



Typical Challenges for Vertically Integrated Measurement, Reporting and Verification Systems of Greenhouse Gas Emissions

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ABOUT THIS REPORT

The report was compiled by the ICLEI World Secretariat as part of The Climate Footprint Project. It provides an overview of the most common barriers and constraints for an effective implementation of a national vertically integrated MRV System. Included are recommendations on how these common barriers can be overcome in order to close the existing vertical gap in a more effective way.

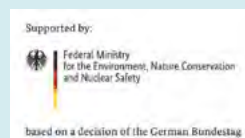
The results compiled here are based on conducting personal interviews with state representatives, desk research, and the outcomes of 11 multi-level governance dialogues held in Brazil, Mexico, India and South Africa, in addition to desk research from relevant literature and projects around the world managed or implemented by ICLEI. These activities took place between 2019 and 2021 and relied on the institutional arrangement mapping and expertise from relevant stakeholders.

THE CLIMATE FOOTPRINT PROJECT

The Climate Footprint Project supported state and regional governments to improve their efforts to monitor and reduce greenhouse gas (GHG) emissions, namely Pernambuco (Brazil), Chhattisgarh and West Bengal (India), Baja California, Jalisco and Yucatan (Mexico) and KwaZulu-Natal (South Africa).

Sub-national state and local level greenhouse gas (GHG) inventories provide important data to enable policy makers to understand GHG emission sources and trends, and, consequently, improve the design and implementation of emission reduction strategies for their territories.

The Climate Footprint Project, implemented between February 2019 and February 2021, was led by The Climate Group, as Secretariat of the Under2 Coalition. It was implemented in coordination with Ricardo Energy and Environment, Greenhouse Gas Management Institute, CDP and ICLEI - Local Governments for Sustainability.



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INTRODUCTION

Tackling climate change requires a coordinated effort at all levels by all actors, from the local to the global scale. Committed nations have agreed to do their part, defining and implementing their commitments and plans through their Nationally Determined Contributions (NDCs), which are at the heart of the Paris Agreement. To ensure compliance, it is important for these countries to develop effective mechanisms to measure both greenhouse gas (GHG) emissions and reductions derived from climate action.

National level reporting to the United Nations Framework Convention on Climate Change (UNFCCC) includes national communications (NCs), biennial reports (BRs) and biennial update reports (BURs). International assessment and review take place, and international consultation and analysis are part of all transparency arrangements under the UNFCCC. One of the core mechanisms of the Paris Agreement and other climate change mitigation agreements is the development of national Measurement, Reporting and Verification (MRV) systems for signatory countries. A national vertically integrated MRV system will enable data aggregation and data transparency on GHG emissions to better predict GHG reductions, and monitor the impacts of policies and governance measures. For developing countries, creating a MRV system can be especially challenging due to budgetary

limitations, as well as potentially lacking data collection tools, expertise, previous studies, monitoring instruments, and databases.

To address these challenges it is suggested that national governments integrate their national MRV system vertically with data and/or MRV systems of subnational governments in their country. Many national MRV systems do not include subnational governance bodies in any substantial way (CIFOR, 2019). However, subnational governments (state, regional and local governments) are key players in mitigating climate change, as their decisions influence between 50% and 80% of GHG emissions (UNDP, 2009). Their in-situ knowledge and direct contact with environmental concerns and local actors allow them to react quicker than national governments. As such they often create more ambitious climate-related goals and actions for climate change mitigation (NDC Support Cluster, 2018). Having a vertically integrated MRV system enables shared responsibilities, ideally with clearly defined roles for each level of government, with consideration of their respective (required) resources, objectives and mandates. The impact of actions can be amplified where both budget and approach can be aligned to secure coherence and consolidate visions.



The inclusion of subnational governments in a vertically integrated national MRV system can bring a range of practical benefits:

- Accelerating the achievement or extension of NDC goals, with the additional identified subnational contributions;
- Aiding in identifying and optimizing the demand and supply of financial, technical, and human resources for all levels of government;
- Providing more accurate data, and relevant data at different scales to cross-check different aspects, offering a level of data sovereignty for subnational governments to verify national disaggregated data, also to improve territorial policy and planning;
- Allowing for the identification of and response to capacity building needs at all levels;
- Providing more effective and ambitious climate change planning and implementation, at the appropriate level of government.

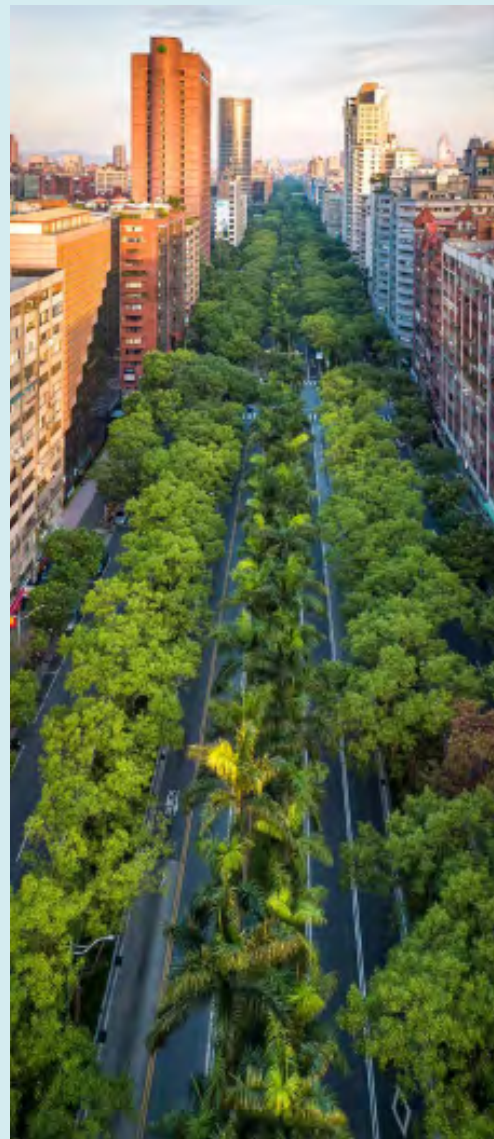
This approach can also provide increased financing opportunities for national and subnational governments' climate planning, accountability and action, due to the ongoing and growing interest in high data-and-reporting quality standards.

