CGER-REPORT

ISSN 2434-5679
CGER-I177-2025

Proceedings of the 22nd Workshop on Greenhouse Gas Inventories in Asia (WGIA22)

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Foreword

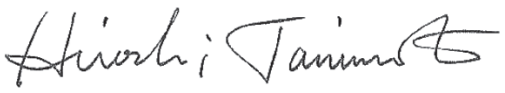
The international community now recognizes increases in anthropogenic emissions of greenhouse gases (GHGs) as the primary cause of climate change and its impacts. The Working Group I contribution to the Sixth Assessment Report (AR6) published by the Intergovernmental Panel on Climate Change (IPCC) in 2021 stated that "Observed increases in well-mixed greenhouse gas concentrations since around 1750 are unequivocally caused by human activities. Since 2011 (measurements reported in AR5), concentrations have continued to increase in the atmosphere, reaching annual averages of 410 ppm for carbon dioxide in 2019". In order to address mitigation and adaptation to climate change, all of us on the globe must be making more efforts than ever in each of our respective fields. To this end, the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) agreed to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels under the Paris Agreement.

Transparency of mitigation actions is becoming increasingly important, and 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 for their countries' mitigation actions to reduce GHG emissions. Against this background, all parties are required to submit Biennial Transparency Reports (BTRs), which include national GHG inventories, under the Paris Agreement Enhanced Transparency Framework (ETF).

To enhance the 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 Asian countries to develop and improve their GHG inventories through enhanced regional information exchange. The Greenhouse Gas Inventory Office of Japan (GIO) affiliated with the Center for Global Environmental Research (CGER), Earth System Division (ESD), NIES, has functioned as the Secretariat for this workshop since its first session.

This CGER report serves as the proceedings of the 22nd WGIA (WGIA22), which was held in Phnom Penh, Cambodia, this year. We hope that this report will be useful for all those who work in the field of GHG inventories as well as climate change, and that it will contribute to the further progress of inventory development in Asia.

TANIMOTO Hiroshi



Director
Earth System Division
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Preface

The Paris Agreement established the ETF to build mutual trust and confidence and to promote effective implementation. The purpose of the framework is to provide a clear understanding of climate change actions, including progress made towards achieving Parties' individual nationally determined contributions (NDCs) to inform the global stocktake. Each Party shall provide the national GHG inventory and information necessary to track progress made in implementing and achieving its NDC in BTR. Against this background, GHG inventories are being accepted more and more as being valuable because they support the transparency and accuracy of the implementation of national mitigation actions, and the importance of developing robust national systems for the steady preparation of inventories is now widely acknowledged.

WGIA has contributed significantly to the construction and consolidation of a network of officials and researchers involved in GHG inventory preparation in Asian countries and to the identification and provision of solutions for common issues relevant to inventories.

This time, the WGIA22 was held in Phnom Penh, Cambodia from 15th to 18th July 2025 with the cooperation of Ministry of Environment of Cambodia. The topics set out for this workshop were based on consideration of the current situation of the member countries.

The outcomes of the WGIA22 are summarized in this report as Proceedings. We hope that this report will be found useful and will contribute to the further improvement of the GHG inventories of the WGIA member countries.

We would like to thank all the attendees for their participation and active contribution to the workshop.

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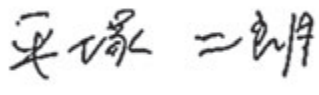

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List of Acronyms and Abbreviations

AB	WGIA Advisory Board
AD	Activity Data
AIM	Asia-Pacific Integrated Model
BAU	Business-as-Usual
BOG	Breakout Group
BTR	Biennial Transparency Report
BUR	Biennial Update Report
CGER	Center for Global Environmental Research
CRT	Common Reporting Tables
COVID-19	Coronavirus Disease 2019
CS	Country-Specific
EF	Emission Factor
ESD	Earth System Division
ETF	Enhanced Transparency Framework
FAO	Food and Agriculture Organization of the United Nations
FY	Fiscal Year
FX	Flexibility
GHG	Greenhouse Gas
GIO	Greenhouse Gas Inventory Office of Japan
IEF	Implied Emission Factor
IGES	Institute for Global Environmental Strategies
IPCC	Intergovernmental Panel on Climate Change
IPCC TFI	IPCC, Task Force on National Greenhouse Gas Inventories
IPPU	Industrial Processes and Product Use
JSON	JavaScript Object Notation
JICA	Japan International Cooperation Agency
LCCP	Low Carbon Compatible with Paris Target
LULUCF	Land Use, Land-Use Change and Forestry
MAFF Japan	Ministry of Agriculture, Forestry and Fisheries, Japan
ML	Mutual Learning
MOEJ	Ministry of the Environment, Japan
MPG	Modalities, Procedures, and Guidelines
NARO	National Agriculture and Food Research Organization, Japan
NC	National Communication
NDC	Nationally Determined Contribution
NIES	National Institute for Environmental Studies, Japan
NID	National Inventory Document
NIR	National Inventory Report

QA/QC	Quality Assurance and Quality Control
Q&A	Questions and Answers
UNFCCC	United Nations Framework Convention on Climate Change
TER	Technical Expert Review
WGIA	Workshop on Greenhouse Gas Inventories in Asia
2006 IPCC Guidelines	2006 IPCC Guidelines for National Greenhouse Gas Inventories
2019 Refinement	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Chemical terms

CO_2	Carbon dioxide
CH_4	Methane
N_2O	Nitrous oxide
HFC	Hydrofluorocarbon
PFC	Perfluorocarbon
NF_3	Nitrogen trifluoride
kt	kilo tonnes
Mt	Million tonnes

Photos of the Workshop

Welcome Address

Director General of the General Directorate of Policy and Strategy, Ministry of Environment, Cambodia

Senior Negotiator, Office of Climate Change Negotiation, International Strategy Division, Global Environment Bureau, Ministry of the Environment, Japan

Opening Remark

Secretary of State, Ministry of Environment, Cambodia

The Plenary Sessions

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Waste: Bhutan – Mongolia

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1. Executive Summary of WGIA22

1 Executive Summary of WGIA22

The Ministry of the Environment of Japan (MOEJ) and the National Institute for Environmental Studies (NIES) convened, together with the Ministry of Environment of Cambodia, the "22nd Workshop on Greenhouse Gas (GHG) Inventories in Asia (WGIA22)" from July 15th to July 18th, 2025, in Phnom Penh, Cambodia (partly online).

Annual workshops have been held since 2003 (excluding 2020 due to the Coronavirus Disease 2019 (COVID-19) pandemic) in order to support Asian countries in improving the accuracy of their GHG inventories and to facilitate the enhancement of cooperative relationships in the Asian region. This year, 144 participants (including those online) attended WGIA22 in total, consisting of government and research representatives of 15 member countries (Bhutan, Brunei, Cambodia, China, India, Indonesia, Japan, the Republic of Korea, Laos, Malaysia, Mongolia, the Philippines, Singapore, Thailand, and Viet Nam), in addition to representatives of the Intergovernmental Panel on Climate Change (IPCC) Task Force on National GHG Inventories (TFI), the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), Food and Agriculture Organization of the United Nations (FAO), Ministry of Agriculture, Forestry and Fisheries, Japan (MAFF Japan), National Agriculture and Food Research Organization (NARO), and others.

Opening Session

The Ministry of Environment of Cambodia and MOEJ delivered welcome addresses and opening remarks, and the Ministry of Environment of Cambodia made a presentation on Cambodia's Climate Change Policy and Biennial Transparency Report (BTR). Following this, MOEJ made a presentation on Japan's progress on climate change measures and international cooperation. Cambodia has raised its GHG emissions reduction target from 41.7% (compared to the 2030 Business-as-Usual (BAU) scenario) to 61% (compared to the 2035 BAU scenario) under the conditional scenario in Nationally Determined Contribution (NDC) 3.0. Japan aims to reduce its GHG emissions by 60% in Fiscal Year (FY) 2035 and by 73% in FY2040 from its FY2013 levels. Following this, the GHG Inventory Office of Japan (GIO) gave an introduction to WGIA.

Updates on the GHG Inventory of BTRs

Brunei, China, the Philippines, and Korea gave presentations on their first BTR and reported the most recent information on national circumstances, emission estimates, mitigation actions, and other relevant data.

Countries are steadily making progress in improving their national GHG inventories towards fulfilling the requirements under the Enhanced Transparency Framework (ETF) of the Paris Agreement. However, countries are still facing challenges, such as the reporting of detailed information through the Common Reporting Tables (CRTs). Experience sharing offers valuable guidance for countries working to strengthen their national systems, particularly with GHG inventories becoming a component of BTR submissions.

Estimation Methodology and Data for Agriculture

MAFF Japan presented an overview of the Agricultural Area and Livestock Surveys used

as activity data (AD) for the Agriculture sector in Japan, and Thailand gave a presentation on the development of country-specific (CS) emission factors (EFs) for its livestock sector. Indonesia presented its methane EF development for rice cultivars. NARO gave a presentation on a nationwide soil carbon calculation system for Japanese agricultural land, and NIES gave a presentation on the emission projections using the Asia-Pacific Integrated Model (AIM).

Accurate estimation of GHG emissions critically depends on the availability and quality of AD. Therefore, there is an urgent need to strengthen national agricultural statistics. Leveraging advanced technologies such as remote sensing and satellite imagery, as well as building robust institutional arrangements, will be essential. Several countries have successfully developed CS EFs and models to better reflect their national conditions. These practices offer valuable lessons for other countries. The development of emission projections must be grounded in reliable inventory data. However, there are unique challenges, including the impacts of climate change on food production and the dynamics of international food trade, which add complexity to both emission estimation and policy planning.

Discussion on the ETF GHG Inventory Reporting Tool

Breakout groups (BOGs) were set up to facilitate the sharing of issues encountered by participating countries in using the ETF GHG Inventory Reporting Tool and to attempt to provide solutions through knowledge sharing from those with prior experiences or through discussions. The UNFCCC Secretariat took part in the discussions online.

The facts, such as the implied emission factors (IEFs) in the CRT, do not always match the EFs used for estimation. Areas in the land-transition matrix should be filled, and how to deal with the failure of importing JSON (JavaScript Object Notation) files from the IPCC software was discussed.

Technical Expert Review and Support Available

IPCC/TFI presented its recent activities, and UNFCCC provided an overview of the technical expert review (TER) process of GHG inventories under the Paris Agreement. Institute for Global Environmental Strategies (IGES) shared insights from the Technical Expert Reviewer experience. Indonesia shared its experience of undergoing a centralized review of its first BTR and National Inventory Document (NID). FAO gave a presentation about the support for transparency focused on GHG inventories in Asia.

The TER process, particularly through in-country review, is a valuable opportunity for direct dialogue between the reviewers and experts from countries undergoing review. It enables countries to gain access to best practices and helpful advice to improve the quality of future BTRs. The process also contributes to strengthening national capacity for preparing good-quality national GHG inventories. Effective use of the various tools and capacity-building opportunities made available by the IPCC and the FAO will enhance the completeness and transparency of inventory reporting.

Mutual Learning

The Mutual Learning (ML) was held for the following two GHG inventory sectors: Energy sector (China and Japan), and Waste sector (Bhutan and Mongolia). The

participants exchanged materials and questions to learn about the inventory and institutional arrangements of the counterpart country. For each session, two countries engaged with each other by following up on the Questions and Answers (Q&A) that had taken place before the Workshop.

Many WGIA countries have submitted their first BTRs under the Paris Agreement's ETF. They are working to improve the completeness of inventory reporting by identifying previously unestimated sources through reporting CRTs, organizing primary statistics for AD, and developing CS EFs. One of the participating countries is also continuing to address issues that were identified during past ML sessions.

The participants shared their experiences and had frank discussions to further enhance and improve these efforts. Building on these discussions, the participants are expected to improve and prepare their inventories for the next BTR submission.

Poster Session

This was held to share information on various GHG-related topics, including the latest results from research. Seven posters were displayed during the workshop, and active discussions took place at the session.

2. Workshop Report

2 Workshop Report

Please note that all presentation materials can be downloaded from the GIO website at: https://www.nies.go.jp/gio/en/wgia/22.html

2.1 Opening Session

The welcome address was delivered by H.E. SUM Thy, Director General of the General Directorate of Policy and Strategy, Ministry of Environment of Cambodia, and Mr. NOMOTO Takuya, MOEJ. The opening remark was delivered by H.E. CHUOP Paris, Secretary of State, Ministry of Environment of Cambodia.

Mr. LEANG Sophal made a presentation on Cambodia's Climate Change Policy and the BTR. He reported that Cambodia had officially submitted the BTR1 on 31 December 2024 and the NDC 3.0 in 2025. The NDC 3.0 reflects a significant increase in ambition compared to the NDC 2.0, in that Cambodia has raised its GHG emissions reduction target from 41.7% (compared to the 2030 BAU scenario) to 61% (compared to the 2035 BAU scenario) under the conditional scenario in NDC 3.0. Following this, Mr. OKANO Shohei and Ms. TAKEUCHI Chihiro (MOEJ) jointly presented Japan's progress on climate change measures and international cooperation. Mr. Okano stated that Japan set ambitious targets to reduce its GHG emissions by 60% in FY2035 and by 73% in FY2040, from its FY2013 levels. In FY2023, Japan's total GHG emissions were 1,071 Mt CO_2 eq., which was a 23.3% reduction compared to FY2013. Ms. Takeuchi explained that Japan promotes decarbonization globally to achieve the 1.5 ℃ goal of the Paris Agreement, through the dissemination of an Asian Economic Growth Model toward Net Zero, including cooperation initiatives for development and implementation of NDCs and Long-Term Low Emission Development Strategies.

Mr. ITO Hiroshi (GIO) gave an introduction of WGIA22. He introduced the historical progress of WGIA, as well as its participants, agenda, and expected outcomes. The expected outcomes of WGIA22 were:

- To enhance the quality of GHG inventories for BTRs,
- To enhance understanding of the methodology of the Agriculture sector,
- To enhance understanding of how to use the ETF GHG Inventory Reporting Tool, and
- To strengthen the participants' understanding of the TER.

Lastly, he emphasized that an accurate inventory in the BTRs would contribute to the future planning and assessment of the progress towards emission reduction targets under the Paris Agreement.

2.2 Session I: Updates on the GHG Inventory of BTRs

This session was chaired by Ms. Sandee G. RECABAR (Philippines) and the rapporteur was Ms. HAYASHI Atsuko (GIO).

