



UGANDA'S SECOND BIENNIAL UPDATE REPORT TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

Project Inception Meeting



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Introduction

- Biennial Update Reports (BURs) are reports to be submitted by non-Annex I Parties.
- BURs provide updates of national Greenhouse Gas (GHG) inventories, including a national inventory report and information on mitigation actions, needs and support received.
- BURs also provide updates on actions undertaken by a Party to implement the Convention, including the status of its GHG emissions and removals by sinks, as well as on the actions to reduce emissions or enhance sinks.

Key elements of the Biennial Update Reports (BURs)

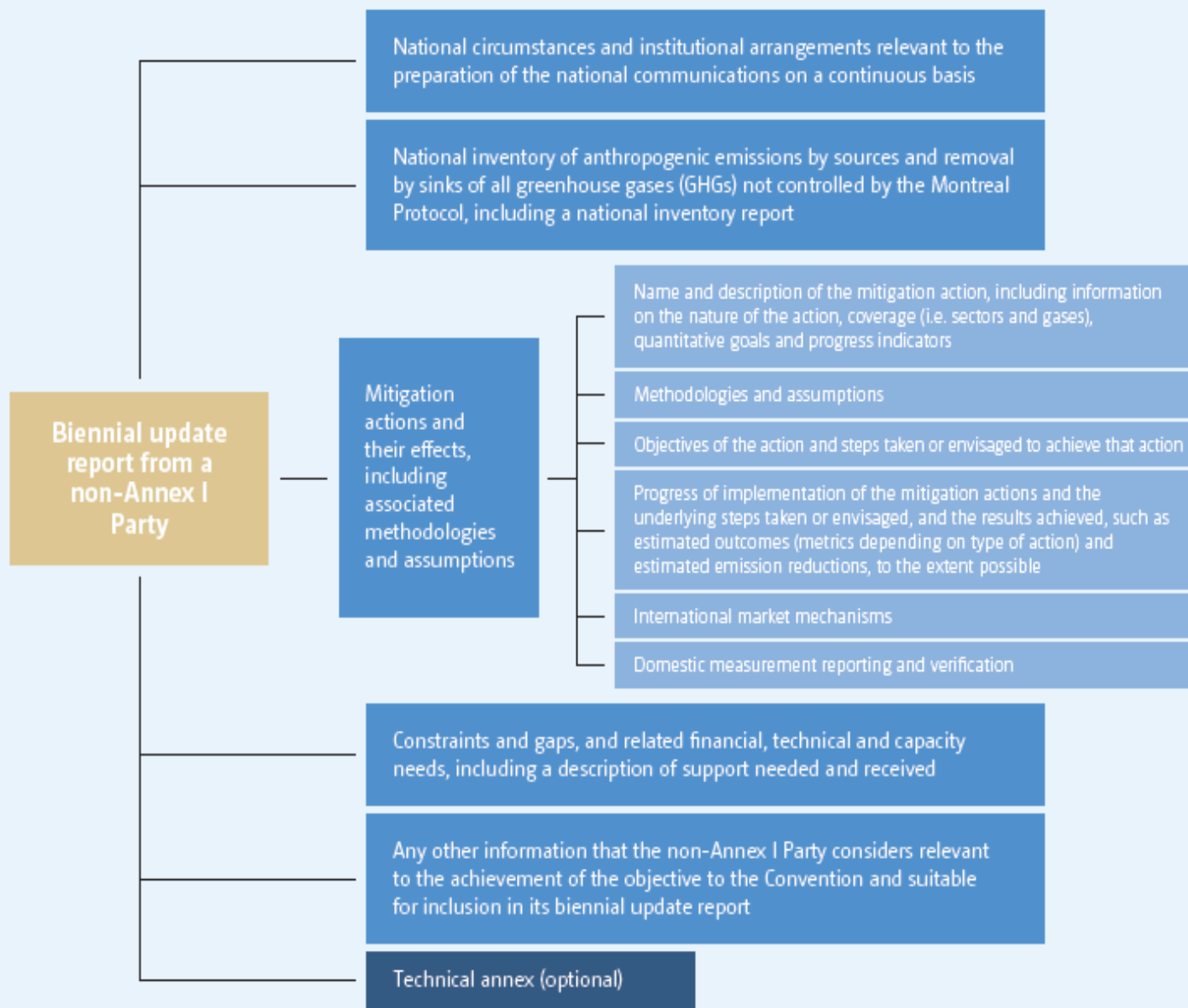


Image Credit: https://unfccc.int/files/inc/graphics/image/x-png/bur1_full.png

Uganda and BURs

- Uganda is a signatory and Party to the United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol and the Paris Agreement.
- Uganda has commitment to honouring its reporting obligations and as such has since provided first National Communication in 2002, the Second National Communication in 2014 and the Nationally Determined Contribution in 2015/2016.
- Uganda is also obligated to prepare and submit Biennial Update Reports (BURs) to the UNFCCC in accordance with decision 2/CP.17.
- Uganda submitted its First BUR in 2019 and therefore, this current effort is to meet its commitment towards SBUR

First BUR Key Highlights

- Biomass is the primary source of energy in all the sectors apart from transport and service sector
- Electricity generation is mainly from hydropower sources and installed capacity is approx. 925M W in 2015.
- Waste disposal remains a key challenge in the city and urban areas.
- Uganda's emissions have had a steady rise increasing from 53 thousand Gg tonnes in 2005
- to close to 90 thousand Gg tonnes in 2015.
- The AFOLU sector has remained the most significant source accounting for over 86% of the emissions followed by the energy sector accounting for 10.8%.
- Uganda had taken a number of efforts and put in several initiatives at institutional, and programmatic level such as NAMAs and REDD+ etc.
- **Constraint:** *Comprehensive assessment for finance, technology transfer and capacity building was not done for lack of efficient mechanisms for the collection of reliable data, archiving and updating in a manner that meets the minimum IPCC requirements.*

The Current Assignment

Intent: A comprehensive SBUR for submission to the UNFCCC prepared in accordance with the guidelines contained by decision 2/CP.17 for Parties not included Annex 1 to the Convention

Objectives

- i. To undertake national stocktaking and stakeholder consultation to review work carried out under previous climate change enabling activities, identify gaps, and propose relevant activities to be undertaken within the framework of preparing the Second Biennial Update Report (BUR2) under the UNFCCC.
- ii. To prepare the second biennial update report of Uganda under the UNFCCC, as per the approved implementation plan for the BUR2
- iii. To undertake National Stakeholders' engagement and institutional arrangement to prepare subsequent reports under the UNFCCC.

