Barrier Assessment for MRV/ETF in Botswana's transport sector

ICAT Initiative for Climate Action Transparency

Initiative for Climate Action Transparency – ICAT Barrier Assessment for MRV/ETF in Botswana's transport sector

Deliverable #4

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Abbreviations

BTR	Biennial Transparency report
CH_4	Methane
CO_2	Carbon Dioxide
DMS	Department of Meteorological services
DoE	Department of Energy
DRTS	Department of Road Transport and Safety
ETF	Enhanced Transparency Framework
GHG	Greenhouse Gas
GoB	Government of Botswana
ICAT	Initiative for Climate Action Transparency
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MFED	Ministry of Finance and Economic Development and Planning
M&E	Monitoring and Evaluation
MENT	Ministry of Environment, Natural Resources and Tourism
MPGs	Modalities, Procedures and Guidelines
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MRV	Measuring Reporting and Verification
NAMAs	Nationally Appropriate Mitigation Actions
N_2O	Nitrous Oxide
NDC	Nationally Determined Contributions
NIR	National GHG Inventory Report
QA/QC	Quality Assurance & Quality Control
SB	Statistics Botswana
SDG	Sustainable Development Goal
NC	National Communication
p-km	passenger- kilometre
t-km	tonne-kilometre
TMU	Technical Management Unit
TOR	Terms of Reference
UNEP-CCC	United Nations Environment Programme – Copenhagen Climate Centre (newly formed)
UNFCCC	United Nations Framework Convention on Climate Change
v-km	Vehicle-kilometre
WG	Working Group

Glossary

Accuracy
A relative measure of the exactness of an emission or removal estimate. Estimates should be accurate in the sense that they are systematically neither over nor under true emissions or removals, so far as can be judged.

Activity
A practice or ensemble of practices that take place on a delineated area over a given period of time.

Activity data
Data on the magnitude of a human activity resulting in emissions or removals taking place during a given period of time. Data on energy use, metal production, land areas, management systems, lime and fertilizer use, and waste arising are examples of activity data.

Carbon dioxide equivalent emission
The amount of carbon dioxide (CO2) emission that would cause the same integrated radiative forcing or temperature change, over a given time horizon, as an emitted amount of a greenhouse gas (GHG) or a mixture of GHGs. There are a number of ways to compute such equivalent emissions and choose appropriate time horizons. Most typically, the CO2-equivalent emission is obtained by multiplying the emission of a GHG by its global warming potential (GWP) for a 100-year time horizon.

Transparency
Transparency means that the assumptions and methodologies used for an inventory should be clearly explained to facilitate replication and assessment of the inventory by users of the reported information. The transparency of inventories is fundamental to the success of the process for the communication and consideration of information.

Enhanced Transparency Framework (ETF)
ETF is designed to build trust and confidence that all Paris Agreement Parties are contributing their share to the global effort through MRV of Implementation of their Nationally Determined Contributions (NDC) in order to track if the global goal of achieving 1.5 to 2 Degrees Celsius is being achieved.

Introduction

Background

The Initiative for Climate Action Transparency (ICAT) aims to help governments build capacity to measure the effects of their policies and report progress publicly, thus fostering greater transparency, effectiveness, trust, and ambition in climate policies worldwide. Botswana has prioritized the Energy and Transport sectors for its ICAT activities.

This report is on Deliverable 4 of the ICAT Botswana study "Barriers assessment for MRV/EFT in the Transport sector" focussing on issues that are hindering or will hinder Botswana from achieving an effective MRV that will transit to ETF requirements under the Paris Agreement. Recommendations towards an enabling environment are also proposed.

Botswana like other UNFCCC Parties have been undertaking MRV through the National Communications (NCs), biennial update reports (BURs), Nationally Appropriate Mitigation Actions (NAMAs) etc. However, with the advent of the Paris Agreement, Parties are also required to report in a transparent manner and provide necessary information for clarity. This is required for domestic as well as international transparent reporting as part of the global stocking to determine if the Parties are moving towards their targets defined in NDCs, as well as report the capacity building, finance and technological transfers received for mitigation.

