitment to actively respond to climate change. This third NC consists of 8 chapters and summarizes the nation's accomplishments in efforts to reduce GHG emissions, including key strategies and measures such as Low Carbon, Green Growth('08), Mid-term GHG Mitigation Target('09), Adaptation Measures for Climate Change('10) etc.

The third NC includes the GHG inventory compilation up to 2009.

Total GHG emissions were 607.6 Mt CO_2 eq. in 2009, representing a 105.0 percent increase since 1990 and a 0.9 percent increase from 2008. Total GHG net emissions were 564.7 Mt CO_2 eq., in 2009, representing a 106.6 percent increase since 1990, and a 0.6 percent increase since 2008. Total GHG emissions consisted of the following sectors: 84.9 percent from the energy sector, 9.3 percent from industrial processes, 3.3 percent from agriculture, and 2.5 percent from the waste sector. The share of CO_2 in the total GHG emissions in 2009 was 89.0 percent, followed by 4.6 percent of CH_4, 3.1 percent of SF_6, 2.1 percent of N_2O, 1.0 percent of HFCs, and 0.4 percent of PFCs. Compared to the levels in 1990, CO_2 and N_2O emissions increased by 112.5 percent and 18.8 percent, respectively, and CH_4 emissions decreased by 9.1 percent. Emissions of HFCs and SF_6 increased by 5.2 percent and 160.3 percent, but PFC emissions decreased by 4.2 percent

– Decisions taken in COP16 and 17: The MRV landscape –

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Abstract

COP13 (Bali) decided to address enhanced national/international action on mitigation of climate change, including, inter alia, consideration of: 1) measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, by all developed country Parties, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances, and 2) nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner.

COP15 (Copenhagen), at which the above work was to be concluded in the AWG-LCA, did not manage to reach a conclusion, but the following COP16 (Cancun) managed to bring forth pledges of economy-wide emission reduction targets for 2020 by developed countries, and pledges of nationally appropriate mitigation actions to be implemented for 2020 by developing countries. With these pledges, came a strong call to enhance transparency of 1) progress towards the achievement of quantified economy-wide emission reduction targets by developed countries, and 2) mitigation actions by developing countries and their effects. It is against this backdrop that various important decisions were taken on MRV issues in Cancun and Durban (COP17) as the following:

For developed countries, reporting of National Communications (NCs) is now to be done every four years, and reporting of Biennial Reports (BRs) is to be done every two years, both agreed upon in Durban. BRs are subject to International Assessment and Review as determined in Cancun. For developing countries, reporting of NCs is now to be done every four years, and reporting of Biennial Update Reports (BURs) is to be done every two years, as agreed upon in Cancun and Durban, respectively. BURs are subject to International Consultation and Analysis as determined in Cancun.

Other recent developments surrounding inventory issues include the revision of the UNFCCC reporting guidelines on annual inventories for Annex I countries. COP17 adopted the revised Guidelines for trial use, and following the release of the revised CRF Reporter based on the revised reporting guidelines, Annex I countries are to start the trial use on a voluntary basis. This is to enable the further refinement of the guidelines and CRF Reporter, to be done in the latter half of 2013, prior to COP19 when the guidelines will be officially adopted. With the final decision by COP19, the 2006 IPCC Guidelines will be the designated methodological guidelines for AI reporting under the Convention from April 2015.

As stated above, the reporting requirements have been enhanced for both developed countries and developing countries, and inventory-making will be at the core for both NCs and B(U)Rs. A large workload is foreseen for the inventory community, and early planning is urgently needed.

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– Review the past, Proposal for the future of WGIA-activity –

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Abstract

Workshop on GHG Inventories in Asia (WGIA) has started its history in 2003 responding to the international needs of an information exchange forum on the preparation of national GHG inventories for efficiently improving the inventory quality of Non-Annex I (NAI) Parties. About 30 experts from 11 countries in Asia and 2 international organizations attended the 1st workshop. Since then, the number of participating countries and participants has increased in response to the growing attention to the climate change issues. Currently 14 countries are involved in the WGIA and about 140 experts are expected to be present at the WGIA10.

The workshop has dealt with a wide range of topics related to the inventory taking into account the requests by participants, international needs, etc. Besides, participants updated every year the progress made by the neighboring countries in their inventory preparation as well as the outcomes of international negotiations. The continuous activities of WGIA must have indirectly contributed to the improvements in the inventory quality of the member countries. The comparison study between Initial and Second National Communications (INC and SNC) revealed that the inventories of most member countries have significantly enhanced especially from the point of view of completeness (e.g., coverage of gases, categories, years).

Regardless of such improvements, challenges and constraints still remain in all countries. In addition, issues related to the sustainable inventory development may soon be raised, since more frequent submission of inventory than ever before in the form of biennial update reports (BUR) are required for NAI Parties from 2014 on.

The workshop is planned to be held continuously and will try to set timely agenda taking into account the requests by member countries. In order to make the workshop more meaningful by covering appropriate agenda items and to run the workshop more smoothly, the WGIA Secretariat proposes the draft Terms of Reference (TOR) on the occasion of the 10th anniversary of the workshop. The TOR clearly defines the conventional activities and proposes two new bodies which would support the workshop. The next workshop is planned to be held in accordance with the TOR, if the Secretariat does not obtain any objections by the end of October 2012.