Scope of the assignment

1. *To undertake national stocktaking and stakeholder consultation to review work carried out under previous climate change enabling activities and identify gaps and propose relevant activities to be undertaken within the framework of preparing the Second Biennial Update Report (BUR2) under the UNFCCC.*

- A review of the previous initiatives of the climate change, assess the adequacy and identify the gaps.
- Reviewing accounting standards and methods, determining the organizational and operational boundaries as well as choosing a base year
- Data collection will be undertaken and GHG emissions will be quantified
- A GHG Inventory management plan will also be developed to formalize the data collection procedures and document process in the inventory management plan
- Report on progress since the last communication
- National circumstances will be based on the previous findings and dependent on the scenarios of the country and the information on the physical characteristics of Uganda...

2. *To undertake National Stakeholders' engagement and institutional arrangement for preparation of subsequent reports under the UNFCCC.*

- A nationwide stakeholder consultations and engagement and institutional arrangements
- Source data to be used for GHG inventory from the respective stakeholders within the public and private sectors of the economy
- Undertake the National Greenhouse Gas inventory covering UNFCCC identified key sectors, namely: Agriculture, Forestry, and other Land use (AFOLU), Energy, Industrial Processes and Product Use (IPPU), Waste and Transport.
- Inventory studies estimates will be done using the Tier 2

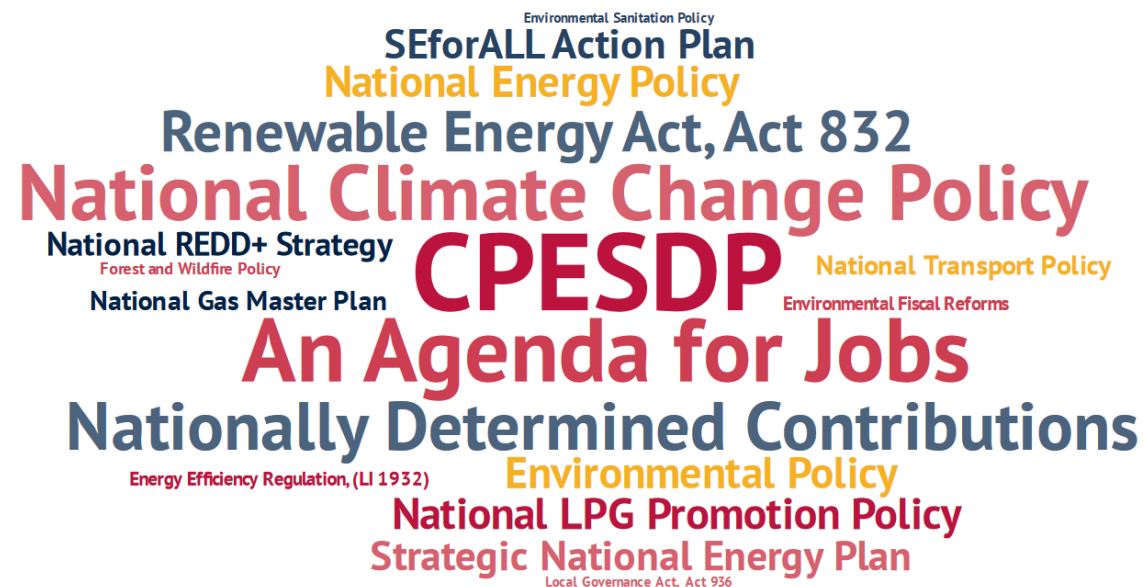
3. *To prepare the second biennial update report of Uganda under the UNFCCC, as per the approved implementation plan for the BUR2*

- Update the second biennial report with the new findings (data) the gaps identified from the previous interventions will be filled
- final report in accordance with the UNFCCC guidelines produces in accordance with the approved implementation plan for the BUR2

Detailed Methodology to the SBUR

1. National circumstances and institutional arrangements following UNFCCC guidelines

- National consultations will adopt a co-creational, inter-sectoral and multi-sectoral, inclusive and results-oriented approach---critical for delivering a shared perspective/vision
 - In person meetings/dialogues
 - Focus group discussions
 - Virtual meetings/conversations
 - Online surveys with experts (for expert views)
- Systematic review of strategic documents
 - Review report on existing institutional arrangements and recommendation on relevant improvements to support successful implementation of the biennial update reports and NCs on a continuous basis prepared
 - Review information on Uganda's national circumstances which may affect the country's ability to mitigate climate change
 - Review relevant documents, policies and development programmes, and Population and housing census
- Analysis of the institutional setup and its operation and analyses if it meets the expectations at National and International requirements



Collage of strategic national documents reviewed by Ghana for TBUR (Uganda's current SBUR proposes to similarly review several national documents)

National Greenhouse Gas Inventory for Energy, Industrial Processes and Product Use (IPPU) and Waste Sectors of the IPCC

Overview of the overall task

- Methodologies established by the latest UNFCCC guidelines for the preparation of national communications from non-Annex I Parties approved by (COP) or those determined by any future decision of the COP on this matter.
- Updates of national GHG inventories according to decision 17/CP.8. will be provided
- Updates on national GHG inventories shall be consistent with capacities, time constraints, data availabilities, and the level of support provided by developed countries Parties for biennial update reporting
- Based on the country's previous reporting the, Uganda will use the IPCC 2006 software version 2.890 to assess the inventory of the NGHGs.
- Desk reviews of previous GHG inventories focusing on the Energy, Transport, Industrial Process and Product Use and Waste sectors (non-AFOLU).
- Reviews, consultations and co-creation meetings through workshops will be conducted
- Stocktaking assessment will be done and will involve checking the quality of the activity data and emission factors

Task 1: National GHG inventories

- Capacities of National GHG Inventory Team will be established and their capacities to undertake GHG inventory strengthened
- Review relevant literature in the Non AFOLU Sectors and working closely with CCD
- Non-AFOLU stakeholders have been prioritised but this process is iterative-taking into consideration rapid evolution taking place in the country (ref. Page 9-10)
- Key stakeholder consultations e.g. MDAs

Summary:

Sector based consultations, reviews, secondary data retrieval, emissions estimations/modeling, & uncertainty assessment of NIGHGs

National GHG emissions from Agriculture, Forestry Land Use and Land cover change

Overview; The Revised 1996 IPCC Guidelines, the IPCC good practice guidance for LULUCF (2003), the 2006 Guidelines and 2019 refinement to the 2006 Guidelines will be adopted in this assignment