The purpose of this document is to identify approaches to optimize multi-level governance communications and coordination, with recommendations to overcome common challenges and constraints.

These are illustrated by case studies from several countries, including Brazil, India, Mexico and South Africa - as part of the Climate Footprint Project - addressing the differentiated roles of national and subnational governments, as well as private sector actors.

WHY THIS MATTERS

States and regions are key to tackling climate change and have set themselves ambitious targets; but many lack the technical resources and expertise to track and measure their emissions. Through the Climate Footprint Project, states and regions have been equipped to make more informed decisions on plans for cutting emissions. The project has also supported them in demonstrating their contributions to national government targets and in inspiring further climate action.



1. VERTICALLY INTEGRATED MRV SYSTEMS

Measurement, Reporting, and Verification (MRV) systems are meant to streamline data collection and aggregation based on principles of accountability, efficiency, and data quality. MRV systems vary considerably by approach and are tailored: country and/or case specific. Countries may use multiple MRV systems for different stages of action—one for monitoring emissions, and another for monitoring actions—or a singular combined system that records all stages. Similarly, MRV systems may monitor only GHG outcomes or include non-GHG outcomes along with a range of other variables.

A vertically integrated MRV system goes further and introduces multi-level governance as a core principle. It addresses communication, coordination, shared methods and responsibilities between two or more levels of government along various administrative tiers. There are several advantages to using a vertically integrated MRV systems for both national and subnational governments:

NATIONAL AND SUBNATIONAL LEVELS:

- **Support for achieving NDCs:** Inclusion of subnational governments often results in more ambitious climate actions, better distribution of tasks and more accurate data for informed planning.
- **Ensure vertically integrated action and reporting:** Vertical MRV systems help clarify - for each level of government - its mandate, roles and responsibilities. This process efficiency saves time, clarifies communication and coordination processes, and streamlines data production and use.
- **Attract national and international funds:** Properly recorded MRV data can be used to prove the effectiveness of the policies and actions for GHG emission reduction and lead to other impacts and co-benefits—a key component to securing international and national funding.

SUBNATIONAL LEVEL:

- **Track impacts and benefits of local climate action:** Local data allows for more precise understanding of policy needs and impacts, allowing for informed planning of effective local climate action.
- **Increase transparency of subnational actions:** Data transparency ensures that key stakeholders can see that an effective strategy is in place and that the approach being taken leads to results.
- **Increase credibility of local action:** Following the latest standard for accounting and reporting, such as the Global Protocol for Community-scale GHG Emissions Inventories (GPC), subnational governments can increase confidence levels of other stakeholders and authorities.
- **Create an enabling environment:** Vertical MRV systems are easy to build from and can serve to streamline effective engagement for multi-level governance. Many policies that contribute to the coherence and effectiveness of a climate action plan or Low Emission Development Strategy (LEDS) do not necessarily have a linear impact on GHG reductions but rather enhance effective processes towards monitoring (ICLEI, 2016).

Implementing an effective vertical MRV system requires understanding and change in three pillars of Vertical MRV management:

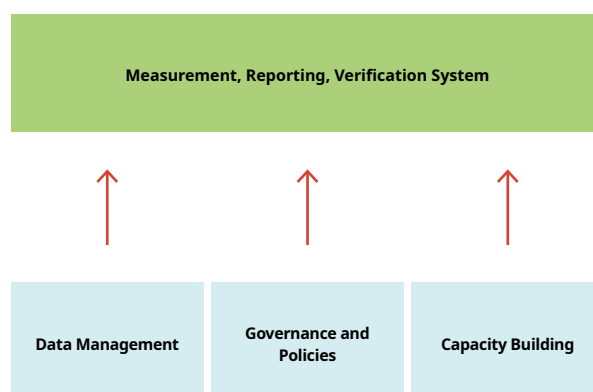


Figure 1. Work pillars for a vertically enhanced MRV system

2. DATA MANAGEMENT

Data Management addresses the access, collection, aggregation, organization, storage, and effective use of data. This is a critical pillar for the effective and efficient implementation of a vertical MRV system. Within a vertical MRV system, data management works stage-by-stage through a unified, though separate, set of systems. Each stage requires some understanding of the common issues to better avoid or overcome these common issues.

- Proper data management as a whole provides the following benefits within a vertical MRV system:
- Provides easier data access for use, validation and aggregation
- Saves time and resources in the long run
- Creates a clearer understanding of results
- Prevents data destruction and misplacement
- Reduces data errors, offering a system of in-built checks to identify errors
- Meets data quality requirements often required by funders

The points elaborated here will help with understanding what is needed to close the data gap between subnational and national governments, in order to implement an effective vertically integrated MRV system that serves a multi-level aligned strategy.

Typical/common data management problem areas:

- Differentiated approaches (top-down vs bottom-up, different data structure)
- Difficult data collection and access
- The differentiated data collection process
- Diverse data sourcing, reliability of source
- Lack of agreement on IPCC Tiers and data quality
- Data comparison and aggregation at different levels

2.1 TOP-DOWN VS BOTTOM-UP DATA SHARING

Before any significant changes are made to create a vertical MRV, governments must aim for a data sharing system that enables as many levels of government as possible, but prioritizes states/provinces as a first step.

There are a range of data sharing frameworks possible but they all inhabit two general categories; top-down, or bottom-up. Top-down frameworks focus on the data needs and decisions of the nation level government. They follow a clear top-to-bottom hierarchy. Bottom-up data sharing focuses on the data needs of those at the local level of government.

