

Multilevel Governance Guidelines on  
Integrated Climate Action Coordination in Lao PDR

# GUIDELINES ON MEASUREMENT, REPORTING AND VERIFICATION (MRV)

20 August 2020





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## Abbreviations and Acronyms

2006 IPCC Guidelines	2006 IPCC Guidelines for National Greenhouse Gas Inventories
AFOLU	Agriculture, Forestry and Other Land Use
BTR	Biennial Transparency Report
BUR	Biennial Update Report
CDP	Carbon Disclosure Project
CGE	Consultative Group of Experts
CIRIS	City Inventory Reporting and Information System
DCC	Department of Climate Change
DONRE	District Office of Natural Resources and Environment
EIT	Economies in Transition
ETF	Enhanced Transparency Framework
FMCP	Facilitative Multilateral Consideration of Progress
GCoM	Global Covenant of Mayors for Climate and Energy
Gg	Gigagram
GHG	Greenhouse Gas
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories
GST	Global Stocktake
ICA	International Consultation and Analysis
ICAT	The Initiative for Climate Action
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Process and Product Use
LDCs	Least Developed Countries
LULUCF	Land use, land-use change, and forestry
M&E	Monitoring and evaluation
MONRE	Ministry of Natural Resources and Environment
MPGs	Modalities, Procedures and Guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement, contained in decision 18/CMA.1 and its annex
MRV	Measurement, reporting and verification
NDC	Nationally Determined Contribution
NGO	Non-governmental organisation
PCCB	Paris Committee on Capacity-building
PONRE	Provincial Office of Natural Resources and Environment
REDD+	Reducing emissions from deforestation and forest degradation, conservation of existing forest carbon stocks, sustainable forest management and enhancement of forest carbon stocks
SBI	Subsidiary Body for Implementation
SIDS	Small Island Developing States
TACCC	Transparency, Accuracy, Consistency, Completeness, and Comparability
TER	Technical Expert Review
TTE	Team of technical experts
UNFCCC	United Nations Framework Convention on Climate Change

## 1. Introduction to the Guidelines

This is one of a set of four guidelines explaining multilevel governance processes related to climate change as they affect Laos. The Department of Climate Change (DCC) of the Ministry of Natural Resources and Environment (MONRE) is the focal point for climate change in Laos. DCC staff are active in global affairs and they drive the mainstreaming of climate change action within the country. At a sub-national level, the climate change mandate is carried by the Provincial Office of Natural Resources and Environment (PONRE) and the District Office of Natural Resources and Environment (DONRE) in each province and district. As the focal point at their level for climate change-related governance processes and systems, it is important that the institutional knowledge in these offices is strengthened to enable staff to fulfil their role in implementing legislation, policies and plans, thereby ensuring that Laos has a cohesive multilevel climate change response. The purpose of these guidelines is to strengthen the technical and institutional knowledge of PONRE and DONRE staff. The guidelines focus on:

1. Measurement, reporting and verification (MRV);
2. Legal frameworks, policies and treaties;
3. Governance – climate coordination enhancement; and
4. Financing tools and mechanisms

The objectives of this guideline are to support the technical understanding of PONRE and DONRE staff in the following three areas:

- I. MRV obligations under the UNFCCC;
- II. MRV in Laos; and
- III. Guidelines, tools and methodologies for MRV.

## 2. Introduction to MRV

All Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are obliged to communicate information relevant to the implementation of the convention. This is necessary so that progress in responding to climate change, including the extent and trends of greenhouse gas (GHG) emissions and removals, can be measured at a global level and effective actions can be planned and evaluated. Communications to the UNFCCC have been gradually standardised. At a domestic level, measurement, reporting and verification (MRV) guides a country to understand its GHG emissions and removals, and provides data to inform mitigation strategies, to evaluate the impact of mitigation actions, to monitor the progress made in achieving climate goals, and to make climate and GHG emission data publicly available to national and international stakeholders.

MRV is a term which was introduced at the thirteenth Conference of the Parties (COP) in Bali in 2007. It refers to the UNFCCC reporting framework in the context of climate change mitigation. The aim of mitigating climate change is to reduce GHG emissions on a global level. Mitigation is carried out through a process of setting GHG emission reduction targets, implementing actions designed to reduce emissions and then measuring the emission levels to see if, in fact, the target reduction has been reached, before setting a new target and continuing the cycle.

MRV is carried out at regional level, and at national and sub-national levels in every country which is a party

**M = Measure** (or monitor) data and information on emissions, mitigation actions, and support.

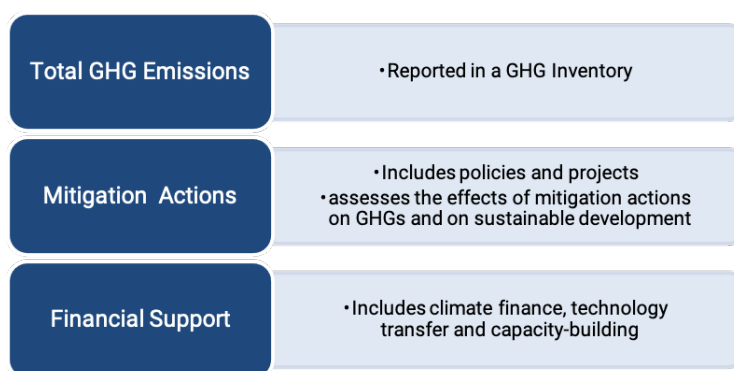
**R = Report** by presenting the gathered data in the form of inventories and other standardised reports to make it widely accessible.

**V = Verify** by carrying out an independent assessment of the reported data to confirm that it is accurate and contains all the required information.

to the UNFCCC. Although each country has a unique MRV system, there are, in many countries, expectations on provinces, districts, cities, corporations and facilities to measure their emissions and climate actions and to report this information and have it externally verified. Projects are also expected to carry out MRV. Within a country, local areas will contribute data so that the Government can measure the climate situation of the country as a whole. The data from every country, when aggregated, will show global progress on climate change mitigation, adaptation, progress of the NDCs, and support needed and received to enable higher climate ambitions.

While MRV originated in the UNFCCC system, there are numerous reasons for a country to develop a strong MRV system. In addition to tracking emission trends and mitigation measures, MRV can assist in monitoring progress on the Sustainable Development Goals; provide data for national policy decisions; build national capacity; ensure transparency, good governance and accountability and credibility of results; engage the private sector; improve access to funding; and contribute to wider national reporting on the state of the environment, climate issues and policy effects (de la Torre, 2018).

There are three separate climate-related aspects that MRV is carried out on. These are shown in Figure 1. Each one has different activities and processes.