The aim of this session was to share experiences in preparing BTRs, particularly

focusing on GHG inventories, under the ETF referred to in Article 13 of the Paris Agreement. Brunei, China, the Philippines, and Korea presented their latest BTRs, enabling participants to learn from each country's efforts and improvements.

Ms. Amal Hamizah Hasnan (Brunei) gave a presentation on Brunei's GHG inventory included in its first BTR, which described Brunei's emissions profile based on 2022 data, estimation methodologies, and challenges in its preparation. The BTR was submitted in December 2024, supported by institutional mechanisms under the Mandatory Reporting Directive (MRD) on GHG, which was launched in April 2023. Ms. Hasnan highlighted the improvements in data coverage and identified ongoing challenges, particularly in data completeness. She also presented Brunei's early-stage quality assurance and quality control (QA/QC) procedures, as well as a Tier 1 uncertainty assessment that pinpointed sectors with higher uncertainty. Despite institutional and technical constraints, Brunei expressed its commitment to enhance its inventory system through collaboration, capacity building, and regional cooperation.

Dr. XU Danhui (China) gave a presentation on China's first BTR. China submitted its first BTR and CRT in December 2024, following the rules of Modalities, Procedures and Guidelines (MPG) and using the 2006 IPCC Guidelines[1] (including the 2019 refinement[2]), and using Global Warming Potential (GWP) values from the IPCC Fifth Assessment Report. She explained that the GHG inventory covered emissions and removals from the years 2005, 2020, and 2021 using consistent methodologies and official data. In 2021, China's total GHG emissions with LULUCF amounted to about 12,999 Mt CO_2-eq. China's total GHG emissions excluding LULUCF were 14,314 Mt CO_2-eq, with Energy, Industrial Processes and Product Use (IPPU), Agriculture, and Waste contributing 76.9%, 14.9%, 6.5%, and 1.7% of total emissions, respectively.

Mr. Jacinth Paul C. APOSTOL (Philippines) gave a presentation on the Philippines' first BTR submitted in 2025. The Philippines' BTR outlines updated national circumstances and provides GHG inventories for 2015 and 2020, using the 2006 IPCC Guidelines. These inventories support the country's NDC target of a 75% GHG reduction by 2030 compared to 2010. The BTR also presents information on major climate strategies, including the NDC Implementation Plan (NDCIP), finalized in 2024.

Ms. MIN Kyungseo (Korea) gave a presentation on the First BTR and GHG Inventory of the Republic of Korea (ROK). Korea has consistently worked to enhance its GHG inventory, including the estimation of all seven GHGs. These efforts include improving foundational statistics, refining the collection of AD, and developing EFs tailored to national conditions. Key category analyses and sector-specific QA/QC have also been implemented. Emissions peaked in 2018 and declined by 7.6% by 2022, with per-GDP emissions down by 46.2% since 1990. Energy remains the dominant sector. Korea's BTR also includes projections until 2040.

The participants discussed GHG estimation methodologies and sectoral trends in these countries' inventories. Dr. Shirato (NARO) raised a question to the Philippines on the fluctuating LULUCF emissions/removals. Mr. Apostol explained that the trends were due to the inclusion of the estimation for a source category previously not estimated from 2015 onward, as well as a reduction in deforestation resulting from the recent implementation of

[1] 2006 IPCC Guidelines for National Greenhouse Gas Inventories
[2] 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

forest policies. Ms. Bumtsend (Mongolia) asked Korea about specific measures taken in the Energy, Waste, and Agriculture sectors to achieve the observed slight decrease in GHG emissions. Mr. Tanabe (IGES) and Ms. Hayashi noted that Tier 3 methodologies were used in some sectors, such as Energy, IPPU and LULUCF, in Brunei's GHG inventory, and they asked for further details about those methodologies. Mr. Tanabe then encouraged all countries to share their experiences in using higher-tier methods for the sake of ML, and Chair Ms. Recabar agreed with this.

For this session, the following conclusions were shared with the participants.

1) Countries have made good progress, as demonstrated in the submissions of their 1st BTRs, including national GHG inventories.

2) However, countries are still facing challenges in fulfilling the requirements under the ETF of the Paris Agreement, such as the reporting of detailed information through the CRTs.

3) Experience sharing offers valuable guidance for countries working to strengthen their national systems, particularly with GHG inventories becoming a biennial component of BTR submissions.

2.3 Session II: Estimation Methodology and Data for Agriculture

This session was chaired by Prof. Rizaldi Boer (WGIA Advisory Board (AB)/ IPB University) and the rapporteur was Ms. Hayashi.

The aim of this session was to understand the estimation methodology related to agriculture by sharing experiences in developing AD and (EFs).

The chair of this session, Prof. Rizaldi, noted that agriculture was one of the major sources of GHG emissions in Asia, and that it was important to ensure the accuracy of the emissions estimations from the Agriculture sector for mitigation purposes as well.

Mr. HOSAKA Masahiro (MAFF Japan) presented an overview of the Agricultural Area Surveys and Livestock Surveys, conducted by MAFF Japan, to assess the actual conditions of Japan’s agriculture. The data is used as AD for the Agriculture sector in Japan. The Agricultural Area Surveys have two types of surveys. One uses the objective survey method. Its survey population is based on an area frame developed from satellite images. The other is basically conducted through mail or online surveys, and primarily uses a list frame compiled from the results of the latest census , etc. as its basis for survey population. Regarding the Livestock Survey, which covers information on pigs, laying hens, broilers, dairy cattle, and beef cattle, data are gathered through mail or online surveys, except for cattle, which is estimated.

Dr. Patthra PENGTHAMKEERATI (Thailand) gave a presentation on the development of CS EFs for its livestock sector. Dr. Pengthamkeerati explained that Tier 2 EFs for enteric fermentation were developed for key livestock species - dairy cattle, beef cattle, and buffalo - following the 2006 IPCC Guidelines and using animal-specific physiological and feed intake data sourced from national literature and expert consultations. Tier 2 EFs for manure management were also calculated for key livestock species using CS data. The assessment

of EFs incorporated detailed information on feed energy intake, manure characteristics, and waste treatment practices. Dr. Pengthamkeerati explained that this comprehensive approach enabled improved accuracy in the national GHG inventory and supported efforts to identify mitigation opportunities within the Agricultural sector.

Dr. Anggri Hervani (Indonesia) gave a presentation on the methane EF development for rice cultivars in Indonesia. Rice cultivation, a cornerstone of food security in Indonesia and across Asia, is simultaneously a significant contributor to global methane emissions, a potent GHG with a global warming potential far exceeding that of carbon dioxide. He explained that the methane gas emissions were different for each cultivar. The research was conducted with the same conditions for soil, water, fertilizer, and agroclimate.

Dr. SHIRATO Yasuhito (NARO) gave a presentation on a nationwide soil carbon calculation system for Japanese agricultural land. Japan uses the IPCC Tier 3 modelling method to calculate CO_2 emissions and removals derived from changes in soil carbon in agricultural land. The Rothamsted Carbon (RothC) model was validated against long-term experimental datasets across Japan. It was then modified to suit Andosols and paddy soils. This reflected the soil carbon turnover mechanisms in these soils. This calculation system has been used in Japan's GHG inventory since 2015, as well as for developing the country's national soil carbon sequestration target as part of its NDC. He emphasized that long-term field observations should be highlighted further in order to develop modelling approaches.

Dr. Annuri Rossita (NIES) gave a presentation on the emission projections using AIM. She explained a case study of Indonesia’s sustainable food consumption. Using the recursive dynamic Indonesia AIM / Computable General Equilibrium model, she attempted to capture the macroeconomic state and GHG emissions externalities from mitigation policies and shifting food consumption from a conventional diet. In this study, projections were made for three scenarios: BAU, Indonesia Low Carbon Compatible with Paris Target (LCCP), and LCCP+ with add-ons of a sustainable, healthy diet. The results showed that mitigation policies under the LCPP scenario led to a 0.1% GDP loss, and when combined with a sustainable and healthy diet under the LCCP+ scenario, a higher GDP loss (1.0%) was observed. Toward 2060, the share of household spending on food commodities declined across all scenarios; however, per capita food spending rose more under the BAU and LCCP scenarios than under LCCP+, which represents a shift to a sustainable and healthy diet.

Participants discussed the methodologies of the Agriculture sector. Dr. Shirato raised a question on whether the Indonesian cropping area data was available by rice variety and on water management. Dr. Anggri explained that the cropping area data by rice variety were collected by local governments. EFs are developed for a single water management system, and although Indonesia has data on alternate wetting and drying, it is difficult to incorporate it into the GHG estimation. Mr. Raju (India) asked a question on the frequency of the Agricultural Area Survey in Japan, comparing it with the multi-cropping situation in India. Mr. Hosaka explained that Japan conducted surveys once per year. Ms. Thao (Viet Nam) asked how the accuracy of the data was ensured in Japan. Mr. Hosaka explained that Japan surveyed a statistically sufficient number of farmers to secure accuracy.

Prof. Rizaldi raised a question on how to adjust the soil carbon model for each country. Dr. Shirato explained that Asian countries could share measurement data if conditions were similar, such as in the case of neighboring countries. The model could be adjusted for each region. Dr. Federici asked a question on the treatment of the impacts of climate change on

food production in this research project. Dr. Annuri explained that it was excluded. Mr. Tanabe asked about the domestic and international food consumption aspects in NDCs and noted that GHG inventories only covered domestic emissions. Dr. Annuri emphasized the importance of life cycle analysis of food. In addition, Mr. Nomoto (MOEJ) introduced that Japan had included an action plan for food loss in its NDC.

For this session, the following conclusions were shared with the participants.

1) Accurate estimation of GHG emissions critically depends on the availability and quality of AD. Therefore, there is an urgent need to strengthen national agricultural statistics, particularly for data on agricultural land use and livestock populations. Leveraging advanced technologies such as remote sensing and satellite imagery, as well as building robust institutional arrangements, will be essential.

2) Several countries have successfully developed CS EFs and models to better reflect their national conditions. These practices offer valuable lessons for other countries, especially those aiming to enhance the accuracy of their inventories. Where local data is limited, EFs and models from countries in similar agro-ecological zones can serve as interim references to reduce the time and resources required.

3) Development of emission projections must be grounded in reliable inventory data. These projections play a vital role in informing evidence-based policy decisions. However, there are unique challenges, including the impacts of climate change on food production and the dynamics of international food trade, which add complexity to both emission estimation and policy planning.

2.4 Session III: Discussion on the ETF GHG Inventory Reporting Tool

This session aimed to facilitate the sharing of issues encountered by participating countries in using the ETF GHG Inventory Reporting Tool and to attempt to provide solutions through knowledge sharing from those with prior experiences or through BOG discussions.

Prior to the workshop, the WGIA Secretariat requested the participating countries to provide information on issues they had encountered via a questionnaire. The categorizations of the issues were as follows:

- Initial setting
- Data Entry (Data import)
- Interoperability with the IPCC Inventory Software or national calculation systems
- Exporting JSON and Excel tables
- Generating CRTs and submission
- Others

A total of nine issues were raised. Of those, three were classified under “Exporting JSON and Excel tables”, two under “Interoperability with the IPCC Inventory Software”, two under “Data entry”, one under “Generating CRT and submission”, and one under “Others”.

Based on the types of issues, three BOGs were formed. Participants joined groups

according to their interests. The countries that participated in each BOG are listed below:

BOG	Sector	Countries
BOG 1	Energy, IPPU, Waste	Bhutan, Cambodia, India, Japan, Malaysia, Mongolia, Viet Nam
BOG 2	Agriculture, LULUCF	Bhutan, Brunei, Cambodia, Indonesia, Japan, Laos, Malaysia, Philippines, Singapore, Viet Nam
BOG 3	Cross-cutting	Malaysia, Philippines, Japan

Issues discussed and key takeaways from each BOG were identified as follows.

BOG1

- Issues discussed:
  - How to fill in data to CRT Table 1.A(b) (Reference approach) and Table 1.A(d) (Non-energy use),
  - How to fill in the notation keys, especially "FX" (flexibility), for all cells,
  - The IEFs in the CRT do not match the EFs used for estimation.

- Key takeaways from the session:
  - The energy balance tables could be the data sources for CRT Tables 1.A(b) and 1.A(d).
  - "FX" can be filled in automatically through the "Version setting" function.
  - Generally, the CRT shows the IEF in an aggregated way (e.g., although the emissions from fuel combustion (1.A) are estimated for each fuel, the CRT shows only "Liquid fuels"). Therefore, the IEF is not always the same as the EFs used for the emission estimation. However, if the IEF is significantly different from the EFs used, errors may be included in the estimation.

BOG2

- Issues discussed:
  - How to deal with missing data (taking harvest wood products data as an example),
  - How areas in the land-transition matrix and AD for each land-use category should be filled,
  - No estimation for 4(III), although the loss in mineral soils is reported.

- Key takeaways from the session:
  - A clear understanding of the IPCC Guidelines and MPGs is always necessary and is helpful for efficient data entry.
  - Given that the tool remains subject to improvement, users should maintain an awareness of the status of its development.
  - In cases where automated data input is unsuccessful, manual entry may be required to ensure data completeness.
  - Cross-checking area data across different tables is important to ensure consistency.

BOG3

- Issues discussed:
  - Identification of errors in exporting and importing JSON files,

- Failure of importing JSON files from the IPCC software,
- Processing delay in the ETF tool operation.

- Key takeaways from the session:
  - The CRT preparation time within the ETF tool has now been reduced, indicating improved performance. This may naturally resolve the issue of processing delay.
  - Sharing information on the malfunctions of the ETF tool with the UNFCCC Secretariat may contribute to tool improvements.
  - By using an Excel-based cross-check file to compare the original data (e.g., from IPCC software) with CRTs from the ETF tool, it is possible to identify errors in the JSON file for import more precisely.
  - In the event of a JSON file import error, the cycle of first breaking down data import by, e.g., category, then importing via the Excel form or direct input to the ETF tool, may need to be repeated until successful.

2.5 Session IV: Technical Expert Review and Support Available

This session was chaired by Mr. TANABE Kiyoto (IGES).

The reporting and review process is critical to the effective implementation of the ETF under the Paris Agreement. It is important that WGIA countries clearly understand their roles and responsibilities within the TER process and utilize the Review team's findings to improve their national inventories. This session aimed to share relevant information, including experiences from the review of the first BTR under the Paris Agreement, as well as various support and tools available from IPCC and FAO.

