

**Information Matters: Viet Nam**



**Third Capacity Building Mission, Viet Nam**

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## **Information Matters**

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# List of abbreviations

ALU	Agriculture and Land Use Greenhouse Gas Inventory Software
BAU	Business as usual
BMUB	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
BUR	Biennial Update Report
CCOZONE	Ozone Layer Protection and Low Carbon Economy Development Center
CliTech	Center for Responding to Climate Change (formerly Center for Technologies Responding to Climate Change)
DCC	Department of Climate Change (formerly DMHCC)
EF	Emission Factors
FIPI	Forest Inventory and Planning Institute
FPD	Forest Protection Department
FREL/FRL	Forest Emission Reference Level/Forest Reference Level
GDLA	General Department of Land Administration
GHG	Greenhouse gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GSO	General Statistics Office
ICA	International Consultation and Analysis
IAE	Institute of Agricultural Environment
IKI	International Climate Initiative
IM	Information Matters project
IMHEN	Institute of Meteorology, Hydrology and Climate Change
IPCC	Intergovernmental Panel on Climate Change
LULUCF	Land use, land-use change, and forestry
MARD	Ministry of Agriculture and Rural Development
MOIT	Ministry of Industry and Trade
MONRE	Ministry of Natural Resources and Environment
MOT	Ministry of Transport
MPI	Ministry of Planning and Investment
MRV	Measuring, reporting and verification
NAMA	Nationally Appropriate Mitigation Action
NC	National communication
NRSD	National Remote Sensing Department
PM	Prime Minister
Q&A	Question and Answer session
QA	Quality Assurance
QC	Quality Control
REDD	Reducing emissions from deforestation and forest degradation
UN	United Nations
US	United States
UNFCCC	United Nations Framework Convention on Climate Change
VNFOREST	Viet Nam Administration of Forestry
VNU-UET	University of Engineering and Technology of the Viet Nam National University

# Executive Summary

In the context of the Information Matters project (IM), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of and under the International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) provides technical assistance to selected partner countries to improve climate change under the United Nations Framework Convention on Climate Change (UNFCCC). The project is currently in its second phase, which addresses the four partner countries Colombia, Egypt, Georgia and Viet Nam. In Viet Nam, in line with the country specific needs, IM will provide the national partners led by the national climate change focal point – the Department of Climate Change (DCC) of the Ministry of Natural Resources and Environment (MONRE) with tailored technical support and training to enhance the elaboration of national reports to the UNFCCC. Special focus was given to the preparation of Viet Nam's second Biennial Update Report (BUR2), which the country submitted to the UNFCCC Secretariat in November 2017. With this accomplishment, the IM project supports the finalisation of the third National Communication (NC) being expected to be submitted in 2018.

The IM project started its project activities with a stock taking mission from 14 to 18 March 2016, comprising of a number of meetings with key stakeholders to identify gaps and needs. Following that, GIZ officers and experts from the consultancy company NIRAS A/S joined a kick-off meeting and carried out the first capacity building mission between 24 and 26 August 2016 at Song Hong Resort, Vinh Yen city, Vinh Phuc province. The second capacity building mission focussing on the reporting of mitigation actions within the BUR2 took place between 7 and 8 March 2017 at Flamingo Dai Lai Resort, Vinh Phuc province.

This report summarises the third capacity building mission of the IM project in Viet Nam that took place between 9 and 12 January 2018 at BIDV Training Centre, Do Son town, Hai Phong city. The capacity building mission was co-organised by DCC and IM in cooperation with the GIZ project "Creation of an Overarching Framework for Nationally Appropriate Mitigation Actions (NAMAs) and Measuring, Reporting and Verification (MRV) in Viet Nam" with support by the United States (US)-funded SilvaCarbon programme. The mission contained of two events carried out back-to-back: A capacity building workshop on the review of the greenhouse gases (GHG) inventory of the land use, land-use change and forestry (LULUCF) sector in Viet Nam followed by a working session on the review and Quality Assurance (QA)/Quality Control (QC) of GHG inventory of agriculture sector and hands-on exercise on emission projection in LULUCF sector for the period 2020-2030.

The participants invited to attend the first event of the mission (capacity building workshop) included representatives of relevant MONRE agencies: DCC and Institute of Meteorology, Hydrology and Climate Change (IMHEN), National Remote Sensing Department (NRSD), General Department of Land Administration (GDLA), representatives of the Ministry of Agriculture and Rural Development (MARD) and its agencies: Forestry Investigation and Planning Institute (FIPI), Vietnam Administration of Forestry (VNFOREST), Institute of Agricultural Environment (IAE); and Ministry of Planning and Investment Portal (MPI) and its subordinate General Statistics Office (GSO). Additionally, representatives joined the workshop from the University of Engineering and Technology of the Viet Nam National University (VNU-UET), representatives of the United Nations (UN) Reducing Emissions from Deforestation and Forest Degradation (REDD) office and members of the SilvaCarbon project.

The second event of the mission (follow-up working session) was attended by 21 participants, mainly technical staff of the DCC and of relevant agencies such as Ozone Layer Protection and Low Carbon Economy Development Center (CCOZONE) and Center for Responding to Climate Change (CliTech) as well as staff of the VNU-UET. Dr. Stephen Ogle (Colorado State University) and Dr. Pontus Olofsson (Boston University, USGS) were invited as experts to provide scientific input.

The primary objective of the capacity building mission was to improve the overall quality of Viet Nam's GHG inventories in the LULUCF and agriculture sectors. In addition, the training supported the approximation of the different calculation methods for GHG inventories and GHG emission of the MONRE and the MARD.

The key lessons learned during the group exercises included:

- Different ministries may develop GHG estimates for one sector and discrepancies can arise in the results. For this reason, an intragovernmental exchange and agreement on clear and consistent definitions, categories and data sources and methodologies ensures comparability and transparency associated with the different results.

