



GHG Framework Overview

Senegal Waste Sector

FINAL DRAFT

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Document Control and Assurance

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1 Background

The “Support for NDC Implementation in the Waste Management Sector in Senegal and Cote d’Ivoire” project aims to assist Cote d’Ivoire and Senegal to implement their Nationally Determined Contributions (NDCs) in the waste sector, through the support of the development of policy measures and capacity building to facilitate emission reduction in the waste sector. The project comprises four components including:

1. Component 1: Strengthen policies framework to reduce GHGs and Short-Lived Climate Pollutants (SLCPs) in municipal solid waste sector.
2. Component 2: Enhance technical and operational capacity for data monitoring, reporting and verification in the waste sector.
3. Component 3: Provide technical assistant to countries in the installation and running of the biogas and compost plant.
4. Component 4: Coordination, Reporting and Experiences sharing

One of the activities under component 2 consist of developing a National MRV architecture focusing on waste sector in Senegal.

The purpose of this document is to establish a framework for the development of MRV Systems for the waste sector in Senegal which will include 3 main components:

- a) Component 1: Overview of MRV, MRV Framework and MRV Systems
- b) Component 2: Assessment of Current MRV System Components in Senegal’s Waste Sector
- c) Component 3: Development of an MRV Framework for the Waste Sector in Senegal including timeline and approximate cost for development of MRS System Components

More specifically, this document will focus on component 1 and provides an overview of MRV, MRV Framework and MRV Systems. This short introduction will provide relevant information and definitions of Measurement, Reporting and Verification (MRV), MRV Framework and MRV Systems. This will allow participants in the project to have a better understanding of MRV and to assist in the development of the MRV Framework’s objectives.

2 MRV Overview and Context

MRV is an indispensable part of delivering an effective climate change response, whether for a national Low Emissions Development Strategy (LEDS); sub-national stakeholders such as local communities; industry sectors; or individual companies or facilities reducing emissions and transforming to low-carbon and net-zero activities.

The design, development, and operation of an MRV System to meet these stakeholder needs involves significant time and resources.

The context in which MRV takes place must be understood. The following questions must be answered; what is the purpose of MRV? What is Monitored? Reported to who? Verified to what assurance? This is the MRV Framework in which the MRV System is placed.

2.1 Definition of MRV

M, R and V can be defined as:

Measurement: the collection of data to track the progress of actions and the achievement of objectives. Monitoring (M) includes data and information on emissions, mitigation actions, and support. This may entail direct physical measurement of GHG emissions, estimating emissions or emissions reductions utilizing activity data and emission factors, calculating changes relevant to sustainable development, and collecting information about support for climate change mitigation.

There are two basic approaches to Measurement:

1. Top Down: aggregated statistics on sectoral activities (activity data such as energy statistics) are multiplied by estimates of the rate of emissions per unit of activity (i.e.: emissions factors) to estimate emissions.
2. Bottom Up: collect activity and emissions data directly from installations that emit GHGs as a result of combustion of fuel or processes.

Combining both approaches is beneficial. Top-down estimates provide a calibration/sense-check to installation data, and bottom-up data provides greater accuracy and detail.

Reporting: compiling this information in standardized formats to make it accessible to a range of users and facilitate public disclosure of information.

Verification: periodically subjecting the reported information to review, analysis or independent assessment to establish completeness and reliability. Verification helps to ensure accuracy and conformance with de jure (i.e., officially or formally accepted) or de facto (i.e.,

generally accepted) standardized practices or otherwise established procedures, and can provide meaningful feedback for future improvement.

2.2 Principles of MRV

Principles are an important foundation and guide to MRV, GHG accounting and management systems more generally.

MRV Frameworks are not always prescriptive. Quantification methods and processes often deliberately allow flexibility in the potentially wide variety of situations and applications: it is difficult to foresee and provide prescription for every situation. This is where Principles are important to provide direction and guidance.

