



Measurement, Reporting and Verification (MRV)

A Tool for Monitoring Climate Change Mitigation Initiatives



Climate Change Secretariat
Ministry of Mahaweli Development and Environment

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Empowered lives. Resilient nations.

The term MRV first appeared in the context of climate change mitigation policy as part of the Bali Action Plan (2007), which called for “measurable, reportable, and verifiable nationally appropriate mitigation commitments or actions” and stated that they should be “supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner” (UNFCCC 2007). Subsequently, efforts have been made to fill in the details and define what should be measured, reported, and verified, how, by whom, and for what purpose.

Most recently, under the Paris Agreement, it was agreed that all countries will provide emissions data and track progress against their contributions. MRV systems will be a significant component in effectively tracking and improving the implementation of mitigation goals and policies articulated under countries’ Nationally Determined Contributions (NDCs).

This booklet brings together existing knowledge to provide an introductory guide to MRV related to mitigation efforts, with the aim of clearly distinguishing among different types of MRV and enhancing readers’ understanding of the concept of MRV. It seeks to inform a range of groups, including representatives of government, Non-Government, Business Community, Civil Society, Academia, Media and General public who do not have prior knowledge of the concept and are interested in learning about the basics of MRV.

What is MRV?

MRV stands for Measurement, Reporting and Verification.

M (Measurement)	Collecting and compiling information on the progress of implementation and impact of mitigation actions.
R (Reporting)	Submitting the measured information in a defined and transparent manner to the appropriate authorities.
V (Verification)	Assessing the information that is reported for completeness, consistency and reliability.

Benefits of MRV

- Assesses greenhouse gas emission reductions and sustainable development benefits.
- Enables regular evaluation of a country's progress towards achieving the objectives of the Nationally Appropriate Mitigation Action (NAMA) on the basis of predefined indicators.
- Assists countries in setting indicators to monitor transformational change in the direction of low GHG growth pathways.
- Enables monitoring of the implementation and effectiveness of mitigation actions, facilitates access to international finance, and tracks progress in delinking economic growth from GHG emissions
- Enables countries to track their progress in moving to a low-emission development path and in achieving sustainable development goals
- Serves as a GHG accounting tool to achieve Nationally Determined Contributions (NDCs) target.

International MRV obligations /Key Milestones of the MRV

The term MRV was introduced for the first time in the Bali Action Plan to the Climate negotiation desk. The Bali Action Plan stated that the enhanced action on mitigation is to include "nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner".

Following the Bali Action Plan COP 16, COP 17 and COP 19 made the important decisions on MRV.

The historic Paris Agreement signed in December 2015 and entered into force in November 2016 established universal and harmonized measurement, reporting, and verification (MRV) provisions for climate

change mitigation for effectively implementing the Nationally Determined Contributions (NDCs).

Types of MRV

MRV of GHG emissions: conducted at national, organizational, and/or facility level to understand an entity's emissions profile and report it in the form of an emissions inventory.

MRV of mitigation actions: (e.g.: policies and projects) to assess their GHG effects and sustainable development (non-GHG) effects, as well as to monitor their implementation. This type of MRV focuses on estimating the change in GHG emissions or other non-GHG variables.

MRV of support: (e.g.: climate finance, technology transfer and capacity building) to track provision and receipt of climate support, monitor results achieved, and assess impact.

Major elements of MRV Framework of Developing Countries

- MRV of national efforts: GHG inventory and information on the efforts made to mitigate GHG emissions by the country
- MRV of NAMAs: specific mitigation actions in the context of sustainable development identified and implemented by countries

What is MRV of NAMA?

The MRV of NAMA will be conducted for the individual NAMAs and will be conducted at the country level. This supports the National MRV system. It also provides the necessary information on NAMAs needed by countries to prepare their Biennial Updated Reports (BURs¹). Further, domestically and internationally supported NAMAs need to conduct the MRV.

¹ BURs are reports to be submitted by non-Annex I Parties, containing updates of national Greenhouse Gas (GHG) inventories, including a national inventory report and information on mitigation actions, needs and support received. Such reports 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.

The MRV protocols, mechanisms and Institutional mechanism need to be established by the country, based on the general guidance developed by the COP (UNFCCC, 2013b)

MRV of NAMA – Measurement

It is observed that sometimes the word Monitoring is used interchangeably with measurement. Measurement is more appropriate in MRV of NAMA while Monitoring can be used in National MRV because measurement is measuring data to monitor a situation. Measurement is an operational function while monitoring is a management function.

NAMA measurement implementation plan should answer the following questions.

- What to measure? - Measurement parameters
- How to measure? - Measurement methodology
- When to measure? - How frequently or at particular time
- Who should measure? - Responsible person for measurement

MRV of NAMA - Reporting

This is the process of reporting measured results. It can happen in a few stages and needs to define clear responsibilities of the persons involved in reporting. Similar to measuring, reporting implementation plan should also provide answers to the following questions;

- What to report?
- How to report?
- When to report?
- Who should report to whom?

MRV of NAMA – Verification

Different organizations or personnel will be assigned to verify information at different stages of MRV framework, ensuring transparency, completeness, consistency, comparability and accuracy. All qualitative and quantitative information reported should be verified.