- When using remote sensing data for GHG inventory compilation, activity data should not be estimated directly from counting pixels from a map. Intergovernmental Panel on Climate Change (IPCC) good practice stipulates the estimation of activity data through a method that leads to an unbiased estimator of land use and land-use change, removing classification errors and reducing discrepancies.
- Maps only serve to stratify landscapes to inform data collection, so it is possible to use different sources of data in different analyses and arrive at the same result if the approaches are unbiased.
- Four sets of projections should be considered in emission projections given the national circumstances in Viet Nam: baseline/business as usual (BAU) scenario, current policy, planned future policies, and possible future measures enabled with international support.
- The development of country-specific Emission Factors (EFs) especially for key categories will increase accuracy of Viet Nam's estimated emissions.
- The Agriculture and Land Use Greenhouse Gas Inventory Software (ALU) can be used to identify the least expensive mitigation options given a carbon price, which should be informed by the social cost of carbon. Cost analysis performed outside of ALU can be used to inform the activities incorporated into ALU projections for estimating mitigation potentials. The cost analysis and emission projection results can be used to identify worthwhile activities and associated mitigation costs.
- By incorporating activity data and EFs with relevant background information, uncertainty, and QA/QC procedures, ALU enables inventory compilers to apply IPCC good practices as they produce inventories for reporting to the UNFCCC.
- ALU can incorporate country-specific EFs and documentation allowing compilers to advance the inventory to a Tier 2 method.
- QC should be applied simultaneously with GHG inventory compilation.
- QA can be performed by experts not involved in the inventory process, such as university researchers. Experts or even data providers can be sector specific specialists, without having expertise on the full GHG inventory. The QA will be comprehensive by including numerous specialists with different backgrounds from other government ministries, universities and non-governmental organizations.
- Uncertainty analysis is performed not only on sector level, but also propagated to sector totals and grand totals. Data providers need to provide the uncertainty of their data.
- Reliability refers to how well the inventory compilation was carried out, and whether good practice was employed. It does not imply that the emissions data is precise, i.e., that uncertainty is low, although if good practice is followed then uncertainty is typically reduced as far as practical given the information available to the compilers.

The main take-home messages for the participants were:

- Further capacity building and expert advice on uncertainty management will support the enhancement of the quality of GHG inventories.
- One of the key recommendations is to develop country-specific EFs for improving future GHG inventories.
- An exchange between MONRE, MARD and other line ministries on common methodologies, categories (e.g. ecological zones and forest types) and data sources for emission estimation of the LULUCF sector will increase future comparability and transparency of the results by the GHG inventory and Forest Emission Reference Level/Forest Reference Level (FREL/FRL).
- The standardisation of the formal use of remote sensing data is necessary to ensure the inclusion of this data source in the future.
- Within the review of Prime Minister Decision (PM) No 2539 the data templates included in the annex need to be updated to 2006 IPCC guidelines.

# 1 Introduction

## 1.1 Background

In the context of the Information Matters project (IM), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of and under the International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) provides technical assistance to selected partner countries to improve climate change under the United Nations Framework Convention on Climate Change (UNFCCC).

In the case of its partner country Viet Nam, the IM project provides the Department of Climate Change (DCC) of the Ministry of Natural Resources and Environment (MONRE) as well as other agencies and expert teams related to climate change reporting, with tailored technical support and trainings to enhance the elaboration of the country's second Biennial Update Report (BUR) and third National Communication (NC). In this context, IM and experts from the consultancy NIRAS A/S carried out the first capacity building mission between 24 and 26 August 2016. A roadmap for the implementation of the IM project in Viet Nam was developed and discussed with DCC after the first capacity building mission. The second mission was carried out by IM and experts from NIRAS A/S and CAOS in cooperation with DCC and the GIZ project "Creation of an Overarching Framework for Nationally Appropriate Mitigation Actions (NAMAs) and Measuring, Reporting and Verification (MRV) in Viet Nam" from 7 and 8 March 2017. The mission focused on mitigation action reporting for the second BUR. The third mission was organized in collaboration with DCC and support by the GIZ project "Creation of an Overarching Framework for NAMAs and MRV in Viet Nam" as well as the United States (US)-funded SilvaCarbon programme. This time the focus was on strengthening technical capacity associated with elaboration, technical review, and Quality Assurance (QA)/Quality Control (QC) of Greenhouse Gas Emissions (GHG) inventories for land use, land-use change and forestry (LULUCF) and agriculture sectors as well as emission projection development for the LULUCF sector.

## 1.2 The BMUB International Climate Initiative

Since 2008, the IKI of the BMUB has been financing climate and biodiversity projects in developing and newly industrialising countries, as well as in countries in transition. Based on a decision taken by the German parliament (Bundestag), a sum of at least 120 million euros is available for use by the initiative annually. For the first few years, the IKI was financed through the auctioning of emission allowances, but it is now funded from the budget of the BMUB. The IKI is a key element of Germany's climate financing and the funding commitments in the framework of the Convention on Biological Diversity.

The Initiative places clear emphasis on climate change mitigation, adaption to the impacts of climate change and the protection of biological diversity. These efforts provide various co-benefits, particularly the improvement of living conditions in partner countries.

The IKI focuses on four areas: mitigating greenhouse gas emissions, adapting to the impacts of climate change, conserving natural carbon sinks with a focus on reducing emissions from deforestation and forest degradation (REDD+), as well as conserving biological diversity.

New projects are primarily selected through a two-stage procedure that takes place once a year. Priority is given to activities that support creating an international climate protection architecture, to transparency and to innovative and transferable solutions that have an impact beyond the individual project. The IKI cooperates closely with partner countries and supports consensus building for a comprehensive international climate agreement and the implementation of the Convention on Biological Diversity. Moreover, it is the goal of the IKI to create as many synergies as possible between climate protection and biodiversity conservation.

## 1.3 Overview of the Information Matters project

The IM project aims – as its primary goal – to strengthen the in-country capacities for enhanced climate reporting under the UNFCCC in the selected partner countries. The project has a special focus on the preparation of BURs and the development and implementation of sustainable systems for MRV.

During a first project phase (2013-2016), support has been provided to Chile, the Dominican Republic, Ghana and the Philippines. For the second phase (2016-2018), Colombia, Egypt, Georgia and Viet Nam joined the project, allowing building upon the results, experiences and 'lessons learned' during the first phase. During its current third phase (2018-2019), the project will provide support to a number of additional countries under its flexible "Ad-hoc Facility" and continue to provide specified support to its partner countries of the second phase.

A key feature of the IM project is the country-tailored approach. In consultation with the partner countries, specific needs for the setup of MRV systems and the preparation of national greenhouse gas (GHG) inventories are identified, prioritised and addressed through in-country capacity-building workshops and trainings. These capacity-building activities aim to enable the partner countries to define procedures, methods and responsibilities to systematically institutionalise their MRV systems and to meet the reporting requirements under the UNFCCC.

With MRV systems being an essential fundament for the forthcoming Enhanced Transparency Framework under the Paris Agreement, the IM project provides an important basis for its partner countries to also prepare for future transparency requirements.

In each partner country, the project starts with a stock taking of the reporting and MRV arrangements currently in place, including an analysis of the strengths and weaknesses. This is followed by a kick-off workshop with key stakeholders during which the results of the stock taking are reviewed and main gaps and needs identified and prioritised. On this basis, a roadmap for capacity building is developed outlining all activities (i.e. workshops, trainings, backstopping) to be carried out in the country throughout the project.

Sharing 'lessons learned' and facilitating knowledge transfer on good practices through South-to-South exchange is another key element of the project's approach. To this end, a peer-to-peer exchange for the involved institutions of all partner countries is organised enabling countries to exchange experiences in overcoming challenges, build networks and strengthen their capacities at the institutional and national level.

