

Terms of Reference (TOR)

Development of a Measurement, Reporting and Verification (MRV) System with Mobile Data Uploading Facility for the Waste and Energy Sectors

1. Background

The Paris Agreement was adopted at the 21st session of the Conference of Parties (COP21) to the United Nations Framework Convention on Climate Change in 2015 and entered into force on 4th November 2016. It requires all Parties to prepare, communicate, and maintain nationally determined commitments through the submission of Nationally Determined Contributions (NDCs), Biennial Transparency Reports (BTRs), and National Communications (NCs).

As a Party to the Paris Agreement, Sri Lanka has fulfilled these obligations by submitting its Third National Communication (2022), its First Biennial Transparency Report (BTR1) in December 2024, and its latest Nationally Determined Contributions (NDC 3.0) in 2025, in accordance with UNFCCC guidelines.

The Ministry of Environment, as the national focal point to the UNFCCC, is responsible for establishing national Measurement, Reporting, and Verification (MRV) systems across priority sectors aligning with Enhanced Transparency Framework (ETF) of the Paris Agreement (Article 13). The Energy and Waste sectors are two key contributors to national Greenhouse Gas (GHG) emissions and play a critical role in mitigation actions, including energy transition, waste management and circular economy initiatives etc.

Article 13 of the Paris Agreement establishes the Enhanced Transparency Framework (ETF), which requires each Party to develop robust MRV systems to ensure transparency, consistency, comparability, and accuracy of climate reporting.

Sri Lanka has already developed a MRV system for the Agriculture, Forestry and Other Land Use (AFOLU) sector, while strengthening the national needs.

To further strengthen national transparency requirements, the existing MRV system requires enhancement to incorporate sector-specific modules for the Energy and Waste sectors including the integration of mobile-based data collection and uploading functionalities, as well as improved data validation, reporting, and tracking of NDC implementation.

Accordingly, the Ministry of Environment seeks the services of a qualified IT consultancy firm or team to design, develop and operationalize a web-based MRV system, complemented by mobile application support for the Energy and Waste sectors. The system shall be aligned with methodologies of the Intergovernmental Panel on Climate Change and reporting requirements of the UNFCCC including Modalities Procedures and Guidelines (MPGs) for BTR reporting.

2. Objectives

2.1 Overall Objective

To strengthen Sri Lanka's national Transparency Framework for the Waste and Energy sectors by developing a robust, secure, scalable, and user-friendly web-based MRV platform with mobile data uploading facilities, enabling transparent, accurate, and timely reporting under the Enhanced Transparency Framework of the Paris Agreement.

2.2 Specific Objectives

- To enhance the collection, management, validation, storage, and archiving of GHG emissions and activity data for the Waste and Energy sectors.
- To support the preparation of national GHG inventories in accordance with the 2006 IPCC Guidelines and the 2019 Refinement.
- To enable tracking of mitigation and adaptation actions relevant to the Waste and Energy sectors under Sri Lanka's NDCs.
- To generate sector-specific reports compatible with Biennial Transparency Reports (BTRs), National Inventory Reports (NIRs), UNFCCC Common Reporting Tables (CRTs), Common Tabular Formats (CTFs), and national planning requirements.
- To improve institutional coordination through real-time dashboards, analytics and mobile-based data submission.
- To improve transparency, consistency, and accessibility of sectoral climate data through integrated digital systems.

3. Scope of Work

The selected IT consultancy firm/team shall be responsible for the complete lifecycle of the MRV system development and maintenance, including but not limited to the following tasks.

3.1 Requirement Gathering and Analysis

- Require a review of existing databases, applications, spreadsheets, data collection procedures, and reporting workflows. Produce a data-gap assessment and a system integration plan.
- Conduct detailed consultations with the Climate Change Secretariat, Ministry of Environment, relevant sectoral institutions related to energy and waste management and national experts.
- Identify sector-specific data requirements, reporting workflows, institutional roles, responsibilities, and existing data gaps.
- Review existing MRV systems, databases, and institutional arrangements relevant to the Energy and Waste sectors.
- Map inter-operability requirements with existing national databases and systems.