**Figure 1.** Types of MRV

## 2.1. MRV of GHG Emissions and Removals

At a national level, the total human induced GHG emissions and removals in the country are measured, reported and verified. In order to support national GHG inventories the Intergovernmental Panel on Climate Change (IPCC) released guidelines in 1996. An updated version released in 2006 is the current reference. The 2006 IPCC Guidelines for National Greenhouse Gas Inventories (referred to hereafter as the 2006 IPCC Guidelines) are supplemented by the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

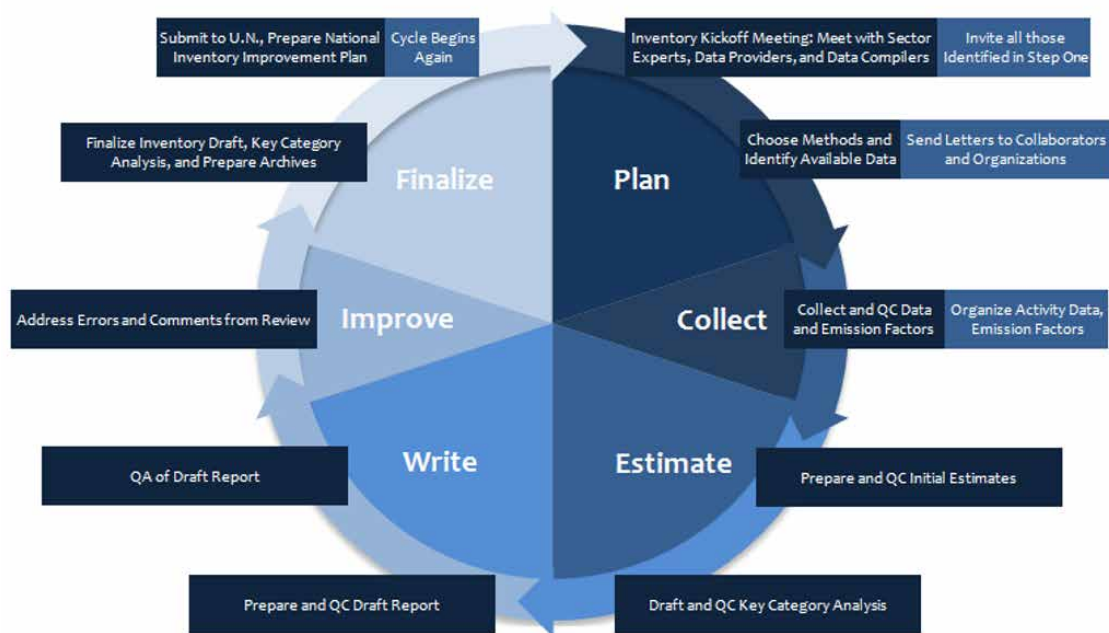
UNFCCC guidance advocates the identification of key sectors in a country. These are the sectors which are responsible for a high proportion of a country's emissions. The major sectors responsible for emissions and removals in many countries are energy; industrial processes and product use (IPPU); agriculture, forestry and other land use (AFOLU); and waste. To the best of their capacity, Non-Annex 1 countries<sup>1</sup> are required to report separately on emissions and removals of three GHGs. These are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O). The countries are encouraged to report on several other GHGs if they are able to do so. While many sectors contain GHG emitting activities, the AFOLU sector is the only one that also removes GHGs from the atmosphere. This happens when plants remove CO<sub>2</sub> from the atmosphere in the process of photosynthesis.

<sup>1</sup> Under the UNFCCC, Annex 1 countries include the industrialized countries that were members of the Organisation for Economic Co-operation and Development (OECD) in 1992, plus countries with economies in transition (EIT). Non-Annex 1 countries are mostly developing countries. Laos is included in this group.

The process of measuring GHG emissions involves identifying the sectors which are responsible for emissions. Within those sectors, the activities which produce emissions are identified. For each activity, an attempt is made to determine the amount of GHG emitted. This value, representing the amount of emissions, is called the emissions factor. The more data that is available about the activity, the more accurate the emissions factor is likely to be. In cases in which localised data is unavailable, countries are able to use default estimates of GHG emissions for a range of human activities. These estimates are found in the 2006 IPCC guidelines. The use of default emission factors is the most basic method of measuring emissions. Methods are grouped into three tiers where Tier 1 involves this most basic method, Tier 2 uses more complex methods which provide more accurate data and Tier 3 is the most complex, providing the most accurate data. The three-tier system is designed to allow for countries' common but differentiated responsibilities.

In order to measure and report in the form of a GHG inventory, countries need to develop a system of data collection which stretches across relevant sectors and levels and which has a focal agency with the responsibility of collating the data. The process is a continuous round of activity which begins a new inventory as soon as the previous one is finalised. An example is shown in Figure 2 on the following page.

Aside from UNFCCC reporting requirements, countries may require smaller entities to report on their emissions, for example organisations such as corporations involved in industry, or facilities such as hospitals. In recent years, there has also been an increasing recognition of the role that sub-national entities play in GHG emissions, and there is a movement of cities which are reducing their emissions through the use of tools and platforms developed for the purpose.



**Figure 2.** GHG Inventory Cycle

Source: United States Environmental Protection Agency, 2011, pp. 1-10

## 2.2. MRV of Mitigation Actions

Mitigation actions include policies, strategies and projects which are designed to lower overall GHG emissions. MRV can assess: (1) the changes to the level of GHG emissions or removals as a result of the mitigation action; (2) sustainable development effects, referring to changes in environmental, social, and/or economic conditions that occur as a result of mitigation actions; and



(3) implementation progress of the mitigation action (Singh, 2016). In the context of mitigation actions, there may be some MRV data which is also required for the monitoring and evaluation (M&E) of projects. In this case, the same data may be included in reporting to different streams. Although MRV and M&E both require data collection and reporting, the term M&E usually refers to climate change adaptation actions, while MRV refers to mitigation. MRV is more standardised across the world, as GHG emission is a measurable and comparable activity. Adaptation, on the other hand, is specific to the local context and there are currently no standard measures for it.

**A mitigation goal** is a commitment to reduce, limit the increase of, or enhance the removal of GHG emissions, or to reduce GHG emissions intensity by a specified quantity, to be achieved by a future date.

**Mitigation policies** include laws, directives, and decrees; regulations and standards; taxes, charges, subsidies and incentives; information instruments; voluntary agreements; implementation of new technologies, processes, or practices; and public or private sector financing and investment; with the aim of reducing GHG emissions.

**A mitigation project** is a specific activity or set of activities intended to reduce GHG emissions, increase the storage of carbon, or enhance GHG removals from the atmosphere.

## 2.1. MRV of Technical and Financial Support

There is a range of mechanisms for countries to be provided with technical, financial and capacity building support. This is a crucial aspect of global climate response. Through their MRV systems, developing countries measure the financial and technical support needed to meet their climate action targets. The support needed is reported to the UNFCCC through standardised reports. In this way, the needs of developing countries are transparent to UNFCCC bodies and potential developed country donors and funds. MRV keeps account of the amount of support that has been provided and of the mechanisms through which it has been provided. Conversely, the amount received by recipient countries is recorded and an evaluation is made of the impact that the support has generated. Through MRV an ongoing check is made of the effectiveness of climate support.

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Ghana is an example of a country which has integrated its data management system so that it includes data on climate change along with its development data management. Ghana's system is built on its pre-existing M&E system for development. Over forty existing structures were recognised as having a part to play in tracking progress on the implementation of mitigation actions. The integrated system facilitates linkages between climate change planning and development activities. It also promotes efficiency in the institutional structure, and highlights effects such as co-benefits of mitigation actions (Wartmann, 2017).