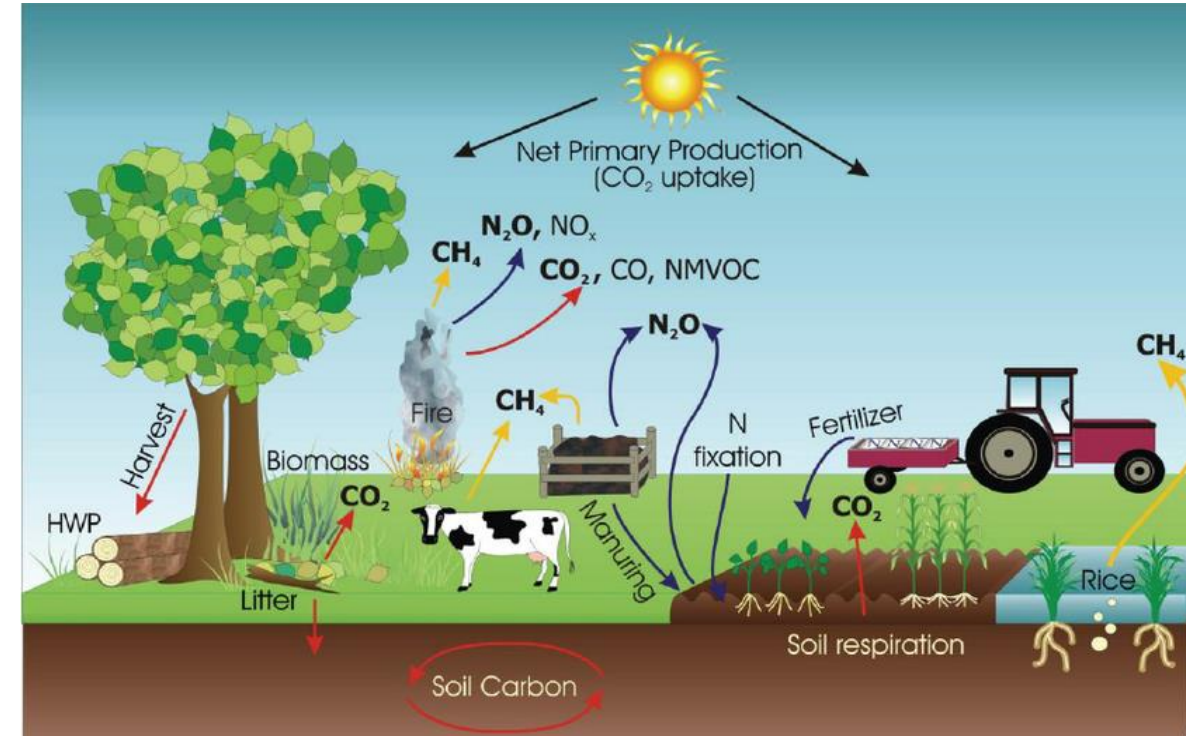
The AFOLU has a number of unique characteristics with respect to developing inventory methods;

- There are many process leading to emissions (removals) of GHG which can be widely dispersed in space and highly variable in time
- This sector is the widest because it deals with anything that involves land management that is not considered under energy, industries and waste treatment
- The purpose of GHG Inventory for AFOLU is to account for GHG emission (removals) that come from human activities on land raising livestock, soil management, growing and harvesting of trees)-
- The challenge is that GHG emissions and removals are due to biogeochemical process inherent in the ecosystems. The emissions and removals in AFOLU can be both natural and anthropogenic and thus there is need to identify and account for only anthropogenic related emissions (and removals)
 - **In AFOLU, anthropogenic GHG emissions by source and removals by sinks are defined as those occurring on managed land**

Managed land is defined as where human interventions and practices have been applied to perform production, ecological or social functions. All land in Uganda is considered managed

Human influence on Biogeochemical Processes

- The Nitrogen cycle soil application of nitrogen- containing fertilizer and manure and nitrogen fixation
- The Carbon cycle comprises CO₂ uptake from NPP, carbon storage in biomass and harvesting, and CO₂ emissions from litter/decay and soil respiration
- Methanogenic and anaerobic decomposition comprises CH₄ emissions in the paddy rice and manure management systems
- Biomass combustion comprises burning of agriculture crops or forest biomass leading to CO₂, CH₄, N₂O, N_xO and NMVOC



AFOLU Major categories are: Agriculture and LULUCF

Agriculture Sub Sector

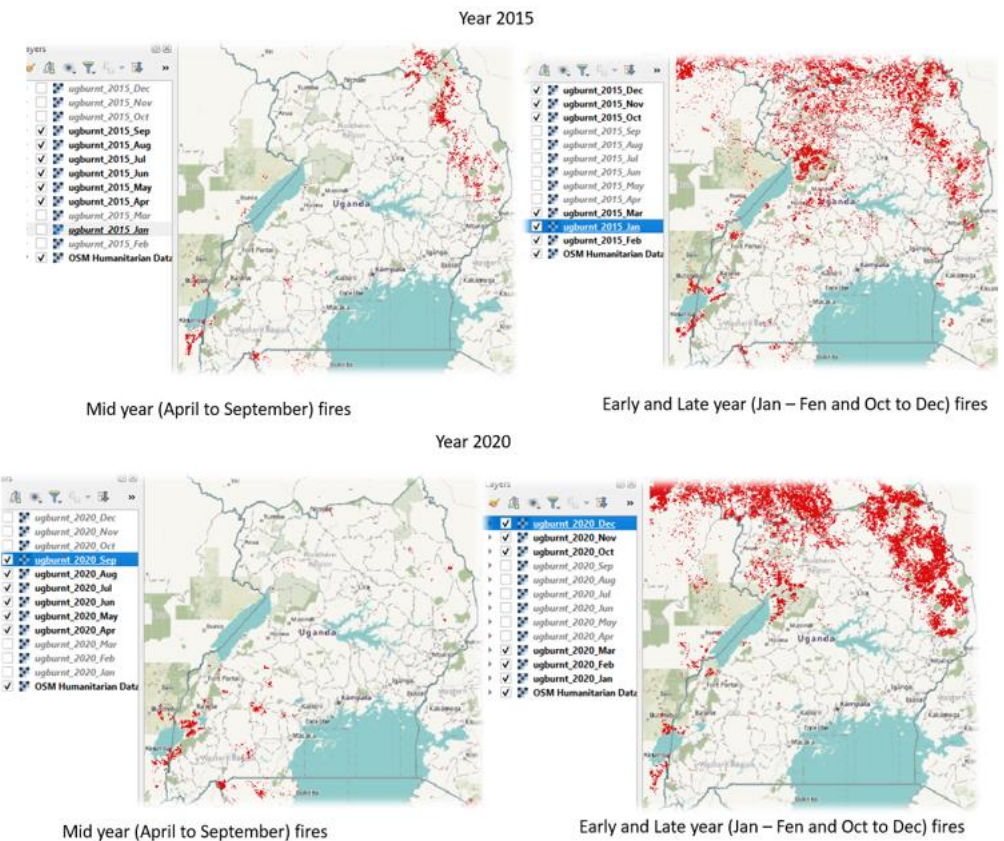
Livestock

- Sources of emissions from agriculture sector are livestock (enteric fermentation and manure management), and the aggregated sources and non-CO2 emissions on land (biomass burning, lime application, Urea application, Direct N2O emissions from managed soils, Indirect N2O emissions from managed soils, Indirect N2O emissions from manure management, and rice cultivation).
- IPCC classification of livestock groups/categories will be followed; dairy and other cattle based on the national context—referenced to 2019 classification as well
- Emissions from small ruminants (goats and sheep), pigs and poultry will be determined using the Tier 1 revised 2006/2019 IPCC Guidelines approach
- Application of appropriate AF and Tier will be discussed with the relevant stakeholder

Aggregated sources and Non-CO2 emissions on land

Biomass burning

- Biomass burning releases potent greenhouse gases CO₂, CH₄, N₂O into the atmosphere.
- IPCC Guidelines only require the calculation of emissions from savannah burning, But, in essence burning of biomass is from; forest land, grassland, cropland and other lands such as wetlands.
- Estimate emissions from burning biomass, two variables are required, (i) burnt area (ii) biomass burning emission factors, mass of fuel available for combustion and combustion factor, thus:
 - Annual burnt-area maps for the years 2018 to 2022 will be produced from the MODIS monthly burnt-area product
 - previous BUR report and datasets will provide historical datasets for 1995-2017
 - Validation will be done using Sentinel 2 imagery with much higher spatial resolution (10 meters compared to 500 m)
- Biomass burning emission factors, mass of fuel available for combustion and combustion factor are available in the IPCC guidelines and also inbuilt in the IPCC software.