Dr. Sandro FEDERICI (IPCC/TFI) presented the activities related to the development of methodologies for estimating anthropogenic GHG emissions/removals, and for supporting the application of the IPCC Guidelines. He encouraged the voluntary use of the 2019 Refinement, noting that it reflects updated scientific information, although the IPCC Inventory Software has not yet been implemented for the 2019 Refinement. He also provided the scopes and timelines for the two upcoming methodology reports on short-lived climate forcers and on carbon dioxide removal technologies and carbon capture utilization and storage. He noted that the IPCC Inventory Software was used by two-thirds of the countries that had submitted inventories, and welcomed comments to improve the Software. He also noted the usefulness of the EF Database, a resource intended to support the quality of inventories.

Mr. Vitor Gois FERREIRA (UNFCCC) provided an overview of the TER process of GHG inventories under the Paris Agreement and explained its implementation, including practical steps and timelines, such as pre-review week questions and responses, review week activities, and post-review week procedures for finalizing the TER. He noted that the review process strengthened institutions, built the capacities of national experts, and supported the establishment of national processes, systems, and tools. Through participation in the review process, experts gain access to best practices and lessons learned from other Parties and experts with varied experiences, while also expanding their professional network. He also provided information on the steps required to become a technical expert reviewer.

Mr. Tanabe shared insights from his experience as a Technical Expert Reviewer. He emphasized the importance of understanding the reporting requirements of the MPGs, as well as the appropriate application of flexibility provisions for developing countries. He noted that Parties should provide clear explanations when applying flexibility, including identification of the provision in the MPGs, clarification of capacity constraints, and estimated timelines for improvement. He also highlighted that the TER could lead to improvements in the inventory, particularly through open conversations with reviewers.

In response to a question about the advantages of in-country review compared to a centralized review, it was confirmed that in-country reviews could enable deeper, off-the-record dialogue between national experts and reviewers. In-country review may also allow broader participation from the Party and provide direct access to data and supporting information, thereby fostering mutual understanding. It was clarified that resubmissions were discouraged during the review period, from 6 weeks prior to the review week to 8 weeks after, to avoid any confusion; however, it is still possible to provide additional data even after the review week, though timely provision is preferred.

Prof. Rizaldi Boer (AB/ IPB University) shared Indonesia's experience of undergoing a centralized review of its first BTR/NID. During the review week, an online meeting was held to discuss possible improvements, following the preliminary Q&A phase in which Indonesia responded to 120 questions from the TER team. The main challenges identified were for completeness and transparency. These challenges included the use of the notation key "NE" for insignificant sources and insufficient documentation of methodologies, AD, and EFs, even when using the IPCC Inventory Software. He emphasized that the TER process helped Indonesia better understand the requirements under the MPGs and improve the clarity of descriptions of methodologies and overall transparency of the BTR/NID. He also noted that Indonesia intended to choose an in-country review in the next cycle, as it will allow more time for exchanging views, which is expected to further improve the BTR/NID.

Dr. Alessandro FERRARA (FAO) gave a presentation about the support for transparency focused on GHG inventories in Asia. He explained that support for GHG inventory reporting requirements was available through various modalities, including one-to-one online mentoring, national and regional training, and review of BTR drafts and TER simulations. FAO also provides tools developed in close collaboration with countries, along with e-learning resources aimed at strengthening institutional and technical capacities. Those resources include methane emissions estimation from enteric fermentation and uncertainty assessment, etc. Information on how to request FAO's support was also shared, including channels such as the Transparency in the Agriculture and Land Use sectors Network.

Following these presentations, it was reaffirmed that, given the fact that many developing countries use the IPCC Inventory Software to estimate emissions and removals, reviewers also need a solid understanding of how the software applies methodological approaches. Countries were encouraged to consult with other countries that had undergone a TER to prepare for their own reviews. Participants also noted that in-country reviews were generally preferred due to challenges such as time zone differences and communication difficulties inherent in the centralized review processes.

For this session, the following conclusions were shared with the participants:

1) The TER process, particularly through in-country review, is a valuable opportunity for direct dialogue between the reviewers and experts from countries undergoing review. It enables countries to gain access to best practices and helpful advice to improve the quality of future BTRs. The process also contributes to strengthening national capacity for preparing good-quality national GHG inventories.

2) Various tools and capacity-building opportunities are available from the IPCC and the FAO. Effective use of them will enhance the completeness and transparency of inventory reporting. It is important for tool users to give feedback to the IPCC and the FAO to help them make these tools even more useful, which will eventually benefit users.

2.6 Poster Session

This was held to share information on various GHG-related topics, including the latest results from research. Seven posters were displayed during the workshop, and active discussions took place at the session. During the one-on-one informal conversations, detailed information on inventory compilation procedures, emission estimation results, including trends, international support programs, and the latest research results on field surveys for developing CS EFs were discussed in depth.

2.7 Wrap-up Session

Following the presentation of the summary of the ML sessions by Dr. ODA Takefumi (GIO), Ms. HATANAKA Elsa (GIO) invited the countries that had participated in the ML sessions to share their comments. The participants of the ML sessions agreed about the usefulness of the ML sessions for improving their national inventories by exchanging experiences and challenges. One of the participants expressed appreciation for the facilitator's organization of the session, which made it easier to raise questions. Another noted that its partner country faced similar challenges, particularly in understanding its waste stream, and expressed appreciation for Japan's facilitation, which provided insights into moving to a higher-tier methodology. Ms. Hatanaka expressed her hope that the ML experience would contribute to future improvement in GHG inventories.

Next, Ms. Hayashi provided a summary of the plenary sessions. Ms. Hatanaka asked for oral comments on the proposed conclusions presented by Ms. Hayashi; however, no comments were received, including after the session in writing.

Following the summary of the plenary sessions, Ms. Hatanaka asked participants and session chairs to share general comments. Ms. Bumtsend emphasized that WGIA offered a valuable opportunity to learn from the experiences of other countries, and also to gain insights and solutions to specific issues from experts like those from the IPCC. Ms. Recabar (Philippines), the chair of Session I, expressed her appreciation for WGIA, noting that its activities of sharing experiences and building connections among experts were beneficial for countries working to improve their national systems for inventory/BTR preparation. On ML, she reemphasized the importance of outcomes gained from the ML and expressed her wish that the key discussion points be shared with those who could not join. Prof. Rizaldi (AB/ IPB University), the chair of Session II, agreed with the conclusion made by GIO and

suggested that advanced countries take the initiative in helping others obtain CS EFs, noting advanced technologies that can be utilized. Mr. Tanabe, the chair of Session IV, recommended that more countries join the ML session in future WGIAs to benefit from the partner country's expertise and input. He emphasized that such experiences were valuable for preparing for TERs and facilitative, multilateral consideration of progress. He also expressed his appreciation to Cambodia and the Secretariat of WGIA. Additional general comments were provided by other participants. Mr. Kosaka (GIO) commended the submission of BTRs by 10 out of 15 of the participating WGIA countries and noted recent improvements in both the quality of inventories and questions provided in the ML sessions.

Following these comments, Ms. Hatanaka looked back at the workshop. She described the ML sessions as a valuable opportunity for ML among WGIA countries and for receiving inputs from GIO members who peruse each country's material. Secondly, she emphasized the importance of obtaining appropriate AD not only for the accurate estimation of emissions and removals, but also for future projections, referencing the plenary session on Agriculture estimation methodologies. Thirdly, she reflected on the session regarding the ETF GHG Inventory Reporting Tool, explained its intention, and invited WGIA countries to contact GIO later if they had any questions. She also stressed the importance of granting access to the tool/involved staff members who will do the data entry work early. Lastly, she stressed the importance of timely submission and continuous improvement, instead of worrying too much about small errors, referencing the session on the review process.

Finally, H.E. PAK Sokharavuth (Cambodia) delivered the closing remarks. He expressed his appreciation to MOEJ and NIES. He looked back at the insightful discussion, valuable experiences shared, regional network strengthened, and practical knowledge gained during WGIA22. He noted that these collectively contributed to the participants' understanding of inventories and how to improve them. He also mentioned the poster session as a valuable opportunity for case studies of neighboring countries. He concluded by thanking all the participants for their active engagement and contribution to the success of WGIA22 and expressed his hope for the continued progress in national inventories through future WGIA activities, and closed the meeting.

2.8 Study Tour

On the fourth day of WGIA22, approximately 60 attendees visited the Royal University of Agriculture and attended lectures introducing the university and its research activities related to climate change mitigation, including the Japan International Cooperation Agency (JICA) Project for the development and social implementation of GHG emission reduction technologies. Following this, the attendees visited the Choeung Ek Genocidal Center, located near the University.

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

Introduction to WGIA22

ITO Hiroshi
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Abstract

Parties under the Paris Agreement (PA) are required to prepare Greenhouse Gas (GHG) inventories as part of or independent of their Biennial Transparency Reports (BTRs), with the exception for least developed country Parties and small island developing States. It is therefore increasingly important for countries to develop reliable GHG inventories.

To support developing and improving GHG Inventories of developing countries in Asia, the Workshop on GHG Inventories in Asia (WGIA) has been held annually since 2003. WGIA is organized by the Ministry of the Environment of Japan (MOEJ) and the National Institute for Environmental Studies (NIES). The member countries are 16 countries (Bhutan, Brunei, Cambodia, China, India, Indonesia, Japan, Republic of Korea, Laos, Malaysia, Mongolia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam). Throughout the years, WGIA has developed and strengthened a network of inventory experts, together with providing information to the public by making presentations and proceedings available on GIO's website.

The upcoming 22nd Workshop on GHG Inventories in Asia (WGIA22) is to be held on 15 - 18 July 2025. WGIA22 aims:
1) To enhance the quality of GHG inventories for BTRs
2) To enhance understanding of the methodology of the Agriculture sector
3) To enhance understanding on how to use the ETF GHG Inventory Reporting Tool, and
4) To strengthen the participants' understanding of technical expert review (TER).

Participants are government officials and researchers from 16 countries in Asia (Bhutan, Brunei, Cambodia, China, India, Indonesia, Japan, Republic of Korea, Laos, Malaysia, Mongolia, Philippines, Singapore, Thailand, Viet Nam, and Uzbekistan) and experts from international organizations (the secretariat of UNFCCC, the IPCC Task Force on National GHG Inventories (IPCC/TFI), Food and Agriculture Organization of the United Nations (FAO)), and others.

Access to relevant information

https://www.nies.go.jp/gio/en/wgia/index.html

Japan's Progress on Climate Change Measures and International Cooperation

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Abstract

Japan's greenhouse gas emissions for FY2023 were 1,071Mt CO_2 eq, showing a 4.0% (44.9 Mt CO_2 eq.) decrease compared to FY2022, and a 23.3% (324.4 Mt CO_2 eq.) decrease compared to FY2013. Our GDP has been on the rise in recent years except in FY2020. Greenhouse gas emissions per unit of GDP have decreased eleven years in a row. Regarding measures for forests and other carbon sinks, including blue carbon, the removals in FY2023 were 53.7 Mt, similar to those of the previous fiscal year (53.8 Mt in FY2022). In the new NDC published in February 2025, Japan sets ambitious targets to reduce its GHG emissions by 60% in FY2035 and by 73% in FY2040, from its FY2013 levels, aligned with the global 1.5°C goal. To achieve the target, Japan formulated "Plan for Global Warming Countermeasures". Japan will pursue efforts to steadily reduce its GHG emissions on a linear pathway from FY2030 target towards the achievement of net zero by 2050. These targets will increase medium and long-term predictability and accelerate Green Transformation (GX) investments, towards simultaneous achievement of net zero and economic growth.

In addition to domestic efforts, Japan promotes decarbonization globally in order to achieve the 1.5℃ goal of the Paris Agreement through dissemination of an Asian Economic Growth Model toward Net Zero including cooperation initiative for development and implementation of NDC and LT-LEDS, facility level Measurement and Reporting framework for GHG emissions with engagement of state and non-state actors, BTR, and GST report. At the same time, we have a Joint Crediting Mechanism (JCM), the Paris Agreement Article 6 Implementation Partnership (A6IP), which promotes international collaboration for capacity building related to Article 6 of the Paris Agreement (A6), and so on. Japan will continue to provide capacity building program through above initiative as well.

References/ Publications

1. National Greenhouse Gas Inventory Document of Japan 2025 (April 2025)
2. Submission of Japan's Nationally Determined Contribution (February 2025)
3. Revision of the Plan for Global Warming Countermeasures (February 2025)
4. Japan's Long-term Strategy under the Paris Agreement (October 2021)

Access to relevant information

1. https://unfccc.int/documents/646591
2. https://www4.unfccc.int/sites/NDCStaging/Pages/Home.aspx
3. https://www.env.go.jp/press/press_04467.html
4. https://unfccc.int/sites/default/files/resource/Japan_LTS2021.pdf
5. PaSTI: https://www.env.go.jp/earth/ondanka/pasti/en/index.html
6. AIM: https://www-iam.nies.go.jp/aim/index.html
7. A6IP: https://a6partnership.org/

3.2 Session I

Brunei Darussalam's GHG Inventory under the First BTR: Emissions Profile, Methodologies and Challenges in Implementation

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Abstract

Brunei Darussalam submitted its first Biennial Transparency Report (BTR) under the Enhanced Transparency Framework (ETF) of the Paris Agreement in December 2024. This presentation provides an overview of the national greenhouse gas (GHG) inventory as featured in the BTR, highlighting Brunei's current emissions and removals profile and the institutional mechanisms established to support continuous and transparent reporting.

The presentation begins with a breakdown of national emissions and removals, outlining the major contributing sectors based on 2022 data. It also introduces the overall structure of Brunei's national inventory system, including roles and responsibilities of sector leads and supporting agencies and data collection processes established under the Mandatory Reporting Directive on GHG launched in April 2023.

A key focus is placed on the methodologies and data sources used to estimate emissions, guided by the 2006 IPCC Guidelines. Country-specific data is utilized where available, with default values applied in sectors where national data are limited. The presentation also highlights improvements made in activity data coverage, while also identifying ongoing challenges, particularly in data completeness across certain IPCC categories.

Additionally, the presentation outlines Brunei's quality assurance and quality control (QA/QC) procedures, which are in the early stages of formalization but follows a tiered review approach to ensure consistency, transparency, and reliability of estimates. It also presents results of the Tier 1 uncertainty assessment, applied at the aggregate level for 2022 emissions and for trend analysis using 2010 as the base year. The analysis identifies sectors and categories contributing the highest uncertainty which will help to prioritize future improvements.