My presentation will review the past WGIA-activity; show the results of the INC and SNC comparison study of member countries; and propose the draft TOR and related schedule until the next workshop.

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4.3 Session II

4.3.1 Session II-1

Workshop on GHG Inventories in Asia – Overview – Using the New IPCC Software –

Simon Eggleston
IPCC Task Force on National Greenhouse Gas Inventories

Abstract

The Task Force on National Greenhouse Gas Inventories (TFI) part of the Intergovernmental Panel on Climate Change (IPCC) has now produced new inventory software to assist countries in the compilation, documentation and archiving of the national greenhouse gas emission inventories. This software is useful for estimating emissions whatever reporting framework is used. While the software is based on the IPCC 2006 Guidelines (IPCC 2006) it can, and is, being used by those reporting according to the earlier Revised 1996 Guidelines (IPCC 1997).

The 2006 Guidelines update and revise earlier IPCC guidance and both volumes of the later IPCC Good Practice Guidance (GPG) (IPCC 2000; IPCC 2003). The new 2006 guidelines contain many improvements and updates that are valuable and can be used by inventory compilers however they report. The 2006 Guidelines include many revised default emission factors. Another improvement is the removal of the potential emission methods. The new methods give an estimate of actual annual emissions at Tier 1 which can be improved as more data is collected.

The new software includes all the improvements in the 2006 Guidelines. It also has a number of improvements compared to earlier emission inventory software. It is stand-alone and not dependent on particular versions of MS Windows or Office. It includes default emission factors that can be over-written with country specific data. It is based on the worksheets and so gives clear indication of how the calculations are made and includes additional features such as the reference method, used for QA/QC of energy use; uncertainty assessment; key category analysis used to guide methodological choice and various input and output features. The TFI will continue to support the new software through its website, web forms and user guides.

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4.3.2 Session II-2

Initial National Communication (INC) Project in Myanmar

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Abstract

Myanmar has an estimated population of 59.1 million, consisting of diverse ethnic groups that collectively speak over 100 languages and dialects. Myanmar is at an historic stage in its development and continues to experience rapid changes. A new Constitution was adopted in May 2008, national elections were held in November 2010, and key bi-elections held in April 2012. Parliaments and governments have been formed at the national and region/state levels. The new Constitution provides for the basic principles of democracy; rule of law and human rights, and for the separation of powers between the executive, legislature and judiciary. The President has set out a reform agenda focusing on good governance and ensuring fundamental rights, and a number of reforms have already been undertaken. It is generally considered that these developments represent a unique opportunity for Myanmar to place itself on a path of sustainable, inclusive development.

In order to form a central body to coordinate the environmental affairs with national economic development, the National Commission for Environmental Affairs (NCEA) was established in 1990 under the Ministry of Foreign Affairs. NCEA was relocated under the Ministry of Forestry in 2004 to be chaired by the minister for the Ministry of Forestry. It was responsible for development of policies and strategies, programmes of action, and management and coordination of all activities related to climate change issues in Myanmar. Responsibilities for policy formulation and implementation are also dispersed among several ministries and agencies, local and provincial authorities. Climate change issues should be managed as a unity rather than through a sector-by-sector approach. Implementation of the identified measures will also require good coordination among ministries and agencies. However, there is weak coordination of sectoral actions, and responsibilities are not clearly defined between sectors. The NCEA was abolished and the National Environmental Conservation Committee (NECC) was formed on 20th April 2011. Under the agreement at the second regular session of the first Pyidaungsu Hluttw, the Republic of Union of Myanmar issued the notification that Ministry of Forestry was renamed into the Ministry of Environmental Conservation and Forestry (MOECAF) on 6th September, 2011. Under this issue, environmental affairs will be taken into action more promptly and effectively by the designated Ministry. The establishment of new Department of Environmental Conservation was approved by the Government and at the moment it is under the recruiting process.

National GHG Inventory team successfully conducted national GHG inventories for the base year 2000 by using 2006 IPCC guidelines. It covered five sectors, namely energy, industrial processes and product use, agriculture, forestry and other land use, and waste sectors. According to the INC draft report, total emission was estimated to be 74,358 Gg CO_2-e of which the GHG emissions by the land use change and forestry sector was the largest portion (54 %) among all sectors. However, carbon removal by this sector accounted for 142,221 GgCO_2- e from the atmosphere so that the country's net emissions turned out to be a negative value of 67,863 GgCO_2- e (- 67.8 million tons of CO_2). In line with IPCC 2006 methodology, the figures do not include emissions due to small-scale use of wood fuels or due to forest clearance, which together form a major source of greenhouse gases. Myanmar can be

considered a net negative emitter of greenhouse gases, due to the fact that its forests absorb more greenhouse gases than are emitted from other sources. In the future, as Myanmar develops, emissions due to energy use, transport, industrial processes, agriculture and waste are likely to grow, potentially very rapidly. The large area of deforestation was encountered in Myanmar but the deforested areas by various causes, such as illegal logging and land use change patterns cannot be available. Moreover, the data on actual biomass burning during land use change (e.g., shifting cultivation, land clearing, etc.) and actual areas burnt (e.g., forest fire) annually were still lacking. In the draft report, GHG emissions from all sectors during 2000-2005 shows rising trends because of the emerging economic development activities in transportation, energy and industries, commercial production of agriculture and livestock breeding and etc. For example, due to the increased sown area and domestic animals and more fertilizer inputs will promote the GHG emissions. Moreover, the trend of GHG removal indicated the constant decline because of decrease in natural forest area.