Since COP 24 new reporting requirements under the Paris Agreement, ETF require Non-Annex I countries, like Botswana, to report through Biennial Transparency Reports (BTR), whose first submission is due by 31st December 2024 at the latest. The BTR's outline is currently being negotiated at the UNFCCC under the Subsidiary Body for Scientific and Technological Advice (SBSTA), but the provisions embodied in the Modalities Procedures Guidelines (MPGs) have defined that the BTR will constitute the following:

- A national Inventory Report (NIR) of anthropogenic emissions by sources and removals by sinks of greenhouse gases.
- Information necessary to track progress made in implementing and achieving NDCs under Article 4 of the Paris Agreement; and
- Information on Mitigation Actions, Policies and Measures (APM) that support the implementation and achievement of its NDC under Article 4 of the Paris Agreement.

Objectives

The overall objective of the ICAT project for Botswana is to support the development and implementation of a functional MRV system focusing in this case on the transport sector (and energy sector) that will be coordinated by MENT to support MRV in accordance with the EFT under Paris Agreement and ensuring synergies between the two priority sectors. The common deliverables for the two sectors are presented in Table 1 below.

Deliverable 1	Situational Analysis on MRV in Botswana and Needs and gap assessment for MRV in the transport sector (synergizing with the energy sector).
Deliverable 2	Strengthening institutional arrangements for MRV in the transport sector.
Deliverable 3	Develop a list of indicators for NDC tracking and monitoring in the Transport sector. Develop capacity for data management and impact assessment to track NDC implementation in the transport sectors based on ICAT methodologies and/or other available tools.
Deliverable 4	Barrier Assessment for MRV/EFT in the transport sector.
Deliverable 5	Develop a roadmap to ensure the achievement and sustainability of ICAT outcomes.
Deliverable 6	Report documenting the final validation workshop and main outcomes of ICAT Botswana.

Table 1 ICAT Botswana deliverables for transport sector

Specific to this report for Deliverable 4, is the assessment of barriers towards achieving a robust and effective MRV system for the transport sector in Botswana that complies with the EFT under the Paris Agreement.

Methods and Approaches

This ICAT study has involved consultations of the energy and transport sector stakeholders during Situation analysis (deliverable 1) and Institutional arrangements (Deliverable 2). In both cases, stakeholders identified the constraints and gaps in creating and operating MRV systems that will transit to ETF. Thus, these inputs from stakeholders and previous analysis have been the main sources of information on this barrier assessment. The content of consultations in Deliverable 1 and Deliverable 2 are presented in the following Table 2.

Deliverable 1	Deliverable 2
• Awareness of Paris Agreement- ETF- ICAT • Stakeholder involvement in Botswana Reporting process i.e. What climate change related reporting they are involved with and extent of their participation whether is just data provision or analytical work as well. • Data status for their sector and adequacy and quality for MRV • What data information system already exists for their sector and data stored and relevance to MRV • What additional data would be required in their opinion • What resources would be required to meet those data gaps • What MRV tools stakeholders are using and or familiar with • Capacity needs of stakeholders to participate better in MRV and use of MRV tools • How the data information system can be improved • Any ideas how a national data information system could be created or consolidated to better serve the MRV process • What key stakeholders should participate in MRV • Proposals on a working governance structure (who to coordinate and other structures under that governance structure) • What stakeholder see as necessary technical committees/groups for their sector and to serve what purpose. • What stakeholders see as the role of the NCCC and whether such sub committees/groups would be formed within the NCCC. • Stakeholders' views on existing policy/legal framework with regard to having an effective MRV systems • What additional policy/legal framework would be required to achieve effective MRV system for sector and Botswana	• Adequacy of existing national climate change institutions to perform NDC MRV • How inter-ministerial and technical management unit mentioned in the TORs can be structured; and whether new structures were needed or old ones can be adapted to take this role • At sectoral level key elements was how sectoral working groups would be structured and the expertise required for that; and whether there are existing sectoral groups that can be adapted for this role. • Linkages of such sector and national institutions can be made • Any desired policy/legal framework to support NDC MRV institutional framework. • QA/QC systems in place and how they can be strengthened

Table 1 Content of stakeholder consultations that informed barriers Assessment for the energy and transport sectors.

Basing on the stakeholder inputs from the consultations, the barriers are assessed along the following topics.

1. Awareness of Botswana Stakeholders to MRV/ETF under Paris Agreement
2. Institutional strength, participation, and governance structures
3. Data Status and Requirements and QA/QC systems
4. Information Systems
5. MRV Tools accessible and can be used
6. Capacity Needs in various spheres of the MRV/ETF creation
7. Resources needs (financial etc)
8. Policy/legal Frameworks

The responses the stakeholders presented with regard to constraints and gaps in these topics together with experiences of other Parties have informed the presented barrier assessment. Detailed assessment is presented in Chapter 3.

