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# Proceedings of the 14th Workshop on Greenhouse Gas Inventories in Asia (WGIA14)

## - Capacity Building for Measurement, Reporting and Verification -

**26th-28th July 2016, Ulaanbaatar, Mongolia**

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

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- Capacity Building for Measurement, Reporting and Verification -

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# Contents

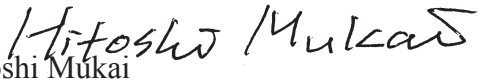
# Foreword

The international community now recognizes increases in anthropogenic emissions of Greenhouse Gases (GHGs) as the primary cause of climate change and its impacts. The 5th Assessment Report published by the Intergovernmental Panel on Climate Change (IPCC) in 2013 stated that "the atmospheric concentrations of the greenhouse gases carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$) have all increased since 1750 due to human activity." Moreover, since 2012, many GHG observatories including Mauna Loa Observatory in Hawaii have noticed that the daily mean concentration or monthly mean concentration of $CO_2$ surpassed 400 parts per million (ppm) in May for the first time. In order to address mitigation and adaptation to climate change, all of us on the globe have been making more efforts than ever in both scientific and political fields.

Furthermore, "Measurement, Reporting and Verification", abbreviated as MRV, are important for ensuring the transparency and accuracy of each country's mitigation actions by quantifying anthropogenic GHG emissions. In this respect, national GHG inventories, which provide information on GHG emissions and their trends over time, play a critical role as a basis for decision makers to design and implement strategies of their countries' mitigation actions for reducing GHG emissions.

In order to support the enhancement of capacities for national GHG inventories in Asian countries, 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). This workshop supports government officials, compilers, and researchers in the Asian countries to develop and improve their GHG inventories through enhancing regional information exchange. 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 CGER report serves as the proceedings of the 14th WGIA, which was held from July 26 to July 28, 2016, in Ulaanbaatar, Mongolia. 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.



Hitoshi Mukai

Director
Center for Global Environmental Research
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# Preface

An important lesson that we have learned from experience in the history of the UNFCCC is the importance of "measurement, reporting and verification" (MRV). This includes measuring the effects of emissions reduction initiatives; reporting the results of the measurement on the international stage; and verifying the status of reductions. MRV ensures the transparency and accuracy of reports on each country's mitigation actions.

For steady implementation of MRV, it is essential to develop national systems for preparation of national greenhouse gas (GHG) inventories and to improve the accuracy of the inventories. The newly agreed Paris Agreement calls for the establishment of an enhanced transparency framework for action and support, in order to build mutual trust and confidence and to promote effective implementation. The purpose of the framework for transparency of action is to provide a clear understanding of climate change action, including clarity and tracking of progress towards achieving Parties' individual nationally determined contributions (NDCs), and Parties' adaptation actions to inform the global stocktake. Each Party shall regularly provide a national inventory report and information necessary to track its progress made in implementing and achieving its NDC. In light of this, the GHG inventories are accepted more and more as being valuable because the inventories support transparency and accuracy of implementation of the national mitigation actions in a MRV manner.

Since its first session in 2003, WGIAs have been held thirteen times so far. WGIAs have contributed significantly to the construction and consolidation of a network of officials involved in GHG inventory preparation in Asian countries and other institutes, and to the identification and solution of common issues of relevance to the inventories.

This time, the 14th WGIA (WGIA14) was held from 26th to 28th July, 2016 in Ulaanbaatar, Mongolia, as a capacity building workshop for 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 WGIA14 are summarized in this report as Proceedings. It is our hope that this report will be found useful and will contribute to the further improvement of the GHG inventories of the WGIA-member countries.

In conclusion, we would 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 |
| BR | Biennial Report |
| BUR | Biennial Update Report |
| BUR1 | The first Biennial Update Report |
| CDM | Clean Development Mechanism |
| CGE | Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention Center |
| CGER | for Global Environmental Research |
| $CH_4$ | Methane |
| $CO_2$ | Carbon dioxide |
| COP | Conference of the Parties |
| CRAES | Chinese Research Academy of Environmental Sciences, China |
| CS | Country-Specific |
| EF | Emission Factor |
| ETF | Enhanced Transparency Framework |
| FAO | Food and Agriculture Organization of the United Nations |
| FSV | Facilitative Sharing of Views |
| FY | Fiscal year |
| GEF | Global Environmental Facility |
| GHG | Greenhouse Gas |
| Gg | Giga gram ($10^9$ g) |
| GIO | Greenhouse Gas Inventory Office of Japan |
| GIR | Greenhouse Gas Inventory and Research Center of Korea |
| 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 |
| GSP | Global Support Programme |
| HFCs | Hydrofluorocarbons |
| IAR | International Assessment and Review |
| ICA | International Consultation and Analysis |
| IGES | Institute for Global Environmental Strategies, Japan |
| INC | Initial National Communication |
| INDC | Intended Nationally Determined Contribution |
| IP | Industrial Processes |
| IPCC | Intergovernmental Panel on Climate Change |
| IPCC TFI | IPCC, Task Force on National Greenhouse Gas Inventories, |
| JCM | Joint Crediting Mechanism |
| JICA | Japan International Cooperation Agency |
| KECO | Korea Environment Corporation |
| LCS | Low-carbon Society |
| LUCF | Land-Use Change and Forestry |
| LULUCF | Land Use, Land-Use Change and Forestry |
| MEGDT | The Ministry of Environment, Green Development and Tourism |
| ML | Mutual Learning |

| | |
|---|---|
| MoEFCC | Ministry of Environment, Forest and Climate Change, India |
| MOEJ | The Ministry of the Environment, Japan |
| MONRE | Ministry of Natural Resources and Environment, Vietnam |
| MURC | Mitsubishi UFJ Research and Consulting Co., Ltd., Japan |
| MRV | Measurement, Reporting and Verification<br>Measureable, Reportable, and Verifiable |
| NAMA | Nationally Appropriate Mitigation Action |
| $N_2O$ | Nitrous oxide |
| NC | National Communication |
| NDC | Nationally Determined Contribution |
| NIES | National Institute for Environmental Studies, Japan |
| NIR | National Inventory Report |
| NMVOC | Non-methane volatile organic compounds |
| ONEP | Office of Natural Resources and Environmental Policy and Planning, Thailand |
| PA | Paris Agreement |
| QA | Quality Assurance |
| QC | Quality Control |
| REDD | Reducing Emissions from Deforestation and forest Degradation in developing countries |
| REDD+ | Reducing Emissions from Deforestation and forest Degradation, and the Role of Conservation, Sustainable Management of Forests, and Enhancement of Forest Carbon Stocks |
| SBI | Subsidiary Body for Implementation |
| SNC | Second National Communication |
| TA | Technical Analysis |
| TGO | Thailand Greenhouse Gas Management Organization (Public Organization) |
| TNC | Third National Communication |
| TTE | Team of Technical Experts |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| UNFCCC | United Nations Framework Convention on Climate Change |
| WGIA | Workshop on Greenhouse Gas Inventories in Asia |

## Photos of the Workshop

Welcome Address

Ms. Bulgan Tumendemberel

Overall Chairperson

Dr. Nobuko Saigusa

Closing Remarks

Mr. Batjargal Zamba

Chairpersons for the Plenary Sessions

Opening Session

Mr. Batjargal Zamba

Session I

Mr. Takahiko Hiraishi

Session II

Mr. Kiyoto Tanabe

Session III

Dr. Sumana Bhattacharya

Session IV


Dr. Sirintornthep Towprayoon

Mutual Learning Sessions

Energy

Waste

Industrial Process

LULUCF

Discussions in the Plenary Sessions


Discussions in the Poster Session

Information Exchanges in Reception & Tea Breaks

# 1. Executive Summary of WGIA14

# 1 Executive Summary of WGIA14

**Executive Summary of WGIA14**

The Ministry of the Environment of Japan (MOEJ) and the National Institute for Environmental Studies (NIES) convened, together with the Ministry of Environment, Green Development and Tourism of Mongolia, the "14th Workshop on Greenhouse Gas (GHG) Inventories in Asia (WGIA14)" from July 26 (Tuesday) to 28 (Thursday), 2016, in Ulaanbaatar, Mongolia.

The annual workshops have been held since 2003 in order to support non-Annex I (NAI) Parties in Asia to develop and improve their GHG inventories and to facilitate the enhancement of cooperative relationships towards improvement in the accuracy of national GHG inventories in the Asian region.

This year, 93 participants including government and research representatives from thirteen countries (Brunei, Cambodia, China, India, Indonesia, Japan, Lao P.D.R., Malaysia, Mongolia, Myanmar, Republic of Korea, Thailand, and Vietnam) attended WGIA14, in addition to representatives of the Technical Support Unit of the IPCC Task Force on National Greenhouse Gas Inventories (IPCC/TFI/TSU), the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), United Nations Environment Programme (UNEP), Food and Agriculture Organization of the United Nations (FAO), and guest presenters from Australia and Iran.

The presentations and discussions on each subject are summarized below.

**Opening Session**

As host countries, the Japanese and Mongolian governments individually made welcome addresses and presentations. Japan presented its climate change policies including "Plan for global warming countermeasures" which is based on the Paris Agreement. Then, the Mongolian government made a presentation on its climate change policies including Intended Nationally Determined Contribution (INDC) submitted last year, and mentioned about the progress of the BUR to be submitted next year.

The results of a follow-up survey regarding Mutual Learning (ML) were also reported in the session. It was indicated that the ML sessions were helpful for improving national GHG inventories and the capacity of GHG inventory compilers.

**Progress Made in NC and BUR of NAI Parties**

The session chair explained the relevant provisions in the Paris Agreement, and highlighted Article 13 of the transparency framework in the Agreement. He also suggested that the scope of the workshop should be expanded further in the future.

India, Malaysia, Indonesia and Thailand talked about their submitted first BURs and reported on their updated emission amounts, mitigation activities, and relevant data.

Through the discussion, participants exchanged views on how to interpret UNFCCC decisions and the practicalities of implementing them. It was acknowledged that the 2006 IPCC Guidelines reflect the latest scientific knowledge, but the transition to using them requires capacity building.

**Institutional Arrangement for National GHG Inventory and BUR**

The UNFCCC secretariat talked about the activities undertaken by the UNFCCC in response to a mandate arising from the SBI 42 to support NAI countries in meeting their reporting requirements through, among other things, training on the use of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, and building sustainable national greenhouse gas inventory management systems. Cambodia reported on its institutional

arrangement which was strengthened last year. Iran explained about its current status toward submitting NC this year. Lastly, Australia made a presentation on their national carbon accounting system which was incorporated in their national inventory system.

In the session, the importance of coordination among institutional arrangements for inventory preparation, mitigation planning, and adaptation was highlighted.

**Good Practices for ICA Process**

A Co-Chair of IPCC TFI made a presentation to explain the ICA process with some pieces of advice to the participants based on his experience. China made an experience-based presentation as one of the TTE members. Vietnam shared their experience of the ICA process, which has just been completed in this May. Korea introduced their experience of the ICA process and gave an overview of R. Korea's BUR1.

It was acknowledged that the ICA process contributed to enhancing transparency and capacity of countries to improve their GHG inventories, mitigation, and emission reduction work, as well as to the next submission of BURs and Nationally Determined Contributions (NDC).

**Activities with Co-benefits for GHG Inventories, Mitigation, and related support**

In this session, presentations on various activities were made as follows:

First, NIES talked about terrestrial monitoring and GHG inventories and introduced the development of integrated carbon observation and analysis systems. A participant from China introduced his research about the co-benefits study on greenhouse gases mitigation and air pollutant control in China. FAO talked about FAO work addressing the Paris Agreement. Mongolia talked about the current state of Joint Crediting Mechanism (JCM) development in Mongolia. Then, IPCC/TFI/TSU explained about recent activities of IPCC TFI. Lastly, UNEP introduced Global Support Programme (GSP) by UNDP/UNEP to technically support NAI in their climate change reporting.

In the session, participants reconfirmed the co-benefits between air pollution control and terrestrial monitoring etc., and the enhancement of GHG inventories. Clarifications were also sought and provided for related support for the improvement of GHG inventories.

**Mutual Learning of Each Sector's GHG Inventories**

Mutual Learning sessions were held for the following four GHG inventory sectors: Energy sector (Brunei and Korea), Waste sector (Mongolia and Thailand), LULUCF sector (Laos and Indonesia), and Industrial Process sector (Myanmar and Malaysia).

The ML participants preliminarily exchanged materials and questions to learn about the inventory and institutional arrangements of the counterpart country approximately two months before the workshop. In each session, two countries participated by following up on the Q&A which had taken place over the course of two and a half months preceding the workshop. Experts and government officials in charge of the national inventory from the partner countries met each other in person at the sessions, and clarified their questions and elaborated on their answers.

They also exchanged additional information and follow-up questions. Members of the GHG Inventory Office of Japan and consultants involved in the Japanese inventory joined in to facilitate the exchange. Through the Mutual Learning sessions, specific issues in the four inventory sectors were identified and some solutions were proposed. Common difficulties such as challenges in collecting activity data or achieving completeness in the coverage of sources/sinks, and institutional arrangement issues were acknowledged.

**Poster Session**

This year, a poster session was held for the first time at WGIA; 17 posters were displayed

during the workshop and active discussions were made at the session.

The poster session was held to share the latest research results and deepen the discussion on specific issues. The first trial was very welcomed by the many participants and many said that they looked forward to the poster session at the next WGIA.

# 2. Workshop Report

# 2 Workshop Report

Please note that all presentation materials can be downloaded from the website of Greenhouse Gas Inventory Office of Japan (GIO):
http://www-gio.nies.go.jp/wgia/wg14/wg14index-e.html

## 2.1 Opening Session

The opening session was chaired by Mr. Batjargal Zamba (Mongolia), and the rapporteur was Mr. Naofumi Kosaka (GIO).

The welcome address was delivered by Mr. Yoshio Nakura, Director of the Low-Carbon Society Promotion Office, Ministry of the Environment, Japan (MOEJ), followed by the welcome address delivered by Ms. Bulgan Tumendemberel, Head of Green Development Policy and Strategic Planning Department, Ministry of Environment Green Development and Tourism (MEGDT) of Mongolia.

Mr. Hiroshi Ito (GIO) gave an overview of WGIAs and the follow-up survey of Mutual Learning activities. He introduced the organization of WGIA in progress, and its objectives, participants, and agenda. The objectives of WGIA14 were:

- To enhance sector-specific capacity for inventory compilation (Mutual Learning)
- To share information on national GHG inventories for national communications (NCs) and biennial update reports (BURs) (Session I)
- To enhance the understanding of the institutional arrangement of NC and BUR for continuous GHG inventory compilation (Session II)
- To explore good practices for International Consultation and Analysis (ICA) of BUR (Session III)
- To promote activities with co-benefits for GHG inventory and related support (Session IV)

Mr. Ito emphasized that an accurate inventory of NCs and BURs will contribute to planning and assessment of the emission reduction target in INDC/NDC.

He also showed the results of the follow-up survey of previous Mutual Learning sessions. The survey was conducted from May to June 2016. Mutual Learning sessions would improve not only the quality of GHG inventories, but also the capacity of GHG inventory compilers. He concluded that Mutual Learning sessions were good capacity-building opportunities for making GHG inventory compilation.

Mr. Shigeyoshi Sato (MOEJ) made a presentation on Japan's climate change policies as well as the current situation of Japan. He reported on Japan’s national greenhouse gas emissions based on the 2006 IPCC guidelines in fiscal year (FY) 2014. Total emissions in FY2014 were 1,364 million tonnes of carbon dioxide equivalents (Mt $CO_2$ eq.), a 3.1% decrease compared to FY2013 and a 2.4% decrease compared to FY2005. He also showed the reduction target of "3.8% or more emission reduction compared to FY2005" and a 6.0% reduction by FY2030 compared to FY 2013 (25.4% compared to FY2005), as shown in Japan’s INDC. Furthermore, he introduced a variety of policies and measures including public campaign for reducing GHG emissions by using carbon tax revenue, making full contribution to the implementation of the Paris Agreement.

Mr. Gerelt-Od Tsogtbaatar (Mongolia) made a presentation on Mongolia’s climate change policies. He overviewed the national circumstances and policy measures of climate change in Mongolia. He also showed the GHG emission reduction target of 14% by 2030 compared with 2010 which was described in INDC submitted in September 2015. In addition, he explained about the preparation progress of the BUR of Mongolia which will be submitted to the UNFCCC in June 2017.

In the discussion, Japan's GHG emission trend and emission reduction target in INDC were discussed. Mr. Sato described the importance of carbon tax revenue and cooperation among relevant ministries and agencies in the process of developing the Plan of Global Warming Countermeasures. A participant pointed out the need for further enhancement of the linkage between the national development plan and the INDC. In Mongolia, CDM accounts for a relatively large share of planned emission reductions. Some barriers may exist to increase CDM projects in such a scale.

## 2.2 Session I: Updates on the National Communications (NCs) and Biennial Update Reports (BURs) from Non-Annex I Parties

This session was chaired by Mr. Takahiko Hiraishi (IGES) and the rapporteur was Mr. Naofumi Kosaka (GIO).

In the beginning of this session, Mr. Hiraishi explained the relevant provisions in the Paris Agreement. He highlighted Article 13 of transparency framework in the Paris Agreement, and mentioned that the national inventory report shall be submitted regularly.