Finally, the presentation discusses key limitations and challenges faced which includes institutional and technical capacity constraints, gaps in emissions estimates, and difficulties in estimating emissions from smaller source categories etc. Despite these challenges, Brunei remains committed to strengthening its inventory system over time through capacity building, inter-agency collaboration, and progressive refinement of methodologies and data collection systems. This presentation aims to share Brunei's experience in developing the national inventory system in a resource-constrained context, while identifying opportunities for peer learning, technical support, and regional cooperation.

References/ Publications

Brunei Darussalam First Biennial Transparency Report

The People's Republic of China
First Biennial Transparency Report on Climate Change

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Abstract

China has submitted 9 GHGI to the Convention Secretariat, with the first submission of BTR and CRT in December 2024. According to the implementation rules of MPG, each Party shall use the 2006 IPCC Guidelines, and shall use any subsequent version or refinement of the IPCC guidelines agreed upon by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA), and each Party shall use the 100-year time-horizon global warming potential (GWP) values from the IPCC Fifth Assessment Report, or 100-year time-horizon GWP values from a subsequent IPCC assessment report as agreed upon by the CMA. The inventory for the base year (2005 for China) of Nationally Determined Contribution (NDC) was updated using the same methodology and data sources as those for 2020-2021. The current inventory was prepared in accordance with the above requirements. Activity data were mainly sourced from official statistics, and the emission factors were primarily based on country-specific parameters.

The first BTR provides GHGI for continuous time series from year 2005, 2020 to 2021.The National GHG Inventory includes emissions and removals of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6) from five categories: Energy, Industrial Processes and Product Use (IPPU), Agriculture, Land Use, Land-Use Change and Forestry (LULUCF), and Waste. In 2021, China's total GHG emissions (with LULUCF) amounted to about 12,999 $MtCO_2$ eq, and GHG removals from LULUCF amounted to 1,315 $MtCO_2$ eq, China's total GHG emissions (without LULUCF) amounted to about 14,314 $MtCO_2$ eq. In 2021, Energy, IPPU, Agriculture, and Waste accounted for 76.9%, 14.9%, 6.5%, and 1.7% of China's total GHG emissions (without LULUCF), respectively.

References/ Publications

The People's Republic of China First Biennial Transparency Report on Climate Change

Philippines' first BTR: Lessons Learned and Sharing of Experience

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Abstract

The Philippines' First Biennial Transparency Report (BTR) to the United Nations Framework Convention on Climate Change (UNFCCC) under the Paris Agreement reaffirms the country's commitment to the Enhanced Transparency Framework (ETF) and its active role in advancing global climate action. Despite contributing minimal contribution to global greenhouse gas (GHG) emissions, the Philippines remains among the most climate-vulnerable countries due to its archipelagic geography, exposure to extreme weather events, rising sea levels, and limited adaptive capacity.

This inaugural BTR demonstrates the Philippines' resolve to align national efforts with international climate commitments. It presents an updated account of national circumstances and reports on the 2015 and 2020 national GHG inventories covering the energy, transport, agriculture, forestry and other land use (AFOLU), industrial processes and product use (IPPU), and waste sectors, based on the 2006 IPCC Guidelines. These inventories informs the development and updating of the country's Nationally Determined Contribution (NDC) target of a 75% GHG emission reduction and avoidance by 2030, with the majority of this ambition dependent on international support.

The BTR highlights key mitigation measures, the National Adaptation Plan (NAP) 2023–2050, and the Nationally Determined Contribution Implementation Plan (NDCIP) and Gender Action Plan (GAP) completed in 2024, which together outline the country's pathway toward transformative resilience and low-carbon development. The report underscores the co-benefits of adaptation and mitigation actions and stresses the importance of cross-sectoral coordination to ensure inclusive and sustainable growth, consistent with the principle of common but differentiated responsibilities and respective capabilities (CBDR-RC).

The report also outlines systems for tracking climate finance, technology needs, and capacity-building support, while applying flexibility provisions in line with the ETF to reflect national circumstances and capacities. Strengthening data systems and institutional arrangements will help the country enhance the quality, accuracy, and completeness of future reports.

Developed through a whole-of-government and whole-of-society approach, this BTR demonstrates the Philippines' commitment to transparent, science-based climate governance. It calls for sustained and strengthened international cooperation, timely climate finance, technology transfer, and capacity development to address existing gaps and barriers. This submission lays the groundwork for continued improvements in reporting and implementation, fostering trust among Parties and reaffirming the Philippines' shared resolve to build a climate-resilient, low-carbon, and sustainable future for generations to come.

References/ Publications

2015 and 2020 National Greenhouse Gas Inventories. Climate Change Commission. 2023. https://climate.gov.ph/public/ckfinder/userfiles/files/Knowledge/Commission%20Resolution%20No_%202023-005.pdf

3. Abstracts

CCC Resolution 2018-003 Adopting the Guidance Document in Institutionalizing the Philippine Greenhouse Gas Inventory Management Reporting System of Executive Order No. 174 series 2014 Climate Change Commission Resolutions. 2018. https://climate.gov.ph/knowledge/climate-laws-and-policies/resolutions

Climate Change Expenditure Tagging. Climate Change Commission. (n.d.).

Executive Order 174 series of 2014, Institutionalizing the Philippine GHG Inventory Management and Reporting System. Climate Change Commission. 2014. https://climate.gov.ph/knowledge/climate-laws-and-policies/resolutions

Implementation Plan for the Philippines' Nationally Determined Contribution 2020-2030. Climate Change Commission. 2024. https://climate.gov.ph/knowledge/ph-ndc-implementation-plan-2020-2030

Official Development Assistance Portfolio Review. Department of Economic, Planning, and Development. (n.d.).

Philippines' National Adaptation Plan 2023-2050. Climate Change Commission. 2024. https://climate.gov.ph/knowledge/ph-nap-2023-2050

Philippines NDC Gender Action Plan. Climate Change Commission. 2024. https://climate.gov.ph/knowledge/nationally-determined-contribution-gender-action-plan-ndc-gap

The Republic of Korea's First Biennial Transparency Report and GHG Inventory

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Abstract

Under the Paris Agreement, Parties are required to submit Biennial Transparency Reports (BTR) to enhance clarity and accountability in climate action. The Republic of Korea (ROK) submitted its first BTR in accordance with the Modalities, Procedures and Guidelines (MPGs) adopted under the Enhanced Transparency Framework. It includes all key components outlined in the MPGs, including the national greenhouse gas (GHG) inventory, tracking progress in implementing and achieving the nationally determined contribution (NDC), climate change impacts and adaptation, and supporting the global community.

The first BTR provides detailed information on national GHG inventory (Chapter I), covering all sectors—Energy, IPPU, Agriculture, LULUCF, and Waste—for the period 1990–2022. Emissions from sources and removals by sinks are calculated according to the 2006 IPCC Guidelines, with partial application of the 2019 Refinement, and global warming potentials from the IPCC Fifth Assessment Report. In parallel with the estimation all seven GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3), ROK has made continuous efforts to improve its inventory through advancements in basic statistics, activity data collection, and the development of country-specific emission factors. It includes key category analyses, and sector-specific QA/QC protocols. Total emissions (without LULUCF) in ROK peaked in 2018 have since a declining trend in 2022, reduced by 7.6% compared to peak levels. Per-unit GDP emissions fell by over 46.2% since 1990, indicating continuing decoupling. It also highlights national GHG inventory trends by sector and gases – emissions from the energy sector maintained a share of ~80% of total emissions over years, playing a major influence on the trend of the national total, while CH_4 emissions declined due to structural shifts in agriculture and industry. The first BTR further includes tracking progress toward the NDC, projections to 2040 under a "WM (With Measures) scenario", and descriptions of mitigation policies such as the Korea Emissions Trading System, renewable energy adoption, and methane capture.

ROK is continuously improving its national inventory system under a coordinated institutional framework involving relevant ministries and technical agencies. As part of this effort, the ministries jointly develop a five-year rolling plan—the Master Plan for National Greenhouse Gas Inventory—which guides strategic enhancements in inventory methodologies, data quality, and transparency. In addition, we communicated with experts from relevant ministries and technical agencies to ensure transparent in preparation of first BTR. ROK's experience in preparing its first BTR offers valuable lessons for other countries, particularly experts for preparing first BTR as well as anyone who are seeking to understand ROK's GHG inventory. ROK also seeks to support other nations in meeting ETF requirements and advancing global climate ambition.

References/ Publications

The Republic of Korea's First Biennial Transparency Report and Fifth National Communication under the United Nations Framework Convention on Climate Change and the Paris Agreement

3.3 Session II

The Outline of Agricultural Area and Livestock Survey in Japan

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Abstract

The Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF Japan) conducts Agricultural Area Surveys and Livestock Surveys to assess the actual conditions of agricultural land and estimate relevant data, such as the number of livestock producers and animals. To ensure the continuous publication of accurate data, MAFF Japan employs various methods, including objective surveys, mail surveys, and online surveys, as well as utilizing data sources beyond surveys, such as administrative information, satellite data, field visits, and innovative data collection techniques.

The Agricultural Area Survey consists of two components: the Agricultural Land Area Survey and the Crop Planted Area Survey. The Agricultural Land Area Survey uses the objective survey method, while the Crop Planted Area Survey is conducted through mail or online surveys basically. The survey population for the Agricultural Land Area Survey is composed based on an area frame developed from satellite images. In contrast, the Crop Planted Area Survey primary uses a list frame as its survey population.

Regarding the Livestock Survey, which includes pigs, laying hens, broilers, dairy cattle, and beef cattle, data are gathered through mail or online surveys, except for cattle. For estimating cattle-relevant data, administrative information, such as Database on Individual Identification Information of Cattle, is utilized. The survey population for the mail and online surveys is a list frame developed using the results of the Census of Agriculture and Forestry, as well as the Livestock Survey.

Meanwhile, in the ASEAN region, the ASEAN Food Security Information System (AFSIS) has been operational for over twenty years, enhancing food security by strengthening agricultural statistics throughout the region. One ongoing challenge is estimating the rice planted area in ASEAN countries, utilizing the Japanese Radar Satellite (ALOS-2) and the Rice Mapping Software “INAHOR,” which was developed by the Japan Aerospace Exploration Agency (JAXA).

References/ Publications

Statistical Yearbook of MAFF (https://www.maff.go.jp/e/data/stat/nenji_index.htm)

Access to relevant information

Land Parcel Information Database (https://open.fude.maff.go.jp/)
The webpage of AFSIS (https://www.aptfsis.org/)

Development of emission factors for Thailand's livestock sector

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Abstract

Thailand submitted its first Biennial Transparency Report (BTR), which includes the national greenhouse gas inventory for the years 2000 to 2022. The report follows the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. In 2022, Thailand's total GHG emissions (excluding the Land Use, Land-Use Change and Forestry sector) were 385,941.14 kilotonnes of CO_2 equivalent ($ktCO_2eq$). The Energy sector remained the largest source, contributing 65.89% of total emissions. The Agriculture sector accounted for 17.86%. Compared to the year 2000, emissions from the Energy and Agriculture sectors slightly decreased. In the Agriculture sector, total GHG emissions in 2022 were 68,933.74 $ktCO_2eq$. Of this, emissions from livestock were 22,745.15 $ktCO_2eq$ (33.04%), including 18,347.24 $ktCO_2eq$ from enteric fermentation, 3,730.02 $ktCO_2eq$ from direct manure management, and 667.90 $ktCO_2eq$ from indirect manure management.

For Thailand's greenhouse gas (GHG) inventory, the methodologies and data sources used to estimate greenhouse gas (GHG) emissions from enteric fermentation and manure management in livestock sector, following the 2006 IPCC Guidelines. Tier 2 emission factors for enteric fermentation were developed for dairy cattle, beef cattle, and buffalo using animal-specific physiological and feed intake data sourced from national literature and expert consultations, primarily from the Department of Livestock Development. Tier 1 default values were applied for poultry, sheep, goats, and swine.

For manure management, livestock population data served as the primary activity input, supplemented by species-specific nitrogen excretion rates and the distribution of manure across various management systems. Tier 2 emission factors were calculated for key livestock species using country-specific data, while Tier 1 defaults were applied for minor species. The assessment incorporated detailed information on feed energy intake, manure characteristics, and waste treatment practices. This comprehensive approach enables improved accuracy in national GHG inventories and supports efforts to identify mitigation opportunities within the agricultural sector.

Livestock emissions differ by animal group due to differences in digestion and feeding systems. Ruminants produce more methane through enteric fermentation, making them a key focus for future improvements in the inventory.

References/ Publications

BTR1: Publication date 26 Dec 2024.

Access to relevant information

Inventory, Emission factor of Livestock, Agriculture

Methane Emission Factor Development for Rice Cultivars in Indonesia: A Mitigation Approach

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Abstract

Rice cultivation, a cornerstone of food security in Indonesia and across Asia, is simultaneously a significant contributor to global methane emissions, a potent greenhouse gas with a global warming potential far exceeding that of carbon dioxide. The anaerobic conditions prevalent in flooded rice paddies, a consequence of the water management practices essential for weed control and optimal rice growth, foster the proliferation of methanogenic archaea, which produce methane as a metabolic byproduct (Li et al., 2024). This methane is then released into the atmosphere through various pathways, including diffusion through the water column, ebullition of gas bubbles, and, most significantly, transport via the aerenchyma tissues of rice plants, which act as conduits for gas exchange between the submerged soil and the atmosphere (Wassmann et al., 1993). According to the research from Indonesian Agency for Agricultural Engineering and Modernization, the methane gas emission is different in each cultivar. The research was conducted with same condition of soil, water, fertilizer and the agroclimate. The single factor differences were only rice cultivars during the test. Given the substantial contribution of rice agriculture to global methane budgets, mitigating methane emissions from rice paddies is crucial for achieving climate change mitigation goals and ensuring the long-term sustainability of rice production systems. Different rice cultivars exhibit considerable variation in their methane emission potentials, stemming from differences in root morphology, aerenchyma development, and photosynthetic efficiency, all of which influence the transport of methane from the soil to the atmosphere.