There are specific advantages to either approach, e.g., top-down leads on efficiency and economies of scale, while bottom-up gains accuracy due to typically reporting on more data. Bottom-up systems may also provide better aggregation of data, clarity on the data confidence level (e.g. its reliability and accuracy), simplified access for data collection (official data repositories, hosting facilities and available channels) and more clearly identified data sources. Data managed at the local level implies a more direct involvement in the data collection process, more so than at the national level. So, in theory, it can be more apparent when the data is inaccurate or incomplete (USDA, 2015).

The selection of a suitable system will also impact the administrative mandate of governors and mayors, who deal with many other localized issues. Bottom-up data sharing helps to accurately determine troubled areas such as local emissions, and clear up pollution sourcing issues which often have transboundary concerns. A common example being transboundary emissions from commuting, where the fuel was purchased in one municipality, but used in another/others.

2.2 DATA COLLECTION AND ACCESS

A main driver for data provision to an MRV system is the timely collection and aggregation of quality GHG related data for use in national, state and/or local analysis and planning. In order to effectively link these data formats within one system, sub-systems which allow for different variables and constraints of the various jurisdictional contexts should be integrated. Trends that exist on a national scale may not be the same at the subnational or local scale. Identifying and understanding these patterns enables governing bodies to better identify root problems and measure the effect of policy. Data collection addresses primarily activity data, measuring human activity (e.g. kilowatt hour of electricity used or tons of waste generated) and associated relevant meta-data (e.g. when, how, what). Different countries often tailor MRV structures to suit their own needs based on the available stakeholders, resources, needs, and chosen methodologies.

2.3 INITIAL DATA COLLECTION AND ACCESS

Data collection and access is often difficult within developing countries. Legal (especially for subnational governments), physical, and political limitations can make data collection in different sectors or industries difficult. Particularly in developing countries, access to information may be limited by privacy concerns or the interests of the data supplier. Further, developing countries often suffer from insufficient technical capacity and a significant lack of available tools, such as previous studies, monitoring instruments and databases at all levels. This requires the rapid development of more permanent staff, effective plans, technical capacity, and ongoing education—such as the case in Kenya (Kenya Ministry of Environment and Forestry, 2020). At the subnational level further challenges exist. Decades of focusing on national level reporting has left many subnational governments with a significant lack of existing activity data. In places that do have data, the data is often hard to access, of doubtful quality, incomplete, or too complex. Incomplete data collection and access for subnational governments restricts effective policy building and hinders quick responses to local climate related issues.

2.4 DATA AGGREGATION PROCESSES

Accurate and uniform data aggregation processes are key to establishing high-quality data and timely analysis. However, in most cases, data aggregation systems are not streamlined across the various government ministries or subnational departments that request the data, causing significant loss of resources for reporting organizations—public or private. Different government bodies working with climate related activity data often request the same data but in differing templates, timelines, and data quality requirements. By not using streamlined templates, timelines, and requirements, reporting stakeholders need to use significantly more resources to create the different data packages. Redundant but similar tasks to similar organizations often creates unneeded friction and cumulative waste of time, human resources, budget, and technical skills.

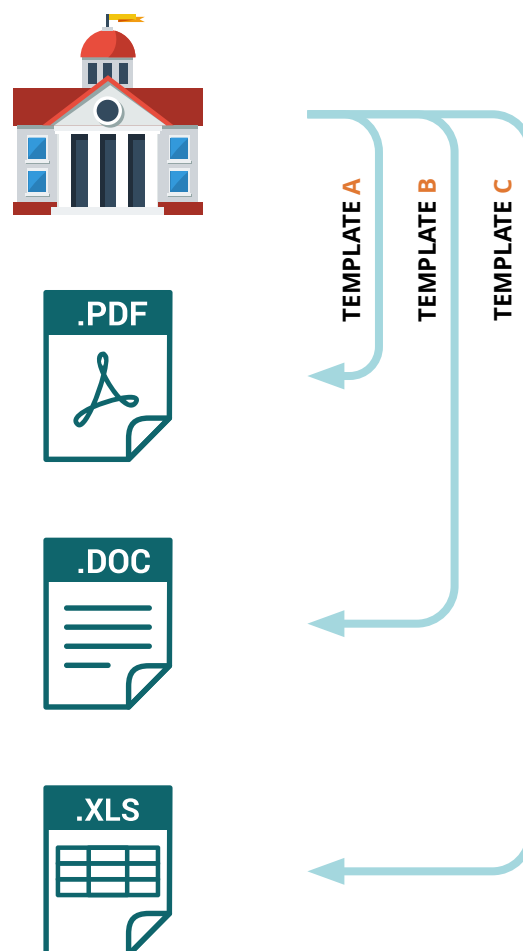


Figure 2. The use of different templates for different stakeholders requesting the same information from a unique source can complicate the data collection process

2.5 DIVERSE DATA SOURCING

Sourcing data for the MRV system will depend on what data is available, which can then determine which tier (see next section) can be used. However, sourcing data of similar complexity across the different jurisdictional levels can be challenging. The various types and quality of data that a government collects from a variety of different sources often leads to large and hard to navigate databases with a range of data quality. In the absence of an integrated MRV system, the methodology used can be selected independently by each level of government. However, in an integrated MRV system, the tier and methodology selection should align between levels as much as possible. This helps provide policy makers and experts with more comparable data in the future. The decision of which tier of data to use is best reached through transparent dialogues among the relevant institutions.

Diverse data usage also impacts the need for effective database management, as cataloging the data's various sources and units is important to ongoing data quality efforts. Having a shared taxonomic and categorization system is imperative as activity names, units and other details are often different, although the data measures the exact same activities and sources. This also has impacts on meta-data used for enhanced transparency of collected information. When saving data files, a shared and established naming and meta data record system is crucial to maintaining data accuracy. Timeframe, Source, Data Type, measurement methodology, modeling or extrapolation methods, Data Tier and unit are all important information to include.

MEXICO – THE IMPORTANCE OF UNIFIED DATA COLLECTION TEMPLATES

Throughout the Climate Footprint Project's multi-level governance dialogues held between 2019 and 2021, the states of Jalisco, Yucatan and Baja California in Mexico identified that they had been using different templates and formats for data collection from the same supplier, when they participated in working 'tables' together. They then discussed the need to strengthen horizontal communication and harmonize the process in a common effort in order to observe more robust and timely responses (ICLEI, 2019).