Non-Annex I Parties shall, as per COP 16 decision, submit national GHG inventories as a part of their BURs or NCs every two years. An ICA process for the first BUR has begun in early 2015. Many participant countries have already started preparation for their BURs and/or NCs. Therefore, in this session, India, Malaysia, Indonesia, and Thailand, which submitted their BURs after previous WGIA, gave presentations about their first BURs.

Mr. Hiroshi Ito (GIO) made an introductory presentation of this session. He overviewed relevant articles of the Convention for NCs, first BUR and ICA of BURs. He also showed the submission status of NCs and BURs in Asian countries.

Dr. Javiardhan Ramanlal Bhatt (India) gave a presentation on India's first BUR. GHG emissions from India were 2,136 million tonnes $CO_2$-eq. in 2010. India's per capita GHG emissions were 1.56 tonnes $CO_2$-eq. in 2010. He explained that India's reduction target was 20-25 per cent to be achieved by 2020 compared with the 2005 level.

Dr. Elizabeth M P. Philip (Malaysia) gave a presentation on Malaysia's first BUR. Malaysia reported on their GHG emissions/removals from 1990 to 2011, policies relating to emission reduction and their effects. She pointed out that gaps still existed in policies where quantified emission reduction may not be a direct output.

Mr. Budiharto (Indonesia) gave a presentation on Indonesia's first BUR. Indonesia reported on their GHG emissions/removals from 2000 to 2012. He explained that Tier 1 and Tier 2 of the 2006 IPCC guidelines were used to estimate this GHG inventory. The annual emissions over the period of 2000-2012 increased consistently with a rate of about 3.6% per year without LUCF, the annual emissions with LUCF fluctuated considerably due to high inter-annual variability of emissions from the LUCF sector.

Dr. Jarunee Nugranad (Thailand) gave a presentation on Thailand's first BUR. She showed that Thailand's GHG emissions/removals were 234.58 Mt $CO_2$-eq. in 2011 reported in their first BUR. She also explained Thailand's mitigation actions, through the Climate Change Master Plan 2015-2050, the Nationally Appropriate Mitigation Actions (NAMA) toward 2020, and the Intended Nationally Determined Contributions (INDCs) by 2030. In addition, she showed the GHG inventory schedule including the NC/BUR submissions plan.

In the discussion, technical issues on BUR Guidelines such as reporting year were confirmed. It was acknowledged that the 2006 IPCC Guidelines reflected the most recent findings of GHG inventory, but changing methodology from the Revised 1996 IPCC Guidelines to the 2006 IPCC Guidelines required capacity building due to additional gases and emission sources.

## 2.3 Session II: Institutional Arrangement for National GHG Inventory and BUR

This session was chaired by Mr. Kiyoto Tanabe (Co-Chair of IPCC TFI, member of UNFCCC CGE) and the rapporteur was Mr. Naofumi Kosaka (GIO).

Mr. Akira Osako (GIO) made an introductory presentation of this session. He reviewed and reminded about what were described in the UNFCCC guidelines with regard to institutional arrangement, and he informed that the UNFCCC has published a "Toolkit" which is a manual for establishing institutional arrangements for non-Annex I Parties. He also reviewed what had been discussed in past WGIA sessions regarding the theme of this session.

Mr. Dominique Revet (UNFCCC Secretariat) made a presentation on "UNFCCC Support to Strengthening Transparency in Reporting National GHG Inventories by non-Annex I Parties". He explained that the UNFCCC was providing, for each of the three regions of non-Annex I Partis, a five-day hands-on training workshop on "the building of sustainable national GHG Inventory management systems, and the use of the 2006 IPCC guidelines for national GHG inventories", and was planning to support the enrollment in Online Training and Certification in the 2006 IPCC Guidelines Program, both for non-Annex I Parties but subject to availability of funds.

Mr. Uy Kamal (Cambodia) made a presentation on "Institutional Arrangement of Cambodia". Last year, Cambodia strengthened their institutional arrangement by establishing National Council for Sustainable Development which is honorary chaired by the Prime Minister and chaired by the Minister of Environment. Also a new National GHG Inventory Team was established, and the members are from various ministries.

As a guest presenter from a country outside the scope of WGIA, Mr. Mohammad Sadegh Ahadi (Iran) made a presentation on "Overview of GHG Emission Inventory and Its Institutional Arrangement in Iran". Iran is to submit its third National Communication this year, however Iran still has accuracy issues and huge uncertainty in activity data and emission factors in certain areas. He pointed out the necessity of an international supporting system.

Lastly, as a guest presenter from Annex I Party, Dr. Shanti Reddy (Australia) made a presentation on Australian "National Carbon Accounting Using Remote Sensing Data", in which system the remote sensing data from NASA satellites are processed by a developed data processing model, and used for estimation of carbon emissions and removals in the LULUCF sector. He explained in his presentation how this new system was developed and adequately incorporated into the national inventory system.

Following the above presentations, several questions and comments were raised from the floor. In response to the questions related to the UNFCCC support program, Mr. Revet clarified that e-learning courses, regarding all sectors of inventory for the 2006 IPCC Guidelines, would be made available subject to availability of funds, and the experts who took this e-learning course and passed the examination would be given a certificate. Regarding the Inventory of Iran, questions on how the provincial inventories were integrated into the national inventory were asked. Mr. Ahadi explained the responsible entity of inventory, compilation procedures, and training courses. In response to the

questions related to Australian remote sensing, Dr. Reddy explained that more than ten years have been spent for the necessary improvement of the data processing model, however at present the time-series data from NASA are available for free for every country, and the annual operating cost is decreased to approximately one million US dollars. A general question arose from the floor asking which institutional arrangement is better, namely the specialized task-based work distribution to various organizations or entrusting all to a more solid organization; however this remains to be answered in the future. At the end of this session, the chair commented on the importance of coordination between institutional arrangements for inventory preparation, mitigation planning, and adaptation.

## 2.4 Session III: Good Practices for the ICA process

This session was chaired by Dr. Sumana Bhattacharya (AB/IORA Ecological Solutions Pvt. Ltd), and the rapporteur was Mr. Naofumi Kosaka (GIO).

As the first round of ICA for BURs had just been completed in May 2016, there were experienced participants here in this WGIA. Therefore, this session was held with the aim of sharing some good practices from experience-based presentations.

Ms. Atsuko Hayashi (GIO) made an introductory presentation. She explained the process of ICA with data showing a snapshot of the figures of non-annex I parties being at each stage of the process. Then, she showed an overview of past sessions related to the ICA process in order to locate where we were and to clarify the aims for this session.

Mr. Kiyoto Tanabe started off the session with a presentation entitled “Introduction of the ICA Process”. He provided some basic information and gave some important points. He emphasized especially some points as his advice to the participants, which were:

1) Making clear what has been updated in the submitted BUR and what will be updated in the next submission is the key information.
2) Preparing well for questions and answers before and during TA and FSV is very important, as it enhances communication between TTE and parties and makes this process successful.
3) Taking advantage of this opportunity to find ways to improve the national GHG inventory is important.

Prof. Zhu Songli (China) made an experience-based presentation as one of the TTE members. She shared ideas of what were “good practices” through her experience of the TA process. The important point which she emphasized was to make an effort to make everybody happy through the ICA process instead of just collecting a party’s errors. She also mentioned how each party could make a better preparation for the TA, such as in-depth understanding of the reporting guidelines and quick responses to TTEs’ questions. She ended with saying that the ICA process had just started, so the process itself will evolve and develop over time.

Dr. Nguyen Phuong Nam (Vietnam) introduced Vietnam’s experience of the ICA process, which was completed in this May. First he gave an overview of Vietnam’s BUR1, including its institutional arrangement and preparation. Then, he presented some challenges found during the ICA process. One of the biggest challenges he found was the lack of a domestic MRV system. He emphasized therefore the need for domestic coordination among institutions and local GHG inventory experts as well as the importance of BUR preparation.

The last speaker, Dr. Hyung-Wook Choi (Republic of Korea) also introduced their experience of the ICA process. He gave an overview of Republic of Korea’s BUR1, including the submitted contents,

the institutional arrangement and the overview of the GHG inventory. He also talked about the key questions raised by the TTE and from the floor at FSV. He found that the whole process helped to understand the international MRV process. Finally, he mentioned about the challenge for their next BUR, which was to harmonize the datasets of bottom emissions coming from each company.

Through this session and comments from the floor, we could have a common understanding of how the ICA process worked beneficially in many ways. We were made aware that the process contributed to increasing the transparency and capacity of countries in improving their respective GHG inventories and mitigation actions.

## 2.5 Session IV: Activities with Co-benefits for GHG Inventories or Mitigation, and Related support

This session was chaired by Dr. Sirintornthep Towprayoon (AB/ King Mongkut's University of Technology Thonburi) and the rapporteur was Mr. Naofumi Kosaka (GIO).

A similar session was held in WGIA13, "Session IV: International Activities Contributing to GHG Inventories and Mitigation", and some support programs and relevant activities for GHG inventories were also introduced in that session.

In WGIA 14, this session focused on "Co-benefits" and "Support" related to GHG inventories and/or mitigation. The session aims were as follows.

1) To understand the interlinkages between GHG inventory preparation or mitigation, and co-beneficial activities,
2) To understand GHG inventories in a broad context,
3) To gain knowledge on support programs to prepare/improve GHG inventories and to carry out mitigation actions.

In this session, a wide range of experts gave presentations and participants exchanged views on various activities.

Mr. Kohei Sakai (GIO) introduced the background for the session, agenda, and possible points for discussion during the session.

Dr. Nobuko Saigusa (NIES) talked about terrestrial monitoring and GHG inventories. She introduced the development of integrated carbon observation and analysis systems based on satellite, airborne, and ground-based observations, and atmospheric and terrestrial carbon cycle models developed by NIES. She pointed out that the accuracy improvement of anthropogenic $CO_2$ emissions in the GHG inventory can contribute to the accuracy improvement of their monitoring data.

Dr. Qingxian Gao (China) introduced his co-benefits study on greenhouse gases mitigation and air pollutant control in China. He studied the co-benefits for three typical industries (iron steel, cement, and transportation). His results indicated that air pollution control had both positive and negative effects on GHG reduction and energy saving. On the other hand, GHG reduction and/or energy saving activities had positive effects on air pollution reduction.

Mr. Martial Bernoux (FAO) talked about FAO work addressing the Paris Agreement. FAO provides AFOLU sector data relating to GHG inventory. FAO is also preparing e-learning courses to compile national GHG inventories for the AFOLU sector. He demonstrated a prototype e-learning course under construction. Mr. Martial Bernoux emphasized that the FAOSTAT emissions database was useful as a verification tool of national GHG inventories.

Ms. Undarmaa Khurelbaatar (Mongolia) talked about the current state of Joint Crediting Mechanism (JCM) projects in Mongolia. As of July 2016, two JCM projects have been registered in Mongolia in collaboration with the Japanese government. She stated that the JCM would promote the actions listed in Mongolian NAMA submitted to the UNFCCC, and could help contribute to achieving Mongolia's emission reduction.

Dr. Baasansuren Jamsranjav (IPCC/TFI/TSU) explained about recent activities of IPCC TFI. Their main activity is refinement of the 2006 IPCC Guidelines. An online survey and expert meeting were initiated by IPCC-TFI in 2015, and a scoping meeting is planned in August 2016. She also introduced the IPCC EFDB (emission factor database), an IPCC inventory software, support to training programmes on GHG inventories, and other activities.

Mr. Stanford Mwakasonda (UNEP) introduced Global Support Programme (GSP) by UNDP/UNEP, which is technical support to Non-Annex I countries in their climate change reporting obligations, including NCs, BURs, and INDCs. According to the GSP survey, there is a strong need for capacity building in the national inventory systems and data collection. Many respondents are planning to use the 2006 IPCC Guidelines.

Following the above presentations, some comments were given and questions were raised. For Dr. Gao's presentation, participants sought clarification whether the study covered the perspective of cost-benefits/health benefits. A participant mentioned that a clarification of boundary was important for the analysis of co-benefits. If trade-off was observed, minimization of negative impacts should be sought. In addition, Dr. Rizaldi Boer mentioned that the connection between GHG inventories and mitigation was important.

Participants asked about the issue of discrepancy between FAOSTAT data and data used for national GHG inventory. Mr. Bernoux noted that, in principle, FAO data come from the submissions of each country's statistics department. Therefore, he encouraged that if countries found data discrepancies between FAO and national inventories, first of all, they communicate it with national data providers. For the JCM project, participants asked about the use of credits by JCM including their allocation between the two partner countries. Ms. Khurelbaatar answered that details for allocation were not decided at this time. An Indonesian participant remarked that Indonesia could share information about JCM projects.

Participants asked about the content and sources of funding for the support provided by the Global Support Programme. Mr. Mwakasonda clarified that the GSP support was meant for e.g. development of robust national institutional arrangements, and it was not a direct support for national institutional arrangements. He also said that the funds may come from two channels - the GEF budget or from GSP directly.

Finnally, Dr. Towprayoon, session chair, summarized that although several activities can be beneficial to inventories and mitigation, enhancing the inventory activity itself can also benefit many aspect.

## 2.6 Wrap-up Session

This session was chaired by Dr. Nobuko Saigusa (NIES). In this session, the rapporteurs from the Mutual Learning session and plenary sessions provided summaries of the discussions including findings and recommendations, which were followed by the final discussion to conclude the workshop.

**Summary of the Plenary Sessions**

Mr. Naofumi Kosaka (GIO), the rapporteur of the Plenary Sessions, reported a summary of the presentations and discussions of the Opening Session through Session IV. He summarized the sessions as follows:

- Transparency of inventory reporting is important in light of the aim of BUR and ICA.
- Establishment of institutional arrangement is important to meet the requirement for BUR submission frequency.
- There is a beneficial relationship between air pollution control and terrestrial monitoring etc., and improvement of GHG inventories.
- Various support programs and activities are available and useful to prepare GHG inventories continuously and accurately.

The discussion after his report is summarized as follows.

Mr. Takahiko Hiraishi (IGES) proposed that the workshop should consider expanding its scope of collaboration to cover a wider range of issues such as mitigation, and synergetic linkages between mitigation and adaptation. This was briefly discussed at this session and was left to the AB/OC meeting for consideration.

**Summary of the Mutual Learning**

Ms. Sumiko Harasawa (GIO) presented the background and objectives of the Mutual Learning (ML) programme as well as the outcomes of past MLs. She also summarized the ML held in this workshop.

The discussion after her report is summarized as follows.

Many participants of ML expressed their appreciation. They said that the ML was beneficial in that points of further improvement became clear, best practices were learned from the counterpart, accuracy of calculation could be improved, and so on.

Many people, regardless of participation in the ML in this year, wished to participate in the ML in the next workshop.

It was suggested that ML would be more effective if more than two countries participated in the same ML, because it would allow for sharing of more experiences and common difficulties.

Generally, it was agreed that the ML was useful and should be continued.

**Closing Remarks**

The closing remarks were delivered by Mr. Batjargal Zamba (Mongolia) and Dr. Nobuko Saigusa (NIES). They thanked all for their active participation.

# 3. Abstracts

# 3 Abstracts

*In this section, the abstracts of the presentations are compiled. The abstracts are attached in an unedited form, as they were received from the presenters.*

## 3.1 Opening Session

### Japan's Climate Change Policies

Shigeyoshi Sato
*Ministry of the Environment, Japan*

**Abstract**

The Ministry of the Environment, Japan (MOEJ), with the cooperation of relevant ministries, agencies and organizations, prepares Japan's national inventory and compiles supplementary information required under Article 7.1, which is annually submitted to the Conference of the Parties through the UNFCCC Secretariat in accordance with the UNFCCC and the Kyoto Protocol.

Last April, Japan submitted its National Greenhouse Gas Emissions based on 2006 IPCC guidelines in fiscal year (FY) 2014 in line with the Act on Promotion of Global Warming Countermeasures. Total emissions in FY2014 were 1,364 million tonnes of carbon dioxide equivalents (Mt $CO_2$ eq.), a 3.1% decrease compared to FY2013; a 2.4% decrease compared to FY2005.

In accordance with the Cancun Accord and the Durban Decision under the UNFCCC, last December, Japan has submitted the 2nd Biennial Report (BR2). Technical review for Japan's BR2 was conducting in June, 2016.

After COP21 at Paris, Japan decided the Plan for Global Warming Countermeasures based on Act on Promotion of Global Warming Countermeasures in May 2016 which includes emission reduction targets, policies and measures for achieving targets and so on. The 2020 emission reduction target was set in this plan as "3.8% or more emission reduction compared to 2005FY", that includes the emission reduction effect resulting from the utilization of nuclear power, the safety of which are confirmed by the Nuclear Regulation Authority. The 2030 emission reduction target is 26.0% reduction by FY2030 compared to FY 2013(25.4% compared to FY2005), as shown in Japan's INDC. As long-term goal, Japan will pursue the goal of 80% reduction by FY2050.

Japan will make the best effort to achieve the emission reduction target for FY2020 and FY2030 through the implementation of a variety of policies and measures including public campaign for reducing GHG emissions by using carbon tax revenue, and make full contribution to the implementation of the Paris Agreement.

