TOOLKIT

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April 2014

LOW EMISSION CAPACITY BUILDING PROGRAMME

STRENGTHENING NATIONAL GREENHOUSE GAS (GHG) INVENTORY SYSTEMS

Numerous resources are available to assist developing countries that are putting in place a national greenhouse (gas) inventory system. This document, which accompanies the Low Emission Capacity Building (LECB) Programme's Information Brief on this topic, contains a range of items – from international data sets and models, to templates and terms of references.

1. Intergovernmental Panel on Climate Change (IPCC) guidance, software, and Emission Factor Database

Guidance manuals

The IPCC Task Force on National GHG Inventories (TFI) (http://www.ipcc-nggip.iges.or.jp/) oversees the elaboration of internationally adopted approaches for estimating GHG emissions, as well as good practice guidance. These materials are available in all UN languages:

- IPCC Guidelines for National Greenhouse Gas Inventories (1996 Revised, 2006)
- IPCC 2000 Good Practice Guidance & Uncertainty Manual (GPGAUM)
- IPCC 2003 Good Practice Guidance for Land-Use, Land-Use Change & Forestry

Inventory software

The IPCC Inventory Software (http://www.ipcc-nggip.iges.or.jp/software/index.html) implements the simplest Tier 1 methods in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* and, as such, is useful to users of all versions of IPCC Guidelines. The TFI is currently working on making the software compatible with the Tier 2 methods in the 2006 IPCC Guidelines.

Contents

This software has a number of improvements over earlier software for the *Revised 1996 Guidelines*, including:

- Standalone software that does not require any additional software or internet access
- Covers all inventory categories, but can also be used for management of specific sectors
- Allows different parts of the inventory to be developed simultaneously
- Data entry in worksheets following 2006 IPCC Guidelines for ease-of-use
- Provides default data from 2006 IPCC Guidelines but gives users the flexibility to use their own country-specific information

IPCC Emission Factors Database (EFDB)

This IPCC library is where users can find emission factors and other parameters with background documentation or technical references that can be used for estimating GHG emissions and removals: http://www.ipcc-nggip.iges.or.jp/EFDB/main.php

2. UNFCCC Consultative Group of Experts (CGE)

The UNFCCC CGE has elaborated a range of training materials on the GHG inventory process, including presentations, guidance notes, and exercises that can be downloaded here: http://unfccc.int/national_reports/non-annex_i_natcom/training_material/methodological_documents/items/349.php. The CGE training materials are also available in French and Spanish.

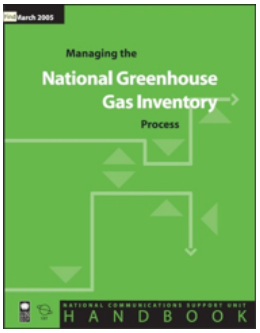
The materials include presentations on a range of cross-cutting issues such as:

- National arrangements
- Building a sustainable national GHG inventory management system
- Key category analysis
- Data gaps
- Quality assurance/quality control measures

The materials are designed to facilitate the preparation of national communications by non-Annex I Parties in accordance with the UNFCCC Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention (decision 17/CP.8). It is in no case intended to replace any of the methodologies or tools referred to or mentioned in its various modules. For further detail and explanation, the reader is therefore always encouraged to go back to the original documents or tools referred to.

3. UNDP-GEF Handbook: Managing the National GHG Inventory Process

Compiling a national greenhouse gas (GHG) inventory requires a fairly lengthy and interconnected series of tasks, including collecting emission factors and activity data, selecting appropriate methods, estimating GHG emissions and removals, implementing uncertainty assessment and quality assurance/quality control procedures, reporting the results, and documenting and archiving all relevant data and procedures.



This work requires fundamental decisions about data and methods, the establishment of a network of contacts for accessing data and reviewing results and the design of a system for data management, quality assurance, quality control, documentation and archiving. The inventory process should be planned, operated and managed to ensure optimal quality and efficiency, given available resources. This is especially important as countries produce their second and subsequent national inventories.

The objective of this handbook (http://ncsp.undp.org/document/managing-national-greenhouse-gas-inventory-process), developed by the UNDP under the GEF-funded National Communications Support Programme, was to provide non-Annex I Parties with a strategic and logical approach to a sustainable inventory process. Inputs were provided from a wide range of institutions and national experts from Annex I and non-Annex I Parties.

Among the recommendations are that a significant part of a country's GHG inventory improvement efforts focus on documentation and archiving, because this is critical to the long-term sustainability and institutionalisation of the inventory process

It should be noted that the handbook uses the word "management" in its traditional sense of organising, supervising and arranging activities, data or people. This interpretation is different from the more narrowly defined "inventory management" (UNFCCC 2002) that focuses on archiving.

The handbook is meant to complement the Intergovernmental Panel on Climate Change (IPCC) inventory guidance, and is also useful to apply in conjunction with the US-EPA's Template Workbook.

4. US EPA/US AID Template Workbook for Developing a National GHG Inventory System

A major component of US EPA's approach to building sustainable national GHG inventory management systems is to use the pre-defined National System Templates as a starting point. Completed templates can be compiled into a single National Inventory System Report, which provides a comprehensive documentation of each critical component for managing development of the GHG inventory development process. These tools are consistent with IPCC and UNFCCC guidelines for national GHG inventory development.

The complete workbook can be downloaded in English and Spanish (French forthcoming) or in English for each of the six individual templates, and the Key Category Analysis Tool.

Complete Template Workbook (MS Word, 2,849KB). En Espanol (MS Word, 2,84KB)

Institutional Arrangements for National Inventory Systems (IA) (MS Word, 270KB)
Assists inventory teams in assessing and documenting the strengths and weaknesses of existing institutional arrangements and to help plan arrangements for future inventory development to ensure continuity and integrity of the inventory, promote institutionalization of the inventory process, and facilitate prioritization of future improvements.

Methods and Data Documentation (MDD) (MS Word, 200KB)
Assists inventory teams in documenting and reporting the origin of methodologies, activity datasets, and emission factors used to estimate emissions or removals. Future inventory teams can refer to the completed template for each source and sink category to determine what information was collected, how the data were obtained, and what methods were used, as well as to reproduce estimates.

Description of Quality Assurance and Quality Control Procedures (QA/QC) (MS Word, 265KB)
Guides countries through the establishment of a cost-effective QA/QC program to im-prove transparency, consistency, compar-ability, completeness, and confidence in national GHG inventories. The template includes supplemental checklists with recommended QA/QC procedures that are specific to management roles, such as the Inventory Coordinator and QA/QC Coordinator, as well as sector leads.

Description of Archiving System (AS) (MS Word, 68KB)
Facilitates reproducing and updating GHG emission estimates to be easily recreated, safeguards against data and information loss, and facilitates development of subsequent inventories by future inventory staff. An archive system is an inexpensive yet critical step toward a sustainable National Inventory System.

Key Category Analysis (KCA) (MS Word, 1,437KB)
Identifies the sources and/or sinks that have the greatest contribution to national emissions, and thus should be the focus of improvement efforts. The template and

tool are consistent with IPCC Guidelines. The KCA Tool enables a country to determine key categories from GHG inventory estimates.

Key Category Analysis Tool (MS Excel, 1,632KB). En Espanol (MS Excel, 1,698KB) National Inventory Improvement Plan (NIIP) (MS Word, 85KB)
Synthesizes findings and describes specific priorities for future capacity-building projects based on the needs identified in the first five templates, and facilitates continual inventory improvements.

5. US EPA/Colorado State University Agriculture and Land Use (ALU) software tool

The **Agriculture and Land-Use Greenhouse Gas Inventory (ALU) software tool** (http://www.nrel.colostate.edu/projects/ALUsoftware/) enables countries to estimate emissions and removals from estimate emissions and removals associated with biomass C stocks, soil C stocks, soil nitrous oxide emissions, rice methane emissions, enteric methane emissions, manure methane and nitrous oxide emissions, as well as non-CO2 GHG emissions from biomass burning.

Methods are based on guidelines provided by the IPCC, as documented in the Revised 1996 IPCC National Greenhouse Gas Inventory Guidelines as further refined in the 2000 IPCC Good Practice Guidance on Uncertainty Management in National Greenhouse Gas Inventories and 2003 IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry. (A version that is compliant with the IPCC 2006 Guidelines will be ready by Spring/Summer 2015.)

The ALU software guides an inventory compiler through the process of estimating GHG emissions and removals related to agricultural and forestry activities. The software simplifies the process of conducting the inventory by dividing the inventory analysis into steps to facilitate the compilation of activity data, assignment of emission factors and completion of the calculations. The software also has internal checks to ensure data integrity.