Inventory and Mitigation for Methane Emissions from Livestock in Indonesia

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Abstract

Livestock contribute on methane emission to environment. Methane is produced as part of the normal digestion process of ruminant animal. In Indonesia, methane produce from beef cattle, dairy cattle, buffalo, sheep, goat, pig, local chicken, broiler, layer and duck. The distribution of the population is mainly in Java, Sumatera and Sulawesi. In this study, methane emissions from livestock were estimated according to IPCC Guideline (2006). In order to make more accurate, the population of dairy cattle, beef cattle and buffalo are corrected by animal population structure from survey result conducting by *Biro Pusat Statistik* (2006). Base on the population structure, the correction factors ($k_{(T)}$) for beef cattle, dairy cattle, and buffalo are 0.72, 0.75 and 0.72 respectively.

The averaged total methane emission from enteric fermentation during 2000-2006 was 596.07 Gg. The emission decreased slightly from 607.89 Gg in 2000 to 594.83 Gg in 2006. In term of total methane emission from livestock, enteric fermentation contributed 89%. Methane emission from enteric fermentation was largely dominated by the beef cattle of more than 11 million animal unit (AU) contributing 62.8%. The second largest came from buffaloes (16.0%), and the third is goat (10.4%).

Methane emission from manure management in 2000 was 79.69 Gg. The methane emission from manure management was smaller compared to enteric fermentation. Methane emission from manure management was dominated by pig contributing 46.1%, followed by dairy cattle (10.3%) and beef cattle contributed the third largest emission (10.2%). East Java Province as the largest contributor produce 9.72 Gg (12.2%) followed by Central Java Province (8.0 Gg, 12.2%) and North Sumatera Province 7.7 Gg, 1.9%).

GHG mitigation technologies applied in Indonesia. For their broadly applications, socialization and extension services should be provided. To make the program work properly, there is a need for extension services specialized on mitigation technologies. Priority of mitigation technology is chosen according to following steps: a) Technology criteria: the technology should be applicable, low cost and have direct benefit to the farmer; 2) Simple for its arrangement; 3) Technology can be conducted by local institution such as cooperative; 4) Effective in increasing agriculture productivity as well as mitigating GHG emission; and 5) Integration to other agriculture development program. Base on the criteria above, the main livestock methane mitigation program should be focused on increasing of beef and dairy cattle efficiencies (reducing methane per unit product). In general, four methane mitigations program have been advised as fundamentals strategies: feeding quality improvement, supplementation, long-term breeding program and bioenergy from animal sewage.

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Greenhouse Gases Inventory in Agricultural Sector of Thailand

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Abstract

The present greenhouse gases inventory in agricultural sector of Thailand was carried out by the Office of Natural Resources and Environmental Policy and Planning for the Second National Communication submitted to the UNFCCC. The process was guided by the National Climate Change Committee and supervised by the Project Steering Committee. The inventory describes greenhouse gases status of the year 2000-2004. It follows the UNFCCC reporting guideline which was adopted by Decision 17 of COP8; the Revised 1996 IPCC Guidelines for National GHG Inventory; the 2000 IPCC Good Practice Guidance and Uncertainty Management; and the 2003 Good Practice Guidance for Land-Use Change and Forestry. In the year 2000, the greenhouse gases emission from agricultural sector in form of carbon dioxide equivalent accounts for 51.88 million ton or 22.6 percent of the total emission of the country which is the second shares after the energy sector. With the limitation of data availability and quality, mainly from the department of livestock and the Office of Agricultural Economics, the tier 1 methodology was solely used for agricultural soils, while the tier2 methodology was applied with the other four sub-sectors. Four different types of greenhouse gases from agricultural activities are reported. They are methane, nitrous oxide, carbon monoxide, and nitrogen oxides. The most significant greenhouse gas emitted from agricultural sector is methane from rice cultivation, enteric fermentation, manure management and field burning of agricultural residues. Nitrous oxide is from agricultural soils, manure management, and field burning of agricultural residues while both carbon monoxide and nitrogen oxides are from field burning of agricultural residues. Considering the share in the total amount of greenhouse gases produced from agricultural sector, in form of carbon dioxide equivalent, the biggest share is from rice cultivation. Enteric fermentation is the second. Agricultural soils, manure management, and field burning of agricultural residues are the third, the fourth, and the fifth respectively. Changes in terms of the total amount of emission of both methane and nitrous oxide gases from the year 2000 to 2004 were estimated in between 51-56 $TgCO_2$ eq. These little changes are from the observation from almost constant figures of harvesting areas of rice cultivation as well as the areas calculated for N_2O emission from agricultural soils. Considering experience gained from the inventory, recommendation for improvement was proposed to make available more detailed data as well as to improve knowledge and to develop standardized fraction burning values for calculation purposes.

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Greenhouse gas emission from China cropland

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Abstract

Greenhouse gas (GHG) emission of cropland is one of important GHG sources due to human being activities. In China, rice paddy is a major anthropogenic methane (CH_4) source and agricultural land is a major nitrous oxide (N_2O).