**References**

Ministry of the Environment, Government of Japan

**Access to relevant information**

http://www.env.go.jp/en/index.html

## 3.2 Session I

### India's First Biennial Update Report to UNFCCC

J R Bhatt, Scientist-'G'
*Ministry of Environment, Forest and Climate Change*
*Government of India*

## Abstract

India is a Party to the United Nations Framework Convention on Climate Change (UNFCCC). The Convention requires all the Parties to furnish information on implementation of the Convention in the form of periodic National Communications. India furnished its Initial National Communication in 2004 and Second National Communication in 2012 to the UNFCCC. These two Communications contained national GHG inventories of the years 1994 and 2000 respectively.

Conference of Parties to UNFCCC in its sixteenth session decided that developing countries should also submit Biennial Update Report (BUR) as an update to the most recently submitted National Communication. In case of India, first Biennial Update Report is an update to the Second National Communication.

BUR has been prepared by the Ministry of Environment, Forest and Climate Change (MoEFCC) with the participation of 17 expert institutions including laboratories of the Council of Scientific and Industrial Research (CIMFR, CRRI, IIP, NEERI and NPL), institutes of Indian Council of Agricultural Research (CRIDA, IARI, NDRI), organizations of MoEFCC (FSI and ICFRE), premier educational institutions (IIM Ahmedabad and IISc), Non-governmental research organizations (TERI and IRADe) and other institutions (CII, EESL, NRSC). It has undergone multi-tier review process, including peer review and review by other government institutions, expert advisory committee, and steering committee. The BUR was submitted to UNFCCC Secretariat on 22 January 2016, after approval of the Cabinet.

BUR contains information on five major components viz. (I) National Circumstances, (II) National Greenhouse Gas Inventory, (III) Mitigation Actions, (IV) Domestic Monitoring, Reporting and Verification (MRV) arrangements, (V) Finance, Technology and Capacity Building Needs and Support Received.

India emitted 2.136 billion tonnes CO2 equivalent greenhouse gases in 2010. Out of the total emissions, Energy sector accounted for 71%, Industrial Processes and Product Use 8%, Agriculture 18% and Waste sector 3%. About 12% of emissions were offset by carbon sink action of forests and croplands, considering which net national GHG emissions were 1.884 billion tonnes $CO^2e$.

India's per capita GHG emissions in 2010 were 1.56 t $CO^2e$ which is less than one third of the world's per capita emissions and far below than many developed and developing countries.

A reduction in emission intensity of GDP by about 12% between 2005 and 2010 has been achieved against the voluntary pledge of India to reduce the emission intensity of its GDP by 20-25 per cent by 2020 compared with the 2005 level.

# Malaysia's First Biennial Update Report

Philip,E[1], K.S. Yap[2], E.S. Tan[3] and A.Muhammad Ridzwan[2]

[1]*Forest Research Institute Malaysia (FRIM), 52109 Kepong, Selangor, Malaysia*
[2] *Ministry of Natural Resources and Environment, Malaysia, 62574 Putrajaya, Malaysia*
[3] *UNITEN, Kajang.*

## Abstract

Malaysia submitted her First Biennial Update Report (BUR) to UNFCCC in 2016. The BUR consists of six chapters and two technical annexes. The technical annexes are related to additional information on greenhouse gas inventory and REDD+ Results based payments. The Report covers an update of the National Circumstance, Greenhouse Gas Inventory, mitigation actions and their effects, level of support, constraints, gaps & needs and other information addressing climate change.

Information provided includes anthropogenic emissions and removals of greenhouse gases for the 2011 with a time series from 1990-2010. Policies relating to emissions reduction and their effects are reported. Gaps still exist in policies where quantified emission reduction may not be direct output.

One of the challenges faced in producing the BUR is the understanding the vague UNFCCC decisions. Malaysia spent a fair bit of time on presenting the report in a transparent manner. In addition, operationalizing the MRV system fully was another challenge because national capacity was also being built.

Malaysia is currently undergoing the International Consultative Analysis process. Institutionalizing the activities proved to be sustainable as experts are available to provide addition clarification when sought by the Team of Technical Experts (TTE). This has also enabled Malaysia to have meaningful interaction with the TTE.

# Biennial Update Report: *Indonesia experience*

Budiharto, S.Si., M.Si.
*Directorate of GHG Inventory and MRV, Directorate General of Climate Change, Ministry of Environment and Forestry, Indonesia*

## Abstract

Indonesia First Biennial Update Report (BUR) to the UNFCCC contains the national inventory of anthropogenic emissions by sources and removal by sinks of all greenhouse gases (GHGs) not controlled by the Montreal Protocol, including a national inventory report, as well as information on mitigation actions and their effects, as well as the associated methodologies and assumptions.

Indonesia became a party to the United Nation Framework Convention on Climate Change (UNFCCC) in Rio in 1992, which was ratified in 1994 through Law no. 6/1994 and requires submission of National Communication and Biennial Update Report (BUR). Indonesia has submitted the first National Communication on October 27th, 1999 and the Second National Communication (SNC) has been submitted on November 1st, 2010. Meanwhile, The First Biennial Updated Report (BUR-1) has been submitted on December 2015.

The scope of activities to develop Indonesia First BUR are National GHG inventory for 2000-2012; GHG mitigation policies and measures to address climate change; Description of national circumstances and other relevant information; and Publication and dissemination of the Biennial Update Report (BUR).

The National Greenhouse Gases Inventory was estimated using Tier 1 and Tier 2 of the 2006 IPCC Reporting Guidelines and the IPCC GPG for LULUCF. The local emission factors have been used for Agriculture, LUCF, and waste, while energy and IPPU still using IPCC default. Period of Analysis is the year 2000-2012 (2000-2005 Recalculation from SNC).

National GHG inventory 2012 is contributed of main sector LUCF and Peat Fire (47,8%) followed by Energy (34,9%), Agriculture (7,8%), Waste (6,7%), and IPPU (2,8%). Without LUCF, contributed Energy sector was 66,9% by total emission, and followed by Agriculture (14,9%), Waste (12,8%) and IPPU (5,4%).

The GHG emissions from energy, agriculture and waste, increased at the annual rates of 4.6%, 1.3% and 4.0% respectively, while those from industry sector was relatively less than 1%. Without LUCF, the annual emissions over the period of 2000-2012 increased consistently with a rate of about 3.6% per year. With LUCF, the annual emissions fluctuated considerably due to high inter-annual variability of emissions from LUCF sector.

Based on Presidential Regulation No. 61 year 2011, Indonesia has targeted the emission reduction at level up to 26% in 2020 and further up to 41% by international support. Total emission reduction that has been achieve in 2010-2012 was 41.29 MtCO2-e or 13,76 Mt CO2-e annually and there were other 27 mitigation actions in which 4 activities were supported by NAMA and 23 were non-Presidential Regulation. The resulted emissions reduction over that period was reported to be about 5.09 Mt CO2-e or about 1.70 Mt CO2-e annually. Most of the reported emissions reduction achievement subject to verified.

# Thailand's First Biennial Update Report

Jarunee Nugranad
*Office of Natural Resources and Environmental Policy and Planning, Thailand*

## Abstract

Thailand is fully committed since 1992 to cooperating and contribution to international efforts to address climate change issues, as a non-Annex I country, under the United Nations Framework Convention on Climate Change (UNFCCC). Thailand's initial national communication (INC), submitted in 2000, and the second national communication (SNC), submitted in 2011, provide an overview of national circumstances that influence Thailand's capacity to respond, describe Thailand's greenhouse gas (GHG) inventory and mitigation options, and compile other important information such as vulnerability and adaptation, research and development, financial resources, technology transfer and public awareness. Thailand's first biennial update report (BUR1), submitted in December 2015, states Thailand's progress of the nationally appropriate mitigation actions (NAMA) implementation until 2013. The report includes four sections: (i) national circumstances, (ii) national greenhouse gas inventory for 2011, (iii) mitigation measures, and (iv) constraints and gap, related financial, technical, and capacity needs. Overall, Thailand's NC & BUR reports have demonstrated its GHG emissions and removals situations, raising an awareness of the people of the nation in climate change, through the Climate Change Master Plan 2015-2050, the Nationally Appropriate Mitigation Actions (NAMA) toward 2020, and the Intended Nationally Determined Contributions (INDCs) by 2030.

*Keywords:* Thailand, climate change, biennial update report, UNFCCC, greenhouse gas

## 3.3 Session II

# UNFCCC Support to Strengthening Transparency in Reporting National GHG Inventories by non-Annex I Parties

Dominique Revet
*UNFCCC Secretariat*

## Abstract

At the forty-second session of the Subsidiary Body for Implementation (SBI)[1], Parties gave the UNFCCC Secretariat a mandate to make every effort to ensure that training is made available to all non-Annex I Parties in the use of the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas (GHG) Inventories, and in building sustainable national GHG inventory management systems.

Following that request, the UNFCCC Secretariat and the IPCC Secretariat concluded a memorandum of understanding with the aim to provide a framework for, and enhance collaboration in responding to the mandate by SBI 42.

**In 2016**, the UNFCCC will have organised 3 regional *Workshops on the Building of Sustainable National Greenhouse Gas Inventory Management Systems, and the Use of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories* in collaboration with the Technical Support Unit of the IPCC Task Force on National GHG Inventories and the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention (CGE).

The workshops consist of **five** sessions. The **first** session is for sharing of country experiences. The **second** session focuses on the key role of the national GHG inventory management system, including presentations and hands on materials to support the development of a national GHG inventory management system. For this, the Secretariat adapted training materials developed by the US EPA, including the National GHG Inventory System Template Workbook[2]. Sessions **three through five** provide training on the 2006 IPCC Guidelines, including general guidance, reporting, and sectoral guidance. Participants also learn how to utilize the IPCC inventory software for compiling various components of a national GHG inventory.

**The UNFCCC Secretariat has designed a programme and is currently raising funds** to support the implementation of regional workshops on the building of sustainable national GHG inventory management systems, and the use of the 2006 IPCC guidelines for national GHG inventories on an annual basis **from 2016 to 2021**, as well as the on-line training and certification of national experts on the use of the 2006 IPCC guidelines.

[1] FCCC/SBI/2015/10, paragraph 29.
[2] https://www3.epa.gov/climatechange/EPAactivities/internationalpartnerships/capacity-building.html

# Cambodia's Institutional Arrangement to prepare GHG inventory

Uy Kamal
*Deputy Director, Department of Climate Change,*
*General Secretariat of National Council for Sustainable Development, Cambodia*

## Abstract

In this presentation, the newly institutional arrangement to deal with climate change and sustainable development is summarized. The Department of Climate Change (DCC) is under General Secretariat of National Council for Sustainable Development, a new establishment to promote sustainable development, ensuring economic, environmental, social and cultural balance within the Kingdom of Cambodia. The new national greenhouse gas inventory team was established, and the technical capacity building was provided through cooperation activities with local and international development partners i.e. USAID, FAO and JICA through National REDD+ Programme, and WGIA. Knowledge on IA, MDD, KCA, Archiving system, QA/QC, and the improvement plan is a pre-requisite for the team to ensure quality and perfectness of future national and sectoral GHG inventory reports, as well as BUR, TNC, and NDC.

## References

Royal Decree (2015): Royal Decree NorSor/ RorKorTor/ 0515/ 403 on the Establishment of the National Council for Sustainable Development, dated on 09 May 2015
Sub Decree (2015): Sub Decree No. 55 OrNorKro BorKor on Organization and Functioning of the Ministry of Environment, dated on 04 May 2015

# Overview of GHGs Emission Inventory and Its Institutional Arrangement in Iran

Mohammad Sadegh Ahadi
*Project Assistant for Third National Communication to UNFCCC,*
*Department of Environment, National Climate Change office,*
*Islamic Republic of Iran*

## Abstract

The purpose of this presentation is over viewing of institutional arrangement for preparation of National GHGs emission inventory in Iran and identifying its gaps, constraints and bottleneck, and proposing our findings for overcoming the bottle neck in preparation of emission inventory. Then trough the exchange of views with other participants, we find best practice for overcoming the barriers.

Lack of accurate data and information and also lack of country specific emission factors are the common problems in compiling GHGs emission inventory in developing countries. Also lack of professional experts is another problem in preparation of emission inventory. So it is recommended that a regional center for training and capacity building on GHGs emission inventory is established with cooperation of international and local organizations in region.

In Iran energy and industrial process sector are responsible for more than 90% of total GHGs emission. The easy access to data especially in energy sector is possible. The Ministries of Energy (Power) and Petroleum are publishing National Energy and Hydrocarbon Balance in yearly basis. The yearbooks are including energy consumptions by fuels, sectors and also GHGs emission from fuel combustion. The major problem in estimation of the GHGs emission inventory in energy sector is huge uncertainty in emission factor for Venting, Flaring and Fugitive emissions from oil and gas industries. So development of local emission factors is important.

In Agriculture, forestry and land-use change there are huge uncertainty in activity data, although the government starts some activity for reducing the uncertainty on activity data for land use change through satellite based data collection.

Finally share of experience, exchange of views and regional cooperation have an important role in improvement of the quality of GHGs emission inventory reporting in region, so we request that NIES establish a regional experts network and Frequent Answer and Questions (FAQ) system for inventory.

## References

- Iran's National Communications (INC, SNC and TNC) to UNFCCC
- National Rules of Procedures for Implementation of UNFCCC/KP in Iran

## Access to relevant information

Please see the National Climate Change Office website (www.climate-change.ir)

# National Carbon Accounting Using Remote Sensing Data

Shanti Reddy
*Department of the Environment, Australia*

## Abstract

Estimating greenhouse gas emissions and removals from the land sector is potentially a critical component of national inventory reporting by countries under the United Nations Framework Convention on Climate Change (UNFCCC).

Remote sensing data from orbiting satellites is now routinely available and can be very useful for obtaining consistent high quality and cost effective country-specific information on land use and land cover changes, which can be essential for national inventory reporting.

The Australian government has pioneered the application of time series Landsat satellite data for national inventory reporting purposes. As part of its national inventory system, Australia has developed an operational satellite based forests and woody vegetation monitoring system using the time series data from 1972 to the present day.

A detailed description of the use of satellite data for modelling greenhouse gas emissions and removals from Australia's Land use, Land Use Change and Forestry (LULUCF) sector will be discussed in this presentation.

The presentation will also address how the Australian Government is able to fulfil its international reporting commitments to the UNFCCC by applying latest technology, innovative computations and modelling techniques.

Australian experience demonstrates the many advantages of using remotely sensed data including increased transparency and confidence in the national greenhouse gas accounts. Our accounts have been subject to annual external reviews for the last ten years by technical experts under the UNFCCC review process.

The outputs from the national inventory system are published online to support domestic climate change programs such as the Australian Government's Emissions Reduction Fund (ERF) which supports project-level land sector abatement.

## 3.4 Session III

## Introduction of International Consultation and Analysis (ICA) Process

Kiyoto Tanabe
*Co-chair, Task Force on National Greenhouse Gas Inventories,*
*Intergovernmental Panel on Climate Change (IPCC TFI);*
*Member of UNFCCC Consultative Group of Experts on National Communications from Parties not Included in Annex I to the Convention (CGE)*

## Abstract

International consultation and analysis (ICA) of biennial update reports (BURs) is an important process aiming to increase the transparency of mitigation actions and their effects by the Parties not included in Annex I to the UNFCCC (non-Annex I Parties). It should be conducted in a manner that is nonintrusive, non-punitive and respectful of national sovereignty, through technical analysis by teams of technical experts (TTEs) in consultation with the Party concerned and through a facilitative sharing of views.

This presentation explains the basics of ICA process, and gives some pieces of advice from a viewpoint of technical expert to the WGIA participants.

- It is important to clarify in the BUR what have been updated and what will be updated in the next submission. In particular, the information on what need to be improved is important for identification of capacity building needs and for continuous improvement.
- It is important to be well prepared for questions and answers before and during the week of technical analysis as well as facilitative sharing of views.
- Non-Annex I Parties should take advantage of technical analysis and facilitative sharing of views, as they are good opportunities to find ways to improve their national GHG inventories. Good communication with the TTE and other parties is crucial to identification of capacity building needs, which will enable continuous and efficient improvement of national GHG inventory.

## References

Decision 17/CP.8 “Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention”
Decision 2/CP.17 “Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention”

## Access to relevant information

http://unfccc.int/national_reports/non-annex_i_parties/ica/items/8621.php

# Experience on International Consultation and Analysis

Zhu Songli
*Energy Research Institute, National Development and Reform Commission*

## Abstract

According to the decision 2/CP.17 of UNFCCC, non-annex I parties shall submit a biennial update report (BUR) every two years and subject to international consultation and analysis (ICA). The ICA process consist of two steps: a technical analysis (TA) of the BURs and a facilitative sharing of views (FSV) which will have as input the BURs and summary report produced after TA. By the end of June, 2016, the first and complete round of ICA has been completed by participation of 13 non-annex I parties.

In this presentation, the author, as one of co-leads of the team of technical experts (TTE) carrying out the first round of TA in May 2015, shared the experiences on feedbacks on the process and how parties could better prepare for the process. In particular, analysis on GHG inventory is taken as an example to show how TTE would analyze the chapter. In additional, as an observer completely joining the first FSV in May 2016, the author also shares the feeling on the workshop by summarizing the frequently asked questions raised by other parties in the fields of institutional arrangements, GHG inventory developments and mitigation action.

In general, in TA process, TTE will focus on completeness and transparency of BURs, that is if the party has provided information completely as per requirements of reporting guides, and if this information is reported in the way that TTE could understand and get the picture. The summary report would focus on capacity building need identification, which will contribute to the further improvements of following BURs. The FSV is also very friendly and most questions goes to challenges faced by and experiences accumulated for the first submission of BURs and its regular submission in future.

