Government of Nepal
Ministry of Forests and Environment

# NATIONAL MRV FRAMEWORK

## Tracking and Communicating Climate Action Transparently

MEASUREMENT | REPORTING | VERIFICATION

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## Tracking and Communicating Climate Action Transparently

Government of Nepal
Ministry of Forests and Environment
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**Ministry of Forests and Environment (MoFE), Government of Nepal**

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# Foreword

Nepal stands at a crucial stage in its climate journey. As a country facing multiple impacts of climate change, our commitments under the Paris Agreement are not only international obligations but also vital pathways to safeguarding our people, ecosystems, and economy. Transparency lies at the heart of effective climate action, and the establishment of a robust national Measurement, Reporting, and Verification (MRV) system is indispensable in this regard.

This report, prepared under the Capacity Building Initiative for Transparency (CBIT) Project, presents a strategic framework for operationalizing Nepal's MRV system in line with the Enhanced Transparency Framework (ETF) of the Paris Agreement. Envisioned as a cornerstone of Nepal's climate governance architecture, the MRV system will strengthen institutional coordination, enhance accountability, and enable greater access to international climate finance. As Chair of the Project Steering Committee, I take immense pride in presenting this National MRV Framework, which provides the institutional arrangements and guidance necessary for sectoral ministries to prepare the Greenhouse Gas (GHG) emission inventory, track progress on NDC implementation, and communicate adaptation and support actions.

As Nepal advances in implementing its Nationally Determined Contributions (NDCs), National Adaptation Plan (NAP), and Long-Term Strategy (LTS) for Net Zero Emissions, the MRV system will serve as the backbone of evidence-based policymaking and credible international reporting. Its development reflects our collective commitment to transparency, inclusiveness, and sustainability. I extend my sincere appreciation to all stakeholders who contributed to this important work and encourage continued collaboration to ensure that this framework is translated into effective action at all levels of governance.

I would also like to express my deep gratitude to the Climate Change Management Division and the CBIT Project team for their extraordinary leadership and technical expertise in laying the foundation for climate transparency in Nepal. Equally, I acknowledge the valuable support of federal and provincial ministries, experts from the UNFCCC, and our national and international partners, whose contributions have been crucial in strengthening Nepal's efforts to track and communicate climate action transparently.

**Rajendra Prasad Mishra, PhD**
Secretary
Ministry of Forests and Environment

# Acknowledgement

The institutionalization of a National MRV Framework marks an important step forward in Nepal's climate governance. This document provides a comprehensive framework that not only addresses our international reporting obligations under the Enhanced Transparency Framework (ETF) but also strengthens domestic systems for data management, coordination, and accountability.

By integrating greenhouse gas inventories, adaptation monitoring, and climate finance tracking, the MRV system will generate reliable and verifiable information to support national planning and international reporting. Equally important, it will enable Nepal to demonstrate results, enhance credibility with development partners, and mobilize the financial and technical resources necessary to accelerate climate action.

The Ministry of Forests and Environment, through its Climate Change Management Division, remains committed to leading and coordinating this effort in collaboration with sectoral ministries, provincial and local governments, and other partners. While the challenges are significant, this framework offers a clear roadmap that emphasizes inclusiveness, transparency, and capacity development.

I extend my gratitude to the Secretary of the Ministry of Forests and Environment for his support and guidance throughout this process. I sincerely acknowledge the support from my division, our sectoral ministries at the federal and provincial levels, the National Statistics Office (NSO), and members of the technical working group. We are grateful for the expert guidance received from UNFCCC and CBIT-GSP, which helped to strengthen this framework. A special thanks to GEF for its financial support through the WWF Nepal CBIT project. I acknowledge the technical role played by the technical and editorial team members for their collaborative effort and contribution in finalizing this document. While I may not be able to mention each agency or person engaged in this process, I extend my appreciation to all the individuals and institutions for their contributions.

I encourage all stakeholders to actively engage in the implementation process, recognizing that the MRV system is not merely a reporting tool but a strategic instrument to drive transformative climate action in Nepal.

**Maheshwar Dhakal, PhD**
Joint Secretary
Climate Change Management Division
Ministry of Forests and Environment

# Executive Summary

Nepal, as a signatory to the UNFCCC and the Paris Agreement, is progressing toward fulfilling its climate commitments by developing a clear and transparent Measurement, Reporting, and Verification (MRV) system. This document presents a strategic framework for institutionalizing a national MRV system aligned with the Enhanced Transparency Framework (ETF) under Article 13 of the Paris Agreement. The MRV system is critical not only for tracking progress toward Nepal's climate goals but also for enabling access to international climate finance and supporting evidence-based policymaking.

Considering Nepal's vulnerability to climate change and its commitment to low-emission, climate-resilient development, a comprehensive MRV system is essential for monitoring progress on Nationally Determined Contributions (NDCs), the National Adaptation Plan (NAP), and the Long-term Strategy (LTS) for Net-zero Emissions. Despite efforts across key sectors (energy, industry, agriculture, forestry, and waste), existing data systems remain fragmented, institutional roles are poorly defined, and inter-sectoral coordination is limited. Therefore, a well-defined MRV system is vital for national compliance, efficient reporting, and international climate finance mobilization.

## Legal and Institutional Foundations

The legal and constitutional framework of Nepal provides a strong foundation for the implementation of Measurement, Reporting, and Verification (MRV) activities. The Constitution of Nepal (2015) explicitly recognizes the State's responsibility to comply with international treaties and agreements to which Nepal is a party. This provision establishes a constitutional mandate for the integration of international commitments, including climate-related transparency mechanisms, into national policies and actions. Nepal is a signatory and ratifying Party to the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC). Article 13 of the Paris Agreement establishes the Enhanced Transparency Framework (ETF), which requires all Parties to submit information on greenhouse gas emissions and progress on nationally determined contributions (NDCs), including support received and provided.

In alignment with the constitutional requirement to implement international obligations, and as a Party to the Paris Agreement, Nepal is legally obliged to fulfill the reporting and transparency requirements outlined under the ETF. This obligation provides the legal and institutional basis for the development, operationalization, and institutionalization of MRV systems across sectors and levels of government.

The Environment Protection Act (2019) and its Rules (2020) have general provisions for data collection and reporting, national climate report preparation, and dissemination. The National Climate Change Policy (2019) acknowledges the need for a national MRV system and mandates MoFE to lead reporting efforts.

## MRV Architecture and Stakeholder Roles

To ensure an effective, coordinated, and sustainable Measurement, Reporting, and Verification (MRV) system aligned with the Enhanced Transparency Framework (ETF) under the Paris Agreement. Based on the views and suggestions from sectoral ministries and stakeholders, this framework document has envisioned the Ministry of Forests and Environment (MoFE) as the National Entity (NE) for Nepal's MRV system, with the Climate Change Management Division (CCMD) designated as the national coordinating body. A dedicated MRV Unit under the CCMD functions as the secretariat, coordinating with federal ministries, provincial and local governments, sectoral agencies, and technical working groups. The Unit's responsibility mostly covers GHG inventory preparation, adaptation, and climate finance tracking, international reporting (including BTRs and NDCs), QA/QC processes, and institutional capacity building. Currently, the emission measurement section in the division deals with data related to the GHG as well as other components of the

reporting requirements under BTR. For the short term, the same unit serves the coordinating role, whereas in the long run, a designated MRV unit is to be established.

The Environment Protection and Climate Change Management National Council (EPCCMNC) shall provide policy oversight, whereas the Inter-Ministerial Climate Change Coordination Committee (IMCCCC) serves as the MRV Steering Committee. Sectoral ministries in key emission areas (energy, IPPU, AFOLU, waste) shall appoint focal points for data management. Provincial and local governments shall act as data providers through platforms such as the Provincial Climate Change Coordination Committees (PCCCCs).

Stakeholder participation from the private sector, academia, and civil society shall be encouraged for data sharing and community engagement. A centralized digital MRV platform and standardized templates shall support effective data flows and coordination across all levels.

## MRV Components

Nepal's MRV system tracks greenhouse gas (GHG) emissions using IPCC guidelines, applying Tier 1 to Tier 3 methodologies and tools such as the IPCC Inventory Software and the NDC Tracking Tool. Emissions estimates are derived from sectoral activity data collected across federal, provincial, and local levels and consolidated into a national GHG inventory.

Adaptation monitoring is guided by indicators identified in the National Adaptation Plan (NAP). Key mechanisms include Local Adaptation Plans for Action (LAPAs), community-based reporting systems, and the Climate Change Data Management and Reporting Center, which collectively ensure inclusive and effective adaptation tracking.

Climate finance monitoring captures both public and private climate-related expenditures using tools such as the Climate Change Budget Code (CCBC), Climate Change Financing Framework (CCFF), and the Medium-Term Expenditure Framework (MTEF). It also includes data on technology transfer and capacity-building activities, supporting enhanced transparency and evidence-based decision-making.

## Data Systems and Verification

The MRV system shall be supported by robust and integrated data systems. This includes standardized data collection and reporting protocols, alignment with national Management Information Systems (MIS), and a secure, role-based, centralized database. Quality assurance and quality control (QA/QC) procedures, including internal reviews, third-party verification, and cross-sectoral audits, shall be implemented to ensure data accuracy and credibility. Structured and timely data flows from municipalities to provincial authorities, and the national MRV Unit is essential to maintain consistency, completeness, and transparency across all levels.

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# Abbreviations

| | |
|---|---|
| AEPC | Alternative Energy Promotion Centre |
| AFOLU | Agriculture, Forestry, and Other Land Use |
| AKC | Agriculture Knowledge Centre |
| BTR | Biennial Transparency Report |
| CBIT | Capacity Building Initiatives for Transparency |
| CBO | Community Based Organization |
| CCBC | Climate Change Budget Code |
| CCDMMRC | Climate Change Data Management, Monitoring, and Reporting Center |
| CCFF | Climate Change Financing Framework |
| CCMD | Climate Change Management Division |
| CNI | Confederation of Nepalese Industries |
| CSO | Civil Society Organization |
| DHS | Department of Health Services |
| DoA | Department of Agriculture |
| DoC | Department of Custom |
| DoED | Department of Electricity Development |
| DoFSC | Department of Forests and Soil Conservation |
| DoI | Department of Industry |
| DoLMA | Department of Land Management and Archive |
| DoLS | Department of Livestock Services |
| DoS | Department of Survey |
| DoTM | Department of Transport Management |
| DRM | Disaster Risk Management |
| DSA | Data Sharing Agreement |
| DWSM | Department of Water and Sewerage Management |
| EPA | Environment Protection Act |
| EPCCMNC | Environment Protection and Climate Change Management National Council |
| EPR | Environment Protection Regulation |
| ERC | Electricity Regulatory Committee |
| ETF | Enhanced Transparency Framework |
| FNCCI | Federation of Nepalese Chambers of Commerce and Industry |
| FOLU | Forest and Other Land Use |
| FRTC | Forest Research and Training Center |
| GCF | Green Climate Fund |
| GEF | Global Environment Facility |
| GHG | Greenhouse Gas |
| IMCCCC | Inter-ministerial Climate Change Coordination Committee |
| IPCC | Intergovernmental Panel on Climate Change |
| IPPAN | Independent Power Producers Association Nepal |
| IPPU | Industrial Processes and Product Use |
| KUKL | Kathmandu Upatyaka Khanepani Limited |
| LTS | Long-Term Strategy for Net Zero Emissions |
| MoALD | Ministry of Agriculture and Livestock Development |
| MoEWRI | Ministry of Energy, Water Resources and Irrigation |

| | |
|---|---|
| MoF | Ministry of Finance |
| MoFAGA | Ministry of Foreign Affairs and General Administration |
| MoFE | Ministry of Forests and Environment |
| MoHP | Ministry of Health and Population |
| MoICS | Ministry of Industry, Commerce and Supplies |
| MoITFE | Ministry of Industry, Tourism, Forests and Environment |
| MoLMCPA | Ministry of Land Management, Cooperatives and Poverty Alleviation |
| MoWS | Ministry of Water Supply |
| MRV | Measurement, Reporting, and Verification |
| MPGs | Modalities Procedures and Guidelines |
| MTEF | Medium-Term Expenditure Framework |
| NAP | National Adaptation Plans |
| NARC | Nepal Agricultural Research Council |
| NCCP | National Climate Change Policy |
| NDC | Nationally Determined Contributions |
| NDCPI | Nationally Determined Contribution Implementation Plan |
| NEA | Nepal Electricity Authority |
| NEXT | Nationally Determined Contribution Expert Tool |
| NOC | National Oil Corporation |
| NSO | National Statistics Office |
| PCCCC | Provincial Climate Change Coordination Committee |
| QA/QC | Quality Assurance and Quality Control |
| REDD+ | Reducing Emissions from Deforestation and Forest Degradation |
| REDD IC | REDD Implementation Center |
| NE | National Entity |
| TAF | Transparency and Accountability Framework |
| UNFCCC | United Nations Framework Convention on Climate Change |
| WECS | Water and Energy Commission Secretariat |

# I Chapter

# Introduction and Context

The National MRV Framework for Nepal has been developed in compliance with the Enhanced Transparency Framework (ETF) under the Paris Agreement. It is the outcome of a comprehensive and inclusive process that reviewed Nepal's existing legal and policy frameworks, engaged in consultations across all seven provinces with sectoral ministries and diverse stakeholders, and incorporated inputs from national multistakeholder consultations, technical working group meetings, and reviews by sectoral ministries and the National Statistics Office (NSO). Serving as a guiding document, this framework provides direction for all sectoral ministries to establish dedicated MRV systems, strengthen their data management capacities, and ensure that the information generated effectively contributes to Nepal's Biennial Transparency Reports (BTR), National Communications, and Nationally Determined Contributions (NDCs).

## 1.1 Background and Rationale for MRV

The United Nations Framework Convention on Climate Change (UNFCCC), adopted in 1992 and entered into force in 1994, provides the foundational international legal framework for collective action to address climate change. Its objective is to stabilize greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. While the Convention itself is non-binding in terms of emission reduction obligations, it has facilitated the development of subsequent legally binding instruments, most notably the Kyoto Protocol and the Paris Agreement.

The Kyoto Protocol, adopted in 1997 and entered into force in 2005, established binding emission reduction commitments for developed country Parties (Annex I). However, the importance of a robust reporting and review framework was underscored through the Protocol's mechanisms and further emphasized in the 2007 Bali Action Plan, which called for enhanced transparency in both mitigation actions and support mechanisms. The Copenhagen Accord (2009) introduced the concept of differentiated measurement, reporting, and verification (MRV) processes, namely, International Assessment and Review (IAR) for developed countries and International Consultation and Analysis (ICA) for developing countries. A significant advancement in transparency was achieved through the Paris Agreement (2015), which introduced the Enhanced Transparency Framework (ETF) under Article 13. This framework obliges all Parties, including Nepal, to regularly submit Biennial Transparency Reports (BTRs), covering GHG inventories, mitigation actions, adaptation measures, and support received and provided. The ETF aims to build mutual trust and promote effective implementation of climate commitments by ensuring that climate-related information is transparent, accurate, complete, comparable, and consistent, while avoiding double-counting.

In alignment with its international obligations and national priorities, Nepal has demonstrated a strong commitment to global climate action under the UNFCCC and the Paris Agreement. As the country transitions towards a climate-resilient and low-emission development pathway, the establishment of a comprehensive and functional MRV system has become both a strategic necessity and an operational imperative. An effective MRV system is critical for tracking progress toward the Nationally Determined Contributions (NDCs), evaluating the effectiveness of climate policies and measures, ensuring the transparency of climate finance flows, and fulfilling reporting requirements under the UNFCCC (Figure 1). Additionally, such a system strengthens the basis for evidence-informed policymaking, enhances coordination across sectors and governance levels, and builds institutional credibility with development partners.

Nepal's climate actions span multiple sectors, including energy, industry, agriculture, forestry, and waste management. However, existing monitoring systems remain fragmented, institutional roles and mandates are not fully harmonized, and sectoral capacities for data generation and reporting are uneven. These challenges have resulted in inconsistent reporting, limited verification of emission reductions, and difficulties in consolidating climate information at the national level.

The establishment of an integrated MRV system will facilitate coherence between climate objectives and development priorities, strengthen inter-agency coordination, and support the timely and credible submission of BTRs, NDC updates, and other national communications to the UNFCCC. MRV, as a structured process for measuring, reporting, and verifying climate-related data, serves as a fundamental tool to enhance transparency, promote accountability, and ensure that Nepal's climate commitments are translated into measurable outcomes. It also enables the country to access international climate finance, foster trust through data transparency, and strengthen its position in international climate negotiations.

For the effectiveness of the MRV system, it is embedded with the core principles like inclusiveness, transparency, accountability, consistency, capacity development, and adaptability (UNFCCC, 2015).

a) **Inclusiveness:** It ensures the representation of diverse perspectives, making the MRV system responsive to the needs of all sectors. Active stakeholder engagement fosters ownership, collaboration, and broad-based support for climate initiatives.

b) **Transparency:** It builds trust and credibility by ensuring that all methodologies, data, and assumptions involved in MRV are publicly available and accessible

c) **Accountability:** It ensures all stakeholders involved in the MRV process are held responsible for their actions and outcomes, ensuring proper oversight and integrity.

d) **Consistency:** It promotes uniformity in methods and approaches used for data collection, reporting, and verification over time. This facilitates comparison across periods and sectors, enabling accurate tracking of progress toward national climate goals.

e) **Capacity Development:** It focuses on enhancing the skills and knowledge of stakeholders, such as government officials and

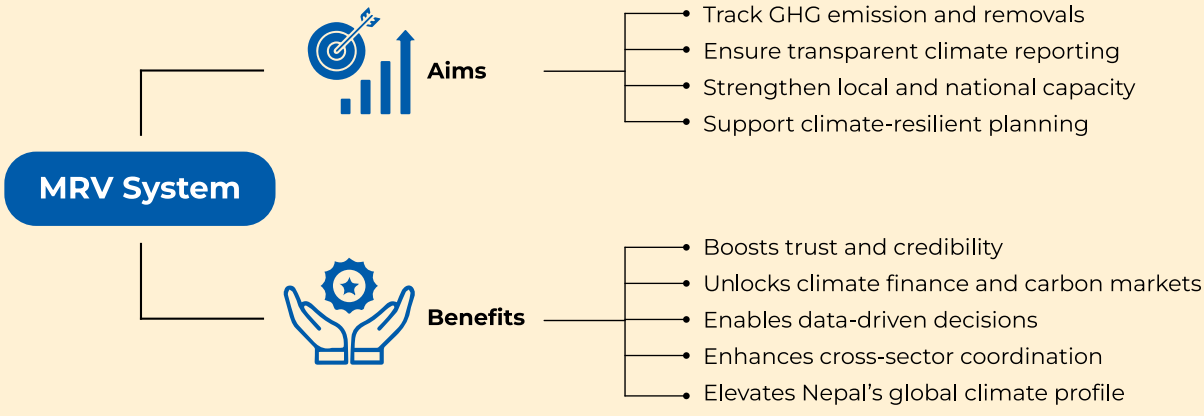


**Figure 1. Aims and benefits of the MRV system**

technical experts, ensuring their meaningful participation in the MRV process.

f) **Adaptability:** It ensures that MRV system remains relevant and effective in response to changing circumstances, including evolving climate policies, new scientific knowledge, and emerging technologies.

In this context, the development and institutionalization of a comprehensive MRV system is both a national priority and a strategic necessity. It shall enable Nepal to move from ad-hoc climate data collection toward a structured, transparent, and accountable system that supports long-term climate ambition and sustainable development.

## 1.2 Nepal's Climate Commitments

Nepal has made good progress in fulfilling its international climate change obligations and strengthening national climate governance frameworks. The country has submitted its Initial National Communication (2004), Second National Communication (2014), and Third National Communication (2021) to the United Nations Framework Convention on Climate Change (UNFCCC), providing detailed information on national greenhouse gas (GHG) emissions, climate vulnerabilities, and corresponding mitigation and adaptation measures.

In alignment with the objectives of the Paris Agreement, Nepal has submitted three iterations of its Nationally Determined Contributions (NDCs), namely: the Intended NDC in 2016, the first NDC in 2016, the Second NDC in 2020, and NDC 3.0 in 2025. These documents outline ambitious sectoral targets across energy, forestry, transport, agriculture, and waste management, reflecting Nepal's commitment to low-carbon and climate-resilient development.

Acknowledging the increasing urgency of climate adaptation, the Government of Nepal approved the National Adaptation Plan (NAP) in 2021. The NAP identifies priority adaptation actions, designates institutional responsibilities, and sets forth financing strategies to enhance national resilience. In the same year, Nepal formulated and submitted its Long-Term Strategy for Net Zero Emissions (LTS), committing to achieving net-zero carbon emissions by 2045. Most recently, Nepal finalized and formally submitted its first Biennial Transparency Report (BTR) in 2025, thereby operationalizing its commitment to the Enhanced Transparency Framework (ETF) under the Paris Agreement.

These national and international submissions illustrate Nepal's increasing ambition and leadership in the global climate regime. However, the realization of these commitments and the preservation of credibility at both national and international levels require the establishment of a robust and integrated MRV system. Such a system is essential to systematically track implementation progress, consolidate results across sectors, verify emission reductions, and support timely and accurate reporting. The development of a comprehensive MRV system is, therefore, not only a technical requirement but a strategic enabler for fulfilling Nepal's transparency obligations, enhancing access to climate finance, and ensuring accountability in the delivery of its climate commitments.

## 1.3 Importance of MRV under the Enhanced Transparency Framework

The Enhanced Transparency Framework (ETF), established under Article 13 of the Paris Agreement, represents a significant advancement in the global climate governance architecture. Its primary objectives are to build mutual trust among Parties, enhance accountability, and facilitate the tracking of progress towards the implementation and achievement of Nationally Determined Contributions (NDCs) (UNFCCC, 2021). For countries such as Nepal, the implementation of a robust and integrated Measurement, Reporting, and Verification (MRV) system is essential to fulfilling the requirements of the ETF and strengthening national climate governance.

Under the ETF, all Parties are required to regularly submit Biennial Transparency Reports, which must include comprehensive information on national GHG inventories, progress in implementing and achieving NDCs, climate adaptation actions, and support received and needed. Unlike previous reporting arrangements that differentiated between developed and developing countries, the ETF provides a unified framework, while incorporating flexibility provisions for Least Developed Countries (LDCs) and Small Island Developing States (SIDS), in recognition of their capacity constraints. The submission of the BTR report goes to an expert review exercise organized by the UNFCCC Secretariat.

In this context, the development and operationalization of a national MRV system is of strategic importance for Nepal for the following reasons:

- **Facilitating Evidence-Based Reporting**
  A national MRV system enables Nepal to systematically measure GHG emissions reductions, monitor adaptation actions, and assess the implementation status of climate policies and programs. It ensures that data reported to the UNFCCC is credible, evidence-based, and consistent with international reporting standards.

- **Enabling Timely and Coordinated Submissions**
  The MRV system supports the timely preparation of BTRs, national GHG inventories, and other communication requirements under the Paris Agreement. It facilitates data harmonization across sectors and institutions, thereby enabling Nepal to meet its reporting obligations in an efficient and coordinated manner.

- **Enhancing Access to Climate Finance**
  Transparent and verifiable data generated through the MRV system strengthens Nepal's ability to mobilize international climate finance, including results-based payments under mechanisms such as REDD+ and performance-based financing. Development partners increasingly require robust MRV systems as a prerequisite for funding support.

- **Informing Policy and Planning**
  The MRV system provides high-quality data and analytical insights that inform evidence-based policymaking, guide resource allocation, and enable progress tracking of key national strategies and plans, including the NDC, NAP, and LTS for Net Zero Emissions.

- **Demonstrating Leadership and Building Credibility**
  Through alignment with the ETF, Nepal reaffirms its commitment to transparency, accountability, and climate ambition.
  This enhances the country's credibility in international climate negotiations and strengthens collaboration with bilateral and multilateral partners.

- **Building Technical and Institutional Capacity**
  The development and implementation of the MRV system under the ETF contributes to building national technical expertise and institutional capacity. These capacities also support broader environmental governance and sustainable development objectives.

  For Nepal, the MRV system forms a foundational element of climate architecture under the ETF. Beyond ensuring compliance with international obligations, it serves as a strategic instrument to enhance domestic climate ambition, access international support, and advance the country's sustainable development goals.

# II
# Chapter

# LEGAL AND INSTITUTIONAL FOUNDATIONS

This chapter assesses the legal and institutional foundations required for the establishment of a robust, transparent, and functional MRV system in Nepal. A well-designed MRV system is essential for tracking progress, ensuring compliance, and enhancing transparency in national climate actions. Its effective implementation requires a strong legal framework and clearly defined institutional arrangements. Strengthening these foundations is critical to building trust among stakeholders, fostering inter-agency coordination, and ensuring the realization of long-term climate goals, particularly in fulfilling Nepal's international commitments under the Paris Agreement.

## 2.1 Review of Existing Legal and Policy Instruments

As a Party to the United Nations Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Agreement, Nepal is committed to developing a national MRV framework aligned with the ETF established under Article 13 of the Paris Agreement. This commitment necessitates a robust and implementable legal and institutional basis to ensure systematic and credible climate data management. This section outlines key climate-related legal and policy documents, along with relevant institutions, that have been reviewed as part of this analysis. The scope of the review includes national legal instruments such as the Constitution, acts, regulations, policies, strategies, and plans, as well as institutional mandates spanning ministries, departments, commissions, and local authorities.

### The Constitution of Nepal

The Constitution of Nepal (2015) establishes the highest legal authority guiding environmental governance and adherence to international commitments. Under Article 51(b)(3), the State is obligated to implement international treaties and agreements, thereby creating a constitutional basis for incorporating MRV obligations arising from the Paris Agreement into national legal and policy frameworks. In addition, the Constitution enshrines the principles of good governance, transparency, and accountability, values that are essential to the design and effectiveness of a national MRV system. Nepal's federal structure further enables the decentralization of climate-related functions across federal, provincial, and local governments. This multi-level governance arrangement calls for integrated MRV mechanisms that ensure coherent engagement and coordination among all levels of government. Within this constitutional context, Nepal has adopted a range of climate change and sectoral legal and policy instruments that provide a foundation for MRV development.

### Environment Protection Act (EPA), 2019, and Environment Protection Rules (EPR), 2020

The Environment Protection Act (EPA), 2019, serves as the overarching legislative framework for environmental and climate governance in Nepal. It delegates responsibilities related to pollution monitoring, environmental impact management, and climate risk assessment to various levels of government and relevant stakeholders. Certain provisions, such as those mandating pollution control reporting and periodic environmental audits, provide a basis for the MRV system. Although the act explicitly outlines the provision related to ETF, Chapter 4 of the Act includes provisions related to the formulation of adaptation plans, preparation of emissions inventories, risk mitigation measures, and carbon trading, which are the entry point to develop the ETF road map under the Paris Agreement and establish a comprehensive MRV system in place. The accompanying Environment Protection Rules (EPR), 2020, provide operational guidance for implementing the Act. The Rules outline procedures for collecting data related to climate change scenarios, conducting pollution tests, and submitting adaptation-related reports.

### National Climate Change Policy (NCCP), 2019

The National Climate Change Policy (NCCP), 2019, serves as Nepal's principal policy instrument for guiding national climate action. It recognizes the need for the development of a national MRV system and outlines commitments to enhance data management, climate finance tracking, and institutional capacity at all levels of government. The policy mandates MoFE to lead the fulfillment of Nepal's international reporting obligations, including Nationally Determined Contributions (NDCs), National Communications, Adaptation Communications, and other commitments. As BTR is also reporting an obligation for Nepal, it can be said that the policy has opened the mechanism to strengthen the national climate reporting system. It further envisions the establishment of a national coordination council, designation of focal points across federal, provincial, and local levels, and the development of a Transparency and Accountability Framework (TAF) to support coherent implementation. Through these provisions, the NCCP provides a strategic foundation for the establishment and institutionalization of an MRV system aligned with the Enhanced Transparency Framework under the Paris Agreement.

**Table 1. Major national policy documents relevant to the MRV system**

| Policy Document | Summary of Provision |
|---|---|
| Second NDC, 2020 | Commitment to the development of MRV systems to track NDC implementation across sectors. Emphasizes data collection, transparency, and accountability, but does not provide a specific operational timeline. |
| NDC Implementation Plan, 2023 | Defines MRV structures at national, sectoral, and activity levels, emphasizing the role of CCMD under MoFE and proposing indicator-based progress tracking. |
| NDC 3.0, 2025 | Aligns with the ETF under the Paris Agreement and includes a commitment to operationalize MRV systems by 2030 to support reporting obligations, including BTR and climate finance tracking. |
| NAP, 2021 | Introduces a three-tier tracking system and the creation of a Climate Change Data Management, Monitoring, and Reporting Centre. |
| Long-Term Strategy for Net-Zero Emissions, 2021 | Proposes dynamic MRV systems integrated into all sectors with five-year emissions tracking. |
| REDD+ Strategy, 2018 | Establishes a detailed MRV mechanism in the forestry sector, including roles for national and local institutions. |
| National Framework of Local Adaptation Plan for Action, 2019 | Aims to integrate climate change adaptation and disaster risk reduction into development planning at the local level. The implemented LAPAs can provide first-hand information for adaptation communication. |
| GESI and Climate Change Strategy and Action Plan, 2020 | This strategy and action plan are in line with the Paris Agreement and place special emphasis on the need to enhance capacity and build institutional foundations based on local and national needs, while promoting a gender-responsive, participatory, and transparent approach that considers vulnerable communities and environmental interests. |
| Guideline for Climate Change Management in Planning within the Forestry and Environment Sector, 2020 | Guides to improve the system of tracking climate finance by using the Climate Change Budget Code (CCBC), ensuring that climate change issues are addressed from the planning and budgeting process. This guideline also supports framing a chapter under BTR, Support received, need, and mobilization. |

### National Policy Documents Relevant to the ETF

Nepal has formulated several climate policy documents in response to its international commitments, reflecting a growing emphasis on transparency, accountability, and institutional strengthening. The Second Nationally Determined Contribution (NDC), 2020, includes a commitment to establish MRV frameworks to track progress on mitigation and adaptation targets. It emphasizes the importance of enhancing transparency and accountability mechanisms across sectors. The Third Nationally Determined Contribution (NDC 3.0) further reinforces this commitment by aligning more explicitly with the requirements of the Enhanced Transparency Framework under the Paris Agreement. It includes a defined timeline to operationalize ETF by 2030, supporting structured reporting and implementation tracking in line with global best practices.