In 1994 inventory, the total annual methane emission from paddy fields of the region/nation was equal to the CH_4 emission factor of different rice field multiplied by the corresponding rice harvested area and then summed them up to obtain the national CH_4 emission from paddy field. The paddy fields are divided into four types: early (late) rice of double rice, single rice and winter water flooded rice field (paddy field with year round flooding). The CH_4 emission factor is simulated by CH_4 MOD model for early rice, late rice and single rice with spatial resolution 10km×10km. The model CH_4 MOD has been recommended as Tier 3 in 2006 IPCC Guidelines for National Greenhouse Gas Inventories. And CH_4 emission from winter water flooded rice field in non-rice planting is directly roughly calculated by CH_4 emission factor multiplying area of winter water field.

The total nitrous oxide emissions from cropland are including direct emission and indirect emission, which is equal to the nitrogen input of a specific nitrogen process multiplied by its corresponding N_2O emission factor. Nitrogen source is mainly including nitrogen fertilizer, returning residues, manure application and biological nitrogen fixation (BNF, which is excluding in nitrogen source in 2006 IPCC guideline). China is divided into six regions according to climate belt and crop planting regime, and each region has its own major cropland type. Nitrogen input of each type of cropland is calculated with a regional nitrogen cycling model IAP-N. The N_2O direct emission factor by cropland type is summarized from field observation covering 13 provinces of China. The N_2O indirect emission from croplands is adopting the IPCC method and its default emission factors.

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SNC: Gaps, Challenges and Improvements for the GHG Inventory of the Agriculture and LUCF Sectors

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Abstract

The GHG inventory component of the Philippine Second National Communication (SNC) was based on the inventory year 2000. Institutionalizing the GHG inventory process is important in order for the Philippines to have a regular, more accurate and sustainable compilation of the national GHG inventory. In the process of compiling the 2000 GHG inventory, the method used was documented and written in manual form, to serve as a step-by-step guide for each sector. A database for the 2000 Philippine GHG inventory, including worksheets and documentation was hosted online.

The Philippine 2000 GHG inventory for the Agriculture and LUCF sectors were completely based on the methodologies provided in the 1996 IPCC Guidelines. Most of the methodologies and assumptions were based on Tier 1 approach, except for methane emission from rice where country-specific emission factors were used. Lack of more disaggregated activity data and country-specific emission factors makes it difficult to be able to move to a higher tier. There is a gap in having country-specific emission factors for livestock, residue burning and agricultural soils.

Inventory for the LUCF sector relied mainly on the Forestry Statistics published by the Forest Management Bureau. Biomass density, carbon density and carbon content values used were from the results of studies conducted in the Philippines. Issues raised for the GHG inventory for the LUCF sector include extrapolations on land use data, revision of the definition of forest, new classification of the Philippine forests, biomass density value used after land use conversion for second growth forests.

Further disaggregation and improvement of activity data in the agriculture sector including area of grassland in the Philippines and the management practices applied, grassland area burned, estimates of direct N_2O emissions from soils due to the application of synthetic fertilizers, and area of organic soils (histosols) drained for agricultural production, and management of agricultural residues to fit the GHG inventory requirements. For future inventory, attempt must be done to use higher tier for key categories which include CH_4 emission from enteric fermentation, CH_4 and N_2O emission from manure management, CH_4 emission from cultivation and N_2O emission from agricultural soils.

Major agricultural research agencies and universities can be consulted to assist future inventory compilers in developing country-specific emission factors.

Monte Carlo Simulation of Uncertainty Analysis for National GHG Inventories

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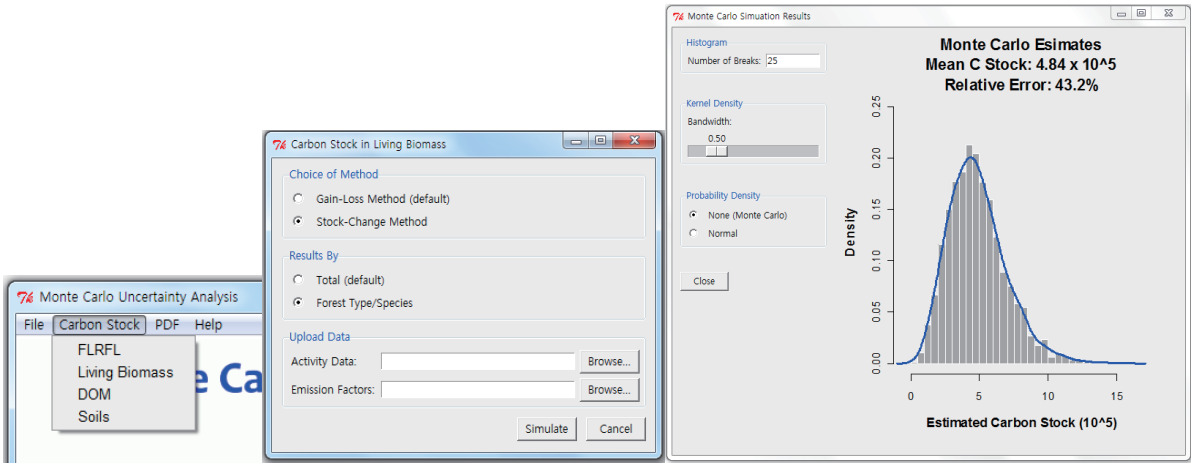
Abstract

Uncertainty estimates are an essential element of a complete inventory greenhouse gas emission and removals. The Monte Carlo method (Approach 2; IPCC 2006) is considered for uncertainty analysis of LULUCF sector in the Republic of Korea. The Monte Carlo method has several advantages over the Propagation of Error method (Approach 1; IPCC 2006). It is particularly suitable when the input parameters have (a) large uncertainties, (b) non-Gaussian distribution, (c) complex calculation algorithm, (d) correlations among themselves, and (d) variable uncertainties in the trend. Development of uncertainty analysis program is starting to develop uncertainty analysis framework based on the recommendations from IPCC GLs for the case of South Korea to achieve consistent uncertainty calculation for future reporting. This program is built in the R, the open source statistical software so that the program is not limited by licensing and applicable to developing countries to assist uncertainty analysis in their greenhouse gas report to IPCC and to assist knowledge transfer.