ICA is still a process in learning by doing. Active participation from all developing country parties are crucial to make the process being perfect and to improve capacity of parties involved.

# Experience of Viet Nam during ICA process for reviewing of the first BUR

Nguyen Phuong Nam
*Center for Technology Responding to Climate Change, Ministry of Natural Resources and Environment, Viet Nam*

## Abstract

Viet Nam has supported actively to Paris Climate Agreement in 2015 during the Twenty first Conference of Parties (COP21) on December 2015. Even Viet Nam is a non-Annex I Party who does not have to report annually the GHG Inventory Report to United Nations Framework Convention on Climate Change (UNFCCC), the country still contributes a lot of efforts not only to transparency of mitigation actions recognised in Viet Nam's Intended Nationally Determined Contribution (INDC), but also to the Transparent Framework after COP21. The first Biennial Updated Report (BUR1) of Viet Nam was submitted timely to UNFCCC in the December 9$^{th}$, 2014. That submission has been reviewed by international consultation and analysis (ICA) process in the 4$^{th}$ November 2015 according to the decision of UNFCCC that Parties decided to conduct ICA of BURs from non-Annex I Parties at COP 16 in 2010. Even though, a technical analysis (TA) of BURs by a team of technical experts (TTE) and a facilitative sharing of views (FSV) was implemented completely on time at the first time in Viet Nam, some challenges were found. It seems to be a lack of a domestic national measurement, reporting and verification (MRV) system in Viet Nam and the capacity limits of domestic coordination among institutions and local GHG inventory experts for the ICA process. Moreover, the time constrain and missing of historical data were found by technical reviewing. Consequently, a recommendation for improvement from a party as Viet Nam may be an institutional set up of domestic ICA team who can brings the international MRV matching to the domestic MRV as well as the BUR preparation. Timely and sustainable financial support for the reviewing should be concerned besides the needs of capacity building and technical awareness for domestic staffs.

## References

1. http://unfccc.int/national_reports/non-annex_i_parties/ica/items/8621.php
2. First biennial update report of Viet Nam. Available at http://unfccc.int/8722.php
3. Second national communication of Viet Nam. Available at http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php
4. Summary report on the technical analysis of the first biennial update report of Viet Nam submitted on 8 December 2014 Viet Nam. Available at http://unfccc.int/resource/docs/2015/tasr/vnm.pdf

## Access to relevant information

Facilitative sharing of views. Available at http://unfccc6.meta-fusion.com/bonn_may_2016/events/2016-05-21-09-05/viet-nam

# Sharing the Experience of the first BUR and ICA in the Republic of Korea

Hyung-Wook Choi, Ph.D
*Greenhouse gas Inventory and Research Center, Republic of Korea*

## Abstract

The Republic of Korea has submitted the first Biennial Update Report (BUR) to UNFCCC on 29 December, 2014 as a non-annex I Party in accordance with the decision of the 17th Conference of the Parties in Durban. The first BUR of the Republic of Korea was prepared by Greenhouse Gas Inventory and Research Center (GIR) and the relevant ministries. The first BUR contains four chapters: (1) National Circumstances, (2) National Greenhouse Gas Inventory, (3) Mitigation Actions and Effects, and (4) Need of Finance, Technology, and Capacity Building and Assistance Status. National GHG inventory between 1990 and 2012 was estimated based on 1996 IPCC GL (energy, industrial process, agriculture and waste sector), GPG 2000 and GPG-LULUCF (LULUCF sector) for carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrochlorofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride ($SF_6$).

The technical analysis of the Republic of Korea's the first BUR which is the first step of international consultation and analysis (ICA) took place from 18 to 22 May 2015 in Bonn, Germany, and was undertaken by the following a team of technical experts (TTE) drawn from the UNFCCC roster of experts. During the technical analysis, the Republic of Korea received approximately 10 of questions regarding the institutional arrangements and emission trends. Following the technical analysis of the BUR, the TTE prepared and shared a draft summary report with the Republic of Korea on 7 August 2015 for its review. The Republic of Korea, in turn, provided its feedback on the draft summary report on 30 October 2015.

Facilitative Sharing of Views (FSV) which is second step of ICA was conducted on 20 May 2016 in Bonn, Germany. The Republic of Korea gave a short presentation regarding national circumstance, GHG inventory, and our effort of GHG mitigation and received 5 questions, such as Korean ETS, mitigation target, international training program, and GHG inventory, from various parties. ICA was helpful to understand international measurement, reporting, and verification (MRV) process. The Republic of Korea will prepare the 2nd BUR and 4th National Communication (NC) after due consideration of the suggestion from ICA.

## References

- Decision 17/CP.8 "Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention"
- First Biennial Update Report of the Republic of Korea to UNFCCC
- Summary report on the technical analysis of the first biennial update report of the Republic of Korea submitted on 29 December 2014 (FCCC/SBI/ICA/205/TASR.1/KOR

## Access to relevant information

http://www.gir.go.kr/eng/

## 3.5 Session IV

### Terrestrial Monitoring and GHG Inventories

Nobuko Saigusa
*Center for Global Environmental Research, National Institute for Environmental Studies*

**Abstract**

There is an increase in number of observational platforms, such as satellites, aircrafts, ships, and ground stations, for monitoring atmospheric greenhouse gases (GHGs) and air pollutions. National or regional inventories of emissions have also been prepared at greater resolution in space and time. However, due to uncertainties in modeling tools, and limited observational data coverage, high uncertainty still remains in global or regional sources/sinks estimations.

The Center for Global Environmental Research, National Institute for Environmental Studies has been developing an integrated carbon observation and analysis systems based on satellite, airborne and ground-based observations, and atmospheric and terrestrial carbon cycle models. Atmospheric observations are strengthened based on the Greenhouse Gases Observing Satellite (GOSAT) and Comprehensive Observation Network for TRace gases by AIrLiner (CONTRAIL) projects. Transport modeling, inverse modeling, and assimilation methods are being developed and improved for better utilization of observational data from the Asia-Pacific region. Global and regional surface fluxes are estimated and constrained by both "top-down" approach using inverse models and "bottom-up" approach using surface flux observation network data (e.g. AsiaFlux) and upscaling with terrestrial ecosystem models.

Current progress will be presented in better constraints of global, continental, and regional carbon budgets, and detection of carbon cycle change particularly in the Asia-Pacific. Discussions are included how to solve the following questions in the next steps.

1) How can the current capabilities of top-down and bottom-up approaches contribute to reduce uncertainties in the estimates of large anthropogenic emissions? (e.g. fuel use, land use changes, and rapid urbanization)
2) What are the key target regions or events in the Asia-Pacific that we need to focus on? (e.g. El Niño-induced droughts, extreme forest fires in Southeast Asia, and peat degradations in tropical and boreal regions)
3) How should the current capabilities of observation, modeling and analysis systems be integrated into an operational system for long-term monitoring of changes in regional, continental, and global GHGs budgets?
4) How can we provide scientific knowledge and data timely for evaluating mitigation and adaptation policies?

# FAO in support of MRV in Agriculture

Martial Bernoux and Mirella Salvatore
*Mitigating Agriculture GHG Emissions towards Wider Opportunities (MAGHG-2) Project*
*Mitigation of Climate Change in Agriculture (MICCA) Programme*
*Climate and Environment Division*
*Food and Agriculture Organization of the United Nations*

## Abstract

On December 2015 in Paris, the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) concluded negotiations on a landmark agreement (the Paris Agreement, PA) to limit global average temperatures to below 2°C and pursue efforts to limit warming to 1.5°C. Implementation of the PA will rely on countries to meet their own 'contributions' to tackle the drivers and impacts of climate change, as articulated through Nationally Determined Contributions (NDCs). The majority of Parties developed and submitted Intended Nationally Determined Contributions (INDCs) in the lead up to COP21 to facilitate negotiations. Countries are not legally bound under the agreement to meet their NDC contributions. However, the Agreement does establish binding procedural requirements under an *Enhanced Transparency Framework* (ETF) to promote transparency and accountability on the steps countries are taking toward these goals. This transparency is vital for building international trust and confidence that action is taking place as well as for assessing how to facilitate further action.

The ETF will be an important new feature of global action on climate change with a number of potential country-level implications; particularly for the agriculture and land-use sectors. The PA also unquestionably delivers a strong, enhanced transparency and accountability framework through the following provisions:

- Universal and harmonized reporting and verification requirements
  - *All countries are required to regularly submit national greenhouse gas emission inventories;*
  - *For all Parties, the information they submit will be subject to a technical expert review and a multilateral, facilitative consideration of progress.*
- A commitment to enhance transparency over time, while taking account of countries' differing capacities
  - *Capacity building will enable developing countries to establish effective transparency systems.*
- Legally binding rules and processes holding all countries accountable

To date systems for measuring and monitoring progress in the agriculture and land use sectors are considered under-developed relative to other sectors such as energy and transport. For many developing countries, capacity constraints create barriers to reporting progress on such commitments, hence the need for support to capacity development activities to address the new requirements of the ETF. Countries need to enhance their capacity to prepare for implementation and monitoring of NDC under the PA by identifying core technical and institutional capacity gaps and needs for being compliant with an appropriate measurement, reporting and verification (MRV) framework in the agriculture and land use sectors.

Since 2010 FAO has been actively providing dedicated support at regional, sub-regional, and national level. These activities include: facilitating national processes for institutional arrangements; providing guidance on national statistical processes for advancing data collection; giving technical assistance for developing a tier-1 National GHG Inventory; performing quality assurance processes; and supporting the process for the formulation, implementation and monitoring of INDCs and NAMAs. While implementing these activities, FAO promotes synergies and complementarity with relevant

international agencies and initiatives, including UNFCCC, UN-REDD Programme, IPCC and UNDP. FAO has generated guidance and tools that can support countries in improving their inventories.

## Access to relevant information

*Mitigation of Climate Change in Agriculture* (MICCA) Programme website: http://www.fao.org/in-action/micca/en/
*FAOSTAT Emissions database*: http://faostat3.fao.org/browse/G1/*/E
*AFOLU Emissions Analysis Tools:* http://www.fao.org/in-action/micca/resources/tools/ghg/en/
*Climate-Smart Agriculture*: http://www.fao.org/climatechange/micca/ghg/en/
*On the Road to Enhanced Transparency for Nationally Determined Contributions (NDC) Implementation:* http://faounfcccagworkshop.wix.com/etfforndcworkshop

# Current state of Joint Crediting Mechanism development in Mongolia

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## Abstract

In accordance to the climate change mitigation and greenhouse gas reduction, Governments of Japan and Mongolia has been collaborating and implementing capacity building activities between 2011-2013 in order to establish Bilateral Offset Crediting Mechanism (BOCM). Based on the previous cooperation and efforts, on January 8, 2013, Japan and Mongolia signed the bilateral document of the Joint Crediting Mechanism (JCM) in Ulaanbaatar, Mongolia. Mongolia was the first country to sign the bilateral document with Japan Government. Since Japan and Mongolia signed bilateral documents on the "Low carbon development partnership", the number of partner countries has increased to 16 as of July 2016. For Mongolia, the implementation of JCM would assist in achievement of the NAPCC strategic objective 3: "Mitigate GHG emissions and establish a low carbon economy through the introduction of environmentally friendly technologies and improvement in energy effectiveness and efficiency". Also, JCM will promote the actions listed in Mongolian NAMA submitted to UNFCCC secretariat in January, 2010 according to the Copenhagen Accord. To implement JCM, both sides established a Joint Committee (JC) which consists of representatives from the two sides. The JC may develop or modify the Rules of Implementation and other rules and guidelines and designates the third-party entities to verify GHG mitigation amounts received under JCM activities. Ministry of Environment, Green Development and Tourism of Mongolia established Joint Crediting Mechanism secretariat under the Climate Change Coordination Office by 2013. Due to the Government structural change in 2015, JCM secretariat was re-established at Climate Change Project Implementation Unit of Nature Conservation Fund of Mongolia under the MEGDT. Between 2013- 2016, in total of 11 study projects were conducted and 2 methodologies were approved by the JC. 2 projects were officially registered under the JCM and Mongolia's very own local Third Party Entity was established successfully. Currently the registered projects are now aiming for the credit issuance. In its INDC, Mongolia has outlined a series of policies and measures that the country commits to implement up to 2030, in the energy, industry, agriculture and waste sectors. The expected mitigation impact of these policies and measures will be a 14% reduction in total national GHG emissions excluding Land use, land use change and forestry (LULUCF) by 2030, compared to the projected emissions under a business as usual scenario. According to the INDC submission of Mongolia, JCM could be one of the suitable contribution to achieve our country's expectation to reduce GHG emission as an internationally agreed mechanisms and instruments under the auspices of the UNFCCC.

## References

Government of Mongolia

## Access to relevant information

www.jcm.go.jp, www.jcm-mongolia.com
Intended Nationally Determined Contribution (INDC) Submission by Mongolia

# IPCC TFI: Recent Activities

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## Abstract

The IPCC Task Force on National Greenhouse Gas Inventories (TFI) initiated a technical assessment of IPCC Inventory Guidelines in 2015 through a combination of on-line questionnaire survey and expert meetings. The technical assessment revealed that there has been abundant new scientific and empirical knowledge published since 2006 which the IPCC should take into account.

43rd Session of the IPCC (IPCC-43) held in Nairobi, Kenya on 11-13 April 2016 approved the TFI's proposal on "Refinement of 2006 IPCC Guidelines for National Greenhouse Gas Inventories, including production of a Methodology Report(s)". The TFI is planning to hold a scoping meeting in August 2016 for the preparation of the Methodology Report(s). Draft terms of reference, draft table of contents and draft work plan prepared at this meeting will be submitted for consideration and approval at IPCC-44 in October 2016.

The activities to maintain and improve the IPCC Emission Factor Database (EFDB) and IPCC Inventory Software have been progressing. New data have been added to the EFDB (about 360 data were accepted in 2015 for inclusion into the database) and work to incorporate Tier 2 methods in the software is underway.

The IPCC TFI is continuing its other activities supporting users of the IPCC Guidelines and contributing to inventory-related capacity building programmes providing technical expertise as well as inventory-related materials developed by the TFI (e.g. UNFCCC regional hands-on training workshops held in March and June 2016 in Africa and Latin America and Caribbean regions).

## Access to relevant information

http://www.ipcc-nggip.iges.or.jp/

# Global Support Programme (GSP)

# Technical Support to Non-Annex 1 countries in their climate change reporting obligations

Stanford Mwakasonda
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*United Nations Environment Programme (UNEP), Nairobi, Kenya*

## Abstract

The Global Support Programme (GSP) was officially launched on the 8th of December 2015, at COP 21 in Paris, France. It is jointly implemented by UNEP and UNDP. The programme was initiated with the objective of providing support to non-Annex I Parties in their preparations of National Communications (NCs) and Biennial Update Reports (BURs), Intended National Determined Contributions (INDCs), including components of the reports such as national institutions, national greenhouse gas inventories, mitigation analysis, vulnerability and adaptation assessment, etc. It is critical for these reports, submitted to the UNFCCC, to have the highest possible quality levels (accuracy, transparency, comparability, consistency, completeness) and be submitted in a timely manner to facilitate monitoring ad tracking of the global effort to reduce the concentration of greenhouse gases in the atmosphere, in accordance with articles of the Convention. To this end, GSP provides technical support to all countries that approach the GSP team, and complements the work of other supporting bodies such as the Consultative Group of Experts (CGE) on National Communications from Parties not included in Annex I to the Convention. GSP conducts surveys and discussion with national climate change focal points and coordinators to determine capacity needs for developing countries. This presentation will highlight the outcomes of one of such surveys.

## References

None

## Access to relevant information

Website being constructed

## 3.6 Poster Session

# What's your difficulty in developing Greenhouse Gas Inventory Measurement and Management? KEEI can help you solve the difficulty!

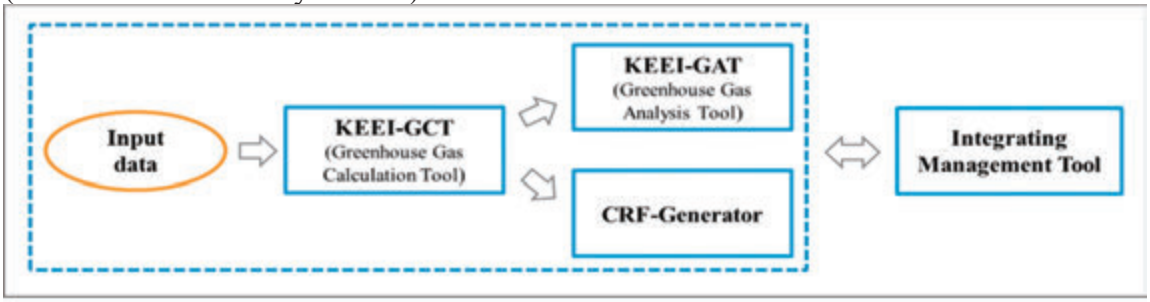
## - KEEI National Greenhouse Gas Inventory Measurement-Management System -

Sung-Kyun Kim, Gil-Whan Kim, Ji-Hyeon Kim
*Korea Energy Economics Institute, Korea*

**Abstract**

Korea Energy Economics Institute (KEEI) has put continuously effort into developing National Greenhouse Gas Inventory Measurement-Management System since 2011, to present a more accurate and transparent Greenhouse Gas statistics.