Following the submission of the BUR, IM provides further assistance to its partner countries to prepare for a successful International Consultation and Analysis (ICA) process. Trainings on QA/QC help to enhance the quality of future GHG inventories.

Towards the end of the project, partner countries will have acquired an enhanced level of expertise on climate monitoring and reporting and verification processes. They are invited to share their experiences at relevant international events, such as those organised under the Partnership on Transparency in the Paris Agreement ([www.transparency-partnership.net](http://www.transparency-partnership.net)) and other related initiatives.

## **2 The third Information Matters capacity building mission**

### **2.1 Workshop Arrangements**

The third mission in Viet Nam was organised by DCC in collaboration with the IM, with support from US's SilvaCarbon programme. The mission was divided into two separate but linked events. The first capacity building workshop "Review of GHG inventory in the LULUCF sector in Viet Nam" took place on 9 and 10 January and focused on strengthening capacities and a common understanding of GHG inventory development in the LULUCF sector of related technical staff of MONRE and other relevant line ministries in Viet Nam. The follow-up working session, "Review and QA/QC of GHG inventory for Agriculture sector and hands-on exercise on emission projection in LULUCF sector for period 2020-2030", took place on 11-12 January. Participants gained further experience with the elaboration, technical review, and QA/QC of GHG inventories for the LULUCF and agriculture sectors, as well as emission projections for LULUCF with expert guidance, followed by hands-on exercises using the *Agriculture and Land Use National Greenhouse Gas Inventory (ALU) Software*.

A total of 43 participants attended the first capacity building workshop, including representatives of relevant MONRE agencies: DCC and Institute of Meteorology, Hydrology and Climate Change (IMHEN), National Remote Sensing Department (NRSD), General Department of Land Administration (GDLA), representatives of the Ministry of Agriculture and Rural Development (MARD) and its agencies: Forestry Investigation and Planning Institute (FIPI), Vietnam Administration of Forestry (VNFIRST), Institute of Agricultural Environment (IAE); and Ministry of Planning and Investment (MPI) and its subordinate General Statistics Office (GSO). Additionally, representatives joined the workshop from the University of Engineering and Technology of the Viet Nam National University (VNU-UET), representatives of the UN-REDD office and members of the SilvaCarbon programme.

The second event of the mission, the follow-up working session, was attended by 21 participants, mainly DCC representatives and technical staff of relevant agencies such as Ozone Layer Protection and Low Carbon Economy Development Center (CCOZONE), VNU-UET and CliTech.

High-quality simultaneous interpretation was arranged for appropriate understanding, correct communication and effective discussion. Almost all presentations (as applicable) were prepared beforehand and translated from English into Vietnamese and vice versa.

## 2.2 Objectives

The overall objective of this mission was to strengthen technical capacity on the elaboration, technical review, and QA/QC of the GHG inventory for the LULUCF and agriculture sectors as well as emission projection on LULUCF. In addition, the first workshop and follow-up working session introduced MONRE staff to the technical and practical aspects of ALU software through hands-on exercises and training.

The concrete objectives of the capacity building mission were:

- Conducting a technical review and QA/QC of the processes (methodologies and activity data collection as well as selection of EFs etc.) and results of the 2013 GHG inventory for LULUCF and the 2014 GHG inventory for agriculture;
- Facilitate an exchange between the expert groups responsible for the compilation of the GHG inventory to serve UNFCCC reporting requirements and Forest Emission Reference Level/Forest Reference Level (FREL/FRL) to be developed for the United Nations (UN) REDD+ process clarifying the calculation of different results;
- To strengthen capacity of technical staff from MONRE and other relevant line ministries on GHG inventory compilation and emission projection analyses for the LULUCF sector;
- To build capacities on the use of remote sensing data and maps to estimate GHG emissions; and
- To strengthen capacities in applying the ALU software for the elaboration, technical review, and QA/QC of GHG inventories as well as emission projection development and uncertainty management.

## 2.3 Objectives

### Day 1

#### **Capacity building workshop 'Review of the GHG inventory in the LULUCF sector in Viet Nam' (9-10 January 2018)**

The workshop on 'Review of the GHG inventory in the LULUCF sector in Viet Nam' organized by DCC launched on the morning of Tuesday 9 January 2018 with opening remarks given by Mr. Nguyen Khac Hieu (Deputy Director General of the DCC) and Mr. Quach Tat Quang (Acting Director of the CCOZONE).

Ms. Verena Schauss (IM Country Coordinator) presented an overview of the IM project, explaining scope and goals of the project, the activities that have been conducted in Viet Nam to date and the future possibilities for support by the project. This was followed by a presentation by Mr. Nguyen Van Minh (Deputy Head, Division of GHG Emission Reduction and Ozone Layer Protection) providing an introduction and latest updates on Viet Nam's GHG inventory system. The presentation consisted of three parts: organizational structure, implementation, and opportunities and challenges. Mr. Minh explained the roles and responsibilities of various actors including MONRE, DCC, IMHEN, MPI, GSO, the Provincial and Municipal People's Committees, line ministries, and the private sector. He further explained that inventories will be developed biannually from the baseline of 2014 and that Prime Minister Decision (PM) 2539 will be reviewed to prepare for post-2020 implementation ensuring harmonisation with national law.

Regarding difficulties in implementation, not all ministries and local governments have arrangements to support MONRE and MPI. Furthermore, technical and financial resources are limited and data collection procedures are inconsistent. The legal framework could be strengthened by establishing the use of common methodologies for the inventory system, including a description of requirements and responsibilities of different ministries.

Subsequently, a Question and Answer (Q&A) session took place with main topics presented in Table 1.

**Table 1: Questions raised and comments given in the first Q&A Session**

Question/Comment	Answer by DCC
There is a need to facilitate data sharing and accessibility of the national statistics database currently managed by GSO, and to consolidate databases managed by other line ministries such as MARD, Ministry of Industry and Trade (MOIT) and Ministry of Transport (MOT).	MONRE is aware of the need for better disclosure of information and has discussed this with other ministries. The ICA is an important process in the UNFCCC reporting procedure, and data disclosure is needed for the analysis.
The type of data that needs to be collected for developing GHG inventories needs to be clearly prioritized.	Data needs to be prioritized for main sources and sinks. The biggest need for Viet Nam is to develop country-specific EFs for key source categories in different sectors.
There are discrepancies in inventories between MARD, who produce REDD+ reports and Forest Resource Assessments, and MONRE, who produce NCs and BURs. The differences are associated with the choice of methodology and data sources.	MONRE and MARD will be discussing choices of methodology and EFs, and how to best harmonize databases to avoid conflicts in the future.
The data template in PM Decision No.2359 annex is not sufficient for inventory purposes.	Revision of Decision No.2359 is being considered to include sub-categories in the annex.
The United Kingdom under its Prosperity Fund (through Ricardo Energy & Environment) supported the creation of technical guidelines and the improvement of templates for collection of activity data under the PM decision No. 2359, however works need to be done to improve the GHG inventory.	
In the near future, the GSO will need to report 'per capita GHG emissions' in annual national statistic publications, however there is currently no procedure to calculate these yearly.	
Statistics data from GSO can be used as a check on the remote sensing data from NRSD to allow for verification of land use information compiled from the remote sensing data.	