References/ Publications

Li, T., McDermid, S., Valdivia, R. O., & Sundaram, P. (2024). Climate change mitigation and adaptation for rice-based farming systems in the Red River Delta, Vietnam. CABI Agriculture and Bioscience, 5(1). https://doi.org/10.1186/s43170-024-00308-0

Wassmann, R., Papen, H., & Rennenberg, H. (1993). Methane emission from rice paddies and possible mitigation strategies. Chemosphere, 26, 201.
https://doi.org/10.1016/0045-6535(93)90422-2

A nationwide soil carbon calculation system for Japanese agricultural land

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Abstract

Japan uses the IPCC Tier 3 modelling method to calculate CO_2 emissions or removals derived from changes in soil carbon (C) in agricultural land. First, the Rothamsted Carbon (RothC) model — one of the most widely used soil carbon models — was validated against long-term experimental datasets across Japan. It was then modified to suit Andosols and paddy soils, for which the original model was not suitable. This reflected the soil carbon turnover mechanisms in these soils. A nationwide soil C calculation system was then developed by combining these modified models with spatial model input data such as meteorology, soil types, land use and agricultural activities. This calculation system has been used in Japan's National Greenhouse Gas Inventory Report since 2015, as well as for developing the country's national soil carbon sequestration target as part of its NDC (Nationally Determined Contribution). The importance of long-term field observations should be highlighted further, as many valuable long-term experiments have supported the development of modelling approaches. A web-based decision support tool called 'Visualization of CO_2 absorption by soils' has been developed based on the above models. This tool allows users to easily calculate changes in soil C, CH_4 and N_2O emissions and fossil fuel consumption. With this tool, farmers can identify ways to improve the environmental sustainability of their products. Soil C sequestration can help to mitigate climate change and enable sustainable agricultural production while maintaining soil fertility. The development of models and tools may help to widely disseminate mitigation options.

References/ Publications

Shirato Y, Hakamata T, Taniyama I 2004: Modified Rothamsted carbon model for Andosols and its validation: Changing humus decomposition rate constant with pyrophosphate-extractable Al. Soil Sci. Plant Nutr., 50, 149～158.

Shirato Y, Taniyama I 2003: Testing the suitability of the Rothamsted carbon model for long-term experiments on Japanese non-volcanic upland soils. Soil Sci. Plant Nutr., 49, 921～925.

Shirato Y, Yokozawa M 2005: Applying the Rothamsted Carbon Model for long-term experiments on Japanese paddy soils and modifying it by simple tuning of the decomposition rate. Soil Sci. Plant Nutr., 51, 405-415.

Yagasaki Y, Shirato Y 2014a: Assessment on the rates and potentials of soil organic carbon sequestration in agricultural lands in Japan using a process-based model and spatially explicit land-use change inventories - Part 1: Historical trend and validation based on nation-wide soil monitoring. Biogeosciences, 11, 4429-4442.

Yagasaki Y, Shirato Y 2014b: Assessment on the rates and potentials of soil organic carbon sequestration in agricultural lands in Japan using a process-based model and spatially explicit land-use change inventories - Part 2: Future potentials. Biogeosciences, 11, 4443-4457.

Access to relevant information

“Visualization of CO_2 absorption by soils” (https://soilco2.rad.naro.go.jp/) (Web site in Japanese)

Emission Projections using the Asia-Pacific Integrated Model (AIM): A Case Study on Indonesia's Sustainable Food Consumption

-Socioeconomic Impacts from Shifting to Sustainable Food Consumption Towards Indonesia's Net Zero Emission-

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Abstract

Low- and middle-income countries will opt for the future pathway of the global food system. Similarly, in Indonesia, as a developing nation, an increasing trend in food consumption is expected. Agricultural sector expansion for food sufficiency efforts may exacerbate the pressure on the Forestry and Other Land Use (FOLU) sector; hence, it draws a setback to the country's 2060 Net Zero Emission (NZE) vision.

A comprehensive tool like an integrated assessment model is essential for assessing food consumption patterns, as it captures the interaction between agricultural production sectors and economic actors. Asia-Pacific Integrated Model (AIM) is an integrated assessment model developed by the National Institute for Environmental Studies (NIES), Kyoto University, and Mizuho Research & Technologies in collaboration with Asian researchers. The model has been used to assess climate change mitigation measures at the national level to support climate policies. Using the recursive dynamic Indonesia Asia-Pacific Integrated Model/Computable General Equilibrium (AIM/CGE) model, we attempted to capture the macroeconomic state and GHG emissions externalities from mitigation policies and shifting food consumption from a conventional diet. In this study, the projection was simulated for three scenarios of Business-as-Usual (BaU), Indonesia Low Carbon Compatible with Paris Target (LCCP), and LCCP+ with add-ons of a sustainable healthy diet. The LCCP+ scenario emphasizes a lower calorie intake per capita and less consumption of emission-intensive food sectors according to the national Desirable Dietary Pattern (DDP).

Our results found that mitigation policies under the LCPP scenario lead to a 0.1% GDP loss, and when combined with a sustainable and healthy diet under the LCCP+ scenario, a higher GDP loss (1.0%) was observed. Toward 2060, the share of household spending on food commodities declines across all scenarios; however, per capita food spending rises more under the BaU and LCCP scenarios than under LCCP+, which represents a shift to a sustainable and healthy diet. While the implementation of agriculture mitigation policies potentially generates 15% of emission reduction, we found an additional 10% of emission reduction if mitigation policies were followed by behavioral changes on food demand. Considering the plausible socioeconomic and environmental impacts of agriculture mitigation policies and dietary shifting, policies aiming to increase household income and regulate food prices, adding in the synergy of cross-sectoral policies, are key enablers for coupling health, socioeconomic, and environmental benefits.

Keywords: AIM/CGE, behavioral change, food demand, net zero, sustainable diet

3.4 Session IV

The Seventh Assessment Report Cycle of the IPCC:

Activities of the Task Force on National Greenhouse Gas Inventories (TFI) as supported by TSU

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Abstract

The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988. Its main objective was to assess scientific, technical and socio-economic information relevant to the understanding of human induced climate change, potential impacts of climate change and options for mitigation and adaptation. The IPCC has completed assessment reports, developed methodology guidelines for national greenhouse gas inventories, special reports and technical papers (see http://www.ipcc.ch/).

The IPCC has three Working Groups and a Task Force.

- ✓ Working Group I (WG I) : The science of climate change
- ✓ Working Group II (WG II) : Impacts, adaptation and vulnerability
- ✓ Working Group III (WG III) : Mitigation of climate change
- ✓ Task Force on National Greenhouse Gas Inventories (TFI)

The TFI was established by the IPCC, at its 14th session (October 1998), to oversee the IPCC National Greenhouse Gas Inventories Programme (IPCC-NGGIP). This programme had been undertaken since 1991 by the IPCC WG I in close collaboration with the Organisation for Economic Co-operation and Development (OECD) and the International Energy Agency (IEA). In 1999, the Technical Support Unit (TSU) of TFI was set up at the Institute for Global Environmental Strategies (IGES) in Japan.

The objectives of the TFI are:

I. to develop and refine an internationally agreed methodology and software for the calculation and reporting of national GHG emissions and removals; and
II. to encourage the widespread use of this methodology by countries participating in the IPCC and by signatories of the United Nations Framework Convention on Climate Change (UNFCCC).

Products of the IPCC TFI are at foundation of the Enhanced Transparency Framework under the Paris Agreement -*IPCC Guidelines*- and are instrumental for its implementation -*IPCC Inventory Software*.

References/ Publications

2006 IPCC Guidelines for National Greenhouse Gas Inventories

2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands

2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Access to relevant information

https://www.ipcc-nggip.iges.or.jp/index.html

Outline of the UNFCCC reviews process under the Paris Agreement

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GHG inventory Unit, UNFCCC

Abstract

Biennial Transparency Reports (BTRs) and National Inventory Reports (NIRs) constitute key pillar in the operationalization of the Enhanced Transparency Framework (ETF) under the Paris Agreement, whose implementation formally commenced in 2024 and is now fully underway. The ETF builds upon many years of experience gained through the Measurement, Reporting and Verification (MRV) system established under the UNFCCC and the Kyoto Protocol. It aims not only to ensure mutual trust and confidence among Parties but also to serve as an avenue for Parties communicating robust and policy-relevant information to the international community and scientific bodies.

Within ETF, Greenhouse gas (GHG) inventories are a fundamental component of the ETF and form the empirical foundation upon which the tracking of progress toward Nationally Determined Contributions (NDCs) of most Parties is based. High-quality, transparent, and consistent reporting—aligned with the modalities, procedures and guidelines (MPGs) adopted by Parties and the methodological guidance provided by the IPCC— are crucial to ensure the credibility and reliability of reported data. The reporting and review process is thus critical to the effective functioning of the ETF.

This presentation provides an overview of the institutional and procedural framework for national GHG inventory reporting by Parties and its subsequent technical expert review, as coordinated by the UNFCCC secretariat. It outlines the key elements of the review process, including the materials, training modules, and support approaches that are being developed to facilitate efficient, consistent, and technically rigorous reviews. The presentation also highlights practical experiences in the implementation of the ETF, offering workshop participants a comprehensive understanding of the operational landscape and emerging developments relevant to transparency under the Paris Agreement.

References/ Publications

Modalities, Procedures and Guidelines (MPGs),
https://unfccc.int/resource/tet/0/00mpg.pdf

2006 IPCC Guidelines for National Greenhouse Gas Inventories,
https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories,
https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html

Access to relevant information

https://unfccc.int/reporting-and-review
https://unfccc.int/process-and-meetings/transparency-and-reporting/training-programmes-for-expert-reviewers
https://www.ipcc-nggip.iges.or.jp/index.html

Reviewer Experience

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Abstract

This presentation aims to help colleagues from WGIA member countries to prepare for the technical expert review (TER) of the first biennial transparency report (BTR1) under the Paris Agreement by providing advice based on my experiences gained mainly through the TER of Guyana's BTR1 which was conducted as an in-country review from 30 September to 4 October 2024 in Georgetown, Guyana. Guyana's cases are referred to in this presentation, but they are just as examples. This presentation does never intend to examine or assess Guyana's BTR1.

Some pieces of advice are offered to colleagues from the WGIA member countries from the reviewer's perspective as follows.

Needless to say, it is advisable that they should familiarize themselves with the reporting requirements stipulated in the modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement (MPG). This is necessary because questions from technical expert reviewers are associated with one or some of the MPG reporting requirements.

Among others, clear explanation about application of a "flexibility" provided for in some of the provisions in MPG is important. "Flexibility" lowers the hurdle for developing country Parties to meet reporting requirements. Where necessary, the "flexibility" should be duly applied and transparently explained. Developing country Parties would be advised to prepare for reviewers' questions about "flexibility".

It is also recommended that those who will undergo TER try to imagine what reviewers want to know. Preparation of answers or relevant materials in advance will facilitate the TER. In this context, Mutual Learning sessions in WGIA are very helpful.

Finally, it is highly advisable that dialogue with technical expert reviewers should be fully enjoyed. Technical expert review is a golden opportunity to find ways to improve the BTR (including national GHG inventory) in consultation with technical expert reviewers.

References/ Publications

- Report on the technical expert review of the first biennial transparency report of Guyana (FCCC/ETF/TERR.1/2024/GUY)
  https://unfccc.int/documents/647938
- Addendum to the Report on the technical expert review of the first biennial transparency report of Guyana (FCCC/ETF/TERR.1/2024/GUY/Add.1)
  https://unfccc.int/documents/647937
- Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement (Annex to decision 18/CMA.1)
  https://unfccc.int/documents/193408

Experiences in Undergoing Technical Expert Review (TER) of 1ST Indonesian BTR and NIR

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Abstract

This report summarizes Indonesia's experience undergoing its first Technical Expert Review (TER) of the National Inventory Document (NID) and Biennial Transparency Report (BTR), submitted in December 2024 under the enhanced transparency framework. The centralized review process assessed Indonesia's greenhouse gas inventory and reporting according to the Modalities, Procedures, and Guidelines (MPG) established in Decision 18/CMA.1 and Decision 5/CMA.3. The review aimed to identify findings, provide support for future reporting cycles, and discuss capacity-building needs.

Overall, the review team found that Indonesia's NID and BTR were well-prepared and comprehensive, particularly regarding mitigation policies and measures. However, key challenges remain related to completeness, transparency, and methodological clarity. The review highlighted the need for Indonesia to carefully apply all MPG requirements, including clear documentation of methodologies, activity data, emission factors, and assumptions used for emissions estimation. Reporting gaps such as incomplete activity data or unestimated emissions must be transparently noted with justifications, and proxy data used where appropriate.

Several specific areas for improvement emerged. Indonesia should more clearly describe the construction of the business-as-usual (BAU) emission scenario and differentiate it from projections reflecting implemented or additional mitigation measures. Methodological assumptions underlying emission reduction estimates should be detailed directly within the BTR or annexes, rather than relying solely on external references. For forward-looking projections, reporting should extend from the most recent inventory year through at least fifteen years beyond the next "zero or five" year, explicitly addressing any applied flexibility provisions and capacity constraints.

The TER provided valuable lessons for Indonesia, including a better understanding of how to properly follow the MPG, enhanced clarity, and transparency in reporting, and identification of challenges in estimating emissions from various sources and sinks. Importantly, Indonesia intends to pursue an in-country review during the next cycle, reflecting its commitment to continuous improvement.

This first centralized TER represents a crucial step for Indonesia in strengthening its transparency framework and reporting quality under the Paris Agreement. The insights from the review help the country enhance the completeness, accuracy, and transparency of future greenhouse gas inventories and biennial reports, ultimately supporting improved tracking of Indonesia's Nationally Determined Contribution (NDC) implementation and climate policy initiatives.

FAO support to transparency: a focus on Asia

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Abstract

The Enhanced Transparency Framework (ETF) under the Paris Agreement requires countries to submit Biennial Transparency Reports (BTRs) containing comprehensive information on greenhouse gas (GHG) inventories, mitigation, adaptation, and support received and provided. FAO plays a key role in assisting developing countries to meet these requirements, particularly in the agriculture, forestry, and other land use (AFOLU) sector.

This presentation provides an overview of FAO's support to ETF implementation, beginning with its role as a GEF implementing agency for Enabling Activities and CBIT projects. FAO provides technical and institutional assistance for the development of national MRV systems, the establishment of legal and institutional arrangements, and the design of country-driven roadmaps and capacity-building strategies.

A range of technical tools and services are presented, including the BTR Roadmap Tool, ETF Capacity Assessment Tool (ETF-CAT), GHG Data Management Tool, GLEAM, Collect Earth, Logic, and FAOSTAT. These tools support data collection, analysis, reporting, and review readiness across all ETF elements.

The presentation also highlights FAO's support for countries in reporting to the UNFCCC using CRT and CTF tables and for preparing for the Technical Expert Review (TER), ensuring alignment with IPCC guidelines and UNFCCC processes. Country-specific examples from Asia help illustrate practical applications.