KEEI's Greenhouse Gas Inventory Measurement - Management System is the fruit of KEEI's effort, which is composed of three software, GCT (Greenhouse Gas Calculation Tool), GAT (Greenhouse Gas Analysis Tool) and CRF -Generator.




KEEI National Greenhouse Gas Inventory Measurement-Management System

KEEI is going to introduce and demonstrate CRF-Generator for the first time in WGIA14. The purpose of CRF-Generator is to enhance efficiency of making CRF documents and to pursue more precise results by preventing human-error in advance.

Under the previous system, hands-on worker had to repeat tracking and modifying formula in input data files. Even small revisions of calculation method made users to open all files which are related.

With CRF-Generator, just simple task is needed to make CRF files and to review the process and error. Moreover, users don't ever have to open and modify all data to apply revised calculation method. Function key "formula changing" allows users to pick years whatever users want and to change formula, coefficient and notation key easily.

KEEI convince that CRF-Generator would be helpful to offer fine quality Greenhouse emission statistics and integrated management control to related organizations.

# National GHG Inventory System in the Republic of Korea

Nari Youn
*Greenhouse gas Inventory and Research Center, Republic of Korea*

## Abstract

In 2013, the total population of South Korea was estimated at approximately 50,220 thousand, about 0.7% of the world's total population. This ranked South Korea as the 25th most populous country in the world. The nominal gross domestic product (GDP) of South Korea showed a consistent increase since 1990, rising by an average annual rate of 207.6%. Energy consumption, vehicle registration, and waste generation surged as well.

The National GHG Inventory details national GHG emissions in energy, industrial processes, agriculture, LULUCF (land use, land-use change and forestry), and waste sectors in accordance with the Intergovernmental Panel on Climate Change's Guidelines (IPCC GL) from 1990 to 2013.

To enhance the transparency and accuracy of the national GHG inventory, South Korea keeps the measurement and verification processes separate while preparing the national GHG inventory. In the measurement process, relevant ministries review and submit inventory documents prepared by sectoral agencies to Greenhouse Gas Inventory and Research Center (GIR). In the verification process, GIR reviews inventories from each sector and requests additional data and revisions if necessary before producing a verification report and the draft national inventory. After technical assessments and deliberations by the Technical Group and the Working Group, the Management Committee reviews and approves the final draft of the national GHG inventory.

The GHG emissions in South Korea in 2013 were 694.5 million tons of $CO_{2eq.}$ (Excluding LULUCF). This represented a 137.6% increase from 292.3 million tons of $CO_{2eq.}$ in 1990 and a 1.5% increase from 684.3 million tons of $CO_{2eq.}$ in 2012. GHG Emission trends from 1990 to 1997 showed an annual increase of over 5% per year. Emissions in 1998 declined significantly due to the East Asian economic crisis by grew again thereafter as the regional economy stabilized and experienced renewed growth. The share of each sector in the total GHG emissions in 2013 is 87.3% for the energy sector, 7.6% for the industrial processes sector, 3.0% for the agriculture sector, and 2.2% for the waste sector, respectively. Looking into the emissions pathway by year, GHG emissions in South Korea were expected to reach their peak during 2013 to 2014 and begin to decline, resulting in the decoupling of GHG emissions from economic growth.

## References

First Biennial Update Report of the Republic of Korea to UNFCCC

## Access to relevant information

http://www.gir.go.kr/eng/

# Sustainable Development & Climate Change:
# Toward Enhancing the Role of Capacity Development for Implementation of INDCs in the ASEAN Countries

Jakkanit Kananurak, Nareerat Thanakasem
*Climate Change International Technical and Training Center, TGO, Thailand*

Bundit Limmeechokchai
*Sirindhorn International Institute of Technology, Thammasat University, Thailand*

## Abstract

The Climate Change International Technical and Training Centre or CITC was established by Thailand Greenhouse Gas Management Organization (TGO), Ministry of Natural Resources and Environment (MONRE). This flagship project officially launched on in 2014 by MONRE and supported by Japan International Cooperation Agency (JICA). The vision of CITC is to become a leading climate change training centre in ASEAN so that CITC set the mission in three areas which are i) providing capacity development on climate change mitigation and adaptation, ii) promoting climate change networking platform and iii) promoting knowledge dissemination on climate change mitigation and adaptation. Currently CITC has achieved the progress of curriculum development and training for ASEAN countries in i) Greenhouse Gas Inventory (GHGI), ii) Climate Change Management for Sustainable Development (CCSD), iii) Mitigation Mechanisms (MM) and iv) Climate Change Economics (CCE). There are several stakeholders supporting CITC including members in ASEAN countries, academic/research institutes, and public and private sectors.

The current linkage of CITC is related from global, regional to national policies. CITC also involves with sustainable development goals of United Nations and climate resilience of United Nations Framework Convention on Climate Change (UNFCCC) in meeting the 2 degree target thru INDCs. The target group of CITC is the ASEAN region. Therefore, the ASEAN Community roadmap during 2009-2015 has been involved in the national level. Moreover, in the 11th National Economic and Social Development Plan of Thailand, CITC has collaborated with MONRE on national action plan in the climate change master plan of Thailand to achieve the low carbon society in 2050.

# Low Carbon Society and Mitigation Measures

Myint Soe
*Environmental Expert, SNC Myanmar*

## Abstract

Myanmar would undertake mitigation actions in line with its sustainable development needs as its contribution to global action to reduce future emissions of greenhouse gases.

The actions presented below will result in reductions in greenhouse gas (GHG) emissions. The implementation of these actions will be contingent to a number of factors. This includes support for capacity-building, technology development and transfer, and financial resources from the international community, as well as the active participation of the national and international private sector

Department of Rural Development under Ministry of Agriculture, Livestock and Irrigation has received co-funding from a number of international development partners to develop mitigation actions in this sub-sector (such as the drafting of the Comprehensive Village Development Plan). As a final result of the overall action, 6 million people in rural areas will have access to electricity generated by a variety of sources, 40% of which will be sourced from renewable energy such as of mini-hydro, solar home system and solar mini-grid technologies.

# GHG Measurement and Data Analysis in Mongolia

Oyunchimeg Dugerjav
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*Information and Research Institute of Meteorology, Hydrology and Environment*

## Abstract

Mongolia is located in central Asia and harsh climate. Ecosystem has changed rapidly under climate change and human activities. We have some international studies are going on in the south east region of Mongolia for air quality. The east-southern region is arid and semi-arid desert of Mongolia which is freedom of anthropogenic influence.

Since 2005 to 2014, Scientific expedition of Buryat science centre /BSC/ of Russian academy science /RAS/ and Institute of Meteorology and Hydrology of Mongolia has worked in the Mongolian arid and semi-arid region desert /Sainshand/ We have measured surface ozone, NO2, CO2, aerosol optical depth and meteorological parameters. Since 1992 NOAA is started GHG sampling with Institute of Meteorology and Hydrology / under NAMHEM/ of Mongolia. The sampling point /UUM/ is located south desert of Mongolia. The site has been measured CO2, CH4, SF6, $N_2O$, and CO. The sampling results are shown CO2 is increasing by 39 ppm /11%/ from 1992 to 2012 and SF6 has been increased 70 percent 1997-2009. There is a lot of diurnal and seasonal variation. But CO2 concentration is increasing in every season. [Data from GMD -NOAA]. The some results are shown that several days, very high concentrations of GHG were observed in the region. The numbers of days with high concentration are increasing. It may be indicated polluted air mass transport from industrial region from Russia and China to Mongolia. I have compared non- CO2 greenhouses trends for the sampling sites Mongolia, China and Kazakhstan [data from NOAA].

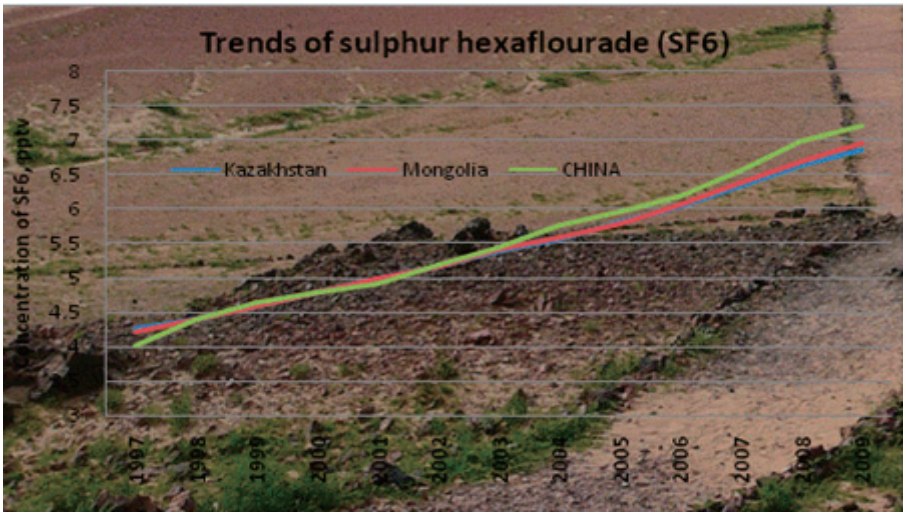


Figure 1. Trends of sulphur hexafluoride at 3 different sites [data from GMD-NOAA]

# Uncertainty Analysis of $CO_2$ Emission from Municipal Solid Waste Incineration Plant

Seungdo Kim and Jeejae Lim
*Department of Environmental Sciences and Biotechnology, Hallym University, Korea*

## Abstract

This paper addresses the uncertainty analysis (UA) results of continuous emission monitoring system (CEMS) of $CO_2$ emission from seven incineration plants of municipal solid waste (MSW) in Korea. Uncertainty analysis methodologies for assessing the $CO_2$ emissions from MSW incineration plants were developed for Tier 1, Tier 3 of the IPCC estimation method as well as CEMS. $CO_2$ emitted from MSW incineration plants can be distinguished into two sources: fossil fuel origin such as waste plastics and biogenic origin. We analyzed fossil fuel origin fraction of $CO_2$ in flue gas by isotope method. The average UA result of Tier 1, Tier 3, and CEMS are 27.8%, 14.5%, and 6.6%, respectively. In view of UA, CEMS is turned out to be the most reliable method to measure the $CO_2$ emission from the MSW incineration plant. However, high installation and operation costs may frustrate the application of the CEMS to estimate $CO_2$ emissions from MSW incineration plants. Instead, Tier 2 or Tier 3 would be recommended to determine $CO_2$ emission from MSW incineration plant. UA result for Tier 2 would be expected to range from 15 to 25% and for Tier 3 to be about 15%.

## References

IPCC (2000), Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories.

Sdkim123!

# Estimation of Methane, Carbon Dioxide and Nitrous Oxide Emissions form Landfill in China

Gao Qingxian
*Chinese Research Academy of Environmental Sciences (CRAES), China*

## Abstract

In this poster, a summary of in-situ study about greenhouse gases emissions from typical landfill in Beijing, Asuwei landfill. Asuwei landfill is the largest sanitary landfill from no-hazardous waste in Beijing and the area is about 684000 $m^2$. The top layer was divided into six cells and temporarily covered with the geomembrane (HDPE) over worked-out landfill. The static chamber technique and Agilent 7890A gas chromatograph was applied in this study. This study continues 5 years.

# Outcomes of research on low Carbon (LC) in CRAES

Gao Qingxian
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## Abstract

In this poster, a brief introduction about low carbon development studies in CRAES, a complex assessment index system was built up, which integrated three concepts in one system, that is low carbon index, environmental protection index and social development index. Based on the assessment index system, the province and city level assessment were carried out. The co-benefit of pollination control and GHGs mitigation in major sector were calculated and analyzed.

# Methodology to develop EF in waste sector in Thailand: A case of MBT

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[2]*Department of Environmental Engineering, Faculty of Engineering, Kasetsart University,*

## Abstract

Mechanical Biological Treatment (MBT) process is well known in European countries. Thailand, a tropical climate country applied MBT to use. Nevertheless, waste composition in Thailand is different from European zone as well as meteorological condition. The tropical climate, which annually high precipitation rate and high humidity are presented. Three MBT techniques were selected in this study. "MBT windrow type", municipal solid waste (MSW) was placed over palate plate in rectangular shape. Palate plate rules to allow ambient air penetrate into waste layer. After 9 months, degraded MSW transfers to separation facility and plastic RDF send to cement company. "MBT Bunker type", MSW was transferred to bunker zone for 10 channels. Each bunker received a one-day waste amount. MSW was mixed by a set of 4 large screws for introducing the aeration. The mixing process enable for aerobic degradable activity. After 7 days, processed waste was transferred to cement company to utilize as RDF. "MBT. thin layer", MSW was spread and compacted with controlling the height of 0.5 – 1.0 m. for one layer of waste with no daily cover. This waste was placed for 8-12 months after that the landfill mining operation was implemented for plastic waste recovery. The characteristics of all waste in these study sites were investigated. The methane emission investigations were conducted in year 2015 by using the static chamber technique.

The preliminary results of this study showed that methane emission from MBT windrow (11.53 $g/m^2/d$) was lower than that from landfill phase (14.45 $g/m^2/d$) about 20.5%. A seven days operation process from MBT Bunker promoted very low methane emission (0.34 $g/m^2/d$). However, this short time process consumed the electricity and fuel which should be considered further. The results from thin layer landfill were varied from 8.25 to 131.37 $g/m^2/d$. However, the results also showed methane emission 12.53 $g/m^2/d$ at day 41 after the waste were placed then this rate increases until day 111 (26.88 $g/m^2/d$). After that, it decreased to 8.25 $g/m^2/d$ at day 286. It indicated that thin layer landfill could accelerate organic carbon degradation process by reducing moisture content in waste (Heyer et al, 2013). The total results indicate that MBT has advantages to reduce greenhouse gas emission and operate with a short period. However, seasoning, electric power and fuel consumption also issues that should be determine.

## References

Montejo, C., Tonini, D., Marquez, M.D.C., Astrup, T.F., 2013. Mechanical-biological treatment: Performance and potentials. An LCA of 8 MBT plants including waste characterization. J. Envron. Manage. 128, 661-673.

# Tier 2 emission factors of $CH_4$ and $N_2O$ from rice rotation systems

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## Abstract

Rice remains an important economic crop in Thailand, which cultivation area covers almost a half of the country's arable land (OAE, 2012). The different crop management practices have shown different effects on greenhouse gas (GHG) emissions. The flooded rice cultivation increases $CH_4$ emissions, while upland crop cultivation with fertilizer application produce $N_2O$ emission. In agricultural sector, accurate and reliable estimation of the emissions are the key for supporting GHG inventory. Tier selection for GHG estimation depend upon the availability of activity data and emission factors. Under Tier 2, country-specific emission factors should be measured and used instead of default factors (IPCC 2006). This study measured $CH_4$ and $N_2O$ emission from different crop-rice rotation systems and proposed country specific emission factors. The four crop-rice rotation systems were made including fallow land-rice (RF), Rice-rice (RR), Corn-rice (RC), and Sweet sorghum-rice (RS). In rice cultivation season, averaged daily $CH_4$ emissions from RF, RR, RC and RS were 1.72, 5.22, 1.88 and 1.64 kg $CH_4$ $ha^{-1}$ $day^{-1}$, respectively. Emission factors for $N_2O$ emissions from N-input were observed from N-fertilizer, incorporated manure and crop residues. It was found that annual amounts of their N-input were different on each crop-rice rotation system.

## References

- OAE, 2012. Agricultural Economics Database (in Thai). Office of Agricultural Economics, Ministry for agricultural and cooperatives.
- IPCC 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan.

# Developing higher tier data for estimation of GHG emissions from fossil fuel power plants in Thailand

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[1] *The joint graduate school of energy and environment (JGSEE), Centre of Excellence on Energy Technology and Environment (CEE), King Mongkut's University of Technology Thonburi (KMUTT)*
[2] *Faculty of Engineering, King Mongkut's University of Technology North Bangkok (KMUTNB),*

## Abstract

Electric power generation in Thailand relies heavily on fossil fuels. Although recently the country succeeds in elevating share of renewable energy, fossil-fuel combustion in power plants still remain the biggest greenhouse gas polluter. It accounts for roughly 30% of total national emission, making '1A1 Energy industries' most significant key source category. However, readily available official data for GHG estimation of this category were compatible only for Tier 1 estimation approach. This study aimed to investigate the possibility of collecting and developing higher tier activity data (AD) and emission factor (EF) for this key source category. The study reviewed existing information from all relevant national authorities, evaluated data gaps, acquired missing data by using questionnaire and interview, calculated, and suggested approaches for developing country-, technology-specific ADs and EFs for fossil fuel power plants. For estimating EFs, information from 16 power plants during 2007 – 2011 were collected and examined. This was equal to 69% of the total fossil-fuel power production. It included 7 combined-cycle power plants, 6 thermal power plants, 2 gas engine power plants, and 1 diesel engine power plant. The results from this study pointed out that detailed information of fuel use were mostly available in official database of Ministry of Energy. In order to access and make use of these data, unprecedented data sharing system between national authorities, particularly of confidential data provided by private power production companies, must be officially established. The study could suggest country-specific $CO_2$ EFs as follows: 61,026 kg/TJ for natural gas-fired combined-cycle power plants; 59,966 kg/TJ for natural gas-fired thermal power plants; 53,357 kg/TJ for natural gas-fired gas engine power plants; 74,290 kg/TJ for diesel-fired gas engine and diesel engine power plants; 78,355 kg/TJ for fuel oil-fired thermal power plants; 89,047 kg/TJ for bituminous-fired thermal power plants; and 94,229 kg/TJ for lignite-fired thermal power plants. Comparing to 2006 IPCC default EFs of different fuel type, values of EFs presented by this study for natural gas, diesel and fuel oils were higher. On the other hand, EFs for bituminous and lignite from this study are lower than default values.
(Acknowledgement: Department of Alternative Energy Development and Efficiency, Ministry of Energy.)