2.2.1 Types of Principles

There are a large range of Principles relevant to MRV:

- GHG accounting principles (e.g.: IPCC Guidance, GHG Protocol, ISO 14064-1, 14064-2) guide users who aim to convey information (make statements) about emissions.
- GHG verification principles (e.g.: ISO 14064-3) guide auditors on how to convey information about the veracity and credibility of GHG statements.
- broader environmental management system principles (e.g.: ISO 14001) guide the establishment and operation of systems.
- principles relating to MRV Frameworks and methodologies (e.g.: ISO 14080) that guide approaches and processes to identify, assess, develop, and revise methodologies and climate actions.
- GHG MRV Effectiveness principles that guide users in developing and maintaining an appropriate MRV System.

GHG Accounting Principles: relating to the processes of collecting, analysing, manipulating, compiling, collating, reporting and verification of information related to GHG management.

2.2.2 GHG Accounting Principles

GHG accounting principles have been established for some time and are well documented. MRV Frameworks have converged on a core set of 5 or 6 Principles that are reasonably uniformly defined and required.

Table 1: MRV Framework GHG Accounting Principles

Principle	Definitions ¹	Comment
Transparency	<p>There is sufficient and clear documentation such that all involved can understand how the inventory was compiled and can assure themselves that it meets the good practice requirements for national GHG emissions inventories.</p> <p><i>Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.</i></p>	<p>An essential principle for credibility of MRV.</p> <p>Good agreement between Frameworks on the essence of disclosing calculations and assumptions such that they can be checked by independent parties.</p>
Accuracy	<p>National GHG inventories should contain neither over- nor under-estimates so far as can be judged. This means making all endeavors to remove bias from the inventory estimates.</p> <p><i>Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable confidence as to the integrity of the reported information.</i></p>	<p>Good agreement between Frameworks that quantifications are not systematically biased.</p>
Completeness	<p>National, calendar year estimates are reported for all sources and sinks, and gases. Where elements are missing their absence should be clearly documented together with a justification for exclusion.</p> <p><i>Account for and report on all GHG emission sources and activities within the inventory boundary. Disclose and justify any specific</i></p>	<p>Good agreement between Frameworks on including all components within scope, and documenting and justifying any exclusions.</p>

¹ Definitions in plain text are taken from IPCC/UNFCCC Guide for Peer Review of National Inventories; definitions in *italics* are from the WRI/WBCSD GHG Protocol.

	<i>exclusions.</i>	
Consistency	<p>Estimates for different inventory years, gases and categories are made in such a way that differences between years and categories reflect real differences in emissions. Inventory annual trends, as far as possible, should be calculated using the same method and data sources in all years. They should aim to reflect the real annual fluctuations in emissions or removals and not be subject to changes resulting from methodological differences.</p> <p><i>Use consistent methodologies to allow for meaningful performance tracking of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.</i></p>	<p>Good agreement between Frameworks that quantification is done in the same way over time, and any changes are transparently disclosed.</p>
Comparability	<p>The national GHG inventory is reported in a way that allows it to be compared with national GHG inventories for other countries. This comparability should be reflected in appropriate identification of key categories; in the use of the reporting guidance and tables; and use of the classification and definition of categories of emissions and removals.</p>	<p>A core principle for national inventories, where comparison between countries is needed for global analysis, and scopes and quantification are alike. Not included in corporate or project quantification where scopes are not alike.</p>
Relevance	<p><i>Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company.</i></p>	<p>Principle to enable appropriate decision making against pertinent information, where the audience of reporting is not explicitly known. Generally included in corporate and project Frameworks, but not in national inventory Frameworks, where the use is clearly defined.</p>

2.3 Categories of MRV

MRV is commonly applied to the following categories:

1. MRV of **emissions**: estimation and tracking of GHG emissions over time at national, regional, sector, project, or facility levels.
2. MRV of **actions**: assessing impacts of mitigation policies and actions, at the project, facility, sector, or national scales.
3. MRV of **support** encompasses international and intranational finance flows, technology transfer, capacity building and their impacts.
4. MRV of **other outcomes**: connecting GHG mitigation actions with co-benefits such as energy access, adaptation, or SDGs.