Ms. Tran Thu Huyen (CCOZONE's expert on GHG inventory in LULUCF) presented results of the 2013 GHG inventory for the LULUCF sector, describing activity data sources, selection of EFs, methodology, and key results. Activity data were collected from communications and documentations by the Forest Protection Department (FPD), FIPI, and GSO, from the maps of remote sensing in combination with the Land Use Matrix of NRSD, other official documents, reports and expert knowledge. EFs were obtained from publications such as the 2006 Intergovernmental Panel on Climate Change (IPCC) guidelines and based on data collected by other agencies, such as aboveground forest biomass stocks from FIPI. Regarding methodology, carbon stock was calculated using the Gain-Loss method.

Next, Mr. Nguyen Dinh Hung (FIPI) gave a presentation on the development of FREL/FRL for Viet Nam, covering background, dataset and methodology, FIPI's work on the forest inventory, and key results and linkage to the GHG inventory in the LULUCF sector. FREL/FRL activity data only considers CO<sub>2</sub> and is estimated using the Stock Difference method based on five year forest cover maps from 1995-2010, which are developed through the FIPI/ National Forest Inventory and Monitoring Programme. The 2017 technical assessment stated that Viet Nam's FREL/FRL is in accordance with guidelines, but recommended improvements, including development of forest cover maps based on previous maps to

reduce artifacts, providing time-series information on land use changes, estimating non-CO<sub>2</sub> GHG, and harmonizing the data and methodology used in the national GHG inventory and FREL/FRL.

This was followed by a Q&A session on the differences between the national inventory and FREL/FRL with main points presented in Table 2.

**Table 2: Questions raised and comments given in the second Q&A Session**

Question/Comment	Response from DCC and presenters
<p>What are the reasons for discrepancies between the GHG inventory and FREL/FRL and how can these be resolved?</p>	<p>The GHG inventory uses Gain-Loss method and top-down collected data such as wood removal statistics, to estimate annual changes in carbon stocks. FREL/FRL uses Stock Difference method and a bottom-up approach to data collections based on sampling a network of forest plots, and estimates changes over five years. MONRE and MARD classify land and forest types differently due to discrepancies between their definitions and numbers of categories. To address this issue, FIPI needs to coordinate with DCC and the GHG inventory national team in particular the CCOZONE to harmonize methodology and activity data sources, and agree on classification of ecological zones and forest types.</p>
<p>UN-REDD technical requirements for receiving results based payments are stricter than national inventory requirements. Therefore, MARD has limited freedom to change methods when working to harmonize with MONRE. At the same time, it is important to harmonize the emission calculation results because Viet Nam needs to report to the UNFCCC/UN-REDD in a transparent manner.</p>	
<p>For both GHG inventory and FREL/FRL development, it needs to be considered whether using a constant growth increment is appropriate, and to present uncertainties. Presenting uncertainties may uncover similarities in emission estimates that are otherwise hidden.</p>	
<p>When using remote sensing data, activity data should not be based on counting pixels directly from the map. IPCC good practice stipulates the estimation of activity data through use of an unbiased estimator to remove classification errors and reduce discrepancies.</p>	
<p>FREL/FRL should consider including non-CO<sub>2</sub> GHG, e.g. methane accounts for more than 4000 tonnes.</p>	<p>CO<sub>2</sub> is the dominant GHG when considering forest land use.</p>

In the afternoon, Dr. Stephen Ogle (Colorado University, IPCC lead author and international expert on GHG inventory and ALU developer) gave an introduction on key technical aspects, including overview of UNFCCC requirements, methodology of LULUCF GHG measurement, principles of IPCC good practice, and use of the ALU software. Dr. Ogle described the three IPCC Tiers, the procedure and rationale behind Key Category Analysis, selection of EFs, and methods for activity data collection. The IPCC principles of good practice include transparency, accuracy, consistency, comparability, and

completeness, and application of these principles are encouraged through steps of activity data entry, emission factor assignment and emission estimation by using the ALU software.

Mr. Quang presented on the experience of using ALU for the LULUCF GHG inventory in Viet Nam, highlighting advantages and disadvantages of the software. ALU is recognized as user friendly, comprehensive, and meeting the IPCC guidelines. However, a key challenge is that ALU often requires data classification that is more detailed than what is available in the national statistics and databases, which needs to be addressed by improving national data collection and updating templates included in PM decision No. 2359. Mr. Quang urged participants to discuss how to improve the quality of input data.

A Q&A session followed to discuss use of ALU, with main points is presented in Table 3.

**Table 3: Questions raised and comments given in the third Q&A Session**

Question/Comment	Response from DCC and presenters
How far back does data collection methodology need to be consistent for application in the inventory?	As a non-Annex I country, Viet Nam does not need to report pre-2000 when data was collected using land use maps. However, data splicing methods exist to allow harmonisation of data across a time series.
Map qualities differ between FIPI and NRSD and between years. Would this create problems for activity data analysis?	Maps only serve to stratify landscapes to inform data collection, so there is no issue with using different sources. The application, regardless of the data sources, should produce unbiased estimates, although the level of precision may vary depending on the data sources. Regardless it is important that different ministries agree on classifications in order to ensure greater consistency in results.
One of the big challenges in Viet Nam is data gaps, for example on forest loss due to natural disasters or forest fires.	This issue is common in other countries, since data is often collected without the GHG inventory in mind. Methods exist to address this and have been covered in prior ALU trainings.
Does ALU allow cost analysis of mitigation options?	Cost analysis can be performed outside of ALU and used to inform projections of GHG emissions in the software to identify worthwhile activities and associated mitigation costs.

Mr. Dang Truong Giang (NRSD) presented on remote sensing technology for the GHG inventory, explaining the background of the NRSD, Viet Nam's capacity for remote sensing, and the procedures for producing land use/land cover maps and estimating GHG emissions. He stated that a circular will be produced in the coming future to guide the use of remote sensing data for the GHG inventory. For points of discussion, Mr. Giang expressed concern about consistency between climatic data and soil data, and the needs for time series to calculate GHG emissions, integrated management of remote sensing and Geographic Information System (GIS) data, and MONRE and MARD to use the same classification in land use and land cover maps.

This was followed by a presentation of Dr. Pontus Olofsson (Boston University, USGS) providing insight on the necessity of mapping and estimating activity data. While remote sensing has many advantages over classic forest inventory approaches, classification errors are inevitable due to limited map resolution. To avoid these and to follow good practice, IPCC methods should be applied in a manner to produce an unbiased estimator for activity data, with maps serving to stratify the study area for sampling rather than providing direct information on activity data.