MODIS fire retrievals showing the seasonality of biomass burning over Uganda 2015 and 2020. credit: <http://modis-fire.umd.edu/>

Emissions from lime application

- Application of agricultural lime, limestone and or Dolomite, leads to CO₂ emissions because Lime is composed of carbonates which react with soil acids leading to CO₂ emissions.
- For national inventory the activity data required to estimate Tier 1 emissions from lime application is the quantity and type of lime applied in agricultural soils at national level.
- The proxy data used for this variable is the quantities of lime imported on an annual basis.
- Data can be obtained from Uganda Revenue Authority (URA) through MWE.

Emissions from Urea application

- Urea is partly composed of carbon, when applied in the soil reactions lead to emission of CO₂.
- Urea emissions will be estimated using the Tier 1 IPCC approach.
- Activity data for the estimation is the quantity applied in soils at national level, this can be estimated from the annual urea imports data obtained from URA through MWE.

Direct and Indirect N₂O Emissions from Managed Soil, and indirect N₂O from manure management and soils

- Nitrous oxide emissions from soil can occur both directly through mineralization followed by nitrification and denitrification
- Activity data required for these estimates include:
 - *(i) quantities of inorganic N fertiliser applied, (ii) livestock population, (ii) manure management systems (Pastures/range/paddock, solid storage, pit storage below animal confinement, anaerobic digester) (iii) proportion of compost applied, (iv) quantities of dung/urine deposited in the field.*
- Deforestation maps and degraded soils maps will be used to assess and estimated emissions attributable to soil mineralization-IPCC allometric equations
- Tier 1 approach will be used, 2018-2022 data will be obtained from URA, MAAIF through MWE

Emissions from Rice cultivation

- Rice cultivation under paddy condition is associated with CH₄ production and loss from the anaerobic soils through the xylem vessels.
- To estimate Emissions from rice cultivation, the area under rice paddy cultivation and the irrigation method used will be required.
- Area under paddy rice cultivation, will be obtained from MAAIF, and UBOS surveys.
- And will be Corroborated with data from NFA and carrying an assessment of cultivated wetland using sentinel images.
- Method of irrigation will be obtained from district production offices in rice cultivating areas under other specialized agencies like the NARO



Emissions from Rice experiment (Image credit: <https://www.cgiar.org/news-events/news/in-search-of-rice-to-reduce-methane-emissions/>)

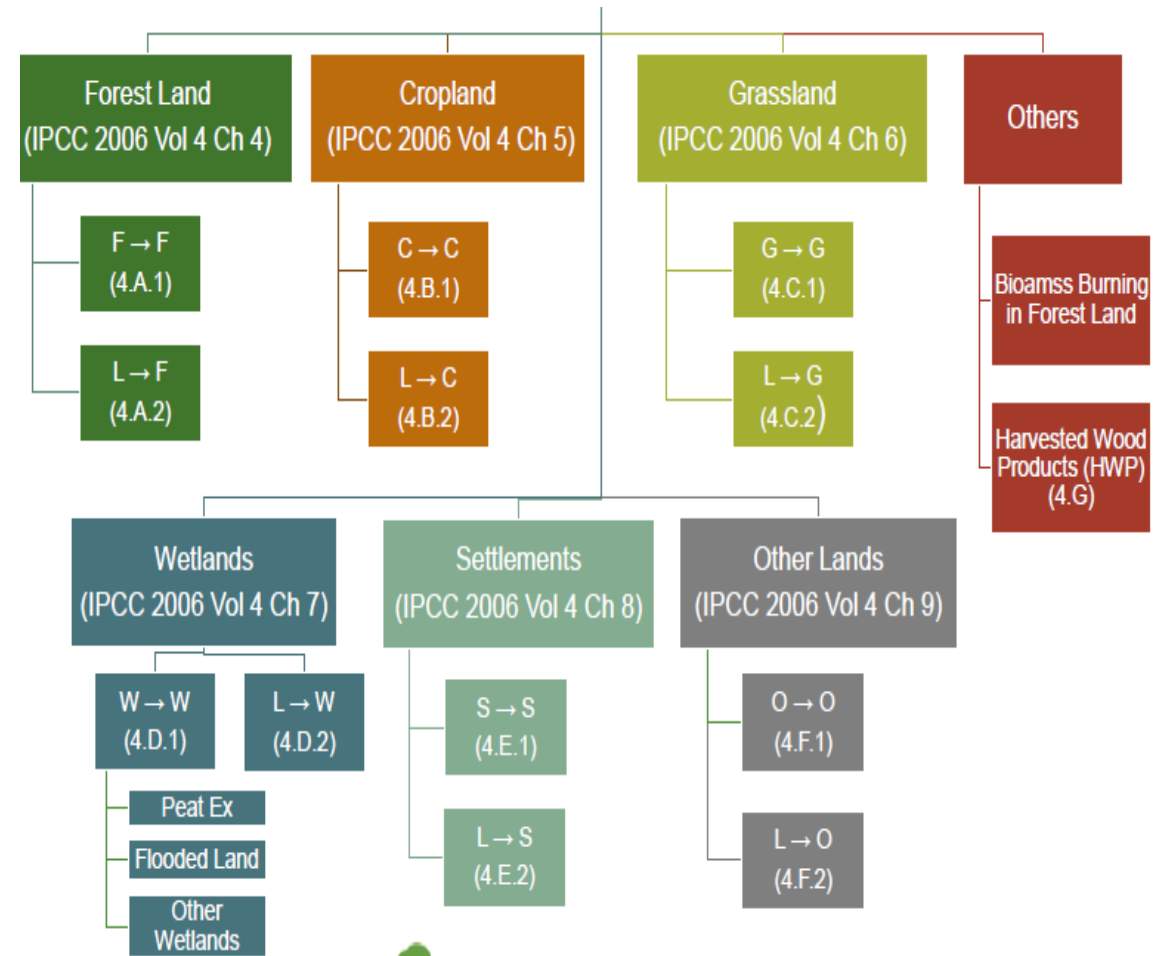
Carbon Pools for LULUCF

Carbon stock changes are categorised into five pools

- Aboveground biomass
- Belowground biomass
- Dead wood
- Litter
- Soil organic matter