Main Characteristics of MRV Framework

- 1. Transparent:** the MRV framework is based on generally accepted standards and methodologies such as those developed for the Clean Development Mechanism (CDM), the Greenhouse Gas Protocol and the International Organization for Standardization (ISO 14064). All calculation formulae are clearly presented, as are any assumptions made and default factors used, and the sources for these are provided.
- 2. Accurate:** the use of generally accepted standards and methodologies, and in particular those developed for the CDM wherever possible, which emphasizes accuracy of reported results, ensures that the tool leads to reporting as accurate results as possible.
- 3. Conservative:** any assumptions and default values presented will tend to under report emission reductions, thereby ensuring that any results are conservative.
- 4. Workable and cost effective:** the MRV framework takes into consideration the realities of collecting data “in the field”. This is reflected in the simplicity of some of the methodologies proposed.
- 5. User-friendly:** again, the emphasis on simplicity of the methodologies proposed aims to ensure that they can be quickly adopted by a wide variety of different experts. The use of Excel based templates and the standardization of methodologies wherever possible, ensure that the MRV framework is both user-friendly and workable.

A Case Study: MRV of Biogas Digester Programme

Biogas is a combustible gaseous fuel that is collected from the microbial degradation of organic matter in anaerobic conditions. Biogas is basically a mixture of methane (CH_4) and carbon dioxide (CO_2) along with a few other traces of gases. Biogas can be collected from landfills, covered lagoons, or enclosed tanks called anaerobic digesters.

Methane is a greenhouse gas which has a Global Warming Potential (GWP) of nearly 24 times that of CO_2 . When organic matter is made to digest within an enclosed digester, biogas is collected inside, and can be used as a source of energy replacing other types of fossil fuels for cooking, heating, steam production, electricity generation, vehicular fuel, and as a pipeline gas. However, in case of improper waste management practices, like open dumping of organic waste/matters, it leads to generation and release of methane to the environment which is a very harmful situation. Thus, biogas technology can be used to reduce the high GWP methane emission from waste to the atmosphere. It also provides several co-benefits related to health, economic and the environment. The benefits include alternative resources like organic fertilizer production, improved waste management practices, etc. Biogas Technology has been considered as one of GHG mitigation initiative under "NAMA Project²" and the project facilitates installation of 1000 biogas digesters with part-finance support.

Example: Proposed MRV system with measurement parameters for pilot installation of Bio digesters (domestic)

	Measure	Report	Verify
<p>What to</p> <p>Emission reduction through one or more of the following measurements as appropriate:</p> <ol style="list-style-type: none"> 1. Volume of biogas generated/CH4 generated. 2. Mass of the nonrenewable fuel utilized in absence of the Bio digester (one time). 3. Mass of the nonrenewable fuel utilized in addition to the bio gas (if used). 4. Digester volume. 5. Utility bills for non-renewable fuels. 6. Emission factor, heating value of fuel, Gas composition. 	<p>Emission reduction through one or more of the following measurements as appropriate:</p> <ol style="list-style-type: none"> 1. Volume of biogas generated/CH4 generated. 2. Mass of the nonrenewable fuel utilized in absence of the Bio digester (one time). 3. Mass of the nonrenewable fuel utilized in addition to the bio gas (if used). 4. Digester volume. 5. Utility bills for non-renewable fuels. 6. Emission factor, heating value of fuel, Gas composition. 	<ul style="list-style-type: none"> • Description of NAMA activity • Assumptions and methodologies • Total CH4 generated and then emission reduction • Non-renewable fuel usage 	<p>Emission Reduction</p>
<p>How to</p> <ol style="list-style-type: none"> 1. Volume of biogas generated/CH4 generated – Gas flow meter (if possible; has practical difficulties). 2. Mass of the nonrenewable fuel utilized in absence of the Bio digester (one time) – Discuss with the owner and then estimate(kg). 3. Mass of the nonrenewable fuel utilized in addition to the bio gas – Discuss with the owner and then estimate(kg). 4. Digester volume – measuring physical dimensions / previously recorded information. 5. Utility bills for non-renewable fuels. 6. Emission factor, heating value of fuel, Gas composition – default values. <p>Note : Activity data also can be used.</p>		<p>Through reports/ Log books and Data Management System or Web based reporting system</p>	<p>HOD of DPAH/Dept of local government through previous records, random checks, with other related documents (license , Subsidies loans etc),No of animals. Waste available.</p>

Who should	Measure	Report	Verify
	LDIs, Technical officers /Field officers (Trained personnel)	Field officers / LDIs and Provincial Council MRV Manager at level 1 SEA MRV Leader at level 2	SEA MRV Leader/CCS NAMA Director
When	Quarterly	Every six months by PC MRV Manager ; Annually by SEA	Every six months by designated officer of PC Annually by SEA

Details of Measurement Methods for MRV of Biogas digesters

No	Measurement parameter	Method of measurement/ Instruments use
01	Location & address	Take GPS coordinates with the mobile phone/Tabloid given
02	Digester volume	Visual inspection and previously recorded information
03	Type of animals & number	Head count (Use for estimating the daily feed to the digester)
04	Amount of CH ₄ generated & utilized	<ol style="list-style-type: none"> 1. Functionality of the digester; Compute using default factors 2. Type of feedstock 3. Daily feed (Estimate using Number of animals and other default factors) 4. Direct measurement by gas flow meter (in domestic level there are practical difficulties)

² NAMA Project: Appropriate Mitigation Actions in the Energy Generation and End Use Sectors in Sri Lanka

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