ETF/MRV under the Paris Agreement

An analysis of the ETF is presented below to show expectations from the Parties with regard to their MRV and hence what action areas will be needed to establish a robust MRV for the transport sector in Botswana.

Specifically, the ETF guides countries on reporting their greenhouse gas emissions, progress toward implementation of their NDCs[1], support provided and mobilized, and support needed and received. The ETF also includes processes for technical experts to review reported information and a multilateral peer review where countries seek clarity and guidance.

Under the current international MRV Framework, all countries are submitting their National Communications (NCs) every 4 years (including the GHG inventory), Biennial Update Reports (BURs) every 2 years; present their NAPs and NAMAs and TNAs.

NCs are mainly to report on measures and policies undertaken to address climate change in the country. Besides information on GHG inventories, NCs are providing information on national circumstances, a general description of what steps and actions the country is taking or planning to mitigate and adapt to climate change, describing gaps and constraints and to state any needs for technical, financial, or capacity building support.

Under the ETF, the introduction of NDCs that are to be submitted every five years and are already developed with their own MRV framework brings a new dimension of reporting in form of the BTR (Figure 1).

According to the ETF requirements, the main purpose of the transparency framework is to transparently demonstrate progress made towards the targets as defined in the NDC (e.g., GHG emissions and GHG mitigation and adaptation), and tracking support received (e.g., capacity building and technical assistance, technology transfer, and finance). In addition, non-GHG impacts (e.g., environmental, social, and economic) of the NDC actions that would lead to transformational change in the country are captured by the MRV system.

[1] climate change impacts and adaptation are reported under Adaptation component of the NDCs.

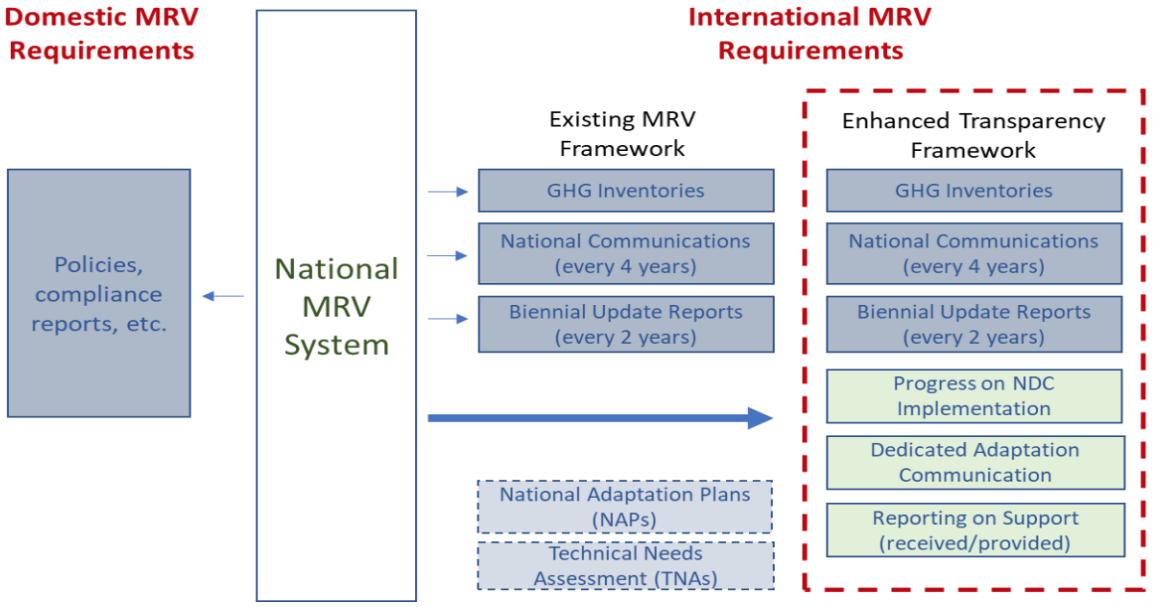

Figure 1 – General Requirements (International and domestic) for national MRV systems

Figure 1 Existing and ETF required MRV systems (Partnership on Transparency in the Paris Agreement, 2018).

MRV of Support is traditionally an area where developed countries are required to track support provided for climate change mitigation activities but developing countries are demonstrating growing interest in the MRV of support received for reasons that include greater accountability of how allocated resources have been used as intended.