This was followed by a Q&A session on remote sensing, with main points presented in Table 4.

**Table 4: Questions raised and comments given in the fourth Q&A Session**

Question/Comment	Response from DCC and presenters
FIPI and NRSD maps differ in classification and number of layers, which leads to discrepancies in calculated GHG stocks.	Both REDD+ reports and NC/BUR are submitted to UNFCCC. To avoid questions during the ICA process and meet the IPCC principle of comparability, FIPI and DCC need to harmonize classification and data sources.
If a pixel on a map is mixed (e.g. 60% forest loss, 40% stable), how should it be classified?	Recommended to classify as the majority land/forest type.
Can you clarify how maps are integrated into ALU?	<p>ALU imports the activity data areas from the maps directly. This data needs to be stratified by climate regions, ecological regions, soil types, etc.</p> <p>Maps from remote sensing can give out/provide the data for inventory with more transparency and more accuracy.</p>
The NRSD land use map containing forest cover change is a good start, but further data such as non-forest land uses, soil and climate types need to be added to allow development of a full GHG inventory.	
If reference sampling for activity estimation only took place in areas of high activity, and areas changed over years, you could lose temporal trends.	Propose use of both spatially fixed and dynamic sampling plots when estimating activity data.
GSO and FPD provide forest inventories by ecological regions, however not all line ministries use this categorization for activity data, leading to a mismatch between the forest inventory data and other information that is used in the GHG inventory. This can lead to errors in inventories when combining this information to estimate emissions.	
One suggestion for harmonizing different maps is to use the FIPI/SilvaCarbon forest cover map as the basis for forest land and then combine this data layer with non-forest activity area provided by other maps.	

Ending the first day of the workshop, Mr. Quang gave concluding remarks emphasizing the importance of having a consistent approach and comparable GHG calculations between MARD and MONRE to meet IPCC requirements and facilitate the national inventory and REDD+ processes.

## Day 2

The workshop continued on the morning of Wednesday 10 January 2018, with a presentation given by Ms. Huyen on preliminary results of LULUCF GHG emission projection in the period 2020-2030. Ms. Huyen raised the question as to whether business as usual (BAU) scenarios should combine master plans and extrapolation of historical data, as they did in the past, or whether master plans should be excluded as these represent policy interventions for emission reduction. Using the latter option to represent BAU, she developed projections assuming future development trends are similar to past trends without changes in policy.

This was followed by a Q&A session on LULUCF projections with main points presented in Table 5.

**Table 5: Questions raised and comments given in the fifth Q&A Session**

Question/Comment	Response from DCC and presenters
Given that certain national strategies end in 2020, how do you project to 2030?	Rates such as forest growth were extrapolated from 2010-2020 to 2020-2030.
Is a simple regression appropriate for historical extrapolation, and is there enough past data?	Simple regression is a common approach in non-Annex I countries, and forest data is available from 2000s.
General participant agreement that plans and policies taking effect after the baseline of 2014 should be excluded in BAU emissions.	Viet Nam needs to clarify what it aims to communicate to the UNFCCC. Future policies demonstrate that Viet Nam is taking mitigation actions. Consider having four sets of projections: baseline, current policy, planned future policies, and possible future policies along with associated mitigation benefits.
It should be kept in mind that policy targets are often more ambitious than ecological reality, for example with mangrove restoration where the reality of achieving high survival rate is difficult.	
The inventory compilation team should be aware of the national target program on sustainable forest development for 2016-2020 and National REDD+ Action Plan when considering future policies and projections.	

Following a short break, the workshop concluded with a final open discussion among participants, with main discussion points presented in Table 6.

**Table 6: Questions raised and comments given in the final open discussion**

Question/Comment	Response from DCC and presenters
While Hanoi National University is the only university in attendance this time, there is potential for greater university involvement, as in the US, for example with verification and validation of inventories.	DCC agrees with importance of university and research institutes' engagement. One way for universities to participate immediately is through the QA process. Long-term, universities can help develop country-specific EFs.
When using IPCC default factors, compilers need to use full IPCC uncertainty range, you cannot simply choose a mid-range value.	For key categories, Viet Nam should aim to develop country-specific EFs. Where no data is available, it is acceptable to use expert knowledge.
Data providers in Viet Nam such as GSO do not currently provide data on uncertainties.	Uncertainty is crucial to inform policy-makers about risk associated with mitigation strategies.
Proposal is made to have a tutorial or working session on estimating activity area with confidence intervals and entering the information into ALU.	
An urgent capacity building need for MONRE is in standardizing the formal use of remote sensing data for developing inventories. It is hopeful that NRSD data will be used in 2018 for the 2016 LULUCF GHG inventory.	
It is recognized that different ministries have different needs and aims for the inventories they develop. This is not problematic <i>per se</i> , as long as ministries establish clear, consistent definitions of land categorization and transparent methodologies.	
Hope to have a consultation workshop in the future to agree on data sources and methods between DCC and FIPI, inviting land administration representatives and VNFOREST policymakers, in addition to FIPI technical staff.	

Ms. Schauss and Mr. Quang gave concluding remarks, thanking participants for their engagement and drawing the one and a half day workshop to an end.

**Follow-up working session ‘Review and QA/QC of the GHG inventory for agriculture and hands-on exercise on emission projection in LULUCF for 2020-2030’ (11-12 January 2018)**

The two-day follow-up working session on ‘Review and QA/QC of the GHG inventory for agriculture and hands-on exercise on emission projection in LULUCF for 2020-2030’ commenced on the afternoon of Wednesday 10 January 2018.

Dr. Stephen Ogle gave a presentation on GHG emission projection analysis. This covered how to project activity data from the baseline inventory, determining appropriate EFs, addressing leakage, links to social cost of carbon, and determining costs of mitigation. This approach focuses on identification of worthwhile mitigation actions. He then facilitated a hands-on exercise that carried on to the next morning, starting with gaining familiarity with ALU, calculating LULUCF projections using 2014 data, and finally incorporating economic analyses to compare BAU and mitigation projections.

**Day 3**

The third day commenced with an emission projection that included Viet Nam’s National Forestry Development Strategy 2006-2020 and one the REDD+ Action Plan 2014-2020. The points addressed during the subsequent Q&A session are presented in Table 7.