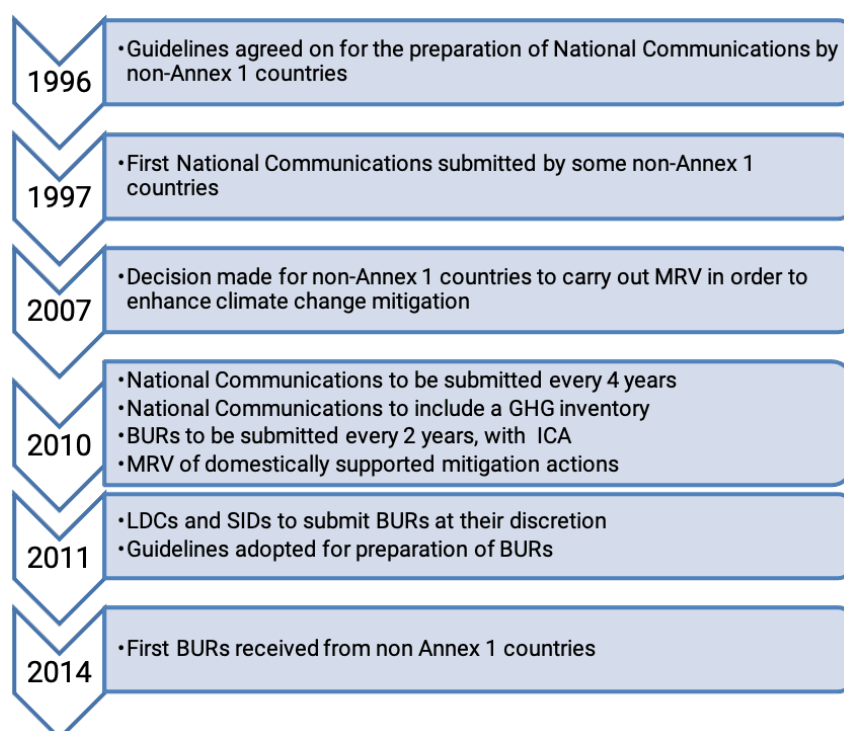
### 3.3. Global Reporting System

Since COP 13, the MRV reporting framework has been refined to guide Parties in reporting their climate status according to their common but differentiated responsibilities and respective capabilities. There are different obligations in timing and details for Annex 1 Parties, non-Annex 1 Parties and Least Developed Countries (LDCs) and Small Island Developing States (SIDs). Annex 1 countries have been required to report for a longer period of time than non-Annex 1 Parties and consequently they have had time to build capacity in reporting. As a consequence of the time lag in the requirement to report, many non-Annex 1 Parties are in earlier stages of capacity building and are learning by doing when it comes to MRV.

While measuring or monitoring is an ongoing process of data collection, which links to monitoring of climate related projects, reporting is carried out through standardised formats on a prescribed timeline. Non-Annex 1 Parties to the UNFCCC, including Laos, are required to submit the following reports:

- National Communications
- Biennial Update Reports (BURs)

Figure 3 shows an outline of the time frame over which key decisions have been made regarding reporting by non-Annex 1 countries.



**Figure 2.** Key dates in reporting by non-Annex 1 countries

#### 3.1. National Communications

The first report decided on under the UNFCCC was the National Communication. These reports are submitted every four years for the purpose of communicating a country's GHG emissions by sources and removals by sinks<sup>2</sup>, as well as the steps that a country is taking to implement the Convention. National Communications include:

<sup>2</sup> A carbon sink is any reservoir that absorbs more carbon from the atmosphere than it releases. The main natural carbon sinks are plants, the ocean and soil.

- A description of a country's national circumstances and institutional arrangements
- A national GHG inventory
- Programmes containing measures to adapt to climate change
- Programmes containing measures to mitigate climate change
- Other information considered relevant to the achievement of the objectives of the convention
- Constraints and gaps, and related financial, technical and capacity building needs

## 3.2. Biennial Update Reports

In order to enhance reporting, Biennial Update Reports (BUR) were added to the reporting framework, to be submitted by non-Annex 1 countries. The BUR may be submitted as part of a National Communication in years in which they are both due, or as a standalone report. The BUR provides updated information on a country's latest National Communication. While the National Communication contains general descriptions, the BUR is more detailed on contents such as mitigation measures and their effects, constraints, gaps and technical, financial and capacity-building support needed.

## 3.3. REDD+

The land use, land-use change, and forestry (LULUCF) sector was identified as a key sector in climate change mitigation. Accordingly, a framework was developed to support developing countries to take action in this sector. Involvement in REDD+ (Reducing emissions from deforestation and forest degradation, conservation of existing forest carbon stocks, sustainable forest management and enhancement of forest carbon stocks) is voluntary. There are incentives in the form of results-based finance for results from the implementation of REDD+ activities, and there are accompanying MRV obligations. These involve technical assessments and a technical annex attached to the BUR which contains results of REDD+ activities. LULUCF experts complete a technical analysis of the results which is separate from the overall BUR analysis.

## 3.4. International Consultation and Analysis

Verification of BURs is carried out through international consultation and analysis (ICA). The BUR will be analysed by a team of technical experts (TTE) drawn from the UNFCCC roster of experts. The analysis focuses on the quality of the reporting rather than analysing the actions and conditions which are reported on, and the TTE identifies any capacity needs in reporting. From their analysis, the TTE drafts a summary report which is shared with the country submitting the BUR for their review. The report is drafted within three months of the analysis and the country has three months to respond to the report. Once the country's comments are received, the TTE has three months to incorporate the comments and complete a final report in consultation with the country.

The second of the two parts of the ICA process consists of a facilitative sharing of views in the form of a workshop which is convened by the Subsidiary Body for Implementation (SBI). This is the body within the UNFCCC which is responsible for MRV. The workshop is attended by countries which have received final summary reports of their BUR and involves a presentation by each country of their BUR, followed by a questions and answer session involving the countries present. This concludes the process for the BUR and the cycle commences again with the preparation of the next BUR.

### 3.5. The Paris Agreement's Enhanced Transparency Framework

The MRV framework was developed under the Kyoto Protocol,<sup>3</sup> which entered into force in 2005. With the 2015 adoption of the Paris Agreement, there is a requirement for a higher standard of measuring, reporting and verification. All developing countries currently report to the UNFCCC in the format described in previous sections. Although the seven non-signatories to the Paris Agreement will continue to report according to the current framework, there will be changes in 2024 for the 190 countries which are Parties to the Paris Agreement.

The Paris Agreement reporting framework is the Enhanced Transparency Framework (ETF). This is informed by modalities, procedures and guidelines (MPGs) which were adopted in 2018.<sup>4</sup> The MPGs are explained in a 32-page annex which provides detailed guidance on the framework. The two purposes of the ETF are:

1. “to provide a clear understanding of climate change action .... including clarity and tracking of progress towards achieving Parties’ individual NDCs ... and Parties’ adaptation actions ... including good practices, priorities, needs and gaps, to inform the global stocktake under Article 14” (UNFCCC, 2015, Article 13, paragraph 5).
2. “to provide clarity on support provided and received by relevant individual Parties in the context of climate change actions ...and, to the extent possible, to provide a full overview of aggregate financial support provided, to inform the global stocktake under Article 14” (UNFCCC, 2015, Article 13. paragraph 6).

In order to track progress towards reaching the Paris Agreement goal of keeping global temperature rise to less than 2° Celsius, and preferably 1.5° Celsius, the ETF will work on a five-year cycle.

The highest level will be a global stocktake (GST) of GHG emissions, impacts and effects of each Party’s Nationally Determined Contributions (NDC), and support needed or received from the international community, which will be carried out for the first time in 2023.

In order to achieve the Paris Agreement goal, additional reports are introduced. These are in the form of Nationally Determined Contributions (NDCs) whereby each country commits to specific mitigation goals, with the aim of raising the country’s ambition every five years. While NDCs are explained in a separate guideline, the Paris Agreement also has implications for MRV.

Unlike the current MRV framework, the ETF applies to all Parties to the Paris Agreement. Nonetheless, there are flexibilities written into the framework in terms of the scope, frequency and level of detail of reporting, to account for developing country Parties that need it in the light of their capacities. Developing countries make an internal decision as to whether to apply flexibility, based on the circumstances of their own country.