These documents reflect a strong policy-level commitment to MRV, laying a solid foundation for its development. While the integration of these provisions into a formal legal framework would enhance enforceability, the existing climate-related and sectoral policies already provide valuable support. Key instruments such as the Forest Act, 2019, and its Rules, 2022; the Industrial Act, 2020; the Solid Waste Management Act, 2013; the Local Government Operation Act, 2017; and the Statistics Act, 2022 emphasize regular studies, data collection, and reporting. Together, these efforts significantly contribute to the establishment of a dedicated and robust MRV system in Nepal.

## 2.2 Institutional Mandates

A range of institutions are involved in climate governance and data management in Nepal. The following section shows the key institutions and their mandate.

**Table 2. Institutional mandate of selected institutions**

| Institution | Mandate |
|---|---|
| Ministry of Forests and Environment (MoFE) | The MoFE is the national focal point for the UNFCCC and plays a central role in MRV coordination. MoFE is also tasked with developing climate policies and overseeing environmental monitoring and compliance with international environmental agreements to which Nepal is a party. Within MoFE, the CCMD performs functions, among others, related to the development of GHG inventories, adaptation communications, climate finance tracking, and report submission to the UNFCCC; however, its legal designation as the national MRV authority is not formalized in law. |
| National Planning Commission (NPC) | The NPC oversees national development planning, M&E systems, and policy coherence, and plays a central role in data integration and project monitoring. While NPC is pivotal for integrating climate MRV into national development frameworks, its role in climate-specific reporting is not clearly defined. |
| Ministry of Finance (MoF) | The MoF is responsible for climate budgeting and public finance management, and tracking. It indirectly supports climate MRV through budget codes and climate expenditure tracking support received. |

| Institution | Mandate |
|---|---|
| Line Ministries | Various line ministries have sectoral responsibilities that intersect with climate MRV:<br><br>**Ministry of Energy, Water Resources and Irrigation (MoEWRI):** Collects data on water resources and energy, but is not mandated to climate MRV-specific data collection and reporting.<br><br>**Ministry of Agriculture and Livestock Development (MoALD):** Oversees agriculture and livestock development programs and projects and their reporting.<br><br>**Ministry of Industry, Commerce and Supplies (MoICS):** Manages industrial data; the Department of Industry (DoI) collects data on enterprises, and has been developing an integrated industrial data portal.<br><br>**Ministry of Water Supply (MoWS):** Maintains data on water and sanitation in the N-WASH portal, but without climate attribution or emissions tracking.<br><br>**Ministry of Federal Affairs and General Administration (MoFAGA):** Coordinates with local governments but does not have a formal mandate for climate MRV functions. However, this ministry can play a coordination role in standardizing local-level data collection and integrating emissions data into the national MRV framework.<br><br>**Ministry of Urban Development (MoUD):** Oversees urban infrastructure and municipal services.<br><br>**Ministry of Health and Population (MoHP):** Oversees public health services and medical waste management through health facilities.<br><br>**Ministry of Physical Infrastructure and Transport (MoPIT):** Manages transport data and vehicle records but does not track GHG emissions or fuel use. |
| Provincial Ministries | Provincial ministries are custodians of different datasets at the provincial level, expected to act as a bridge between the federal and local governments in climate governance and data management. While structures like the Provincial Climate Change Coordination Committees (PCCCC) exist, their specific roles in MRV are not defined, and implementation remains limited due to unclear mandates and inadequate institutional arrangements. Once legally empowered, provincial sectoral ministries are expected to play a key role in MRV by collecting, reporting, and coordinating climate-related data within their respective domains. |
| Local Governments (Municipalities) | Local governments are legally responsible for undertaking many environmental-related activities, including waste management. |

## 2.3 Strengthening the Enabling Environment for MRV in Nepal

The Government of Nepal is committed to enhancing the credibility, transparency, and effectiveness of its climate actions through the establishment of a robust MRV system. Legal and institutional analysis reveals key opportunities to strengthen existing structures in the short term while also laying the groundwork for a dedicated MRV unit to manage all transparency-related obligations in alignment with international requirements and national climate governance priorities.

### Opportunities for Strengthening MRV Implementation:

1. **Strengthening Legal Mandates**
   While Nepal has made considerable progress in climate policy development, a dedicated legal provision focused exclusively on MRV functions across mitigation, adaptation, and climate finance is yet to be established. Key legislation, such as the Environment Protection Act and other sectoral laws, can be further enhanced to clearly define responsibilities for GHG inventories, adaptation tracking, and support mobilization under the Paris Agreement.

2. **Aligning Sectoral Frameworks**
   Existing environmental and sectoral laws are primarily oriented toward pollution control, resource use, or project-level monitoring. Harmonizing these laws with international

MRV frameworks, such as the Enhanced Transparency Framework (ETF) and IPCC guidelines, will ensure that climate-specific data collection and tracking are systematically addressed and integrated across sectors.

3. **Enhancing Implementation and Compliance Mechanisms**
   Several legal instruments, including the Environment Protection Rules and the Forest Act, already provide for environmental reporting. Building on these provisions, further strengthening compliance and enforcement mechanisms will improve accountability, data accuracy, and consistency in reporting.

4. **Clarifying MRV Leadership and Mandates**
   The Ministry of Forests and Environment is currently fulfilling the role of MRV coordination under the Government of Nepal's Work Division Rules. Strengthening this role with a clear legal mandate and authority will enhance inter-ministerial collaboration and facilitate timely, accurate, and verifiable climate data reporting. The Inter-Ministerial Climate Change Coordination Committee (IMCCCC) functions as the central coordination and oversight body at the federal level to enhance coherence and effective implementation of the national MRV system.

5. **Facilitating Inter-agency Coordination**
   Sectoral ministries and agencies maintain valuable climate-relevant data; however, the absence of standardized data-sharing mechanisms limits national integration. Establishing common formats, schedules, and digital platforms will greatly support Nepal's Biennial Transparency Reports and other climate reporting obligations.

6. **Engaging Local Governments**
   Local governments hold constitutional authority for environmental management. Strengthening their roles in MRV, through legal recognition, dedicated roles, and capacity development, will support decentralized data collection and enhance the granularity and relevance of climate information.

7. **Operationalizing Provincial Coordination**
   Under Nepal's federal system, provinces act as key connectors between the federal and local levels. The existing Provincial Climate Change Coordination Committees (PCCCs) offer an institutional entry point for MRV-related coordination. Strengthening their capacity and roles will support more effective implementation of climate reporting systems.

8. **Clarifying Institutional Roles and Responsibilities**
   MRV functions are currently spread across various ministries and agencies without clear delineation, particularly in cross-sectoral areas such as waste and transport. Defining clear mandates and coordination mechanisms will enhance institutional synergy, data reliability, and overall system effectiveness.

9. **Operationalize the Transparency and Accountability Framework (TAF)**
   National Climate Change Policy, 2019 envisions the establishment of institutional mechanisms that promote multi-stakeholder participation, ensure periodic public disclosure of climate-related information, and enable accessible grievance redress systems. This will strengthen public trust, enhance data credibility, and foster inclusive climate governance.

10. **Integrating MRV into the Statistics Act**
    The Statistics Act, 2022, includes provisions to formally integrate climate-related data into the national statistical system. Climate data remains part of the National Statistics Office (NSO)-operated national data portal. Building on this, the development of data collection protocols in accordance with the international reporting requirement or MRV governing institutions will support transparency, accessibility, and compliance with national and international obligations.

# III
# Chapter

# MRV Institutional Setup and Stakeholder Roles

The chapter presents the institutional architecture necessary for implementing an effective, transparent, and coordinated MRV system in Nepal. This chapter outlines the structure of the national MRV system aligned with the ETF under the Paris Agreement and clarifies the roles and responsibilities of key stakeholders at the federal, provincial, and local levels.

## 3.1 National MRV Architecture

### 3.1.1 MoFE as National Entity

To comply with the transparency provision under the Paris Agreement, this document has been prepared by the Ministry of Forests and Environment, suggesting the national and sectoral MRV framework. The MoFE shall function as the National Entity (NE) for the overall MRV system, with the CCMD serving as the national coordinating body. A dedicated MRV Unit within the CCMD shall act as the secretariat to the MRV system, working in close collaboration with federal ministries, provincial and local governments, sectoral agencies, and thematic technical working groups to ensure consistency, quality, and transparency of data across the MRV framework.

This arrangement builds on existing institutional structures and does not necessitate the creation of new entities. The existing Emission Measurement Section within the CCMD shall be designated as the MRV Unit and will be responsible for coordinating MRV-related activities among all relevant stakeholders. However, realizing the need and sustainability point of view, a dedicated MRV unit will be established under the leadership of MoFE. The key responsibilities of the National Entity (NE) include:

- Providing oversight and regulation of MRV processes to ensure alignment with national climate actions
- Coordinating with line ministries and inter-ministerial bodies to ensure enforcement of MRV policies and regulatory compliance
- Facilitating the management of a centralized national MRV database
- Overseeing final QA/QC processes to ensure the credibility of data reported by all entities
- Ensuring that provincial governments and sectoral agencies receive the necessary technical support.

### 3.1.2 Institutional Mandate of the NE

The Ministry of Forests and Environment, as the national focal agency for UNFCCC, holds the primary responsibility for the regular submission and communication of Nepal's Nationally Determined Contributions (NDCs), Biennial Transparency Reports (BTRs), National Adaptation Plans (NAPs), and other relevant policy documents. In this context, the MRV system, which requires multi-tier coordination across various levels of government and sectors, shall be centrally facilitated by the National Entity (NE) to ensure the quality, consistency, and transparency of data flows from the local to the national level.

The NE is mandated to coordinate with sectoral line ministries for the collection and management of sector-specific data related to Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry and Other Land Use (AFOLU), and Waste, in accordance with the 2006 IPCC Guidelines. The specific mandates of the NE are outlined as follows:

- Serve as the national focal point for MRV and transparency under the UNFCCC
- Coordinate the development, implementation, and continuous improvement of Nepal's national MRV system
- Ensure compliance with international reporting obligations, including:
  - Biennial Transparency Reports (BTRs)
  - National Communications
  - National Greenhouse Gas (GHG) Inventories
  - NDC Progress Reports
  - Adaptation Communications
  - Tracking of support related to climate finance, technology transfer, and capacity building.

### 3.1.3 Core Responsibilities and Duties

National Entity responsibilities involve coordination, technical oversight, quality assurance, and international engagement. To align with the ETF under the Paris Agreement, the NE is expected to be tasked with the following key responsibilities and duties:

**(a) Policy and Institutional Coordination**
- Lead inter-ministerial coordination for MRV system implementation
- Integrate MRV-related functions across line ministries and levels of government
- Establish and maintain MRV coordination mechanisms (e.g., steering committee, working groups)
- Provide strategic inputs into national climate commitments, plans, and strategies, such as NDC, NAP, and LTS

**(b) System Oversight and Governance**
- Define national MRV architecture and institutional arrangements
- Approve methodologies, tools, templates, and guidelines for MRV
- Oversee the operation of the MRV Unit within CCMD
- Institutionalize MRV protocols at the federal, provincial, and local levels

**(c) Data Management and Quality Assurance**
- Define protocols for GHG emission data collection from key sectors such as Energy, IPPU, AFOLU, and Waste, their archiving, and security
- Oversee the development of the centralized MRV data platform
- Ensure regular Quality Assurance and Quality Control (QA/QC) of data submitted by sectoral agencies
- Assure authorized data flow to national and international reporting processes

**(d) Reporting and Communication**
- Prepare and submit official reports to the UNFCCC
- Coordinate stakeholder consultations for validation of draft reports
- Communicate MRV results to national stakeholders and the public
- Serve as the national focal point in international transparency platforms

**(e) Capacity Development**
- Identify and address capacity gaps among MRV stakeholders
- Design and implement training programs in collaboration with partners
- Build a sustainable roster of national experts on MRV and transparency

**(f) Tracking of Climate Finance and Support**
- Monitor and report climate finance received and mobilized
- Coordinate with the Ministry of Finance and international partners
- Maintain records of technology transfer and capacity-building activities

**(g) Delegated Functions and Coordination Roles**
- Coordinate between NE and the sectoral ministry for regular and timely data flow
- Empower sectoral MRV focal points and subnational counterparts
- Establish Memoranda of Understanding (MoUs), or Data Sharing Agreements (DSA) with key ministries and agencies
- Delegate operational tasks to the MRV Unit and Sectoral Coordinators in each related ministry

**(h) Accountability**
- Update on progress, challenges, and new developments in reporting mechanisms to the CCMD chief, secretary of MoFE, and MRV steering committee, or IMCCCC, as deemed necessary

### 3.1.4 MRV Unit and its Structure

Nepal's MRV system is centrally coordinated by the MoFE through its CCMD, which functions as the national MRV focal authority. To operationalize MRV at a national scale, the establishment of a dedicated MRV Unit under CCMD has been proposed. This unit shall serve as the technical and

coordinating hub for MRV activities across sectors and levels of government and manage GHG inventories, adaptation and support tracking, and the UNFCCC reporting.

The existing Emission Measurement Section within the CCMD serves as the MRV Unit for the short term and is designated as the MRV unit or institutional setup for the long-term plan. This approach does not create a new structure for MRV, but rather strategically refocuses and builds on the section's current roles and capacities to facilitate database management, GHG inventory and scenario development, adaptation and support tracking, and preparation of the national documents to be submitted to the UNFCCC.

The organizational structure of the MRV Unit is presented in Figure 2. It is a hierarchical model comprising three key levels:

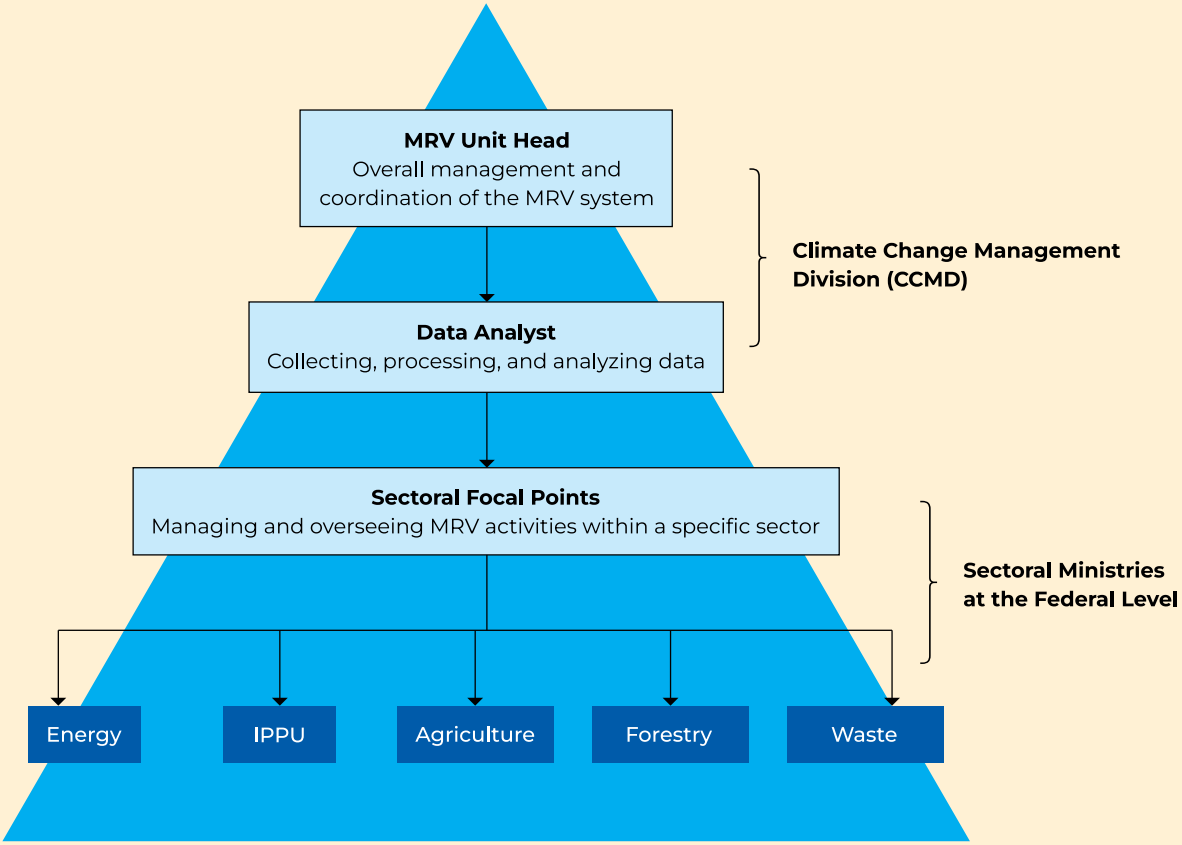


**Figure 2. MRV program arrangement**

The MRV Unit is envisioned to include a multi-disciplinary team comprising:

- MRV Unit Head
- Data Analyst
- Sector Coordinators (Energy, IPPU, AFOLU, Waste)

Each sectoral ministry (e.g., MoFE, MoEWRI, MoICS, MoALD, MoFAGA) shall appoint designated focal points to interface with the MRV Unit, facilitating continuous data sharing, methodological alignment, and reporting. Provincial and local governments shall also play supporting roles through provincial climate coordination committees and local-level implementation units.

### a. MRV Unit Head

This position is responsible for overall management and coordination of the MRV system, ensuring that all activities align with national climate change goals and international obligations. This person shall lead the MRV program unit, coordinate across ministries, and report on progress toward national climate goals.

**Key Responsibilities**

- Lead the design, development, and implementation of the MRV system
- Oversee and coordinate the work of all MRV staff and ensure proper integration of MRV efforts across different sectors

- Manage the preparation and submission of national GHG inventories, NDC progress reports, and National Communications
- Ensure adherence to international reporting standards (e.g., IPCC guidelines, Paris Agreement transparency framework)
- Liaise with national, provincial, and local government bodies, as well as the private sector and CSOs, to ensure comprehensive MRV data collection
- Collaborate with universities and research institutions for the development and implementation of Tier-2 or Tier-3 methodologies for more accurate emission estimation, loss and damage, climate vulnerability estimation, and climate action project development
- Ensure stakeholder engagement and a participatory approach throughout the MRV process
- Provide training and capacity-building opportunities for government officials and stakeholders involved in MRV

**Key Performance Indicators (KPIs)**

- Timely submission of GHG inventories, NDC progress reports, and National Communications
- Effective coordination with ministries and other stakeholders (e.g., periodic coordination meetings, reports on inter-ministerial collaboration)
- Number of collaborations and completion report of the research activities for the development and implementation of Tier-2 or Tier-3 methodologies for more accurate emission estimation, loss and damage, climate vulnerability estimation, and climate action project development
- Successful completion of capacity-building activities for government officials (e.g., number of trainings and workshops conducted, participant feedback)
- Stakeholder satisfaction, assessed through surveys and engagement levels in MRV processes
- Timely development and update of MRV guidelines, methodologies, and protocols

### b. Data Analyst

The MRV Data Analyst is responsible for collecting, processing, and analyzing data related to GHG emissions, mitigation actions, and adaptation by coordinating with sectoral ministries and agencies. This role requires strong technical skills in data analysis and reporting to ensure that accurate data is provided to inform national and international climate action.

**Key Responsibilities**

- Collect, organize, and validate sectoral activity data, emission factors, and GHG data
- Analyze sectoral data to track progress against national climate targets (e.g., NDCs)
- Develop and update data collection methodologies, ensuring they meet international standards (e.g., IPCC guidelines)
- Create reports and visualizations of data for use by stakeholders, including government agencies, civil society, and international bodies
- Work with sectoral ministries and local authorities to support data quality assurance and verification processes

**Key Performance Indicators (KPIs)**

- Timeliness and accuracy of GHG inventory data collection and reporting
- Accuracy of data analysis and identification of trends, or anomalies in emissions and mitigation actions
- Frequency and effectiveness of data quality checks (e.g., error rates in reported data)
- Timely preparation of sectoral reports and visual data presentations
- Successful completion of data verification activities (e.g., number of discrepancies identified and resolved)

### c. Sectoral Focal Points

Although there are some limitations (both technical and structural) in data collection, archiving, and its reporting, this document suggests that sectoral Focal Points are designated officials within the respective line ministries responsible for managing and overseeing MRV activities in their assigned sectors, namely Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry and Other Land Use (AFOLU), and Waste. These focal points play a critical role in ensuring timely and accurate data collection, validation, and coordination with the central MRV Unit.

Each Sectoral Focal Point shall coordinate with relevant institutions and agencies within its sector to ensure effective data flow and quality assurance. They are responsible for compiling sectoral data in alignment with agreed protocols and timelines, and for submitting it to the MRV Unit for further review and integration. This process ensures that sectoral data is appropriately screened and formatted in line with UNFCCC reporting requirements, including submission through designated templates or mechanisms.

**Key Responsibilities**

- Coordinate and facilitate the collection of sector-specific MRV data (e.g., energy

consumption, emissions from transport, land-use change in agriculture, amount of waste generation and disposal)
- Work with relevant ministries and agencies to ensure the data is accurate, up-to-date, and aligned with national guidelines
- Identify key sectoral indicators to track progress toward climate goals and targets
- Provide technical support and training to relevant stakeholders (e.g., energy providers, farmers, waste management service providers, transport companies) on MRV-related methodologies and reporting
- Ensure sector-specific data is verified by the Independent Verification Body and integrated into national reporting systems

**Key Performance Indicators (KPIs)**
- Regular data compilation and timely submission to the MRV unit for further processing
- Quality of sector-specific reports, including clarity and accuracy of sectoral emissions and mitigation progress
- Successful training sessions and capacity-building activities for sector stakeholders (e.g., number of workshops conducted)
- Number of sector-specific indicators developed and tracked over time
- Accuracy of data submitted for verification and resolution of discrepancies or inconsistencies

## 3.2 Stakeholder Mapping and Functional Roles

### 3.2.1 Classification of Stakeholders

A range of stakeholders are identified for Nepal's MRV framework from the mapping and classified into different stakeholder groups based on the organization mandate: a) Government agencies, b) Private sector entities, c) CSOs and IPLCs, d) academic and research institutions, and e) international development partners (See box 1 for broader description). Depending on the stakeholder group, they have coordination and leadership, expertise supply, and data providing roles (Figure 3). The roles and responsibilities of each stakeholder group are defined considering their mandates.

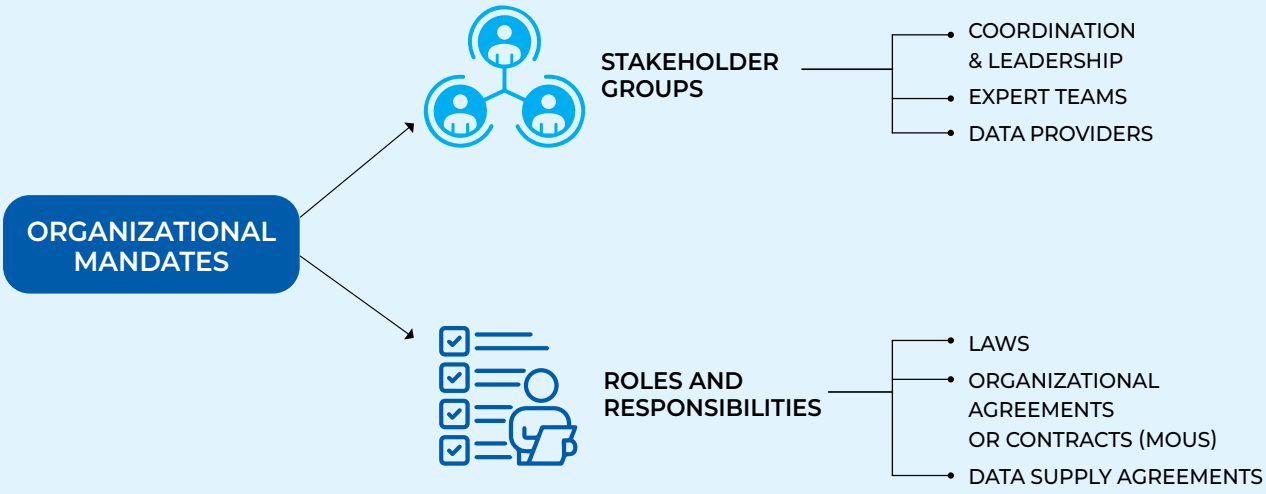


**Figure 3. Organizational mandates (adopted from UNFCCC, 2020)**

BOX 1

## Broad Categories of MRV Stakeholders in Nepal

The successful implementation of Nepal's MRV system relies on the coordinated engagement of diverse stakeholders across government, civil society, academia, and the private sector. Their roles and responsibilities are outlined below:

**Government Agencies:** Core ministries including the Ministry of Forests and Environment (MoFE), Ministry of Energy, Water Resources and Irrigation (MoEWRI), Ministry of Industry, Commerce and Supplies (MoICS), Ministry of Agriculture and Livestock Development (MoALD), Ministry of Federal Affairs and General Administration (MoFAGA), and Ministry of Urban Development (MoUD) are responsible for policy formulation, regulatory oversight, and serving as primary custodians of sectoral data. These agencies coordinate through national platforms such as the National Planning Commission (NPC), Inter-Ministerial Coordination Committee on Climate Change (IMCCCC), Provincial sectoral ministries, Provincial Climate Change Coordination Committee (PCCCC), and Provincial Planning Commissions.

**Local Governments:** Municipalities and rural municipalities are essential actors for on-the-ground implementation, primary data collection, and local-level reporting, particularly in the Agriculture, Forestry, and Other Land Use (AFOLU) and Waste sectors.

**Academic and Research Institutions:** Universities, policy research institutes, and think tanks contribute to the development of methodologies, quality assurance and control (QA/QC), capacity building, and the generation of new data and scientific knowledge to strengthen the MRV system.

**Private Sector:** Industries, energy producers, and waste management companies serve as both data providers and implementation partners in mitigation activities. Sectoral associations such as the Federation of Nepalese Chambers of Commerce and Industry (FNCCI), Confederation of Nepalese Industries (CNI), and Independent Power Producers' Association Nepal (IPPAN) play a key role in mobilizing private sector engagement.

**Civil Society Organizations (CSOs) and Indigenous Peoples and Local Communities (IPLCs):** These groups contribute to participatory data collection, community-based monitoring, advocacy, and promoting social inclusion and equity in climate action and transparency efforts.

**International Development Partners:** Development agencies and international organizations provide critical financial, technical, and capacity-building support. Many also require transparent and credible MRV systems as a prerequisite for climate finance and project implementation.

### 3.2.2 MRV Stakeholders of Mitigation (GHG Emission)

Stakeholders engaged in Nepal's MRV system are categorized according to the four key mitigation sectors, such as Energy, Industrial Processes and Product Use (IPPU), Agriculture, Forestry and Other Land Use (AFOLU), and Waste, and cross-cutting climate actions related to adaptation and support.

The following sections outline the specific roles and responsibilities of national stakeholders within the MRV framework.

#### (a) Energy sector

The energy sector involves diverse stakeholders, including ministries, government agencies, the private sector, academic and research institutions, and CSOs. The MoEWRI as the sectoral lead and governing body for the formulation of policies, acts, and regulations, and the primary source for energy-related information and data. Whereas for the other non-energy economic sectors, the MoICS and the MoPIT shall play a crucial role in activity data reporting.

The National Statistics Office (NSO) shall play a coordination role and collect the data in one data base for nation's multiple use. In this way NSO can be taken as data compiler and provider to the sectoral ministries, however agencies like Electricity Regulatory Commission (ERC), Department of Electricity Development (DoED), Nepal Electricity Authority (NEA), Water and Energy Commission Secretariat (WECS), Alternative Energy Promotion Center (AEPC), Nepal Oil Corporation (NOC), Department of Transport Management (DoTM), Department of Industry (DoI), and Department of Custom (DoC) are vital for collection and communication

of energy and activity related data. Besides, the private sector entities and their associations (like the Independent Power Producers Association Nepal (IPPAN), the Federation of Nepalese Chambers of Commerce and Industry (FNCCI), the Confederation of Nepalese Industries (CNI), and CSOs shall play the roles of data providers. Academic and research institutions shall play the role of knowledge generation and expert support.

Federal and provincial government entities like the IMCCCC, NPC, PPC, CCMD, and PCCCC play a role in effective coordination and facilitation among different stakeholders.

Since energy-related data is multisectoral in nature, linked with energy generation, supply, and end-use applications, the collaborative participation of sectoral entities is crucial for the establishment of the MRV system in the energy sector. The international development partners can contribute to the effective implementation of the MRV system through capacity development and financial support.