One element which can benefit governments in data gathering, transparency, and verification is to create a national level centralized data and information reporting system which covers the linked MRV system. At present, there are often different data management systems used for different mitigation actions or on sub-sectoral and sectoral level. Creating this linkage to a Central system at the national level will require standards and guidelines for data inputs and aggregation, especially when including applicable sector and sub-sector information, and individual mitigation/adaptation actions. This system can start with core national level input/output data, and gradually expand into sectors, sub-sectors, and individual mitigation/adaptation actions (Partnership on Transparency in the Paris Agreement, 2018).

The next chapter presents baseline situation with regard to GHG Inventory, GHG Mitigation, Implementation support, institutional and policy frameworks alluding the transport sector which is the focus of this report.

Barrier Assessment for the transport sector in Botswana

In accordance with the adopted methodology, the barrier analysis has been presented according to the following topics:

1. Awareness of Botswana Stakeholders to MRV/ETF under Paris Agreement

2. Institutional strength, participation, and governance structures
3. Data Status, Requirements and QA/QC systems
4. Information Systems
5. MRV Tools use
6. Capacity Needs in various spheres of the MRV/ERTF creation
7. Resources needs (financial etc)
8. Policy/legal Frameworks

Awareness of Botswana stakeholders to MRV/ETF under the Paris Agreement

There is varied awareness on the MRV/ETF. Public stakeholders are more aware of what is required with reasonable explanation of what is expected on the MRV for GHG Inventory and Mitigation. However, private sector transport stakeholders indicated no awareness, which would limit their appreciation and participation in the national and sector MRV/ETF, and this is for GHG Inventory, Mitigation and support received (capacity building, Financing, technology transfer). The MFEDP also indicated lack of what is expected under the MRV/ETF which would limit their immediate participation on the MRV for Implementation support.

Institutional strength, participation, and governance structures

At the national level, whilst the NCCC is considered to represent an inter-ministerial structure, stakeholders indicated that it has no stipulated annual programmes, and its coordination role needs to be strengthened. Effort is needed to include other private sector stakeholders that are not in the Committee. Its legal status and resource allocation are also required to strengthen its role.

Transport stakeholders have indicated that they have not been active in the NCCC and GHG Inventory team and are seeking participation, although some of them have been supplying transport statistics. Such transport stakeholders have expressed their desire to be included in both the NCCC and GHG Inventory team.

Of the transport relevant stakeholders consulted, over 90% are not yet participating in MRV for support implementation, nearly 60% in GHG Mitigation and 50% in GHG Inventory.

Overall private sector participation is seen as inadequate. There are however some champion groups such as Business Botswana that can lead the way to engage and mobilize their members to provide data and participate in NDC and MRV activities.

The Statistics Botswana (SB) is well placed to be a one stop data post, but a climate information desk is needed and suggestions are that it should have MoUs with DMS and GHG Inventory team for data sharing. Although SB is working on the Data Management Strategy, that has not yet translated into centralized data system yet to coordinate all MRV data required for GHG Inventory, GHG Mitigation and implementation Support. A strong partnership of public and private stakeholders is currently lacking starting with data provision to participation in the various structures of data management, QA/QC and decision making.

In the context of the required institutional arrangements for MRV, certain hierarchical structures are currently not well-established including data providers, sector Working groups, Task Teams and Technical Management Unit (TMU) that are proposed in Deliverable 2 to support the work of both SB and NCCC. High level support at the top is needed to drive the political will needed for climate action in the country[2]. Although the MFEDP is best placed to

[2] Refer to Deliverable 2

collate implementation support there is currently no dedicated institution to collect and analyse climate finance information.

Some transport stakeholders are involved in data collection for their use for planning but are not yet participating in the sector and national MRV.

Data status, requirements, and QA/QC systems

The transport sector is one of the complex sectors with regard to generation of data and impact analysis of policies and measures that can be implemented for GHG inventory and GHG reduction.

In the case of Botswana, key gaps are that transport data required for comprehensive determination of GHG inventory for the transport sector are not yet well collected and structured and some of the useful data already generated are not yet used to derive higher tier transport GHG emissions. Effort is needed to migrate from Tier 1 to Tier 2 of 2006 IPCC Guidelines using data collected and boosting collection of additional data.

Various data sets are still lacking for GHG Inventory, GHG Mitigation and Implementation support in form of both activity data (e.g., v-km per year by vehicle types, fleet vintages, fuel economy) and emission factors (country specific emission factors e.g., per v-km or t-km or p-km). Some of the information like the imported vehicles may exist but not yet collated for GHG Mitigation analysis. Stakeholders have also expressed need to revive development of the energy balances and acquiring data monitoring devices.