Finally, the presentation touches on FAO's collaboration with other transparency actors, including UNEP, ICAT, CBIT-GSP, and regional platforms such as PATPA, with a strong emphasis on regional capacity building.

References/ Publications

At this link, you can find most of the tools developed by FAO to support countries in GHG inventory and transparency efforts, which will be referenced in the presentation.
https://www.fao.org/in-action/climate-change-transparency/resources/tools-and-data/en

At this link, you can find all the eLearning courses (curriculum) developed by FAO to strengthen institutional and technical capacities on GHG inventories
https://www.fao.org/in-action/climate-change-transparency/resources/e-learning/en

3.5 Poster Session

Preparation of Japan's National Greenhouse Gas Inventory and Trends in GHG Emissions

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

Abstract

On the basis of Article 4 and 12 of the United Nations Framework Convention on Climate Change (hereinafter, Convention) and Article 13 of the Paris Agreement, Japan is required to regularly prepare national greenhouse gas (GHG) inventories and submit them to the United Nations. Moreover, Article 7 of Japan's Act on Promotion of Global Warming Countermeasures, which provides for domestic measures under the Convention and the Paris Agreement, requires the Government of Japan to annually estimate and make public Japan's GHG emissions and removals.

In accordance with these Articles, the Greenhouse Gas Inventory Office of Japan (GIO) develops the national GHG inventory under a contract with the Ministry of the Environment. The emissions and removals are estimated based on the outcome of the Committee for the GHG Emission Estimation Methods. Before compiling the inventory, GIO collects data from relevant ministries, agencies, and organizations to estimate emissions and removals. Based on these data together with other data from statistical publications, GIO then compiles the GHG inventory.

Japan's GHG emissions and removals in FY2023 were 1,017 million tonnes of carbon dioxide equivalents (Mt CO_2 eq.). (Emissions: 1,071 Mt CO_2 eq., Removals: 53.7 Mt CO_2 eq.)

The emissions decreased by 23.3% (324.4 Mt CO_2 eq.) compared to the FY2013 emissions (1,395 Mt CO_2 eq.), mainly because of reduced energy consumption and the decrease in CO_2 emissions from electricity production due to the wider use of decarbonized electricity (wider adoption of renewable energy and resumption of nuclear power plant operations).

Access to relevant information

https://www.nies.go.jp/gio/en/index.html

Historical Trends in Agricultural Greenhouse Gas Emissions in Malaysia (1990–2021)

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Abstract

Greenhouse gas (GHG) emissions from Malaysia's agriculture sector have exhibited a 14.9% increase over the past three decades compared to 1990 levels, largely attributable to intensified agricultural practices aimed at meeting food security demands amid population growth. Nitrous oxide (N_2O) and carbon dioxide (CO_2) represent the primary contributors to this trend, having increased by 45.7% and 38.7%, respectively. Emission sources include direct N_2O emissions from managed soils, methane (CH_4) emissions from flooded rice cultivation, indirect N_2O emissions from nitrogen volatilization and leaching, enteric fermentation, and manure management systems. In 2021, agricultural emissions accounted for 7,310.04 Gg CO_2-equivalent, or 2.20% of Malaysia's total GHG emissions. Methane (CH_4) and N_2O constituted the majority of emissions from this sector, at 55% and 39%, respectively, with CO_2 emissions comprising approximately 6%. Despite the sector's relatively modest contribution to national emissions, its high output of non-CO_2 GHGs underscores its importance for mitigation efforts. The projected rise in population beyond 37 million by 2023 is expected to further intensify pressure on agricultural systems, necessitating the implementation of integrated mitigation and adaptation strategies to reduce emissions while maintaining productivity and enhancing national food self-sufficiency.

References/ Publications

Malaysia. 2024 Biennial Transparency Report (BTR). BTR1. | UNFCCC

Access to relevant information

https://unfccc.int/documents/645171

Refining Methane Inventory for Malaysian Rice Cultivation Using Country-Specific Emission Factor

Mohd Aziz Rashid, Mohd Saufi Bastami, Nurul Ain Abu Bakar, Fauzi Jumat, Mohd Fairuz Md Suptian, Mohammad Hariz Abdul Rahman, Azizi Ahmad Azmin and Shaidatul Azdawiyah Abdul Talib

Malaysian Agricultural Research and Development Institute (MARDI), Malaysia

Abstract

Methane (CH_4) emissions from rice cultivation in Malaysia are currently estimated using a regional default emission factor (EF) of 1.60 kg CH_4 ha^{-1} day^{-1}, as a nationally derived EF has not yet been developed. This study aims to develop a country-specific EF for CH_4 emissions from Malaysian rice fields to refine national greenhouse gas (GHG) inventory reporting. The new EF was derived from eleven rice-growing seasons across granary and non-granary areas, incorporating data from field measurements, published literature and unpublished datasets from MARDI. Methane flux was quantified using the static chamber technique and CH_4 concentrations were analysed using a GC System (Agilent 7890A). The calculated mean EF was 1.80 kg CH_4 ha^{-1} day^{-1}, which lies within the range of default values provided by the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories; 2.00 kg CH_4 ha^{-1} day^{-1} (IPCC 1996) and 1.30 kg CH_4 ha^{-1} day^{-1} (IPCC 2006). Malaysia's hot and humid climate likely contributes to the higher EF value by enhancing methanogenesis activity by methanogenic bacteria, which are thermophiles that thrive at high temperatures, accelerating organic matter decomposition and increasing soil CH_4 emissions. In Malaysia's First Biennial Transparency Report (BTR1) submitted to the United Nations Framework Convention on Climate Change (UNFCCC), rice cultivation was reported as the largest source of CH_4 emissions within the agriculture sector, accounting for 89.27 Gg CH_4 (2,499.50 Gg CO_2 eq.) based on the existing regional EF. When applying the newly developed EF, emissions increase to 100.43 Gg CH_4 (2,812.04 Gg CO_2 eq.), reflecting a 12.49% rise in annual CH_4 emissions from rice cultivation. This increase is consistent with IPCC estimation protocols, where annual emissions are calculated by multiplying the daily EF by cultivated area and growing period. The development of a national EF remains an evolving process and continued collection of emission data from diverse agroecological zones will improve its accuracy in representing national rice cultivation emissions.

References/ Publications

Rashid, M. A., Bastami, M. S., Bakar, N. A. A., Jumat, F., Suptian, M. F. M., Rahman, M. H. A., Azmin, A. A and Talib, S. A. A. (2024). Development of National Emission Factor for Rice Production System in Malaysia: A Step Toward Achieving Sustainable Development Goals. Journal of Lifestyle and SDGs Review, 5(2), e02774.

Access to relevant information

https://doi.org/10.47172/2965-730X.SDGsReview.v5.n02.pe02774

JICA Project for Strengthening Capacity Pertaining to National Reporting Obligation to the UNFCCC under the Enhanced Transparency Framework

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Abstract

The Paris Agreement, adopted in 2015 under the UNFCCC, established the Enhanced Transparency Framework (ETF) under Article 13. This framework requires all Parties, including developing countries, to submit Biennial Transparency Reports (BTRs) with GHG inventory data, progress on NDCs, and information on finance, technology transfer, and capacity-building. Unlike the previous MRV system, the ETF applies a common set of Modalities, Procedures and Guidelines (MPGs) to all countries, regardless of development status.

Malaysia has actively engaged in climate reporting, submitting four National Communications (NCs), four Biennial Update Reports (BURs), and completing its first BTR in 2024. In preparation for ETF implementation, Malaysia established the National GHG Centre (MyGHG) under the Ministry of Natural Resources and Environmental Sustainability (NRES), serving as the national focal point for transparency. While this institutional progress is notable, further technical and institutional strengthening is needed to meet ETF standards, particularly in areas such as F-gas emissions estimation and data quality assurance.

In response to Malaysia's evolving needs, the NRES and JICA initiated a three-year technical cooperation project starting in October 2024. The project aims to enhance Malaysia's capacity to fulfil its national reporting obligations under the ETF through two main outputs:

Output 1: Strengthened institutional and technical capacity for preparing BTRs and implementing ETF-related activities

Output 2: Improved methodologies and systems for estimating emissions of fluorinated gases (F-gases)

The overall goal is to strengthen Malaysia's ability to produce more accurate, transparent, and consistent reporting in accordance with the Paris Agreement, thereby contributing to effective global climate action. The project also aims to position Malaysia as a regional leader in ETF implementation, supporting broader capacity-building and knowledge sharing within Southeast Asia.

References/ Publications

NRES-JICA Joint Technical Cooperation Project to Tackle Climate Change (JICA Website)

Access to relevant information

https://www.jica.go.jp/english/overseas/malaysia/information/press/2024/1563532_53453.html
https://www.jica.go.jp/english/overseas/malaysia/information/press/2024/1564520_53453.html

Bilateral Cooperation for BTRs under Japan's transparency-related support initiative

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Abstract

Climate change is not a problem that can be solved solely by reducing greenhouse gas (GHG) emissions in one country; all countries must implement effective climate change countermeasures. In order to effectively implement emission reduction measures in each country, it is crucial to accurately estimate GHG emissions and removals, formulate GHG emissions reduction targets, monitor reduction efforts, and strengthen reduction measures. It is also essential from the perspective of understanding the status of global emission reductions to establish a national system that enables each country to report the actual status of GHG emissions and removals and the implementation of climate change policies to the United Nations Framework Convention on Climate Change (UNFCCC) secretariat in accordance with the Paris Agreement in a transparent and appropriate manner. In this context, the Ministry of the Environment of Japan has implemented the transparency-related support initiative, which consists of various forms of support to help other countries establish such a system and develop relevant capacities to promote transparency activities.

Bilateral Cooperation for the Biennial Transparency Report (BCB) was launched in 2024, providing support for the development and improvement of GHG inventories and BTRs, which are required to be reported under the Paris Agreement. Those activities have been conducted in the Lao People's Democratic Republic and the Kingdom of Cambodia since 2024.

The BCB aims to continuously strengthen the technical capabilities related to transparency of partner countries, support substantive work on GHG inventories and BTRs, and build a network of practitioners engaged in transparency activities. The BCB is not ad-hoc support but rather close-following support, providing ongoing support while accompanying partner countries in the preparation of BTR and GHG inventories. Also, it provides flexible customizability, enabling a support plan to be tailored to the partner country's specific support needs, schedule, and national circumstances.

In the support project for the Lao PDR, the BCB has provided national experts involved in the preparation of GHG inventory for the BTR1 of Lao PDR with basic knowledge of the enhanced transparency framework (ETF), modalities, procedures and guidelines (MPGs), and the 2006 IPCC Guidelines, and supported them in the actual preparation of GHG inventories. In the support project for Cambodia, the BCB has considered the structure and prototype of Cambodia's National GHG Inventory estimation file system (CNGI) and shared information on the national system for preparing GHG inventories.

Support for these two countries will continue in FY 2025. Taking into account the challenges faced by these partner countries, the BCB intends to provide more appropriate and effective technical support and contribute to improving transparency in the Asian region.

Scenario of India GHG emissions in Energy sector inventory data: Methodological approach and challenges

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Abstract

As highlighted in the recent BUR4, India has reduced the emission intensity of its GDP by 36% between 2005 and 2020, which indicates improvement in technology and energy efficiency. Thus, we achieved the initial NDC target much ahead of the deadline. The energy sector accounted for the largest share of GHG emissions, around 75%, followed by agriculture, around 14%, industrial processes and product use (IPPU), around 8%, and waste around 3%. Considering, the energy sector is the most important sector with regards to the emissions, analyzing and reconciling the activity data of energy emissions are real challenges as there are inadequacies and gaps in activity data available from diverse sources. In this sector, coal/lignite are primary energy sources and emission sources. The study of methodologies and choice of data applied in the emission estimation studies are very crucial to fulfill the objectives of the inventory preparation. There are various constraints in data availability in energy sector and in some cases data as per IPCC requirements, e.g., calendar year data are unavailable. To resolve such issue, two consecutive financial years data were reconciled to derive calendar year activity data. As activity statistics from different sources may vary, judicious decision is taken to choose the appropriate one. In India, supply data are often considered be more accurate/appropriate than consumer end data. Nevertheless, the emissions are estimated using the country-specific coal/lignite emission factors and IPCC default values for other fuels. For non-coking coals in power and heat production, and also for few other key sectors, sector-specific emission factors are utilized. These sector-specific factors and country-specific emission factors are being revised for future communications. Tier levels of the estimations are mostly Tier II or improved Tier I. A realistic approach was used to allocate coking coal usage in iron and steel and solid fuel manufacturing. Imported coal, washery performance data, washed coal delivery were considered for Iron and Steel Sectors. The inventory of GHG emissions also includes uncertainty analysis according to the IPCC 2006 guidelines. The uncertainty analysis normally prioritizes national efforts to improve future inventory accuracy and precision and guide policy decisions for mitigation actions.

Keywords: India, GHG Inventory, Methodology, Energy Sector

References

MoEFCC.(2024). India: Fourth Biennial Update Report to the United Nations Framework Convention on Climate Change. Ministry of Environment, Forest and Climate Change, Government of India.

MoEFCC.(2023). India: Third National Communication (TNC) to the United Nations Framework Convention on Climate Change (UNFCCC), Ministry of Environment, Forest and Climate Change.

Overview and Challenges in Agriculture sector: 1st BTR of the Republic of Korea

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Abstract

As of 2022, greenhouse gas (GHG) emissions from the agriculture sector in Korea amounted to 23 million tons, accounting for 3.2% of the country's total emissions. The largest source was rice cultivation, which emitted 7.1 million tons, representing 31.0% of emissions from the agriculture sector. This was followed by enteric fermentation (6.7 million tons), manure management (6.1 million tons), and agricultural soils (2.9 million tons). Other sources, such as crop residue burning, accounted for approximately 0.1 million tons. Rice cultivation, enteric fermentation, and manure management were included in the key category in 2022.

For the agriculture sector, GHG emissions were mainly estimated using the 2006 IPCC Guidelines and the 2019 Refinement for manure management. These results were submitted to the BTR applied with AR5 Global Warming Potential (GWP) values. Out of 56 emission sources in the agriculture sector from the 2006 IPCC Guidelines, Korea reported 34 sources, excluding 4 sources as "NE" (Not Estimated), 17 sources as "NO" (Not Occurring), and 1 source as "NA" (Not Applicable). Furthermore, Tier 2 methodologies were applied to estimate approximately 98% (22.4 million tons) of the agriculture sector emissions, and country-specific emission factors were used for 93% of the total agricultural sector emissions.