3.2 System Design and Architecture

- Design a scalable, secure, modular, and interoperable system architecture aligned with national MRV frameworks and international standards following MPGs of 18/CMA.1 and 5/CMA.3 of ETF of the Paris Agreement (Article 13).
- Develop dedicated MRV modules for the Energy and Waste sectors.
- Ensure flexibility to accommodate future institutional or methodological changes.
- Ensure compatibility with future integration to other sectors.
- Designing and architecture developing should be in the consultative process of relevant stakeholders of energy and waste sectors.

3.3 Software Development and Testing

- Develop a react- responsive web-based admin dashboard with analytical tools, and reporting tools.
- Customize and extend existing source code and databases where applicable.
- Develop functionalities to support multiple user categories, including Super Admin, Admin, Reviewer/Validator, and Data Providers. (Define role-based permissions and the workflow for data entry, submission, review, correction, validation, and approval.)
- Facilitate streamlined data entry and submission processes.
- Conduct unit testing, system testing and iterative refinements.
- Coordinate closely with national experts and CCS technical staff during development and testing.
- Ensure the system is compatible with standard web browsers and mobile devices.

3.4 Greenhouse Gas Inventory Preparation

- Enable collection, storage and estimation of GHG emissions using IPCC Tier 1 and Tier 2 methodologies where applicable.
- Automate emission calculations using IPCC worksheets, default emission factors or country specific emission factors, CRTs, etc.
- Develop functionalities to define, revise, update, and archive emission factors.
- Support reporting formats required for National Inventory Reports (NIRs), Biennial Transparency Reports (BTRs), and other UNFCCC submissions.
- Ensure traceability and documentation of assumptions, methodologies, and calculation procedures.
- Ensure deriving of CRTs for reporting purposes of UNFCCC.

3.5 NDC Tracking

- Develop system functionalities to track and monitor to progress of mitigation and adaptation actions in the Waste and Energy sectors under Sri Lanka's NDCs.
- Allow linkage of actions to indicators, baselines, targets and timelines.
- Generate progress reports aligned with ETF requirements and projections and future demands.
- Allow tracking of sectoral mitigation measures and policy interventions.
- Ensure deriving of CTFs for reporting purposes of UNFCCC.

3.6 Support Needed and Received

- Develop a system to upload supports (finance, Technology development and transfer, and capacity building) needed and received.
- Ensure deriving of CTFs for reporting purposes of UNFCCC.

3.7 Mobile Data Uploading Facility and Integration

- Develop an Android-based mobile application and/or mobile-responsive uploading interface to facilitate field-level and institutional data uploading.
- Clearly define the scope and operational boundaries of the mobile application during the inception phase.
- Include functionalities such as:
 - Data uploading using standardized templates and formats in accordance with IPCC, UNFCCC, MPGs.
 - Online and offline data entry capabilities where feasible
 - Automated validation at the point of data entry
 - Uploading of supporting documents, photographs, and records where applicable
 - User authentication and secure data transfer

3.8 QA/QC, Data Verification and Validation.

- Implement Quality Assurance/Quality Control (QA/QC) procedures aligned with IPCC guidelines.
- Develop automated validation rules to ensure accuracy, completeness, consistency.
- Provide interfaces for reviewers and validators to approve, reject, or request revisions to submissions.
- Generate alerts and notifications for anomalies, inconsistencies.

3.9 Reporting and Visualization

- Develop interactive dashboards for data analysis, visualization, and monitoring.
- Ensure dashboard layouts and functionalities are aligned, where applicable.
- Enable customizable report generation for different stakeholders.
- Generate compliance reports aligned with IPCC and UNFCCC reporting requirements.
- Facilitate export of reports and datasets in commonly used formats.

3.10 Security and User Management

- Implement role-based access control with multiple user levels and permissions.
- Ensure secure authentication, encryption, backup, and storage of data.
- Develop data protection and cybersecurity measures in accordance with government standards.
- Develop user guidelines relating to system security and data protection.