Capacity and data availability and completeness limits the GHG mitigation options that can be analysed for the country for the transport sector, including for those in the draft NDC and presented in the ICAT Transport Guide.

There is realization that most transport stakeholders collect various types of data that can be used for MRV/ETF but they are not collated and are largely in form of excel sheets for internal use or as individual organization data systems. The data are not also tailor made for the intended MRV/ETF.

Stakeholders consulted are aware that there is no robust QA/QC system in place for climate change data except the one used by Statistics Botswana. The stakeholders thus pointed out that current structure needs to be centralized and coordinated to cater for information being collected from various sources feeding into the centralised data point.

Although the GHG Inventory is reviewed by external technical experts, but generally the data used are not quality assured. While SB does some level of QC, which is helpful, but both QA and QC need strengthening at lower levels of sector data collection.

An ideal structure must have a head of data management who ensures the quality of data and manage QA/QC system to guarantee the quality for purpose of MRV/ETF.

The proposal was that QA/QC system should be made up of officers from NCCC, TMU and Thematic working groups and should have expertise in statistics, sciences, engineering, data management, Modelling and M&E.

Information systems

Although transport sector statistics are compiled, the current data management structure is considered inadequate for sector MRV as some of the data still to be included remain in the jurisdiction of individual organizations.

It was noted that regarding information storage and exchange over 90% of stakeholders consulted did not have such systems for implementation support, over 80% did not have such system for GHG Mitigation and 75% did not have such a system for GHG Inventory.

An ideal structure must have data management head who ensure the quality of transport data and manage QA/QC

system, with specialized skills for data collection, data capture, QA/QC and equipped with experts specialising on data management.

The Data Processing Centre, such as SB is also to have data management specialists and statisticians tasked with the responsibility of ensuring that data is credible and of good quality.

It is considered important to set up the system first with personnel skills required in data collection and handling at organizational level for QA, then migrate up the structures with QC support to SB level that will have a Centralised data storage facility for archiving data and thematic groups can conduct data processing and analysis deriving GHG Inventory, GHG Mitigation Impacts and resource tracking.

Although the SB is considered well placed already to host the centralized data system it may have to establish an NDC/MRV desk to manage information related to climate action. While the GHG Inventory team is considered relevant, it must include other sectors not represented and private sector participation.

The Data Management Strategy being developed by SB, can then be designed to address the shortfalls in creating a comprehensive data management system for all sectors including for transport sector.

MRV tools accessibility and utilisation

A 33% of the transport sector stakeholders did not know about tools in use for GHG Inventory, 50% for GHG Mitigation and over 65% for finance/implementation support. In the case of GHG Inventory stakeholders, mainly public are familiar with IPCC Guidelines and related tools but about 65% actually do not use them, 75% do not use either GHG Mitigation or financing tools. Some stakeholders use tools specific to their work and not necessarily internationally recognized tools.

Capacity needs in various spheres of the MRV/ETF creation

Lack of human and institutional capacity and resources was identified as another hindrance towards the attainment of the Paris Agreement Transparency framework. The issue of sufficient resources and appropriate capacity is considered a major factor in operating a robust MRV/ETF system. Strong capacity building for transport impacts analysis is particularly lacking and at NDC development stage it was also apparent that assumptions on how the mitigation options will reduce GHG emissions were not clearly defined.

There is evidence from the stakeholder consultations that capacity is also lacking for collection of relevant transport data and that sector coordination is required, hence calling for both financial resources and technical assistance for capacity building.

Some specific capacity building needs encompass:

- Use of software/tools and for general data collection, capture and compilation, quality checks and analysis.
- Statistical production and modelling related to GHG quantification, GHG Mitigation.
- Tracking financing support is lacking particularly for the transport sector beside the government budgets.
- Capacity for establishment of GHG monitoring infrastructure with a dedicated centre with a modern vehicular monitoring centre and well-established data centre.
- Conduction of Energy Statistics Surveys, and to develop Energy Accounts on a yearly basis including transport energy consumption.
- Conduction of research in order to develop country specific emission factors for the sectors- energy and

transport as required by the UNFCCC.

- Capacity building to develop indicators to measure progress against set targets under the NDCs, SDGs, NAMAs, etc. A review of each of the aforementioned is needed and linked databases; personnel (trained on data capture & storage); quality checks; common understanding of indicators.
- Capacity building for thematic working groups.
- Technology for data collection, management, and storage.
- Capacity need to conduct studies to determine the mitigation required.
- Capacity to review NDCs with some specific transport indicators and Climate Change policies as they pertain to the transport sector is needed.
- Stakeholders indicated need to be educated on the ETF under Paris Agreement as well.