**Table 7: Questions raised and comments given in the first working session Q&A**

Question/Comment	Response from DCC and presenters
How do you quantify the social benefits associated with a given mitigation action using ALU?	ALU is used to identify the least expensive mitigation options given a carbon price and social cost of carbon. Calculating co-benefits from taking an action is the second step but requires additional information beyond just the GHG inventory and mitigation analyses. On a related note, MONRE is currently updating the NDC, and working group experts are interested in social and economic impact assessments of the main sectors to determine impacts on socio-economic development indicators.
ALU can be used to determine the mitigation potentials and enable identification of viable options for NAMAs to be planned accordingly, although non-financial barriers such as cultural barriers need to be taken into account as well.	
What are the offset costs included in ALU when taking a mitigation action?	For example, losses in production of a commodity may need to be balanced through increased production or imports elsewhere. This information is used to inform the emission projections in ALU, although the costs are estimated outside of the software.
The exercise so far has considered taking mitigation actions for one year. If extended for ten years, how are discount rates taken into account?	Judging appropriate discount rates is contentious, and it affects whether mitigation actions should be taken now or it is more cost effective to pay for adaptation and climate change damages in the future. Many countries use intermediary discount rates.

In the afternoon, Mr. Ly Viet Hung (CCOZONE Center expert on GHG inventory in agriculture) gave a presentation on the results of the 2014 base-year GHG inventory for agriculture using ALU. Activity data was obtained mostly from GSO and MARD, and EFs were obtained from general publications such as

IPCC guidelines or specific national studies. Notably, 49% of 2014 GHG emissions came from rice cultivation.

Dr. Ogle introduced participants to QA/QC, giving a general overview of definitions and common QA/QC procedures. He emphasized prioritizing key categories and emission and removal categories with recent data or methodological changes. This was followed by a Q&A session with main points presented in Table 8.

**Table 8: Questions raised and comments given in the second working session Q&A**

Question/Comment	Response from DCC and presenters
Can you clarify who is qualified to do QA?	QA is performed by experts not involved in the inventory process, such as scientists in universities, government ministries and non-governmental organizations. Experts or even data providers can be sector specific specialists, without having expertise on the full GHG inventory. The QA will be comprehensive by including numerous specialists, even if there is no single expert on the full inventory.
In Viet Nam, the CCOZONE is responsible for much of the compiling but CliTech has performed uncertainty analyses in the past due to funding issues.	Ideally, the compilers perform both uncertainty analyses and QC.
Uncertainty analysis is performed not only on sector level, but also propagated to sector totals and grand totals. In the US, coordinating statisticians are responsible for this task.	
Inventory reports in Viet Nam are sent to other ministries, some of which are data providers, for review to validate that the data was used correctly. Is this a process of QA or QC?	Whether to call this process QA or QC is a matter of semantics. What matters is that the process is carried out to verify data. However, if the data providers are not directly involved with the inventory, this set of checks would be considered QA.

The remainder of the day was spent on a hands-on session facilitated by Dr. Ogle on inputting livestock data (buffalo) into ALU and using the built-in QC feature.

#### **Day 4**

The working session continued on the morning of 12 January, with a focus on estimating GHG emissions from agriculture in ALU defining EFs. Before proceeding to uncertainty analysis, a short Q&A session took place with main points presented in Table 9.

**Table 9: Questions raised and comments given in the third working session Q&A**

Question/Comment	Response from DCC and presenters
Can ALU be used to develop EFs specific to certain livestock?	Yes, you can input livestock characteristics and estimate gross feed intake, which can be used to derive country-specific EFs in ALU.
MARD is currently developing guidelines to develop EFs, using direct field measurements and modelling approaches.	It is important to ensure that the sample of livestock in the study is representative of the entire population of livestock, to avoid sampling biases.
Few ministries, including MARD for agriculture GHG inventory, are currently able to provide enough data for compilers to develop country specific EFs.	Compilers will need to work with the other agencies to set priorities for planned improvements in future inventories, which may include new data collection to derive country-specific EFs.

Dr. Ogle gave a presentation on uncertainty analysis, outlining the rationale and background, the two IPCC approaches to calculating uncertainty, and ways of reducing uncertainty through additional research, development of new models, and improving field measurements. ALU implements the simpler Approach 1, which non-Annex I countries generally use in their inventories because it requires far less information than Approach 2. A following Q&A session on uncertainty analysis addressed the following issues:

**Table 10: Questions raised and comments given in the fourth working session Q&A**

Question/Comment	Response from DCC and presenters
Can you provide real-life examples of performing uncertainty analyses?	Dr. Ogle showed an example from his work on the US greenhouse gas inventory. He will disseminate a number of relevant papers to participants for additional information.
How do you determine accuracy of data?	You can never be absolutely certain about data accuracy. However, if the sampling design was correctly developed with appropriate methods, we can assume that measured data is accurate.
Reliability refers to how well the inventory procedure was carried out, and whether good practice was employed. It does not imply that the data is precise or that uncertainty is low.	
GSO should provide data on uncertainty, as this allows policy-makers to assess risk associated with taking or not taking certain mitigation actions. Where uncertainty data are unavailable, the compilers will need to rely on expert knowledge and then prioritize additional data collection in a future inventory, particularly if the emissions category is a key source.	

The final hands-on session facilitated by Dr. Ogle explored using uncertainty analysis for data on nitrogen fertilizer usage.

Closing remarks were given by Mr. Quang, who remarked that the working-session was a success and urged participants to continue improving ALU skills, and Ms. Schauss thanked everyone for their great support and active participation.

## 2 Lessons Learned and Key Messages

This section summarises the main lessons learned during the training workshop. This includes the lessons learned throughout the group exercises and the discussions after each presentation. The key take-home messages highlighted by the international trainers for the participants are also included.

### 2.1 Lessons Learned

Different GHG results for the LULUCF sector:

- Different ministries may develop GHG estimates for one sector based on diverging aims and requirements, and discrepancies can arise in the results. For this reason, an intragovernmental exchange and agreement on clear and consistent definitions, categories and data sources and methodologies could help to ensure comparability and transparency associated with the different results.
- In the case of the LULUCF sector in Viet Nam, the following differences were identified:
  - The GHG inventory estimates annual changes in carbon stocks using the gain-loss method and data available in national statistics that are collected with top-down approaches.
  - FREL/FRL activity data only considers CO<sub>2</sub> emissions based on the stock difference method and activity data collected every five years from the FIPI/ National Forest Inventory and Monitoring Programme. The programme produces forest cover maps from 1995-2010 and compiles data from a network of forest inventory plots that are used to estimate carbon stock changes with the stock difference method.

Remote sensing:

- Applying remote sensing to get maps as inputs for GHG inventory is an advance tool to improve quality of inventory for LULUCF sector.
- When using remote sensing data for GHG inventory compilation, activity data should not be estimated directly from counting pixels from a map. IPCC good practice stipulates the estimation of activity data through a method that leads to an unbiased estimator of land use and land-use change, removing classification errors and reducing discrepancies.
- Maps only serve to stratify landscapes to inform data collection, so it is possible to use different sources of data in different analyses and arrive at the same result if the approaches are unbiased.

Emission projections:

- Four sets of projections should be considered in emission projections given the national circumstances in Viet Nam: baseline/BAU scenario, current policy, planned future policies, and possible future measures enabled with international support.

Emission factors:

- The development of country-specific EFs especially for key categories will increase accuracy of Viet Nam's estimated emissions.