The classification of the stakeholders for the energy sector is given in Table AI(a) of the Annex. The energy sector stakeholder matrix provides a roadmap for coordinated action, aligning government agencies, private entities, academic and research institutions, civil society, and development partners to strengthen transparency and data integrity within the MRV system. By clarifying roles and streamlining responsibilities, it lays the groundwork for more reliable emissions tracking from the available activity data and supports Nepal's broader climate ambitions.

### (b) Industrial Processes and Product Use (IPPU)

IPPU demands strong collaboration among industries, regulatory bodies, academic and research institutions to ensure accurate and verifiable data flows, particularly in areas of cross-sector coordination and data harmonization. Table AI(b) presents the classification of the stakeholders for the IPPU sector.

The Ministry of Industry, Commerce, and Supplies serves as the sectoral lead and shall play the crucial role for data reporting and policy development in the IPPU sector. Agencies like NSO, DoI, and DoC are vital for the collection and communication of activity-related data of the sector. Besides, the private sector entities and their associations (like FNCCI, CNI, cement and steel manufacturers etc.) shall play the roles of data providers. Academic and research institutions shall play the role of knowledge generation and expert support.

### (c) Agriculture, Forestry and Other Land Use (AFOLU)

#### Agriculture

In the context of Nepal's agriculture sector, the government agencies, such as the MoALD and provincial ministries, play a central role in setting policies and ensuring regulatory oversight. Data providers include both federal and provincial institutions like the Department of Agriculture (DoA), Department of Livestock Services (DoLS), Directorate of Agriculture Development (DoAD), Directorate of Livestock and Fisheries Development (DoLFD), Agriculture Knowledge Center, Nepal Agricultural Research Council (NARC), and Local Governments for collecting agricultural and livestock data. Academic and research institutions shall play the role of knowledge generation and expert support. The classification of the stakeholders for the agriculture sector is given in Table AI(c).

#### Forestry and Other Land Use (FOLU)

The Ministry of Forest and Environment is a governing body for the FOLU sectors. For land-related information, the Ministry of Land Management, Cooperatives and Poverty Alleviation (MoLMCPA) role shall be crucial. Major sector-specific data providers consist of the Department of Forests and Soil Conservation (DoFSC), Forest Research and Training Center (FRTC), REDD Implementation Centre (REDD-IC), Department of Survey (DoS), and Department of Land Management and Archive (DoLMA). As these sectors account for both emissions by source and removal by sinks, there are several stakeholders engaged in data collection, analysis, and reporting, as shown in Table AI(d).

Besides, the private sector entities and their associations (like FNCCI, CNI, Wood and Non-Timber Forest Products industries) shall play the role of data providers. Academic and research institutions shall play the role of knowledge generation and expert support. Similar to the energy sector, federal and provincial government entities shall play the role of effective coordination and facilitation.

### (d) Waste sector

Nepal's waste sector involves multiple stakeholders across federal, provincial, and local levels, as reported in Table AI(e). Multiple waste streams, including municipal solid waste, industrial waste, medical waste, and sludge and wastewater, are managed by various institutions with fragmented mandates. Municipalities are the primary implementing agencies responsible for maintaining documentation related to waste

generation, transportation, and disposal; however, due to the complex nature of waste governance, it requires coordination across various levels of government and institutions.

The Federal Affairs and General Administration (MoFAGA) shall serve as the sectoral focal agency for waste. The Ministry of Urban Development (MoUD), the Ministry of Health and Population (MoHP), the Ministry of Water Supply (MoWS), and the Ministry of Industry, Commerce and Supplies (MoICS) shall play a coordinating and supporting role. Agencies such as Kathmandu Upatyaka Khanepani Limited (KUKL), Department of Health Services (DHS), DoI, Department of Water Supply and Sewerage Management (DWSSM) and AEPC, NSO contribute relevant data to strengthen coordination. The District Coordination Committee (DCC) shall coordinate with local governments to ensure alignment of MRV-related activities with the provincial and national priorities.

Besides, the private sector entities (like Private Waste Collection Companies, Recycling Industries, Composting Firms, Waste to Energy Companies, Private Septic Tank Cleaners) and their associations shall play the role of data providers. Academic and research institutions shall play the role of knowledge generation and expert support.

### 3.2.3 Stakeholders for MRV of Adaptation and Support

The adaptation part of the MRV system looks after efforts to manage the impacts of climate change, such as tracking progress on NAPs, assessing climate resilience across sectors, and reporting and sharing outcomes. Likewise, the support part of the system consists of tracking the need, use, impact, and effectiveness of financial and technical support, ensuring transparency between donors and recipients. MoFE, MoF, the Social Welfare Council (SWC), and the National Planning Commission are the major agencies for coordinating climate actions on adaptation and support. The stakeholder mapping and classification for adaptation and support are given in Table AI(f).

### 3.2.4 Stakeholder Roles and Responsibilities Matrix

Broad and meaningful stakeholder engagement significantly enhances the effectiveness and utility of the transparency system, contributing to evidence-based decision-making and the preparation of high-quality reports. Engaging stakeholders involves identifying and reaching out to key individuals and institutions, while offering mutual benefits for their participation, such as access to relevant data, expert insights, and technical or institutional resources. To establish a robust MRV system, incorporating clear roles and responsibilities of related stakeholders, is vital for Nepal to meet its climate commitments and strengthen data-driven policymaking and project implementation. The stakeholder roles and responsibilities matrix is prepared based on the following criteria:

- Legal and policy support
- Data generation and management
- Communication

During implementation of the MRV system, it is essential to incorporate tasks and objectives related to transparency (for example: QA/QC Plan), record verification activities to ensure alignment (QA/QC Log), and track and update ongoing improvements to strengthen transparency (Improvement Plan). The stakeholder roles and responsibilities matrix for the MRV system of Nepal is given in Table 4.

**Table 4. Stakeholder Roles and Responsibilities Matrix**

| Stakeholder Category | Stakeholder Name | Sector | Roles and Responsibilities | Reporting/Coordination Mechanism | Key Performance (KPI) |
|---|---|---|---|---|---|
| Government Ministries | MoFE | • FOLU | Act as the focal and lead ministry for MRV<br><br>Provide sectoral policy and regulatory oversight to enforce MRV in fulfilling national and international climate commitments | Act as National Focal Authority for MRV, coordinates with sectoral ministries and technical agencies | • Timely submission of GHG inventories, NDC progress reports, and National Communications<br>• Effective coordination with ministries and other stakeholders (e.g., monthly coordination meetings, reports on inter-ministerial collaboration)<br>• Timely development and update of MRV guidelines, methodologies, and protocols |
| | MoICS | • Energy, IPPU, AFOLU, Waste | Provide sectoral policy and regulatory oversight to enforce MRV | Support to National entity, act as sector lead, coordinate with sectoral and technical agencies | • Timeliness and accuracy of GHG emission-related activity data collection and reporting<br>• Frequency and effectiveness of data quality checks (e.g., error rates in reported data)<br>• Timely preparation of sectoral reports and visual data presentations |
| | MoALD- DoLMA | • Agriculture and Livestock Development | Provide sectoral policy and regulatory oversight to enforce MRV | | |
| | MoFAGA | • Waste | Provide sectoral policy and regulatory oversight to enforce MRV | | |
| | MOF | • Energy, IPPU, AFOLU, Waste | Provide financial policy and regulatory oversight to climate change finance | | |
| Sectoral Government entities | **Focal entity:**<br><br>CCMD | • Energy, IPPU, AFOLU, Waste | Responsible for GHG emission inventory, NDC tracking, adaptation communication, and reporting on support needed, received and mobilization | Reports to the related focal ministry | • Development of a data template and communication with the sectoral ministries and concerned agencies.<br>• Timeliness and accuracy of GHG inventory data collection and reporting<br>• Accuracy of data analysis and identification of trends, or anomalies in emissions and mitigation actions<br>• Frequency and effectiveness of data quality checks (e.g., error rates in reported data)<br>• Successful completion of capacity-building activities for government officials (e.g., number of trainings and workshops conducted, participant feedback) |

| Stakeholder Category | Stakeholder Name | Sector | Roles and Responsibilities | Reporting/Coordination Mechanism | Key Performance (KPI) |
|---|---|---|---|---|---|
| Sectoral Government entities | **Federal:** WECS, NSO, and other Government sectoral entities | • Energy, IPPU, AFOLU, Waste | Activity data providers for emission calculation, adaptation, and/or support activities<br><br>NSO shall play a role of data compiler and data provider to the sectoral ministries | Reports to the related focal and sectoral lead | • Timeliness and accuracy of activity data for GHG inventory reporting<br>• Frequency and effectiveness of data quality checks (e.g., error rates in reported data)<br>• Timely preparation of sectoral reports and visual data presentations |
| | **Provincial:** Provincial Sectoral related ministries, directorates, departments, and centers<br><br>Provincial Policy and Planning Commission,<br><br>Provincial Statistics Offices | • Energy, IPPU, AFOLU, Waste | Activity data providers for emission calculation, adaptation, and/or support activities | Reports to the related sectoral lead | • Timeliness and accuracy of activity data for GHG inventory reporting<br>• Frequency and effectiveness of data quality checks (e.g., error rates in reported data)<br>• Timely preparation and communication of sectoral reports to respective ministries |
| | **Local level:** Local governments (Metropolitan Cities, Sub-metropolitan Cities, Municipalities, Rural Municipalities) | • Energy, IPPU, AFOLU, Waste | Activity data providers for emission calculation, adaptation, and/or support activities | Reports to related provincial and sectoral lead | • Timeliness and accuracy of activity data for GHG inventory reporting<br>• Frequency and effectiveness of data quality checks (e.g., error rates in reported data)<br>• Timely preparation of sectoral reports and visual data presentations |
| Knowledge Generation and Expert Support | Universities and Research Institutions | • Energy, IPPU, AFOLU, Waste | Activity data providers for emission calculation, conduct research and analysis to generate a national database (such as Tier-2 or Tier-3 methodologies and more accurate emission estimation, and climate change-related national circumstances | Communicate data to MRV system, support QA/QC, engage in consultations and collaborations | • Timeliness and accuracy of activity data for GHG inventory reporting<br>• Frequency and effectiveness of data quality checks (e.g., error rates in reported data)<br>• Timely preparation of sectoral reports and visual data presentations |

| Stakeholder Category | Stakeholder Name | Sector | Roles and Responsibilities | Reporting/Coordination Mechanism | Key Performance (KPI) |
|---|---|---|---|---|---|
| Private Sector | Private entities in different sectors | • Energy, IPPU, AFOLU, Waste | Provide activity data, ensure accurate reporting | Submit data to the MRV system | • Timeliness and accuracy of activity data for GHG inventory reporting<br>• Frequency and effectiveness of data quality checks (e.g., error rates in reported data)<br>• Timely preparation of sectoral reports and visual data presentations |
| CSOs including Youths | | | Support in conducting research, and capacity-building activities for communicating reliable, transparent, and comprehensive information on GHG<br><br>emissions, actions, and support | Provide data and engage in participatory MRV processes | • Timeliness and accuracy of activity data for GHG inventory reporting<br>• Timely preparation of sectoral reports and visual data presentations |

## 3.3 Data Flow, Coordination Mechanisms, and Inter-agency Platform

This mechanism is designed to ensure that data is systematically collected, validated, and reported from the local to the national level through an integrated, bottom-up process. The mechanism operates as follows:

Sectoral Data Collection at Source: Primary activity data is generated at the source, including municipalities, industries, and sectoral line departments.

Consolidation and Validation: Collected data is consolidated and validated at the provincial and federal levels to ensure accuracy and completeness.

Central Compilation and Analysis: The MRV Unit under CCMD of MoFE compiles, analyzes, and prepares data for national-level reporting.

The ministry has adopted a bottom-up coordination approach, beginning with local governments as the initial points of data generation. This structure ensures that MRV data is rooted in local realities, reflecting the diversity of sectoral and subnational contexts. Local stakeholders, including government units, service providers, and community-based actors, play an active role in generating and reporting data, thereby enhancing the accuracy, ownership, and contextual relevance of the MRV system.

In parallel, the mechanism also ensures vertical integration across all tiers of government (local, provincial, and federal), facilitating continuous communication, coordination, and capacity alignment. This structured and participatory approach minimizes duplication, enhances data quality, and fosters coherence among various institutions engaged in climate action. The mechanism further establishes standardized procedures for data reporting, communication, and decision-making, ensuring the MRV system remains responsive, inclusive, and accountable. It supports the alignment of institutional mandates with reporting obligations under the Enhanced Transparency Framework (ETF) of the Paris Agreement. The coordination mechanism is operationalized through a clear institutional framework with designated focal points across key sectors and governance levels, as mentioned in the section above. The process flow of this coordination mechanism is illustrated in Figure 4. It demonstrates how roles, responsibilities, and reporting pathways are integrated within the MRV system to ensure effectiveness, transparency, and compliance with national and international requirements.

### 3.3.1 Inter-agency Platform

To strengthen institutional collaboration and improve data management within Nepal's MRV system, MoFE, through CCMD, establishes a formal Inter-agency Coordination Platform. This platform will institutionalize coordination among MRV focal points, technical staff, and sectoral agencies. It will play a critical role in standardizing data formats, streamlining reporting protocols, and overseeing the implementation of quality assurance and quality control (QA/QC) procedures across all MRV-related activities.

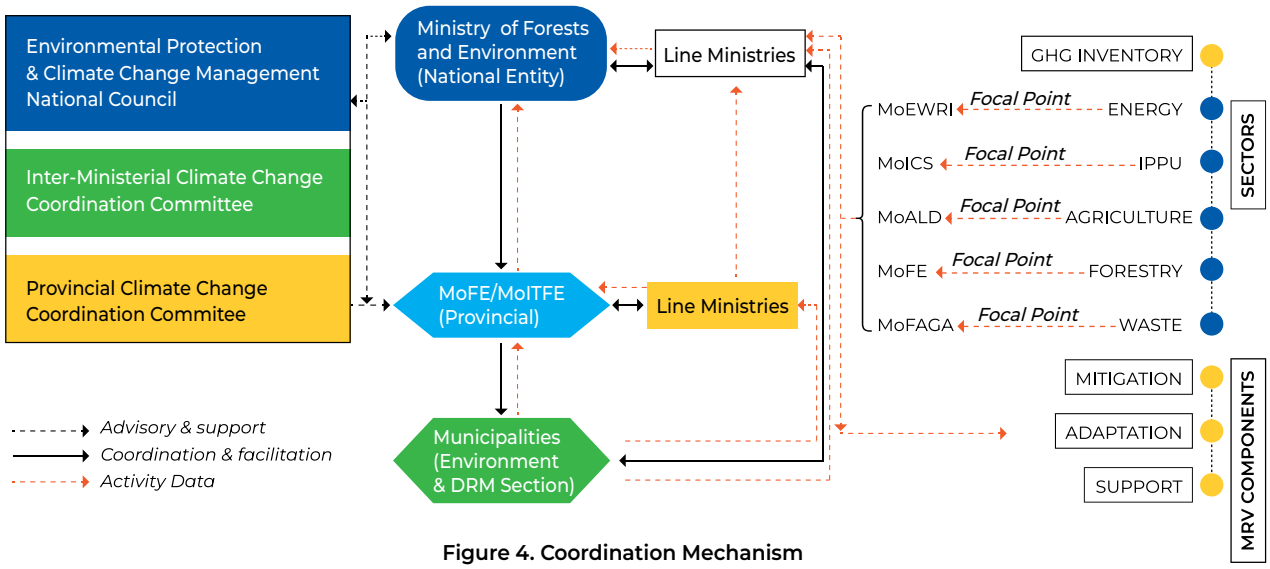


**Figure 4. Coordination Mechanism**

The CCMD of MoFE, as the designated National entity under the Enhanced Transparency Framework (ETF), serves as the national coordinating body responsible for the overall implementation and oversight of the MRV system. A dedicated MRV Unit within MoFE will coordinate with federal line ministries, provincial governments, local authorities, sectoral agencies, and thematic technical working groups to ensure that data collection and reporting processes are consistent, high-quality, and transparent. The strategic direction and oversight of this unit shall be guided by EPCCMNC and the IMCCCC, ensuring alignment with national policies, international obligations, and progress monitoring.

At the subnational level, provincial governments hold a vital role in decentralizing MRV data collection and verification, particularly in sectors such as energy, agriculture, forestry, and waste management, where emission and adaptation activities are localized. The provincial-level coordination will be managed through the MoFE or Forests and Environmental-related ministries, which serve as a provincial focal agency for climate change-related issues. These institutions coordinate directly with the MRV unit of the national entity and oversee the collection, verification, and preliminary quality checks of data compiled from local authorities, in collaboration with sector-specific provincial agencies. The Provincial Climate Change Coordination Committee will support the development of provincial climate strategies and MRV policies. Furthermore, to ensure uniformity and build technical capacity, the federal MRV Secretariat shall provide ongoing training and resources to provincial focal units. While provincial MRV systems must adhere to national guidelines, they are encouraged to tailor their data collection processes to reflect local environmental, economic, and social contexts.

Local governments should implement MRV-related responsibilities through their Environment and Disaster Risk Management (DRM) Sections. Designated municipal officers, situated within relevant departments such as environment, planning, or infrastructure, will be tasked with collecting and reporting MRV data and maintaining direct coordination with provincial

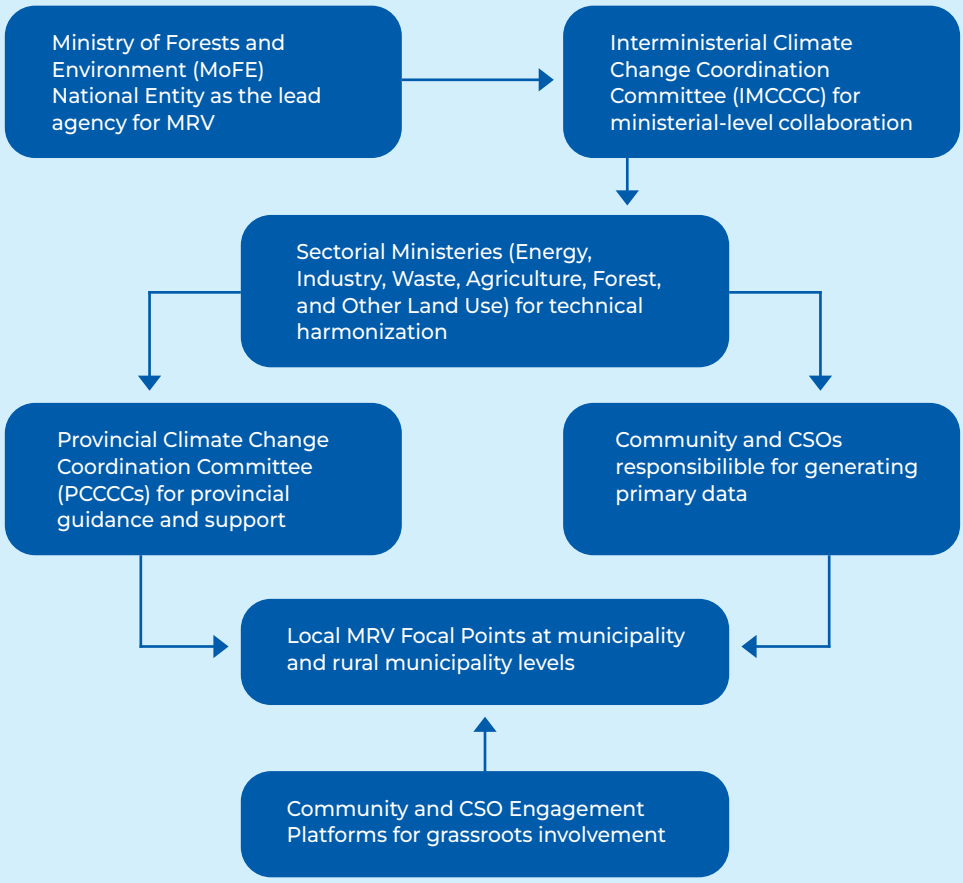


**Figure 5. Institutional Structures for Coordination**

focal agencies. These local sections may also partner with community-based organizations and local NGOs to facilitate grassroots-level data gathering and verification. Integration of MRV processes into existing planning instruments, such as annual plans and medium-term development frameworks, will enhance institutional sustainability and ensure that MRV activities contribute meaningfully to local development agendas.

To ensure cross-sectoral coherence, each relevant ministry or department shall establish a sectoral MRV unit. These units will be responsible for engaging with data providers within their respective domains and maintaining regular communication with the national entity and the MRV unit. They will align methodologies, indicators, and reporting processes with federal and provincial MRV systems to ensure data consistency and comparability across sectors.

This multi-tiered approach to MRV coordination necessitates a clearly defined institutional architecture. Roles, responsibilities, and communication channels must be explicitly laid out for actors at the federal, provincial, local, and sectoral levels. This further ensures systematic information flow, accountability, and timely reporting. The institutional structure supporting this coordination mechanism is outlined in Figure 5, which illustrates the interconnected roles, responsibilities, and reporting pathways essential to maintaining the integrity and functionality of Nepal's MRV system.

The coordination approaches outlined above recognize Nepal's multi-level governance structure and sector-specific realities. In each component (Mitigation, Adaptation, and Support) and sectors (Energy, IPPU, AFOLU, and Waste), the designated focal point from each sectoral entity/ line ministries shall communicate essential information to the National Coordination Entity in collaboration with respective provincial ministries, academic institutions, and CSOs.

### 3.3.2 Strategy for data acquisition

The Data Acquisition Strategy outlines a systematic approach for collecting, processing, and managing data essential for climate actions (GHG emission, mitigation, adaptation, and support). It ensures that data needed for monitoring Nepal's climate targets, fulfilling UNFCCC reporting requirements, and verifying the accuracy of climate-related information is gathered consistently, accurately, and transparently. It is envisioned that a separate Data Sharing Agreement (DSA) between MoFE and sectoral data providers shall be done, which ensures equal ownership and collaboration for providing data for effective MRV. The MRV unit shall make reported information publicly available to increase transparency.

Each sector agency shall designate a data coordinator responsible for reviewing the data before submission, ensuring it meets established quality standards. Additionally, the MRV unit shall conduct regular audits and provide feedback to sector agencies on any discrepancies or issues with the data, enabling a continuous cycle of improvement. Reporting (National GHG inventory, Annual national reports) should be based on UNFCCC reporting guidelines, ensuring year-to-year comparison and comparability with other nations. The reporting shall be made publicly available to increase transparency with the existing public reporting portal of MoFE. There shall be the provision of annual sectoral reporting to ensure that reporting remains timely and accurate. Furthermore, capacity building through training sessions is critical to ensure sector agencies understand the importance of QA/QC in their data collection and reporting processes. In the absence of required expertise within the dedicated institutions, the use of international experts shall be necessary, which shall be gradually replaced by national experts and in-house staff in the long run for effective and sustainable transition.

# IV Chapter

# MRV Components: Mitigation, Adaptation, and Support

This chapter presents Nepal's MRV components, developed in alignment with the ETF outlined in Article 13 of the Paris Agreement. Nepal is committed to regularly measuring and reporting on its GHG mitigation efforts, adaptation measures, and the climate finance received and provided. Thus, Nepal's MRV framework comprises all three components: mitigation, adaptation, and support (Figure 6).

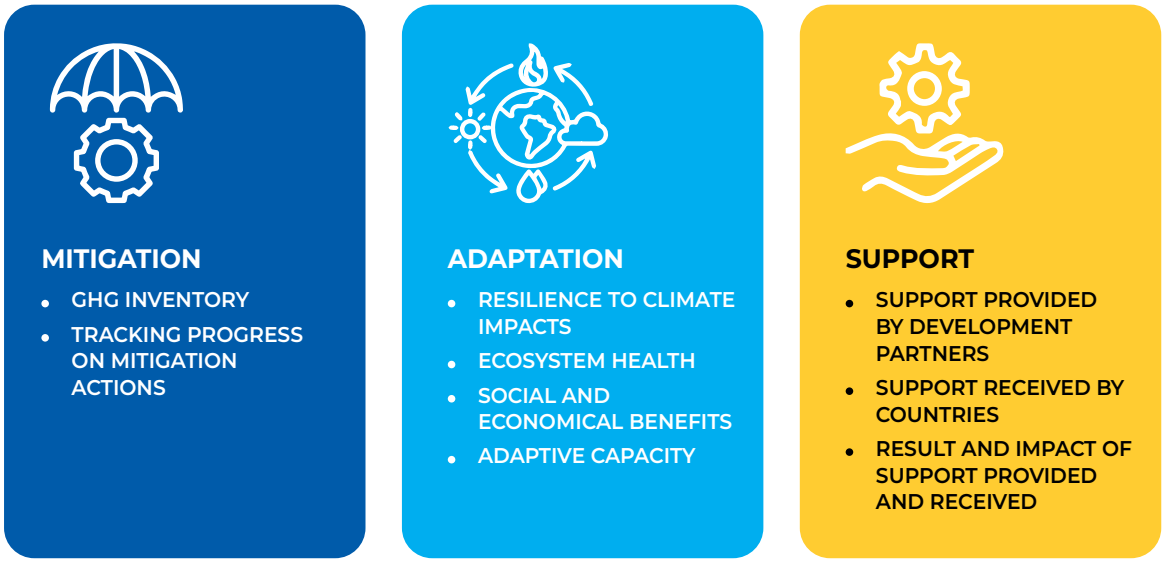


**Figure 6. Components of Nepal's MRV system**

## 4.1 Mitigation

### 4.1.1 GHG inventory (IPCC guidelines, Tier approaches)

A GHG inventory is a systematic account of emissions and removals of GHGs from anthropogenic sources within a country or sector. It serves as a foundational element of the MRV system, enabling countries to monitor their climate change mitigation performance, fulfill international reporting obligations under the UNFCCC and the Paris Agreement, and inform domestic policy decisions. A reliable GHG inventory enhances transparency, accountability, and

comparability, ensuring that climate actions are tracked and verified consistently over time.

The preparation of GHG inventories is guided by internationally accepted methodologies developed by the Intergovernmental Panel on Climate Change (IPCC). The most widely used guideline is the 2006 IPCC Guidelines for National GHG Inventories (IPCC, 2006), with additional updates provided in the 2019 Refinement. These guidelines ensure that inventories are prepared following the TACCC principles: transparency, accuracy, completeness, comparability, and consistency. They provide detailed methodologies for calculating emissions and removals for all major gases ($CO_2$, $CH_4$, $N_2O$, HFCs, PFCs, $SF_6$, and $NF_3$) and cover five key sectors: Energy; Industrial Processes and Product Use (IPPU); Agriculture, Forestry and Other Land Use (AFOLU); Waste; and Other (e.g., indirect emissions).

Within the inventory, emissions by sources refer to processes or activities that release GHGs into the atmosphere, such as the combustion of fossil fuels, industrial processes, or livestock management. In contrast, removals by sinks are processes that absorb GHGs from the atmosphere, primarily through biological processes such as forest carbon sequestration and soil carbon uptake. Accurate accounting of both emissions and removals allows countries to determine their net GHG emissions, which is essential for assessing mitigation progress.

### Tier Approaches (Accuracy Levels)

To accommodate differences in data availability and national capacities, the IPCC provides a tiered approach to emissions estimation. Tier 1 uses default emission factors and simplified equations, making it suitable for countries with limited data and technical capacity. Tier 2 involves country-specific emission factors and more detailed activity data, offering greater accuracy. Tier 3 employs complex models and high-resolution data, often at the facility or project level, and is typically used for key categories with significant emissions. Countries may use a mix of these tiers across different sectors, depending on the significance of the emission source and available data.

The country may combine tiers across sectors, using Tier 1 for some and Tier 2/3 for others. Each of the four main sectors in the GHG inventory has specific characteristics. The Energy sector covers emissions from the combustion of fossil fuels across transport, electricity generation, industry, and residential use, as well as fugitive emissions from fuel extraction and distribution. The IPPU sector accounts for emissions from industrial processes such as cement and chemical production, and from the use of products that contain GHGs, such as refrigeration systems. The AFOLU sector is unique in that it includes both significant emissions sources (e.g., enteric fermentation, fertilizer use, deforestation) and major carbon sinks (e.g., afforestation and soil carbon storage). Finally, the Waste sector includes emissions from solid waste disposal, wastewater treatment, and waste incineration, predominantly in the form of methane and nitrous oxide.

### 4.1.2 Mitigation Action Tracking and Emission Reduction Estimation

Mitigation action tracking is the systematic monitoring of the implementation status, performance, and impact of policies, measures, and projects aimed at reducing GHG emissions. Some useful tools for mitigation action tracking are as follows:

a) The IPCC Inventory Software is a tool developed by the IPCC to support countries in compiling their national GHG inventories in accordance with the IPCC Guidelines for National GHG Inventories. The IPCC Inventory Software covers Energy, IPPU, AFOLU, Waste, and Other (e.g., indirect emissions) and implements the simplest Tier 1 method for all sectors and Tier 2 methods for most categories under Energy, IPPU, AFOLU, and Waste Sectors based on the 2006 IPCC Guidelines, with some modules reflecting the 2019 Refinement, for National GHG Inventories.