The mentioned capacities are desired at both institutional and human capacity levels to enhance the institutional capacity.

Resource needs (financial, etc.)

Climate finance, technical assistance and Technology transfer are seen as critical in the creation of an effective MRV system for Botswana.

The support expressed by the stakeholders as needed to meet the requirements for MRV/ETF are:

- Funds to buy emission monitoring devices and to put up structures for emission measurement.
- Financial and human resources to resuscitate the production of the National Energy balances, for conducting Energy Statistics Surveys, and to develop Energy Accounts on a yearly basis.
- Financial support to fund research institutions to conduct research in order to develop country specific emission factors for the sectors, particularly for the transport sector.
- financial resources to develop indicators to measure progress against set targets under the NDCs, SDGs, NAMAs, etc.
- Funding for data collection and related training.
- Technology for data collection, management, and storage.
- Financial resources to support and build capacity on data management and sustainability and integration to the existing data and systems.

Climate Finance is provided for a number of international and domestic activities, but the MEFD does not yet have a read compilation of these resources provided in the past (although they can be compiled when needed) and are usually resident on the websites of the donors/development partners and financing institutions. Stakeholders have also proposed creation of a central facility for receiving, collecting, and analysing climate finance data to report to the NCCC locally and also as part of the MRV system.

Technical Assistance (TA) has been mentioned as important to build capacity in the country particularly for impact analysis of transport GHG mitigation options. The TA is needed to support building of expertise and funding data

collection. Transport sector financing allocation is not well disaggregated, and the indications are that government budgets are used to collect the transport statistics being collected by the government entities.

Technology transfer and establishment of a coordinated GHG Data centre will be required support to enable proper monitoring.

The MFED reacted that if creation of such effective MRV will come at an extra cost in terms of resources (financial and human), then a climate finance fund will be required for ease of tracking funds since domestic funded projects and interventions are mixed with other initiatives.

Policy/legal frameworks

Overall stakeholders expressed the need to strengthen existing policy/legal framework with a much-organised coordination.

On the policy/legal framework, formulating and implementing transport pricing policies, fuel subsidy removal, road pricing, vehicle purchase incentives for more efficient vehicles, will be some of the reforms required in analysing the GHG mitigation options such as those in the ICAT Transport Guide

Legally binding agreements with data providers (collection and sharing) are needed and in some cases MoUs for the same purpose are proposed.

Towards an enabling environment for MRV/ETF in the transport sector

The presented enabling environment presented here is a combination of what stakeholders recommended and also inputs from experiences of other countries.

Awareness of Botswana stakeholders to MRV/ETF under the Paris Agreement

Raising of awareness with private sector in particular on the NDC/MRV process, is considered crucial to ensure active participation by those that have not been involved before. For instance, from public side, organizations such as BERA in partnership with Dept. of Energy, DMS, and DRTS would raise awareness on the importance of data for NDC MRV with private sector counterparts. On the private sector, the transport groupings such as Business Botswana, Bus associations can also mobilize their members to provide needed data for MRV.

A general awareness on the MRV/ETF under Paris Agreement and opportunities under Article 6 with regard to NDCs will be another useful input to the process.

Another important awareness raising is to educate the public on climate change impacts caused by carbon emissions and transport related pollution.

Institutional strength, participation, and governance structures

Some lessons emerging from other countries' experiences that can be applied to the Botswana case are that:

- Climate actions that include aspects of MRV should be signed off by the highest office in the land and or by the coordinating ministry which in the case of Botswana is MENT.

- Although the NCCC is tasked to approve the NDC[3] but process starts with lead sectoral agencies that prepare their GHG inputs and signed by Department Secretaries before sending to the NCCC for approval.

- cooperation of various government ministries in the NDC MRV is needed and the central role that the MENT plays in the economy-wide M&E of sector performances.

- The other players that are not often mentioned in the climate change institutional framework are transport associations and funders and these can play an important role to provide additional transport data required.

- The interesting institutional element is linking transport with trade as a multisectoral approach. The importance of combining public (central government and subnational municipalities), private (transport organizations, technology suppliers) included) and civil society is also indicated.

- Emerging lessons from other case studies is the importance of involving financiers, semi state and non-state players especially the regional players and to ensure coordination between central government and regional institutions and avoid overlaps of mandates among institutions even at national government level.