Photo source: ICLEI ©

SOURCE NAME IN NATIONAL TOOL	DATA USER'S NAME IN SUBNATIONAL TOOL	SECTOR	UNIT
Livestock Unit	Adult Bovine Unit	Agriculture, Forestry, and Other Land Use (AFOLU)	Heads of cattle (in thousands)
Energy intensity per capita	Per capita use	Energy	Kilogram of Oil Equivalent (KOE)/GDP/capita
Units produced	Units generated	Energy - Electricity	Kwh
Number of Passengers	Number of users	Energy - Transport	Hundreds of people

Table 1 Examples of differentiated terminology between Source and End User. Changes which are unexpected and not properly communicated could hinder the integration of subnational tools and national. These include terminology and sector identification.

2.6 IPCC TIERS AND DATA QUALITY

Often national governments and subnational governments are limited by their mandates and budgets in regard to the quality and type of data that is collected, and thus which IPCC data Tiers can be used. A national level government may have considerable data that would qualify for tier 3 use on the energy drawn from the power grid. A subnational level government may have similarly high-quality data on waste management or even transportation that would qualify for tier 3 use. However, neither government can use the other's data without the communication and data sharing framework of a vertically integrated MRV system in place. By combining data, governance can allow for leapfrogging from less accurate Tier 1 data and analysis to more accurate Tier 3 data and analysis, which adds significant confidence.

Further, by coordinating types of data collected and IPCC tiers used for the NDC calculations, overall data analysis, especially at the national and global level, can be improved by reducing the amount of gap filling needed in analysis that depends on high- and low-quality data.

2.7 ENHANCING DATA COMPARISON AND AGGREGATION AT NATIONAL AND SUBNATIONAL LEVELS

Similar to issues of data aggregation for IPCC tiers, subnational governments usually use their own methods of data processing to meet their own unique needs. This may provide them with unique insights, but it can also create problems when comparing results and data. Since the national standards for GHG emission inventories are defined by the IPCC (2019) Guidelines for National Inventory Compilers, national governments are locked into using this method. However, by adopting similar methods, through proper communication and collaboration, subnational governments can bridge the gap and contribute more easily to data sharing while still addressing their unique situation and considerations - such as transboundary emissions or upstream activities. (Environmental Science and Technology, 2009).

Comparability and database aggregation are also limited by a lack of understanding of vertical aggregation procedures. Integrating the subnational governments' vision and needs may be technically feasible, but only through political will and a reasonable degree of assurance that integration can be fully realized.

For reference, the Global Covenant of Mayors for Climate and Energy, has published a guide to their [Common Reporting Framework](#), which includes a recommended mapping of sources and categories to help practitioners aggregate inventories developed with different methodologies (Global Covenant of Mayors for Climate and Energy, 2019).



SOUTH KOREA – ENABLING AGGREGATION THROUGH ADAPTED TOOLS

During COP 25 in Madrid (2019), the Korea Environment Corporation – KeCO (a Public Sector Organization) presented their adapted tool for GHG inventory development, which allows both IPCC and GPC aligned reporting and export, facilitating aggregation at the national level. This work reflected the interest of the sub-national actors in showcasing flexibility and empowerment of sub-national governments, which are participating in several trans-national initiatives which required The Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) compliant GHG inventories. These inventories are additional to the IPCC inventories requested by the national government for comparison and aggregation purposes. KeCO, with support from ICLEI World Secretariat, adapted its already existing tool to export GPC inventories, in addition to IPCC inventories. This was done through a single data input process, moving one step closer to a successful vertical integration of their MRV system. To achieve this, a lengthy process was undertaken which included mapping of sectors and sub-sectors, as well as use of real data to test its application. As of today, the tool is available for cities and states wishing to have two versions of their GHG inventory for different purposes. The tool remains one of the few accredited tools recognized by the “Built on GPC” seal that serves sub-national governments.



Photo source: ICLEI ©

3. GOVERNANCE AND POLICY MAKING

Governance and policy making enable the conditions for successful vertical MRV integration and the effective fulfillment of NDC goals. Through formal arrangements such as mandates and frameworks, policy impacts all anthropogenic environmental issues or solutions by fostering the development of public and private institutions and behavior. These features may allow for smoother data collection and will define the communication, data sharing, and capacity building systems for the most integrated and efficient MRV systems possible.

Further, it is important that policy and governance is used to stipulate, encourage, or provide guidance to all fields of concern within the vertical MRV. While levels of informal communication and knowledge sharing are important, the co-creation of policy embedded knowledge sharing systems is key to the data heavy requirements of government (Holsapple & Joshi, 2002; Willem & Buelens, 2007). The absence of such a political frame in one field—such as capacity building—may also impact other areas—such as in-house technical skills. Policy mandates and goals are also important and serve to encourage and empower other policies to be successful. Governance and policy frameworks for a vertical NDC-related MRV system can easily be replicated and adjusted to other departments for other fields or to entirely different administrations, such as state-to-state adoption.

3.1 LACK OF DECENTRALIZATION

Decentralization is the cornerstone of effective multi-level governance. It ensures that subnational states and local governments are recognized as semi-autonomous but dependent, with their own legal powers and relative financial independence (Global Taskforce of Local and Regional Governments, UN Habitat, UNDP, 2016). The need for effective vertical integration calls for a proper devolution process, which can provide more room for action

Outside of the practical elements of policy for a vertical MRV, it's important to note that strong multilevel governance and policy building can serve to strengthen stakeholder confidence in a government as a whole and serve as a foundation for other programs. When done well, this framework can create an increasingly resilient and flexible system for adapting to emerging local issues better than a single level of government can - making it ideal for addressing the ever-changing problems presented by climate change.