Key reporting and verification elements of the ETF are:

- Nationally Determined Contributions
- Biennial Transparency Report (BTR)
- National Inventory Report (to be submitted as a standalone report or as a component of a BTR)
- Technical Expert Review (TER)
- Facilitative, multilateral consideration of progress submitted as a standalone report or as a component of a BTR)

<sup>3</sup> See Guidelines on legal frameworks, policies and treaties for further explanation of the Kyoto Protocol and the Paris Agreement.

<sup>4</sup> The MPGs can be accessed from <https://unfccc.int/documents/184700>

### 3.5.1. Biennial Transparency Report

The contents of a BTR include:

- (a) A national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases;
- (b) The information necessary to track progress in implementing and achieving a country's NDCs;
- (c) Information on climate change impacts and adaptation;
- (d) Developed country Parties shall provide information on financial, technology transfer and capacity-building support provided to developing country Parties;
- (e) Developing country Parties should provide information on financial, technology transfer and capacity-building support needed and received (UNFCCC, 2018).

The BTR, TER and facilitative, multilateral consideration of progress will replace the BUR and ICA for developing country Parties to the Paris Agreement.

### 3.5.2. National Inventory Report

The MPGs specify that the 2006 IPCC Guidelines should be followed in the preparation of a national inventory report. Countries are required to report on seven gases, these being CO<sub>2</sub>, methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF<sub>6</sub>) and nitrogen trifluoride (NF<sub>3</sub>). There is flexibility for developing countries to report on CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O as well as any of the additional four gases (HFCs, PFCs, SF<sub>6</sub> and NF<sub>3</sub>). In order to carry out a national inventory, countries commit to "implement and maintain national inventory arrangements, including institutional, legal and procedural arrangements for the continued estimation, compilation and timely reporting of national inventory reports in accordance with [the] MPGs" (UNFCCC, 2018, Annex, II, B, para. 18). In addition to the current level of GHG emissions and removals, Parties are required to make projections of emissions and removals fifteen years into the future (with flexibility of the time frame for developing countries). Countries should report a scenario 'with measures' and may also report the additional scenarios according to the following definitions:

Type of scenario	Explanation
With measures	encompasses currently implemented and adopted policies and measures
With additional measures	encompasses implemented, adopted and planned policies and measures
Without measures	excludes all policies and measures implemented, adopted and planned after the year chosen as the starting points for the projection

**Table 1.** Definitions of scenarios with or without measures

Source: UNFCCC, 2018

### 3.5.3. Technical Expert Review

A technical expert review team will review each BTR, strictly following the MPGs to ensure that the review is done in a "facilitative, non-intrusive, non-punitive manner, respectful of national sovereignty, and will avoid placing undue burden on Parties (UNFCCC, 2018, annex, para. 148). The TER will entail:

- A review of the consistency of the information submitted by the Party under Article 13, paragraphs 7 and 9, of the Paris Agreement with the MPGs, taking into account the flexibility accorded to developing countries

- Consideration of the Party's implementation and achievement of its NDC
- Consideration of the Party's support provided, as relevant
- Identification of areas of improvement for the Party related to its ETF obligations
- Assistance in identifying capacity-building needs of developing countries

The TER will be carried out as a centralised review, in-country review, desk review or simplified review. A centralised review is undertaken by the review team from a single, centralised location from where the team may review several BTRs. For an in-country review, the team will travel to the country whose BTR they are reviewing. In a desk review, members of the team will not be gathered in one place, but each will conduct their role in the review from their home location. A simplified review consists of a review of the report's completeness and consistency with the MPGs, with the technical expert review component being conducted at a later time.

Before the week of the TER of its BTR, a country has the opportunity to answer questions posed by the review team. The review team then provides preliminary feedback to the country. A draft technical expert review report is then prepared and shared with the country for their comments. These comments are incorporated into the final TER report. The entire process should take no more than twelve months.

### 3.5.4. Facilitative, multilateral consideration of progress

Usually after receipt of a country's TER report, the country will participate in a facilitative, multilateral consideration of progress (FMCP). This consists of an online, written question and answer phase in which any Party is able to ask questions of another Party regarding the information submitted in its BTR, and the contents of the TER report. The second and final phase of the process is a working group session which involves a presentation by the Party whose BTR has been reviewed, and questions and discussion involving all Parties present.

Although the measuring component of MRV will continue in the years ahead, the ETF has more stringent and detailed reporting and verification requirements. These are being introduced in order to ramp up transparency and understanding of climate activity, and to prepare for the global GHG stocktake, which is set to take place in 2024.

- National Communications continue (may in future be submitted as a single report with BTR)
- REDD+ reporting continues
- ETF common reporting tables, report outlines, and training for experts to be developed by COP 26
- 31 December 2024: Final date for BURs from developing countries
- 31 December 2024: First BTRs due (LDCs and SIDS have discretion)

## 4. MRV in Laos

As an early signatory to the UNFCCC, Laos has been involved in MRV for many years. Table 2 shows the dates of reports which had been submitted before August 2020.

Document	Date
First National Communication	2 November 2000
Second National Communication	24 June 2013
First NDC	1 October 2015
Biennial Update Report	28 July 2020

**Table 2.** Reporting submitted to the UNFCCC by Lao PDR

## 4.1. Lao National Communications

The Lao National GHG Inventory Project was initiated in 1997 with one of its objectives being to conduct an inventory of sources and sinks of GHG emissions in the Lao PDR. This was the first major undertaking of its sort in the country. Results of the inventory were reported in the First National Communication. The inventory was conducted for the year 1990, and followed the 1996 IPCC Guidelines. The inventory covered the energy, land use change and forestry, agriculture and waste sectors, and reported on carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), carbon monoxide (CO), nitrous oxide (N<sub>2</sub>O) and other nitrous oxides (NO<sub>x</sub>). Data gathered from statistics was used to determine the volume of relevant activities in 1990 and GHG emissions were estimated from the volumes using the IPCC default emission factors, which was the Tier 1 approach

. At the time, no work had been done on determining Lao emission factors for any of the reported activities. Hence, the data did not account for things such as the breed or age of livestock, and the type of animal feed used in the agriculture sector. Similarly, there was no data on wastewater in the various sectors. The first GHG inventory concluded that in 1990 Laos was a net sequester of CO<sub>2</sub>, removing 121,641 Gg (gigagrams) from the atmosphere, twice as much CO<sub>2</sub> as was emitted (Science Technology and Environment Agency, 2000).

In 2013 Laos submitted the Second National Communication. In the intervening years since the First National Communication, awareness of climate change had grown, both internationally and in Laos. The second GHG inventory in Laos was conducted for the year 2000. A fifth sector, industrial processes, was added to the inventory.

Non-methane volatile organic compounds (NMVOCs) and sulphur dioxide (SO<sub>2</sub>) were added to the gases reported on in the first inventory. Again, a Tier 1 approach was undertaken, with all the emissions factors being IPCC default values. This was because of insufficient available statistical data, and insufficient technical and financial resources, to enable use of a higher tier.

The second inventory showed a substantial increase in GHG emissions since the first inventory. Laos had moved from being a net CO<sub>2</sub> sink to a net CO<sub>2</sub> emitter of 41,764 Gg. While the increase was reasoned to be due in part to accelerated socio-economic development, it was also felt to be a result of increased technical capacity and greater availability of relevant data. Table 3 shows the sectoral distribution of GHG emissions.