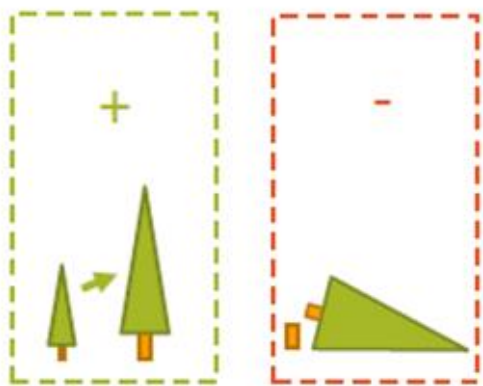
These pools may be aggregated further into three carbon pools

- Living biomass = (ABG + BGB)
- Dead Organic Matter (DOM) = Deadwood + Litter
- Soils organic matter



Comparison of Tier 1 and Tier 2

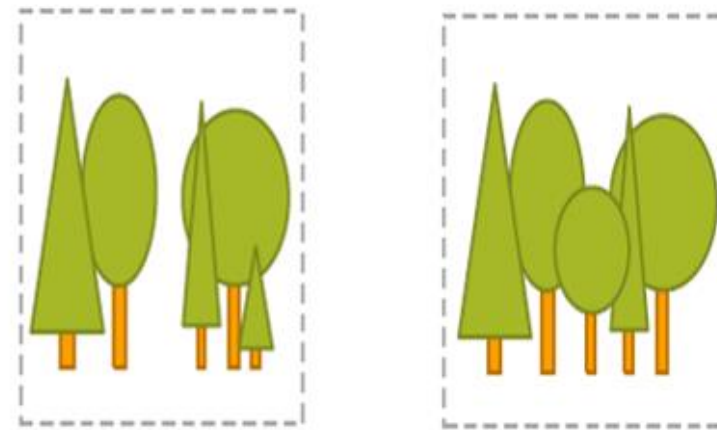
Gain – Loss (Tier 1 Method or Approach)



Annual increase in biomass carbon stocks

Annual decrease in carbon stocks due to loss

Stock Change (Tier 2 Method or Approach)

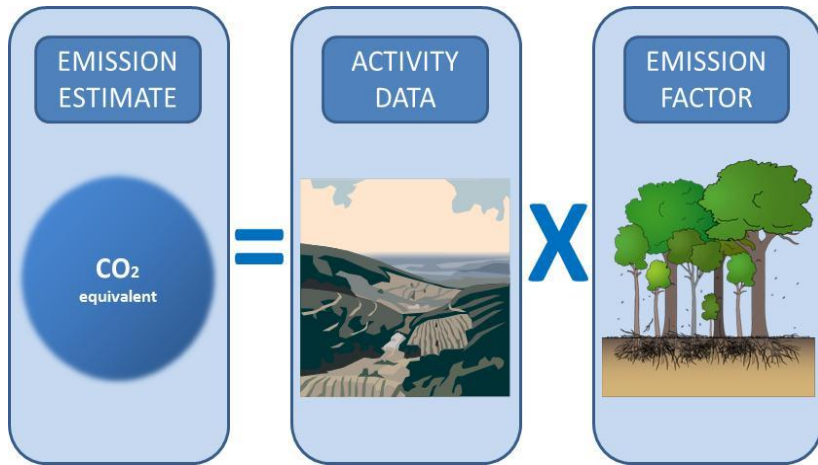


Change in carbon stocks =

$C \text{ Stock}_{t_2} - C \text{ Stock}_{t_1}$

$t_2 - t_1$

Estimation of Emission; Approach 3



Land Use Manager

Land use structure

- Forest Land
 - Managed Forest Land
 - Plantation
 - THF**
 - Woodland
 - Unmanaged Forest Land
 - Cropland
 - Grassland
 - Wetlands
 - Settlements
 - Other Land

Land use subdivision - common parameters

Land use subdivision name: THF

Country/Territory: Uganda

Soil Type: High Activity Clay Mineral

Soil Status: Natural

Continent: Africa

Climate Region: Tropical Montane Moist

Land use subdivision - Managed Forest Land specific parameters

Ecological zone: Tropical mountain systems

Species: User-defined

Natural Forest: Plantation: Abandoned managed land:

Land mass: Unspecified

Age class (yr): >20 y

Above-ground biomass stock (t d.m. / ha): 150,000

Above-ground biomass growth (G) (t d.m. / ha / yr): 0.000

Ratio of below-ground biomass to above-ground biomass (R) (t root d.m. / t shoot d.m.): 0.240

Biomass carbon fraction (C / t d.m.): 0.470

Growing stock level (V) (m³ / ha): <10

Average net annual increment of growing stock (Iv) (m³ / ha / yr):

Biomass conversion and expansion factor for increment (BCEF) (t d.m. / m³ wood volume): Specified

Biomass conversion and expansion factor for standing stock (BCEF_s) (t d.m. / m³ wood volume): Specified

Biomass conversion and expansion factor for wood and fuelwood removal (BCEF_r) (t d.m. / m³ wood volume): Specified 0.000

Basic wood density (D) (t d.m. / m³ fresh volume):