Many governments also have an interest in mitigating GHG emissions from agriculture and forestry. Determining mitigation potential requires an understanding of both current emission trends and the influence of alternative land use and management practices on future emissions. The software program is designed to support an evaluation of mitigation potentials using the inventory data as a baseline for projecting emission trends associated with management alternatives.

Also associated with the tool are specific activity data workbooks that assist inventory compilers in compiling the required data for implementing the IPCC methodologies.

The software has several innovative features:

- Accommodates Tier 1 and 2 methods as defined by the IPCC
- Allows compilers to integrate GIS spatial data along with national statistics on agriculture and forestry
- Designed to produce a consistent and complete representation of land use for inventory assessment
- Can develop an enhanced characterization for livestock
- Has explicit quality control and quality assurance steps
- Provides a long-term archive of data and results in digital format
- Generates emission reports that can be included in communications with interested parties.

6. Food & Agriculture Organisation FAOSTAT3 Database

FAO has released a database which now contains updated estimates for Agriculture (1961-2011), plus projections to 2030 and 2050) and Land Use (1990-2010). It provides countries with vital, regularly updated information to help them consistently identify, assess and report GHG emissions from their agriculture, forestry and other land use sectors, as part of the activity data they already report to FAO. The new update was produced by the FAO Monitoring and Assessment of GHG Emissions and Mitigation Potential in Agriculture Project (http://www.fao.org/climatechange/micca/ghg/en/), funded by the Governments of Germany and Norway.

The new data are available at the following links:

Emissions – Agriculture
http://faostat3.fao.org/faostat-gateway/go/to/browse/G1/*/E (Browse data)
http://faostat3.fao.org/faostat-gateway/go/to/download/G1/*/E (Download data)

Emissions – Land Use
http://faostat3.fao.org/faostat-gateway/go/to/browse/G2/*/E (Browse data)
http://faostat3.fao.org/faostat-gateway/go/to/download/G2/*/E (Download data)

The data are accompanied by metadata information in **English, Spanish and French**, detailing the estimation procedures with reference to the 2006 IPCC Guidelines. The metadata, accessible online under both the browse and download sections of FAOSTAT, can assist statistical offices involved in the collection and validation of agricultural/forestry statistics to identify the appropriate variables needed for GHG estimates. Metadata are also useful for environmental agencies that compile and report GHG emissions for the AFOLU sector. You may also access metadata directly here: http://www.fao.org/climatechange/micca/78838/en/.

FAOSTAT3 offers free, easy access to data and introduces enhanced features tailored to the information needs of a wide variety of users. These include browsing and analysis of data, advanced interactive data download, cross-domain data search using free-text, and data exchange through web services.

The FAOSTAT GHG database is not seen as a replacement for UNFCCC reporting requirements, but can nonetheless provide significant support to FAO member countries along four key dimensions:

1. providing regular updates of global and regional trends in GHG emissions from AFOLU;
2. bridging gaps in capacity of member countries in assessing and reporting GHG emissions, considering new requirements under the Durban accords;
3. establishing a GHG emission benchmark for quality control and quality assurance; and
4. providing a coherent framework for national-level analysis and dialogue on GHG assessment and gaps.

How to navigate to the GHG domain in FAOSTAT3

1. Select "**Browse Data**" from the menu bar on the top of the FAOSTAT3 page. This opens by default the FAOSTAT domain data page "**Production**".
2. Click on "**Emissions – Agriculture**" or "**Emissions – Land Use**" on the left column to access the FAOSTAT GHG data domain.
3. Select the sub-domain of interest: several graphic representations are displayed by default at global level and averaged over the period 1990-2010.
4. Menus on top of the page allow users to modify the default graphics by choosing a single country, different years of analysis and other options specific to the sub-domain. The new data selections will be displayed in real time on the webpage.

7. NATIONAL TRAINING ON ESTABLISHING A GREENHOUSE GAS (GHG) NATIONAL INVENTORY SYSTEM

Download Template

[date]

DRAFT AGENDA

Objectives

- Create a common understanding of the key elements of national GHG inventory system
- Raise awareness of the importance and uses of the GHG inventory
- Agree an action plan for addressing bottlenecks in the institutional arrangements & management arrangements
- Develop an inventory improvement strategy to improve key activity data in the priority sectors identified under the LECB project

Approach

Working closely with the GHG inventory team leader from the Second or Third National Communication, LECB experts will complete – to the extent possible – templates 1, 2 and 5 of the US-EPA workbook on Developing a National GHG Inventory System (on institutional arrangements, methods & data documentation, and key category analysis respectively). The information gathered through in this work will be used to tailor the training and ensure that key issues and barriers in-country can be addressed.

Workshop overview

A larger group of stakeholders will be invited to Day 1 of the training in order to promote the importance of the GHG inventory to a broader constituency and gain a common understanding of the value of a national inventory system. On day 1, the existing institutional arrangements will be presented and participants will agree on an action plan for improving the overall management process.

A targeted group of GHG inventory focal points will attend the training on Days 2 and 3 that will focus on data issues and inventory improvement strategy.

Day 1: You can't manage what you can't measure: institutionalising the GHG inventory process	Day 2: Addressing data gaps & quality issues	Day 3: Strategy for improving the GHG inventory system

Day 1: Institutionalising The GHG Inventory Process

09:45 – 09:00	Session 1: Welcome & Introduction
09:45 – 09:00	• Welcome (national representative) • Introduction to the LECB Programme (UNDP) • Overview of the agenda & workshop expectations (UNDP) • Round of introduction by participants
11:30 -9:45	**Session 2: The importance of the national GHG inventory**
10:30 – 9:45	**Presentation: The UNFCCC context and broader objectives of GHG inventories (20 mins)** Participants will also be updated on the implications of the UNFCCC negotiating process (e.g., Biennial Update Reports, Measuring, Reporting, & Verification) as well as the general benefits of GHG inventories that can be used in national awareness-raising efforts. Questions & plenary discussion (25 minutes)
11:00 – 10:30	**Presentation: Snapshot of [COUNTRY'S] GHG inventory (national expert) (15 mins)** Questions (15 mins) The purpose is to present the national context by giving a brief overview of GHG inventory status and key results (emissions trends), using the key category analysis (US EPA Template 5)
11:30 – 11:00	Tea/coffee break
12:30-11:30	**Presentation: The key elements of the National GHG Inventory System (30 mins)** The purpose of this presentation is to ensure a common understanding in the audience of the various elements of the GHG national inventory system, i.e., institutional arrangements, QA/QC, documentation and archiving, inventory improvement plan, and use of key category analysis. Questions & plenary discussion (30 minutes)
16:00-12:30	**Session 3: How to improve the institutional arrangements for the GHG inventory**
13:00-12:30	**Presentation: Overview of [Country's] institutional arrangements (national expert) (15 mins)** Questions for clarification (15 mins) The current institutional arrangements and key barriers to sharing information will be introduced, based on the mapping undertaken using US EPA's Template 1.
14:00-13:00	Lunch
15:00-14:00	**Working Groups: Overcoming Institutional Barriers (60 mins)** Participants will split into 3 to 4 working groups (around 12-10 participants per group) to discuss the root causes of information sharing and institutional collaboration, as well as identify concrete ways to overcome these barriers. Each working group will be assigned a facilitator [from a key line Ministry?], backstopped by a member of the LECB resource team.
16:00-15:00	**Report back & plenary discussion** Each working group will report on 3 key findings and solutions from their discussions. Participants will then collectively endorse elements for an action plan that incorporates the solutions identified. The action plan will include who is responsible for conducting each action, a timeline for completion, and any assistance needed from the LECB programme.

16:30 – 16:00	Tea/coffee break
17:00-16:30	**Session 5: Next steps to promote the GHG inventory**
17:00-16:30	**Plenary discussion: Promoting the GHG inventory (30 mins)** In the final session, participants will provide suggestions on how to raise the profile of the GHG inventory as a policy and decision-making tool, based on the perspectives of their institutions (i.e., what value the GHG inventory could bring to their work) so that the LECB team can develop an awareness raising strategy as part of the overall inventory improvement plan.

Day 2: Addressing Data Gaps & Quality Issues

The mapping of existing data prepared using US-EPA's Template 2 must be shared with the participants at least one week prior to the national training. Depending on sectors selected, ALU workbook might also be shared with LULUCF experts.