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Department of Alternative Energy Development and Efficiency (DEDE), 2007-2011. Annual Report on Thailand Energy Situation & Annual Report on Electric Power in Thailand. Alternative Energy and Efficiency Information Center, Department of Alternative Energy Development and Efficiency, Ministry of Energy.

IPCC 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan.

# Developing Country Level Emission Factors

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*[2]Forestry Department Peninsular Malaysia.*
*[3]A.Muhammad Ridzwan. Ministry of Natural Resources and Environment, Malaysia*

## Abstract

Malaysia used country specific emission factors for LULUCF. Emission factors and activity data are applied were based the most important land uses/activities. Emission factors for croplands, rubber and oil palm were derived from field measurements and since published. This paper will highlight the methodology applied in constructing country specific emission factors for the forest activity data.

Malaysia has been conducting National Forest Inventory (NFI) since 1972 and since conducted it every ten years once. The National Forest Inventory initially covered only the logged Inland Forest and Peat swamp forest. However, in 2002, the NFI covered Protected Areas and State Land Forest. The Inventory plots were stratified following the forest category and type.

Emission factors were generated from the National Forest Inventory, by calculating the mean increment between 2002 and 2012 NFI data. Changes are then estimated by calculating the difference between the state at time $t + 1$ from the state at time $t$. Three common sampling designs can be used for change estimation with the same sampling units in most cases with exception of a few sampling units can be replaced between occasions. Mortality rate was between 0.9 -1.1%.

Above-ground biomass (AGB) increments cannot be directly measured but estimated by applying allometric relationships relating stem diameter, height and wood density to AGB. The increment was calculated by comparing the growth difference in ABG. The increment was determined for each diameter class and forest stratification between 2002 and 2012 Inventory cycle. For means of comparison, biomass increment was also calculated using the equation presented by Brown (1997).

Biomass density of a strata is estimated using the equation above. Number of trees/ha is obtained from the Forest inventories and the mid-point of biomass class is determined. Biomass of tree at mid-point is determined using the equation above and biomass of all trees is determined by multiplying the number of trees with the biomass of tree at mid-point.

The emission factors derived for Inland forest are 9.3t/ha/yr and Peat swamp forest 9.2 t/ha/yr respectively. These values were consistent with those obtained by Banin et al (2013) for Inland forest in Sabah.

# Deep Decarbonizing AFOLU Sector Toward 2 Degree

Rizaldi Boer, Gito Sugih Imanuel, Siddik Thoha, M. Ardiansyah, and Anter Parulian
*Indonesia*

## Abstract

The Paris Agreement clearly stated the need for global communities to work together to hold the increase of global temperature below 2°C (pursuing 1.5°C). The peak of GHG emission should happen as soon as possible and achieve a balance between anthropogenic emissions and removals in the second half of this century. For Indonesia, the development of agriculture and forestry sectors has contributed significantly to the GHG emission. The increase in land demand following the increase in demand for food, pastoral, wood, and settlements and other infrastructure development would be a challenge to deep decarbonizing this sector. With strong commitment and good mitigation policies and measures, deep decarbonizing this sector is possible without scarifying much development target of this sector. Mitigation policies and measures include (i) improving the management of land and forest resources through development of Forest Management Unit in all forest areas, (ii) pushing adoption of sustainable management practices in production forests by implementing mandatory certification systems, (iii) reducing dependency on natural forests in meeting wood demands by increasing establishment of timber plantation on community lands and state lands and increasing the use of wood from agriculture plantations, (iv) reducing pressure on natural forest for establishment of development areas and agriculture expansion by the improvement of varieties, land productivity and cropping intensity, (v) enhancing sink through increasing the implementation of restoration of production forests ecosystem and land rehabilitation, (vi) limiting use of peat land for timber and agriculture plantation through the issuance of moratorium policies and peat land restoration, and (vii) increasing the adoption of low emission farming practices. The result of analysis suggests that by 2050 Indonesia would be able to deep decarbonizing this sector up to -0.05 ton $CO_2e$ per capita. Rapid decrease in emission is result of increase land productivity and cropping intensity leading to less demand for land for crop production and enhanced mitigation actions. The reliance on natural forest for producing wood is also decreased as a result of increasing rate of timber plantation development in particular, and increasing rate of land rehabilitation. In addition, emission from peat decomposition also decrease significantly as a result of the peat land moratorium policy in which no more of peat land conversion for large plantation is allowed, and restoration of larger part of peat land.

# Forest Degradation Mapping Using Advanced Spatial Techniques

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## Abstract

With ever increasing population, the forests in tropical regions have become vulnerable to anthropogenic pressures which is further compounded by the changing climate resulting in enormous degradation and deforestation. Efforts are on to revive the forests and a solution for sustainable management of forests is essential. To ascertain the health of forests, remote sensing techniques are used followed by ground truthing. Interpretation of remote sensing data is often done by manual digitisation. This is tedious and time consuming. IORA has developed cost effective spatial modelling technique that enables quick interpretation of degradation and deforestation which can be applied to interpret satellite imageries at all spatial resolutions.

The model allows spectral un-mixing of forest and non-forest components of vegetation indices obtained from satellite imageries. A regression model has been setup that correlates site specific mapped canopy cover with field measurements. The continuous layer of dense vegetation cover is distinguished with respect to spectral signature of bare soil. The same layer is utilized to estimate the vegetation fraction at pixel level. This product is then stratified into forest and non-forest areas using forest cover stratification maps in sync with country specific definition. This is further validated on ground with respective stakeholders. The vegetation fraction thus developed at pixel level not only distinguishes the forest cover from the non-forest land uses but also enables temporal analysis of deforestation. The classification of the forests and non-forest cover is further improved by visually interpreting the satellite data sets. For dataset consisting of more than one forest type, a calibration model is developed to include the canopy cover for each stratum. Time series analysis of these canopy cover maps thus provide the progressive changes in forest cover and hence information on extent of forest degradation.

This approach has been successfully piloted in the states of Madhya Pradesh and Sikkim in India.

## References

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Matricardi, E. A., Skole, D. L., Pedlowski, M. A., Chomentowski, W., & Fernandes, L. C. (2010). Assessment of tropical forest degradation by selective logging and fire using Landsat imagery. Remote Sensing of Environment, 114(5), 1117-1129.

# Grid-based Sampling of Satellite Imagery to Support Mongolia's AFOLU Sector GHG Reporting and REDD+ Forest Reference Level Construction

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## Abstract

Mongolia became a partner country of the UN-REDD Programme in June 2011, the country has quickly taken steps to start implementing REDD+ readiness activities. This includes particularly the preparation of its National REDD+ Readiness Roadmap, which was officially adopted by the Ministry of Environment and Green Development and Tourism (MEGDT) in June 2014. Mongolia is implementing a full-scale National Programme funded by the Programme Policy Board in July 2014.

The Programme is the United Nations Collaborative Initiative on Reducing Emissions from Deforestation and forest Degradation (REDD+) in developing countries. The Programme was launched in 2008 to assist developing countries prepare and implement national REDD+ strategies. It builds on the convening power and expertise of the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP).

As part of Mongolia's REDD+ readiness enabling activities there is a requirement to develop a National Forest Monitoring System for assessing emissions from forest changes which should be consistent with other national GHG reporting mechanisms.

The Climate Change Project Implementing Unit within the Ministry of Environment Green Development and Tourism is the agency responsible for GHG Inventory and National Communications, the UN-REDD programme is supporting the AFOLU land assessment for the whole of Mongolia for the Third National Communication covering the period 1990 to 2015.

The assessment will use newly developed and freely available software tools OpenForis Collect Earth developed by FAO accessing the entire satellite image archive hosted by Google as well as cloud based image processing tools. The land assessment is based upon visual interpretation of imagery on a grid based stratified sampling scheme for the whole country. The results will be used for the Third National Communication and in a trial for the construction of the REDD+ Forest Reference Level.

## Access to relevant information

www.reddplus.mn

# Brunei Darussalam's GHG Emissions and Emission Trends in the Energy Sector (2010 –2014)

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## Abstract

The objective of the Climate Change Convention (UNFCCC) is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. It is, therefore, important for all parties to estimate and communicate their levels of greenhouse gas (GHG) emissions and removals by developing their GHG emission inventories, as mentioned in Article 4, paragraph 1 and Article 12, paragraph 1 of the Convention. Brunei Darussalam has submitted its first national communications along with its first national GHG inventory (2010) in April 2016.Currently the second national communications which covers 2014 inventory is under progress.

Brunei Darussalam's total gross GHG emissions in 2010 totalled 9,488.6 GgCO2e, with corresponding net emissions of 6,612.4 GgCO2e after taking into account CO2absorption by Land-Use Change and Forestry activities. The energy sector emitted 8,858.2 GgCO2e, which is about 93% of the total gross emissions in 2010. Majority of the emissions came from the energy industries (4,176 GgCO2e), followed by fugitive emissions from oil and gas activities (2,955 GgCO2e), road transportation (1,171 GgCO2e), manufacturing and construction (450 GgCO2e), and residential sector (105 GgCO2e). The emissions from the sector had increased by 13% between 2010 and 2014, the latter in which the emissions totalled 10,006 GgCO2e. The contribution of each energy subsectors in the total emissions had slightly changed during the same period. The share of energy industries had increased from 47% to more than 53% while that of the road transportation had remained stable at around 13%.CO2and CH4are the main GHG gases generated by the energy sector. All the emissions were derived through Tier 1 estimates using the Revised 1996 IPCC Guidelines.

This poster will describe Brunei Darussalam's first national GHG inventory for the year 2010 for the energy sector and its data collection processes. Along the line, the summary of GHG emissions from 2010 to 2014 for the energy sector, along with the uncertainty assessments and the key category analysis, will also be included. Since the energy sector contribution is about 93% from the total gross emissions in 2010, this poster will be focusing only on the energy sector. This will also include emissions contribution from each of the energy sector's components.

## References

Brunei Darussalam Initial National Communication, April 2016.

# 4. Report on Mutual Learning Session

# 4 Report on Mutual Learning Session

## 4.1 Overview of the Mutual Learning

Mutual Learning (ML) is an activity to improve the individual countries' inventories through the following series of processes: 1) exchanging inventories between two countries; 2) learning from a partner's inventory; and 3) exchanging comments on each other's inventories. The primary purpose of the ML is to improve GHG inventories by providing details of methods and data for GHG emission/removal estimation between two countries and exchanging comments on the methods and data. The ML is also expected to foster and strengthen a cooperative relationship among GHG inventory 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 an examiner versus an examinee.

The first Mutual Learning was held on the Waste sector between GIO and Korea Environment Corporation (KECO) in the annual workshop in 2008. The Secretariat of WGIA introduced this activity in WGIA8 in 2010. With the participants' agreement, ML has been held in the following WGIAs as one of the sessions.

Table 4.1.1 History of Mutual Learning

| | 2008-2010 | 2010 WGIA8 | 2011 WGIA9 | 2012 WGIA10 | 2013 WGIA11 | 2014 WGIA12 | 2015 WGIA13 | 2016 WGIA14 |
|---|---|---|---|---|---|---|---|---|
| **General** | Trial implementation Japan- Korea | Introduction to ML (with hands on training) | - | - | - | - | Japan-Vietnam | - |
| **Energy** | | | Indonesia-Mongolia | Cambodia-Thailand | Lao PDR-Thailand | Indonesia-Myanmar | - | Brunei-Korea |
| **IP** | | | - | Indonesia-Japan | - | - | - | Myanmar-Malaysia |
| **Agriculture** | | | - | Indonesia-Vietnam | China-Myanmar | China-Mongolia | Indonesia-Lao PDR | - |
| **LULUCF** | | | Japan-Lao PDR | - | - | Vietnam* | Cambodia-Mongolia | Indonesia-Lao PDR |
| **Waste** | | | Indonesia-Cambodia-Korea | China-Korea | Malaysia-Vietnam | - | Korea-Myanmar | Mongolia-Thailand |

*Reporting from Vietnam with comments from experts

**Participants**

In December 2015, the WGIA Secretariat advertised the ML to the participants of WGIA, and received applications from 17 groups from 9 parties. Considering the requirements of the applicants and an appropriate balance among sectors and the feasibility of implementation, the WGIA Secretariat set up four pairs (Brunei and Korea on Energy sector, Indonesia and Lao PDR on LULUCF sector, Myanmar and Malaysia on Industrial processes sector, and Mongolia and Thailand on Waste sector) in April 2016.

**Preparation**

A few months before WGIA14, the chosen participants in the ML submitted the materials of their inventories to the WGIA Secretariat, including worksheets used for estimating emissions and reports describing details of methodologies, and exchanged the materials with their partner countries through the Secretariat. Through studying the materials provided by the partner country, the participants found good points as well as issues to improve in the partner's inventory. They also found issues to clarify by questions. Thus, participants wrote such comments and questions to their partner countries into "Question and Answer Sheets". After that, the "Question and Answer Sheets" were shared with the partner countries through the Secretariat. The partner countries responded to these comments and questions before WGIA14 took place.

Table 4.1.2 Preparation Process of Mutual Learning

| Process | Schedule |
|---|---|
| Call for entries | 2015/12/18 |
| Announcement of participants | 2016/04/13 |
| Material submission deadline | 2016/04/22 |
| Studying the materials | During May |
| Comment exchange | During June |
| Answers to comments | End of June |
| Preparation | Till 2016/07/26 |
| Sessions | 2016/07/26 |

**Discussions**

In the WGIA14, the ML participants split into four sessions (Energy, Industrial processes, LULUCF and Waste) and discussed sector-specific issues based on preliminary comment exchanges. In order to encourage a frank discussion and to ensure confidence, these sessions were closed.

In these sessions, participants discussed counterpart's inventories and their national systems, sharing their own technical issues (e.g. data collection, adoption of emission factors, national system, etc.) with the partners to overcome the obstacles, and clarifying matters in their own inventory which should be improved. Due to the adequate preliminary preparation of comment exchange over two months, they could deeply learn actual issues on each other’s inventory.

Since the ML programme provides a good opportunity to study both the counterparts’ and the participants’ own inventories, participants have shown interest to continue to participate in this programme in future WGIAs. The points of discussions and outcomes of each individual ML session are summarized in the following sections (4.2 - 4.5).

## 4.2 Energy

**Sector Overview**

Brunei Darussalam and the Republic of Korea participated in a ML session on the Energy sector. General information of the two countries is shown in Table 4.2.1 below.

Table 4.2.1 Sector Overview for the ML on Energy Sector

| | Brunei | Korea |
|---|---|---|
| National total GHG emissions (kt-$CO_2$ eq.) | 9,488.6 (in 2010, without LULUCF) | 688,341.56 (in 2012, without LULUCF) |
| Responsible agency for the inventory | Energy and Industry Department, Prime Minister's Office | Greenhouse Gas Inventory and Research Center |
| Estimation methodology | Revised 1996 IPCC Guidelines | Revised 1996 IPCC Guidelines and partially 2006 IPCC Guidelines |
| Source of emission factors | IPCC Guidelines default values | Basically IPCC Guidelines default values and partially country-specific values |
| Source of activity data | National Statistics | Energy Statistics Yearbook, and other statistics |

**Materials Used**

In order to prepare for the ML session in WGIA14, both countries exchanged their documents relevant to the Energy sector two to three months before the workshop. The exchanged documents were as follows:

Brunei
- Initial National Communication, 2016
- Spreadsheets created by using the Revised 1996 IPCC Guidelines software

Korea
- First Biennial Update Report, 2014
- National Greenhouse Gas Inventory Report, 2015
- Common reporting format, 2015
- Own spreadsheets to calculate GHG emissions from stationary combustion

**Questions and Answers**

After receiving the materials described above, both countries studied them and provided questions and comments to their partner country approximately one month before the workshop. The classification and the number of questions are summarized in Table 4.2.2.

Table 4.2.2 Classification of Questions and Comments in the ML on Energy Sector

| Classification of questions | Number of questions | |
|---|---|---|
| | from Brunei to Korea | from Korea to Brunei |
| Acquisition of activity data | 6 | 5 |
| Adoption of emission factors or parameters | 1 | 3 |
| Estimation methods | 3 | 1 |
| Institutional arrangement | 0 | 0 |
| Others | 1 | 6 |

**Outcomes of the Mutual Learning Session**

Through the ML session, several issues and good practices in the participating countries' preparation of GHG inventory were identified.

**➢Issues and Solutions**

Some issues were pointed out through the ML as follows:

Brunei

1) It is difficult to collect data due to lack of detailed information.
2) Human resources are limited. There are no dedicated team members for inventory preparation in each sector.
3) Data management issues. Simplifying workbook is one of possible solutions.

Korea

1) Precise sectoral activity data are desired, whereas national total data are reliable.
2) Closer work between energy and transport experts is planned.
3) There is difficulty in adopting the 2006 IPCC Guidelines.