3.11 Training and Capacity Building

- Separate training programmes for data providers, reviewers, administrators, and technical staff
- Conduct structured training and capacity-building programmes for system users, administrators, reviewers, and technical staff.
- Provide ongoing hands-on training and technical guidance in parallel with system development to ensure user familiarity during the implementation process.
- Conduct at least two training sessions during the system development phase and one comprehensive training session after completion and full operationalization of the system.
- Provide hands-on training during User Acceptance Testing (UAT).
- Develop and provide user manuals, training materials, operational guidelines, and video tutorials where appropriate.

3.12 Technical Support and Maintenance

- Provide technical support and system maintenance throughout the contract period and for a minimum of three (03) years after successful commissioning of the system.
- Provide support for software updates, bug fixes and system enhancements.

3.13 Ownership and Handover

- Hand over the complete source code, databases, system architecture documentation, technical manuals, and access credentials.
- Ensure that the Ministry of Environment retains full ownership and intellectual property rights of all software, databases, documentation, and associated outputs developed under this assignment.
- Provide sufficient technical documentation to enable future system upgrades.

4. Duration of the Consultancy

The duration of the consultancy shall be 180 calendar days from the date of signing the contract.

5. Deliverables and Payment Schedule

The consultancy firm/team shall submit the following key deliverables:

- Inception Report including work plan, methodology, and requirement analysis
- Revised Inspection Report after the Inspection workshop
- Draft MRV framework
- System Design and Architecture Documents
- Functional Web-based Waste and Energy sectors MRV System
- Mobile Data Uploading Facility/Application
- Configured GHG inventory calculation modules
- NDC tracking and reporting modules
- QA/QC verification and validation modules
- User manuals, operational guidelines, and training materials
- Hands-on training and capacity-building programmes
- Successful completion of User Acceptance Testing (UAT)

- Finalized and fully operational MRV system
- Final technical report and handover package including source code and documentation
- Maintenance and technical support plan

6. Facilities Provided by the Ministry of Environment

The Ministry of Environment shall provide:

- Technical guidance and coordination support
- Standardized templates and reporting formats
- Facilitation of coordination with relevant institutions and data providers
- Existing reference materials and relevant documentation
- Web hosting infrastructure and related access where applicable

7. Reporting and Coordination

The consultancy firm and team shall work under the overall supervision of the Climate Change Secretariat (CCS), Ministry of Environment, and shall coordinate closely with relevant government institutions, sector experts, data providers, and relevant stakeholders.

Regular progress review meetings and reporting mechanisms shall be established during the consultancy period by the Ministry of Environment.

08.Deliverables for the MRV system and Payment

Payments shall be done based on the deliverables as follows.

Sq. No	Deliverables	Time Frame	Payment Instalment
1	a. Submission of project inception report with the work plan b. Submission of infrastructure and system requirement specification document. c. Submission of a system prototype and flow diagram	Within 01 month from the date of Contract signed	20%

2.	a. Functional specifications related to data collection, uploading via mobile application, validation, report generation according to UNFCCC requirements and archiving with soft copies. b. 1st stakeholder consultation and capacity building for relevant stakeholders. c. Present to the National Expert Committee on Climate Change Mitigation.	Within 02 months from the date of Contract signed	20%
3.	a.3 Capacity Buildings, Trainings for Stakeholders on MRV System. b. Submission of Draft user manual/training materials for GHG inventory software, database and the mobile application for approval.	Within 04 months from the date of Contract signed	20%
4.	a. On successfully handing over the printed comprehensive training materials with soft copies b. Other related documents and softcopies requested by the Client. (All source code used in this project including, user name / passwords and other relevant information of web hosting (if any) c.5th Capacity Buildings, Trainings for Stakeholders on MRV System. d. A test run of the system together with all the relevant stakeholders.	Within 05 months from the date of Contract signed	20%
5.	a. 10 Hands on training sessions of the MRV system (Generate CRTS, CTFs for GHG Inventories NDC tracking FTC) b. Present the final MRV system to the National Expert Committee on Climate Change Mitigation c. On successfully implement/release of the MRV system including the mobile uploading facility finalized through stakeholder validation. d. Conduct a User Acceptance Testing (UAT) for unconditional UAT sign-off, release of the MRV system confirming quality assurance	Within 06 months from the date of Contract signed	20%