**Table 5. IPCC provides three tiers of methodological complexity for estimating GHG emissions**

| Tier | Description | Data Requirement | Use Case |
|---|---|---|---|
| Tier 1 | Uses default emission factors and simple equations | Low | Suitable for countries with limited data |
| Tier 2 | Uses country-specific emission factors and activity data | Medium | For key categories, improves accuracy |
| Tier 3 | Uses detailed models, facility-level, or high-resolution data | High | For major emitting sectors, or advanced inventories |

b) NDC Tracking Tool: There are multiple tools available for tracking the progress of NDC implementation. Among them, an online tool developed by the UNFCCC is widely in use. Similarly, there is a separate tool developed by FAO in 2022. It helps to monitor the progress in implementing and achieving the targets of the NDCs of Nepal. It enables the comparison of planned versus actual mitigation and adaptation actions across all sectors and estimates GHG reductions achieved through implemented mitigation measures, relative to sectoral, or national baselines and NDC targets. The tool adopts a multi-sectoral, modular approach aligned with the MPGs of the ETF, specifically MPGs III and decision 4/CMA.1, annex II, to support data collection based on the country's available information. NDC Tracking Tool supports countries in refining their NDCs and provides critical inputs to the Global Stocktake (GST) process, which assesses global progress toward meeting the long-term goals of the Paris Agreement.

c) The Nationally Determined Contribution Expert Tool (NEXT), by FAO, is a GHG accounting platform designed to support annual environmental impact assessments within the Agriculture, Forestry, and Other Land Use (AFOLU) sector. It generates a 30-year series of both annual and cumulative estimates of carbon removals and GHG emissions reductions resulting from climate actions undertaken by Parties to the Paris Agreement. Similarly, CBIT-GSP offers a template for accounting for GHG emissions, which complements the data template designed by the IPCC.

   NEXT offers high-frequency data outputs and a broad set of indicators, including the social value of carbon, enabling a comprehensive evaluation of the environmental and economic impacts of mitigation actions. By providing detailed insights, the tool supports countries in interpreting, monitoring, and enhancing the ambition of their NDCs. Ultimately, it contributes to and aligns with the global stocktake process under the Paris Agreement in a consistent and harmonized manner.

d) BTR Guidance and Roadmap Tool aims at supporting countries in handling their BTR according to ETF guidelines in time (FAO, 2025). The tool is developed by GIZ and FAO. It incorporates the MPG for the transparency framework and facilitates long-term planning, and helps in structuring and elaborating a roadmap for the BTR process.

### 4.1.3 Institutional Arrangement for Mitigation MRV

The overall MRV framework comprises three core components: Mitigation MRV (covering four key sectors: energy, IPPU, AFOLU, waste), Adaptation MRV, and Support MRV (focused on climate finance and capacity-building). The framework is built on three foundational pillars and institutional arrangements:

I. **Measurement:** Measurement involves collecting and quantifying data on GHG emissions across sectors, the outcomes of mitigation actions, and climate finance received and utilized.
II. **Reporting:** Reporting entails compiling and submitting key documents, like the National Communication Report, BTRs, and NDC progress reports, to the UNFCCC to demonstrate
III. **Verification:** Verification ensures the accuracy and credibility of this information through domestic verification by MoFE and international verification by the UNFCCC.

Figure 7 shows the proposed overall institutional arrangement for the MRV System of Nepal. The overall institutional arrangement for Nepal's mitigation MRV is composed of sectoral government agencies, private entities, CSOs, academic and research institutions, and international development partners who can contribute to the data collection and supply to the provincial ministry or directly to the federal line ministry (Figure 7).

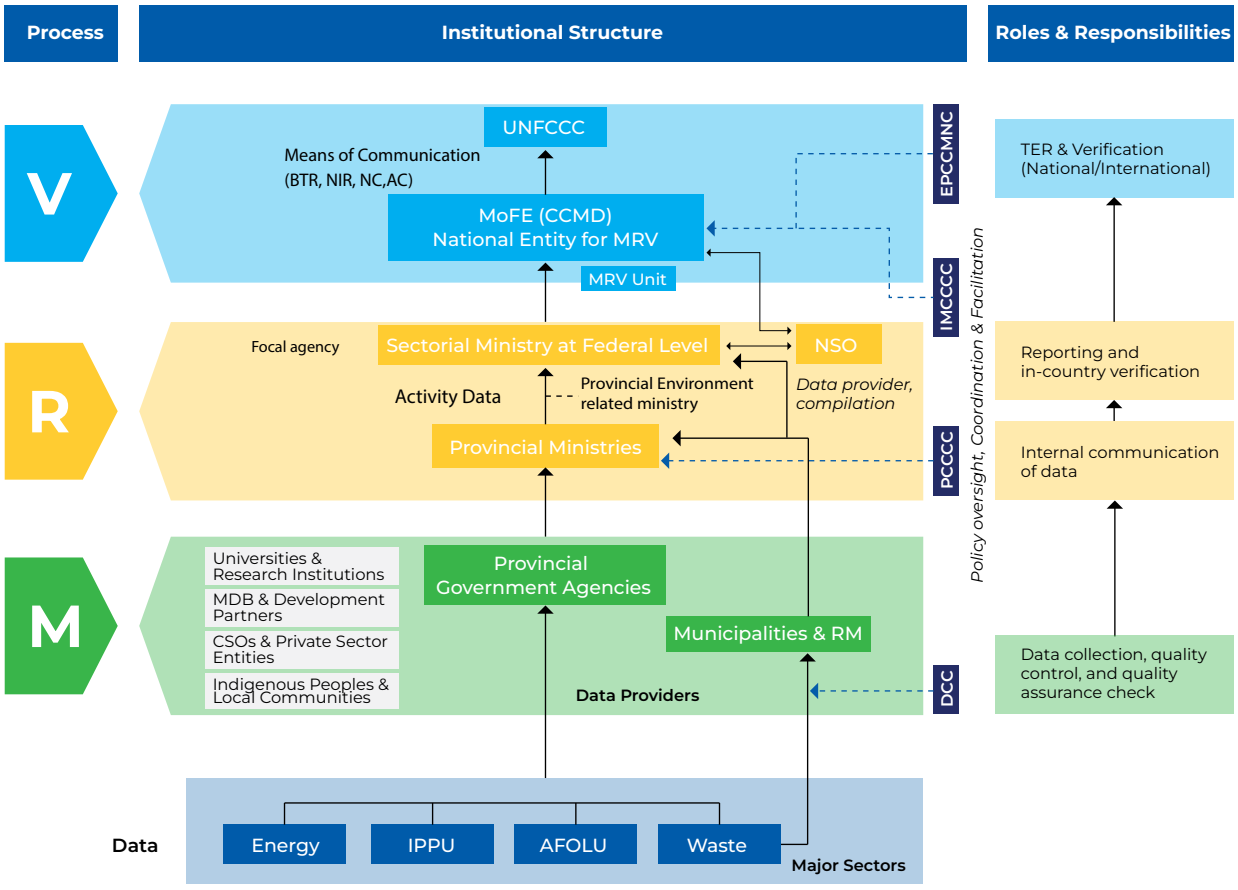


**Figure 7. National MRV Framework for Nepal**

Policy and strategic guidance, and facilitation are provided by EPCCMNC and IMCCCC. At the Measurement level, a diverse set of data providers, including universities, research institutions, development partners, private sector entities, and local communities, work alongside provincial and municipal agencies to gather sector-specific data (from Energy, IPPU, AFOLU, and Waste sectors). These entities are responsible for ensuring data collection, quality control, and assurance, mostly for the sector-specific activity data. The Reporting process is led by sectoral ministries at the federal level, in coordination with provincial ministries and relevant focal agencies, including the National Statistical Office (NSO), to compile and submit sectoral data. The Ministry of Forests and Environment, particularly through its CCMD, acts as the national entity responsible for MRV coordination. It compiles and submits national reports to the UNFCCC, including GHG inventories and updates on NDCs, adaptation, and support. At the national level, the verification shall be ensured by the CCMD with expert review, including the engagement of a University and a scientist in the respective field. At the international level, verification will be done through an independent body under the leadership of the UNFCCC. Altogether, this institutional architecture aims to establish a robust, transparent, and accountable MRV system aligned with international climate reporting obligations.

### a) Energy Sector

The energy sector of Nepal plays a critical role in achieving the country's climate goals, particularly in terms of emission reduction, renewable energy deployment, and improving energy efficiency. Currently, Monitoring, Reporting, and Verification (MRV) practices in the sector are largely oriented towards data collection for energy statistics. Institutions such as the Water and Energy Commission Secretariat (WECS), Nepal Oil Corporation (NOC), Nepal Electricity Authority (NEA), and the Alternative Energy Promotion Centre (AEPC) are responsible for gathering data on electricity generation, energy consumption, and the expansion of renewable energy technologies. These datasets have supported MoFE in estimating greenhouse gas (GHG) emissions from fuel combustion and energy production for the preparation of Nepal's National Communication and Biennial Transparency Report.

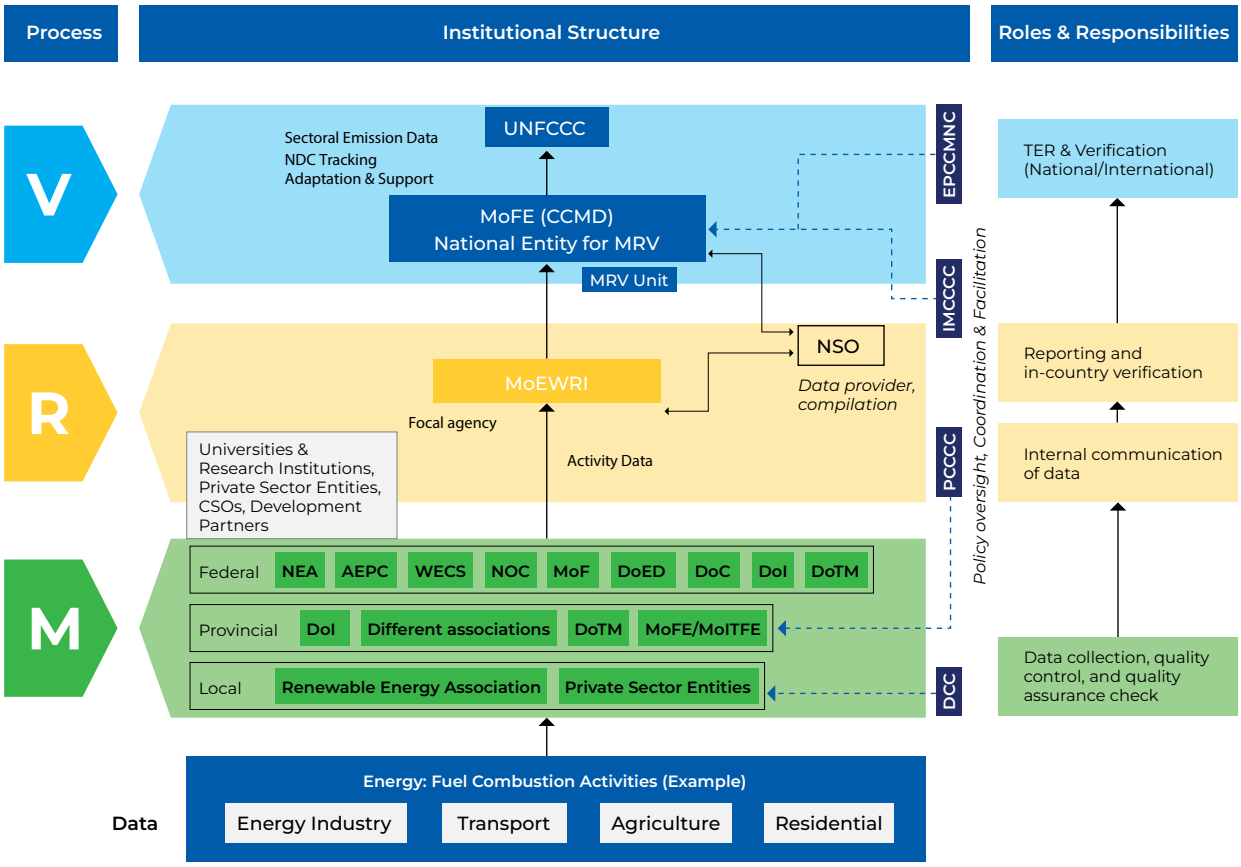


**Figure 8. MRV Framework for Institutional Arrangements in the Energy Sector in Nepal**

Recognizing the critical gap in the regular and systematic flow of data, the Government of Nepal is committed to institutionalizing a robust MRV mechanism in the energy sector. This mechanism aims to ensure the timely, accurate, and harmonized delivery of sectoral data to the CCMD under the MoFE.

**Institutional Mechanism**

The Ministry of Energy, Water Resources, and Irrigation (MoEWRI) shall lead the integration of MRV systems in the energy sector. A dedicated focal agency, primarily the Water and Energy Commission Secretariat (WECS), shall be designated to oversee the operationalization of MRV functions. WECS shall coordinate with relevant entities, including NEA, NOC, AEPC, the National Statistics Office (NSO), and the Department of Transport Management (DoTM), to ensure consistent data generation and flow. The MRV system shall align with the national MRV framework and capture key indicators on energy production, consumption, energy efficiency, and renewable energy development. It shall also integrate information on mitigation technologies, adaptation interventions such as climate-resilient energy infrastructure, and climate finance and support relevant to the energy sector. To ensure coherence across sectors, the MRV mechanism in the energy sector shall establish cross-sectoral linkages with transport, industry, and agriculture. WECS, as the sectoral MRV coordinating agency, shall work closely with academic and research institutions and non-state actors to facilitate information exchange, capacity building, and policy alignment at the federal, provincial, and local levels. The Government of Nepal shall strengthen institutional capacities, establish standard protocols for data collection and QA/QC, and leverage existing digital platforms for real-time data access. This effort will contribute to enhanced transparency in tracking progress towards Nepal's NDCs and international climate reporting obligations.

**(b) IPPU Sector**

The Industrial Processes and Product Use (IPPU) sector in Nepal currently exhibits limited but evolving monitoring and reporting practices, particularly on activity data such as the number and scale of industry, per day production, and export-import raw materials details. These practices primarily help to calculate GHG emissions from this sector. The Ministry of Industry, Commerce, and Supplies (MoICS), through the Department of Industry (DoI), collects basic industrial data such as production volumes, industry types, and raw material use. Key challenges include the absence of routine and standardized data collection procedures are evident in this sector. To address these challenges and institutionalize MRV practices in the IPPU sector, it is designated that the MoICS will be the sectoral lead agency for MRV integration. The establishment of a formal MRV unit within MoICS will be prioritized, tasked with coordinating data collection, quality control, and reporting processes. This shall include compiling activity-level data from key industrial sub-sectors such as cement, iron and steel, and chemicals. Mechanisms shall be established to carry out periodic industrial surveys, energy audits, and enforce mandatory data reporting for industries exceeding defined production or emission thresholds. To foster a coherent national MRV framework, MoICS shall establish formal collaboration with MoFE and other line ministries, as well as academic and research institutions and non-state actors. These partnerships support the development of nationally appropriate emission factors, data verification protocols, and tracking of climate finance and support related to industrial mitigation and adaptation actions. Through systematic data generation, verification, and reporting, Nepal aims to enhance transparency in its industrial emissions tracking and contribute effectively to its Nationally Determined Contributions (NDCs) and global climate commitments.

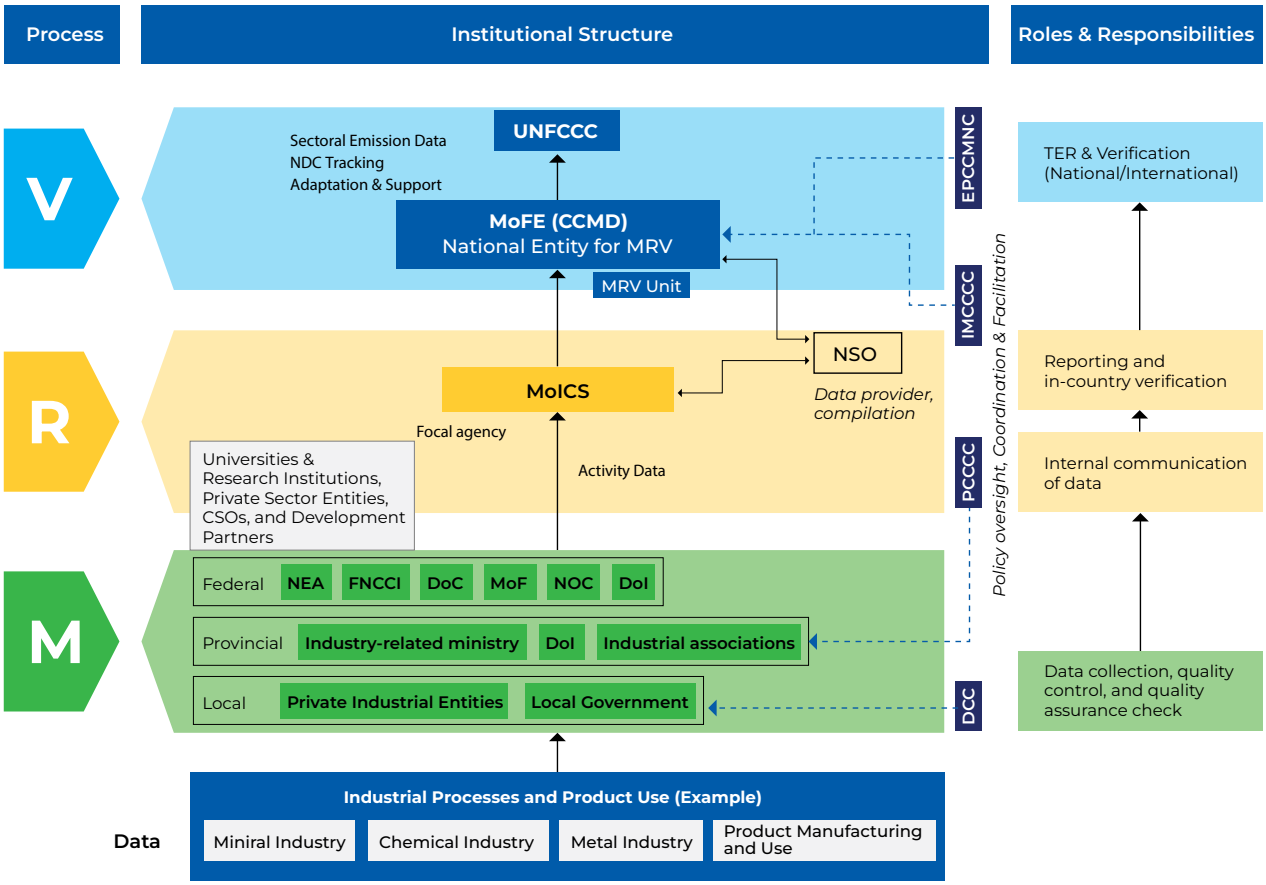


**Figure 9. MRV Framework for Institutional Arrangements in the IPPU sector in Nepal**

**(c) AFOLU Sector**

In Nepal, the AFOLU sector plays an important role in the national mitigation MRV system due to its significant contribution to both GHG emissions and removals. The forestry sub-sector, has made notable progress in institutionalizing MRV. The MoFE, through the REDD IC, has developed a National Forest Monitoring System (NFMS) and Forest Reference Emission Level (FREL), and prepared GHG inventories using the IPCC guidelines. Nepal has submitted REDD+ results to the UNFCCC and received results-based payments, demonstrating operational MRV capacity in the forestry sector. Similarly, the agriculture component of AFOLU, led by the Ministry of Agriculture and Livestock Development (MoALD), contributes to national GHG inventories by supplying activity data (e.g., livestock numbers, fertilizer use, rice cultivation).

Figure 10 shows the institutional arrangement for the AFOLU sector. To strengthen MRV in AFOLU, the MoFE, through the DoFSC , REDD IC and FRTC, and MoALD, are designated as sectoral focal points. DoFSC will coordinate with provincial environment ministries (e.g., MoITFE), while MoALD will coordinate with provincial Ministries of Agriculture, Directorates, and Agriculture Knowledge Centers (AKCs). Both agencies shall ensure systematic collection and integration of data on emissions, mitigation (e.g., agroforestry, livestock), adaptation (e.g., climate-smart agriculture), and climate finance in coordination with academic and research institutions, universities, and relevant non-state actors. This coordination will facilitate the development of national emission factors, improve MRV methodologies, and enhance capacities at the federal, provincial, and local levels.

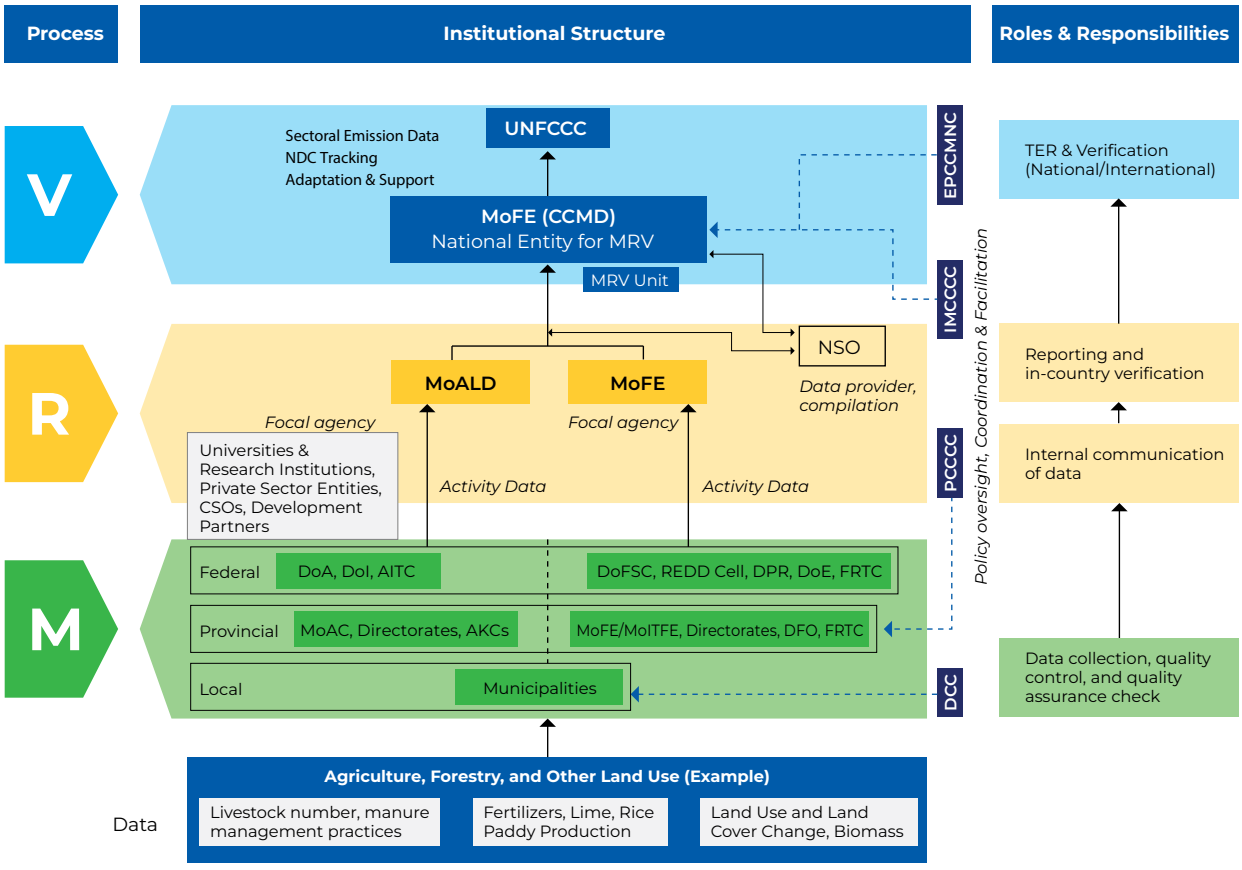


**Figure 10. MRV Framework for Institutional Arrangements in the AFOLU Sector in Nepal**

**(d) Waste Sector**

The waste sector is a critical component of Nepal's MRV system, contributing to national GHG emissions and offering significant potential for mitigation through improved waste management practices. MoFAGA is mandated to coordinate with local governments, and MoUD is designated as the focal agency for the waste sector under the national MRV framework. This includes collaboration with municipalities and line ministries such as MoFE, MoFAGA, MoWS, MOIC, and MoHP.

The MRV framework shall cover various waste streams, including municipal solid waste, wastewater, industrial waste, and medical waste. Municipalities are designated as the primary authorities responsible for aggregating and reporting waste-related data within their jurisdictions. They will collect data from institutions and private entities engaged in waste collection, transportation, and recycling, and are empowered to monitor waste generated by industries, health facilities, and water and sanitation systems. At the provincial level, the MoFAGA and MoFE shall serve as the focal agencies for MRV, coordinating with sectoral ministries and supporting local governments. District Coordination Committees (DCCs) shall facilitate horizontal coordination among municipalities and ensure smooth information flow across all administrative levels. Whereas academic and research institutions shall contribute to the MRV system strengthening through methodological development, research, and capacity-building. They will provide technical expertise, offer training programs, and support data analysis and policy formulation to improve environmental reporting and climate transparency.

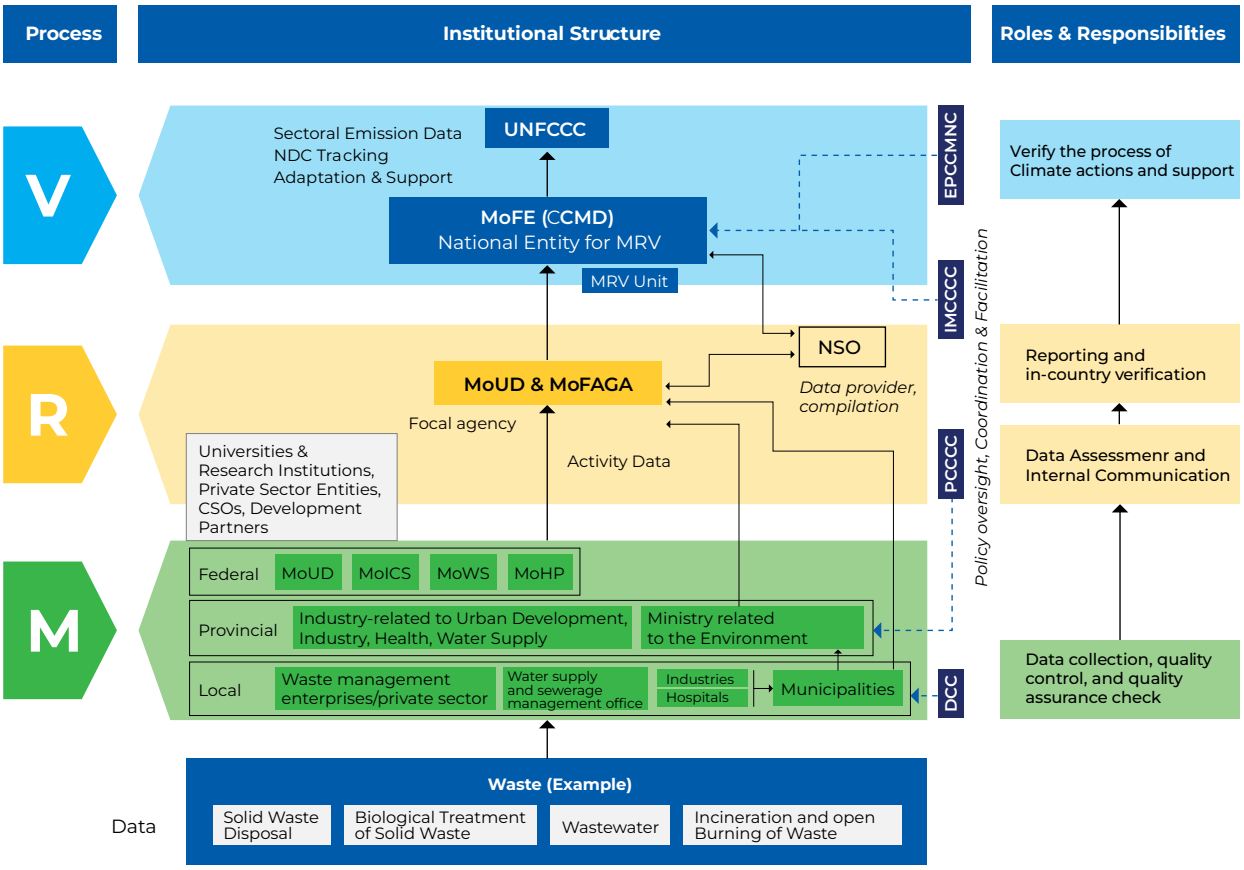


**Figure 11. MRV Framework for Institutional Arrangements in the Waste Sector in Nepal**

## 4.2 Adaptation

The adaptation MRV system of Nepal is designed to track progress on climate adaptation measures outlined in the NAP and communicate adaptation efforts through structured reporting mechanisms. The system aims to monitor the effectiveness of adaptation interventions, assess vulnerability reduction, and demonstrate progress toward building climate resilience across sectors and communities.

The adaptation MRV framework operates within the context of Nepal's ETF obligations and supports the preparation of Adaptation Communications as required under the Paris Agreement (Figure 12). This system integrates national-level policy tracking with community-based monitoring to provide comprehensive coverage of adaptation activities across diverse geographical and socio-economic contexts. The institutional arrangement for climate adaptation transparency and MRV workflow in Nepal involves a multi-tiered coordination mechanism led by the MoFE. The CCMD within MoFE acts as the focal agency responsible for aggregating and reporting adaptation data in alignment with the ETF of the Paris Agreement. NPC and sectoral ministries such as agriculture, water, health, and urban development are tasked with collecting adaptation-related data and indicators from their respective programs. Local governments, empowered by the Local Government Operation Act, implement and monitor adaptation activities on the ground, although they often lack capacity and standardized reporting tools. Provincial governments serve as intermediaries, helping to integrate data across levels. Data flows from local to federal levels through existing monitoring and evaluation systems. Strengthening coordination, defining roles, and building capacity are key to an effective adaptation of the MRV system. An adaptation MRV Database is provisioned to track the progress, outcomes, and finance through dedicated indicators, under the MoFE.