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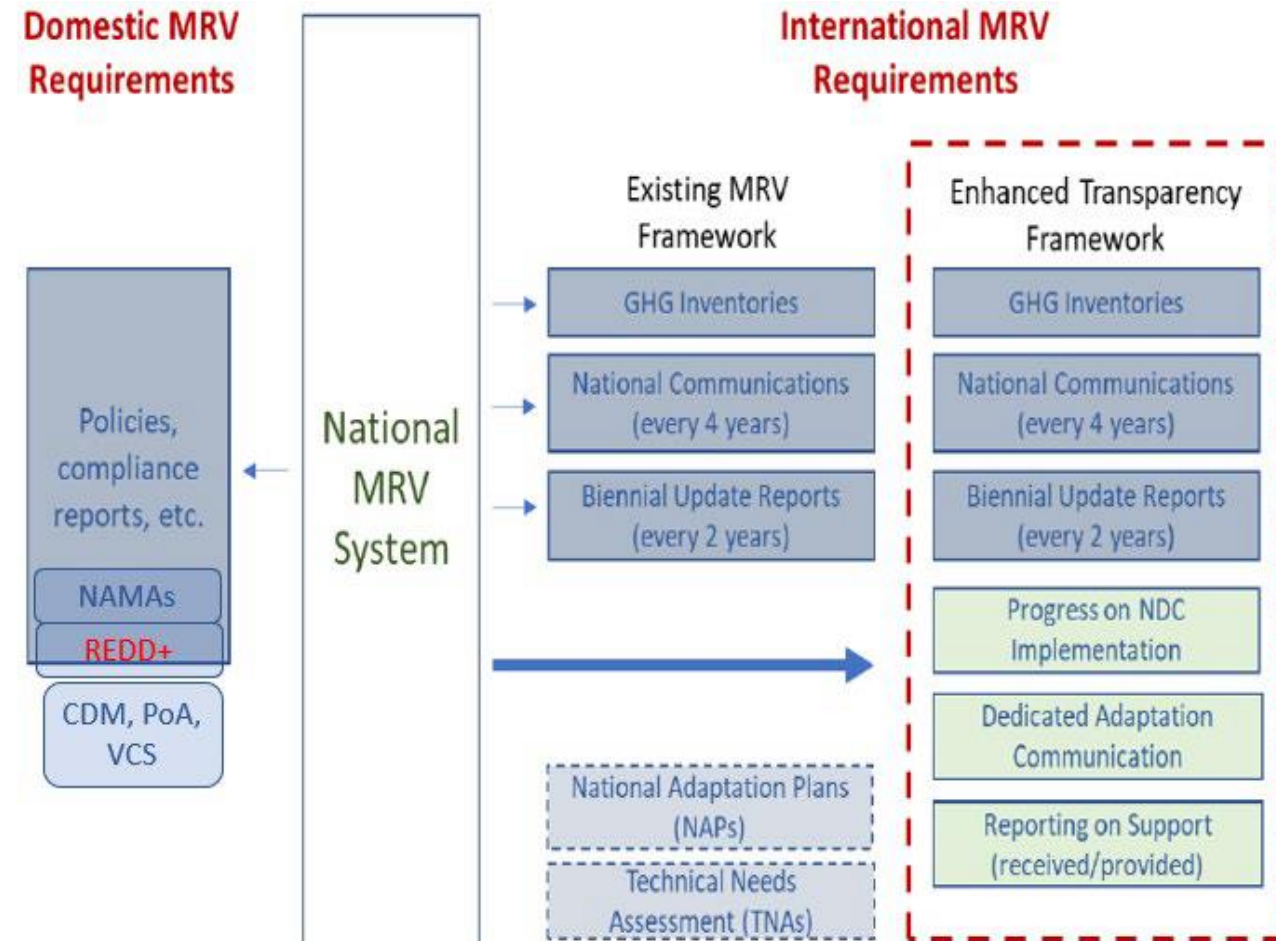
Region: Uganda Region Region area (ha): 20,240,505,000 Approach 3 2015

Final	Initial	Forest Land		Cropland		Grassland		Wetlands		Settlements		Other Land		Final Area (ha)	Net change (ha)
		Managed Forest Land	Unmanaged Forest Land	Cropland Annual Crops	Cropland Perennial Crops	Managed Grassland	Unmanaged Grassland	Managed Wetlands	Unmanaged Wetlands	Settlements (Treed)	Settlements (Other)	Managed Other Land	Unmanaged Other Land		
Forest Land	Managed Forest Land	1804337		36758.61										1841095.61	-477737.28
	Unmanaged Forest Land													0	0
Cropland	Cropland Annual Crops	514495.89		3400903				2000						3917398.89	479737.28
	Cropland Perennial Crops				7222586									7222586	0
Grassland	Managed Grassland					6952872								6952872	0
	Unmanaged Grassland													0	0
Wetlands	Managed Wetlands							713834						713834	-2000
	Unmanaged Wetlands													0	0
Settlements	Settlements (Treed)									93702				93702	0
	Settlements (Other)										40158			40158	0
Other Land	Managed Other Land											14027		14027	0
	Unmanaged Other Land													0	0
	Initial Area (ha)	2318832...	0	3437661...	7222586	6952872	0	715834	0	93702	40158	14027	0	20795673.5	0

Information on Domestic measurement, reporting and verification (MRV)

Overview

- Will document Uganda's MRV; what and how GHG and mitigation is measured, tracked and reported, how supported needed and received is measured and reported, including the verification of the measurement and reports.
- This will include institutional arrangements, tools used e.g (<http://ugandamrv-env.eba-6x2ahhvu.us-east-2.elasticbeanstalk.com/>) and how the tool is used to track mitigation and adaptation actions.
- The assessment will cover data and application of EF for all sectors, i.e. Waste, energy, Forestry, Agriculture, transport, etc
- Will work closely with MWE-CCD and all stakeholder.



Domestic MRV to be anchored to the existing framework (Image credit: FBUR, Uganda)

National emission factors for key source categories, including activity data documented

Task II: Other relevant information for inclusion in the BUR

- Other information relevant to the achievement of the objective of the convention e.g. gender mainstreaming
- Archived data retrieval and reviews conducted (systematic/or otherwise)
- Workshop on gender mainstreaming is proposed as gender is a key strategic GoU action

Task III: Information on Support received for preparation and submission on BUR.

- level of support received to enable the preparation and submission of BUR1 will be described
- A collaborative approach to engage with CCD and the Climate Finance Unit at the Ministry of Finance, Planning and Economic Development (MoFPED) to synthesise the information on support received will be utilised

Finance, technology and capacity-building needs and support received.

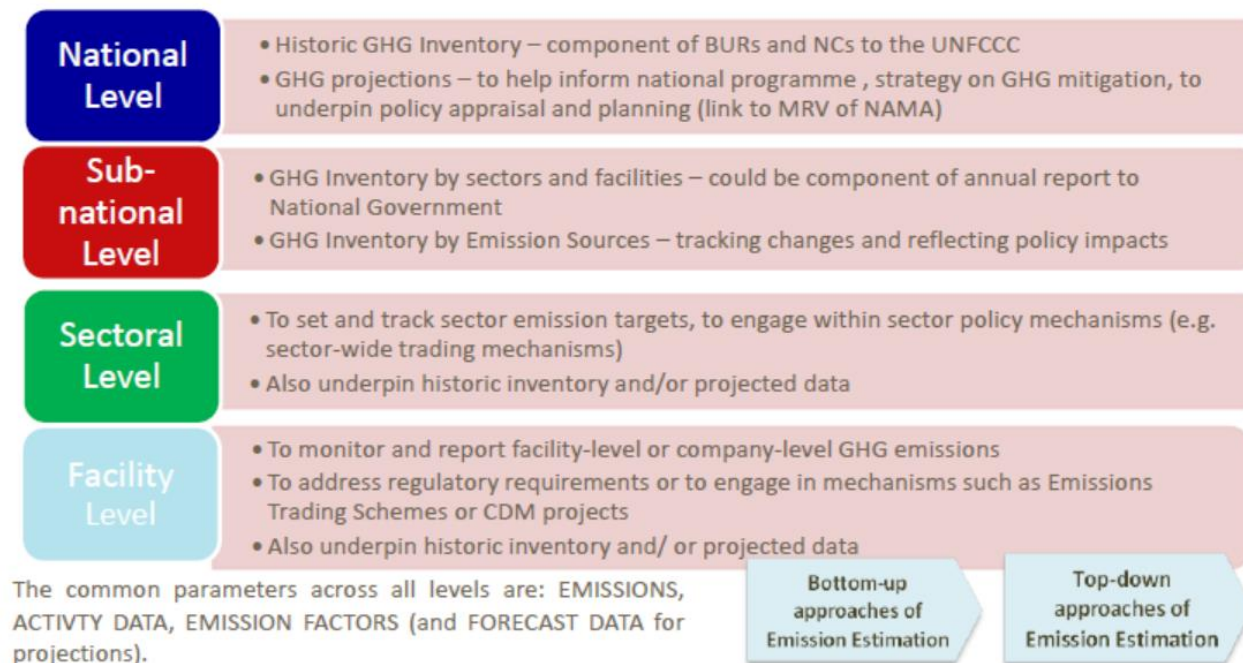
- Information on technology needs, which must be nationally determined, and on technology support received with regard to the development and transfer of technology will be provided
- Constraints, gaps and related financial, technical and capacity needs assessment will be conducted across prioritised stakeholder categories
- Review, analysis and revise the framework for the continuous assessment and reporting of constraints, gaps and related financial, technical and capacity needs and support needed and received
- Institutional consultations with key MDAs responsible for technology transfer e.g. NCST and private sector will be undertaken