10:00-09:00	Session 1: Clinic on key resources
09:30-09:00	**US-EPA Template Workbook for a GHG National Inventory System & NCSP Handbook, Managing the National GHG Inventory Process** Overview of the two resources, and how they complement one another.
10:00-09:30	**The IPCC Emission Factor Database**
13:30-10:00	**Session 2: Overcoming data barriers – the importance of documentation and archiving**
10:15-10:00	**Presentation: Role of [lead GHG inventory institution] (national expert) (15 mins)** The role of the lead GHG inventory institution will be described in terms of what it is mandated to do and what its expectations are vis-à-vis the key data providers.
11:15-10:15	**Presentation: Overview of findings from data mapping (national experts) (30 mins)** Plenary discussion (30 mins) The national experts will present the key findings from the data mapping undertaken using US EPA's Template 2, e.g., where the biggest data gaps occur (and why, if known), where there is the most uncertainty about data, etc.
11:45-11:15	Tea/coffee break
	Participants will break into 3-2 parallel groups (e.g., energy & transport, agriculture & LULUCF, waste & industrial processes – final groups will be based upon country needs/ priorities and the existing institutional arrangements) to discuss: • The findings for the sector & what additional information they might have for addressing data gaps • Impact of improving emission factors vs activity data • Strategies for leveraging national expertise to address data gaps • Capacity constraints (human, technical, financial) • What is needed at the system level to address the various issues identified, with a particular focus on key categories
14:30-13:30	Lunch

16:00-14:30	The working groups will report back on findings from their sector (15 minutes per working group), followed by a plenary discussion
16:30-16:00	Tea/coffee break
17:30-16:30	**Session 3: QA/QC planning**
17:30-16:30	The working groups will reconvene to refine findings based upon the plenary discussion and elaborate a QA/QC plan for the sector(s).

Day 3: Strategy for Improving the GHG Inventory System

On day 3, participants will review the outcomes & recommendations of the previous two days and draft an inventory improvement strategy for each sector (issue, who will respond, timeline, barrier analysis, etc), paying particular attention to the sectors identified for NAMA development under the LECB project.

For presentation materials that can be adapted for this workshop, please go to the LECB Teamworks space: https://undp.unteamworks.org/node/212578

8. SAMPLE TERMS OF REFERENCE – LECB PROJECT

Download Template

LECB GHG Inventory System team leader

Working under the direct supervision of the LECB Project Manager, the GHG Inventory System Team Leader will provide technical knowhow for capacity assessment and for design of National Inventory System. Relevant project activities that will involve the services of the GHG Inventory Team Leader are described under Outcome 1: Robust national systems for preparation of GHG emission inventories have been established at a national level. The National GHG Inventory System Team Leader will provide technical guidance and supervise the work of the experts and the national institutions involved in the GHG inventory system development. He/She will also meet regularly with the team leaders of the other project Thematic Working Groups (TWGs) in order to share information, assumptions, and data.

In order to build on previous similar exercises, one prerequisite is that the Inventory Team Leader must have been substantially involved in preparing the GHG inventory for the National Communication – ideally in the role of inventory team leader for the National Communication.

Potential outputs and tasks for establishing a national inventory system are described below. Key resources to support the experts include:

- IPCC Guidelines for National Greenhouse Gas Inventories (1996 Revised, 2006)
- IPCC 2000 Good Practice Guidance & Uncertainty Manual (GPGAUM)
- IPCC 2003 Good Practice Guidance for Land-Use, Land-Use Change & Forestry
- UNDP 2005 Handbook: Managing the National GHG Inventory Process
- US EPA/US AID 2011 Template Workbook: Developing a National GHG Inventory System (English, Spanish, French)

The specific duties are as follows:

Managerial Duties

- Prepare a detailed workplan for national activities, in consultation with the Project Manager
- Prepare a monitoring and evaluation programme to ensure timely assessment of project activities
- Participate in the preparation of TORs for Inventory National Consultants and participate to the process of interviewing the candidates for inventory national consultants and sub-contractors
- Work closely with the UNDP country office, the Project Manager and the Project Steering Committee in the disbursement of funds related to project activities (as part of contracting duties, above)
- Prepare progress reports for the Project Steering Committee
- Ensure good co-ordination with relevant national institutions and government ministries to ensure that project activities are distinct and fully complementary to other national initiatives, particularly the National Communication

Technical and Supervisory Duties

- Manage and coordinate the day-to-day activities of the TWG on National GHG Inventory Systems and National Consultants hired to support the project outcome, *Robust national systems for preparation of GHG emission inventories have been established at a national level*
- Supervise and coordinate the production of project outputs within the TWG 1 and link to work under other TWGs, as needed
- Provide necessary guidance and technical support to inventory national consultants and sub-contractors in performing their functions
- Identify training needs at contracted national institutions and for other project stakeholders, as described in the project document, and prepare a training programme
- Act as key inventory technical expert and resource person in the design and conduct of training seminar/workshops in the development and implementation of the national inventory system
- Recommend legal and institutional frameworks, as well as coordination mechanisms that will ensure periodic development of GHG inventories, Biennial Update Reports and National Communications
- Recommend mechanisms at the national and institutional levels to link National Inventory System with MRV-related activities on a sustained basis

- Ensure that the contracted national institutions are familiar with the application of IPCC Good Practice Guidance
- Ensure the publication and dissemination of results
- Other tasks that the Project Steering Committee identify as necessary to the success of the Project in attaining its objectives.

Qualifications

- Advanced degree or higher (Master's or higher) in areas relevant to climate change, environment and national development
- A minimum of 7 years of professional experience in the area relevant to the Project and demonstrating ability in development of computer-based inventory systems
- Substantial involvement in the preparation of the national GHG inventory of the National Communication is mandatory
- Substantial knowledge of methodologies for inventories (IPCC Revised 1996 Guidelines or 2006 Guidelines and Good Practice Guidance)
- Demonstrated strong leadership, effective management skills, good coordination ability and team working spirit
- Good organizational skills, with strong experience in organizing and facilitating meetings, workshops and writing reports
- Substantial experience in Government and in inter-departmental procedures preferred
- Familiarity with international negotiations and processes under the UNFCCC preferred
- Familiarity with computers and word processing
- Understanding of written and Spoken English

Duration: XXXXX

No project staff can be simultaneously employed by government, in line with UNDP rules and regulations.

LECB GHG Inventory System national expert(s)

Working under the direct supervision of the GHG National Inventory System Team Leader, the National Consultants will provide technical knowhow on strengthening the elements and design of the National Inventory System in the priority sectors identified in the project document. Relevant project activities that will involve the services of the GHG Inventory Expert(s) are described under the project Outcome: Robust national systems for preparation of GHG emission inventories have been established.

Potential outputs and tasks for establishing a national inventory system are described below. Key resources to support the experts include:

- IPCC Guidelines for National Greenhouse Gas Inventories (1996 Revised, 2006)
- IPCC 2000 Good Practice Guidance & Uncertainty Manual (GPGAUM)
- IPCC 2003 Good Practice Guidance for Land-Use, Land-Use Change & Forestry
- UNDP 2005 Handbook: Managing the National GHG Inventory Process
- US EPA/US AID 2011 Template Workbook: Developing a National GHG Inventory System (English, Spanish, French)

It is anticipated that the work conducted will be coordinated closely with national experts working on the compilation of the national GHG inventory for the National Communication and the LECB experts working on development of NAMAs, LEDS, and MRV systems.

Output 1: Planning process agreed for building a robust national system for preparation of GHG emission inventories and linkages to MRV, including definition of legal and institutional arrangements

- Document the current inventory management team and sectoral roles and arrangements
- Review & document the legal & institutional arrangem-ents for elaborating the GHG inventory
- Provide recommendations for strengthening the institutional frameworks and coordination mechanisms that ensure periodic GHG inventory updates, Biennial Update Reports, and national communications in the sectors covered by the Project
- Recommend mechanisms at the national and institutional levels to link GHG Inventory system to MRV-related activities on a sustained basis

Output 2: Data, emission factors, sources, methods & assumptions documented and archived for selected key sectors

- Document the selection process of national activity data & emission factors and related parameters (units, source, year of data, etc) used in the inventory preparation process for selected key sectors
- Document the method choice, description and assumptions
- Document the data collection methods of data providers
- Elaborate a national manual of procedures to prepare the inventory
- Identify data that must be compiled/developed to fill gaps for key categories and identify appropriate methods/approaches to overcome data gaps
- Provide recommendations for improving the data collection system, including analysis of barriers to obtaining data and solutions for overcoming these barriers

Output 3: Quality assurance/quality control (QA/QC) procedures described

- Review the main elements of a QA/QC plan
- List key QA/QC personnel and any country-specific additional QA/QC responsibilities
- Elaborate a Tier 1 QA/QC checklist
- Elaborate a Tier 2 QA/QC checklist as appropriate
- Describe improvements to the QA/QC plan

Output 4: Archiving system described

- Describe the existing archiving program and procedures
- Elaborate an archive system plan, including responsi-bilities, procedures, and checklist
- Provide recommendations for improving the archiving system

Output 5: Key category analysis

- Complete the Tier 1 key category "base year level analysis" and "trend analysis"
- Complete the Tier 2 key category "base year level analysis" and "trend analysis", as appropriate

Output 6: Inventory improvement strategy developed, including awareness raising and sustainability components

- Summarize priorities for improving national inventory system based on Outputs 1 to 5
- Describe communication, outreach, and training activities/plans
- Prioritize inventory improvements (i.e., immediate, medium term, long term), and review periodically over the lifetime of the LECB project
- Develop a long-term in-country programme to improve inventory

Output 7: Strengthened national capacities for inventory planning and inventory management.