**➢Good Practices**

Some good practices were pointed out through the ML as follows:

Brunei

1) Easy access to data by merging ministries.
2) Holding regular capacity building sessions with governmental stakeholders.

Korea

1) Developed own inventory data system including software package.
2) Developed own energy balance table.
3) Working closely with stakeholders and ministries.
4) Producing CRF (common reporting format) files. (That is a big challenge for NAI countries, though.)

**➢Suggestions for Future MLs**

The participants' suggestions for future ML were as follows:

Understanding of each counterpart's inventory would be enhanced if a common format (summary table of emissions by gas species and category) was created and it was included in the material exchange.

Table 4.2.3 Participants in the ML on Energy Sector

| Parties | Name | Organization | Title |
|---|---|---|---|
| Brunei | Mr. Abdul Matiin Hj Muhd Kasim | Energy and Industry Department, Prime Minister's Office | Head of Renewable Energy Unit |
| | Mr. Muhammad Nabih Fakhri bin Matussin | Brunei National Energy Research Institute | Researcher |
| Korea | Dr. Sung-kyun Kim | Korea Energy Economics Institute | Research Fellow |
| | Dr. Gil Whan Kim | | Associate Research Fellow |
| | Ms. Ji Hyeon Kim | | Research Associate |
| Facilitators and Resource persons | Mr. Naofumi Kosaka (Co-facilitator) | Greenhouse Gas Inventory Office of Japan (GIO) | GHG Inventory Expert |
| | Mr. Akira Osako (Co-facilitator) | | |
| | Mr. Tomoki Takahashi (Resource person) | Mitsubishi UFJ Research and Consulting Co., Ltd. | Analyst |
| Observers | Mr. Shigeyoshi Sato (Observer) | Ministry of the Environment | Chief Official |
| | Mr. Kosuke Murata (Observer) | | Official |

## 4.3 Industrial Processes Sector

**Sector Overview**

Myanmar and Malaysia participated in the Mutual Learning session for Industrial Processes sector. The general information for the two countries is as shown in Table below.

Table 4.3.1 Sector Overview for the ML on Industrial Processes Sector

| | Myanmar | Malaysia |
|---|---|---|
| National total GHG emissions (Mt-$CO_2$ eq., without LULUCF) | 74.40 (in 2000) | 290.23 (in 2011) |
| GHG emissions in the IP sector (Mt-$CO_2$ eq.) | 0.46 (in 2000) | 18.166 (in 2011) |
| Responsible agency for the inventory | Ministry of Environmental Conservation and Forestry | Ministry of Natural Resources and Environment |
| Estimation methodology | 2006 IPCC Guidelines, Tier 1 | Revised 1996 IPCC Guidelines, GPG (2000), and 2006 IPCC Guidelines, Tier 1/Tier 2 |
| Source of emission factors | IPCC default values and Country-specific parameters | IPCC default values and Country-specific parameters |
| Source of activity data | National statistics and data provided by industry | Data provided by industry, national statistics, and international sources |

**Materials Used**

In order to prepare for the Mutual Learning session in WGIA14, the partner countries exchanged their documents relevant to GHG emission/removal estimation for the sector through the Secretariat three months before the workshop. The documents exchanged were as follows:

Myanmar:
- Myanmar's Initial National Communication under the UNFCCC (2012, PDF)
- Revised 1996 IPCC Guidelines spreadsheet (Excel)

Malaysia:
- Malaysia's First Biennial Update Report (BUR) to the UNFCCC (2016, PDF)

**Questions and Answers**

After receiving the estimation documents, the countries studied them and submitted questions and comments to the partner country approximately one and a half months before the workshop. The classification and the number of the questions are as follows.

Table 4.3.2 Classification of Questions and Comments in the ML on Industrial Processes Sector

| Classification of question | Number of questions/comments | |
|---|---|---|
| | from Myanmar to Malaysia | from Malaysia to Myanmar |
| Acquisition of activity data | 2 | 1 |
| Adoption of emission factors or parameters | 0 | 1 |
| Estimation methods | 1 | 1 |
| Institutional arrangements | 1 | 0 |
| Others | 5 | 3 |

**Outcomes of the Mutual Learning Session**

Through the Mutual Learning, several issues and good practices in the participating countries' preparation of the GHG inventory were identified.

**➢Issues and solutions**

The following were identified as issues, and experience was shared to seek options and solutions.

- ✓ How to aggregate AD to use in the national level inventory (who compiles it/checks it etc.)
- ✓ How to disaggregate AD (e.g. to calculate emissions from Iron and Steel Production using the 2006 IPCC Guidelines - by process type/furnace type)
- ✓ How to construct AD (e.g. for each sub-category under Refrigeration and Air Conditioning)
- ✓ How to deal with smaller sources/smaller non-$CO_2$ emissions, and prioritization of work
- ✓ How to make better uncertainty assessments
- ✓ How to develop better institutional arrangements for the IP sector inventory, especially with regard to data provision
- ✓ How to deal with the issue of historical data availability
- ✓ How to explain country-specific EFs transparently
- ✓ How to harmonize the national inventory and corporate reported data (for the future)

**➢Good Practices**

The following were identified as good practices.

- ✓ Building trust and capacities in the stakeholders (e.g. private sector data providers), through utilization of workshops - asking for data and later providing results of calculations, or providing explanations of data handling to alleviate concerns on confidentiality
- ✓ Better understanding of the IPCC Guidelines, leading to better AD provision and development of country-specific EFs
- ✓ Applying newer default values from the 2006 IPCC Guidelines

**➢Possible follow-up activities**

The following were identified as possible follow-up activities.

- ✓ Further consideration of other emissions than $CO_2$ such as $CH_4$, $N_2O$, and NMVOCs etc., for all sources
- ✓ Re-evaluation of Lime production AD and EF

Table 4.3.3 Participants in the ML on Industrial Processes Sector

| Parties | Name | Organization | Title |
|---|---|---|---|
| Myanmar | Mr. Myint Soe | SNC Myanmar | Environmental Expert |
| | Ms. Hnin Hnin Aye | SNC Myanmar | Environmental Expert |
| | Mr. Aung Thu Han | Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation | Assistant Director |
| Malaysia | Ms. Ee Sann Tan | Department of Mechanical Engineering, Universiti Tenaga asional (UNITEN) | Senior Lecturer |
| | Dr. Elizabeth Philip | Climate Change & Forestry Programme, Forest Research Institute Malaysia (FRIM) | Head |
| | Mr. Muhammad Ridzwan bin Ali | Environmental Management and Climate Change, Ministry of Natural Resources and Environment | Assistant Secretary |
| Facilitators and Resource persons | Ms. Elsa Hatanaka (Facilitator) | GHG Inventory Office of Japan (GIO), National Institute for Environmental Studies (NIES) | Researcher |
| | Mr. Kohei Sakai (Sub-facilitator) | GHG Inventory Office of Japan (GIO), National Institute for Environmental Studies (NIES) | GHG Inventory Expert |
| | Mr. Takuji Terakawa (Resource person) | Mitsubishi UFJ Research and Consulting Co., Ltd. | Analyst |
| Observers | Mr. Shigeyoshi Sato | Ministry of the Environment, Japan | Chief Official |
| | Mr. Kosuke Murata | Ministry of the Environment, Japan | Official |

## 4.4 Land Use, Land-Use Change and Forestry Sector

**Sector Overview**

Indonesia and Lao PDR participated in the mutual learning session for Land Use, Land-Use Change and Forestry sector. The general information of two countries was shown in Table below.

Table 4.4.1 Sector Overview for the ML on LULUCF Sector

| | Indonesia | Lao PDR |
|---|---|---|
| National total GHG emissions (Gg-$CO_2$ eq., without LUCF) | 758,979 (in 2012) | 8,826 (in 2000) |
| GHG emissions/removals in the LULUCF sector (Gg-$CO_2$ eq.) | 694,978(in 2012) | 41,916 (in 2000) |
| Responsible agency for the inventory | The Ministry of Environment, Centre for National GHG Inventory System | The Ministry of Natural Resources and Environment |
| Estimation methodology | 2006 IPCC Guidelines, GPG (2000)* and GPG-LULUCF*, Tier 1 and Tier 2 | Revised 1996 IPCC Guidelines and GPG (2000) *, Tier 1 |
| Source of emission factors | Country-specific parameters and IPCC default values | IPCC default values |
| Source of activity data | Mainly from satellite data and survey (hybrid of approach 2 and 3) | Mainly from national forest inventory report/system |

*GPG (2000): IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories

*GPG-LULUCF: IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry

**Materials Used**

In order to prepare for the mutual learning session in WGIA14, both countries exchanged their documents relevant to GHG emission/removal estimation for the sector to the Secretariat two months before the workshop. The exchanged documents were as follows:

Indonesia:
- Indonesia's First Biennial Update Report (BUR) under the UNFCCC in 2015 (PDF)
- GHG inventory (reported inventory years: 2000 to 2012) (Excel)

Lao PDR:
- Lao PDR's Second National Communication (SNC) under the UNFCCC in 2013 (PDF)
- Overview- GHG inventory spreadsheet (reported inventory year: 2010) (Excel)
- Module5- LUCF sector (reported inventory year: 2010) (Excel)

**Questions and Answers**

After receiving the estimation documents, both countries studied them and submitted questions and comments to the partner country through Secretariat approximately one month before the workshop. The classification and the number of the questions are as follows.

Table 4.4.2 Classification of Questions and Comments in the ML on LULUCF Sector

| Classification of question | Number of questions | |
|---|---|---|
| | from Lao PDR to Indonesia | from Indonesia to Lao PDR |
| Acquisition of activity data | 1 | 2 |
| Adoption of emission factors or parameters | 2 | 3 |
| Estimation methods | 2 | 2 |
| Institutional arrangement | 1 | 1 |
| Others | 0 | 2 |

**Outcomes of the Mutual Learning Session**

Through the mutual learning, several issues and good practices in the participating countries' preparation of GHG inventory were identified.

**➢Issues and solutions**

For both countries, treatment of agricultural plantation and agroforestry in terms of land-use definitions should be considered (especially canopy >20%).

Lao PDR**:**

The issues raised for Lao PDR were: 1) some categories (such as $CO_2$ emissions from mineral soil) are not estimated because of inadequate activity data. 2) key category analysis was not conducted, but it will be done in the future, in Lao PDR's third national communication under the UNFCCC; 3) changes from primary forest to secondary forest and other land uses were not fully estimated.

**➢Good Practice**

The good practices for both countries were: 1) institutional arrangement for GHG inventory is established, i.e. built on existing arrangement; 2) illegal logging information in the loss estimation is reflected.

Indonesia:

The good practices identified for Indonesia were: 1) in accordance with the 2006 IPCC Guidelines, key category analysis (with LUCF and without LUCF) were conducted for data of 2012; 2) uncertainty analysis (with LUCF and without LUCF) were conducted qualitatively by Tier1; 3) the 2006 IPC Guidelines as well as the 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (Wetlands Guidelines) were applied; 4) some data applied to national forest reference emission levels (RLs) for REDD+ in forest sector were used; 5) a hybrid approach in land representation was conducted.

Lao PDR:

The good practices identified for Lao PDR were: 1) template tables of the Revised 1996 IPCC Guidelines were applied for calculation of GHG emissions and removals with the use of updated emission factors in the 2006 IPCC Guidelines. It is easy to track the calculation process; 2) country specific information of biomass stock in "after conversion" version was given.

**➢Possible follow-up activities**

Both countries agreed that applying good practices of other countries is important.

Indonesia:

Methodologies and data, including land representation, should be improved.

Lao PDR:

Applying the 2006 IPCC Guidelines and moving to higher tier with the use of country specific emission factors should be considered.

Table 4.4.3 Participants in the ML on LULUCF Sector

| Parties | Name | Organization | Title |
|---|---|---|---|
| Indonesia | Prof. Rizaldi Boer | Center for Climate Risk and Opportunity Management Bogor Agricultural University | Executive director |
| | Mr. Ginting Immanuel Gito | CCROM-SEAP IPB | LULUCF |
| | Mr. Budi Harto | Climate Ministry of Environment and Forestry | GHG Inventory of Landbased Sector |
| | Ms. Mamay Maesaroh | Climate Ministry of Environment and Forestry | GHG Inventory of Landbased Sector |
| Lao PDR | Mr. Nouansyvong Mone | Department of Disaster Management and Climate Change, MoNRE | GHGI compiler |
| | Mr. Inthaboualy Immala | Department of Disaster Management and Climate Change, MoNRE | Chief of GHGI and Mitigation Division/ GHGI Coordinator |
| | Mr. Bounthabandid Soukanh | Forest Inventory and Planning division (FIPD) | Deputy Director of FIP |
| Facilitators and Resource persons | Dr. Midori Yanagawa (Co-facilitator) | GHG Inventory Office of Japan (GIO), National Institute for Environmental Studies (NIES) | GHG Inventory Expert |
| | Mr. Hiroshi Ito (Co-facilitator) | | |
| | Ms. Atsuko Hayashi (Co-facilitator) | | |
| | Mr. Atsushi Sato (Resource person) | Environment and Energy Dept., Mitsubishi UFJ Research and Consulting Co., Ltd. | Senior Researcher |

## 4.5 Waste Sector

**Sector Overview**

Mongolia and Thailand participated in a ML session for waste sector. The general information of the two countries was shown in Table 4.5.1 :

Table 4.5.1 Sector Overview for the ML on Waste Sector

| | Mongolia | Thailand |
|---|---|---|
| National total GHG emissions (Gg-$CO_2$ eq.) | 26,277 (in 2012, excluding LULUCF) | 305,523 (in 2011, excluding LULUCF p30 BUR2015) |
| GHG emissions in the Waste sector (Gg-$CO_2$ eq.) | 263 (in 2012 MARCC2014 p223) | 11,425 (in 2011 p30 BUR2015) |
| Responsible agency for the inventory | The Ministry of Environment, Green Development and Tourism (MEGDT) | Office of Natural Resources and Environmental Policy and Planning |
| Organization in charge of Waste sector | Climate Change Project Implementing Unit | Thailand Greenhouse Gas Management Organization |
| Estimation methodology | Tier2 for Key category, Tier 1 for others | Tier2 for Key category, Tier 1 for others |
| Source of emission factors | Country-specific parameters and IPCC default values | Country-specific parameters and IPCC default values |
| Source of activity data | National statistics | Mainly from national statistics |

**Materials Used**

In order to prepare for the ML session in WGIA14, both countries exchanged their documents relevant to GHG emission estimation of the sector with each other two months before the workshop. The exchanged documents were as follows:

Mongolia:
- Mongolia's Assessment Report on Climate Change (MARCC)-2009
- Mongolia's Assessment Report on Climate Change (MARCC)-2014
- Second National Communication 2010
  - CRF tables 1990-2012 (Excel)
  - CRF tables 1990-2006 (Excel)

Thailand:
- Document on GHG mitigation in the Waste sector for the 3rd National Communication and Biennial Updated Report (BUR)
- CRF tables 2006 (Excel)

**Questions and Answers**

After receiving the materials described above, both countries studied them and provided questions and comments to their partner country approximately one month before the workshop. The classification and the number of the questions were as follows.

Table 4.5.2 Classification of Questions and Comments in the ML on Waste Sector

| Classification of question | Number of questions | |
|---|---|---|
| | from Thailand to Mongolia | from Mongolia to Thailand |
| Acquisition of activity data | 3 | 2 |
| Adoption of emission factors or parameters | 2 | 0 |
| Estimation methods | 2 | 7 |
| Institutional arrangement | 0 | 0 |
| Others | 0 | 1 |

**Outcomes of the Mutual Learning Session**

Through the mutual learning, several issues and good practices in the participating countries' preparation of GHG inventory were identified.

**➢Issues and solutions/ Outstanding issues**

Solid Waste Disposal

- Mongolia announced that the FOD method will be adopted in their current ongoing GHG inventory preparation with historical waste data.
- Thailand shared their methods for activity data collection and estimation for completing historical activity data.
- Thailand shared their experience that waste composition may be influenced by the level of urbanization in cities and their recycling policy.

Waste Water Handling

- Mongolia and Thailand shared the common understanding that $CH_4$ and $N_2O$ emissions from untreated wastewater need to be estimated in GHG inventory based on 2006 GL.
- Thailand raised the concern that it was necessary to consider air temperature for determining MCF for EF for septic tanks. Low temperatures such as those in Mongolia in the winter season may affect $CH_4$ and $N_2O$ production.

Uncertainty

- Mongolia informed that uncertainty analysis would be conducted in their current ongoing GHG inventory preparation.
- Thailand shared their results of uncertainty analysis using Tier 1 methodology in the Waste sector and explained its next improvement plan to upgrade uncertainty in EF.

**➢Good Practices**

<u>Mongolia:</u>

- Mongolia introduced new country specific MCF for $CH_4$ emissions from septic tank for some industrial wastewater, which is a major GHG emission source in the wastewater treatment category in Mongolia, based on domestic research.

<u>Thailand:</u>

- There was a significant update from SNC (2011) to BUR (2015) in the Waste sector in terms of accuracy and completeness. A key driving force of this improvement in Thailand is deciding a national GHG reduction target as INDC and a national plan for promoting mitigation actions.

**➢Follow-up activity**

- Mongolia will apply the FOD method for estimating $CH_4$ emissions from SWDS and conduct uncertainty analysis in the next GHG inventory preparation.
- Thailand will update uncertainty analysis for the next GHG inventory preparation.