The process of carrying out uncertainty analysis for all carbon pools. There are several options are available to methods and categories. As you could see, the graphing window contains several options to help visualize the results. At the minimum, a histogram of the simulated carbon content value was displayed. The thick blue line overlaying the histogram is the empirical kernel density curve. Above the histogram, basic information was presented including the title that informs the user what the carbon estimate is, mean carbon stock and relative error in %.

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Developing a Sustainable AFOLU GHG System

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Abstract

Moving from the Initial National Communication to Second National Communication (NC2), a couple of lessons were learnt and steps were taken to improve the short comings of INC. Institutionalizing the national GHG inventory process together with capacity building were some of the actions taken towards developing a sustainable system. Although second liners were also trained during the NC2 period, some of them have moved on to either different positions or on study leave. We are still exploring a workable system.

In the NC2, Malaysia used the1996 Revised IPCC Guidelines while for the NC3, Malaysia hopes to use the 2006 IPCC Guidelines. Moving from activity based to land based accounting is a daunting task especially when land use data are not updated consistently or easily accessible. Currently, a Land use template is being developed so that this information would be reported on an annual basis by the respective stakeholders. Developing the template has been tedious, as land use information is not well documented in some areas.

Some of the challenges faced are the tracking multiple land use especially in croplands.

Additionally, tracking the land use in private owned farm in the some states are equally difficult. Another issue that is being raised is the soil classification especially the wetlands. Would a 30 year old drained peatland continue to be a peatland currently? The paper will address how some of the challenges are addressed.

4.4 Session III

– Challenges for Development of GHG Inventory: Experiences of JICA Technical Cooperation –

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Abstract

The presentation focuses on some of the critical issues in supporting development of National GHG Inventory, based on our experiences of 2 projects which are ongoing in Vietnam and Indonesia.
4 massages are delivered;

(1) **Capacity development aspects in the process of development of GHG inventory should be more focused on.** JICA believes that since it is important to establish the reliable and self-reliant system after completion of the inventory, the human resource development should be started from the initial stages of design and develop the system for national GHG inventory.
(2) **Strong commitment on climate change by the government is fundamental.** Tasks on GHG inventory are additional to routine work by line ministries and agencies. They require additional staffing and budget with good guidance. These supports could not be materialized without strong commitment by the government.
(3) **Sustainability of the system to operate GHG inventory should be secured.** In order to secure the sustainability of the system, the cooperation mechanism among line ministries and agencies and self-improving mechanism, in particular, should be carefully designed and implemented. Along with the regulations and guidance to operate the system, it is important to share the understanding among related ministries and agencies of tangible merits of the inventory and to provide them some incentives including training or learning opportunity.
(4) **Sharing clearer vision how to utilize the inventory toward value added activities is an important motivation for multi-stakeholders cooperation.** National GHG inventory is a useful tool not only for understanding the level of the GHG emissions but for a basis of development and implementation of mitigation policies and measures including NAMAs in MRV manner. Preparation of NAMAs is expected to mobilize financing both internationally and domestically for its implementation in future.

Access to relevant information

http://www.jica.go.jp/english/operations/climate_change/index.html

– Overview of US Government Programs –

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Abstract

Southeast Asian countries have made considerable progress in preparing their greenhouse gas inventories that are consistent with the requirements of the Intergovernmental Panel on Climate Change (IPCC) guidelines/guidance on GHG inventory development. However, gaps in institutional capacity, methodological issues and data quality still need to be addressed to improve their national GHG inventories, which will be prepared on a more regular basis as components of both National Communications and Biennial Update Reports to the UNFCCC.

This Project is based on the lessons learned and challenges gained in implementing the Phase 1 of the "Regional Capacity Building for Sustainable National Greenhouse Gas Inventory Management Systems in Southeast Asia or SEA GHG Project." Phase II is designed to build upon the experience gained by Southeast Asian countries in preparing their Second National Communications to the UNFCCC. Six countries are participating in Phase II of the project: Cambodia, Malaysia, Papua New Guinea, Philippines, Thailand and Vietnam.

The Project has five technical assistance components (e.g. national GHG systems to targeted improvements to Agriculture), one optional (Mitigation Analysis), which if implemented, will strengthen each country's institutional arrangements, functions, and ability to manage their GHG inventory. It will also enhance the technical capacity of each of the countries personnel by improving methodological choices in the selection of the appropriate methods, activity data, and emission factors, thus leading to the development of improved and sustainable inventory management systems in Southeast Asia. The knowledge and experiences that will be obtained by participation of the countries in the Project will also support the preparation of their next and subsequent National Communications to the UNFCCC, and provide a foundation to support MRV systems (monitoring, reporting, and verification) of future climate change programs in Southeast Asian countries. Phase 2 of the Project will also provide a basis for supporting development of low-emission development strategies (LEDS), and nationally appropriate mitigation actions (NAMAs), in Southeast Asian countries, in the context of sustainable development.