ALU software:

- The ALU software can be used to identify the least expensive mitigation options given a carbon price, which should be informed by the social cost of carbon. Cost analysis performed outside of ALU can be used to inform the activities incorporated into ALU projections for estimating mitigation potentials. The cost analysis and emission projection results can be used to identify worthwhile activities and associated mitigation costs.
- By incorporating activity data and EFs with relevant background information, uncertainty, and QA/QC procedures, ALU enables inventory compilers to apply IPCC good practices as they produce inventories for reporting to the UNFCCC.
- ALU can incorporate country-specific EFs and documentation allowing compilers to advance the inventory to a Tier 2 method.

QA/QC and uncertainty:

- QC should be applied simultaneously with GHG inventory compilation, and ideally by the inventory compilers/responsible agencies.
- QA can be performed by experts not involved in the inventory process, such as university researchers. Experts or even data providers can be sector specific specialists, without having expertise on the full GHG inventory. The QA will be comprehensive by including numerous

specialists with different backgrounds from other government ministries, universities and non-governmental organizations.

- Uncertainty analysis is performed not only on sector level, but also propagated to sector totals and grand totals. Data providers need to provide the uncertainty of their data.
- Reliability refers to how well the inventory compilation was carried out, and whether good practice was employed. It does not imply that the emissions data is precise, i.e., that uncertainty is low, although if good practice is followed then uncertainty is typically reduced as far as practical given the information available to the compilers.

## **2.2 Key Take-Home Messages**

Different GHG results for the LULUCF sector:

- An exchange between MONRE, MARD and other line ministries on common methodologies, categories (e.g. ecological zones and forest types) and data sources for emission estimation of the LULUCF sector will increase future comparability and transparency of the results by the GHG inventory and FREL/FRL.

Remote sensing:

- The standardisation of the formal use of remote sensing data is necessary to ensure the inclusion of this data source in the future.
- Within the review of PM Decision No. 2539 the data templates included in the annex need to be updated to 2006 IPCC guidelines.

General:

- Further capacity building and expert advice on uncertainty management will support the enhancement of the quality of GHG inventories.
- The development of country-specific EFs especially for key categories is important for improving the future GHG inventories.

### 3 Appendix 1: Training Agenda

#### Information Matters Capacity Building Workshop: Review of GHG inventory in the LULUCF sector in Viet Nam

Venue: Do Son town, Hai Phong city, Viet Nam

Date: 09 - 10 January 2018

<u>2:30pm</u> , 08 January 2018	Departure by bus from Ha Noi for GIZ/IMHEN people and trainers: <b>at IMHEN-NAMA office No. 23 Lane 62 Nguyen Chi Thanh, Dong Da, Ha Noi</b> for other participants at MONRE – <b>No. 10 Ton That Thuyet, Cau Giay, Ha Noi</b>
<u>2:00pm</u> , 10 January 2018	A bus from Do Son to Ha Noi will be arranged for those participants who do not attend the 2 <sup>nd</sup> IM event on 11-12 January and would like to go back to Ha Noi

Day 1 (09 January 2018)		
8:00 – 8:30	<b>Registration</b>	MONRE/DCC & GIZ/IM
8:30 – 8:40	<b>Objectives, expected outcomes and approval of Agenda</b>	MONRE/DCC
8:40 - 8:55	<b>Opening remarks (brief)</b>	- Mr. Nguyen Khac Hieu, DDG of DCC, MONRE
8:55 - 9:10	<b>Session 1: Presentation about the Information Matters project</b>	Verena Schauss, IM Country Coordinator
9:10 - 9:30	<b>Session 2: Introduction and latest updates on National GHG Inventory System</b> <ul style="list-style-type: none"> <li>– Introduction of the National GHG Inventory System under the PM’s Decision No. 2359</li> <li>– Experience on initial implementation</li> </ul>	Mr. Nguyen Van Minh, Deputy Head, Division of GHG Emission Reduction & Ozone Layer Protection, DCC, MONRE
9:30 - 9:45	<b>Session 3: Presentation on the results of 2013 GHG inventory for the LULUCF sector</b> <ul style="list-style-type: none"> <li>– Data set (activity data collection) and calculation process</li> <li>– Selection and use of Emission Factors</li> <li>– Key results</li> </ul>	Ms. Tran Thu Huyen, Expert on GHG inventory in LULUCF
9:45 - 10:00	<b>Discussion (including Q&amp;A)</b>	
10:00 - 10:20	Photo session and Coffee break	
10:20 - 10:40	<b>Session 4: Introduction of GHG emission calculation using Forest Reference Emission Level (FREL) under MARD and linkage to GHG inventory</b> <ul style="list-style-type: none"> <li>– Background</li> <li>– Data set and methodologies</li> <li>– FIPI’s work on the forest inventory</li> </ul>	Mr. Nguyen Dinh Hung, Forest Inventory and Planning Institute (FIPI)

	<ul style="list-style-type: none"> <li>– Key results/findings and linkage to GHG inventory in LULUCF sector</li> </ul>	
10:40 - 12:00	<p><b>Facilitated plenary discussion: Review, analysis (including QA/QC as applicable) and assessment of the 2013 GHG inventory results for the LULUCF sector</b></p> <ul style="list-style-type: none"> <li>– Assessment of 2013 GHG inventory results, methods and various calculations</li> <li>– Discussion</li> <li>– Linkage with other emission calculations (as applicable)</li> </ul>	Facilitated by Dr. Stephen Ogle and DCC
12:00 - 14:00	Lunch	
14:00 - 14:40	<p><b>Session 6: Key technical aspects: from theory to practice</b></p> <ul style="list-style-type: none"> <li>– Overview on UNFCCC requirements, methodologies &amp; key technical aspects of GHG inventory in the LULUCF sector for Non-Annex I countries;</li> <li>– QA/QC objectives per IPCC guidelines and documentation of QA/QC findings</li> <li>– Introduction of ALU software as important supporting tool for GHG inventory and emission projection in LULUCF and agriculture sectors as well as recent support to Viet Nam on this topic.</li> </ul>	Dr. Stephen Ogle, Colorado University, IPCC lead author and international expert on GHG inventory and ALU software
14:40 - 15:00	<p><b>Session 7: Practical experience of tools application for GHG inventories for the LULUCF sector</b></p> <ul style="list-style-type: none"> <li>– Overall process of transferring the ALU software in Viet Nam</li> <li>– First-hand experience in ALU software application for the GHG inventory: advantage and limitations.</li> </ul>	Mr. Quach Tat Quang, Team Leader, expert on GHG inventory, Acting Director of CCOZONE Center
15:00 - 15:30	<b>Discussion</b> ( <i>merged with coffee break</i> )	All participants
15:30 - 16:00	<p><b>Session 8a: Contribution of remote sensing and mapping tools in providing technical inputs for GHG inventory</b></p> <ul style="list-style-type: none"> <li>– Role of remote sensing and analysis and other mapping tools in GHG inventory for LULUCF sector</li> <li>– Practical experiences in remote sensing application for developing maps as input for GHG inventories</li> </ul>	Mr. Dang Truong Giang, National Remote Sensing Department (NRSD)
16:00 - 16:30	<p><b>Session 8b: USGS presentation on remote sensing and mapping tools in providing technical inputs for GHG inventory</b></p> <ul style="list-style-type: none"> <li>- Remote sensing and mapping tools</li> <li>- Accuracy assessment and validation of activity data from maps</li> </ul>	Dr. Pontus Olofsson, Boston University, USGS
16:30 - 17:00	Discussion and Q&A	All participants
17:00 - 17:15	<b>Wrap up and summary of the first day results and key messages</b>	Mr. Quach Tat Quang, DCC
18:30	Dinner	