COMMON GOVERNANCE AND POLICY TROUBLE AREAS TO BE DISCUSSED ARE:

- Lack of decentralization
- No clear roles and responsibilities
- Lack of multilevel and multisectoral governance policies
- Gaps in vertical cooperation
- Misaligned regional and national NDC Goals
- Lack of Cross-Cutting Approach
- Challenges in information sharing
- Financial Resources as a necessary instrument

from subnational governments; including how data and processes are managed and recorded. The development of policies and initiatives calling for this might be a strenuous process, which requires a common front by the subnational governments and a long-term plan for climate action; indicating for the strategy to align and enhance national targets through sectoral actions and how subnational contribution can only enhance these.

3.2 NO CLEAR ROLES AND RESPONSIBILITIES

Establishing the roles and responsibilities of subnational states and local governments is challenging, especially where powers overlap on topics such as transport and waste. Without clear distinction between levels of governance, cooperation is made more difficult and progress can be slow or ineffective. However, the importance of subnational governments has been acknowledged in the Paris Agreement, which advocates for a partition of management rights and allocation of clear roles for all levels of government.

It is essential for both national and state levels to encourage decentralization decision making downwards, in order to adequately empower all subnational actors for local action and NDC participation (UNFCCC, 2016). Top-down leadership and bottom-up action should be cumulated, and in all cases, bottom-up governance needs to be more supported, especially through an apparent delineation of roles and responsibilities (UNFCCC, 2016). Though sometimes a difficult process, clearing up roles is one of the easiest and most effective ways to increase efficiency and reduce wasted man hours for both national and subnational governments.

Further, establishing roles and responsibilities with the private sector is often challenging due to differing mandates and goals. However, through dialogue and mutual problem solving, agreement can be reached where a countries' NDCs and sectoral agendas can align in win-win situations.

Political differences and power limitations can create further challenges in establishing firm roles. Subnational governments are often not required by law to support NDC goals or data collection for a vertical MRV. Without policy to establish compliance, roles and responsibilities, subnational governments are left to their own political willingness, which may vary by administration. This can lead to non-compliance and greater difficulty in establishing a vertically integrated MRV system.

INSTITUTIONAL COOPERATION APPROACH IN CHILE

In Chile, regional governors decided to chair a committee on climate change, involving public authorities from all levels of governance. Moreover, this committee embraced both a vertical and a horizontal approach by summoning businesses, citizens, non-governmental organizations (NGO) and academics. This initiative managed to harmonize a climate change perspective within development plans and their local implementations (International Partnership on Mitigation and MRV, Low Emission Capacity Building Programme, 2014).



Source: Pablo Garcia ©

SOUTH AFRICA – NATIONAL CLIMATE CHANGE BILL DRAFT HIGHLIGHTS THE NEED FOR MULTILEVEL GOVERNANCE

South Africa is currently developing a Climate Change Bill to support the coordination of integrated climate change response, including strategies towards emissions reduction. The draft bill aims at ensuring a transition towards a climate resilience and low carbon economy across all spheres of government in accordance with the principles of cooperative governance (DEA, 2018). This means integrating all levels of governance to coordinate and harmonize policies, plans, programmes and decisions around climate change (Mkhize, 2018). According to the bill, a binding National GHG Emission Reduction Trajectory has to be established and aligned to the National GHG Inventory and empowered through Sectoral Emissions Targets (SETs), which leads to the definition of Sectoral Emission Reduction Plans (SERPs) (Abdino, 2019). The bill empowers the provinces to establish a Provincial Committee on Climate Change and indicates their role to prepare implementation plans based on their specific needs (ICLEI Africa, 2018). It comprises the already mentioned Sectoral Emission Targets (SETs) for key economic sectors and Carbon Budgets, including a national carbon tax.



Discussion about National MRV, enabling frameworks and Climate Change Bill in South Africa. Photo source: ICLEI ©

3.3 LACK OF MULTI-LEVEL AND MULTI-SECTORAL GOVERNANCE POLICIES

Multi-level governance refers to a form of political organization where authority is established on different scales and is constantly under negotiation between different levels of government (Daniell & Kay, 2017). To be effective, multi-level governance must be institutionalized with defined roles and responsibilities. Stakeholders at all levels must understand the co-benefits of a multi-level approach, and reach a common understanding, such as the foundational acknowledgement that no actor or sector can solve climate change by itself. For instance, while ministers of environment are often mandated to develop and monitor, they usually lack the actual capabilities to influence sectoral policies (Climate Policy Initiative, 2016). In some cases, a pivotal institution may be lacking. In other cases, there may not be a need to create new structures, but instead, to modify and build on to existing ones. In whatever way improvement is carried out, mainstream coordination across all levels should be implemented to allow entry points into the vertical MRV system for subnational states (International Partnership on Mitigation and MRV, Low Emission Capacity Building Programme, 2014).

3.4 GAPS IN VERTICAL COOPERATION

Transition to a vertical MRV system requires not just national planning but also subnational planning (UNFCCC, 2016). Without planning and practice, there may be a mass failure of the implementation of the MRV system at subnational levels, as the governments and relevant ministries struggle to get up to speed with a reporting and data collection system that, by its nature, cannot slow down. Again, it is vital that any subnational climate actions are aligned with national and international levels, and that communication is ongoing. Mandates, institutional arrangements, and strategies — top-down or bottom-up — can enhance consistency of decisions and cooperation in climate policy across all levels. With regard to institutional agreements, deeply embedding them in policy frames is required for maximum effectiveness.

Policy weaknesses in formal arrangements is most often the root of insufficient data access and data sharing between all levels of governance. Formalizing the integration of all actors involved, from the national to the subnational governments, and dialogue is a way to partially fix this. Evidence suggests that higher political commitment at a national level also increases subnational buy-in and support for national GHG goals. This accelerates multi-level cooperation, and encourages more successful and ambitious subnational policies as a whole (International Partnership on Mitigation and MRV, Low Emission Capacity Building Programme, 2014).