My presentation will review objectives and components of Phase II, activities to date and plans moving forward.

References

Fact Sheet on EPA, USAID GHG Inventory Capacity Building Efforts
UNFCCC Project Document

Access to relevant information

http://www.epa.gov/climatechange/EPAactivities/internationalpartnerships/capacity-building.html

– Overview of US Government Programs –

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United States Agency for International Development Regional Development Mission for Asia (USAID/RDMA, located in Bangkok, Thailand), United States

Abstract

The United States Government supports a range of activities that help build capacity in developing greenhouse gas inventories in the Asia region. This support falls within a broader global effort by the US Government to support the development of low emission development strategies (LEDS), which developing countries have been encouraged to develop since the Copenhagen Accord in 2009.

LEDS involve a country-led, comprehensive process that includes all economic sectors to identify opportunities for promoting economic growth while also reducing GHG emissions—with the goal of "decoupling" growth from emissions. Thus, LEDS is a core part of efforts to promote green growth. National GHG inventories are a critical part of LEDS in helping governments assess current conditions and improve planning and decision-making associated with emissions sources and options for identifying emission reductions. In support of LEDS, several US Government agencies, including USAID, the US State Department, and US EPA, support a worldwide initiative called Enhancing Capacity for Low Emission Development Strategies, or EC-LEDS, which has included the creation of new EC-LEDS partnerships between the US and Bangladesh, the Philippines, and Vietnam, and discussions are underway to establish agreements with additional Asian countries.

With funding from USAID, USEPA's support for the UNFCCC Regional capacity building for sustainable national greenhouse gas inventory management systems in Southeast Asia Phase II (SEA GHG Project) is an important part of the US contribution to strengthen GHG inventories in the region. The US Government also supports efforts to strengthen GHG inventories through USAID's regional Low Emissions Asian Development (LEAD) Program, which works closely with USEPA to complement efforts under the SEA GHG Project and "fill gaps" in technical areas not already being addressed, and which will be supporting efforts to improve a number of sub-national inventories. Other programs help address specific challenges related to carbon monitoring in forests. USAID's regional Lowering Emissions in Asia's Forests (LEAF) Program supports capacity building in forest carbon monitoring, and similarly a multi-agency program called SilvaCarbon addresses forest carbon stock and flow estimation, mapping, and remote sensing.

References

Fact Sheets on EC-LEDS Initiative, LEAD Program, LEAF Program, and SilvaCarbon Program

Access to relevant information

http://www.usaid.gov/rdma
http://www.lowemissionsasia.org (in development)
http://en.openei.org

Inventory systems and carbon markets: the Australian story

Rob Sturgiss

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Abstract

Australia is among world leaders in greenhouse gas emissions inventory systems and measurement, reporting and verification. We have over two decades of experience in developing a unique, integrated and comprehensive inventory system which accounts for greenhouse gas emission and sequestration at all levels from national to company-level. Australia has developed customised IT systems, data collection systems and methodologies capable of supporting these national inventory systems and supporting Carbon Pricing and Emissions Trading systems.

On 1 July, 2012, Australia's Carbon Pricing Mechanism was launched as a driving force in meeting national mitigation commitments and contributing to global mitigation. The mechanism has been designed to promote emissions trading opportunities, post-2015, and Australia will be looking to purchase carbon credits. Australia recognises the importance of establishing national inventory systems as part of measurement, reporting and verification and has the knowledge, experience and expertise to assist others in achieving this as a step towards engaging in carbon markets. As such, Australia has developed an MRV capacity development program to assist countries that are interested in developing robust and transparent methodologies, data collection and data management systems.

References

MRV capacity development modules – sharing Australian MRV expertise

Access to relevant information

www.climatechange.gov.au/emissions

Develop Sustainable Low-Carbon Society Scenarios by Simulation Models – In the case of Vietnam and its implementation to Asia –

Junichi Fujino[*1], Yumiko Asayama[*1], Nguyen Tung Lam[*2], Nguyen Thai Hoa[*3]
1) NIES, Japan, 2) ISPONRE, Vietnam, 3) Kyoto University, Japan

Abstract

Institute of Strategy and Policy on Natural Resources and Environment (ISPONRE), Ministry of Natural Resource and Environment (MONRE) in the Government of Vietnam organized the workshop on "Exploring Potential for Low Carbon Society" in Vietnam on May 31, 2012 at the Gland Plaza Hotel, Hanoi. It was implemented with the support of Japan International Cooperation Agency (JICA); International Research Network for Low Carbon Societies (LCS-RNet) Secretariat/Institute of Global Environment Strategies (IGES); National Institute for Environmental Studies (NIES); and Kyoto University. 70 people from the relevant government officials, academics, NGOs, and donor agencies participated in the Workshop.