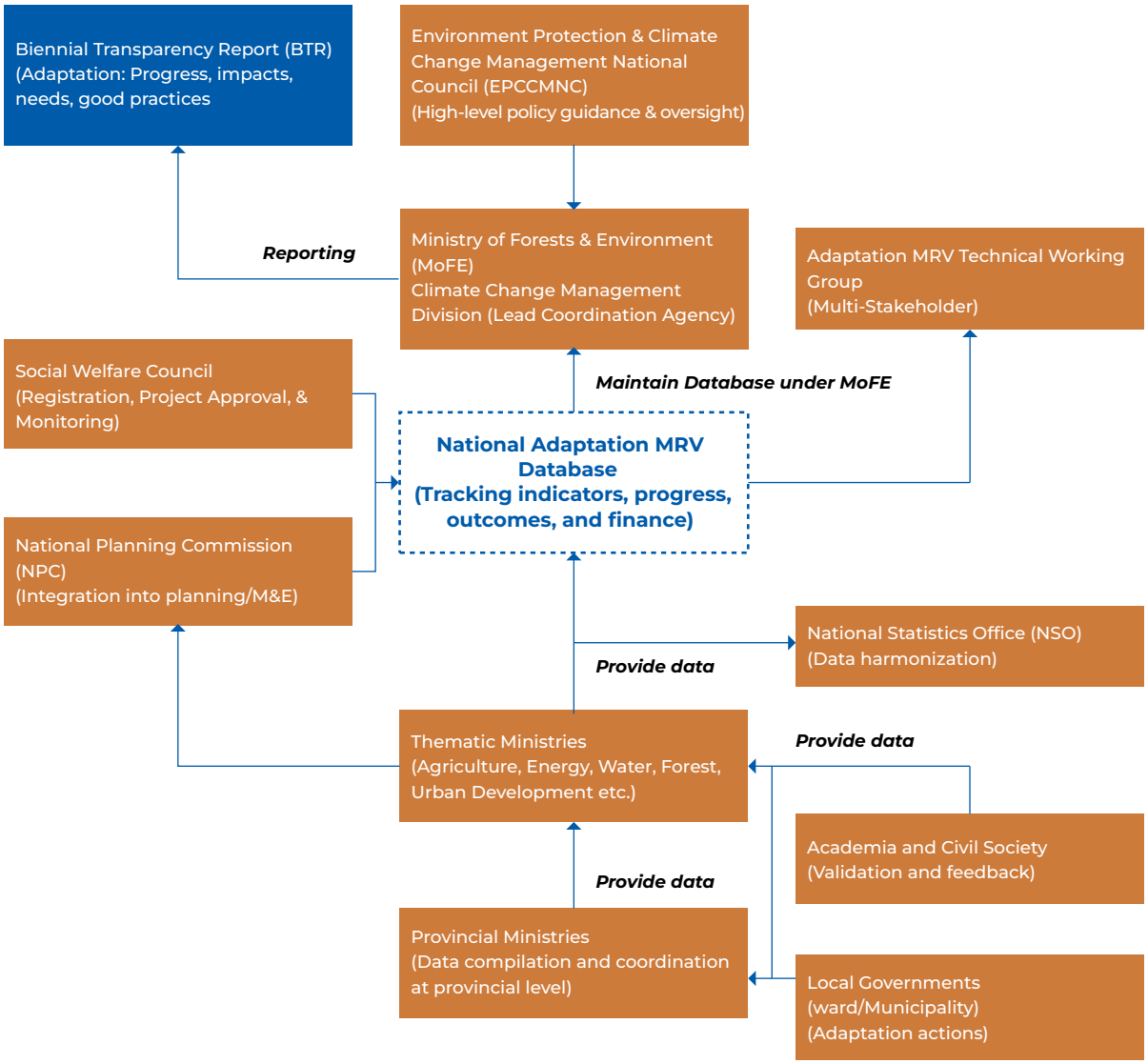


**Figure 12. MRV workflow for Adaptation Communication in Nepal**

### 4.2.1 Indicators and Tracking System for Adaptation Measures

The adaptation tracking framework follows sector-specific indicators as indicated by the NAP. The system follows a results-based monitoring approach, tracking inputs, activities, outputs, outcomes, and long-term resilience impacts while conducting regular vulnerability assessments to monitor changing climate risks and adaptive capacity. The BTR submitted to the UNFCCC includes adaptation priorities, progress, challenges, and lessons as follows:

**Table 6. Adaptation-related provisions of different entities in Nepal**

| Entity | Adaptation-related provisions |
|---|---|
| Environment Protection and Climate Change Management National Council | High-level climate policy oversight chaired by the Prime Minister |
| MoFE – Climate Change Management Division | National focal point for MRV; responsible for coordination, data aggregation, and reporting |
| Adaptation MRV TWG | Multi-stakeholder technical body that sets indicators, ensures QA/QC, and recommends improvements |
| National Adaptation MRV Information System | Central repository of adaptation MRV data, including indicators, finance, and outcomes |
| National Planning Commission (NPC) | Integrates adaptation indicators into national plans, M&E, and budget systems |
| Thematic Ministries | Lead sectoral adaptation tracking (e.g., MoHP for health, MoALD for agriculture) |
| Provincial Ministries | Coordinate the adaptation of MRV data from local levels, ensuring consistency and quality |
| Local Governments (Municipalities) | Implement LAPAs and collect local adaptation data |
| CBOs | Participate in grassroots adaptation and support bottom-up monitoring and evaluation |

### 4.2.2 Community-based and Local Reporting Mechanisms

Adaptation MRV recognizes the role of local communities in climate adaptation and incorporates bottom-up monitoring approaches. It engages local communities, Indigenous groups, and civil society, ensuring the GEDSI approach is adequately integrated in documenting adaptation actions and their effectiveness (e.g., through citizen science, local vulnerability assessments).

**Key Components of Nepal's Adaptation MRV System**

1. Promote transparency, better decision-making, and enhanced implementation of NAP through multi-stakeholder engagement, coordination, and cooperation
2. Transparently track adaptation finance received from various sources
3. Develop a web-based system and maintain a record of the support obtained
4. Establish a Climate Change Data Management, Monitoring, and Reporting Center
5. Collect data harmonized with the monitoring and evaluation processes for Nepal's Nationally Determined Contribution, Sustainable Development Goals, and Green, Resilient and Inclusive Development (GRID) strategic plan
6. Develop a new transparency and accountability framework to be developed as part of the Monitoring, Review and Reporting (MR&R) framework
7. Implement the Local Climate Adaptive Living (LoCAL) mechanism of the UNFCCC to channel climate finance to the local level in the form of Performance-Based Climate Resilient Grants

### 4.2.3 Support (Finance, Technology, Capacity-Building)

The MRV system tracks the mobilization, delivery, and utilization of climate finance, technology transfer, and capacity-building support for climate action (Figure 13). In this arrangement, designated government institutions, typically led by a central coordinating body such as the Ministry of Finance, are responsible for providing primary data and reporting related to climate finance, such as financial flows, technology deployment, and capacity-building initiatives. The MoF plays a key role in tracking climate-related budget allocations and expenditures, while sectoral ministries contribute data on support received and utilized within their domains. Coordination mechanisms, such as inter-ministerial committees and technical working groups, facilitate data sharing and alignment with national priorities. The arrangement also includes partnerships with development

partners, civil society, and subnational governments to ensure comprehensive coverage.

Nepal can make significant steps in establishing systems for MRV of climate finance, both from public and international sources, including the reporting from the Social Welfare Council (SWC). These efforts are crucial for ensuring transparency, accountability, and effective allocation of resources towards climate adaptation and mitigation.

**Key Components of Nepal's Climate Finance MRV System**

1. **Climate Change Budget Code (CCBC):** Introduced in 2012, the CCBC tags climate-related expenditures within the national budget, categorizing them based on their relevance to climate change activities. This system allows for better prioritization and tracking of climate finance across various sectors.
2. **Climate Change Financing Framework (CCFF):** Endorsed by the Ministry of Finance in 2017, the CCFF integrates climate considerations into national planning and budgeting processes. It supports the alignment of climate finance with national strategies for mitigation and adaptation, enhancing coordination at both national and local levels.
3. **Medium-Term Expenditure Framework (MTEF):** The MTEF links climate finance to policy targets, facilitating the integration of climate objectives into medium-term budgeting and planning.
4. **Provincial-Level Climate Budgeting:** Efforts have been made to extend climate budgeting to the provincial level, with provinces categorizing their budgets based on climate relevance.

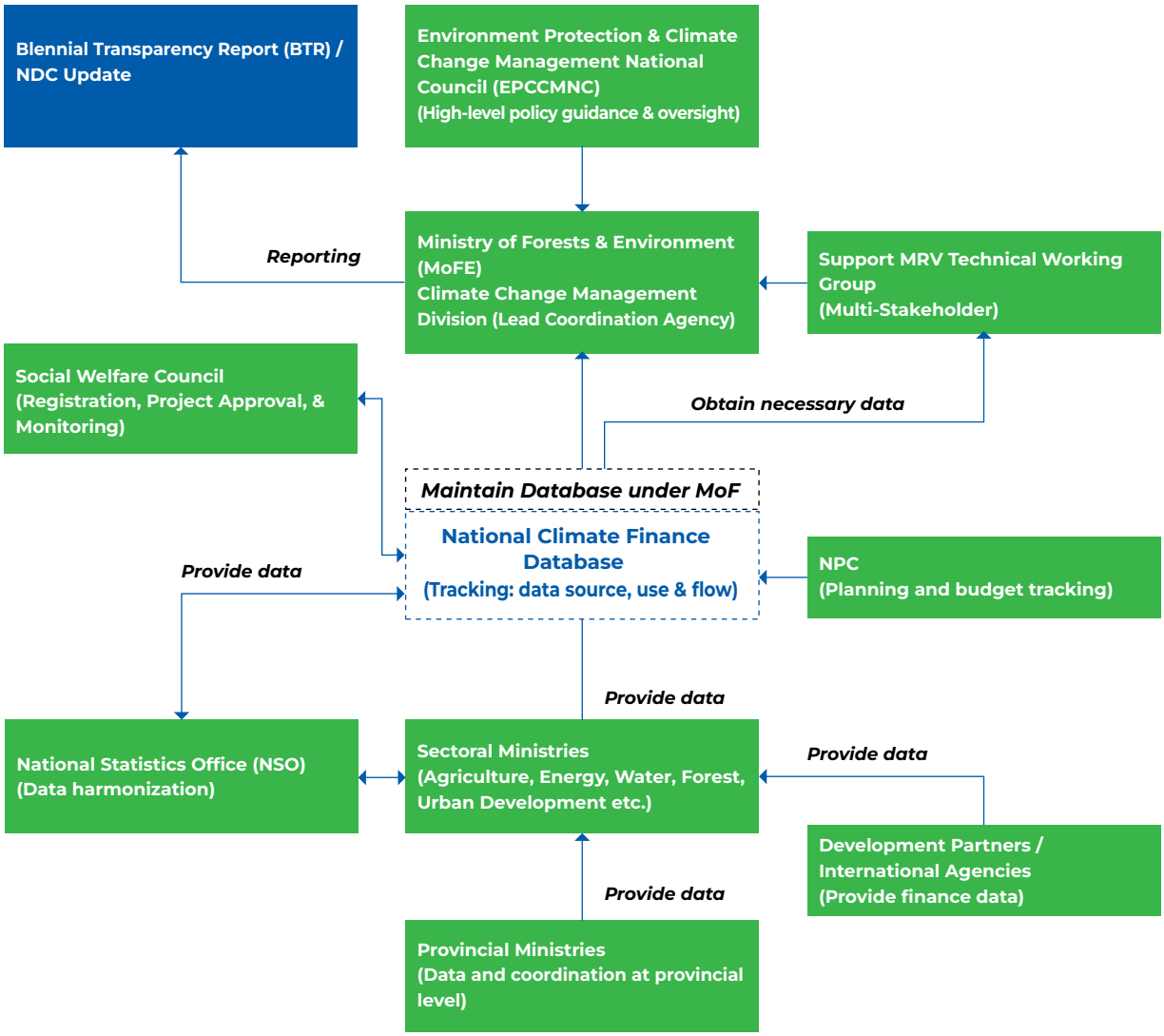


Figure 13. The MRV Framework for Support received, mobilized, and needed

Establishing legal mandates, standard reporting protocols, and digital data systems is crucial for operationalizing this institutional setup and aligning it with the ETF. A national climate finance database is envisioned to track the source, use, and flow of the 'Support' (Financial, Technical, and Capacity) under the MoF. This system serves dual purposes of monitoring support received from international sources and tracking domestic climate finance mobilization. The framework aligns with Enhanced Transparency Framework requirements for reporting on support needed, received, and provided. The support MRV system operates across three interconnected domains of finance, technology, and capacity building with robust tracking mechanisms to ensure transparency, accountability, and effectiveness of climate support utilization (Figure 14).

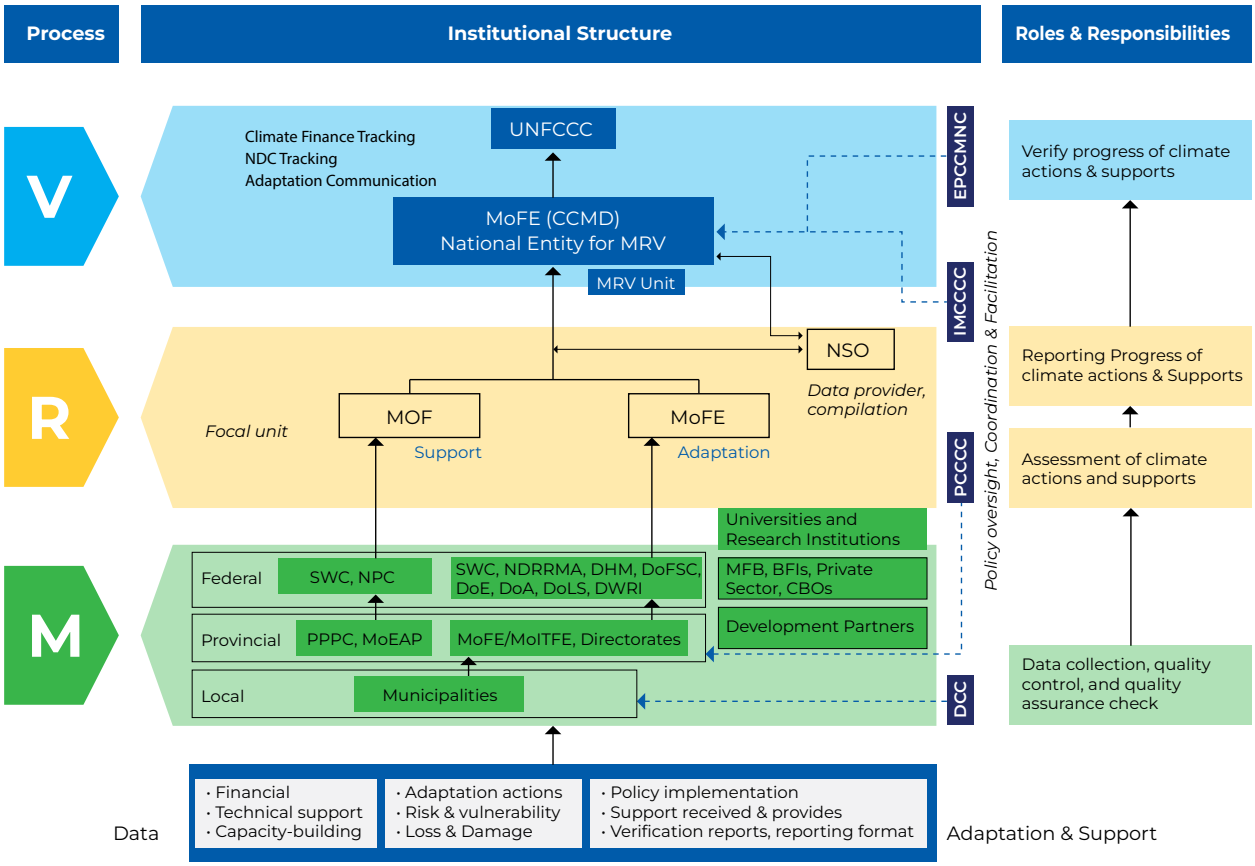


**Figure 14. MRV Framework for Institutional arrangements in Adaptation and Support**

# Chapter V

# Measurement, Data Systems, and Digital Tools

This chapter describes standardized data collection, verification, and digital integration in Nepal's MRV system for climate reporting. It discusses protocols like uniform data formats, submission schedules, confidentiality rules, and quality assurance through sectoral validation and independent audits. The national GHG inventory, managed by MoFE, uses IPCC guidelines and draws data from key sectors: energy, IPPU, AFOLU, and waste. Sector-specific platforms are discussed with the aim of supporting decentralized data gathering, and a centralized MRV platform is proposed to link all systems, ensure consistent national reporting, and interface with broader management information systems.

## 5.1 Data Collection Protocols and Standards

Nepal's MRV system emphasizes a structured and standardized approach to data collection across sectors to ensure consistency, quality, and timeliness. Key protocols and standards include:

a) **Standardized Data Formats:** All data are to be submitted in agreed-upon digital formats (e.g., Excel, CSV, shapefiles) with accompanying metadata to maintain consistency across sectors. Original documents will be retained at the data source level to serve as a reference and ensure traceability.

b) **Submission Timelines:** Clear and sector-specific submission schedules are defined, with annual or biennial timelines aligned with national and international reporting needs.

c) **Confidentiality and Access:** Protocols include clauses on data access rights, ownership, and confidentiality. Only authorized personnel can access sensitive information.

d) **Verification and QA/QC Measures**
- **Validation:** Sectoral agencies validate data by cross-checking with other datasets and established standards.
- **Independent Audits:** Third-party verification ensures accuracy and credibility.
- **Quality Assurance:** Regular training and adherence to IPCC guidelines and 2019 refinements are part of maintaining data integrity.

e) **Data-Sharing Agreements (DSAs):** When no legal mandate exists for data provision, formal DSAs are established to define the data flow process, responsibilities, and confidentiality requirements.

## 5.2 National GHG Inventory System, REDD+ SIS, and Sectoral MRV Platforms

### 5.2.1 National GHG Inventory System

- **Lead Coordination:** Managed by MoFE and coordinated by the CCMD.

- **IPCC Guidelines:** Nepal follows the 2006 IPCC Guidelines and the 2019 Refinement for all inventory sectors: Energy, IPPU, AFOLU, and Waste.

- **Data Sources**
  - **Energy & IPPU:** WECS, NEA, NOC, NSO, AEPC.
  - **Agriculture:** MoALD, Provincial Directorates, and Local Governments.
  - **Forestry (FOLU):** DoFC, FRTC, and REDD IC Implementation Centre.
  - **Waste:** Department of Health Services (DHS), Department of Water and Sewerage (DWSM), DoI, and Municipalities.

### 5.2.2 REDD+ SIS (Safeguards Information System)

- REDD+ Implementation Centre oversees REDD+ MRV and operates the National Forests Information System (NFIS).

- FRTC uses satellite imagery and field surveys to track forest carbon stock, deforestation, afforestation, and periodic land cover statistics

### 5.2.3 Sectoral MRV Platforms

- **Energy:** National Energy Information System (NEIS) by WECS.

- **Agriculture:**
  - AgriMIS (MoALD) for agricultural data.
  - NARC Knowledge Management System for research and publications.

- **Forestry:** NFIS used by the REDD IC.

- **Waste:** LISA Platform by MoFAGA to collect municipal-level data. NWASH platform by MoWS to monitor and manage water, sanitation, and hygiene.

These platforms ensure decentralized data collection feeding into centralized national reporting.

## 5.3 Centralized digital MRV platform (integration with national MIS)

An effective MRV system requires a framework for managing data and reporting. A centralized MRV platform is envisioned to link all systems, ensure consistent national reporting, and interface with broader management information systems. This includes the establishment of a centralized data repository, clear reporting mechanisms, and appropriate compliance and enforcement measures to ensure the quality and reliability of the data supplied by various actors (Figure 15).

The platform consists of a) Official setup, b) Institutional setup, and c) Procedural setup for the climate change adaptation, GHG emission, mitigation, and support components.

A centralized digital MRV platform, managed by the CCMD under the MoFE, can serve as the core repository for all climate-related data. This national repository shall serve as the main platform for storing and managing data submitted by sectoral focal institutions, local governments, private sector actors, NGOs, and development partners. It plays an important role in fulfilling Nepal's national and international reporting obligations, including GHG inventories, BTRs, NCs, and NDC tracking. The platform is being developed to interface seamlessly with sector-specific systems such as the National Energy Information System (NEIS), Agriculture Management Information System (AgriMIS), and the National Forests Information System (NFIS), while also aligning with the National Statistics Office (NSO) to maintain adherence to national statistical standards.

In the long term, the MRV platform aims to integrate with the broader national Management Information Systems (MIS) to enhance data coherence and interoperability across sectors, which includes coordination and collaboration with the Government of Nepal's Integrated Data Management Center (IDMC). Such coordination is expected to enable the sustainability of the national MRV system. Structured reporting mechanisms, including harmonized templates and scheduled reporting cycles, allow sectoral data to be compiled and processed centrally for national submissions. To ensure accountability and continuous data flow, compliance and enforcement measures are applied through legal instruments and data sharing agreements or arrangements, with regular monitoring of data quality and submission timeliness. Capacity-building programs and technical support are also provided to sectors and institutions with limited resources to strengthen their participation in the MRV system.

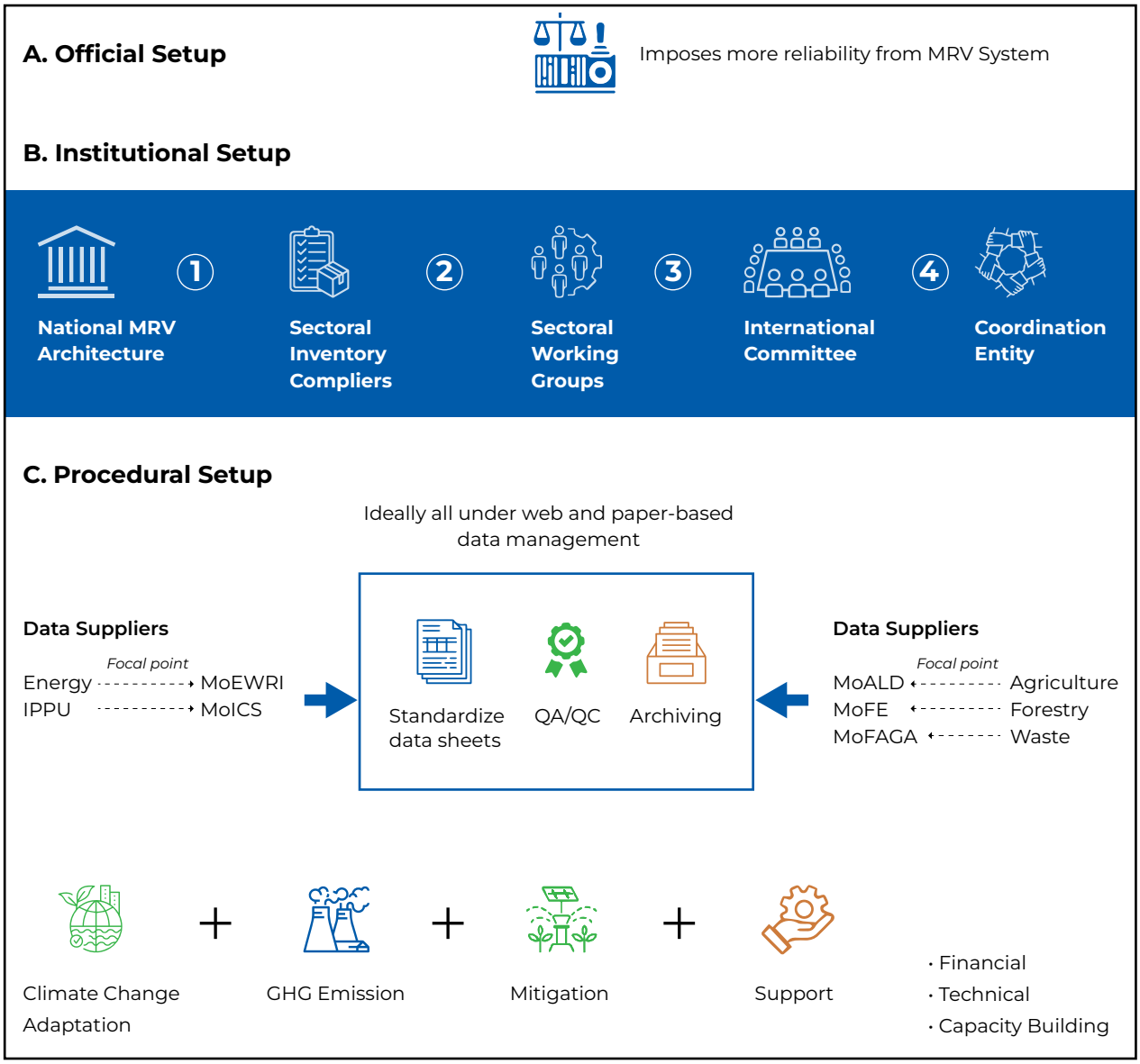


**Figure 15. A proposed centralized MRV platform for Nepal.**

# VI
# Chapter

# QA/QC, Verification, and Reporting

The Quality Assurance and Quality Control (QA/QC), verification procedures, and structured reporting systems play a central role in ensuring the credibility and usability of its MRV. This chapter elaborates on these key components that maintain the integrity, accuracy, and transparency of Nepal's MRV system, focusing on protocols across sectors, mechanisms for third-party and internal verification, and the reporting structure aligned with national and international obligations.

The verification and quality control are critical components of Nepal's MRV system, ensuring that all submitted data is accurate, reliable, and fit for national and international reporting. Verification and quality control processes ensure that the data feeding into Nepal's MRV system is robust and trustworthy, forming a strong foundation for effective climate policymaking, monitoring, and reporting. Therefore, data validation, independent verification, and quality assurance processes contribute to meeting the objective not only of climate change reporting but also of producing sectoral reports in tracking progress.

Data Validation: Before submission, sectoral focal institutions validate the data by cross-checking it with other data sets, ensuring consistency and alignment with national and international standards.

Independent Verification: Periodic audits and third-party verification shall be conducted to verify the accuracy and integrity of the data.

Quality Assurance: Capacity-building programs shall be implemented to ensure that all parties involved in data collection and reporting follow best practices for maintaining high data quality.

## 6.1 Quality Assurance and Quality Control (QA/QC) Protocols across Sectors

A robust Quality Assurance and Quality Control (QA/QC) system is fundamental to ensuring the credibility, transparency, and consistency of Nepal's Monitoring MRV framework. QA/QC applies systematically across all sectors: Energy, IPPU, AFOLU, and Waste to support evidence-based climate reporting and action.

QA/QC procedures are embedded within the institutional workflow at both sectoral and national levels. Line ministries and implementing agencies are responsible for conducting internal QA/QC processes on their respective data. This includes reviewing data completeness, validating activity data against historical trends, and using standardized templates and methods aligned with Intergovernmental Panel on Climate Change (IPCC) guidelines.

The national MRV framework adopts QA/QC protocols based on the 2006 IPCC Guidelines and the 2019 Refinement. These protocols apply tiered methodologies and quality standards suited to each sector's data type, institutional capacity, and reporting frequency.

All submitted data undergo a secondary review by a designated Technical Expert Group (TEG), mandated to assess compliance with national standards and IPCC methodologies. TEG evaluates emission factors, activity data, and methodological choices and identifies any inconsistencies or gaps prior to final data consolidation. Their oversight ensures methodological rigor and harmonization across all sectors. Through the national MRV framework, the Government of Nepal shall institutionalize QA/QC protocols through official arrangements and an applicable format, build technical capacities, and develop digital tools for documentation and traceability. This approach will support continuous improvement and enable Nepal to meet its international climate transparency commitments under ETF.

**Key features of Nepal's QA/QC protocols may include,**

- Standardized data collection formats and templates, developed and shared with all data providers to ensure consistency
- Defined responsibilities and data flow mechanisms, where focal points in sectoral ministries review data at the source before submission to the central MRV Unit
- Metadata requirements, ensuring every dataset is accompanied by comprehensive contextual information (e.g., source, methodology, assumptions)
- Error-checking tools and feedback loops, embedded into the centralized MRV digital platform for real-time detection and correction of inconsistencies
- Regular capacity-building and training programs to ensure all stakeholders, from municipal data collectors to national analysts, understand and implement QA/QC protocols

To operate QA/QC, the MRV system incorporates a QA/QC Plan, a QA/QC Log, and a Continuous Improvement Plan. These instruments ensure that the quality of data is not only monitored but also improved over time through structured, documented feedback and learning.

Furthermore, at the provincial and local levels, preliminary data reviews are carried out by designated officers who ensure completeness and internal consistency before data is transmitted upward. This multi-tiered review structure provides a strong foundation for high-integrity national data aggregation.

## 6.2 Internal and External (Third-Party) Verification Procedures

Verification is the process of independently reviewing and evaluating reported climate data to determine whether it accurately reflects activities on the ground. Nepal's MRV system ensures credibility through internal validation by sectoral agencies and external, independent third-party verification mechanisms.