3.5 MISALIGNED REGIONAL AND NATIONAL GOALS

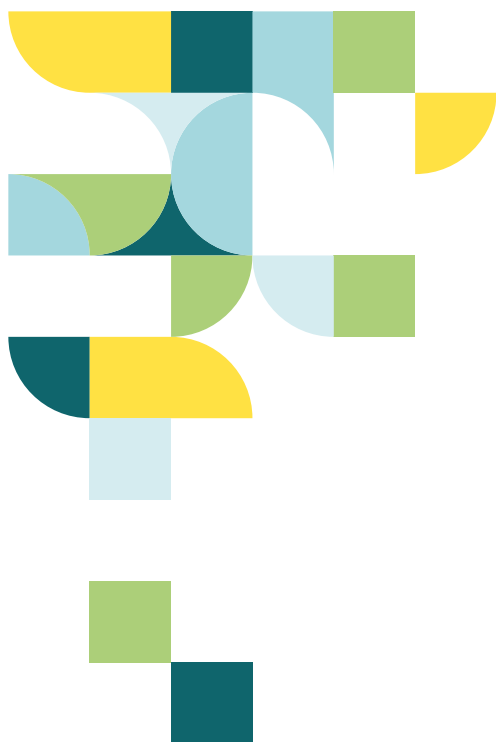
Subnational goals (also referred to as RLC – Regional and Local Contributions) often do not coincide with NDC goals despite their importance and are thus left out of NDC planning. Subnational governments are rarely considered when setting up and carrying out NDC goals. Consequently, subnational contributions and inventories have not always been taken into account, resulting in real shortages of accurate data. Many countries show no coordination mechanisms between levels of governance. Communication is often little to non-existent, especially regarding climate mitigation actions, GHG inventories and the impact of their contributions. But, creating national reporting mandates and guidance to subnational governments can be an excellent opportunity to open trans-governmental communications for a shared vertical MRV.

3.6 LACK OF A CROSS-CUTTING SECTORAL APPROACH FOR MITIGATION MEASURES

So far, a sector-by-sector perspective to emissions tracking is still predominant, either between ministries, or in the MRV organization. Each sector tends to only target their own sectoral issues, without addressing shared intersectoral problems which may be parts of multiple different supply chains and industry relationships, and services. In some cases, MRV systems are not horizontally integrated as they explicitly focus on one specific sector, such as Agriculture, Forestry, and Other Land Use (AFOLU) emissions and mitigation actions tracking, which can result in a highly fragmented process. Since different sectors contribute to various types of climate change issues and concerns, it is important to include a cross-sectoral approach to planning and implementing a vertical MRV or any climate mitigation measures.

3.7 CHALLENGES IN INFORMATION SHARING

A lack of information sharing is mainly based on gaps in communication regarding existing systems, tools, institutional processes, and a lack of adequate examples to imitate for subnational governments. The lack of examples is typically due to the absence of a dedicated communication space between governments. States should also promote learning across relevant actors and levels of governance. Through a vertically integrated MRV system, regulations can provide a collaborative and knowledge sharing approach for both the emissions and actions pillars of an NDC goal.



3.8 FINANCIAL RESOURCES AS A NECESSARY INSTRUMENT

The challenges of meeting adequate climate funding at all levels cannot be over emphasized. Unfunded mandates are dangerous and lead to policies not being implemented. Therefore, it is necessary for national and subnational governments to conduct financial planning (NDC Partnership, 2017). However, developing countries are often severely strained when it comes to excess funds for development - even with international assistance.

Before addressing financial resources, institutional mandates and roles should be clarified, and transparency systems implemented to minimize corruption and also map funding use. This is not only best practice but is often a requirement for international funding. It is then imperative to facilitate financial flows and enhance financial support to all stages of the MRV system (UNFCCC, 2016) in the form of capital flows—public, private, domestic or foreign (OECD, 2016). International funds can help subnational governments be more independent from national funds. Policy can create new income sources and promote green investment through environmental taxes, pollution charges, subsidies limited to green technologies, and the support of early-stage green sectors. Encouraging green sector growth also encourages private investment flows, which are indispensable for green growth and private actor engagement (OECD, 2016). All financial resources must include precise and transparent accounting; addressing the appropriate institutions and actions through mandates and regulations (Partnership on Transparency in the Paris Agreement, 2017).

4 CAPACITY BUILDING AND KNOWLEDGE SHARING

Capacity building is at the heart of vertical MRV implementation and development. Sharing skills and knowledge between the different levels of government is critical to achieving NDC targets. The Paris Agreement is based on country-driven capacity building at all levels. Capacity building is an interactive, participatory and cross-cutting learning process that highlights the importance of overall knowledge sharing (United Nations, 2015). Within a vertical MRV, capacity building should be widespread and carried out where needed at every level.

Lack of capacity is an especially common issue at the subnational level. It is often rooted in a lack of coordination mechanisms and understanding of the operation and needs of an integrated MRV system. A shared multi-level governance capacity is important. According to Corfee-Morlot, et al. (2009), multi-level governance (in this case, for integrated MRV systems) helps to avoid gaps between local climate action plans and national policy frameworks (vertical integration), while encouraging learning across sectors and between relevant departments, institutions, or stakeholders at the local, regional, and national scales (horizontal integration). Multi-level knowledge transfer allows the actors implementing national climate action plans to benefit from local initiatives (Corfee-Morlot, et al., 2009). Knowledge transfer and capacity building helps to empower local climate action and policy development while building expertise to address existing issues around monitoring, reporting and verifying GHG emissions and mitigation actions.

Common capacity building trouble areas to be discussed are:

- Designing a capacity building plan
- Individual capacities
- Organizational capacities
- Institutional capacities and coordination mechanisms

4.1 DESIGNING A CAPACITY BUILDING PLAN

A capacity building plan details the activities that will be undertaken in a specific time, in order to create or improve the skills and competencies required to respond to the needs of the MRV system.

To increase the chance of strengthening the capacities of all relevant stakeholders, the design of the plan should be inclusive and create ownership by identifying and engaging with the target stakeholders in early stages, and then involving them actively in discussions and decisions as the process continues.