This presentation will cover the detailed status of GHG emissions estimation in the agriculture sector as reported in Korea's first Biennial Transparency Report (BTR), along with identified areas for future improvement based on these findings.

References/ Publications

Republic of Korea Biennial Transparency Report (1st BTR)

4. Report on the Mutual Learning Session

4 Report on the Mutual Learning Sessions

4.1 Overview of the Mutual Learning

ML is an activity to improve individual countries' inventories through the following series of processes: 1) exchanging inventories between two countries, 2) perusing a partner country's inventory, and 3) exchanging comments on each other's inventories. The primary purpose of ML is to improve GHG inventories by providing details of methods and data for GHG emission/removal estimation between two countries and by exchanging comments on the methods and data. ML is also expected to foster and strengthen a cooperative relationship among GHG inventory experts. Since the aim of ML is not criticism or audit, participants can conduct a two-way communication and follow-up through direct conversation.

The first ML was held on the Waste sector between GIO and Korea Environment Corporation in an 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 a regular session since WGIA9 in 2011.

Table 4.1.1 History of ML

		General	Energy	IPPU	Agriculture	LULUCF	Waste
2008-2010		Trial implementation Japan–Korea					
2010	WGIA8	Introduction to ML (with hands-on training)					
2011	WGIA9	-	Indonesia–Mongolia	-	-	Japan–Laos	Indonesia–Cambodia–Korea
2012	WGIA10	-	Cambodia–Thailand	Indonesia–Japan	Indonesia–Viet Nam	-	China–Korea
2013	WGIA11	-	Laos–Thailand	-	China–Myanmar	-	Malaysia–Viet Nam
2014	WGIA12	-	Indonesia–Myanmar	-	China–Mongolia	Viet Nam*[1]	-
2015	WGIA13	Japan–Viet Nam	-	-	Indonesia–Laos	Cambodia–Mongolia	Korea–Myanmar
2016	WGIA14	-	Brunei–Korea	Myanmar–Malaysia	-	Indonesia–Laos	Mongolia–Thailand
2017	WGIA15	-	Mongolia–Viet Nam	-	-	Laos–Myanmar	China–Philippines
2018	WGIA16	-	India–Viet Nam	-	-	-	Japan–Laos
2019	WGIA17	China–Singapore	Thailand–Japan	-	Cambodia–Philippines	-	-
2020	ML2020*[2]	Indonesia–Japan	Cambodia–Myanmar	-	China–Japan	Mongolia–Singapore	-
2021	WGIA18*[3]	Thailand–Japan	Brunei–Mongolia	-	-	Bhutan–Indonesia	China–Indonesia
2022	WGIA19*[3]	-	China–Malaysia	-	-	Singapore–Viet Nam	-
2023	WGIA20	-	-	Mongolia–Philippines	-	Indonesia–Laos	Japan–Viet Nam
2024	WGIA21	-	China–Mongolia	India–Malaysia	Cambodia–Indonesia	-	-
2025	WGIA22	-	China–Japan	-	-	-	Mongolia–Bhutan

*[1] Reporting from Viet Nam with comments from experts
*[2] The physical meeting of WGIA was cancelled to prevent the risks of the COVID-19 but the ML sessions were conducted online.
*[3] WGIA18 and WGIA19 were conducted online due to the COVID-19 pandemic.

Participants

The WGIA Secretariat first sought applications from WGIA member countries to participate in the ML sessions. Considering the applicants' possible interests and knowledge, an appropriate balance among sectors, and the feasibility of implementation, the WGIA Secretariat set up two pairs of countries (China and Japan on the Energy sector and Bhutan and Mongolia on the Waste sector).

Preparation Process

A few months before WGIA22, the chosen participants for ML submitted the materials of their inventories to the WGIA Secretariat, including reports describing details of methodologies and worksheets of emission estimates, and exchanged the materials with their partner countries through the Secretariat. By perusing the materials provided by the partner country, the participants found good points, such as advanced methodologies and well-institutionalized inventory management systems, as well as unclear points and issues to be improved in the partner country's inventory. Such findings were provided as

comments and questions to their partner countries in “Q&A Sheets”. After that, the “Q&A Sheets” were exchanged between the partner countries. The partner countries responded to these comments and questions before the WGIA22 took place.

Table 4.1.2 Submitted Materials for the ML

Sector	Country	Inventory
Energy	China	BTR1 (2024) and BUR*1 4 (2024)
	Japan	NID-2025 and CRT-2025
Waste	Bhutan	BTR1 (2024) and CRT-2024
	Mongolia	NC*2 4 (2023) and NIR*3 -2023

*1 Biennial Update Report
*2 National Communication
*3 National Inventory Report

Discussions

In the WGIA22, two ML sessions were held on July 15th to discuss sector-specific issues based on preliminary comment exchanges. To encourage a frank discussion and to ensure confidentiality, these sessions were held as closed-door discussions.

Many WGIA countries have submitted their first BTRs under the Paris Agreement’s ETF. They are working to improve the completeness of inventory reporting by identifying previously unestimated sources through reporting CRTs, organizing primary statistics for AD, and developing CS EFs. One of the participating countries is also continuing to address issues that were identified during past ML sessions.

The participants shared their experiences and had frank discussions to further enhance and improve these efforts. Building on these discussions, the participants are expected to improve and prepare their inventories for the next BTR submission.

In the wrap-up session, broader participation in future ML sessions was strongly encouraged, since the Q&A process in ML supports the preparation for TERs under the Paris Agreement.

The points of discussion and the outcomes of each ML session are summarized in the following sections (4.2–4.3).

4.2 Session on the Energy Sector

Sector Overview

China and Japan participated in the ML session on the Energy sector. The general information for the two countries is shown in the table below.

Table 4.2.1 Overview of GHG Inventories in the ML Partner Countries

	China	Japan
National total GHG emissions (kt CO_2 eq., with LULUCF)	12,998,842 (in 2021, CRT, mainland)	1,020,739 (in 2023, CRT)
GHG emissions in the Energy sector (kt CO_2 eq.)	11,006,718 (in 2021, CRT, mainland)	944,539 (in 2023, CRT)
Responsible agency for the inventory	Ministry of Ecology and Environment	Ministry of the Environment of Japan
Estimation methodology for the Energy sector	2006 IPCC Guidelines, Tier 1, Tier 2, and Tier 3	2006 IPCC Guidelines and 2019 Refinement Tier 1, Tier 2, Tier 3, and CS methods
Source of EFs for the Energy sector	IPCC default values and CS values	Default values of IPCC and EMEP [*1], and CS values
Source of AD for the Energy sector	National Bureau of Statistics, Aviation Agency, relevant associations, etc.	National statistics/surveys, data provided by industry

*1 EMEP: European Monitoring and Evaluation Programme

Materials Used

To prepare for the ML session, the partner countries exchanged their materials relevant to the Energy sector through the Secretariat a few months before the workshop. The materials exchanged were as follows:

China
- BTR1 (2024)
- BUR4 (2024)

Japan
- Inventory submitted in 2025

Questions and Answers

After receiving the materials listed above, the countries studied them and sent questions and comments to the partner country before the workshop. The classification and the number of questions are as follows.

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

Classification of questions	Number of questions/comments	
	from China to Japan	from Japan to China
Acquisition of AD	0	4
Adoption of EFs	6	4
Estimation methods	2	3
Institutional arrangement	0	0
Others	4	6

Outcomes of the Mutual Learning Session

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

- **Issues and Solutions / Outstanding issues**

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

1. The issues[3] identified during the previous ML participation remain. However, these issues are incorporated into the future improvement plan. (China)
2. The inventory description in BTR could be further enhanced, especially for the CS EFs and the CS fuel categories. (China)
3. Possibly increase the frequency of the updates of some EFs for fuel combustion. (Japan)

- **Good Practices**

The following were identified as good practices:

China

1) The inventory description in BTR1 is enhanced compared with the NC3 and BUR3.
2) The data, such as EFs, reported by companies in the national carbon market, are used in the inventory.

Japan

1) Tier 3 method is applied for the fuel combustion category and the fugitive emissions category.
2) Specific references are given for the carbon EFs for the fuel combustion category in NID.

[3] These include obtaining X-2 data for some categories. Refer to the proceedings of WGIA19 and WGIA21 for the other issues.

Table 4.2.3 Participants in the ML on the Energy Sector

Countries	Name	Organization
China	Dr. XU Danhui	National Center for Climate Change Strategy and International Cooperation, Ministry of Ecology and Environment
	Ms. QIU Tingting	
	Dr. HU Peiqi	Energy Research Institute
Japan	Mr. KOSAKA Naofumi (Facilitator)	GHG Inventory Office of Japan, National Institute for Environmental Studies
	Mr. ITO Hiroshi (Facilitator)	
	Ms. HATANAKA Elsa (WGIA Secretariat)	
	Dr. ODA Takefumi (WGIA Secretariat)	
	Mr. OKANO Shohei (Workshop organizer; Online)	Ministry of the Environment of Japan
	Mr. ISHIDA Tsutomu (Workshop organizer; Online)	
	Ms. HAYASHIDA Moeka (Workshop organizer; Online)	
	Mr. HATTORI Kosuke (Resource person)	Mitsubishi UFJ Research and Consulting Co., Ltd.

4.3 Session on the Waste Sector

Sector Overview

Bhutan and Mongolia participated in the ML session on the Waste sector. The general information for the two countries is shown in the table below.

Table 4.3.1 Overview of GHG Inventories in the ML Partner Countries

	Bhutan	Mongolia
National total GHG emissions (kt CO_2 eq., with LULUCF)	9,708 (in 2022, BTR1)	12,909 (in 2020, NC4)
GHG emissions in the Waste sector (kt CO_2 eq.)	99 (in 2022, BTR1)	251 (in 2020, NC4)
Responsible agency for the inventory	Ministry of Energy and Natural Resources (MoENR)	Ministry of Environment and Climate Change (MECC)
Estimation methodology for the Waste sector	The 2006 IPCC Guidelines, Tier 1	The 2006 IPCC Guidelines, Tier 1 and Tier 2
Source of EFs for the Waste sector	IPCC default values	IPCC default values
Source of AD for the Waste sector	National Waste Inventory Survey 2019, Population and Housing Census of Bhutan 2017	Data on population, industrial production, protein consumption, and housing were sourced from the National Statistical Office. Waste generation rates were taken from published materials.

Materials Used

To prepare for the ML session, the partner countries exchanged their materials relevant to the Waste sector through the secretariat a few months before the workshop. The materials exchanged were as follows:

Bhutan
- BTR3 (2022)
- CRT (2022)
- National Waste Inventory Survey (2019)

Mongolia
- NC4 (2024)
- NIR (2023)
- IPCC software data tables

Questions and Answers

After receiving the materials listed above, the countries studied them and sent questions and comments to the partner country before the workshop. The classification and the number of questions are as follows.

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

Classification of questions	Number of questions/comments	
	from Mongolia to Bhutan	from Bhutan to Mongolia
Acquisition of AD	10	2
Adoption of EFs	2	1
Estimation methods	4	1
Institutional arrangement	1	0
Others	2	2

Outcomes of the Mutual Learning Session

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

- **Issues and Solutions / Outstanding issues**

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

1) There is currently no national repository system for GHG inventory data. (Bhutan)
2) The inventory system remained stable until 2022, but has since become unstable. (Mongolia)
3) In Bhutan, septic tank sludge in rural areas is not transported to centralized wastewater treatment systems, whereas in Mongolia, it is. This distinction should be considered when applying AD. (Both countries)
4) A waste separation and collection system has been initiated but is not yet completed. This fact should be considered in AD collection. (Mongolia)
5) To support the preparation of the AD that forms the basis for estimating GHG emissions, waste statistics need to be compiled. (Mongolia)
6) Historical GHG emission estimates, particularly those prior to 2018, are missing and need to be provided. (Bhutan)
7) Waste generated outside major cities is excluded from the GHG emission estimates. (Mongolia)

- **Good Practices**

The following were identified as good practices:

Mongolia

1) On-time BTR1 submission.
2) Implementation of the "National Waste Inventory Survey (2019)" to prepare AD for the Waste sector GHG inventory.

Bhutan

1) NIR preparation, which describes the GHG estimation methodology in detail.
2) GHG emission estimations for the whole time series from 1990 onward.

Table 4.3.3 Participants in the ML on the Waste Sector

Country	Name	Organization
Bhutan	Mr. Sachin LIMBU	Department of Environment and Climate Change, Ministry of Energy and Natural Resources
	Mr. Sonam GYELPO	
	Mr. Singye WANGCHUK	
Mongolia	Dr. Gerelmaa SHAARIIBUU	Supporting Unit for GHG Inventory, the Ministry of Environment and Climate Change
	Ms. Davaasambuu ULZII-ORSHIKH	
	Ms. Tegshjargal BUMTSEND	
Facilitators, etc.	Dr. ODA Takefumi (Facilitator)	GHG Inventory Office of Japan, National Institute for Environmental Studies
	Ms. HATANAKA Elsa (Facilitator)	
	Mr. KOSAKA Naofumi (Facilitator)	
	Mr. OYAMA Seiya (Resource person)	Mitsubishi UFJ Research and Consulting Co., LTD.