Once submitted, the data undergoes technical scrutiny by the MRV Unit or Expert Review Group, which serves as the central authority for assessing methodological soundness and ensuring compliance with IPCC guidelines. This review provides an additional layer of quality assurance through the evaluation of data inputs, assumptions, and reporting formats.

### 6.2.1 Internal Verification

Internal verification is handled by the MRV Unit under the CCMD of the MoFE. This unit plays a role in (a) coordinating sectoral reviews and ensuring data complies with IPCC standards and national reporting requirements, (b) reconciling conflicting datasets through triangulation, especially in cases where data is sourced from multiple institutions, and (c) maintaining data archives and version control, which enables tracking changes and reviewing previous submissions for consistency.

Each line ministry is responsible for conducting initial data checks before submitting activity data or emission data to the CCMD MRV Unit. These include checking for gaps, duplicate entries, and discrepancies in units or timelines. Any anomalies identified are communicated back to the data producers for clarification or correction. This feedback loop reinforces data quality at the source and minimizes errors in national-level compilations.

### 6.2.2 External Verification

While internal mechanisms ensure data integrity within the national system, third-party verification is vital for enhancing the credibility of reports used for international communication and climate finance access. In addition, third-party verification through audits and independent reviews is periodically conducted, particularly for sensitive or complex datasets. This independent assessment enhances the credibility of Nepal's submissions under the ETF of the Paris Agreement.

**Independent audits are proposed especially for:**

- National GHG Inventories
- Climate finance tracking and results-based finance
- Adaptation performance and impact evaluation

Independent verification is expected to follow international best practices and may be conducted by accredited domestic or international organizations with expertise in climate reporting, emissions accounting, and climate finance. The use of third-party auditors aligns with increasing global demand for verifiable data, especially from development partners and climate finance institutions like the Green Climate Fund (GCF) and the Global Environmental Facility (GEF).

This two-layered verification structure, internal technical review and external audit, enhances the trustworthiness of Nepal's MRV outputs and ensures alignment with the Paris Agreement's transparency goals.

## 6.3 Reporting Structure

The reporting structure of BTR, the National Inventory Report (NIR), and other transparency mechanisms shall be prepared by the MoFE, CCMD, in compliance with the Modalities, procedures, and guidelines MPG) for the transparency framework for action and support referred to in Article 13 of the Paris Agreement. Sectoral ministries submit their validated and reviewed data to CCMD. CCMD MRV unit shall calculate the data in the required format or on an as-needed basis, which will be further integrated into national reports. Before final submission, the data and associated reports are reviewed by the appropriate technical body, which confirms whether the information aligns with IPCC guidelines and national standards. To support public transparency, the government plans to operationalize a centralized digital MRV portal, which shall act as the main public-facing platform for accessing climate-related data. The portal shall include information on GHG emissions, mitigation and adaptation efforts, and climate finance, serving as a tool for accountability, stakeholder engagement, and international reporting. This system shall strengthen transparency and help meet obligations under the UNFCCC and the Paris Agreement.

# VII
# Chapter

# MRV Roadmap

This chapter outlines Nepal's strategic roadmap for institutionalizing a national MRV framework in line with Nepal's NDC 3.0 to establish and implement a comprehensive MRV system. The implementation phases include short-term foundational setup, medium-term scaling, and long-term integration into national policies. Key priorities include establishing legal mandates, strengthening institutional capacities, developing centralized digital systems, and conducting stakeholder training. Legal recommendations include enacting climate legislation and formalizing a data-sharing agreement. Financing strategies involve domestic budgeting, public-private partnerships, carbon markets, and international climate finance. Capacity building spans all governance levels, focusing on technical training and MRV integration into academia. The chapter emphasizes establishing independent verification, enhancing QA/QC procedures, and aligning reporting with global standards to ensure transparency, accountability, and long-term sustainability.

## 7.1 Phased Implementation Plan

The MRV system of Nepal is proposed to be gradually institutionalized and implemented to fulfill international ETF obligations, strengthen climate governance, and inform national policy and planning with credible data and evidence-based reporting. Nepal's MRV framework can be implemented through a systematic approach by accommodating it in the existing legal architecture and institutional capabilities.

Figure 16 provides a step-wise implementation of the proposed MRV framework. Key legal foundations include the Environment Protection Act (2019), National Climate Change Policy (2019), and National Adaptation Plan (2021–2050). The MoFE should lead MRV coordination, with support from institutions like the NPC, NSO, DHM, MoF, and local governments. A national MRV system shall incorporate GHG inventories, finance tracking, and adaptation monitoring, all linked to a digital platform. Capacity-building through SOPs, training, and verification systems is essential. Finally, MRV outputs must inform national reporting to the UNFCCC and support transparent, evidence-based planning and accountability at all governance levels.


**Figure 16. Steps to integrate MRV framework into Nepal's existing system.**

The MRV Implementation Plan outlines a strategic approach for the roll-out of the MRV framework over a five-year period, structured into three distinct phases: short-term (1-2 years), medium-term (2-4 years), and long-term (5+ years). This plan aims to progressively strengthen the implementation of MRV systems in the real world. In the short term, efforts shall focus on establishing foundational systems and pilot projects, followed by scaling and refinement in the medium term, and achieving full integration and sustainability in the long term. This phased approach ensures a robust and adaptive MRV system, driving continuous improvement and ensuring alignment with national and international standards.

**Table 7 a. Workplan for the establishment of the MRV System**

| Phase | Key Activities | Details |
|---|---|---|
| **Short Term (Immediate)** | Institutional Setup and Initial Preparations | • Establish the central MRV coordination unit within the CCMD<br>• Designate sector-specific MRV focal agencies (Energy, IPPU, AFOLU, Waste) and focal points on three levels of government<br>• Formalize a formal data sharing mechanism |
| | Design the MRV Database and Software | • Develop the architecture for the centralized MRV database<br>• Design software and tools for data collection, management, and reporting |
| | Pilot MRV Implementation in Priority | • Pilot in 2,3 priority sectors (e.g., Energy, Agriculture, Forestry, and Transport)<br>• Identify emission sources, indicators, and data gaps |
| | Capacity Building | • Conduct training workshops for agencies and stakeholders on MRV data collection, validation, and reporting<br>• Provide training on MRV software and tools |
| | Develop Data Collection Templates | • Finalize and test standardized data collection templates for priority sectors<br>• Align templates with international guidelines (IPCC) |
| **Medium Term** | Full Rollout of MRV System | • Expand the MRV system to cover all relevant sectors<br>• Implement full-scale, integrated data collection, reporting, and verification systems. |
| | Establish Independent Verification Systems | • Set up independent verification mechanisms for MRV data<br>• Develop procedures for external verification of emissions and climate actions |
| | Full Integration with National Planning | • Integrate the MRV system into national climate planning & policy<br>• Ensure MRV data informs NDCs and other climate commitments |
| | Submit System-generated Reports | • Compile MRV data for the first BTR submission<br>• Ensure the BTR meets transparency and accuracy requirements under the ETF |
| **Long Term** | Establish MRV Compliance Monitoring | • Set up systems for monitoring MRV compliance within sectors<br>• Ensure ongoing data collection and regular updates for transparency and accountability |
| | Prepare and submit subsequent reports to the UNFCCC and other needed domains. | • Prepare high-quality data (tier 2,3) for the subsequent reports<br>• Conduct reviews, update portal on a regular basis to ensure alignment with international standards and procedures |

**Table 7b. Capacity Building plan to strengthen the MRV system**

| Timeframe | Capacity Building Activities | Target Group | Expected Outcomes | Responsible Stakeholder |
|---|---|---|---|---|
| Short-Term | Deliver basic MRV and QA/QC training | Government ministries, sectoral focal agencies, and local government | Increased awareness about the MRV framework<br>Basic MRV skills developed at the national and local levels | MoFE, MRV Coordination Unit, Sectoral Focal Agencies, Local Governments |
| | Establish sectoral MRV focal points and dedicated teams. | Sectoral MRV focal points (Energy, AFOLU, IPPU, Waste) | Sector-specific MRV teams are in place, ensuring data ownership and management | MoFE, Sectoral Ministries (Energy, IPPU, AFOLU, Waste), Local Governments |
| | Introduce and train standardized tools for data collection and reporting. | Sectoral MRV focal points (Energy, AFOLU, IPPU, Waste) | Implementation of standardized tools and systems for data entry, validation, and submission | MoFE, Sectoral Ministries (Energy, IPPU, AFOLU, Waste), Local Governments |

| Timeframe | Capacity Building Activities | Target Group | Expected Outcomes | Responsible Stakeholder |
|---|---|---|---|---|
| Medium-Term | Conduct advanced training in data analysis, error detection, and QA/QC techniques. | Sectoral experts, MRV officers | a) Enhanced technical capacity for data validation, QA/QC procedures, and error correction<br>b) Improved sectoral collaboration | Sectoral Focal Agencies, Industry Representatives, MRV Coordination Unit |
| | Organize sector-specific MRV workshops to address sectoral challenges and share best practices and innovations | Sectoral focal agencies, industry representatives | Tailored solutions for sector-specific MRV issues, improved collaboration between sectors, and exchange of best practices | Sectoral Focal Agencies, Industry Representative, MRV Coordination Unit |
| | Integrate MRV into academic curricula aligned with global standards. | Academic institutions, research organizations | Knowledge development from the grassroots level to international practices | MoFE, Academic institutions, research organizations |
| Long-Term | Embed MRV in national policy and formalize roles within institutions. | MoFE, Sectoral ministries | The MRV system is fully institutionalized with a clear legal and policy framework. | MoFE, Ministry of Finance, Sectoral Ministries, Local Governments |
| | Establish a mechanism for continuous capacity development support, such as specialized training and classes for senior decision-makers and technical experts. | MoFE, Sectoral Ministries | Expertise in global MRV standards, international reporting methodologies, and best practices | MoFE, Sectoral Ministries, International Climate Agencies, Foreign Partners |
| | Establish an MRV Research and Development Center to drive continuous research on innovation and context-based solutions for Nepal. | Academic institutions, research organizations | A sustainable, self-reliant MRV capacity-building model, fostering innovation in data management and reporting. | MoFE, Academic Institutions, Research Organizations |
| | Integration of Remote Sensing & Big Data to enhance inventory and timeliness. (e.g., satellite data for AFOLU, waste delivery data from the disposal site) | MoFE, IT, and Remote Sensing Experts, AI experts | Improved data accuracy, precision, and timeliness in GHG inventory and reporting. | MoFE, Environmental Agencies, IT and Remote Sensing Experts |

## 7.2 Financing MRV System Development

The long-term success of Nepal's MRV system depends on sustainable financing, institutional stability, and innovative, context-specific solutions. Given Nepal's diverse geography, evolving institutional structures, and limited private sector engagement, a multi-pronged financing strategy is essential. This strategy identifies actionable pathways to mobilize resources, strengthen partnerships, and institutionalize MRV within national systems.

### Strategic Measures for Financing and Sustainability

**a) Domestic Fund Allocation**

To ensure long-term sustainability and national ownership, domestic resource mobilization is a priority. Sectoral ministries such as MoEWRI, MoICS, MoALD, and MoFAGA shall allocate dedicated funding for MRV-related data generation and monitoring for respective thematic areas. Additionally, a portion of collected environmental taxes (e.g., on vehicles, industries, and waste management) could be earmarked to support sector-specific MRV systems, providing a steady, self-sustaining source of finance.

**b) Public–Private Partnerships (PPPs) for MRV Infrastructure**
Collaborative arrangements between public agencies and private sector actors can support the development and maintenance of MRV infrastructure. Entities such as the Nepal Electricity Authority (NEA), the Alternative Energy Promotion Centre (AEPC), and private technology firms can play key roles in deploying emissions monitoring systems and data platforms. To incentivize private sector participation, the Government may offer cooperation agreements, tax incentives, or subsidies for businesses that contribute to or comply with MRV processes.

**c) Engagement with Carbon Markets**
Revenue generated through participation in national or international carbon markets can be reinvested into MRV systems. Nepal shall explore linking domestic carbon initiatives with global carbon pricing instruments to leverage climate finance opportunities. These funds can support data collection, verification systems, and capacity-building efforts.

**d) Integration into National Development Planning**
Institutionalizing MRV in national development and climate strategies will secure long-term political and financial commitment. MRV infrastructure and activities should be embedded in Nepal's NDCs, Climate Resilience Plans, and budgetary frameworks to enable sustained domestic and international financing.

**e) Mobilization of International Support**
Nepal shall continue to access international climate finance from mechanisms such as the Green Climate Fund (GCF), Global Environment Facility (GEF), and Adaptation Fund. Additionally, investments from global development institutions and climate-focused investors can support technology transfer, institutional strengthening, and capacity development.

## 7.3 Next Steps for Operationalization and Review

To ensure the effective implementation of Nepal's MRV system, the immediate strategic priority is the full operationalization and institutionalization of the national MRV framework. This process includes the formal endorsement of institutional mandates and adoption of operational protocols, which define roles, responsibilities, and coordination mechanisms across key ministries, departments, and agencies.

It is acknowledged that a robust governance structure must be established and reinforced to ensure that data on greenhouse gas (GHG) emissions, mitigation efforts, adaptation measures, and climate finance (support received and provided) are collected, processed, verified, and reported consistently. These actions must align with the Enhanced Transparency Framework (ETF) under the Paris Agreement and contribute to fulfilling Nepal's international commitments.

The operationalization of the MRV system entails the following core elements:

- Establishment of data-sharing systems among institutions to facilitate efficient data flow and minimize duplication
- Institutionalization of Quality Assurance and Quality Control (QA/QC) procedures to ensure data credibility and consistency
- Regular review cycles to monitor progress and incorporate feedback into system improvements
- Vertical and horizontal institutional coordination, linking federal, provincial, and local levels, as well as cross-sectoral collaboration, for harmonized MRV implementation

Simultaneously, sustained investment in national capacity building is critical. This includes tailored training, mentorship, and knowledge transfer to technical personnel involved in GHG inventory compilation, indicator development, and tracking of adaptation and mitigation actions. Capacity development must also focus on enhancing digital literacy, enabling effective use of MRV tools, templates, and reporting platforms. These efforts are foundational to tracking progress toward Nepal's NDC 3.0 and ensuring the timely preparation and submission of the BTR to the UNFCCC. Through this national framework, the Ministry of Forests and Environment notes that a mechanism for continuous improvement, including periodic assessment of the MRV system's legal, technical, and institutional dimensions, must be institutionalized. A feedback loop enhanced by the formal MRV system will foster accountability, ensure transparency, and reinforce Nepal's long-term climate ambition.

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# Annexes

## Annex 1- Stakeholder Mapping Matrix

**Table AI(a). Stakeholder Mapping and Classification: Energy Sector**

| Category | Stakeholder Group | Specific Entities |
|---|---|---|
| Government Agencies/ Bodies | Leadership | Sector Lead: MoEWRI<br>In coordination witj: MoICS, and MoPIT |
| | Coordination and Facilitation | IMCCCC, NPC, CCMD, PCCCC, PPC |
| | Data Providers | Federal: NSO, WECS, ERC, AEPC, DoED, DoTM, DoI, NEA, NOC, DoC, NAST<br>Provincial: Provincial Energy related ministry, Provincial Policy and Planning Commission, Provincial Statistics Offices<br>Local level: Local governments (Metropolitan Cities, Sub-metropolitan Cities, Municipalities, Rural Municipalities) |
| Academic and Research Institutions | Knowledge Generation and Expert Support | Universities, Research Institutions, and Think Tanks |
| Private Sector | Data Providers | Private sector entities and their associations<br>IPPAN, FNCCI, CNI |
| Civil Society and Indigenous Peoples and Local Communities | Data Providers | CSOs engaged in the generation and communication of energy-related information |

**Table AI(b). Stakeholder Mapping and Classification: Industrial Processes and Product Use (IPPU)**

| Category | Stakeholder Group | Specific Entities |
|---|---|---|
| Government Agencies | Leadership | Sector Lead: MoICS |
| | Coordination and Facilitation | IMCCCC, NPC, CCMD, PCCCC, PPC |
| | Data Providers | Federal: NSO, DoI, DoC |
| Academic and Research Institutions | Knowledge Generation and Expert Support | Universities, Research Institutions and Think tanks |
| Private Sector | Data Providers | Cement and Steel Manufacturers, FNCCI, CNI |
| Civil Society and Indigenous Peoples and Local Communities | Data Providers | CSOs engaged in generation and communicating of industry related information |

**Table AI(c). Stakeholder Mapping and Classification: Agriculture**

| Category | Stakeholder Group | Specific Entities |
|---|---|---|
| Government Agencies | Leadership | Sector Lead; MoALD |
| | Coordination and facilitation | Agriculture and industry-related ministry in the Province, IMCCCC, NPC, CCMD, PCCCC, PPC |
| | Data Providers | Federal: NSO, DoA, DoLS, NARC<br><br>Province: Agriculture Development Directorate, Livestock and Fishery Development Directorate, Agriculture Knowledge Centers, Veterinary Hospitals and Livestock Services Centers<br><br>Sector Local: Local governments (Metropolitan Cities, Sub-metropolitan Cities, Municipalities, Rural Municipalities) |
| Academic and Research Institutions | Knowledge Generation and Expert Support | Universities, Research Institutions, and Think tanks |
| Private Sector and Bank and Financial Institution | Data Providers | Agriculture cooperatives, Banks |
| Civil Society and Indigenous Peoples and Local Communities | Data Providers | Civil society organization engaged in the generation and communication of agriculture-related information |

**Table AI(d). Stakeholder Mapping and Classification: Forestry and Other Land Use**

| Category | Stakeholder Group | Specific Entities |
|---|---|---|
| Government Agencies | Leadership | Sector Lead: MoFE<br><br>Ministry of Land Management, Cooperatives and Poverty Alleviation |
| | Coordination and facilitation | Provincial ministries related to forest and land use, IMCCCC, NPC, CCMD, PCCCC, PPC |
| | Data Providers | Federal: NSO, DoFSC, FRTC, REDD Implementation Centre, DoS, DoLMA<br><br>Provincial: Forest Directorate, Division Forest Offices, Soil and Watershed Conservation office |
| Academic and Research Institutions | Knowledge Generation and Expert Support | Universities, Research Institutions, and Think tanks |
| Private Sector | Data Providers | FNCCI, CNI, Wood, and Non-Timber Forest Products industries |
| Civil Society and Indigenous Peoples and Local Communities | Data Providers | Civil society organization engaged in the generation and communication of forest and land use-related information |

**Table AI(e). Stakeholder Mapping and Classification: Waste Sector**

| Category | Stakeholder Group | Specific Entities |
|---|---|---|
| Government Agencies | Leadership | Sector Lead: MoUD<br>In coordination with:<br>MoFAGA<br>MoFE<br>MoUD<br>MoHP<br>MoWS<br>MoICS |
| | Coordination and facilitation | Provincial ministries related to forest and land use, IMCCCC, NPC, CCMD, PCCCC, PPC |
| | Data Providers | Federal: NSO, KVWSMB, NWSC, KUKL, DHS, DoI, DWSM<br>Local: Municipalities |
| Academic and Research Institutions | Knowledge Generation and Expert Support | Universities, Research Institutions, and Think Tanks |
| Private Sector | Data Providers | Private Waste Collection Companies, Recycling Industries, Composting Firms, Waste to Energy Companies, Private Septic Tank Cleaners |
| | Data Providers | Hospitals and Healthcare facilities, Hospitality Sector (Hotels and Restaurants), Industrial Zones and Industries |
| Civil Society and Indigenous Peoples and Local Communities | Data Providers | Civil society organization engaged in the generation and communication of waste-related information |

**Table AI(f). Stakeholder Mapping and Classification: Adaptation and Support**

| Category | Stakeholder Group | Specific Entities |
|---|---|---|
| Government Agencies | Leadership | Lead: MoFE<br>Ministry of Finance (MoF)<br>Sector Ministries |
| | Coordination and facilitation | **Federal:**<br>CCMD<br>Climate Finance Unit/International Economic Cooperation Coordination/MoF<br>NPC<br>National Disaster Risk Reduction and Management Authority<br>Provincial: PCCCC, Provincial ministries related to Forest, Environment, and Climate Change related Ministries<br>Local: Infrastructure and Environment Management Sections under Local Government |
| | Database Management | Climate Change Data Management, Monitoring and Reporting Centre (CCDMMRC) |
| | Data Providers | Intra-government agencies related to climate change adaptation implementation at the Federal, Provincial, and Local levels. |
| Academic and Research Institutions | Knowledge Generation and Expert Support | Universities, Research Institutions, and think tanks related to climate change adaptation implementation |
| Private Sector | Data Providers | Private sector entities related to climate change adaptation implementation |
| Civil Society and Indigenous Peoples and Local Communities | Data Providers | A civil society organization engaged in climate change adaptation implementation |

# Annex 2: Energy, IPPU, and Waste data GHG Emission Inventory Data Requirement Template for Nepal

The information in the Energy, IPPU, and Waste data requirement templates has been designed to be complementary with the IPCC software and is designed to facilitate the use of this software. The data requirements in the templates are based on the methodological requirements set out in the IPCC 2006 Guidelines. The IPCC 2019 Refinement has not yet been formally approved and adopted under the Convention. However, in certain cases, the Data Requirements Templates incorporate data requirements from the 2019 Refinement, where its use is considered best practice.

## 1. Energy Data Requirements in the 2006 IPCC Guidelines

"This Energy GHG Emission Inventory Data Requirement Template for Nepal has been prepared by Ross Hunter Independent Consultant from the US EPA."

**Country: NEPAL**
**Inventory Year: _____(each year for BTR)**

### Fuel Content

The table below outlines the default net calorific values (NCV) (TJ/Gg) and carbon context (NC) (kg C/ GJ) used to compile emissions estimates. Please review and provide any country-specific/ replacement conversion factors, with associated source and brief rationale.

**Liquid Fuels**

| Fuel | Net Calorific Value (NCV) (TJ/Gg) | Carbon Content (NCV) (kgC/GJ) | Replacement Net Calorific Value (NCV) or Gross Calorific Value (GCV) | Rationale and data source for replacement NCV/GCV |
|---|---|---|---|---|
| Aviation Gasoline (Jet/Aviation Gasoline) | 44.3 | 19.1 | | |
| Bitumen | 40.2 | 22 | | |
| Crude Oil | 42.3 | 20 | | |
| Ethane | 46.4 | 16.8 | | |
| Gas/Diesel Oil | 43 | 20.2 | | |
| Jet Gasoline | 44.3 | 19.1 | | |
| Jet Kerosene | 44.1 | 19.5 | | |
| Liquified Petroleum Gases | 47.3 | 17.2 | | |
| Lubricants | 40.2 | 20 | | |
| Motor Gasoline | 44.3 | 18.9 | | |
| Naphtha | 44.5 | 20 | | |
| Natural Gas Liquids | 44.2 | 17.5 | | |
| Orimulsion | 27.5 | 21 | | |
| Other Kerosene | 43.8 | 19.6 | | |
| Other Petroleum Products | 40.2 | 20 | | |
| Paraffin Waxes | 40.2 | 20 | | |

| Fuel | Net Calorific Value (NCV) (TJ/Gg) | Carbon Content (NCV) (kgC/GJ) | Replacement Net Calorific Value (NCV) or Gross Calorific Value (GCV) | Rationale and data source for replacement NCV/GCV |
|---|---|---|---|---|
| Petroleum Coke | 32.5 | 26.6 | | |
| Refinery Feedstocks | 43 | 20 | | |
| Refinery Gas | 49.5 | 15.7 | | |
| Residual Fuel Oil | 40.4 | 21.1 | | |
| Shale Oil | 38.1 | 20 | | |
| White Spirit and SBP | 40.2 | 20 | | |

**Solid Fuels**

| Fuel | Net Calorific Value (NCV) | Carbon Content (NCV) (kgC/GJ) | Replacement Net Calorific Value (NCV) or Gross Calorific Value (GCV) | Rationale and data source for replacement NCV/GCV |
|---|---|---|---|---|
| Anthracite | 26.7 | 26.8 | | |
| Blast Furnace Gas | 2.47 | 70.8 | | |
| Brown Coal Briquettes | 20.7 | 26.6 | | |
| Coal Tar | 28 | 22 | | |
| Coke Oven Coke/ Lignite Coke | 28.2 | 29.2 | | |
| Coke Oven Gas | 38.7 | 12.1 | | |
| Coking Coal | 28.2 | 25.8 | | |
| Gas Coke | 28.2 | 29.2 | | |
| Gas Works Gas | 38.7 | 12.1 | | |
| Lignite | 11.9 | 27.6 | | |
| Oil Shale/Tar Sands | 8.9 | 29.1 | | |
| Other Bituminous Coal | 25.8 | 25.8 | | |
| Oxygen Steel Furnace Gas | 7.06 | 49.6 | | |
| Patent Fuel | 20.7 | 26.6 | | |
| Sub-Bituminous Coal | 18.9 | 26.2 | | |

**Other Fuels**

| Fuel Type | Fuel | Net Calorific Value (NCV) | Carbon Content (NCV) (kgC/GJ) | Replacement Net Calorific Value (NCV) or Gross Calorific Value (GCV) | Rationale and data source for replacement NCV/GCV |
|---|---|---|---|---|---|
| Gaseous Fuels | Natural Gas (Dry) | 48.0 | 15.3 | | |
| Other Fossil Fuels | Industrial Wastes | N/A | 39 | | |
| | Municipal wastes (non-biomass fraction) | 10.0 | 25 | | |

| Fuel Type | Fuel | Net Calorific Value (NCV) | Carbon Content (NCV) (kgC/GJ) | Replacement Net Calorific Value (NCV) or Gross Calorific Value (GCV) | Rationale and data source for replacement NCV/GCV |
|---|---|---|---|---|---|
| | Waste Oil | 40.2 | 20 | | |
| Peat | Peat | 9.76 | 28.9 | | |
| Biomass - Solid | Charcoal | 29.5 | 30.5 | | |
| | Other Primary Solid Biomass | 11.6 | 27.3 | | |
| | Wood/ Wood Waste | 15.6 | 30.5 | | |
| Biomass - Liquid | Biodiesels | 27 | 19.3 | | |
| | Biogasoline | 27 | 19.3 | | |
| | Other Liquid Biofuels | 27.4 | 21.7 | | |
| | Sulphite Lyes (Black Liqor) | 11.8 | 26 | | |
| Biomass - Gas | Landfill Gas | 50.4 | 14.9 | | |
| | Other Biogas | 50.4 | 14.9 | | |
| | Sludge Gas | 50.4 | 14.9 | | |
| Biomass - Other | Municipal Waste | 11.6 | 27.3 | | |

### Energy and Manufacturing Industries

Please provide fuel consumption data for the following activities, including details of the unit (mass, volume, or energy unit).

For each energy industry, it is possible/likely that more than one fuel is used. You may also have data for multiple years. Please add further rows to include data for additional fuel types and years

**Energy Industries**

| Energy Industry | Fuel Type (please select one fuel from the above fuel content tables) | Fuel Consumption (Mass, Volume of Energy Unit – please specify)[1] | Year | Data Source |
|---|---|---|---|---|
| Electricity Generation | | | | |
| Combined Heat and Power | | | | |
| Heat Plants | | | | |
| Petroleum Refining | | | | |
| Manufacture of Solid Fuel | | | | |
| Other Energy Industries | | | | |

1. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*

**Manufacturing Industries and Construction**

| Energy Industry | Fuel Type (please select one fuel from the above fuel content tables) | Fuel Consumption (Mass, Volume of Energy Unit – please specify)[2] | Year | Data Source |
|---|---|---|---|---|
| Iron and Steel | | | | |
| Non-Ferrous Metals | | | | |
| Chemicals | | | | |
| Pulp, Paper, and Print | | | | |
| Food Processing, Beverages, and Tobacco | | | | |
| Non-Metallic Minerals | | | | |
| Transport Equipment | | | | |
| Machinery | | | | |
| Mining (excluding fuels) and Quarrying | | | | |
| Wood and Wood Products | | | | |
| Construction | | | | |
| Textile and Leather | | | | |
| Non-Specified Industry | | | | |

## Transport

Please provide fuel consumption data for the following activities, including details of the unit (mass, volume, or energy unit). For each energy industry, it is possible/likely that more than one fuel is used. You may also have data for multiple years. Please add further rows to include data for additional fuel types and years.

2. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*

**Aviation**

| International/ Domestic aviation | Fuel Type | Fuel Consumption (Mass, Volume of Energy Unit – please specify)[3] | Year | Data Source |
|---|---|---|---|---|
| International | | | | |
| Domestic | | | | |

**Road Transport – Passenger Cars**

| Fuel Type (please select one fuel from the above fuel content tables) | Fuel Consumption (Mass, Volume of Energy Unit – please specify)[4] | Year |
|---|---|---|
| Include – as appropriate data for Motor Gasoline, Gas/Diesel Oil, Liquefied Petroleum Gases, and/ or Lubricants | | |

**Road Transport – Light Duty Vehicles**

| Fuel Type (please select one fuel from the above fuel content tables) | Fuel Consumption (Mass, Volume of Energy Unit – please specify)[5] | Year |
|---|---|---|
| Include – as appropriate data for Motor Gasoline, Gas/Diesel Oil, Liquefied Petroleum Gases, and/ or Lubricants | | |

**Road Transport – Heavy Duty Vehicles**

| Fuel Type (please select one fuel from the above fuel content tables) | Fuel Consumption (Mass, Volume of Energy Unit – please specify)[6] | Year |
|---|---|---|
| Include – as appropriate data for Motor Gasoline, Gas/Diesel Oil, Liquefied Petroleum Gases, and/ or Lubricants | | |

**Railways**

| Fuel Type (please select one fuel from the above fuel content tables) | Fuel Consumption (Mass, Volume of Energy Unit – please specify)[7] | Number of Locomotives | Average number of days operation per locomotive/ year |
|---|---|---|---|
| Please add further rows as required.. | | Total number of locomotives in the national railways fleet | Approximate number of days each locomotive is in use each year – averaged across the fleet |

3. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*
4. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*
5. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*
6. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*
7. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*

**Water-borne Navigation**

| International/Domestic Water-borne Navigation | Fuel Type (please select one fuel from the above fuel content tables) | Fuel Consumption (Mass, Volume of Energy Unit – please specify)[8] | Year | Data Source |
|---|---|---|---|---|
| International<br><br>Please provide any data available enabling the disaggregation by aviation category (civil, helicopter, military) and by aircraft type (e.g. Boeing 737-800, Airbus A330 etc) | | | | |
| Domestic<br><br>Please provide any data available enabling the disaggregation by aviation category (civil, helicopter, military) and by aircraft type (e.g. Boeing 737-800, Airbus A330 etc) | | | | |

## Other Mobile Sources

Sources here relate to activities, support vehicles, and equipment used either within airports or ports. Such activities include loading/unloading of cargo, fueling, auxiliary power systems, and logistics. These activities are usually confined to the airport or port premises, with vehicles not used on public roads.

| Activity type | Fuel Type (please select one fuel from the above fuel content tables) | Fuel Consumption (Mass, Volume of Energy Unit – please specify)[9] | Year | Data Source |
|---|---|---|---|---|
| Mobile – Aviation Component | | | | |
| Mobile – Water-borne component | | | | |

## Buildings

Please provide fuel consumption data for the following activities, including details of the unit (mass, volume, or energy unit). It is likely that more than one fuel is used to provide energy for residential and commercial buildings. You may also have data for multiple years. Please add further rows to include data for additional fuel types and years.

| Buildings type | Fuel Type (please select one fuel from the above fuel content tables) | Fuel Consumption (Mass, Volume of Energy Unit – please specify)[10] | Year | Data Source |
|---|---|---|---|---|
| Commercial/Institutional | | | | |
| | | | | |
| Residential | | | | |
| | | | | |

8. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*
9. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*
10. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*

### Agriculture, Forestry, Fishing, and Fish Farms

Please provide fuel consumption data for the following activities, including details of the unit (mass, volume, or energy unit).

For each agriculture activity type, it is possible/likely that more than one fuel is used. You may also have data for multiple years. Please add further rows to include data for additional fuel types and years.

| Activity type | Fuel Type (please select one fuel from the above fuel content tables) | Fuel Consumption (Mass, Volume of Energy Unit – please specify)[11] | Year | Data Source |
|---|---|---|---|---|
| Stationary | | | | |
| Off-Road Vehicles and Other Machinery | | | | |
| Fishing (mobile combustion) | | | | |
| Non-Specified (Stationary)<br><br>Include here any sectors that do not fall into the above activity types or can be specified as commercial or residential building emissions | | | | |

### Fugitive Emissions from Fuels

A range of different data, split into various categories, is required to calculate fugitive emissions associated with the production and distribution of different fuel types. The tables below provide instructions for what data is required and how this should be included here. It is understood that not all activities here either take place in Nepal or, where they are present, the data requested may not be available. Where activities do not take place, please indicate this by inserting 'N/A' in the table. Where activities do occur and data is not available, please insert 'Not Available'.

For some category types, it is possible/likely that more than one type of activity or metric is applicable. You may also have data for multiple years. Please add further rows to include data for additional categories/ metrics and years.

### Coal Mining and Handling

#### Active Coal Mines

| Fuel Type (please select one fuel from the above fuel content tables) | Quantity of Fuel Combusted (Mass, Volume of Energy Unit – please specify)[12] | Year | Data Source |
|---|---|---|---|
| Please only select a coal fuel type (e.g. sub-bituminous coal, lignite etc) | | | |

11. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*
12. *Data is required in Gg or TJ. Data is therefore requested either in Gg, TJ or an energy/mass unit that can be converted to Gg.*

**Abandoned Coal Mines**

| Mining Type | Number of Abandoned Mines | Closure Interval[13] | Fraction of Gassy Coal Mines (Low/ High)? | Year | Data Source |
|---|---|---|---|---|---|
| Surface | | Please provide data for each closed mine where possible and if data not available an average closure period for different proportions or all mines | Please include if available | | |
| Underground | | Please provide data for each closed mine where possible and if data not available an average closure period for different proportions or all mines | Please include if available | | |

**Flaring/Conversion of Methane to Carbon Dioxide (Underground Mines Only)**

| Mining Type | Volume of Methane Combusted (m3) | Year | Data Source |
|---|---|---|---|
| Underground | Please add further rows as required... | | |

## Uncontrolled Combustion and Burning Coal Dumps

### Fuel Transformation

**Charcoal and Biochar Production**

| Fuel Type | Total Production (kg) | Amount Captured (Gg CO2) | Year | Data Source |
|---|---|---|---|---|
| Charcoal | | If production emissions are captured please specify quantity | | |
| Biochar | | | | |

**Coke Production**

| Total Coke Production (kg) | Coke Oven Gas Produced per Unit of Coke (Nm3/tonne) | Year | Data Source |
|---|---|---|---|
| | | | |

**Gasification Transformation**

| Total Amount of Feedstock (Natural Gas) (TJ) | Amount Captured (Gg CO2) | Year | Data Source |
|---|---|---|---|
| | If production emissions are captured, please specify the quantity | | |

13. *Closure periods are defined as: 1901-1925; 1926-1950; 1951-1975; 1976-2000; 2001-2025*

## Oil and Natural Gas

### Oil - Venting

| Industry Segment | Oil Production Type[14] | Oil Production (10^3m3) | Amount Captured (Gg CO2) | Year | Data Source |
|---|---|---|---|---|---|
| Oil Production | | | If production/transport emissions are captured, please specify the quantity | | |
| Oil Transport | | | | | |

### Oil - Flaring

| Industry Segment | Subcategory[15] | Amount Captured Gg CO2) | Year | Data Source |
|---|---|---|---|---|
| Oil Production | | If production/transport emissions are captured, please specify the quantity | | |
| Well Drilling | | | | |
| Well Testing | | | | |
| Well Servicing | | | | |

### Oil - Other

| Oil Transported by Pipeline (10^3m3) | Oil Refined (10^3m3) | Abandoned Wells (number) | Product Transported (10^3m3) | Product Distributed (10^3m3) | Year | Data Source |
|---|---|---|---|---|---|---|
| | | | Gasoline __ | Gasoline __ | | |
| | | | Diesel __ | Diesel __ | | |
| | | | Aviation Fuel __ | Aviation Fuel __ | | |
| | | | Jet Kerosene __ | Jet Kerosene __ | | |
| | | | Gasoline __ | Gasoline __ | | |

14. *Please select from: Conventional Oil; Heavy Oil/Cold Bitumen; Thermal Oil Production.*
15. *Please select from: Conventional Oil; Heavy Oil/Cold Bitumen; Thermal Oil Production. However, please note that a specific category should only be selected where the 'Oil Production' segment has been selected. For Well Drilling, Well Testing and Well Servicing please include 'All' for Subcategory.*

**Gas - Venting and Flaring**

| Industry Segment | Sub Category | Activity Type (10^6m3)[16] | Amount Captured Gg CO2) | Year | Data Source |
|---|---|---|---|---|---|
| Gas Processing | Sweet Gas Plants | Gas Production | | | |
| | | Raw Gas Feed | | | |
| | Sour Gas Plants | Gas Production | | | |
| | | Raw Gas Feed | | | |
| | Deep Cut Extraction Plants (Straddle Plants | Gas Production | | | |
| | | Raw Gas Feed | | | |
| | Default Weighted Total | Gas Production | | | |
| | | Raw Gas Feed | | | |
| Gas Production | | Gas Production | | | |
| | | Raw Gas Feed | | | |
| Well Drilling | | Gas Production | | | |
| | | Raw Gas Feed | | | |
| Well Servicing | | Gas Production | | | |
| | | Raw Gas Feed | | | |
| Well Testing | | Gas Production | | | |
| | | Raw Gas Feed | | | |

**Gas - Other**

| Gas Category | Quantity (10^6m3) | Amount Captured Gg CO2) | Year | Data Source |
|---|---|---|---|---|
| Marketable Gas | | | | |
| Utility Sales | | | | |

16. *Please only provide either raw gas feed or gas production data, if available. If data is not available total oil production can be used as a proxy instead (data for which is already provided in tables above)*

## 2. Industrial Processes and Other Product Use (IPPU) Data Requirements in the 2006 IPCC Guidelines

"This IPPU GHG Emission Inventory Data Requirement Template for Nepal has been prepared by Sina Wartmann from the US EPA."

The list below considers the GHG inventory categories and gases reported for Nepal previously in its 3rd National Communication under the Industrial Processes and other Product Use (IPPU) sector, as well as the Tiers used to estimate GHGs for these categories and gases. This was Tier 1 in all cases.

In addition, the below includes suggestions on additional data to be collected for two purposes. Firstly, such additional data might help understand whether GHG emissions from categories not reported on in Nepal's 3rd National Communication might be occurring. Secondly, such data might be used for validation purposes, e.g., a carbonate balance.

**Country: NEPAL**
**Inventory Year:** _____(each year for BTR)

### 1. 2A – Mineral industry

**a) 2A1 – Cement production**

| Data | Considerations |
|---|---|
| Amount of cement produced by type [t] | For types of cement see the IPCC Software. Focus on Portland cement if no other information is available. |
| Clinker fraction of cement by type of cement [%] | |
| Clinker imported [t] | |
| Clinker exported [t] | |

**b) 2A2 – Lime production**

| Data | Considerations |
|---|---|
| Amount of lime produced by type [t] | Where available, differentiate by high calcium lime, dolomitic lime, or hydraulic lime |

**c) Suggested: General information for category 2A**
**d) Suggested: Data on further activities which might take place under category 2A**

| Data | Considerations |
|---|---|
| Does glass production take place? | If so, what types of glass (see IPCC Software), amount of glass by type |
| Does ceramics production take place? | |
| Does other uses of soda ash take place? | |
| Does non-metallurgical magnesia production take place? | |
| Do other uses of carbonates take place? | Which types of carbonates are consumed? |

**e) Suggested: Data for carbonate balance**

A carbonate balance (consumption = production + imports – exports – stocks) will support validation of total carbonate consumption values over all activities.

| Data | Considerations |
|---|---|
| Total amount of carbonate produced by type | See types of carbonates in the IPCC Software, most relevant ones are typically calcite and dolomite. |
| Total amount of carbonate imported by type | |
| Total amount of carbonate exported by type | |

| Data | Considerations |
|---|---|
| Total amount of carbonates stocked by type | The assumption can be that carbonate imported/produced is always consumed the same year, as data on stocks might not be available. |

## 2. 2C – Metal industry

### a) 2C1 – Iron and Steel production

| Data | Considerations |
|---|---|
| Coke oven coke produced [t] | |
| Iron produced [t] | |
| Direct reduced iron produced [t] | |
| Sinter produced [t] | |
| Pellets produced [t] | |
| Steel produced by the steelmaking method [t] | The IPCC Software lists the methods Blast Oxygen Furnace, Electric Arc Furnace, Open Hearth Furnace |

### b) Suggested: Further activities which might take place under category 2C

| Data | Considerations |
|---|---|
| Does Ferroalloys production take place? | If so, which ferroalloys. See types in the IPCC Software |
| Does Aluminum production take place? | If so, which technologies are used (Prebake, Soderberg)? |
| Does Magnesium production take place? | If so, which raw material sources are used (Dolomite, Magnetite)? Is SF6 used for Magnesium casting? |
| Does Lead production take place? | |
| Does Zink production take place? | |

## 3. 2D. Non-Energy Products

### a) from Fuels and solvent Use

| Data | Considerations |
|---|---|
| Lubricant use by type [t] | Types include lubricating oils, grease |
| Paraffin wax used [t] | |
| Solvent use [t] | Relevant activities include paint application, degreasing and dry cleaning. Please note the IPCC Software does not provide a calculation approach for the NMVOC emissions from solvent use, these are to be estimated externally and entered directly into the Software. |

## 4. 2F. Product Uses as Substitutes for Ozone-Depleting Substances

### a) 2F1 Refrigeration and Air Conditioning

| Data | Considerations |
|---|---|
| Production, import, export, destruction in [t] of HFC-134a | Please note that this information will be required for all previous years since the use of this substance has started. |
| Production, import, export, destruction in [t] of HFC-404a | Please note that this information will be required for all previous years since the use of this substance has started.<br><br>Please note the IPCC Software offers a Tier 1 calculation only for HFC134a and HFC-152a. |
| Production, import, export, destruction in [t] of HFC-407a | Please note that this information will be required for all previous years since the use of this substance has started.<br><br>Please note the IPCC Software offers a Tier 1 calculation only for HFC134a and HFC-152a. |

### b) Suggested: Further information related to category 2F

| Data | Considerations |
|---|---|
| Does import, export, production, destruction of any other HFCs take place? | See Table 7.1 from Volume 3 of the IPCC 2006 Guidelines for National GHG Inventories below for an overview of the main application areas and HFCs. |

| MAIN APPLICATION AREAS FOR HFCs AND PFCs AS ODS SUBSTITUTES[1] | | | | | | | |
|---|---|---|---|---|---|---|---|
| Chemical | Refrigeration and Air Conditioning | Fire Suppression and Explosion Protection | Aerosols | | Solvents cleaning | Foam Blowing | Other Applications[2] |
| | | | Propellants | Solvents | | | |
| HFC-23 | X | X | | | | | |
| HFC-32 | X | | | | | | |
| HFC-125 | X | X | | | | | |
| HFC-134a | X | X | X | | | X | X |
| HFC-143a | X | | | | | | |
| HFC-152a | X | | X | | | X | |
| HFC-227ea | X | X | X | | | X | X |
| HFC-236fa | X | X | | | | | |
| HFC-245fa | | | | X | | X | |
| HFC-365mfc | | | | X | X | X | |
| HFC-43-10mee | | | | X | X | | |
| PFC-14[3] ($CF_4$) | | X | | | | | |
| PFC-116 ($C_2F_6$) | | | | | | | X |
| PFC-218 ($C_3F_8$) | | | | | | | |
| PFC-31-10 ($C_4F_{10}$) | | X | | | | | |
| PFC-51-14[4] ($C_6F_{14}$) | | | | | X | | |

1. *Several applications use HFCs and PFCs as components of blends. The other components of these blends are sometimes ODSs and/or non-greenhouse gases. Several HFCs, PFCs and blends are sold under various trade names; only generic designations are used in this chapter.*
2. *Other applications include sterilisation equipment, tobacco expansion applications, plasma etching of electronic chips (PFC-116) and as solvents in the manufacture of adhesive coatings and inks (Kroeze, 1995; U.S. EPA, 1992a).*
3. *PFC-14 (chemically $CF_4$) is used as a minor component of a proprietary blend. Its main use is for semiconductor etching.*
4. *PFC-51-14 is an inert material, which has little or nil ability to dissolve soils. It can be used as a carrier for other solvents or to dissolve and deposit disk drive lubricants. PFCs are also used to test that sealed components are hermetically sealed.*

## 5. 2G. Other Product Manufacture and Use

### a) 2G3 N2O from product uses

| Data | Considerations |
|---|---|
| N2O used for medical applications in [t] in the reporting year | N2O from medical applications is calculated considering both the consumption in the reporting year and in the year before. Therefore, data has to be collected for all reporting years and the year before the first reporting year. |

### b) Suggested: Further data related to 2G. Other Product Manufacture and Use

| Data | Considerations |
|---|---|
| Is SF6 used in electrical equipment? | |
| Is N2O used for other applications? E.g. propellant for pressure and aerosol products? | |

## 6. 2H. Other

### a) 2H1 Pulp and Paper Industry

| Data | Considerations |
|---|---|
| Air-dried pulp (for all national pulp and paper production) [t] | |

### b) 2H2 Food and Beverages Industry

| Data | Considerations |
|---|---|
| • The sum of food and beverage production in [t], considering the following:<br>• Total production of home killed meat, including meat subsequently canned<br>• Total fish and seafood landed;<br>• Total production of poultry meat;<br>• Total sugar production;<br>• Total production of fats excluding butter;<br>• Total production of bread;<br>• Total production of cakes, biscuits and breakfast cereals;<br>• Total production of compound feedstuffs for cattle, pigs, poultry and<br>• Other animals;<br>• Total weight of beans roasted to produce coffee;<br>• Total production of wine;<br>• Total production of beer and cider;<br>• Total production of spirits | |

## 7. Suggested: Information on Category 2B – Chemical Production

| Data | Considerations |
|---|---|
| Does ammonia production (2B1) take place? | |
| Does nitric acid production (2B2) take place? | |
| Does adipic acid production (2B3) take place? | |
| Does caprolactam, glyoxal and glyoxylic acid production (2B4) take place? | |
| Does carbide production (2B5) take place? | |
| Does titanium dioxide production (2B6) take place? | |
| Does soda ash production (2B7) take place? | |
| Does petrochemical and carbon black production (2B8) take place? | Relevant products include methanol, ethylene, and carbon black. For a complete list, see IPCC 2006 Guidelines, Volume 3, Chapter 3. |
| Does fluorochemical production (2B9) take place, e.g. production of R-22? | |

## 8. Suggested: Information on Category 2E – Electronics Industry

| Data | Considerations |
|---|---|
| Does production of electronics industries take place? If so, which types? | This might include the production of integrated circuits or semiconductors, TFT flat panel displays, photovoltaics, and heat transfer fluids. It does not include the pure assembly of electronics components. |

## 3. AFOLU Data Requirements in the 2006 IPCC Guidelines

"This AFOLU GHG Emission Inventory Data Requirement Template for Nepal has been prepared by Leandro Buendia from the USFC Project"

**Country: NEPAL**

**Total land Area (in hectare): _____**
**Inventory Year: _____(each year for BTR)**

### A. Climate, Ecological Zone, and Soil Types

**Climate Type: please check (✓) appropriate type(s):**

| | |
|---|---|
| ____ Boreal Dry | ____ Tropical Dry |
| ____ Boreal Moist | ____ Tropical Moist |
| ____ Cool Temperate Dry | ____ Tropical Montane |
| ____ Cool Temperate Moist | ____ Tropical Wet |
| ____ Polar Dry | ____ Warm Temperate Dry |
| ____ Polar Moist | ____ Warm Temperate Moist |

What is the Mean Annual Temperature in the country, in °C: _____

**Ecological Zone Areas: please check the appropriate area(s):**

| | |
|---|---|
| ____ Boreal Coniferous Forest | ____ Temperate Desert |
| ____ Boreal Mountain System | ____ Temperate Mountain System |
| ____ Boreal Tundra Woodland | ____ Temperate Oceanic Forest |
| ____ Polar | ____ Temperate Steppe |
| ____ Subtropical Desert | ____ Tropical Desert |
| ____ Subtropical Dry Forest | ____ Tropical Dry Forest |
| ____ Subtropical Humid Forest | ____ Tropical Moist Deciduous Forest |
| ____ Subtropical Mountain System | ____ Tropical Mountain System |
| ____ Subtropical Steppe | ____ Tropical Rain Forest |
| ____ Temperate Continental Forest | ____ Tropical Shrubland |

**Soil Type: please check appropriate type(s):**

| | |
|---|---|
| ____ High Activity Clay Mineral | ____ Spodic Mineral |
| ____ Low Activity Clay Mineral | ____ Volcanic Mineral |
| ____ Organic | ____ Wetland Mineral |
| ____ Sandy Mineral | |

### B. Land Use and Management

**Table 1. Land-use category**

| IPCC Land Use | Land Use Category | Area (ha) | Percent (%) |
|---|---|---|---|
| Forest Land | Forest Land Remaining Forest Land | | |
| | Cropland Converted to Forest Land | | |
| | Grassland Converted to Forest Land | | |
| | Wetlands Converted to Forest Land | | |
| | Settlements Converted to Forest Land | | |

| IPCC Land Use | Land Use Category | Area (ha) | Percent (%) |
|---|---|---|---|
| | Other Lands Converted to Forest Land | | |
| **Cropland** | **Cropland Remaining Cropland** | | |
| | Forest Land Converted to Cropland | | |
| | Grassland Converted to Cropland | | |
| | Wetlands Converted to Cropland | | |
| | Settlements Converted to Cropland | | |
| | Other Lands Converted to Cropland | | |
| **Grassland** | **Grassland Remaining Grassland** | | |
| | Forest Land Converted to Grassland | | |
| | Cropland Converted to Grassland | | |
| | Wetlands Converted to Grassland | | |
| | Settlements Converted to Grassland | | |
| | Other Lands Converted to Grassland | | |
| **Wetlands** | **Wetlands Remaining Wetlands** | | |
| | Forest Land Converted to Wetlands | | |
| | Cropland Converted to Wetlands | | |
| | Grassland Converted to Wetlands | | |
| | Settlements Converted to Wetlands | | |
| | Other Lands Converted to Wetlands | | |
| **Settlements** | **Settlements Remaining Settlements** | | |
| | Forest Land Converted to Settlements | | |
| | Cropland Converted to Settlements | | |
| | Grassland Converted to Settlements | | |
| | Wetlands Converted to Settlements | | |
| | Other Lands Converted to Settlements | | |
| **Other Lands** | **Other Lands Remaining Other Lands** | | |
| | Forest Land Converted to Other Lands | | |
| | Cropland Converted to Other Lands | | |
| | Grassland Converted to Other Lands | | |
| | Wetlands Converted to Other Lands | | |
| | Settlements Converted to Other Lands | | |
| **Total Land Area** | | | **100** |

*Note: (i) If data on land use conversions (e.g. Cropland Converted to Forest Land, etc.) are not available, please enter data **ONLY** for the main land use category in bold letters (e.g. Forest Land Remaining Forest Land, Cropland Remaining Cropland, etc.); (ii) If area, for each land use category is not available, please provide an estimate of the percent of the Total Land Area, in the column "Percent".*

**Table 2. Forest Land Subcategory Areas**

| Land Use Category | Area (ha) | Percent (%) |
|---|---|---|
| Natural Forest | | |
| Plantation Forest | | |
| ... | | |
| ... | | |
| ... | | |
| **Total Forest Land** | | **100** |

*Note: (i) Please add/include all forest types as possible; (ii) If the area, for each forest land use category, is not available, please provide an estimate of the percent of the Total Forest Land Area, in the column "Percent".*

**Table 3. Forest Land Age/Size Class (for Gain-Loss Method)**

| Land Use Category | Age/Size Class | Area (ha) | Percent (%) |
|---|---|---|---|
| Natural Forest | <= 20 years | | |
| | > 20 years | | |
| Plantation Forest | <= 20 years | | |
| | > 20 years | | |
| ... | <= 20 years | | |
| | > 20 years | | |
| ... | <= 20 years | | |
| | > 20 years | | |
| ... | <= 20 years | | |
| | > 20 years | | |

*Note: (i) Please add/include all forest types as possible; (ii) If the area, for each forest land use category and age/size class is not available, please provide an estimate in per cent.*

**Table 4. Wood Harvest (Timber) and Fuelwood Removal in Forest Land (for Gain-Loss Method)**

| Tree Type | Wood Harvest (cubic meter) | Fuelwood Removal (cubic meter) |
|---|---|---|
| Example: All tree types | | |
| | | |
| | | |
| | | |
| | | |

*Note: Data on Wood harvest and Fuelwood Removal could be expressed for a specific tree type. Please add rows as appropriate for each tree type. If not available for each tree type, aggregate data for all tree types could be used.*

**Table 5. Biomass Disturbances e.g. wildfires and/or prescribed burning (for both Gain-Loss Method and Stock-Difference Method)**

| Land Use Category | Age/Size Class | Area Burned (ha) | Percent (%) |
|---|---|---|---|
| Natural Forest | <= 20 years | | |
| | > 20 years | | |
| Plantation Forest | <= 20 years | | |
| | > 20 years | | |

| Land Use Category | Age/Size Class | Area Burned (ha) | Percent (%) |
|---|---|---|---|
| ... | <= 20 years | | |
| | > 20 years | | |
| ... | <= 20 years | | |
| | > 20 years | | |
| ... | <= 20 years | | |
| | > 20 years | | |

*Note: (i) Please add/include all forest types as possible; (ii) If the area burned, for each forest land use category and age/size class is not available, please provide an estimate in per cent.*

**Table 6. Forest Land Stock Volume (for Stock - Difference Method)**

| Tree Type | Age/Size Class | Stock Volume, m3/ha |
|---|---|---|
| Example: All tree types | <= 20 years | |
| | > 20 years | |
| ... | <= 20 years | |
| | > 20 years | |
| ... | <= 20 years | |
| | > 20 years | |
| ... | <= 20 years | |
| | > 20 years | |
| ... | <= 20 years | |
| | > 20 years | |

*Note: Please add rows as appropriate for each tree type. If not available for each tree type, aggregate data for all tree types could be used.*

**Table 7. Cropland Subcategory Areas**

| Land Use Category | Area (ha) | Percent (%) |
|---|---|---|
| Annual Crops | | |
| Perennial Crops | | |

*Note: Cropland is divided into two major crop categories: Annual Crops and Perennial Crops. Annual crops include rice, maize, wheat, etc. Perennial crops include coconut, oil palm, rubber, fruit trees, etc. If the area for each land use category is not available, please provide an estimate in percent.*

**Table 8. Annual Cropland Management System**

| Management System | Area (ha) | Percent (%) |
|---|---|---|
| Wheat-Wheat System | | |
| Maize – Legume System | | |
| Rice – Rice System | | |
| Other system | | |
| ... | | |
| ... | | |
| ... | | |
| **Total Annual Crops** | | **100** |

*Note: Examples of annual cropland management systems are given above. Wheat – Wheat System means that wheat is planted twice in a year. Maize – Legume System means that a Leguminous crop (e.g., soybean) is planted after maize cropping. Please change, revise, or add additional rows, as appropriate, for other major annual crop management systems in the country. If the area for each management system is not available, please provide an estimate in percent.*

**Table 9. Crop Residue Management**

| Crop Type | Fresh Yield (kg/ha) | Percent Residue Burned (%) | Percent Residue Grazed/ Collected (%) | Percent Residue Retained (%) | Total Residue Percent (%) |
|---|---|---|---|---|---|
| Wheat | | 50 | 25 | 25 | 100 |
| Maize | | | | | |
| Rice | | | | | |
| | | | | | |
| ... etc. | | | | | |

*Note: An Example of wheat residue management (wheat straw) is given above. Please change, revise, or add additional rows, as appropriate, for major annual crop residue management in the country. Please note that Total Residue Percent should be 100%.*

**Table 10. Water Management in Rice and Cultivation Period (optional, only when rice is cultivated in the country)**

| Water Regime During Cultivation | Percent of Total Rice Area (%) | Cultivation Period (days) |
|---|---|---|
| Continuously Flooded | | |
| Intermittently Flooded – single aeration | | |
| Intermittently Flooded – multiple aeration | | |
| Regular Rainfed | | |
| Drought prone | | |
| Deep water | | |
| Upland | | |
| **Total** | **100** | |

*Note: Cultivation period refers to the number of days the rice crop is grown from planting to harvest.*

**Table 11. Perennial Cropland Management System**

| Management System | Area (ha) | Percent (%) |
|---|---|---|
| Coconut Plantation | | |
| Mango Plantation | | |
| Coffee Plantation | | |
| Other Fruit Trees | | |
| ... | | |
| ... | | |
| **Total Annual Crops** | | **100** |

*Note: Examples of Perennial Cropland Management Systems are given above. Please change, revise, or add additional rows, as appropriate, for other major perennial cropland management systems in the country. If the area for each management system is not available, please provide an estimate in percent.*

**Table 12. Woody Perennial Cropland Maturity Class Distribution**

| Land Use Category | Age/Size Class | Area (ha) | Percent (%) |
|---|---|---|---|
| Coconut Plantation | Mature | | |
| | Not Mature | | |
| Mango Plantation | Mature | | |
| | Not Mature | | |
| Coffee Plantation | Mature | | |
| | Not Mature | | |
| Other Fruit Trees | Mature | | |
| | Not Mature | | |
| ... | Mature | | |
| | Not Mature | | |

*Note: Examples of Woody Perennial Cropland are given above. Please change, revise, or add additional rows, as appropriate, for other major woody perennial croplands in the country. If the area for each maturity class distribution is not available, please provide an estimate per cent*

**Table 13. Grassland Subcategory Areas**

| Land Use Category | Area (ha) | Percent (%) |
|---|---|---|
| Shrub land | | |
| Grass | | |
| ... | | |
| ... | | |

*Note: If the area for each land use category is not available, please provide an estimate per cent.*

## C. Livestock

**Table 14. Number of Animals Produced Annually (NAPA)**

| Livestock Category | Total NAPA | Days Alive per year |
|---|---|---|
| Breeding Swine | | |
| Buffalo | | |
| Camels | | |
| Dairy Cows | | |
| Goats | | |
| Horses | | |
| Market Swine | | |
| Mules and Asses | | |
| Non-Dairy Cattle | | |
| Poultry | | |
| Sheep | | |

*Note: Examples of livestock categories are given above. Please change, add, or delete rows, as appropriate.*

**Table 15. Livestock Manure Management System, in per cent**

| Livestock Category | Anaerobic Digester(%) | Daily Spread (%) | Liquid/ Slurry (%) | Solid Storage (%) | Pasture/ Range/ Paddock (%) | Total (%) |
|---|---|---|---|---|---|---|
| Breeding Swine | | | | | | |
| Buffalo | | | | | | |
| Camels | | | | | | |
| Dairy Cows | | | | | | |
| Goats | | | | | | |
| Horses | | | | | | |
| Market Swine | 10 | 10 | 80 | - | - | 100 |
| Mules and Asses | | | | | | |
| Non-Dairy Cattle | - | 20 | - | - | 80 | 100 |
| Poultry | | | | | | |
| Sheep | | | | | | |
| | | | | | | |
| Etc... | | | | | | |

*Note: Examples are shown above for market swine and non-dairy cattle manure management systems. Please change, add, or delete columns and rows, as appropriate. Please note that the Total should be 100%.*

## D. Aggregate sources and non-CO2 emission sources on land

**Table 16. Primary Liming Data**

| Lime Type | Mining (Gg) | Imports Gg | Exports Gg | Non-Soil Uses Gg |
|---|---|---|---|---|
| Dolomite | | | | |
| Limestone | | | | |

*Note: 1 gigagram (Gg) = 1,000,000 kilograms (kg) = 1,000 tonnes*

**Table 17. Primary Nitrogen Fertilizer Data**

| Fertilizer Type | Percent Urea (%) | Percent N (%) | Domestic Production (Gg) | Imports (Gg) | Exports (Gg) |
|---|---|---|---|---|---|
| Ammonium Nitrate | | | | | |
| Ammonium Sulphate | | | | | |
| Diammonium Phosphate | | | | | |
| Urea | | | | | |
| ... | | | | | |
| ... | | | | | |

*Note: Examples of fertilizer types are provided above. Please change, add, or delete columns and rows, as appropriate. Please note that 1 gigagram (Gg) = 1,000,000 kilograms (kg) = 1,000 tonnes*

**Table 18. Amount of Organic Amendment Applied to Soil**

| Amendment Type | Dry Matter (Gg) | Percent N (%) |
|---|---|---|
| Non-manure compost | | |
| Other Organic Amendments | | |
| Sewage Sludge | | |
| ... | | |
| ... | | |

*Note: 1 gigagram (Gg) = 1,000,000 kilograms (kg) = 1,000 tonnes*

## 4. Waste Data Requirements in the 2006 IPCC Guidelines

"This Waste GHG Emission Inventory Data Requirement Template for Nepal has been prepared by Céline Guéguen from the US EPA."