The objective of the Workshop was to identify the methodologies for sustainable Low Carbon Society (LCS) in Vietnam and exchange opinions to explore their usefulness and challenges. The Workshop introduced the National Climate Change Strategies and the draft of Green Growth Strategies in Vietnam. It also delivered the study outcome, "A Low Carbon Society Development Towards 2030 in Vietnam," which was conducted collaboratively by ISPONRE, IMHEN, Water Resources University in Vietnam and Kyoto University, NIES, and JICA. It estimates GHG emissions and mitigations in the sectors of Energy and Agriculture, Forestry and Other Land use sectors (AFOLU), showing Vietnam's socio-economic scenario in 2030.

The LCS scenario study in Vietnam is analyzed using the Asia-Pacific Integrated Model (AIM), which is a group of computer models developed by a team composed of members from NIES, Kyoto University, and several research institutes in the Asian-Pacific region. It is the first set of models focused on the Asian region initially undertaken in 1990. The outcome of LCS Scenario Study is updated from the preliminary study which was implemented by an AIM Project Team in February 2010. The participants expected that the AIM will be the key methodology and the LCS Scenario Study in Vietnam will be useful to develop Nationally Appropriate Mitigation Action (NAMA), monitoring the National Climate Change Strategies and the draft of Green Growth Strategies.

In the panel discussion, participants discussed the necessity of research at both macro and micro levels which would assist in consensus building among different stakeholders. The importance of such research was discussed in terms of the necessity of introducing sustainable economic structure and suitable technology options which would bring about the socio-economic benefits while reducing the GHG emissions in Vietnam. The panel also discussed the financial support and capacity development for Vietnam's society in line with its needs. The participants emphasized the necessity of collaborative work among different stakeholders towards building a sustainable LCS, making use of the lessons learned from past experiences. These lessons should be shared not only inside Vietnam but among Asian countries.

Access to relevant information

http://2050.nies.go.jp (this website includes Vietnam LCS Scenario and other Asian scenarios)

Annex I: Agenda

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Day 0* Morning (For Mutual Learning), Tuesday 10th July		
08:30-12:00	**Mutual Learning on Agriculture / Indonesia and Vietnam** ***Room: SONG THAO***	
	Chair: Dr. Junko Akagi (GIO) Co-Chair: Mr. Kohei Sakai (GIO)	Rapporteur: Mr. Hiroshi Ito (JICA Indonesia)
08:30-12:00	**Mutual Learning on Waste / China and Korea** ***Room: SONG DA***	
	Chair: Mr. Hiroyuki Ueda (MURC)	Rapporteur: Ms. Masako White (GIO)

Day 0* Afternoon (For Mutual Learning / SEA GHG Project meeting), Tuesday 10th July		
13:30-17:00	**Mutual Learning on Energy / Cambodia and Thailand** ***Room: SONG THAO***	
	Chair: Dr. Yuriko Hayabuchi (GIO)	Rapporteur: Mr. Akira Osako (GIO)
13:30-17:00	**Mutual Learning on Industrial Processes / Indonesia and Japan** ***Room : SONG DA***	
	Chair: Ms. Elsa Hatanaka (GIO)	Rapporteur: Ms. Elsa Hatanaka (GIO)

13:30-17:00	**SEA GHG Project meeting**	***Room: SONG LO***

**** Day 0, 10 July: Just for limited participants***

Day 1 Morning, Wednesday 11th July		
08:00-08:30	**Participants Registration**	
08:30-09:30	**Opening Session** ***Grand Ballroom***	
	Chair: Dr. Yukihiro Nojiri (GIO)	Rapporteur: Mr. Luong Quang Huy (DMHCC)
08:30-08:35	Mr. Shinsuke Oda (MOEJ)	Welcome address
08:35-08:40	Mr. Nguyen Khac Hieu (DMHCC)	Welcome address
08:40-08:50	Dr. Keizo Hirai (GIO)	"Overview of WGIA10"
08:50-09:10	Mr. Michihiro Oi (MOEJ)	"Japan's climate change policies"
09:10-09:30	Mr. Nguyen Minh Bao (DMHCC)	"Introduction of Mitigation Options for GHG emissions in Vietnam"
09:30-10:00		***Group Photo & Tea Break***
10:00-11:30	**Session I: NC updating and discussion on WGIA- activity** ***Grand Ballroom***	
	Chair: Mr. Takahiko Hiraishi (IGES)	Rapporteur: Dr. Junko Akagi (GIO)
10:00- 10:10	Mr. Dominique Revet (UNFCCC)	"Update on non-Annex I National Communications"

10:10-10:25	Dr. Sumana Bhattacharya (India)	"Update on India' s National Communication"
10:25-10:40	Dr. Sang Won Lee (Republic of Korea)	"Korea's 3rd NC and GHG Inventory in 2009"
10:40-11:05	Ms. Elsa Hatanaka (GIO)	"Decisions taken in COP16 and 17"
11:05-11:30	Dr. Junko Akagi (GIO)	"Review the past, Proposal for the future of WGIA-activity"
11:30-13:30		***Lunch***

Day 1 Afternoon, Breakout Groups, Wednesday 11th July		
13:30-17:00	**Session II-1: Hands-on Training using the new IPCC Inventory Software**	***Grand Ballroom and SONG DA***
	Chair: Dr. Simon Eggleston (IPCC TFI-TSU)	Rapporteur: Dr. Keizo Hirai (GIO)
13:30- 13:45	Dr. Simon Eggleston (IPCC TFI TSU)	Overview (*Grand Ballroom*)
13:45- 16:00 ***(Tea Break Included)***	Dr. Keizo Hirai (GIO) Mr. Kiyoto Tanabe (IPCC TFI TSU) Dr. Takefumi Oda (GIO) Dr. Jamsranjav Baasansuren (IPCC TFI TSU)	Energy/IPPU (*Grand Ballroom*) Waste (*SONG DA*)
16:00- 17:00	All of Session II-1	Results-analysis and Discussion (*Grand Ballroom*)