Annex I: Agenda

Annex I: Agenda

The 22nd Workshop on GHG Inventories in Asia (WGIA22)

Period: 15th - 18th July 2025
Venue: Sofitel Phnom Penh Phokeethra (Cambodia)

<table>
<tr><th colspan="3">Day 1: Morning, 15th July 2025</th></tr>
<tr><td>8:30 - 9:00</td><td colspan="2">Registration</td></tr>
<tr><td rowspan="3">9:00-12:30</td><td>Mutual Learning
(Closed session)</td><td>Hands-on Training
on IPCC Inventory Software</td></tr>
<tr><td>Room: Phokeethra 2</td><td>Room: Phokeethra 1</td></tr>
<tr><td>Sector: Waste</td><td>Sector: Agriculture</td></tr>
<tr><td rowspan="3">(11:00 - 11:15 Tea Break)</td><td>Combination of Countries:
Bhutan – Mongolia</td><td rowspan="3">Morning Session:</td></tr>
<tr><td>Facilitator:
Dr. ODA Takefumi (GIO)
Ms. HATANAKA Elsa (GIO)
Mr. KOSAKA Naofumi (GIO)</td></tr>
<tr><td>Rapporteur:
Dr. ODA Takefumi (GIO)</td></tr>
<tr><td>12:30 - 14:00</td><td colspan="2">Lunch</td></tr>
<tr><th colspan="3">Day 1: Afternoon, 15th July</th></tr>
<tr><td rowspan="3">14:00-17:30</td><td>Mutual Learning
(Closed session)</td><td>Hands-on Training
on IPCC Inventory Software</td></tr>
<tr><td>Room: Phokeethra 2</td><td>Room: Phokeethra 1</td></tr>
<tr><td>Sector: Energy</td><td>Sector: Agriculture</td></tr>
<tr><td rowspan="3">(16:00 - 16:15 Tea Break)</td><td>Combination of Countries:
China – Japan</td><td rowspan="3">Afternoon Session:</td></tr>
<tr><td>Facilitator:
Mr. KOSAKA Naofumi (GIO)
Mr. ITO Hiroshi (GIO)</td></tr>
<tr><td>Rapporteur:
Dr. ODA Takefumi (GIO)</td></tr>
<tr><td colspan="3">Note on Mutual Learning sessions: 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 are allowed to attend.</td></tr>
</table>

Annex I

Day 2: Morning, 16th July		
8:30 - 9:00	**Registration**	
9:00 - 10:20	**Opening Session**	
	Room: Ballroom 2 **Chair: H.E. CHUOP Paris, Secretary of State (MoE, Cambodia)**	**Rapporteur: Ms. HAYASHI Atsuko (GIO)**
9:00 - 9:05	Welcome Address	H.E. SUM Thy (MoE, Cambodia)
9:05 - 9:10	Welcome Address	Mr. NOMOTO Takuya (MOEJ)
9:10 - 9:15	Opening Remark	H.E. CHUOP Paris (MoE, Cambodia)
9:15 - 9:25	***Group Photo***	
9:25 - 9:40	Climate Change Policy and BTR in Cambodia	Mr. LEANG Sophal (Cambodia)
9:40 - 10:00	Japan's Progress on Climate Change Measures and International Cooperation	Mr. OKANO Shohei / Ms. TAKEUCHI Chihiro (MOEJ)
10:00 - 10:10	Introduction to WGIA22	Mr. ITO Hiroshi (GIO)
10:10 - 10:30	**Questions and Answers**	**All**
10:20 -10:45	***Tea Break***	
10:45 - 12:15	**Session I: Updates on the GHG Inventory of Biennial Transparency Reports (BTRs)**	
	Room: Ballroom 2 **Chair: Ms. Sandee G. Recabar (Philippines)**	**Rapporteur: Ms. HAYASHI Atsuko (GIO)**
10:45 - 11:00	Brunei Darussalam's GHG Inventory under the First BTR: Emissions Profile, Methodologies and Challenges in Implementation	Ms. Amal Hamizah Hasnan (Brunei)
11:00 - 11:15	Introduction of National GHG inventory in China	Dr. Xu Danhui (China)
11:15 - 11:30	Philippines' first BTR: Lessons Learned and Sharing of Experience	Mr. Jacinth Paul C. Apostol (Philippines)
11:30 - 11:45	The Republic of Korea's First Biennial Transparency Report and GHG Inventory	Ms. Kyungseo Min (Korea)
11:45 - 12:15	**Questions and Answers**	**All**
12:15 - 13:30	***Lunch***	

Day 2 Afternoon, 16th July		
13:30 - 16:30	**Session II: Estimation Methodology and Data for Agriculture**	
	Room: Ballroom 2	**Rapporteur: Ms. HAYASHI Atsuko (GIO)**
	Chair: Prof. Rizaldi Boer (AB/ Bogor Agricultural University)	
13:30 - 13:50	The Outline of Agricultural Area and Livestock Survey in Japan	Mr. HOSAKA Masahiro (MAFF, Japan)
13:50 - 14:10	Development of Emission Factors for the Thailand's Livestock Sector	Dr. Patthra Pengthamkeerati (Thailand) (On-Line)
14:10 - 14:30	Methane Emission Factor Development for Rice Cultivars in Indonesia: A Mitigation Approach	Dr. Anggri Hervani (Indonesia)
14:30 - 14:50	**Questions and Answers, Discussion**	**All**
14:50 - 15:20	***Tea Break***	
15:20 - 15:40	A Nationwide Soil Carbon Calculation System for Japanese Agricultural Land	Dr. SHIRATO Yasuhito (NARO)
15:40 - 16:00	Emission Projections using the Asia-Pacific Integrated Model (AIM): A Case Study on Indonesia's Sustainable Food Consumption	Dr. Annuri Rositta (AIM/NIES)
16:00 - 16:30	**Questions and Answers, Discussion**	**All**
16:30 - 18:00	**Session III: Discussion on the ETF GHG Inventory Reporting Tool**	
	Advisor: Mr. AIZAWA Tomoyuki (UNFCCC)	
	Break out Group 1: Energy, IPPU, Waste	
	Room: Phokeethra 2	**Rapporteur: Mr. KOSAKA Naofumi (GIO)**
	Break out Group 2: Agriculture, LULUCF	
	Room: Phokeethra 3	**Rapporteur: Ms. HAYASHI Atsuko (GIO)**
	Break out Group 3: Cross-cutting Issues	
	Room: Phokeethra 4	**Rapporteur: Dr. ODA Takefumi (GIO)**
19:00 - 21:00	***Welcome Reception***	***Room: Phokeethra sky***

Annex I

Day 3 Morning, 17th July		
9:00 - 12:00	**Session IV: Technical Expert Review and Support Available**	
	Room: Ballroom 2	**Rapporteur: Ms. HAYASHI Atsuko (GIO)**
	Chair: Mr. TANABE Kiyoto (IGES)	
9:00 - 9:20	The Seventh Assessment Report Cycle of the IPCC	Dr. Sandro Federici (IPCC/TFI)
9:20 - 9:40	Outline of the UNFCCC reviews process under the Paris Agreement	Mr. Vitor Gois Ferreira (UNFCCC) (On-Line)
9:40 - 10:00	Reviewer Experience	Mr. TANABE Kiyoto (IGES)
10:00 - 10:30	**Questions and Answers, Discussion**	**All**
10:30 - 11:00	***Tea Break***	
11:00 - 11:20	Experience in Undergoing Review (TER) of 1st Indonesian NID&BTR	Prof. Rizaldi Boer (Indonesia)
11:20 - 11:40	FAO Support to Transparency: A Focus on GHG Inventory and Asia	Dr. Alessandro F. Ferrara (FAO)
11:40 - 12:00	**Questions and Answers, Discussion**	**All**
12:00 - 13:30	***Lunch***	
Day 3 Afternoon, 17th July		
13:30 - 15:00	**Poster Session**	
	Room: Foyer	
13:30 - 15:00	**Discussion**	Poster Presenters
15:00 - 15:20	***Tea Break***	
15:20 - 16:10	**Wrap-up Session**	
	Room: Ballroom 2	**Chair: Ms. HATANAKA Elsa (GIO)**
15:20 - 15:30	Summary of the Mutual Learning Sessions	Dr. ODA Takefumi (GIO)
15:30 - 15:40	**Discussion**	**All**
15:40 - 15:50	Summary of the Plenary Sessions	Ms. HAYASHI Atsuko (GIO)
15:50 - 16:00	**Discussion**	**All**
16:00 - 16:05	Closing Remarks	Ms. HATANAKA Elsa (GIO)
16:05 - 16:10	Closing Remarks	H.E. PAK Sokharavuth, (MoE, Cambodia)
Day 3 Evening, 17th July		
16:30 - 17:30	**Joint Meeting of the WGIA Organizing Committee and Advisory Board**	
	Room: Phokeethra 1	**Chair: Mr. ITO Hiroshi (GIO)**
16:30 - 17:00	Review of Activities in WGIA22	OC/AB members
17:00 - 17:30	Discussion on Topics for WGIA23	OC/AB members

Poster Session			
17th July, 13:30 - 15:00 Room: Foyer			
No.	**Topic**	**Title**	**Name, Organization**
P-1	7	Preparation of Japan's National Greenhouse Gas Inventory and Trends in GHG Emissions	GIO, NIES
P-2	7	Historical Trends in Agricultural Greenhouse Gas Emissions in Malaysia (1990–2021)	Mohd Saufi B[1]., Rozimah M. R[1]., Mohd Aziz R[1]., Mohd Fairuz M.S[1]., and [1,2]Sub-working Group GHG Inventories for Agriculture Sector, [1]Malaysian Agricultural Research and Development Institute, [2]Ministry of Natural Resources and Environmental Sustainability, Malaysia
P-3	1	Refining Methane Inventory for Malaysian Rice Cultivation Using Country-Specific Emission Factor	Mohd Aziz Rashid, Mohd Saufi Bastami, Nurul Ain Abu Bakar, Fauzi Jumat, Mohd Fairuz Md Suptian, Mohammad Hariz Abdul Rahman, Azizi Ahmad Azmin and Shaidatul Azdawiyah Abdul Talib, Malaysian Agricultural Research and Development Institute
P-4	6	Malaysia: JICA Project for Strengthening Capacity Pertaining to National Reporting Obligation to the UNFCCC under the Enhanced Transparency Framework	Noraini S[1]., Nurul Adni N. H[1]., Kasuya Y[2]., and Fukuda M[2]. [1]Ministry of Natural Resources and Environmental Sustainability (NRES), Malaysia [2]Japan International Cooperation Agency (JICA), Japan
P-5	6	Bilateral Cooperation for BTRs under Japan's Transparency-related Support Initiative	MORIMOTO Takashi and FUKUDA Maya, Mitsubishi UFJ Research and Consulting Co., Ltd. (MURC), Japan
P-6	7	Scenario of India GHG emissions in Energy sector inventory data: Methodological approach and challenges	Arnold Luwang Usham[1]*, Pinaki Sarkar[1], Santi G Sahu[1], Vallu Ramakrishna[1], Tuhin S Khan[2], Sunil Pathak[2], Amardeep Raju[3], Ajay Raghava[3], Sharath K Pallerla[3] [1]CSIR-Central Institute of Mining and Fuel Research (CIMFR), Dhanbad, India [2]CSIR- Indian Institute of Petroleum (IIP), Dehradun, India [3]Ministry of Environment, Forest and Climate Change (MoEFCC) Govt. of India
P-7	7	Overview and Challenges in Agriculture Sector: 1st BTR of the Republic of Korea	Moonjung Kim, WonGi Jo, Sohyang Lee, Hyung-Wook Choi Ministry of Environment, Greenhouse Gas Inventory and Research Center of Korea, Republic of Korea

Annex I

Topics:
1. Emission factor development (Sector)
2. Data collection and statistics
3. Remote-sensing and GIS
4. Low carbon society and mitigation measures
5. International framework
6. International support programmes
7. Other

Study Tour, 18th July		
8:00	Meet up at Hotel Lobby	
9:00	Arrival at Royal University of Agriculture (RUA)	
9:00-9:30	Registration	
9:30-9:40	Welcome Remarks by Rector of the RUA	Prof. Dr. NGO Bunthan, RUA
9:40-9:45	Welcome Remarks by MoEJ	Mr. NOMOTO Takuya, MOEJ
9:45-10:00	Introduction of the RUA	Mr. PIN Theara, Head of the Planning International Cooperation Office (PICO)
10:00-10:20	Climate Change Action Implemented by Center for Agricultural and Environmental Studies	Mr. Sok Pheak, Deputy Director of Center for Agricultural and Environmental Studies (CAES)
10:20-10:50	Climate Change Mitigation: Biodigester Development	Mr. LOR Lytour, Faculty of Agricultural Biosystems Engineering (FABE)
10:50-11:10	The Project for development and social implementation of greenhouse gas emission reduction technologies in paddy fields of West Tonle Sap Lake by establishing a large paddy area water management system (SATREP)	Ms. Noriko YAMADA, Project Coordinator
11:10-11:40	Break	
11:40-12:30	Visit to Cambodia's historical site: The Killing Fields	
13:00	Arrival at Hotel Lobby	

Abbreviations:

AB:	*WGIA Advisory Board*
AIM:	*Asia-pacific Integrated Model*
BTR:	*Biennial Transparency Report*
ETF:	*Enhanced Transparency Framework*
FAO:	*Food and Agriculture Organization of the United Nations*
GHG:	*Greenhouse Gas*
GIO:	*Greenhouse Gas Inventory Office of Japan, NIES*
IGES:	*Institute for Global Environmental Strategies*
IPCC:	*Intergovernmental Panel on Climate Change*
IPCC/TFI:	*IPCC, Task Force on National Greenhouse Gas Inventories*
JICA:	*Japan International Cooperation Agency*
MAFF:	*Ministry of Agriculture, Forestry and Fisheries, Japan*
MOEJ:	*Ministry of the Environment, Japan*
MURC:	*Mitsubishi UFJ Research and Consulting*
NARO:	*National Agriculture and Food Research Organization, Japan*
NIES:	*National Institute for Environmental Studies, Japan*
NRES:	*Ministry of Natural Resources and Environmental Sustainability, Malaysia*
OC:	*WGIA Organizing Committee*

Annex II: List of Participants

Annex II: List of Participants

BY PARTICIPATING COUNTRY
(Alphabetical order by FAMILY NAME)

BHUTAN
Mr. Sonam GYELPO
Department of Environment and Climate Change, Ministry of Energy and Natural Resources

Mr. Sachin LIMBU
Department of Environment and Climate Change, Ministry of Energy and Natural Resources

Mr. Singye WANGCHUK
Department of Environment and Climate Change, Ministry of Energy and Natural Resources

BRUNEI
Ms. Nurul Ashira Kathereen Abdullah Liew
Department of Agriculture and Agrifood, Ministry of Primary Resources and Tourism

Ms. Farah Ani Haji Gapor
Department of Agriculture and Agrifood
Ministry of Primary Resources and Tourism

Ms. Amal Hamizah Hasnan
Brunei Climate Change Office
Prime Minister's Office

CAMBODIA
H.E. CHUOP Paris
Ministry of Environment

H.E. PAK Sokharavuth
Ministry of Environment

H.E. SUM Thy
Ministry of Environment

H.E. CHAN Phaloeun
Ministry of Agriculture, Forestry, and Fisheries

Ms. CHEAT Meardey
Department of Climate Change, Ministry of Environment

CHRENG Karodine
Ministry of Mine and Energy

ENG Viyura
Electricity Authority of Cambodia, Ministry of Mine and Energy

Dr. HAK Mao
Department of Climate Change
Ministry of Environment

HEANG Bora
Ministry of Mine and Energy

HUN Sereynithia
Ministry of Environment

HOM Phaly
Ministry of Mine and Energy

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