2.4 MRV Framework

The MRV Framework is the context in which MRV takes place: Who is being Reported to? What level of assurance in Verification is required? What coverage and accuracy of Measurement is needed? In essence, what is the purpose of MRV?

To establish an effective MRV System, the requirements of the MRV Framework must be understood.

Table 2: Examples of MRV Frameworks

MRV Category	Possible Frameworks	Aggregation
Emissions	IPCC Guidelines for National Greenhouse Gas Inventories	National
	GHG Protocol Corporate Accounting and Reporting Standard GHG Protocol Scope 3 Standard ISO 14064-1	Corporate
	IPCC guidelines can be used for specific sources. Guidance on source-specific emissions calculation methods from national programs, such as EUETS Sector Guidance from GHG Protocol Corporate Accounting and Reporting Standard	Facility
Actions	UNFCCC MPGs for NDCs Guidance and ETF	National

	<p>WRI: Climate Policy Implementation Tracking Framework</p> <p>GHG Protocol Mitigation Goal Standard</p> <p>Guidance from donor agencies or multilaterals, such as World Bank Clean Technology Fund, Global Environment Facility, Green Climate Fund etc.</p>	
	<p>GHG Protocol Corporate Accounting and Reporting Standard and Scope 3 Standard</p> <p>ISO 14064-1</p>	Corporate
	<p>GHG Protocol Project Standard</p> <p>ISO 14064-2</p> <p>Guidance from donor agencies or multilaterals (as above)</p> <p>Methodological guidance under the Clean Development Mechanism (CDM)</p> <p>Gold Standard</p> <p>Verified Carbon Standard (VCS)</p>	Facility or Project
Support	<p>UNFCCC Common tabular format (CTF) in Biennial Reports</p> <p>UNFCCC MPGs for NDCs Guidance</p> <p>Organisation for Economic Cooperation and Development (OECD) Development Assistance Committee (DAC) climate markers or the joint method developed by multilateral development banks (MDBs)</p>	National Provision of support
	<p>Climate Public Expenditure and Institutional Review for domestic budgeting (CPEIR)</p>	National Receipt of support
	<p>Guidance provided by various mitigation funds (CTF, GEF etc.) and donor organizations</p>	National & International Impact of support
Other Outcomes	<p>Nationally Appropriate Mitigation Action (NAMA) Sustainable Development Evaluation Tool</p> <p>SDG Indicator framework</p> <p>Methods specific to the sustainable development effect (e.g., poverty reduction)</p>	National or sector-wide

	<p>CDM Sustainable Development Co-Benefits Tool</p> <p>Gold Standard SDG contribution tool</p> <p>Methods specific to the sustainable development effect</p>	<p>Facility or project</p>
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A good understanding of stakeholders’ objectives facilitates appropriate selection of MRV Framework(s), that can be combined and modified, as necessary.

2.5 MRV System

An MRV System is the ecosystem of organisations, individuals, requirements, processes, tools, and capacities that facilitate and undertake the collecting, collating, manipulating, compiling, presenting, reporting and verification of emissions and other data to assess progress on climate change responses.

An MRV System assesses and transparently communicates information relating to climate change. It is more than verifying results for quality and assurance – an MRV System is a planning tool within a continuous improvement management system.

MRV Systems inform stakeholders (operations managers, investors, policymakers, etc.) about GHG sources and sinks and the efficacy of investments to mitigate emissions. This enables optimal decision making and allocation of resources.

An MRV System can provide the high level of resolution and assurance to attract climate finance to achieve NDCs, and for that finance to yield best value for money. An effective MRV System is a good investment because it facilitates and prioritises actions and accelerates financial decision-making towards cost-effective climate actions.