- Report on needs and capacity assessment for the GHG inventory systems in the sectors covered
- Provide technical inputs to the design of a capacity building program on national GHG inventory systems
- Participate as a resource person in trainings on applying best practices in GHG national inventory systems
- Other tasks that the National Inventory System Team Leader will identify as necessary to the success of the Project in attaining its objectives.

Qualifications

- Advanced degree or higher (Master's or higher) in areas relevant to climate change, environment and national development
- Good knowledge of global and national climate change issues
- A minimum of 5 years of professional experience in National GHG Inventories, particularly in the priority sectors identified under the project
- Substantial knowledge of methodologies for inventories (IPCC Revised 1996 Guidelines or 2006 Guidelines and Good Practice Guidance)
- Good coordination ability and team working spirit
- Good organizational skills, with experience in organizing and facilitating meetings, workshops and writing reports
- Good interpersonal/communication skills

GHG Inventory System: International Consultant(s)

Working in direct collaboration with the GHG National Inventory System Team Leader, the International Consultant(s) will provide technical knowhow and capacity building for strengthening the elements and design of the National Inventory System in the priority sectors identified in the project document. Relevant project activities that will required the services of the GHG Inventory International Consultant(s) are described under the project Outcome: Robust national systems for preparation of GHG emission inventories have been established.

It is anticipated that international consultants may be required to support some of the following activities (country to identify needed support as required):

Tasks

- Share examples of international best practices for strengthening the institutional frameworks and co-ordination mechanisms that ensure periodic GHG inventory updates, Biennial Update Reports, and national communications in the sectors covered by the Project
- Provide guidance on mechanisms to link GHG Inventory system to MRV-related activities on a sustained basis
- Provide trainings on data collection and improvement strategies in the sectors covered by the Project
- Identify sources of available data from prior and ongoing international and regional projects that may fill identified data gaps
- Provide recommendations for improving the data collection system, including analysis of barriers to obtaining data and solutions for overcoming these barriers based on regional and international experiences (e.g. voluntary approaches)
- Provide training on the IPCC Emission Factor Database, and recommendations on improvements of emission factors
- Advise on archiving tools and databases
- Provide technical review of elaborated QA/QC plan, inventory improvement strategy, communications & awareness raising strategy, and training plans
- Train (trainers) in relevant aspects of IPCC Good Practice applications, including key category analysis
- Act as resource persons at workshops, preparing technical materials and presentations.

Qualifications

- An advanced post-graduate university degree in a subject related to climate change and/or environmental management, or equivalent work experience
- At least 10 years of experience in application of IPCC methodologies for GHG inventories
- Extensive experience working in developing countries on climate change issues
- Familiarity with international negotiations and processes under the UNFCCC
- Familiarity with computers and word processing

Duration: Dependent upon final Terms of Reference.

Download Templates

National Inventory Coordinator: Responsibilities and Qualifications

This document describes the position responsibilities for the National GHG Inventory Coordinator (NIC), as well as qualifications that the NIC ideally would possess in order to effectively manage and coordinate development of a National GHG Inventory. This document is part of EPA's National GHG Inventory Toolkit, a supplementary resource to EPA's Developing a National GHG Inventory System Template Workbook. This Toolkit can be used by key members of a national inventory team to successfully design and develop a sustainable inventory system. This document clarifies likely responsibilities of the NIC, depending on existing institutional arrangements and national circumstances.

NIC Preparation

The NIC, under the supervision of [X], will be responsible for managing all aspects of National GHG Inventory development, including providing technical assistance to all members of the National GHG Inventory Team, ensuring funding is in place, briefing senior management, and establishing the overall National Inventory Schedule. The coordinator should have a comprehensive understanding of the UNFCCC reporting requirements, IPCC guidelines, and a general understanding of all GHG sectors.

- Review the UNFCCC Consultative Group of Experts (CGE) training materials on the preparation of national communications (NCs) by non-Annex I Parties [CGE Materials]
- Review the UNFCCC guidelines/manuals related to NCs and Biennial Update Reports (BURs) from non-Annex I Parties. [UNFCCC Guidance]
- Review the BUR training materials on institutional arrangements. [BUR Materials]
- Review the IPCC Guidelines to understand the default methods, data sources, basic QA/QC, uncertainty assessment and reporting procedures. [IPCC Guidelines]
- Review the inventory chapter of the previous NC and other materials relevant to the previous National GHG Inventory.
- Understand which GHG source or sink categories were identified as key categories in the previous inventory.
- Review UNDP's Managing the National Greenhouse Gas Inventory Process.
- Review the EPA's Template Workbook on *Developing a National Greenhouse Gas Inventory System* and additional Toolkit Materials available on the GHG Inventory Capacity Building portal [EPA Template Workbook & Capacity Building, Capacity Building Portal]
- Review existing software packages for developing inventory estimates (IPCC software, UNFCCC software, ALU software, country-specific software).
- Understand GEF funding options available for preparing NCs and BURs [GEF Funding Guidelines & Application Form]

NIC Responsibilities and Activities

The following list highlights the main responsibilities and activities of the NIC:

✓ Manage and support the National GHG Inventory staff, schedule, and budget in order to develop the inventory in a timely and efficient manner.

- Prepare a detailed workplan for producing the National GHG Inventory, including interim deliverables and specific outputs, in close consultation with sectoral leads and relevant data providers on a [X] basis (e.g., monthly, biennial, annual etc.).
- Establish internal processes and schedule to ensure that the national inventory team produces accurate emission estimates.
- Develop Statement of Work documents and contracts with consultants to support inventory cross-cutting tasks and report compilation.
- Oversee sector leads/consultants handling the report compilation both at the sector level and compilation from all sectors to ensure incorporation of the inventory in the NC and BUR for submittal to the UNFCCC.

✓ Identify, assign, and oversee national inventory sector leads.

- Assist sector leads to prepare and implement sector specific workplans, including interim outputs/deliverables, as well as identify, collect, and organize data for inclusion in the inventory.

- Assist sector experts with the use of activity data and select and apply appropriate IPCC Good Practice Guidance to improve existing methodologies and emission factors.

✓ Assign cross-cutting roles and responsibilities, including those for Quality Assurance/Quality Control (QA/QC), archiving, key category analysis (KCA), uncertainty analysis, and compilation of the inventory section of the NC and/or BUR.

- For all project activities (i.e., QA/QC, uncertainty analysis, archiving, etc.), coordinate with cross-cutting leads to convey responsibilities to sector leads, consultants, national agencies and institutions, and relevant international organizations, such as UNDP country offices, IPCC, UNFCCC, and GEF.

- Manage QA processes and inventory review periods (if applicable) with support from the QA/QC Coordinator.

✓ Maintain and implement a national GHG inventory improvement plan. Foster and establish links with related national projects, and other regional, international programmes as appropriate.

NIC Qualifications

The NIC should have a strong scientific, technical and policy background. It is essential for the candidate to possess the ability to work both independently and with a wide variety of members of governments, agencies, non-governmental organizations, and research institutions. A strong understanding of UNFCCC National GHG Inventory reporting and the IPCC Guidelines for National Greenhouse Gas Inventories is a prerequisite. The following list provides examples of the qualifications and knowledge desired for a NIC. These qualifications can be revised or modified, as appropriate for your national circumstances.

✓ Relevant experience in the field of climate change, with a focus on GHG inventories;

✓ A science degree in a subject related to environmental studies/management, chemical engineering, or similar (an advanced degree such as Masters or Ph.D. in specific GHG inventory sectors/categories could be beneficial);

✓ Demonstrated knowledge and application of the methodologies for preparing GHG inventories and familiarity with the IPCC Inventory reports (Revised 1996 IPCC Guidelines, Good Practice Guidance reports and IPCC 2006 Guidelines);

✓ Experience applying UNFCCC GHG inventory reporting guidelines;

✓ Familiarity with the content of National Communications and UNFCCC processes;

✓ Experience managing budget and distributing and balancing work among employees in accordance with the established workflow and employee skill levels and occupational specializations to assure timely accomplishment of the work unit's mission;

✓ Experience working on a diverse team of individuals with different technical backgrounds and specialties; and

✓ Evaluating and addressing complex issues associated with quantifying national GHG emissions using UNFCCC and IPCC guidelines.