**➢Suggestions for future ML and WGIA**

- ML with 3 or 4 participating countries may be effective in terms of wider information sharing. However, necessary time for discussion should be considered.
- More in-depth discussion on the estimation of GHG emissions under limited AD availability and/or country-specific EF for estimation of emissions will be effective.

Table 4.5.3 Participants in the ML on Waste Sector

| Parties | Name | Organization | Title |
|---|---|---|---|
| Mongolia | Dr. Shaariibuu Gerelmaa | CCPIU of NCF under MEGDT | Environmental Expert |
| | Dr. Baasansuren JAMSRANJAV | IPCC | Senior Programme Officer |
| Thailand | Dr. Chiemchaisri Chart | Kasetsart University | Associate Professor |
| | Dr. Jarusutthirak Chalor | | Associate Professor |
| | Dr. Nugranad Jarunee | Office of Natural Resources and Environmental Policy and Planning | Environmentalist |
| | Dr. Prasertsin Tuangporn | | Environmentalist |
| Facilitators and Resource persons | Mr. Hiroyuki Ueda (Chair) | Environment and Energy Dept., MURC | Senior Analyst |
| | Ms. Sumiko Harasawa | GIO | GHG Inventory Expert |
| | Mr. Kohei Sakai | | GHG Inventory Expert |

# Annex I: Agenda

## Annex I: Agenda

### The 14th Workshop on GHG Inventories in Asia (WGIA14)
**- Capacity building for measurement, reporting and verification -**
**Period: 26th – 29th July, 2016,**
**Venue: Best Western Premier Tuushin Hotel, Ulaanbaatar, Mongolia**

**Study tour – Visiting the Salkhit Wind Park (The first Mongolian wind farm)**
**29 July, 2016, Ulaanbaatar, Mongolia**

| **Day 1: Morning, 26th July 2016 (Tuesday)** | | |
|---|---|---|
| **08:30-12:00** | **Mutual Learning (Closed sessions: only the countries participating in the session, facilitators, rapporteurs and the WGIA Secretariat can enter conference rooms for the sessions)** | |
| **Sector** | Energy | Waste |
| **Combination of Participating Countries** | **Brunei – Korea** | **Mongolia – Thailand** |
| Room | Suld Hall | |
| Facilitator | Mr. Naofumi Kosaka (GIO)<br>Mr. Akira Osako (GIO) | Mr. Hiroyuki Ueda (MURC) |
| Rapporteur | Ms. Sumiko Harasawa (GIO) | |
| **Note: Mutual learning sessions are closed sessions in order to secure confidentiality of information so that countries participating in each mutual learning session can provide unpublished information. Therefore, only participating countries in each session, facilitators, resource persons and the WGIA Secretariat can enter each of the rooms. In addition, facilitators and resource persons will be registered in advance and receive confirmation of participation from the countries engaging in mutual learning and the WGIA Secretariat.** | | |
| ***12:00-14:00*** | ***Lunch*** | |
| **Day 1: Afternoon, 26th July (Tuesday)** | | |
| **14:00-17:30** | **Mutual Learning (Closed sessions: only the countries participating in the session, chairs, facilitators, rapporteurs and the WGIA Secretariat can enter conference rooms for the sessions)** | |
| **Sector** | Industrial Process | LULUCF |
| **Combination of Participating Countries** | **Malaysia - Myanmar** | **Lao PDR - Indonesia** |
| Room | Suld Hall | |
| Facilitator | Ms. Elsa Hatanaka (GIO) | Dr. Midori Yanagawa (GIO) |
| Rapporteur | Ms. Sumiko Harasawa (GIO) | |

| Day 2: Morning, 27th July, 2016 (Wednesday) | | | |
|---|---|---|---|
| **7:45 - 8:30** | **Participant Registration** | | |
| **8:30 – 9:55** | **Opening Session** | | |
| | **Room: Soyombo Hall** | **Chair: Mr. Batjargal Zamba (Mongolia)** | **Rapporteur: Mr. Naofumi Kosaka (GIO)** |
| 8:30 – 8:40 | Welcome Address | | Mr. Yoshio Nakura (MOEJ) |
| 8:40 – 8:50 | Welcome Address | | Ms. Bulgan Tumendemberel (Mongolia) |
| 8:50 – 9:10 | Overview of WGIA14 & Progress of Mutual Learning | | Mr. Hiroshi Ito (GIO) |
| 9:10 – 9:25 | Japan's Climate Change Policies | | Mr. Shigeyoshi Sato (MOEJ) |
| 9:25 – 9:40 | Climate Change Policy in Mongolia | | Mr. Gerelt-Od Tsogtbaatar (Mongolia) |
| **9:40 – 9:55** | **Questions and Answers** | | **All** |
| ***9:55 – 10:25*** | ***Group Photo & Tea Break*** | | |
| **10:25 – 12:00** | **Session I: Updates on the National Communications (NCs) and Biennial Update Reports (BURs) from non-Annex I Parties** | | |
| | **Room: Soyombo Hall** | **Chair: Mr. Takahiko Hiraishi (IGES)** | **Rapporteur: Mr. Naofumi Kosaka (GIO)** |
| 10:25 – 10:30 | Introduction to the Session | | Mr. Hiroshi Ito (GIO) |
| 10:30 – 10:45 | India's First Biennial Update Report to UNFCCC | | Dr. Javiardhan Ramanlal Bhatt (India) |
| 10:45 – 11:00 | Malaysia's First Biennial Update Report | | Dr. Elizabeth M P. Philip (Malaysia) |
| 11:00 – 11:15 | Biennial Update Report: Indonesia Experience | | Mr. Budiharto (Indonesia) |
| 11:15 – 11:30 | Thailand's First Biennial Update Report | | Dr. Jarunee Nugranad (Thailand) |
| **11:30 – 12:00** | **Questions and Answers** | | **All** |
| ***12:00 – 13:30*** | ***Lunch*** | | |

| Day 2 Afternoon, 27th July (Wednesday) | | | |
|---|---|---|---|
| **13:30 – 15:30** | **Session II: Institutional Arrangement for National GHG Inventory and BUR** | | |
| | **Room: Soyombo Hall** | **Chair: Mr. Kiyoto Tanabe (IPCC/TFI; CGE)** | **Rapporteur: Mr. Naofumi Kosaka (GIO)** |
| 13:30 – 13:35 | Introduction to the Session | | Mr. Akira Osako (GIO) |
| 13:35 – 13:50 | UNFCCC Support to Strengthening Transparency in Reporting National GHG Inventory by non-Annex I Parties | | Mr. Dominique Revet (UNFCCC) |
| 13:50 – 14:05 | Cambodia's Institutional Arrangement to prepare GHG inventory | | Mr. Kamal Uy (Cambodia) |
| **14:05 – 14:25** | **Questions and Answers, Discussion** | | **All** |
| 14:25 – 14:40 | Overview of GHGs Emission Inventory and Its Institutional Arrangement in Iran | | Mr. Mohammad Sadegh Ahadi (Iran) |
| 14:40 – 14:55 | National Carbon Accounting Using Remote Sensing Data | | Dr. Shanti Reddy (Australia) |
| **14:55 – 15:15** | **Questions and Answers, Discussion** | | **All** |
| ***15:15 – 15:45*** | ***Tea Break*** | | |
| **15:45 – 17:30** | **Session III: Good Practices for ICA Process** | | |
| | **Room: Soyombo Hall** | **Chair: Dr. Sumana Bhattacharya (AB/ Iora Ecological Solutions Pvt ltd.)** | **Rapporteur: Mr. Naofumi Kosaka (GIO)** |
| 15:45 – 15:50 | Introduction to the Session | | Ms. Atsuko Hayashi (GIO) |
| 15:50 – 16:05 | Introduction of International Consultation and Analysis (ICA) Process | | Mr. Kiyoto Tanabe (IPCC/TFI; CGE) |
| 16:05 – 16:25 | Experience on International Consultation and Analysis: TA and FSV | | Prof. Zhu Songli (China) |
| 16:25 – 16:45 | Experience of Vietnam during ICA Process for the reviewing of the first BUR | | Dr. Nguyen Phuong Nam (Vietnam) |
| 16:45 – 17:05 | Sharing the Experience of the first BUR and ICA in the Republic of Korea | | Dr. Hyung-Wook Choi (Korea) |
| **17:05 – 17:30** | **Questions and Answers, Discussion** | | **All** |
| | | | |
| ***19:00 – 21:00*** | ***Welcome Reception hosted by Japan & Mongolia*** | | |

| Day 3 Morning, 28th July 2016 (Thursday) | | | |
|---|---|---|---|
| **9:00 – 12:30** | **Session IV: Activities with Co-benefits for GHG Inventories or Mitigation, and Related Support** | | |
| | **Room: Soyombo Hall** | **Chair: Dr. Sirintornthep Towprayoon (AB/ King Mongkut's University of Technology Thonburi)** | **Rapporteur: Mr. Naofumi Kosaka (GIO)** |
| 9:00 – 9:05 | Introduction to the Session | | Mr. Kohei Sakai (GIO) |
| 9:05 – 9:20 | Terrestrial monitoring and GHG inventories | | Dr. Nobuko Saigusa (NIES) |
| 9:20 – 9:35 | The Co-benefit Study on Greenhouse Gases Mitigation and Air Pollution Control in China | | Prof. Gao Qingxian (China) |
| 9:35 – 9:50 | FAO in support of MRV in Agriculture | | Mr. Martial Bernoux (FAO) |
| **9:50 – 10:15** | **Questions and Answers, Discussion** | | **All** |
| *10:15– 10:45* | *Tea Break* | | |
| 10:45 – 11:00 | Current state of Joint Crediting Mechanism development in Mongolia | | Ms. Undarmaa Khurelbaatar (Mongolia) |
| 11:00 – 11:15 | IPCC TFI: Recent Activities | | Dr. Baasansuren Jamsranjav (IPCC/TFI/TSU) |
| 11:15 – 11:30 | Global Support Programme (GSP)<br>Technical Support to Non-Annex 1 countries in their climate change reporting obligations | | Mr. Stanford Mwakasonda (UNEP) |
| **11:30 – 12:00** | **Questions and Answers, Discussion** | | **All** |
| *12:00 – 13:30* | *Lunch* | | |

| Day 3 Afternoon, 28th July (Thursday) | | | |
|---|---|---|---|
| **13:30 – 15:00** | **Poster Session** | | |
| | Room: Poster Room (In front of Soyombo Hall) | | |
| **15:00 – 16:30** | **Wrap-up Session** | | |
| | **Room: Soyombo Hall** | **Chair: Dr. Nobuko Saigusa (NIES)** | |
| 15:00 – 15:15 | Summary of the Mutual Learning Sessions | | Ms. Sumiko Harasawa (GIO) |
| **15:15 – 15:30** | **Discussion** | | **All** |
| *15:30– 15:45* | *Tea Break* | | |
| 15:45 – 16:00 | Summary of the Plenary Sessions | | Mr. Naofumi Kosaka (GIO) |
| **16:00 – 16:10** | **Discussion** | | **All** |
| **Closing Remarks** | | | |
| 16:10 – 16:20 | Closing Remarks | | Mr. Batjargal Zamba (Mongolia) |
| 16:20 – 16:30 | Closing Remarks | | Dr. Nobuko Saigusa (NIES) |

| Day 3 Evening, 28th July (Thursday) | | | |
|---|---|---|---|
| **17:00 – 18:00** | **Joint Meeting of the WGIA Organizing Committee and Advisory Board (members of the OC and AB, the WGIA Secretariat)** | | |
| | **Room: Suld Hall** | **Chair: Mr. Hiroshi Ito (GIO)** | |
| 17:00 – 17:30 | Review of Activities in WGIA14 | | All |
| 17:30 – 18:00 | Discussion on Topics for WGIA15 | | All |

| Study Tour, 29th July 2016 (Friday) | |
|---|---|
| 8:00 – 17:00 | **Study Tour - Visiting Salkhit Wind Park (The first Mongolian wind farm)** |

***Abbreviations:***

*AB: WGIA Advisory Board*
*BUR: Biennial Update Report*
*CGE: Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention*
*GHG: Greenhouse Gas*
*GIO: Greenhouse Gas Inventory Office of Japan, NIES*
*ICA: International Consultation and Analysis*
*IGES: Institute for Global Environmental Strategies, Japan*
*IPCC: Intergovernmental Panel on Climate Change*
*IPCC/TFI/TSU: IPCC, Task Force on National Greenhouse Gas Inventories, Technical Support Unit*
*JCM: Joint Crediting Mechanism*
*JICA: Japan International Cooperation Agency*
*MOEJ: Ministry of the Environment, Japan*
*MRV: Measurement, Reporting and Verification*
*MURC: Mitsubishi UFJ Research and Consulting*
*NC: National Communication*
*NIES: National Institute for Environmental Studies, Japan*
*OC: WGIA Organizing Committee*
*UNFCCC: United Nations Framework Convention on Climate Change*

| Poster Sessions | | |
|---|---|---|
| **13:30 – 15:00** | **Room:** | |
| **Number** | **Title** | **Name, Organization** |
| P-1 | What's your difficulty in developing Greenhouse Gas Inventory Measurement and Management? KEEI can help you solve the difficulty!<br>- KEEI National Greenhouse Gas Inventory Measurement-Management System - | Dr. Sung-kyun Kim, Dr. Gil-Whan Kim, Ms. Ji-Hyeon Kim<br>Korea Energy Economics Institute, Republic of Korea |
| P-2 | National GHG Inventory System in the Republic of Korea | Ms. Nari Youn, Dr. Hyung-Wook Choi<br>Greenhouse gas Inventory and Research Center, Republic of Korea |
| P-3 | Sustainable Development & Climate Change: Toward Enhancing the Role of Capacity Development for Implementation of INDCs in the ASEAN Countries | Dr. Bundit Limmechokchai,<br>Sirinthorn International Institute of Technology, Thammasat University, Thailand<br>Dr. Jakkanit Kananurak, Ms. Nareerat Thanakasem<br>Climate Change International Technical and Training Center, TGO, Thailand |
| P-4 | Low Carbon Society and Mitigation Measures | Mr. Myint Soe,<br>Environmental Expert, SNC Myanmar, Myanmar |
| P-5 | GHG measurement and data analysis in Mongolia | Ms. Oyunchimeg Dugerjav<br>Researcher, Information and Research Institute of Meteorology, Hydrology and Environment (IRIMHE), Mongolia |
| P-6 | Uncertainty Analysis of $CO_2$ Emission from Municipal Solid Waste Incineration Plant | Mr. Jeejae Lim and Prof. Seungdo Kim,<br>Hallym University, Republic of Korea |
| P-7<br>P-8 | 1. Estimation of methane, carbon dioxide and nitrous oxide emissions from Landfill in China<br>2. Outcomes of Research on Low Carbon in CRAES | Prof. Gao Qingxian,<br>Chinese Research Academy of Environmental Sciences (CRAES), China |
| P-9 | Methodology to develop (higher Tier) EF in waste sector in Thailand | Komsilp Wangyao[1], Noppharit Sutthasil[2], Panida Payomthip[1], Sakulrat Sutthiprapa[2], Chart Chiemchaisri[2] and Sirintornthep Towprayoon[1],<br>[1] King Mongkut's University of Technology Thonburi (KMUTT), Thailand<br>[2] Kasetsart University, Thailand |
| P-10 | Tier2 Emission Factor of Methane and Nitrous Oxide from Rice Rotation System | Ms. Nittaya Cha-un, Mr. Amnat Chidthaisong and Dr. Sirintornthep Towprayoon, King Mongkut's University of Technology Thonburi, Thailand |
| P-11 | Developing country level emission factors | Dr. Elizabeth M P. Philip,<br>Environmental Management and Climate Change, Ministry of Natural Resources and Environment, Malaysia |

| | | |
|---|---|---|
| P-12 | Deep decarbonizing AFOLU sector toward 2 degree | Prof. Rizaldi Boer,<br>Centre for Climate Risk and Opportunity Management in Southeast Asia and Pacific,<br>Bogor Agricultural University, Indonesia |
| P-13 | Forest Degradation Mapping Using Advanced Spatial Techniques | Dr. Sumana Bhattacharya,<br>Iora Ecological Solutions Pvt ltd., India |
| P-14 | Grid-based Sampling of Satellite Imagery to Support Mongolia's AFOLU Sector GHG Reporting and REDD+ Forest Reference Level Construction | Mr. Richard Metcalfe,<br>UN-REDD Programme, Mongolia |
| P-15 | Developing higher tier data for estimation of GHG emissions from fossil fuel power plants in Thailand | Awassada Phongphiphat, Suthum Patumsawad and Sirintornthep Towprayoon,<br>King Mongkut's University of Technology Thonburi (KMUTT) |
| P-16 | Brunei Darussalam's GHG Emissions and emission trends in the energy sector (2010-2014) | Mr. Abdul Matiin Hj Muhd Kasim,<br>Renewable Energy Unit, Energy Department,<br>Prime Minister's Office, Brunei |
| P-17 | Preparation of Japan's National Greenhouse Gas Inventory and Trends in GHG Emissions | GIO, Japan |

# Annex II: List of Participants

## Annex II: List of Participants

BY PARTICIPATING COUNTRIES
(Alphabetical order by family name)

**BRUNEI**
Mr. Abdul Matiin Kasim
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