There are different levels at which capacities can be created to support the performance of stakeholders that contribute to the MRV system (Tusiime, Ahumuza, & Kimeze, 2018). The following sections provide insights to building capacities at the individual, organizational and institutional levels.



DOMINICAN REPUBLIC –PARTIAL KNOWLEDGE SHARING OF NATIONAL GOALS WITH SUBNATIONAL GOVERNMENTS

In October 2020, a capacity building activity was held in the Dominican Republic as part of the NDC Partnership – Climate Action Enhancement Package (NCDP-CAEP). This activity was oriented around subnational governments and intended to align national goals with those locally implemented. Many cities stated that there was a lack of communication, as the local leaders were only partially informed about the Dominican Republic NDC, which made it difficult to coordinate strategies. The need for a more robust capacity building and dissemination program was commonly agreed on.

The Ministry of Environment and Natural Resources, along with the Ministry of Economy, Planning and Sustainable Development, agreed to enhance their resources in order to formulate a robust communication strategy to share timely and accurate information with subnational governments (IPCC, 2019). By May 2021, the Dominican Republic NDC recognized the role of local governments as key for effective Multi-Level Governance as an outcome of this process.



Photo source: ICLEI ©

4.2 INDIVIDUAL CAPACITIES

Like any nested system, the most basic levels of action are as critical to address as higher or more complicated levels. Individual capacity building aims to enhance the managerial and technical capacities and skills of people within an organization (Tusiime, Ahumuza, & Kimeze, 2018). Building capacities within individuals will ensure that they have the knowledge and competencies to use and apply the methods and tools needed to produce reports in line with the national and international guidelines of the MRV system. Skills required for reporting include GHG emissions inventory compilation, Quality Assurance/Quality Control (QA/QC), utilizing Information Technologies, and more. Internal individual resourcing and support is critical to building larger organizational capacities (addressed in the next section) and facilitates internal growth capacity as individuals share knowledge with other staff and create a robust base of knowledge (UNFCCC, 2020)

It is important to assess how best to retain and disseminate knowledge and individual skills within the organization. Financial resources should be allocated for this purpose.

4.3 ORGANIZATIONAL CAPACITIES

This dimension of capacity building aims at establishing an effective and efficient management at the organizational level. It entails tailored and specialized training courses, knowledge sharing, membership in capacity building networks, network building events, collaborative learning, and other activities (Tusiime, Ahumuza, & Kimeze, 2018). Beyond building capacities at the individual level, organizational capacity building aims to create lasting systems and a base of knowledge that is embedded in an organization and not lost when individual staff leaves the organization. Such systems must be supported by sustainable structures that ensure long-term organizational knowledge retention and sustained capacity building (Dagnet, Cogswell, Bird, Bouyé, & Rocha, 2019).

Providing consistent, timely and appropriate guidance can also help to increase retention of institutional knowledge in the long run, as ongoing capacity building can function as an incentive to stay in an organization.

4.4 INSTITUTIONAL CAPACITIES AND COORDINATION MECHANISMS

Enhancing capacities at the institutional level is based on the aim to strengthen inter-institutional relationships as a core part of establishing the cooperative framework that the integrated MRV system requires. As detailed above, capacity building at the individual and organizational levels ensures the existence of a strong team of experts, capable of effectively performing MRV activities within the different institutions. Institutional capacity building, in contrast, entails building the relationship-oriented skills needed to enable and solidify partnerships amongst relevant stakeholders, so they may cooperatively optimize a shared MRV system, or other multilevel and multi-sectoral systems (Dagnet, Cogswell, Bird, Bouyé, & Rocha, 2019; Tusiime, Ahumuza, & Kimeze, 2018).

Ultimately, an increased institutional capacity supports the abilities required to develop comprehensive, detailed and accurate GHG emissions inventories, and to prepare the information needed for the country to submit and update its NDCs and BURs. The needs assessment to design a plan for building institutional capacities should consider different aspects of the partnering organizations—such as current levels of technical, or staff capabilities to perform MRV activities or the level of ambition present to improve MRV-related capacities.

PERNAMBUCO, BRAZIL –SHARING KNOWLEDGE VERTICALLY TO ENHANCE TECHNICAL ASSISTANCE AT ALL LEVELS OF GOVERNMENT

In 2019, the State of Pernambuco compiled its first GHG inventory with support from the Climate Footprint Project, which included technical assistance from Ricardo Energy and Environment and WayCarbon CITATION The19 \l 1033 (The Climate Group, 2019). During this process, the State of Pernambuco invited a specialist, who had previously worked on the City of Recife's inventory, to join the technical team tasked with compiling the state inventory. In this way, the technical capacity developed in the project was enhanced by prior capacity building in the URBAN-LEDS project, where ICLEI and other partners provided trainings at the local level during the construction of Recife's inventory.



Announcement of Pernambuco's first GHG Inventory
Source: (Reprodução/TV Globo, 2019)

5. GENERAL RECOMMENDATIONS

DATA MANAGEMENT

1. Standard template for data collection

A commonly shared template that can satisfy the needs of all involved parties. Such a template would reduce response time and increase efficiency in data collection. With a standard template, data can be managed/analyzed faster, and aggregation processes made more efficient, serving the national GHG inventory in a more constructive manner while leveraging bottom-up cooperation.

2. Common period for data collection

A recommended shared timeframe for data collection will help secure proper participation of all stakeholders, as they could organize their resources more effectively according to the reporting period. The second quarter of the year might be the most suitable time for requesting and collecting new data relevant to the development of the NDC's GHG inventory for the previous year. This suggested late scheduling is mostly because it will allow time to process and handle any changes from post-COP results and communications which occur in the first quarter of each year and still allow time for data cleaning and consolidation.

3. Identification of stakeholders and institutions

All relevant data providers must be identified and synergies between different levels should be highlighted; cities, states and national governments might have different data sources but eventually these sources feed into each other through different channels, and agreements, or mandates. Synergy mapping will help to develop better data sharing channels in the future.