Sector roles and responsibilities: Agriculture

In implementing institutional arrangements for the National Greenhouse Gas (GHG) Inventory, it is important to communicate responsibilities to all contributing staff. This document describes the major responsibilities for the Agriculture Sector Lead, whose primary role will be to manage and coordinate development of GHG emission estimates in the Agriculture sector. This document is part of EPA's National GHG Inventory Toolkit, a supplementary resource to EPA's Developing a National GHG Inventory System Template Workbook, in particular the Institutional Arrangements (IA) Template. This Toolkit can be used by key members of a national inventory team to help design and develop a sustainable inventory management system. The Agriculture Sector lead can use this document as a reference tool during the development of the National GHG Inventory to guide him/her through the most important responsibilities of the position.

The Agriculture Sector Lead Should Understand:

- their specific responsibilities as the Agriculture Sector Lead, including a clear understanding with their immediate supervisor/organization and the National Inventory Coordinator (NIC) on their role in producing the Agriculture GHG estimates for the inventory,
- the expected and required deliverables and timeline for the submission of each deliverable,
- the estimated amount of time necessary to complete the tasks of the Agriculture Sector Lead,
- the budget available, as appropriate to your institutional arrangements and national circumstances, such as the funds allocated by your immediate supervisor or the NIC, to develop the Agriculture sector GHG estimates how these funds may be utilized in support of developing and documenting the Agriculture estimates, and
- the IPCC Guidelines for their sector, including default methods, data sources, basic QA/QC, uncertainty assessment, and reporting procedures.

Agriculture Sector Preparation

✓ Review the Consultative Group of Experts' (CGE) materials related to the Agriculture sector. [CGE Materials]

✓ Review the Agriculture section of the IPCC Guidelines to understand the default methods, data sources, basic QA/QC, uncertainty assessment, and reporting procedures of [X]. [2006 IPCC Guidelines]

✓ Review the UNFCCC guidance materials for additional information. [UNFCCC Guidance]

✓ Review the Agriculture section of the previous National GHG Inventory and other reports relevant to national GHG estimates for this sector. Reviewing the Agriculture section from other country's GHG inventory reports can also be informative.

✓ Understand which categories in the Agriculture sector were identified as key categories in the previous inventory.

✓ Review the EPA's Template Workbook on *Developing a National Greenhouse Gas Inventory System* and additional Toolkit Materials available on the GHG Inventory Capacity Building portal. [EPA Template Workbook & Capacity Building, Capacity Building Portal]

✓ Use software packages, if applicable, that are relevant and useful for this sector.

✓ Be familiar with the National Communication (NC) development process.

Agriculture Sector Responsibilities and Activities

✓ Review the *IPCC Guidelines for National Greenhouse Gas Inventories and Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*.

- Understand the GHG categories that are sources in the Agriculture sector.
- At minimum understand the Tier 1 methodologies, data needs, and other requirements for developing GHG estimates for the Agriculture sector, and become familiar with those for Tier 2.

✓ Collaborate with the NIC to manage the Agriculture sector budget and develop a/an Agriculture sector-specific workplan and schedule that coincides with deliverables acknowledged in the overall National Inventory Schedule.

✓ Develop and implement an Agriculture sector-specific plan for archiving all relevant information and materials, in coordination with the archiving coordinator and adhering to any existing archiving guidance materials for your national inventory.

✓ Identify the types of agricultural practices in your country that are relevant to production of GHG emissions (e.g., Crop Production, Livestock Management, Burning of Agricultural Residues or Grasslands), contact national, regional, and local experts to determine if the necessary data is readily available, and establish institutional arrangements for collecting activity data.

✓ Oversee the establishment and arrangements between Agriculture sector data collectors and third-party data providers.

- If required, develop agreements such as Memorandums of Understanding (MOU) with necessary

organizations (e.g., Ministry of Agriculture, universities) to assist with activities required by the Agriculture Sector Lead (e.g. data collection, generating GHG estimates), as appropriate.

- Develop Statements of Work (SOW) to engage contractors, and/or sector experts. Manage the work being carried out under these contracts to ensure it is meeting the requirements and needs of your GHG inventory sector.

✓ Contact federal agencies/ministries or non-governmental organizations to inquire about the existence of satellite imagery data for categories such as Agriculture Residue Burning. Ensure this is done in coordination with the LULUCF sector, which also requires access to imagery.

✓ Consider potential improvements identified in the previous inventory for this sector and assess whether to implement improvements based on the contribution to overall national emissions (by conducting a Key Category Analysis) and availability of resources.

✓ Oversee development of GHG estimates from all categories in the Agriculture sector.

- Determine the most appropriate IPCC methodology to be used to estimate GHGs for each category.
- Oversee choice and/or development of emission factors.
- Coordinate with the LULUCF Sector Lead to determine emission calculations and activity data adjustments for complex categories such Agricultural Soil Management and Manure Management.
- Ensure consistency of data between enteric and manure management (e.g., livestock populations and characterization).
- Ensure consistency between nitrogen quantities in Manure Management and Agricultural Soil Management.
- Coordinate with the Waste sector to ensure assumptions on application of sewage sludge and nitrogen content are consistent.
- Document in a transparent manner all methodologies, data, emission factors, and assumptions in coordination with contractors and other technical experts that are developing the estimates.

✓ In consultation with the QA/QC coordinator, convene Agriculture sector working group to review calculations and perform initial Quality Assurance/Quality Control (QA/QC), consulting QA/QC coordinator.

- QA includes review procedures conducted by personnel not involved in the inventory development process (e.g., experts not involved with estimate development, the public, other relevant agencies, non-governmental organizations, universities, etc.).
- QC includes routine reviews implemented by the inventory development team to measure and control the quality of the inventory as it is prepared (e.g., sector leads and supporting experts involved with estimate development).

✓ Coordinate the response to comments received from QA (external) reviews of the Agriculture sector GHG estimates and update the inventory if necessary.

✓ Review the final Agriculture sector GHG estimates and the narrative describing the assumptions, methodologies, and results.

✓ Oversee the development of the uncertainty analysis for the Agriculture sector.

✓ Identify and document any improvements needed for subsequent inventories, related to activity data, emission factors, methodologies, or oth

Sector roles and responsibilities: LULUCF

In implementing institutional arrangements for the National Greenhouse Gas (GHG) Inventory, it is important to communicate responsibilities to all contributing staff. This document describes the major roles and responsibilities for the Land Use, Land-Use Change, and Forestry (LULUCF) Sector Lead, whose primary role will be to manage and coordinate development of GHG emission/removal estimates in the LULUCF sector. This document is part of EPA's National GHG Inventory Toolkit, a supplementary resource to EPA's *Developing a*

National GHG Inventory System Template Workbook, in particular the Institutional Arrangements (IA) Template. This Toolkit can be used by key members of a national inventory team to help design and develop a sustainable inventory management system. The LULUCF Sector Lead can use this document as a reference tool during the development of the National GHG Inventory to guide him/her through the most important responsibilities of the position.

The LULUCF Sector Lead Should Understand:

- their specific responsibilities as the LULUCF Sector Lead, including a clear understanding with their immediate supervisor/organization and the National Inventory Coordinator (NIC) on their role in producing the LULUCF estimates for the inventory,
- the expected and required deliverables and timeline for the submission of each deliverable,
- the estimated amount of time necessary to complete the tasks of the LULUCF Sector Lead,
- the budget available, as appropriate to your institutional arrangements and national circumstances, such as the funds allocated by your immediate supervisor or the NIC, to develop the LULUCF sector GHG estimates and how these funds may be utilized in support of developing and documenting the LULUCF estimates, and
- the IPCC Guidelines for their sector, including default methods, data sources, basic QA/QC, uncertainty assessment, and reporting procedures.

LULUCF Sector Preparation

✓ Review the Consultative Group of Experts' (CGE) materials related to the LULUCF sector. [CGE Materials]

✓ Review the LULUCF section of the IPCC Guidelines to understand the default methods, data sources, basic QA/QC, uncertainty assessment, and reporting procedures. [2006 IPCC Guidelines]

✓ Review the UNFCCC guidance materials for additional information. [UNFCCC Guidance]

✓ Review the LULUCF section of the previous National GHG Inventory for your country and other reports relevant to national GHG estimates for this sector. Reviewing the LULUCF section from other country's GHG inventory reports can also be informative.