Day 2 (10 January 2018)		
9:00 - 9:15	<b>Recap of Day 1</b>	Mr. Quach Tat Quang, DCC
9:15 - 9:45	<p><b>Session 9: Preliminary results of the GHG emission projection in LULUCF sector for period 2020-2030</b></p> <ul style="list-style-type: none"> <li>– Methodology and data</li> <li>– Key preliminary results &amp; discussion</li> <li>– Q&amp;A</li> </ul>	Ms. Tran Thu Huyen, Expert on GHG inventory in LULUCF

9:45 - 10:30	<b>Initial discussion and expert assessment of the GHG emission projection in LULUCF sector for 2020-2030</b>	Facilitated by DCC and Dr. Stephen Ogle
10:30 - 10:45	Coffee break	
10:45 - 11:45	<b>Discussion on other technical issues for GHG inventory and emission projection in LULUCF sector;</b> <ul style="list-style-type: none"> <li>– Discussion; Expert review and assessment;</li> <li>– Uncertainty Analysis;</li> <li>– Capacity building needs;</li> <li>– The way forwards/ linkages with NDC process.</li> </ul>	Facilitated by DCC and Dr. Stephen Ogle
11:45 - 12:00	<b>Workshop conclusion remarks and closing</b>	Mr. Quach Tat Quang, DCC Ms. Verena Schauss, IM
12:30 - 14:00	Lunch	
14:00	Departure to Ha Noi (for participants not attending the follow-up workshop)	

## Information Matters Follow-up Working Session: Review and QA/QC of GHG inventory for Agriculture sector and hands-on exercise on emission projection in LULUCF sector for period 2020-2030

**Venue: Do Son town, Hai Phong city, Viet Nam**

**Date: 11 - 12 January 2018**

Day 1 (10 January 2018)		
14:00 - 15:30	<b>Hands-on exercise on emission projection in LULUCF sector for period 2020-2030</b> <ul style="list-style-type: none"> <li>- Application of economic scenarios in emission calculations</li> <li>- Creation of a work plan for compilation of relevant data and analysis</li> <li>- Including data in ALU software</li> <li>- Mitigation analysis using ALU software</li> </ul>	Facilitated by Dr. Stephen Ogle, Colorado State University  Supported by Ms. Tran Thu Huyen
15:30 - 15:45	Coffee break	
15:45 - 17:15	<b>Hands-on exercise on emission projection in LULUCF sector for period 2020-2030 (continuation)</b>	Dr. Stephen Ogle, Supported by Ms. Tran Thu Huyen

Day 2 (11 January 2018)		
9:00 - 9:15	<b>Recap of Day 1</b>	Mr. Quach Tat Quang ,DCC
9:15 - 10:30	<b>Hands-on exercise on emission projection in LULUCF sector for period 2020-2030 (continuation)</b> <ul style="list-style-type: none"> <li>- Challenges in methodologies and EFs selection and usage as well as data collection</li> </ul>	Dr. Stephen Ogle, Supported by Ms. Tran Thu Huyen
10:30 - 10:45	Coffee break	
10:45 - 12:00	<b>Hands-on exercise on emission projection in LULUCF sector for period 2020-2030 (continuation)</b> <ul style="list-style-type: none"> <li>- IPCC good practice documentation of QA/QC findings</li> </ul>	Dr. Stephen Ogle, Supported by Ms. Tran Thu Huyen
12:00 – 14:00	Lunch break	
14:00 – 14:30	<b>Presentation of the results of 2014 base-year GHG inventory for Agriculture sector using ALU software</b> <ul style="list-style-type: none"> <li>- Data set (activity data collection) and calculation process</li> <li>- Selection and use of Emission Factors (EFs)</li> <li>- Key results</li> <li>- Q&amp;A</li> </ul>	Mr. Ly Viet Hung, Expert on GHG inventory in agriculture sector
14:30 – 15:30	<b>Hands-on exercise on the review and QA/QC of the 2014 base-year GHG inventory for Agriculture sector</b> <ul style="list-style-type: none"> <li>- Methodology and approaches</li> <li>- QA/QC for activity data</li> <li>- Review and QC for EFs</li> <li>- QA/QC for the results of GHG inventory</li> <li>- IPCC good practice documentation of QA/QC findings</li> <li>- Documentation of QA/QC findings</li> </ul>	Facilitated by Dr. Stephen Ogle  Supported by Mr. Ly Viet Hung and DCC
15:30 - 15:45	Coffee break	

15:45 – 17:15	<b>Hands-on exercise on the review and QA/QC of the 2014 base-year GHG inventory for Agriculture sector (continuation)</b>	Facilitated by Dr. Stephen Ogle Supported by Mr. Ly Viet Hung and DCC
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<b>Day 3 (12 January 2018)</b>		
9:00 - 9:15	<b>Recap of Day 2</b>	Mr. Quach Tat Quang, DCC
09:15-10:30	<b>Introduction: uncertainty analysis for LULUCF and Agriculture sectors:</b> <ul style="list-style-type: none"> <li>– Background and methods for uncertainty analysis, including by application of ALU software</li> <li>– Experience/analysis of uncertainty analysis for 2013 base-year GHG inventory (for the BUR2 of Viet Nam) and lessons learned</li> <li>– Recommendations and plan for 2014 base-year GHG inventory</li> <li>– Q&amp;A</li> </ul>	Facilitated by Dr. Stephen Ogle Supported by Ms. Tran Thu Huyen and Mr. Ly Viet Hung
10:30- 10:45	Coffee break	
10:45-12:00	<b>Hands-on exercise on the uncertainty analysis for LULUCF and Agriculture sectors</b> <ul style="list-style-type: none"> <li>- Uncertainty estimation of data using ALU software</li> </ul>	Facilitated by Dr. Stephen Ogle Supported by Ms. Tran Thu Huyen and Mr. Ly Viet Hung
12:00 – 12:15	<b>Workshop conclusion</b>	Mr. Quach Tat Quang, DCC Ms. Verena Schauss, IM

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