Sector	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO	NO <sub>x</sub>	NMVOC	SO <sub>x</sub>
LUCF	42,758	52	0.36	456.84	12.97		
Energy	1,004	0.7	0.08	41.48	7.5	6.43	1.55
Industrial Processes	48.4					17.86	0.05
Agriculture		251.4	7.7	8.39	0.32		
Waste		2.4	0.27 <sup>5</sup>				
Total	43,810.7	306.7	8.43	506.7	20.84	24.28	1.6

**Table 3.** GHG emissions (Gg) for the year 2000 as reported in the Second National Communication

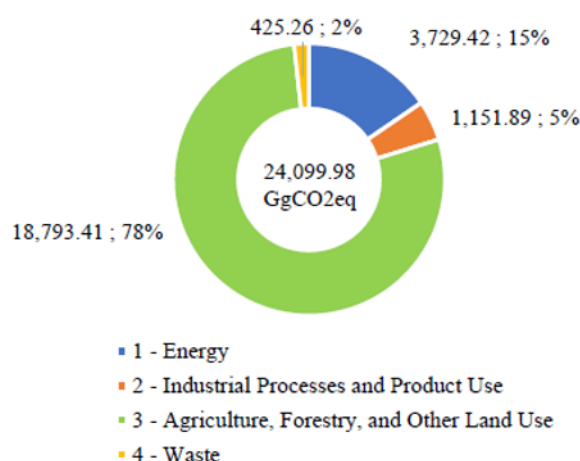
## 4.2. Lao Biennial Update Report

The third national GHG inventory was conducted with a base year of 2014, and the draft was

5 The 0.27 Gg of N<sub>2</sub>O in the waste sector was emitted from wastewater management



submitted to the UNFCCC as part of the first Biennial Update Report in July 2020.<sup>6</sup> For the first time, the 2006 IPCC Guidelines were used. These more recent guidelines have reduced the number of sectors from five to four, in order to improve accuracy and transparency. This was achieved by bringing the Agriculture and LULUCF sectors together into an Agriculture, Forestry and Other Land Use (AFOLU) sector. The 2006 guidelines, and the third Lao GHG Inventory, therefore cover the Energy, Industrial Process and Product Use (IPPU), AFOLU and Waste sectors. Emissions were estimated for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. As with the previous inventories, the IPCC default emission factors were used in a Tier 1 approach. The inventory showed that in 2014 Laos emitted 24,099.98 Gg CO<sub>2</sub>eq.<sup>7</sup> The distribution of emissions over the four reported sectors is displayed in Figure 4.



**Figure 4.** Net GHG emissions by sector in 2014 in Laos

The process of conducting the GHG inventory is summarised in Figure 5. The figure also shows that TACCC (Transparency, Accuracy, Consistency, Completeness, and Comparability) was part of the process. From calculating TACCC, a figure of 37.93% was arrived at as the level of combined inventory uncertainty.

The report notes that in order to improve the level of certainty and thus the quality of the inventory, there needs to be both improvement in the activity data and also development of country specific EFs.

SECTOR	EMISSION SOURCES
Energy	Fuel combustion, particularly in transportation, manufacturing and construction, and the energy industry
IPPU	Cement, lime, and iron production processes
AFOLU	Land and land use change, livestock, harvested wood products
Waste	Solid waste disposal, biological treatment of solid waste, incineration and open burning of solid waste, and wastewater treatment and discharge

**Table 4.** Main emission sources by sector in Laos in 2014

A range of activities were responsible for GHG emissions in 2014, as shown in Table 4.

In reporting constraints, gaps, needs and support received, the BUR reported a range of financial, systemic, capacity, institutional and other constraints. These include insufficient finance to invest in mitigation and low emission technologies; an unclear and incomplete legal and regulatory framework; lack of coordination amongst stakeholders; limited technical capacity; insufficient information on the effects of mitigation technologies; insufficient models and best practices; and

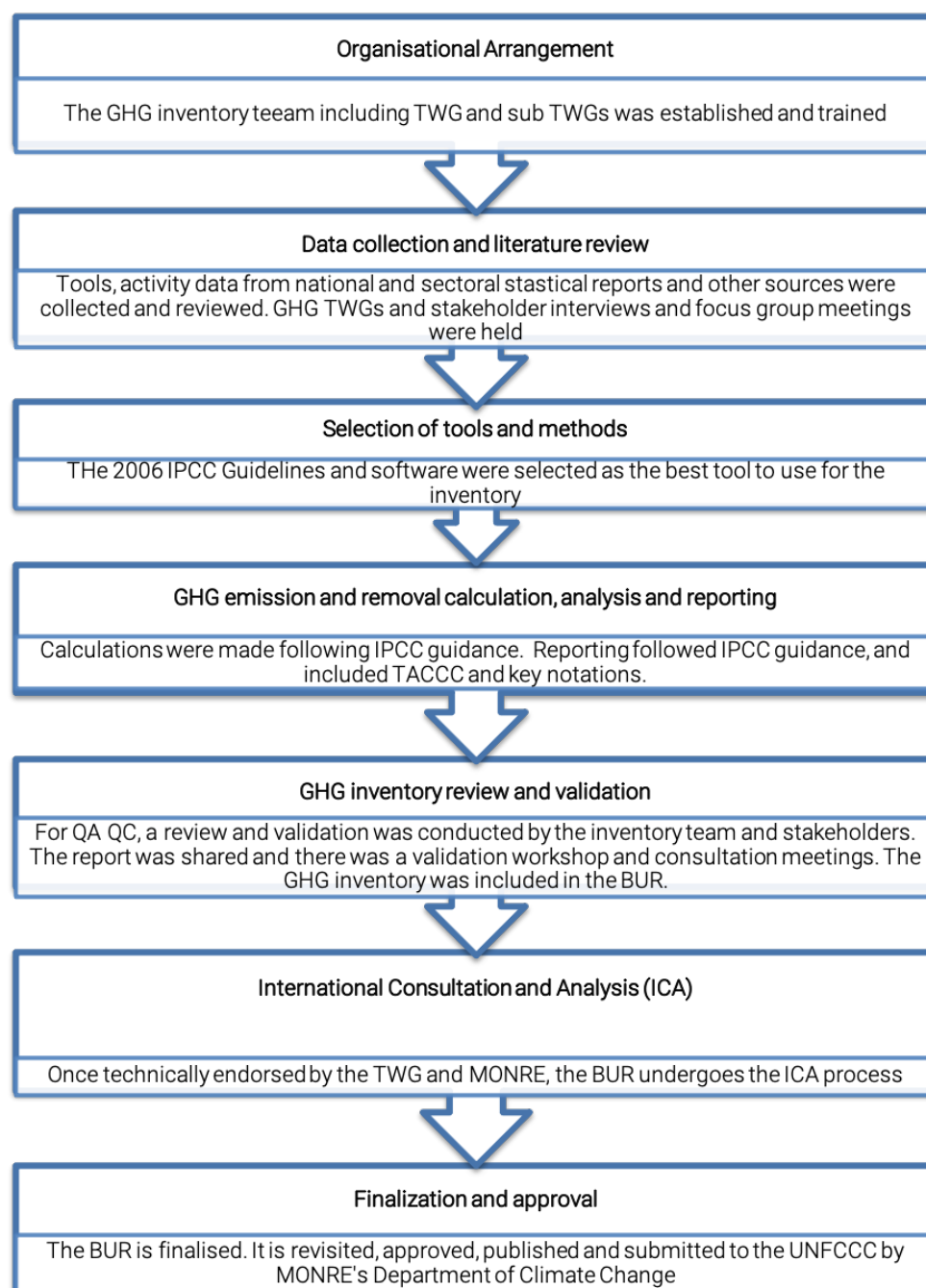
<sup>6</sup> The Biennial Update Report (in English) can be accessed from <https://unfccc.int/documents/231736>

<sup>7</sup> CO<sub>2</sub>eq is CO<sub>2</sub> equivalent. This refers to the amount of GHGs having the same amount of global warming potential as CO<sub>2</sub>. For example, 3 Gg CO<sub>2</sub>eq of GHGs has the same global warming potential as 3 Gg of CO<sub>2</sub>



lack of M&E and data and information systems. There is a need of about US\$ 1.5 billion to enable implementation of the actions in the national climate change strategy. Most of the USD 223 million in support received in 2013-4 was for the benefit of the forestry sector.