**Country: NEPAL**

**Inventory Year: _____(each year for BTR1)**

### I. Solid Waste Disposal (category 4A)

DOC: Degradable Organic Carbon
GDP: Gross Domestic Product
ISW: Industrial Solid Waste
MSW: Municipal Solid Waste
SWDS: Solid Waste Disposal Sites

#### A. Data related to waste generation and waste composition

| Data needed | | IPCC Software<br>2006 IPCC GLs and its 2019 Refinement |
|---|---|---|
| **Population [Capita]** | | Country-specific values must be documented from the starting year. |
| **GDP [Millions $]** | | Country-specific values must be documented from the starting year. |
| **MSW generation rate [kg / capita]** | | Default value available. Using country-specific value is highly recommended. |
| **ISW generation rate [kt/ Millions $]** | | Default value available. Using country-specific value is highly recommended. |
| **Total sludge generated [kt wet basis]** | | Country-specific values must be documented from the starting year. |
| **Composition of Municipal waste going to SWDS [%]** | Food waste | Default value available. Using country-specific value is highly recommended. |
| | Garden and Park | |
| | Paper and cardboard | |
| | Wood and straw | |
| | Textiles | |
| | Disposable nappies | |
| | Bulk MSW | |
| | Inert waste[18] (glass, metal, plastics) | |
| Composition of Industrial waste going to SWDS [%] | Bulk Industrial waste | Country-specific values must be documented from the starting year. |
| | Food, beverage and tobacco | Country-specific values must be documented from the starting year. |
| | Petroleum products, Solvents, Plastics | Country-specific values must be documented from the starting year. |
| | Rubber | Country-specific values must be documented from the starting year. |
| | Wood and wood products | Country-specific values must be documented from the starting year. |
| | Pulp and paper | Country-specific values must be documented from the starting year. |
| | Textile | Country-specific values must be documented from the starting year. |
| | Construction and demolition | Country-specific values must be documented from the starting year. |
| | Inert[1] (glass, metal, plastics) | Country-specific values must be documented from the starting year. |

18. *Inert in terms of anaerobic decomposition*

| Data needed | | IPCC Software<br>2006 IPCC GLs and its 2019 Refinement |
|---|---|---|
| Composition of Other waste going to SWDS [%] | Clinical waste | Country-specific values must be documented from the starting year. |
| | Hazardous waste | Country-specific values must be documented from the starting year. |
| Composition of Sludge waste going to SWDS [%] | Industrial sewage sludge | Country-specific values must be documented from the starting year. |
| | Municipal sewage sludge | Country-specific values must be documented from the starting year. |

### General parameters

As necessary to update the spreadsheet "Parameters" in the IPCC Inventory Software

| Data needed | IPCC Software<br>2006 IPCC GLs and its 2019 Refinement |
|---|---|
| **Region** | Selected in a dropdown list.<br>The choice has an impact on the default parameters proposed in the IPCC Software / 2006 IPCC GLs and its 2019 Refinement. |
| **Subdivision** | Optional: Possibility to define geographical subdivisions |
| **Climate zone** | Selected in a dropdown list.<br>The choice has an impact on the default parameters proposed in the IPCC Software / 2006 IPCC GLs and its 2019 Refinement. |
| **Starting year** | Selected in a dropdown list |
| **Delay time** | Default value available. Applying any other value must be carefully justified. |
| **Fraction of $CH_4$ in generated landfill gas** | Default value available. Applying any other value must be carefully justified. |
| **DOC in each category of Municipal Solid Waste**<br>(Food waste; Garden and Park; Paper and cardboard; Wood and straw; Textiles; Disposable nappies) | Default value available. Applying any other value must be carefully justified. |
| **DOC in each category of Industrial Solid Waste**<br>(Food, beverage and tobacco; Petroleum products, Solvents, Plastics; Rubber; Wood and wood products; Pulp and paper; Textile) | Default value available.<br>Applying any other value must be carefully justified. |
| **DOC in Other waste**<br>(Clinical waste; Hazardous waste) | Default value available.<br>Applying any other value must be carefully justified. |
| **DOC in Sludge**<br>(Industrial sewage sludge; Municipal sewage sludge) | Default value available.<br>Applying any other value must be carefully justified. |

## C. Data related to the type of landfills/disposal practices in use

The following data are requested separately for Municipal Solid Waste, Industrial Solid Waste, Sludge, and other waste (Clinical, hazardous), except if statistics regarding waste amount generated and composition already include all types of waste.

| Data | IPCC Software<br>2006 IPCC GLs and its 2019 Refinement |
|---|---|
| **Part of the generated MSW disposed in SWDS [%]** | Default value available. But using country-specific values is highly recommended. |
| **Part of the generated ISW is disposed in SWDS [%]** | Default value available. But using country-specific values is highly recommended. |
| **Part of the generated Sludge disposed in SWDS [%]** | Default value available. But using country-specific values is highly recommended. |
| **Part of the generated Other waste disposed in SWDS [%]** | Default value available. But using country-specific values is highly recommended. |

| Data | | IPCC Software<br>2006 IPCC GLs and its 2019 Refinement |
|---|---|---|
| **Part of disposed Municipal waste per type of SWDS [%]** | Unmanaged - shallow | Default value available. But using country-specific values is highly recommended. |
| | Unmanaged - deep | |
| | Managed - anaerobic | |
| | Managed poorly-semi-aerobic | |
| | Managed well-semi-aerobic | |
| | Managed poorly-semi-aerobic | |
| | Managed – poorly-active aeration | |
| | Managed – well-active aeration | |
| | Uncategorized SWDS | |
| **Part of disposed Industrial waste per type of SWDS [%]** | Unmanaged - shallow | Country-specific values to be documented from the starting year. |
| | Unmanaged - deep | Country-specific values must be documented from the starting year. |
| | Managed - anaerobic | |
| | Managed poorly-semi-aerobic | |
| | Managed well-semi-aerobic | |
| | Managed poorly-semi-aerobic | |
| | Managed – poorly-active aeration | |
| | Managed – well-active aeration | |
| | Uncategorized SWDS | |
| **Part of disposed Other waste per type of SWDS [%]** | Unmanaged - shallow | Country-specific values must be documented from the starting year. |
| | Unmanaged - deep | |
| | Managed - anaerobic | |
| | Managed poorly-semi-aerobic | |
| | Managed well-semi-aerobic | |
| | Managed poorly-semi-aerobic | |
| | Managed – poorly-active aeration | |
| | Managed – well-active aeration | |
| | Uncategorized SWDS | |

| Data | | IPCC Software<br>2006 IPCC GLs and its 2019 Refinement |
|---|---|---|
| **Part of disposed Sludge per type of SWDS [%]** | Unmanaged - shallow | Country-specific values must be documented from the starting year. |
| | Unmanaged - deep | |
| | Managed - anaerobic | |
| | Managed poorly-semi-aerobic | |
| | Managed well-semi-aerobic | |
| | Managed poorly-semi-aerobic | |
| | Managed – poorly-active aeration | |
| | Managed – well-active aeration | |
| | Uncategorized SWDS | |
| **Methane Correction Factor for each type of SWDS** (Unmanaged – shallow; Unmanaged – deep; Managed - anaerobic; Managed poorly-semi-aerobic; Managed well-semi-aerobic; Managed – poorly-active aeration; Managed – well-active aeration; Uncategorized SWDS) **[fraction]** | | Default value available.<br><br>Applying any other values must be carefully justified. |
| **Oxidation factor for each type of SWDS** (Unmanaged – shallow; Unmanaged – deep; Managed - anaerobic; Managed poorly-semi-aerobic; Managed well-semi-aerobic; Managed – poorly-active aeration; Managed – well-active aeration; Uncategorized SWDS) **[fraction]** | | Default value available. |
| **Amount of $CH_4$ flared [kt]** | | Country-specific values must be documented from the starting year. |
| **Amount of $CH_4$ used for energy [kt]** | | Country-specific values must be documented from the starting year. |

## II. BIOLOGICAL TREATMENTS (category 4B)

4B1: Waste composting
4B2: Waste digestion (biogas production)

### A. Data related to organic waste

| Data needed | IPCC Software<br>2006 IPCC GLs and its 2019 Refinement |
|---|---|
| **Annual amount of organic waste composted [kt wet basis]** | Country-specific values must be documented for all inventoried year. |
| **Annual amount of waste digested [kt wet basis]** | Country-specific values must be documented for all inventoried year. |

### B. Emission factors

| Data needed | IPCC Software / 2006 IPCC GLs and its 2019 Refinement |
|---|---|
| **Emission factors ($CH_4$ and $N_2O$)** | Default value available. |

## III. WASTE INCINERATION AND OPEN BURNING (category 4C)

4C1: Waste incineration (without energy recovery)
4C2: Open burning of waste

### A. Data related to waste

| Data needed | | Requirements in the IPCC Software 2006 IPCC GLs and its 2019 Refinement |
|---|---|---|
| **Amount of Municipal Waste combusted [kt wet basis]** | Food waste | Country-specific values must be documented for all inventoried year. |
| | Garden and Park | |
| | Paper and cardboard | |
| | Wood and straw | |
| | Textiles | |
| | Disposable nappies | |
| | Glass | |
| | Metal | |
| | Plastic | |
| | Rubber and Leather | |
| | Bulk MSW | |
| **Amount of Industrial Waste combusted [kt wet basis]** | Food, beverage and tobacco | Country-specific values must be documented for all inventoried year. |
| | Petroleum products, Solvents, Plastics | |
| | Rubber | |
| | Wood and wood products | |
| | Pulp and paper | |
| | Textile | |
| | Construction and demolition | |
| | Bulk ISW | |
| **Amount of Other Waste combusted** (incineration or open-burning) **[kt wet basis]** | Clinical waste | If the activity occurs, country-specific values must be documented for all inventoried year. |
| | Hazardous waste | |
| **Amount of Sludge incinerated [kt dry basis]** | Industrial sewage sludge | If the activity occurs, country-specific values must be documented for all inventoried year. |
| | Municipal sewage sludge | |
| **Amount of Fossil liquid waste incinerated [kt]** | Lubricants | If the activity occurs, country-specific values must be documented for all inventoried year. |
| | Solvents | |
| **Dry matter content for each type of combusted waste** (Food waste; Garden and Park; Paper and cardboard; Wood and straw; Textiles; Disposable nappies; Glass; Metal; Plastic; Rubber and Leather; Food, beverage and tobacco; Petroleum products, Solvents; Plastics; Rubber; Wood and wood products; Pulp and paper; Textile; Construction and demolition; clinical waste; Hazardous waste; Industrial sewage sludge; Municipal sewage sludge; Lubricant, Solvents) **[fraction]** | | Default values available. |
| **Fraction of carbon in dry matter for each type of combusted waste** (see list above) **[fraction]** | | Default value available. |
| **Fraction of fossil carbon in total carbon for each type of combusted waste** (see list above) **[fraction]** | | Default value available. |

### B. Data related to combustion

| Data needed | | Requirements in the IPCC Software 2006 IPCC GLs and its 2019 Refinement |
|---|---|---|
| **Oxidation factor [fraction]** | Incineration | Default value available. |
| | Open burning | Applying any other values must be carefully justified. |
| **$CH_4$ and $N_2O$ Emission factors** | Incineration | Default values available. |
| | Open burning | |

## IV. WASTEWATER TREATMENT AND DISCHARGE (category 4D)

4D1: Domestic wastewater (and industrial WW treated in municipal WWTP)
4D2: Industrial wastewater (in situ facility)

BOD: Biological Organic Demand
COD: Chemical Organic Demand
EF: Emission factor
WW: Wastewater
WWTP: Wastewater Treatment Plants
Please note that the 2019 Refinement methodology needs more data than the 2006 GLs and that both methodologies are not absolutely consistent; some issues were corrected in the 2019 Refinement.

Therefore, it may be difficult to apply the latest version of the IPCC Software (which includes the 2019 Refinement) to calculate emissions from the sector. It may be necessary to estimate some intermediate parameters outside the software.

Hereafter are the parameters necessary to apply a methodology consistent with the corrected 2006 GLs, but without the IPCC 2019 Refinement new developments.

### A. Data related to organic load and N content of wastewater per treatment/discharge pathway for domestic wastewater

| Data needed | | Requirements in the IPCC Software 2006 IPCC GLs and its 2019 Refinement |
|---|---|---|
| **Population [capita]** | | Country-specific values must be documented for all inventoried years. |
| **Part of the population by income group [%]** | Urban high income | Country-specific values must be documented for all inventoried years. |
| | Urban low income | |
| | Rural | |
| **Per capita daily BOD production [g/cap./day]** | | Default value available. per region. |
| **Correction factor for industrial discharge (of organic load) in sewer [fraction]** | | Default value available. |
| **Annual per capita protein consumption [kg/person]** | | Country-specific values must be documented for all inventoried years. |
| **Fraction of Nitrogen in protein [kg N/Kg protein]** | | Default value available.<br><br>Applying any other values must be carefully justified. |
| **Factor for non-consumed protein added to the wastewater [fraction]** | | Default value available. |
| **Factor for industrial and commercial co-discharged [fraction]** | | Default value available. |

| Data needed | | Requirements in the IPCC Software 2006 IPCC GLs and its 2019 Refinement |
|---|---|---|
| **Degree of utilization of modern centralized WWTP [%]** | | Country-specific values must be documented for all inventoried years. |
| **Degree of water treatment utilization (per income group) [%]** | Direct discharge - Sea, river and lake | |
| | Direct discharge – Stagnant sewer | |
| | Direct discharge – Flowing sewer | |
| | Treatment system – Aerobic WWTP | |
| | Treatment system – Anaerobic reactor for wastewater | |
| | Treatment system – Shallow lagoon | |
| | Treatment system – Deep lagoon | |
| | Treatment system – Septic system | |
| | Treatment system – Latrines (dry climate, groundwater lower than latrines, small families) | |
| | Treatment system – Latrines (dry climate, groundwater lower than latrines, communal) | |
| | Treatment system – Latrines (wet climate/flush, groundwater higher than latrines...) | |
| | Treatment system – Latrines (regular sediment removal | |
| Organic component removed as sludge [kg BOD] | | Country-specific values must be documented for all inventoried years. (Default value is 0). |
| Nitrogen removed with sludge [kg N] | | Country-specific values must be documented for all inventoried years. (Default value is 0). |
| CH4 recovered and flared [kg] | | Country-specific values must be documented for all inventoried years. (Default value is 0). |

### B. Data related to organic load (COD) and Nitrogen content (N) in wastewater per treatment/ discharge pathway for industrial wastewater

| Data needed | | Requirements in the IPCC Software 2006 IPCC GLs and its 2019 Refinement |
|---|---|---|
| **Total industrial production per industrial sector [ton]** | Alcohol Refining | Country-specific values must be documented for all inventoried years. |
| | Beer & Malt | |
| | Coffee | |
| | Dairy Products | |
| | Fish Processing | |
| | Meat & Poultry | |
| | Organic Chemicals | |
| | Petroleum Refineries | |
| | Plastics & Resins | |
| | Pulp & Paper | |
| | Soap & Detergents NA | |
| | Starch Production | |
| | Sugar Refining | |
| | Vegetable Oils | |
| | Vegetables, Fruits & Juices | |
| | Wine & Vinegar | |
| **Wastewater generation per industrial sector** (Alcohol Refining; Beer & Malt; Coffee; Dairy Products; Fish processing; Meat & Poultry; Organic Chemicals; Petroleum Refineries; Plastics & Resins; Pulp & Paper; Soap & Detergents; Starch Production; Sugar Refining; Vegetable Oils; Vegetables, Fruits & Juices; Wine & Vinegar) **[$m^3$/ton]** | | Default values available. |
| **COD in wastewater per industrial sector** (Alcohol Refining; Beer & Malt; Coffee; Dairy Products; Fish processing; Meat & Poultry; Organic Chemicals; Petroleum Refineries; Plastics & Resins; Pulp & Paper; Soap & Detergents; Starch Production; Sugar Refining; Vegetable Oils; Vegetables, Fruits & Juices; Wine & Vinegar) **[kg/$m^3$]** | | Default values available. |
| **Organic component removed as sludge [kg COD]** | | Country-specific values must be documented for all inventoried years. (default value is 0). |
| **$CH_4$ recovered and flared [kg]** | | Country-specific values must be documented for all inventoried years. (default value is 0). |

### C. Data related to wastewater treatment system/discharge pathways for domestic (5D1) and industrial (5D2) wastewater

| Data needed | Requirements in the IPCC Software 2006 IPCC GLs and its 2019 Refinement |
|---|---|
| **Maximum methane producing Capacity [kg $CH_4$/kg BOD]** | Default value available. |
| **Methane Correction factor per type of treatment system/Discharge pathways** (Direct discharge - Sea, river and lake; Stagnant sewer; Flowing sewers /Treatment system – Aerobic WWTP; Anaerobic reactor for wastewater; Shallow lagoon; Deep lagoon; Septic system; Latrines) | Default values available. |
| **N2O Emission Factor for modern centralized WWTP [g N2O/inhabitant]** | Default value available. |

## Annex 3: Modalities, procedures and guidelines (MPGs) – Facilitative Tool

**Green – mandatory information**

**Yellow – non mandatory information**

**Red – information in tabular and/or textual format**

# FTC support needed and received

## Information on financial, technology development and transfer and capacity-building support needed and received under Articles 9-11 of the Paris Agreement

### A. National circumstances, institutional arrangements and country-driven strategies (in textual format)

130. Developing country Parties should provide information on national circumstances and institutional arrangements relevant to reporting on support needed and received, including:

(a) A description of the systems and processes used to identify, track and report support needed and received, including a description of the challenges and limitations;

(b) Information on country priorities and strategies and on any aspects of the Party s NDC under Article 4 of the Paris Agreement that need support.

### B. Underlying assumptions, definitions and methodologies (in textual format)

131. In reporting information on support needed and received, developing country Parties should describe the underlying assumptions, definitions and methodologies used to provide information on support needed and received, including, as applicable, those used to:

(a) Convert domestic currency into United States dollars;

(b) Estimate the amount of support needed;

(c) Determine the reporting year or time frame;

(d) Identify support as coming from specific sources;

(e) Determine support as committed, received or needed;

(f) Identify and report the status of the supported activity (planned, ongoing or completed);

(g) Identify and report the channel (bilateral, regional or multilateral);

(h) Identify and report the type of support (mitigation, adaptation or cross-cutting);

(i) Identify and report the financial instrument (grant, concessional loan, non- concessional loan, equity, guarantee or other);

(j) Identify and report sectors and subsectors;

(k) Report on the use, impact and estimated results of the support needed and received;

(l) Identify and report support as contributing to technology development and transfer and capacity-building;

(m) Avoid double counting in reporting information on support needed and received for the implementation of Article 13 of the Paris Agreement and transparency- related activities, including for transparency-related capacity-building, when reporting such information separately from other information on support needed and received.

### C. Information on financial support needed by developing country Parties under Article 9 of the Paris Agreement

132. Developing country Parties should provide information on financial support needed under Article 9 of the Paris Agreement in textual format, including, to the extent possible and as available and as applicable:

(a) Sectors for which the Party wishes to attract international finance, including existing barriers to attracting international finance;

(b) Description of how the support will contribute to its NDC and to the long-term goals of the Paris Agreement.

133. Developing country Parties should provide, in a common tabular format, information on financial support needed, including the following, to the extent possible, and as available and as applicable:

(a) Title (of activity, programme or project);
(b) Programme/project description;
(c) Estimated amount (in domestic currency and in United States dollars);
(d) Expected time frame;
(e) Expected financial instrument (grant, concessional loan, non-concessional loan, equity, guarantee or other);
(f) Type of support (mitigation, adaptation or cross-cutting);
(g) Sector and subsector;
(h) Whether the activity will contribute to technology development and transfer and/or capacity-building, if relevant;
(i) Whether the activity is anchored in a national strategy and/or an NDC;
(j) Expected use, impact and estimated results.

## D. Information on financial support received by developing country Parties under Article 9 of the Paris Agreement

134. Developing country Parties should provide, in a common tabular format, information on financial support received, including, to the extent possible, and as available and as applicable:

(a) Title (of activity, programme or project);
(b) Programme/project description;
(c) Channel;
(d) Recipient entity;
(e) Implementing entity;
(f) Amount received (in domestic currency and in United States dollars);
(g) Time frame;
(h) Financial instrument (grant, concessional loan, non-concessional loan, equity, guarantee or other);
(i) Status (committed or received);
(j) Sector and subsector;
(k) Type of support (mitigation, adaptation or cross-cutting);
(l) Whether the activity has contributed to technology development and transfer and/or capacity-building;
(m) Status of activity (planned, ongoing or completed);
(n) Use, impact and estimated results.

## E. Information on technology development and transfer support needed by developing country Parties under Article 10 of the Paris Agreement

135. Developing country Parties should provide, in textual format, information on technology development and transfer support needed under Article 10 of the Paris Agreement, including on, to the extent possible, and as available and as applicable:

(a) Plans, needs and priorities related to technology development and transfer, including those identified in technology needs assessments, where applicable;
(b) Technology development and transfer related needs for the enhancement of endogenous capacities and technologies.

136. Developing country Parties should provide, in a common tabular format, information on technology development and transfer support needed, including, to the extent possible and as available and as applicable:

(a) Title (of activity, programme or project);
(b) Programme/project description;
(c) Type of support (mitigation, adaptation or cross-cutting);
(d) Type of technology;
(e) Expected time frame;
(f) Sector;
(g) Expected use, impact and estimated results.

## F. Information on technology development and transfer support received by developing country Parties under Article 10 of the Paris Agreement

137. Developing country Parties should provide, in textual format, information on technology development and transfer support received under Article 10 of the Paris Agreement, including on, to the extent possible, and as available and as applicable:

(a) Case studies, including key success and failure stories;
(b) How the support contributes to technology development and transfer, endogenous capacities and know-how;
(c) The stage of the technology cycle supported, including research and development, demonstration, deployment, diffusion and transfer of technology.

138. Developing country Parties should provide, in a common tabular format, information on technology development and transfer support received, including on, to the extent possible, and as available and as applicable:

(a) Title (of activity, programme or project);
(b) Programme/project description;
(c) Type of technology;
(d) Time frame;
(e) Recipient entity;
(f) Implementing entity;
(g) Type of support (mitigation, adaptation or cross-cutting);
(h) Sector;
(i) Status of activity (planned, ongoing or completed);
(j) Use, impact and estimated results.

## G. Information on capacity-building support needed by developing country Parties under Article 11 of the Paris Agreement

139. Developing country Parties should provide, in textual format, information on capacity-building support needed under Article 11 of the Paris Agreement, including on, to the extent possible and as available and as applicable: (a) The approach a Party seeks to take to enhance capacity-building support;
(b) Country-specific capacity-building needs, constraints and gaps in communicating those needs, and an explanation of how the capacity-building support needed would improve the provision of such information;
(c) Processes for enhancing public awareness, public participation and access to information in relation to capacity-building.

140. Developing country Parties should provide, in a common tabular format, information on capacity-building support needed, including the following, to the extent possible, and as available and as applicable:

(a) Title (of activity, programme or project);
(b) Programme/project description;
(c) Expected time frame;
(d) Type of support (mitigation, adaptation or cross-cutting);
(e) Expected use, impact and estimated results.

## H. Information on capacity-building support received by developing country Parties under Article 11 of the Paris Agreement

141. Developing country Parties should provide, in textual format, information on capacity-building support received under Article 11 of the Paris Agreement, including on, to the extent possible, and as available and as applicable:

(a) Case studies, including key success and failure stories;
(b) How support received has enhanced a Party's capacity;
(c) Capacity-building support received at the national and, where appropriate, subregional and regional level, including priorities, participation and the involvement of stakeholders.

142. Developing country Parties should provide, in a common tabular format, information on capacity-building support received, including the following, to the extent possible and as available and as applicable:

(a) Title (of activity, programme or project);
(b) Programme/project description;
(c) Implementing entity;
(d) Recipient entity;
(e) Type of support (mitigation, adaptation or cross-cutting);
(f) Time frame;
(g) Status of activity (planned, ongoing or completed);
(h) Use, impact and estimated results.

### I. Information on support needed and received by developing country Parties for the implementation of Article 13 of the Paris Agreement and transparency-related activities, including for transparency-related capacity-building

143. Developing country Parties should provide information on support needed and received for implementing Article 13 of the Paris Agreement and transparency-related activities, including on, to the extent possible:

(a) Support needed and received for preparing reports pursuant to Article 13;
(b) Support needed and received for addressing the areas for improvement identified by the technical expert review teams.

144. Developing country Parties should provide, in a common tabular format, summary information on support needed and received for implementing Article 13 and transparency- related activities, including for transparency-related capacity-building, including, to the extent possible and as applicable:

(a) Title (of activity, programme or project);
(b) Objectives and description;
(c) Recipient entity;
(d) Channel;
(e) Amount (in domestic currency and in United States dollars);
(f) Time frame;
(g) Status of activity (planned, ongoing or completed);
(h) Use, impact and estimated results.

145. In reporting information on support needed and received for the implementation of Article 13 of the Paris Agreement and transparency-related activities, including for transparency-related capacity-building, developing country Parties should ensure the avoidance of double counting in reporting this information separately from other information on financial, technology development and capacity-building support that is needed or received.

## Annex 4: List of consultation meetings held while finalizing the National MRV Framework

| S.N. | Events | Date | District/Province |
|---|---|---|---|
| 1 | Provincial Consultation on Developing a Comprehensive Legal and Institutional Framework for Nepal's MRV System | 2/27/2025 | Pokhara, Gandaki Province |
| 2 | Provincial Consultation on Developing a Comprehensive Legal and Institutional Framework for Nepal's MRV System | 3/9/2025 | Birendranagar, Karnali Province |
| 3 | Webinar with UNFCCC's representatives to prepare the MRV Framework | 4/3/2025 | Virtual Meeting |
| 4 | Provincial Consultation on Developing a comprehensive legal and institutional framework for Nepal's MRV system. | 4/11/2025 | Hetauda, Bagmati Province |
| 5 | Provincial Consultation on Developing a comprehensive legal and institutional framework for Nepal's MRV system. | 4/20/2025 | Rapti, Lumbini Province |
| 6 | Provincial Consultation on Developing a comprehensive legal and institutional framework for Nepal's MRV system. | 4/23/2025 | Dhangadhi, Sudurpashchim Province |
| 7 | Provincial Consultation on Developing a comprehensive legal and institutional framework for Nepal's MRV system. | 4/27/2025 | Biratnagar, Koshi Province |
| 8 | Provincial Consultation on Developing a comprehensive legal and institutional framework for Nepal's MRV system. | 4/29/2025 | Dhanusadham, Madesh Province |
| 9 | Technical consultation on developing a comprehensive legal and institutional framework for Nepal's MRV system | 5/14/2025 | Kathmandu |
| 10 | Multi-Stakeholder Consultation Workshop on Nepal's MRV System | 6/2/2025 | Kathmandu |
| 11 | Technical consultation on developing a comprehensive legal and institutional framework for Nepal's MRV system | 9/5/2025 | Kathmandu |
| 12 | National MRV Framework and Data Requirement- Inter-Ministerial Consultation | 9/21/2025 | Kathmandu |