The transparency framework is critical to institutionalise the roles and responsibilities of the various stakeholders and promote its timely, effective, and efficient coordination and collaboration.

High level political support and long-term funding is required to set-up the institutional arrangements in order to mainstream the transparency framework.

Data status, requirements, and QA/QC systems

In order to enhance data collection in the transport sector, responsible stakeholders should adopt the most fitting equipment for data gathering where it is needed. In some countries to execute the Tier 2 analysis of GHG emissions in the transport fraternity there is need for an advanced data collection procedure by the SB.

There is need for personal and institutional capacity building in MRV assessment. This strategy develops capacity to these experts in aiding the development of appropriate instruments for data collection as per IPCC guidelines.

For purpose of data provision, a recommendation is made to sign Memorandum of Understanding (MoUs) with data providers including private sector and involve them in the committees for their active participation to prioritise data.

Data pertaining to the transport sector that are collected within public and private sectors for their own business planning should be submitted to the lead organization e.g., via DMS for more reliable GHG inventory preparation, GHG Mitigation and archived by SB.

For MENT to effect complete data collection required for the GHG Inventory, a legal framework will be required and enforced so that all potential data providers comply.

Apart from data providers, third party verifiers will be needed, not only on an ad hoc basis when some reporting is required but as an on-going resource complementing the role played by the sector working Groups, NCCC and National GHG Emission Team.

The Global Warming Potential used in the NIR 2014/15 for CH_4 and N_2O emission factors have changed and will need revision when determining future GHG Inventory and GHG Mitigation.

[3]There is however not yet a legal backing for NDC institutional framework.

Information systems

The Importance of a functional comprehensive data management system under the SB is needed supported by capacitated experts to collect, collate, and analyse data according to transparent practices such as IPCC Guidelines. Such a one stop national data centre for submissions from the lead sectoral agencies such as transport can be the primary enabling platform of the NCCC in consolidating and monitoring data and information on climate change and climate action from various sources and actors coming from both public and private sector and other stakeholders. This will allow decision-makers to access, distribute, and exchange these data for use also in policymaking, development planning, and investment decision-making. The primary components of such a data centre will comprise database and information systems for the following: Greenhouse Gas (GHG) Inventory; Climate Change Mitigation, Climate Finance, and related Reports.

Support will be required to build capacity especially where data are currently not available. Quality assurance assistance and ensuring data confidentiality should be maintained as required by data providers. Equipment may also be required by data providers for purpose of data collection and preliminary processing e.g., in terms of software and hardware and key types of expertise such as statistics/science/engineering sometimes with specialization of database systems, IT and environmental/GIS expertise.

The proposal is that capacity is built from the data providers and a possible third-party entity can support QC prior to SB level that is expected to head the national central data storage and management system.

The Data Processing Centre, such as SB is also to have data management specialists and statisticians tasked with the responsibility of ensuring that data is credible and of good quality. Similar necessary capacity can be supported and resourced at lower levels.

The recommendation is to set up a QA/QC that is aligned from data providers to the central Information and database information system, with SB providing guidance to the lower organizations and this may be executed through a training workshop of identified data providers and analytical teams in sectoral working groups and Thematic groups and even TMU.

MRV tools

There are number of tools available on the ICAT Guide that can be used to create both GHG Inventory and determining GHG Mitigation Impacts. Additional tools are being developed as well that Botswana can adopt and use. As part of this ICAT project for Botswana, some simple tools have also been developed for NDC Measures for the transport (and energy) sectors. The recommendation is that the capacity building under ICAT Deliverable 3 should train selected experts from the transport sector on these tools. Such training can also be continued after the ICAT Botswana by training for the trainers approach.

Capacity needs in various spheres of the MRV/ETF creation

Areas of capacity improvements to meet ETF that are recommended in line with the barrier assessment include:

- The starting point will be educating stakeholders on the Paris Agreement MRV/Enhanced Transparency Framework.
- Capacity Building in the value chain of statistical production,
- Capacity building with regards to estimating GHG emissions, modelling GHG Mitigation Impacts, reviewing NDCs, SDGs and related Climate Change Policies and programmes.
- Effective coordination by the MENT and creating agencies as proposed under Deliverable 2 that include TMU, Task Teams, Sector Working Groups, and inclusion of the private sector in appropriate forums.

- Human resource building capacity on specific areas of the transparency framework, tracking financial support to establish a robust implementation and monitoring structures.