✓ Understand which categories in the LULUCF sector were identified as key categories in the previous inventory.

✓ Review the EPA's Template Workbook on *Developing a National Greenhouse Gas Inventory System* and additional Toolkit Materials available on the GHG Inventory Capacity Building portal. [EPA Template Workbook & Capacity Building, Capacity Building Portal]

✓ Use software packages, if applicable, that are relevant and useful for this sector.

✓ Be familiar with the National Communication (NC) development process.

LULUCF Sector Responsibilities and Activities

✓ Review the *IPCC Guidelines for National Greenhouse Gas Inventories and Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*.

- Understand the GHG categories that are sources/sinks in the LULUCF sector.
- At minimum understand the Tier 1 methodologies, data needs, and other requirements for developing GHG estimates for the LULUCF sector, and become familiar with those for Tier 2.

✓ Collaborate with the NIC to manage the LULUCF sector budget and develop a LULUCF sector-specific workplan and schedule that coincides with deliverables acknowledged in the overall National Inventory Schedule.

✓ Develop and implement a LULUCF sector-specific plan for archiving all relevant information and materials, in coordination with the archiving coordinator and adhering to any existing archiving guidance materials for your national inventory.

✓ Oversee the establishment and arrangements between LULUCF sector data collectors and third-party data providers.

- If required, develop agreements such as Memorandums of Understanding (MOU) with

necessary organizations (e.g., Ministry of Forestry, Ministry of Agriculture, universities) to assist with activities required by the LULUCF Sector Lead (e.g. data collection, generating GHG estimates), as appropriate.

  - Contact federal agencies/ministries or non-governmental organizations to inquire about the existence of satellite imagery data for categories such as Agriculture Residue Burning. Ensure this is done in coordination with the Agriculture sector that may also require access to imagery.

- Develop Statements of Work (SOW) for government units to issue to engage contractors, and/or sector experts. Manage the work being carried out under these contracts to ensure it is meeting the requirements and needs of your GHG inventory sector.

✓ Identify which LULUCF categories are key categories in terms of their contribution to national emissions and removals.

✓ Consider potential improvements identified in the previous inventory for this sector and assess whether to implement improvements based on the contribution to overall national emissions (by conducting a Key Category Analysis) and availability of resources.

✓ Oversee development of GHG estimates from all categories in the LULUCF sector.

- Determine the most appropriate IPCC methodology to be used to estimate GHGs for each category.

- Oversee choice and/or development of emission factors.

- Document all methodologies and assumptions.

- Determine the methodologies to be used to estimate GHG emissions and/or sequestration for soils and other carbon pools.

- Develop a complete and consistent representation of the land base to establish a clear delineation of land use types (i.e., forestland, wetlands, croplands, grasslands, settlements, other) and conversions of lands between these land use types.

- Coordinate with the Agriculture Sector Lead to determine emission calculations and activity data adjustments for overlapping categories such as Agricultural Soil Management and Manure Management.

✓ In consultation with the QA/QC coordinator, convene LULUCF sector working group to review calculations and perform initial Quality Assurance/Quality Control (QA/QC), consulting QA/QC coordinator.

- QA includes review procedures conducted by personnel not involved in the inventory development process (e.g., experts not involved with estimate development, the public, other relevant agencies, non-governmental organiza-tions, universities, etc.).

- QC includes routine reviews implemented by the inventory development team to measure and control the quality of the inventory as it is prepared (e.g., sector leads and supporting experts involved with estimate development).

✓ Coordinate the response to comments received from QA (external) reviews of the LULUCF sector GHG estimates and update the inventory if necessary.

✓ Review the final LULUCF sector GHG estimates and the narrative describing the assumptions, methodologies, and results.

✓ Oversee the development of the uncertainty analysis for the LULUCF sector.

✓ Identify and document any improvements needed for subsequent inventories, related to activity data, emission factors, methodologies, or other components of developing the estimates.

Sector roles and responsibilities: Energy

In implementing institutional arrangements for the National Greenhouse Gas (GHG) Inventory, it is important to communicate responsibilities to all contributing staff. This document describes the major responsibilities for the Energy Sector Lead, whose primary role will be to

manage and coordinate development of GHG emission estimates in the Energy sector. This document is part of EPA's National GHG Inventory Toolkit, a supplementary resource to EPA's Developing a National GHG Inventory System Template Workbook, in particular the Institutional Arrangements (IA) Template. This Toolkit can be used by key members of a national inventory team to help design and develop a sustainable inventory management system. The Energy Sector Lead can use this document as a reference tool during the development of the National GHG Inventory to guide him/her through the most important responsibilities of the position.

The Energy Sector Lead Should Understand:

- their specific responsibilities as the Energy Sector Lead, including a clear understanding with their immediate supervisor/organization and the National Inventory Coordinator (NIC) on their role in producing the Energy GHG estimates for the inventory,
- the expected and required deliverables and timeline for the submission of each deliverable,
- the estimated amount of time necessary to complete the tasks of the Energy Sector Lead,
- the budget available, as appropriate to your institutional arrangements and national circumstances, such as the funds allocated by your immediate supervisor or the NIC, to develop the Energy sector GHG estimates and how these funds may be utilized in support of developing and documenting the Energy estimates, and
- the IPCC Guidelines for their sector, including default methods, data sources, basic QA/QC, uncertainty assessment, and reporting procedures.

Energy Sector Preparation

✓ Review the Consultative Group of Experts' (CGE) materials related to the Energy sector. [CGE Materials]

✓ Review the Energy section of the IPCC Guidelines to understand the default methods, data sources, basic QA/QC, uncertainty assessment, and reporting procedures. [2006 IPCC Guidelines]

✓ Review the UNFCCC guidance materials for additional information. [UNFCCC Guidance]

✓ Review the Energy section of the previous National GHG Inventory and other reports relevant to national GHG estimates for this sector. Reviewing the Energy section from other country's GHG inventory reports can also be informative.

✓ Understand which categories in the Energy sector were identified as key categories in the previous inventory.

✓ Review the EPA's Template Workbook on *Developing a National Greenhouse Gas Inventory System* and additional Toolkit Materials available on the GHG Inventory Capacity Building portal. [EPA Template Workbook & Capacity Building, Capacity Building Portal]

✓ Use software packages, if applicable, that are relevant and useful for this sector.

✓ Be familiar with the National Communication (NC) development process.

Energy Sector Responsibilities and Activities

✓ Review the *IPCC Guidelines for National Greenhouse Gas Inventories and Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*.

- Understand the GHG categories that are sources in the Energy sector.
- At minimum understand the Tier 1 methodologies, data needs, and other requirements for developing GHG estimates for the Energy sector, and become familiar with those for Tier 2.

✓ Collaborate with the NIC to manage the Energy sector budget and develop a/an Energy sector-specific workplan and schedule that coincides with deliverables acknowledged in the overall National Inventory Schedule.

✓ Develop and implement an Energy sector-specific plan for archiving all relevant information and materials, in coordination with the archiving coordinator and adhering to any existing archiving guidance materials for your national inventory.

✓ Oversee the establishment and arrangements between Energy sector data collectors and third-party

data providers.

  - If required, develop agreements such as Memorandums of Understanding (MOU) with necessary organizations (e.g., Ministry of Energy, Ministry of Transportation, universities) to assist with activities required by the Energy Sector Lead (e.g. data collection, generating GHG estimates), as appropriate.

  - Develop Statements of Work (SOW) to issue to engage contractors, and/or sector experts. Manage the work being carried out under these contracts to ensure it is meeting the requirements and needs of your GHG inventory sector.

✓ Coordinate with the energy data providers for fossil fuel combustion to determine how fuel was consumed and electricity was generated for each source category (e.g., energy industries, manufacturing industries, and other sectors).

✓ Coordinate with the Industrial Processes Sector Lead to determine if there will need to be any adjustments made for Energy fossil fuel combustion activity data.

✓ Coordinate with the Waste Sector Lead to determine the amount of waste incinerated used for electricity generation.

✓ Consider potential improvements identified in the previous inventory for this sector and assess whether to implement improvements based on the contribution to overall national emissions (by conducting a Key Category Analysis) and availability of resources.

✓ Oversee development of GHG estimates from all categories in the Energy sector.

  - Determine the most appropriate IPCC methodology to be used to estimate GHGs for each category.

  - Oversee choice and/or development of emission factors.

  - Document all methodologies and assumptions.

✓ Complete both the sectoral and reference approaches to calculating GHG emissions from fossil fuel combustion in the Energy sector and compare the two results.

✓ In consultation with the QA/QC coordinator, convene Energy sector working group to review calculations and perform initial Quality Assurance/Quality Control (QA/QC).