13:30-17:00	**Session II-2: Discussion on AFOLU**	***SONG THAO & SONG LO***
	Chair: Dr. Damasa Magcale Macandog (Philippines)	Rapporteur: Dr. Khin Lay Swe (Myanmar)
13:30- 13:40	Mr. Kohei Sakai (GIO)	"Introductory Presentation"
13:40- 17:00 ***(Tea Break Included)***	Dr. Khin Lay Swe (Myanmar)	"National GHG Inventory in Myanmar"
	Dr. Idat Galih Permana (Indonesia)	"Inventory and Mitigation for Methane Emissions from Livestock in Indonesia"
	Mr. Worapong Waramit (Thailand)	"Greenhouse Gases Inventory in Agricultural Sector of Thailand"
	Dr. Shenghui Han (China)	"Greenhouse gas emission from China croplands"
	Dr. Damasa Magcale Macandog (Philippines)	"Philippine SNC: Gaps, Challenges and Improvements for the GHG Inventory of the Agriculture and LUCF Sector"
	Dr. Kyeong-hak Lee (Republic of Korea)	"Monte Carlo Uncertainty Analysis Program"
	Dr. Elizabeth M.P. Philip (Malaysia)	"Developing a Sustainable AFOLU GHG System"
	All of Session II-2	Discussion
17:00-		***Reception Dinner***

Day 2 Thursday 12th July		
08:00-10:30	**Session III: Presentations by donors and international organization** ***SONG HONG Grand ballroom*** Chair: Mr. Dominique Revet (UNFCCC)	Rapporteur: Mr. Akihiro Tamai (GIO)
08:00-08:30	Mr. Naoki Mori (JICA)	"Challenges in development of GHG inventory-Experiences from JICA technical cooperation"
08:30-09:00	Ms. Mausami Desai (USEPA/ SEA GHG Project) Mr. Orestes Anastasia (USAID)	"Update on SEA GHG Project Phase II"
09:00-09:30	Mr. Rob Sturgiss (DCCEE)	"Overview of US Government Programs"
09:30-10:00	Dr. Junichi Fujino (NIES)	"Inventory systems and carbon markets – the Australian story "
10:00-10:30		"Future Low Carbon Society Scenarios in Vietnam and Asia"
10:30-10:45		***Tea Break***
10:45-11:45	**Wrap-up Session-1** ***SONG HONG Grand ballroom*** Chair: Dr. Yukihiro Nojiri (GIO)	
10:45-11:00	Mr. Hiroshi Ito (JICA Indonesia)	Summary of ML1: Agriculture
11:00-11:15	Ms. Masako White (GIO)	Summary of ML2: Waste
11:15-11:30	Mr. Akira Osako (GIO)	Summary of ML3: Energy
11:30-11:45	Ms. Elsa Hatanaka (GIO)	Summary of ML4: Industrial Processes
11:45-13:30		***Lunch***
13:30-16:10	**Wrap-up Session-2** ***SONG HONG Grand ballroom*** Chair: Dr. Yukihiro Nojiri (GIO)	
13:30-13:45	Mr. Nguyen Minh Bao (DMHCC)	Summary of Opening Session
13:45-14:00	Dr. Junko Akagi (GIO)	Summary of Session I
14:00-14:20	Dr. Keizo Hirai (GIO)	Summary of Session II-1
14:20-14:40	Dr. Khin Lay Swe (Myanmar)	Summary of Session II-2
14:40-15:00	Mr. Akihiro Tamai (GIO)	Summary of Session III
15:00-15:15		***Tea Break***
15:15-16:00	All	Discussion and wrap-up
16:00-16:05	Mr. Nguyen Khac Hieu (DMHCC)	Closing remarks
16:05-16:10	Dr. Yukihiro Nojiri(GIO)	Closing remarks

Abbreviations:

MOEJ: Ministry of the Environment, Japan
NIES: National Institute for Environmental Studies, Japan
GIO: Greenhouse Gas Inventory Office of Japan, NIES
MONRE: Ministry of Natural Resources and Environment, Vietnam
DMHCC: Department of Meteorology Hydrology and Climate Change, Vietnam
MURC: Mitsubishi UFJ Research and Consulting Co., Ltd., Japan
IGES: Institute for Global Environmental Strategies, Japan
JICA: Japan International Cooperation Agency
SEA GHG Project: Regional Capacity Building Project for Sustainable National Greenhouse Gas Inventory Management Systems in Southeast Asia
USEPA: U.S. Environmental Protection Agency
USAID: U.S. Agency for International Development
LEAD Program: USAID Low Emissions Asian Development Program
DCCEE: Department of Climate Change and Energy Efficiency, Australia
UNFCCC: United Nations Framework Convention on Climate Change
IPCC: Intergovernmental Panel on Climate Change
IPCC TFI TSU: IPCC, Task Force on National GHG Inventories, Technical Support Unit

Annex II: List of Participants

Annex II: List of Participants

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