Attached to the BUR is a technical annex to obtain and receive results-based payments for reducing emissions from deforestation and forest degradation and increasing removals through enhancement of forest carbon stocks through REDD+ actions under the UNFCCC. The annex reports 12,805,253 tCO<sub>2</sub>e of reduced emissions and 1,873,301 tCO<sub>2</sub>e of increased removals over the four-year period from 1 January 2015 to 31 December 2018.



**Figure 5.** GHG inventory reporting process

Source: Adapted from draft of Lao PDR First BUR, p.18

### 4.3. Laos' Domestic MRV System

A major undertaking for Parties to the UNFCCC is the development of an MRV system. Laos is in the process of doing this in order to conduct MRV in the three areas of GHG emissions and removals, mitigation actions, and the receipt of financial and technical support. For the meantime, it is planned to focus MRV at the national, sectoral, programme/project and facility levels. MRV will be carried out according to existing domestic processes. At the national and sectoral levels MRV of GHG emissions and removals will continue to be carried out by MONRE in the ongoing cycle of GHG inventory processes for inclusion in National Communications and BURs. Sectors have MRV approaches which are specific to their sector. In the AFOLU sector, the Ministry of Agriculture and Forestry will manage MRV in line with REDD+. There are international mechanisms for the aviation sector, and the Ministry of Public Works and Transport will deal with MRV in aviation.

MRV of mitigation actions will be conducted by the relevant sector, which will then communicate the results to MONRE. It is MONRE's responsibility to collate all of the sectoral MRV reports and incorporate them into the international reporting cycle of National Communications, NDCs and BURs. For MRV of support received, the Ministry of Planning and Investment and the Ministry of Finance are to report to MONRE from their database of overseas development assistance. The National Assembly and State Inspection also provide a third-party review of mitigation actions and support received. MONRE will then report all this data to the UNFCCC as shown in Figure 6.

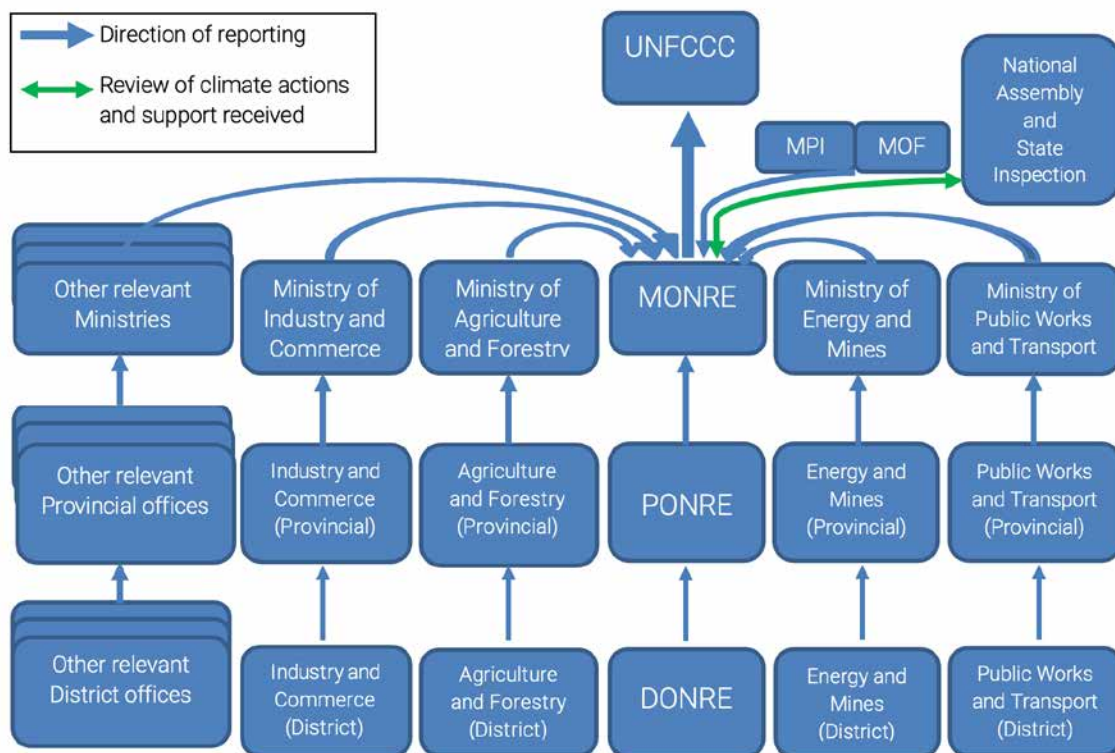


Figure 6. Flow of reported climate data

## 5. Tools, methodologies and guidelines

Numerous tools, methodologies and guidelines have been developed to support all levels of government in their MRV obligations, and in carrying out effective climate action which also contributes to sustainable development. A number of technical entities have been established

through the UNFCCC, some of which have responsibilities to produce guidelines and other support materials. The support materials are in English and some have been translated into other UN languages.

### 5.1. Consultative Group of Experts (CGE)

Originally established to support developing countries with their National Communications, the mandate of the CGE was extended until the end of 2026 to include support for implementing the ETF. CGE activities include training workshops, which were offered online during the Covid-19 pandemic. In 2020, regional training workshops aimed to enhance the technical capacity of experts from developing country Parties in implementing the existing MRV arrangements and in preparing for implementation of the ETF. The CGE also offers free e-learning courses on the preparation of national communications. Other training materials include handbooks, presentations and webinars. These are available in 2020 from the links shown in Table 5. CGE materials are generally aimed at national level experts, and are produced in English and some other UN languages.

Resource	Online location in 2020
Training Materials for the Preparation of NCs	<a href="https://unfccc.int/process-and-meetings/bodies/constituted-bodies/consultative-group-of-experts/cge-training-materials/cge-training-materials-for-the-preparation-of-national-communications">https://unfccc.int/process-and-meetings/bodies/constituted-bodies/consultative-group-of-experts/cge-training-materials/cge-training-materials-for-the-preparation-of-national-communications</a>
Training Materials for the Preparation of BURs	<a href="https://unfccc.int/process-and-meetings/bodies/constituted-bodies/consultative-group-of-experts/cge-training-materials/cge-training-materials-for-the-preparation-of-biennial-update-reports">https://unfccc.int/process-and-meetings/bodies/constituted-bodies/consultative-group-of-experts/cge-training-materials/cge-training-materials-for-the-preparation-of-biennial-update-reports</a>
Links to Webinars	<a href="https://unfccc.int/process-and-meetings/bodies/constituted-bodies/consultative-group-of-experts-cge/cge-webinar-series#eq-1">https://unfccc.int/process-and-meetings/bodies/constituted-bodies/consultative-group-of-experts-cge/cge-webinar-series#eq-1</a>

**Table 5:** Online location of CGE training materials

### 5.2. Paris Committee on Capacity-building (PCCB)

The PCCB was established in 2015 to support capacity-building in developing countries. The PCCB strengthens networks, partnerships and collaboration between actors at all levels from local to global in order to promote synergies and knowledge sharing. It has a major part to play in effecting a coherent and coordinated approach to capacity-building under the UNFCCC. The PCCB facilitates a network which is open to any public or private entity which is engaged in climate action capacity-building. The PCCB network activities are:

1. Technical exchanges/peer-learning activities, such as webinars, workshops, peer-to-peer learning, open call for technical inputs, and compendiums.
2. Communication/outreach activities, for instance newsletters, stories, interviews, and blog posts.
3. Engagement/networking activities, including all-member meetings, thematic/regional meetups, surveys, and open call for proposals (UNFCCC, 2020)

The PCCB network publicises its activities through its website (<https://unfccc.int/pccb-network>), Facebook page (<https://www.facebook.com/pccb.unfccc>) and YouTube channel, where recordings of past events can be viewed.