4. Enable aggregation and comparison

From a top-down perspective, one of the most raised concerns was that subnational governments might use a different inventory compilation methodology to the national government. This should no longer be cited as a barrier, as there are several independent initiatives trying to breach this gap with the support of specialists or guiding documents, along with knowledge sharing for data collection, processing, aggregation and hosting. The wish to harmonize processes from the central government should not limit the decision-making power of subnational governments, but rather look for already available solutions.

From a bottom-up perspective, the demand for timely data on a sectoral basis is a continuous discussion. National governments often do not have the most current data readily available due to the fact that creating national inventories often takes between 2 to 4 years. In comparison, subnational governments (particularly cities) develop inventories on a yearly basis and can act as an easily accessible database for higher level government institutions. An effective MRV system should consider the time-sensitive data needs of states and provinces.

5. Access to data and information

Mandates, policies or formal agreements should secure data access and data sharing across government levels. The effectiveness of this measure depends largely on the political will of the policy makers and empowerment of relevant stakeholders to understand their role in the process and the importance of accurate GHG data. Should there exist conflict between constitutional mandates and the need for collecting emissions data, the more reliable course of action is the development of a bilateral agreement for data sharing. However, this negotiation process can be far more time consuming than a centralized mandate either from the national government or the state/province.

GOVERNANCE AND POLICY MAKING

6. Proper communication framework on mandates and roles

One of the most common barriers for effective vertical integration is a lack of understanding regarding the roles of each institution in the system. This limits the impact of all processes and increases the gaps that already exist (e.g., political differences or lack of financial/technical resources). A communication framework (or strategy) on roles and responsibilities should be included in policy development and stand as a critical support pillar to the overall vertical MRV establishment.

7. Enable conditions to reach ambitious objectives

The goal of a policy is typically to control the behavior of organizations or define public strategy. Should these policies not exist or not involve the relevant mechanisms or stakeholders that they mean to, ambitious objectives become untenable and the objectives that are in place become more burdensome to achieve. A revision of existing related policies, and creation of new policies focusing on the objectives of the vertical MRV system should be undertaken. This will help facilitate more effective MRV operations — such as easier access to data or increased access to financial and technical resources.

8. Long-term planning and planned transitions

The need for mandates and long-term planning is paramount. Mandates create clear and apparent direction and overall objectives. They are critical to the prevention or correction of deviations from overall goals.

Examples of mandate related corrective actions may include:

- Assuring subnational levels of government are properly included in the MRV structure or NDC goals
- Checking on GHG emission reductions in relation to established targets
- Identifying simpler and more effective processes, tools, and capacity sharing platforms
- Raising awareness of overall goals through the community

Effective maintenance of a mandated direction requires collaborative planning at multiple levels, and the participation of not only highly-trained technical staff, but also experts in management, media, and communication.

For subnational governments, the greatest challenge is often transitioning into an integrated vertical MRV system and maintaining these processes through different administrations. To successfully carry this out, a subnational government must create plans for capacity building prior to the initiation of an MRV system, and also when staff come or leave. This is particularly important in government systems which may change staff when administrations change; as climate planning for subnational governments can include 10, 20, or even 30 year goals— such as the 2050 Zero Carbon goal.

9. Enhanced fund management

The various funds and financial resources for climate action can be centralized into a single, but diverse “Climate Fund”. The fund MUST have transparent control and evaluation from an independent and well recognized party. To plan for a fundraising strategy, stakeholders (private sectors, subnational governments) must know which financial flows are available or not, by when, and the mechanisms to unlock them accordingly. They should also be informed on the Key Performance Indicators (KPIs) prepared in advance to measure transparency and success of the funding.

CAPACITY BUILDING AND KNOWLEDGE SHARING

10. Identify capacity needs

A capacity needs assessment provides an invaluable overview of the existing gaps and capacities related to MRV activities, such as data collection, GHG emissions accounting, use of templates for reporting, and abilities for carrying out data analysis and QA/QC processes, among others. A participatory, transparent, and systematic assessment is essential to identify the needs and prioritize the required resources for the establishment of targeted capacity building activities.

11. Establish a capacity building plan

A capacity building plan should be established and contain all detailed activities necessary to create or improve the individual, organizational and institutional capacities to fit the needs of the vertical MRV system. The plan should be inclusive and guarantee ownership at early stages for all relevant stakeholders engaged in the MRV system, including non-governmental actors. It should facilitate dialogue across stakeholders to enable efficient data flow, knowledge sharing and communication regarding ongoing developments and opportunities for improvement of the integrated MRV system.

12. Enhance capacities and establish mechanisms for long-term expertise retention

A robust and integrated MRV system requires niche expertise, management knowledge, technical knowledge, and a sustainable organizational structure. Individual, organizational and institutional capacities need to be enhanced while ensuring the establishment of mechanisms for long-term retention of institutional memory. Individuals' knowledge and expertise should guarantee a continuous and accurate process for data collection, analysis, storage, monitoring and reporting—especially in relation to GHG accounting, the related inventories, and tracking the impacts of mitigation actions. These capacities and long-term expertise retention at the involved institutions should ensure sustainability in the MRV system's operation. Therefore, it is essential to create ownership of the related systems, methods, and processes to build in-house capacities, which can be supported by external consultants. In addition, it is important to enable dialogue spaces and provide continuous and effective access to knowledge while sharing good practices at all levels.

13. Establish a cooperative framework to enable capacity building

A cooperative framework for capacity building should aim at strengthening inter-institutional and cross sectoral relations for the development and implementation of an integrated, vertical MRV System. Strengthening institutional structures through participatory and cooperative approaches helps support the sharing of experiences and lessons learned. This in turn can improve the quality of data in the MRV system, through a better understanding of functions among staff across different sectors and institutions. Cooperative frameworks should also involve agreements for data and knowledge sharing for all governance levels and their related stakeholders. Domestic MRV capacities can also be strengthened by international cooperation through projects, training and technical assistance initiatives provided by international experts.

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