- Preparation of the BTR will allow Botswana to be at the forefront and be a leader in applying the MPGs and benefiting from the support available, enhancing its capacities to fully embrace a low carbon and resilient future.

Resource needs (financial, etc.)

Preparation of the Climate Change Expenditure Tagging reports on resources needed, received, and expended is needed but indications are that both institutional and human capacity will be needed to track such resources.

Another important aspect is that the coordination/lead institution should be empowered to make decisions and mobilize resources for the sector activities. Resources are to be mobilized for:

- Funding for more data collection and training in the use of relevant software.

- To improve the transparency on mitigation efforts and to satisfy reporting requirements from international donors who potentially support conditional NDC measures, indicators for each measures need to be defined and tracked.

Policy/legal frameworks

Some of the recommendations on policy/legal frameworks that stakeholders expressed are that:

- Development, review and preparatory exercise for climate change including MRV should be legislated to adequately address a complete and fully working system.

- A robust Botswana National GHG Policy and legislative framework which covers all the sectors and strength the implementation monitoring system should be created.

- Successful development of the National Action Plan on CO_2 emissions should be pursued.

- Legally binding agreements with all the institutions which are involved with data collection and sharing including the private sector should be signed.

There is also a strong view that, much of the work on NDC MRV can be realised through MoU/MoAs with relevant institutions, especially the private sector and hence these instruments should be implemented. For Public entities, a directive will compel them to be compliant with MRV requirements – as this will also be one way of operationalizing the Climate Change policy.

Conclusions and recommendations

The conclusion from this assessment is that Botswana faces some barriers that will need to be solved in order to establish a robust transport MRV system that meets EFT under the Paris Agreement. This situation is presented by the transport stakeholders that were consulted in the prior deliverables. The recommendations are informed by both stakeholders and experiences of other countries that have been reviewed in the context of their involvement under the ICAT. The assessed barriers and recommended actions to create enabling environment are presented in Table 3 below.

Barrier Assessment Topic	Highlights of barriers	Impact on MRV	Recommended Actions
Awareness of Botswana Stakeholders to MRV/ETF under Paris Agreement	Low awareness particularly by private sector stakeholders on expectations of MRV/EFT	Limited participation in the MRV/ETF process	Awareness raising campaign at country level involving all stakeholders
Institutional strength, participation and governance structures	NCCC to be strengthened, High Level political will be needed to drive climate action, Other hierarchical stages to be created (sectoral WGs, Task Teams, TMU)	Limited effective flow of data and QA/QC and dedicated institutional stages to ensure working MRV system	Establish required institutions under Deliverable 2 with roles as specified
Data Status, Requirements and QA/QC systems	Inadequate transport activity data and country specific emission factors QA/QC inadequate	Without good quality and adequate activity data and emission factors, the MRV cannot function effectively	Create and coordinate data supply chain from data providers, QA/QC, capturing and management, archiving
Information Systems	No comprehensive Central data management system that includes transport data for MRV	A centralized data system can allow access to information for measurement and reporting on the GHG Inventory, GHG mitigation and implementation support when all data from various sources and actors are collected and collated.	Expedite the SB Data Management Strategy and enhance SB data management centre with required skills and related training provided to those providing and managing information/data.
MRV Tools use	Limited tools in use particularly for GHG Mitigation impact analysis and tracking financing	Tools enable determination/quantification of GHG emissions and GHG reduction impacts-that are crucial for MRV. Process is cumbersome without such tools that facilitate computations of emissions and impact analysis	Training of selected experts from the Sector Working Group, Task Teams, TMU on existing tools for GHG Inventory, GHG Mitigation and tracking Implementation support.
Capacity Needs in various spheres of the MRV/ERTF creation	Need for various capacity building from data collection, management. Modelling at both human and institutional levels	Without the various skills needed for coordination, data collection/management, QA/QC, GHG inventory determination, GHG Mitigation analysis, then the MRV system will not be well functioning and implemented	Training of MRV scope and training trainers for continued training
Resources needs (financial etc.)	Limited financial support apart from government budgets for transport	Financing is key to enable recommended actions to take place	Create a climate Finance Fund as proposed by MFEDP
Policy/legal Frameworks	Need strong legal framework and operationalization of the Transport, climate policies and Acts	To ensure that both domestic and international obligations are met.	Develop Legislation for data provision with lead coordination body.

Table 2 Conclusions and recommendations on barrier assessment in Botswana

The presented recommended actions can be included in the Roadmap that is to be developed as part of this ICAT Botswana Project.

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