  - QA includes review procedures conducted by personnel not involved in the inventory development process (e.g., experts not involved with estimate development, the public, other relevant agencies, non-governmental organizations, universities, etc.).

  - QC includes routine reviews implemented by the inventory development team to measure and control the quality of the inventory as it is prepared (e.g., sector leads and supporting experts involved with estimate development). Coordinate the response to comments received from QA (external) reviews of the Energy sector GHG estimates and update the inventory if necessary.

✓ Review the final Energy sector GHG estimates and the narrative describing the assumptions, methodologies, and results.

✓ Oversee the development of the uncertainty analysis for the Energy sector.

✓ Identify and document any improvements needed for subsequent inventories, related to activity data, emission factors, methodologies, or other components of development.

Sector roles and responsibilities: Industrial Processes

In implementing institutional arrangements for the National Greenhouse Gas (GHG) Inventory, it is important to communicate responsibilities to all contributing staff. This document describes the major responsibilities for the Industrial Processes (IP) Sector Lead, whose primary role will be to manage and coordinate development of GHG emission estimates in the IP sector. This document is part of EPA's National GHG Inventory Toolkit, a supplementary resource to EPA's *Developing a National GHG Inventory System Template Workbook*, in particular the Institutional Arrangements (IA) Template. This Toolkit

can be used by key members of a national inventory team to help design and develop a sustainable inventory management system. The IP Sector Lead can use this document as a reference tool during the development of the National GHG Inventory to guide him/her through the most important responsibilities of the position.

The IP Sector Lead Should Understand:

- their specific responsibilities as the IP Sector Lead, including a clear understanding with their immediate supervisor/organization and the National Inventory Coordinator (NIC) on their role in producing the IP GHG estimates for the inventory,
- the expected and required deliverables and timeline for the submission of each deliverable,
- the estimated amount of time necessary to complete the tasks of the IP Sector Lead,
- the budget available, as appropriate to your institutional arrangements and national circumstances, such as the funds allocated by your immediate supervisor or the NIC, to develop the IP sector GHG estimates and how these funds may be utilized in support of developing and documenting the IP estimates, and
- the IPCC Guidelines for the IP sector, including default methods, data sources, basic QA/QC, uncertainty assessment, and reporting procedures.

IP Sector Preparation

✓ Review the Consultative Group of Experts' (CGE) materials related to the IP sector. [CGE Materials]

✓ Review the IP section of the IPCC Guidelines to understand the default methods, data sources, basic QA/QC, uncertainty assessment, and reporting procedures. [2006 IPCC Guidelines]

✓ Review the UNFCCC guidance materials for additional information. [UNFCCC Guidance]

✓ Review the IP section of the previous National GHG Inventory and other reports relevant to national GHG estimates for this sector. Reviewing the IP section from other country's GHG inventory reports can also be informative.

✓ Understand which categories in the IP sector were identified as key categories in the previous inventory.

✓ Review the EPA's Template Workbook on *Developing a National Greenhouse Gas Inventory System* and additional Toolkit Materials available on the GHG Inventory Capacity Building portal. [EPA Template Workbook & Capacity Building, Capacity Building Portal]

✓ Use software packages, if applicable, that are relevant and useful for this sector.

✓ Be familiar with the National Communication (NC) development process.

IP Sector Responsibilities and Activities

✓ Review the IPCC Guidelines for National Greenhouse Gas Inventories and Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories.

  – Understand the GHG categories that are sources in the IP sector.

  – At minimum understand the Tier 1 methodologies, data needs, and other requirements for developing GHG estimates for the IP sector, and become familiar with those for Tier 2.

✓ Collaborate with the NIC to manage the IP sector budget and develop an IP sector-specific workplan and schedule that coincides with deliverables acknowledged in the overall National Inventory Schedule.

✓ Develop and implement an IP sector-specific plan for archiving all relevant information and materials, in coordination with the archiving coordinator and adhering to any existing archiving guidance materials for your national inventory.

✓ Oversee the establishment and arrangements between IP sector data collectors and third-party data providers.

  – If required, develop agreements such as Memorandums of Understanding (MOU) with necessary organizations (e.g., Ministry of Industry, Department of Mines and Geology, universities) to assist with activities required by the IP Sector Lead (e.g. data collection, generating GHG estimates, management/handling of confidential information), as appropriate.

- Develop Statements of Work (SOW) to issue to engage contractors, and/or sector experts. Manage the work being carried out under these contracts to ensure it is meeting the requirements and needs of your GHG inventory sector.

- If IP data are not publically available or reported to the government, identify data providers for each industry (e.g. trade associations, private companies, etc.)

✓ Coordinate with the Energy Sector Lead to determine if there will need to be any adjustments made to either sector in cases where GHG estimates might overlap (e.g. iron and steel production, ammonia, etc.).

✓ Consider potential improvements identified in the previous inventory for this sector and assess whether to implement improvements based on the contribution to overall national emissions (by conducting a Key Category Analysis) and availability of resources.

✓ Oversee development of GHG estimates from all categories in the IP sector.

- Determine the most appropriate IPCC methodology to be used to estimate GHGs for each category.

- Oversee choice and/or development of emission factors.

- Document all methodologies and assumptions.

✓ In consultation with the QA/QC coordinator, convene IP sector working group to review calculations and perform initial Quality Assurance/ Quality Control (QA/QC).

- QA includes review procedures conducted by personnel not involved in the inventory development process (e.g., experts not involved with estimate development, the public, other relevant agencies, non-governmental organizations, universities, etc.).

- QC includes routine reviews implemented by the inventory development team to measure and control the quality of the inventory as it is prepared (e.g., sector leads and supporting experts involved with estimate development).

✓ Coordinate the response to comments received from QA (external) reviews of the IP sector GHG estimates and update the inventory if necessary.

✓ Review the final IP sector GHG estimates and the narrative describing the assumptions, methodologies, and results.

✓ Oversee the development of the uncertainty analysis for the IP sector.

✓ Identify and document any improvements needed for subsequent inventories, related to activity data, emission factors, methodologies, or other components of developing the estimates.

Sector roles and responsibilities: Waste

In implementing institutional arrangements for the National Greenhouse Gas (GHG) Inventory, it is important to communicate responsibilities to all contributing staff. This document describes the major responsibilities for the Waste Sector Lead, whose primary role will be to manage and coordinate development of GHG emission estimates in the Waste sector. This document is part of EPA's National GHG Inventory Toolkit, a supplementary resource to EPA's Developing a National GHG Inventory System Template Workbook, in particular the Institutional Arrangements (IA) Template. This Toolkit can be used by key members of a national inventory team to help design and develop a sustainable inventory management system. The Waste Sector Lead can use this document as a reference tool during the development of the National GHG Inventory to guide him/her through the most important responsibilities of the position.

The Waste Sector Lead Should Understand:

- their specific responsibilities as the Waste Sector Lead, including a clear understanding with their immediate supervisor/organization and the National Inventory Coordinator (NIC) on their role in producing the Waste GHG estimates for the inventory,
- the expected and required deliverables and timeline for the submission of each deliverable,

- the estimated amount of time necessary to complete the tasks of the Waste Sector Lead,
- the budget available, as appropriate to your institutional arrangements and national circumstances, such as the funds allocated by your immediate supervisor or the NIC, to develop the Waste sector GHG estimates and how these funds may be utilized in support of developing and documenting the Waste estimates, and
- the IPCC Guidelines for their sector, including default methods, data sources, basic QA/QC, uncertainty assessment, and reporting procedures.

Waste Sector Preparation

✓ Review the Consultative Group of Experts' (CGE) materials related to the Waste sector. [CGE Materials]

✓ Review the Waste section of the IPCC Guidelines to understand the default methods, data sources, basic QA/QC, uncertainty assessment, and reporting procedures. [2006 IPCC Guidelines]

✓ Review the UNFCCC guidance materials for additional information. [UNFCCC Guidance]

✓ Review the Waste section of the previous National GHG Inventory and other reports relevant to national GHG estimates for this sector. Reviewing the Waste section from other country's GHG inventory reports can also be informative.

✓ Understand which categories in the Waste sector were identified as key categories in the previous inventory.

✓ Review the EPA's Template Workbook on *Developing a National Greenhouse Gas Inventory System* and additional Toolkit Materials available on the GHG Inventory Capacity Building portal. [EPA Template Workbook & Capacity Building, Capacity Building Portal]

✓ Use software packages, if applicable, that are relevant and useful for this sector.

✓ Be familiar with the National Communication (NC) development process.

Waste Sector Responsibilities and Activities

✓ Review the *IPCC Guidelines for National Greenhouse Gas Inventories and Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*.