Building on previous efforts:

- Existing MRV tool was -collaboratively developed by UNDP and MWE.
- How the tool collects data on climate change mitigation, adaption actions, climate finance and SDGs in line with climate change actions
- Evaluation of the national arrangements for Measurement, Reporting and Verification (MRV) related to mitigation actions and their effects.
- Identification of data providers who have implemented climate change actions related projects, central data managers at sector level from the mandated government institutions and the respective responsible personals at the institutions.
- In consultation with stakeholders, document improvements of the MRV processes e.g., data acquisition, archiving, analysis, reporting, QC and verification processes
- Identification of the ideal structure and process (who does what?) through which MRV data can be collected.

Mitigation actions and their effects

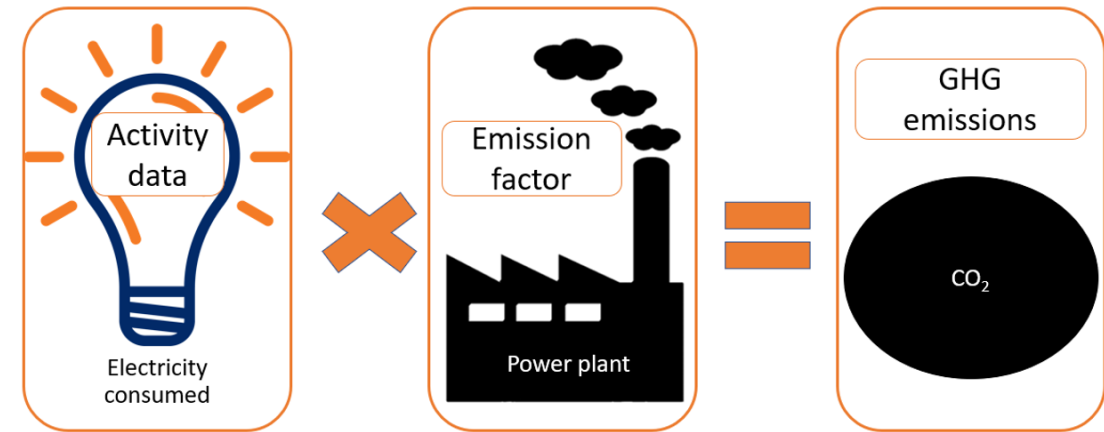
- Guidelines for reporting mitigation actions and their effects in the BUR will be used.
- It provides for specific requirements; namely name, sector, gas(es), methodology, planned emissions, progress.
- A standard template for the identification and reporting mitigation actions or group of mitigation actions will be developed
- Action-matching criteria for information generation will be utilised in actions solicitation from stakeholders
- Collaboratively with ICT division of CCD, review the design, implementation and updating of the mitigation database containing the requisite data including elements, table, relationships, queries and report forms.



Scope for MRV of Emissions (Image Credit; GIZ)

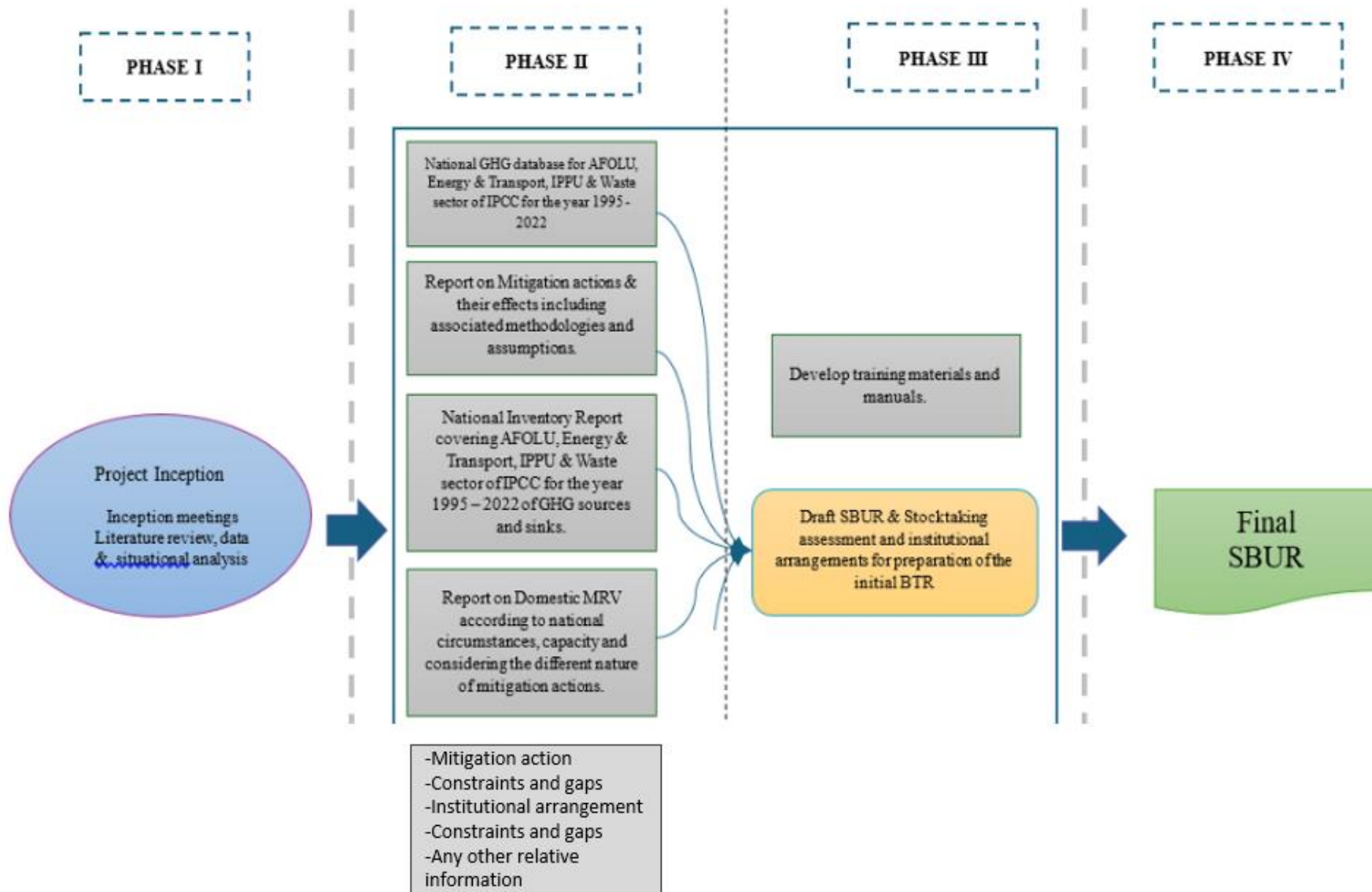
Task IV: Stocktaking assessment and institutional arrangements for preparation of initial BTR.