### 5.3. The Initiative for Climate Action

The Initiative for Climate Action Transparency (ICAT) is a multi-stakeholder partnership which supports improved transparency and capacity building under the Paris Agreement. ICAT's approach integrates guidance, capacity building and knowledge sharing to support countries in both the



**Figure 7.** Overview of ICAT assessment guides

Source: <https://climateactiontransparency.org/wp-content/uploads/2020/03/Overview-of-the-ICAT-series-of-assessment-guides.pdf>

## 5.4. MRV at the Sub-National Level

While previous sections of this guideline deal with national MRV systems, international momentum has gathered over recent years for climate action initiated at the sub-national level, particularly at the city level, since a large proportion of emissions come from activity in cities. It has been estimated that globally, 70% of emissions from energy-related activities come from cities (Greenhouse Gas Protocol, 2014 a). As well as being major contributors to climate change, cities are also particularly impacted by it. As recognised hubs of innovation, creativity and research, climate research at the city level contributes needed data to help gain an in depth understanding of climate change throughout a country, and to increase a country's ambition in its NDCs. While national reporting contains targets and plans, there is a need for action from all levels of government in order to implement climate action plans and achieve the emission reduction targets set in a country's NDC. (Greenhouse Gas Protocol, 2014 a).

Several international initiatives have been established to provide support, guidance and incentives for cities. In 2014, a Global Compact of Mayors brought together over 2,000 cities "to undertake a transparent and supportive approach to reduce city-level emissions, to reduce vulnerability and to enhance resilience to climate change, in a consistent and complimentary manner to national

assessment of the impacts of their policies and actions, and the reporting of progress. ICAT aims to contribute to higher quality data, more efficient and economical policies, and the sharing of lessons learned. In 2020 ICAT is partnering with 40 countries throughout the world in capacity-building. In addition, ICAT has published a series of assessment guides to support the assessment of policies and actions. Figure 7 shows the guides.

There is an introductory guide which explains the use of the guides. This is accompanied by five sector-specific guides looking at GHG impacts. There are then three guides looking at cross-cutting issues. The guide on transformational change looks at assessing policies impacts on bringing about foundational changes to switch to zero-carbon and sustainable development. The guide on non-state and subnational action focuses on integrating these actions into national and sectoral planning. The stakeholder participation process guide is of particular interest for guiding stakeholder consultation and involvement. The assessment guides are intended for use by a wide range of stakeholders including governments, donors, businesses, research institutions, non-governmental organisations and stakeholders affected by policies.

level climate protection efforts” (ICLEI-Local Governments for Sustainability(ICLEI), C40 Climate Leadership Group(C40), United Cities and Local Governments (UCLG), 2014).

Effective climate action is dependent on accurate and complete data, therefore, in order to undertake climate action at the local level, there is a need for MRV systems to measure data and report into the national reporting system. Of the three focus areas for MRV, the measurement of GHG emissions can be carried out through a GHG inventory at a local level, such as a city level.

## 5.5. Global Protocol for Community-Scale Greenhouse Gas Emission Inventories

In order to measure and report GHG emissions at the local level the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) was released. The GPC is a standard framework which is used for any sub-national level GHG inventory. Prior to its release, a variety of frameworks had been used in different locations, making it difficult to compare data from different cities, and to aggregate the emissions data from subnational and national levels. The framework provides a method of measuring and reporting GHG emissions from the sectors specified in the IPCC guidelines (stationary energy, transportation, waste, IPPU and AFOLU). In addition, a sixth sector covers other emissions occurring outside the geographic boundary of the inventory as a result of city activities. Table 6 provides a summary of the contents of the GPC (Greenhouse Gas Protocol, 2014 b, pp. 9-10)

Part I	Part II	Part III
Introduces the GPC reporting and accounting principles, sets out how to define the inventory boundary, specifies reporting requirements and offers a sample reporting template	Provides overarching and sector-specific accounting and reporting guidance for sourcing data and calculating emissions, including calculation methods and equations	Shows how inventories can be used to set mitigation goals and track performance over time, and shows how cities can manage inventory quality

**Table 6:** Contents of the GPC

An important step in the inventory process is the definition of the geographic boundary of the inventory. This is particularly so when multiple inventories are being conducted, in order to avoid double counting emissions. Three scopes are defined, as shown in Table 7.

Scope	Definition
Scope 1	GHG emissions from sources located within the city boundary.
Scope 2	GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary.
Scope 3	All other GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundary.

**Table 7:** Scope definitions

Source: Greenhouse Gas Protocol, 2014 b, p. 31

A major task in conducting a GHG inventory is data collection. Systems are required to measure data from the emitting activities and to collate the data in a central collection point. Once the data has been collated and transferred to the reporting templates contained in the GPC, there is an option to verify the data, either by the organisation that conducted the inventory assessment, or else by a third party. The GPC does not obligate an organisation to verify its inventory data.



Once a GHG inventory has established the emissions from a local area, goals can be set and progress tracked in order to reduce emissions. The GPC recommends establishing a management plan for the inventory process, covering methods, data, documentation, and inventory systems and processes. This facilitates a continuous process of improvement in the tracking of GHG emissions and the achievement of target levels.

## 5.6. International Reporting of Sub-National Data

A reporting framework for sub-national entities was developed by the Global Covenant of Mayors for Climate and Energy (GCoM). The GCoM, in its present format, dates back to June 2016 when the Former Global Compact of Mayors merged with the European Union's Covenant of Mayors for Climate & Energy. Through the GCoM, local governments commit to take measures to:

- (i) reduce/limit greenhouse gas emissions;
- (ii) prepare for the impacts of climate change;
- (iii) increase access to sustainable energy; and
- (iv) track progress toward these objectives (Global Covenant of Mayors for Climate & Energy, 2018, p. 3)

To enable aggregation and comparison of data at a global level, the GCoM developed a common reporting framework, which was released in 2018. Local governments have the option to report directly through this framework. This is a process focussed on cities which is optional and separate from the national reporting obligations of the UNFCCC. It encourages local governments to set targets in order to enhance both mitigation and adaptation actions.

In 2019 Carbon Disclosure Project (CDP) and ICLEI brought out a unified system for reporting climate data from any subnational level. CDP is a not-for-profit organisation that runs a global disclosure system for cities, states and regions as well as companies and investors, with the aim of managing their environmental impacts. Previously having their own reporting systems, ICLEI and CDP partnered to unify the systems in order to simplify the reporting process. Reporting entities report through CDPs platform and the data is shared with ICLEI, enabling both organisations to analyse and report data. The unified system is aligned with other initiatives including the GCoM's Common Reporting Framework.

There are several other tools for MRV of local level data. An example is the City Inventory Reporting and Information System (CIRIS). CIRIS aligns with the GPC and also with the GCoM CRF. It is designed for the management and reporting of city level GHG inventory data. Using Excel, CIRIS performs calculations based on data which is input by the user. It holds all the data, both numerical and word-based, which is required for reporting under the GPC framework.