- Understand the GHG categories that are sources in the Waste sector.
- At minimum understand the Tier 1 methodologies, data needs, and other requirements for developing GHG estimates for the Waste sector, and become familiar with those for Tier 2.

✓ Collaborate with the NIC to manage the Waste sector budget and develop a Waste sector-specific workplan and schedule that coincides with deliverables acknowledged in the overall National Inventory Schedule.

✓ Develop and implement a Waste sector-specific plan for archiving all relevant information and materials, in coordination with the archiving coordinator and adhering to any existing archiving guidance materials for your national inventory.

✓ Oversee the establishment and arrangements between Waste sector data collectors and third-party data providers.

- If required, develop agreements such as Memorandums of Understanding (MOU) with necessary organizations (e.g., Ministry of the Environment, Department of Waste Management, universities) to assist with activities required by the Waste Sector Lead (e.g. data collection, generating GHG estimates), as appropriate.
- Develop Statements of Work (SOW) to issue to engage contractors, and/or sector experts. Manage the work being carried out under these contracts to ensure it is meeting the requirements and needs of your GHG inventory sector.

✓ Coordinate with the Energy Sector Lead to determine whether there is energy generated from waste incineration, and if so, whether that will be included in the Energy sector.

- ✓ Consider potential improvements identified in the previous inventory for this sector and assess whether to implement improvements based on the contribution to overall national emissions (by conducting a Key Category Analysis) and availability of resources.

- ✓ Oversee development of GHG estimates from all categories in the Waste sector.
  - Determine the most appropriate IPCC methodology to be used to estimate GHGs for each category.
  - Oversee choice and/or development of emission factors.
  - Document all methodologies and assumptions.

- ✓ In consultation with the QA/QC coordinator, convene Waste sector working group to review calculations and perform initial Quality Assurance/Quality Control (QA/QC), consulting QA/QC coordinator.
  - QA includes review procedures conducted by personnel not involved in the inventory development process (e.g., experts not involved with estimate development, the public, other relevant agencies, non-governmental organizations, universities, etc.).
  - QC includes routine reviews implemented by the inventory development team to measure and control the quality of the inventory as it is prepared (e.g., sector leads and supporting experts involved with estimate development).

- ✓ Coordinate the response to comments received from QA (external) reviews of the Waste sector GHG estimates and update the inventory if necessary.

- ✓ Review the final Waste sector GHG estimates and the narrative describing the assumptions, methodologies, and results.

- ✓ Oversee the development of the uncertainty analysis for the Waste sector.

- ✓ Identify and document any improvements needed for subsequent inventories, related to activity data, emission factors, methodologies, or other components of developing the estimates.

10. US EPA template: MOU

Download Template

This document provides a template to use to set up an agreement between two organizations, typically between a data provider to the National GHG Inventory and the organization developing the Inventory. This document is part of EPA's National GHG Inventory Toolkit, a supplementary resource to EPA's *Developing a National GHG Inventory System Template Workbook*. This Toolkit can be used by key members of a national inventory team to successfully design and develop a sustainable inventory system. Modify the template below to account for the memorandum of understanding you'd like to develop for your country-specific circumstances.

MEMORANDUM OF UNDERSTANDING

between

_____[MINISTRY X]_____

and

_____ [MINISTRY Y]_____

on

The National Greenhouse Gas Inventory and Program B, C, etc…

I. OBJECTIVES

The objectives of this Memorandum of Understanding (MOU) between [Ministry X] and [Ministry Y] are:

1.

2.

Examples:

1. *To develop a system of data sharing between Ministry X and Ministry Y, to support the development of the National Greenhouse Gas Inventory (for UN reporting obligations (e.g. National Communication, BUR and/or national policy purposes)). Ministry X has been tasked under [degree, law, act, etc.] to coordinate development of the national GHG inventory.*

2. *To commit to work together to develop and jointly implement a program to slow the growth of greenhouse gas emissions.*

II. AUTHORITIES AND RELATED ACTIVITES

Nothing in this agreement alters, or is intended to alter, the legal and regulatory authorities of Ministry X and Ministry Y. This agreement is solely intended to facilitate the fulfillment of legal requirements and cooperative efforts.

A. The National Greenhouse Gas Inventory

1. The Program

Provide a description of the program in question and context for the program in this MOU.

Example from the USA: Section 1605 (a) of the Energy Policy Act (EPAct), requires that the Secretary of Energy, through the U.S. Energy Information Administration (EIA), develop an inventory of national aggregate greenhouse gas emissions. The inventory shall be established in consultation with EPA using existing and readily available data. Information in the inventory shall be analyzed and updated annually, also using available data.

The Clean Air Act Amendments of 1990 require that EPA: prepare national and international inventories of methane; monitor and report CO2 emissions from certain stationary sources; pursue pollution prevention, including prevention of greenhouse gas emissions; and address substances which deplete stratospheric ozone (many of which, including their substitutes, are greenhouse gases). The CAA also authorizes EPA to compile and verify emission inventories of criteria air pollutants, most of which are implicated in climate change as indirect greenhouse gases. Section 103 (c) of the CAA requires that EPA conduct a program of research, testing, and development of methods of sampling, measurement, monitoring, analysis, and modeling of air pollutants, to ensure the comparability of air quality data collected in different States and obtained from different nations.

The Global Climate Protection Act of 1987 requires that the President, through EPA, develop a coordinated national policy on global climate change. As the necessary first step in meeting this requirement, EPA will continue to develop greenhouse gas inventories in cooperation with other agencies and various international organizations. EPA has developed the national inventories of U.S. emissions consistent with draft Intergovernmental Panel on Climate Change guidelines.

2. Authorities

Provide descriptions for the national authorities that are relevant to this MOU.

Example from the USA: EPAct Section 1605 (b) (4) allows reporting entities to use information reported through the voluntary reporting system to demonstrate achieved reductions of greenhouse gases.

B. Program B (If necessary)

1. The Program

Provide a description of the program in question and context for the program in this MOU.

2. Authorities

Provide descriptions for the national authorities that are relevant to this MOU.

III. PROVISIONS

A. The National Greenhouse Gas Inventory

It is mutually agreed:

1) to…;

2) to…

Examples from the USA:

1) to cooperate in the development of greenhouse gas inventories to meet the EPAct provisions and the E.S. commitments under the United Nations Framework Convention on Climate Change;

2) *to share expertise, emission factors, methodologies, and data pertaining to the development of greenhouse gas inventories; and,*

3) *to establish appropriate points of contact for this section who will be available to regularly meet, review cooperative activities, and to raise issues as necessary.*

Ministry X agrees:

1) *to continue to consult with DOE on EPA's maintenance and preparation of the greenhouse gas inventories to meet the U.S. commitments under the UNFCCC;*

2) *to ensure that this inventory will undergo full interagency review, and that any outstanding issues will be raised to the Office on Environmental Policy or its Monitoring, Evaluation, and adjustment Task Force for final resolution; and,*

3) *to forward the inventory to the Department of State for submission by the U.S. Government under the UNFCCC.*

Ministry Y agrees:

1) *to make available supporting technical reports, models, and data that may form the basis of the guidelines; and,*

2) *to provide, in advance, a schedule for review of draft and final materials which includes, to the extent possible, adequate time for review and comment.*

B. Program B (If necessary)

It is mutually agreed:

Ministry X agrees:

Ministry Y agrees:

IV. MEETINGS AND CORRESPONDENCE (*optional*)

To accomplish the goals and activities set forth in this MOU, Ministry X and Ministry Y will to the fullest extent possible:

Regularly meet for the purposes of program planning and monitoring and evaluating outcomes;

Respond to correspondence by telephone or email in a manner and timeframe that promotes efficiency and the timely progress or completion of objectives and tasks consistent with the goals and activities described above; and,

Agree to specific meeting or call times and dates as far as possible in advance of the appointed occasion.

V. POINTS OF CONTACT

The points of contact for the MOU on The National Greenhouse Gas Inventory are:

Ministry X	Ministry Y
Position	Position

Points of contact may be re-designated by the signatories.

VI. DURATION OF THE AGREEMENT

This MOU may be amended by written agreement between Ministry X and Ministry Y. The agreement becomes effective on the date of signature by both parties. It shall remain in effect for a ____ year term from the effective date. This MOU may be terminated by mutual written agreement of X and Y or by either party with ____ days notice to the other party.

This memorandum of understanding is entered into

On the ____ day of ____ in the year ____.

Signatures:

_____	_____
Name	Name
Position	Position
Ministry X	Ministry Y
Date of Signature	Date of Signature

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The LECB Programme is made possible through generous contributions from the European Commission, the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), and the Australian Government.