- A self-assessment and stocktaking exercise will be undertaken
- Self-assessment tool of the CBIT - GSP, guide CCD and stakeholders through the exercise.
- A strategy to incorporate all relevant stakeholders, including their potential roles in the BTR processes and identifies key focal points in working groups to track issues arising linked to financing, constraints and gaps, and technical and capacity needs will be prepared
- A checklist to track issues arising linked to finance, constraints and gaps and technical capacities and needs as the country transitions to BTR will be prepared
- Measures to strengthen and retain the existing institutional arrangement will be proposed with a reference benchmarking on the previous



Depicts a calculation for estimating GHG emissions applying the emission factor of a power plant that produces a quantity of electricity (identified by the activity data e.g., a utility invoice) that is consumed by an end-user (not pictured in the graphic). Image credit: <https://ghginstitute.org/2022/10/31/what-are-emission-factors-and-where-can-i-find-them/>

Conceptualised Process to Deliver SBUR

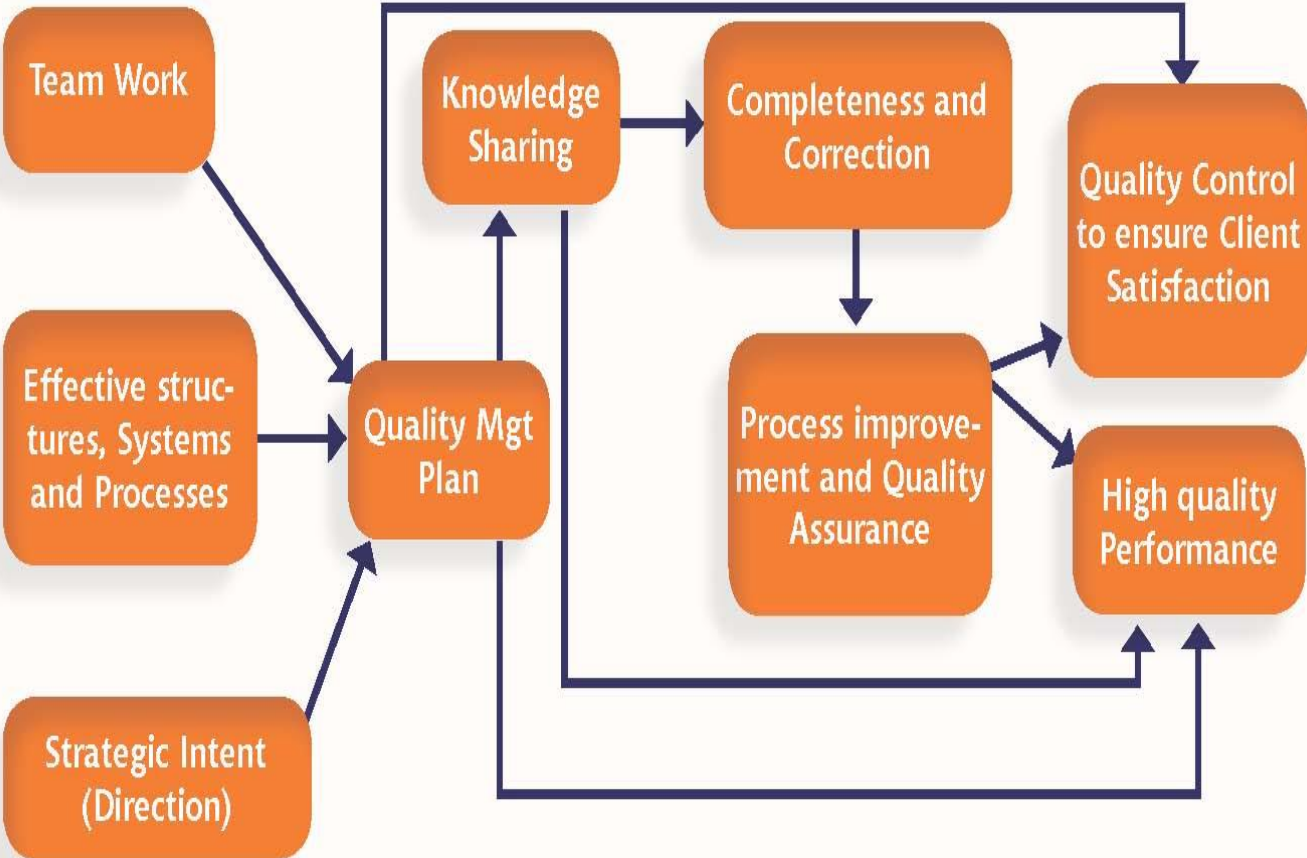


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Government of Uganda

Summary of the methodology for the preparation of Uganda's (SBUR) based on scope of the assignment

Quality assurance



Conceptual model for the quality management process

Project Team

S/N	NAME	TITLE/ROLE
Project Management Team/Committee		
1	Mr Roland Karumuna	Institutional liaison and Management
2	Joseph Obaa	Logistical Coordination
3	Musiwa Joel	IT and data curation
Project Technical Team		
1	Prof. Anthony Egeru	Team Leader
2	Dr Adam Sebbit	National GHG Expert (Energy, IPPU, and Waste Sector)
3	Dr Ibrahim Wanyama	National GHG Expert (AFOLU – Agriculture)
4	Mr Fred Lali	National GHG Expert (AFOLU – Forestry and other Land Uses)
5	Dr Sadadi Ojoatre	Mitigation Expert
6	Mrs Esther Kavuma	Economist (Social and Environmental)
7	Mr Samuel Binta	GIS and Remote Sensing Expert
8	Mr John Begumana	Technical Advisor and Quality Assurance



Alakara
Thank you