### 5.6.1. Case study: GHG inventories in Pakse and Kaysone Phomvihane City

GHG inventories were conducted in 2019 in Pakse and in Kaysone Phomvihane City, using the GPC and CIRIS. Since city level inventories are new to Laos, there are many systems which need to be established in order to produce a high level of accuracy in the inventory. Key requirements are improvements in research, data collection and reporting systems.

The inventory for Pakse found that total emissions were about 373,193 tCO<sub>2</sub>e, which were offset by removals of 19,193 tCO<sub>2</sub> from AFOLU, particularly by the remaining forests and orchards. In Kaysone Phomvihane City the total emissions were about 515,874 tCO<sub>2</sub>e, which were offset by removals from AFOLU of 32,004 tCO<sub>2</sub>.

SECTOR	PAKSE		KAYSONE PHOMVIHANE CITY	
	Emissions (tCO <sub>2</sub> e)	Percentage of total emissions in Pakse	Emissions (tCO <sub>2</sub> e)	Percentage of total emissions in Kaysone Phomvihane City
Stationary energy	224,077	63.30	340,565	70.38
Waste	116,440	32.89	100,204	20.71
Transportation	9,380	2.65	9,373	1.94
AFOLU	4,103	1.16	33,728	6.97
<b>TOTAL</b>	<b>354,000</b>	<b>100.00</b>	<b>483,869</b>	<b>100.00</b>

## 6. Concluding comments and good practices

The development of a national MRV system is a complex process that takes place over several years. International requirements are not static but are continually being refined in order to adapt to new information, enhance transparency, and support all countries to build capacity. The ETF will require solid multilevel institutional arrangements and buy-in from all sectors.

MRV capacity building is a learning by doing process. At sub-national levels there is, in many countries, a significant responsibility in terms of data collection and data management. For focal agencies, there is often also a considerable amount of awareness raising that is required, both in political, sectoral and public arenas.

In Laos, work is underway to implement a national MRV system and to prepare for the ETF. In 2020 Laos submitted its first BUR, amended NDC, and the Third Communication was in its final stages. Some major constraints on the implementation of MRV are limits on financial resources and technical capacity and incomplete institutional frameworks. Despite these constraints, MRV planning is well under way. Countries are at different stages in the development of an MRV system. A 2017 study (Wartmann, 2017) analysed MRV systems and identified a number of good practices from a range of countries at different stages in the development of their systems. One notable practice is long term planning. This can be undertaken by prioritising the most relevant tasks which are achievable and planning them according to available budgets. Further tasks can be implemented in later stages.

A second good practice is the integration of MRV practices into existing systems as much as possible. Countries have monitoring and reporting processes for development actions, for environmental measures and for sectoral activities. A coordinated approach can incorporate MRV into these processes, leading to greater efficiency and a fuller assessment of impacts.

Thirdly, countries have introduced changes gradually, sometimes piloting programmes or having actions voluntary for a specified period of time. This is particularly beneficial where there are obligations placed on organisations and facilities. The introductory period enables stakeholders to become accustomed to the new requirements.

Regardless of how an MRV system is developed, it is important to have a strong institutional framework. There are many sectors and levels involved, and sectors have specific technical requirements which are unique to their sector. A strategic and coordinated approach is therefore essential. Lessons will be learnt along the way and it is valuable to have a process in place to capture the lessons in a cycle of learning and improvement.

## Bibliography

de la Torre, L. W.-M.-A. (2018). National benefits of climate reporting. Discussion paper. Retrieved August 18, 2020, from [https://www.international-climate-initiative.com/fileadmin/Dokumente/2018/180917\\_Information\\_Matters\\_National\\_benefits\\_of\\_climate\\_reporting.pdf](https://www.international-climate-initiative.com/fileadmin/Dokumente/2018/180917_Information_Matters_National_benefits_of_climate_reporting.pdf)

Global Covenant of Mayors for Climate & Energy. (2018). Global Covenant of Mayors Common Reporting Framework. Retrieved August 17, 2020, from [https://www.globalcovenantofmayors.org/wp-content/uploads/2019/04/FINAL\\_Data-TWG\\_Reporting-Framework\\_website\\_FINAL-13-Sept-2018\\_for-translation.pdf](https://www.globalcovenantofmayors.org/wp-content/uploads/2019/04/FINAL_Data-TWG_Reporting-Framework_website_FINAL-13-Sept-2018_for-translation.pdf)

Greenhouse Gas Protocol. (2014 a). Mitigation Goal Standard: An accounting and reporting standard for national and subnational greenhouse gas reduction goals. Washington DC: World Resources Institute. Retrieved August 3, 2020, from <https://ghgprotocol.org/mitigation-goal-standard>

Greenhouse Gas Protocol. (2014 b). Policy and Action Standard: An accounting and reporting standard for estimating the greenhouse gas effects of policies and actions. Washington DC: World Resources Institute. Retrieved August 3, 2020, from <https://ghgprotocol.org/policy-and-action-standard>

ICLEI-Local Governments for Sustainability(ICLEI), C40 Climate Leadership Group(C40), United Cities and Local Governments (UCLG. (2014). The Compact of Mayors: Goals, Objectives and Commitments. Retrieved August 17, 2020, from <https://www.c40.org/>: <https://www.c40.org/researches/compact-of-mayors>

Ministry of Natural Resources and Environment. (2013). The Second National Communication on Climate Change Submitted to the United Nations Framework Convention on Climate Change. Vientiane. Retrieved August 7, 2020, from <https://unfccc.int/resource/docs/natc/laonc2.pdf>

Science Technology and Environment Agency. (2000). The First National Communication on Climate Change: Submitted to the United Nations Framework Convention on Climate Change. Vientiane. Retrieved August 7, 2020, from <https://unfccc.int/resource/docs/natc/laonc1.pdf>

Singh, N. F. (2016). MRV 101: Understanding Measurement, Reporting, and Verification of Climate Change Mitigation. Washington DC: World Resources Institute. Retrieved July 30, 2020, from <https://www.wri.org/publication/mrv-101-understanding-measurement-reporting-and-verification-climate-change-mitigation>

UNFCCC. (2015). Adoption of the Paris Agreement. Retrieved August 4, 2020, from [https://unfccc.int/files/essential\\_background/convention/application/pdf/english\\_paris\\_agreement.pdf](https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf)

UNFCCC. (2018). Decision 18/CMA.1: Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement. FCCC/PA/CMA/2018/3/Add.2. Retrieved August 5, 2020, from [https://unfccc.int/sites/default/files/resource/cma2018\\_3\\_add2\\_new\\_advance.pdf#page=18](https://unfccc.int/sites/default/files/resource/cma2018_3_add2_new_advance.pdf#page=18)

United States Environmental Protection Agency. (2011). Developing a National Greenhouse Gas Inventory System Template Workbook. Retrieved August 3, 2020

Wartmann, S. &. (2017). Analysis of MRV and Accounting Systems of Annex I and Non-Annex I Countries: Good Practices and Lessons Learned. Bonn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Retrieved August 18, 2020, from <https://www.transparency-partnership.net/system/files/document/Good%20Practices%20print%20Published.pdf>

World Resources Institute. (2014). Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. Retrieved August 11, 2020, from [https://ghgprotocol.org/sites/default/files/standards/GHGP\\_GPC\\_0.pdf](https://ghgprotocol.org/sites/default/files/standards/GHGP_GPC_0.pdf)





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