2.6 MRV System Components

An MRV system has many components that vary depending on the MRV Categories addressed (emissions, actions, support, other outcomes). Components typically included are shown in table 3 below:

Table 3: Typical MRV System Components

Component	Description	Examples
Physical capacity	Instruments to measure weight, volume, flow, density, area etc.	Weighbridge, flowmeters (gas, oil etc.), current and voltage meters, sensors (heat, flow, charge etc.), satellite imagery, etc.
Human capacity	Available individuals with up to date & relevant knowledge/expertise in the relevant processes & activities	Process engineers, operational staff, government programme managers, consultants, etc.
Data	Raw activity data, conditional data, statistics, qualitative data	Litres of diesel or tonnes of coal consumed, MWh of electricity generated etc. Number of technologies deployed number of hectares conserved. Human population, livestock numbers and age distribution, ha of forest cover. Legislation passed (Y/N), financial mechanisms made available (Y/N, amount), Minimum Energy Performance Standards approved; etc.
Data series	Historic data comparable with current data to illustrate trends; data projections to provide expected results	Diesel consumption since 2000 (l/year) at facility. Projected diesel consumption (l/year) at facility based on planned production levels
Methodologies	Documents and established or prescribed processes for undertaking M, R &/or V. Approved quantification methods, data compilation guidance, Reporting Standards and Protocols, Verification requirements	Standard Operating Procedures (SOPs) from instrument manufacturers and regulatory bodies for Measurement; published international or national standards (e.g., ISO14064) and guidance such as IPCC 2006 and UNFCCC MPGs for NDCs Guidance and ETF.
Tools	Software-enabled GHG quantification	

IMS	Information (and Data) Management System	
Quality Assurance and Quality Control (QA/QC)	Calibration Review, validation &/or verification (Internal and Independent)	Digital sense-checks & automatic comparators; comparison of monitored data against nameplate or manufacturers specifications and against technology or sector; system check on data flows and error detection; recalculations to check results; random data sampling; physical observations of operations; documentation and process completeness checks; etc.

2.7 MRV System Scope

The ‘scope’ of an MRV System simply refers to what is included in the System. Key decisions in setting scope relate to:

- where/how boundaries are set.
- Which sectors are covered?
- Which greenhouse gases and/or other emissions are included.

Scope is defined by the goals of the stakeholders. In turn, some MRV Frameworks will set minimum requirements for scope and coverage. For example, a national government seeks to meet its obligations under UNFCCC for National Inventory reporting (stakeholder goal). The IPCC 2006 Guidelines (MRV Framework) sets out the boundaries, sectors covered, and greenhouse gases included (minimum requirements).

2.8 MRV System Users

The Users of an MRV System are those who actively contribute and utilise the MRV System. This includes those who provide data, submit reports, undertake verification, or use the reported information for decision making.

In some instance, there are stakeholders who are not users, notably ENGOs² (as representatives of the public) who do not use the MRV System (beyond consuming the Reported information), but are deeply concerned with, and advocate for, ambitious actions and transparent reporting.

² ENGO: Environmental Non-Government Organisation

2.9 Managing an MRV System

The MRV System should draw as much as possible on MRV Frameworks, identified standards and methodologies. The literature on MRV is extensive, and most MRV needs have been identified previously. There is no need to re-invent the wheel!

Most MRV Frameworks provide guidance on what can or should be done beyond the minimum. For example, the IPCC Guidelines discuss Tier 1, 2 and 3 data and that a goal should be to improve accuracy and coverage over time. The national government may choose to move to higher accuracy data in key sectors to demonstrate improvement and facilitate better understanding of the impacts from a range of interventions.

The MRV System should be assumed to evolve and improve over time. It is legitimate to have a simple and limited scope MRV System initially, provided an approach of continuous improvement is incorporated.