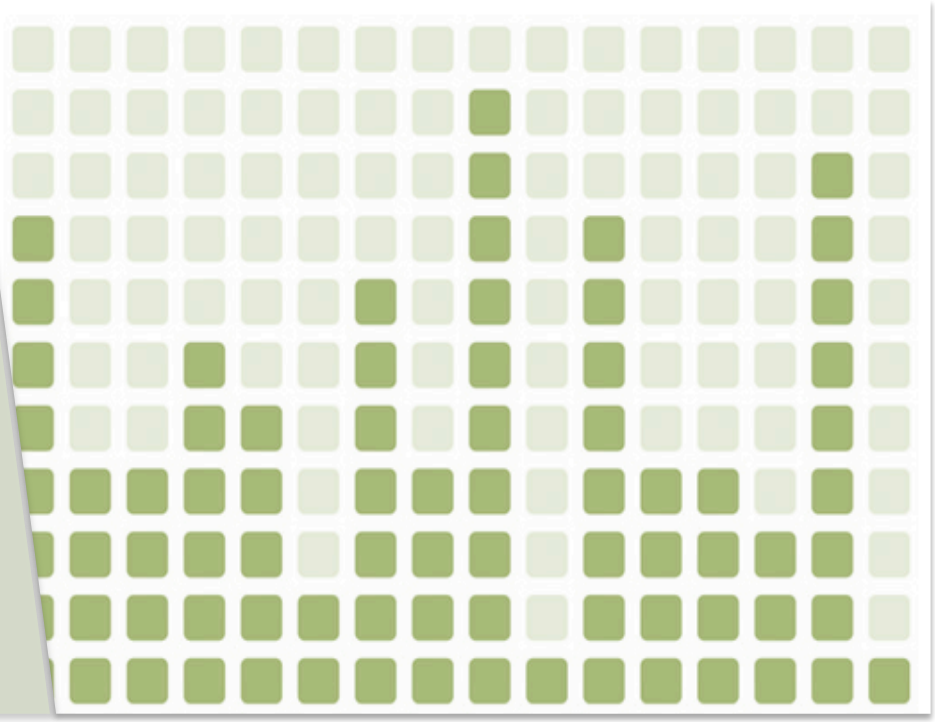
LEDS GLOBAL PARTNERSHIP

September 2016

Measuring Reporting and Verification of Low Emission Development Measures

Resource guide



Contents

List of Abbreviations

AFOLU	Agriculture, Forestry and Other Land Use
APL	Clean Production Agreement
BMUB	German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
BUR	Biennial Update Report
CCAP	Center for Clean Air Policy
CDM	Clean Development Mechanism
CER	Certified emission reduction
CIFF	Children's Investment Fund Foundation
CMP	Meeting of the Parties to the Kyoto Protocol
CORFO	Ministry of Economy and the Economic Development Agency
CPL	National Council for Clean Production
CSD	Commission on Sustainable Development
EEA	European Environment Agency
EFDB	IPCC Emission Factor Database
EMEP	The European Monitoring and Evaluation Programme
GEF	Global Environment Facility
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft fuer Internationale Zusammenarbeit (German Agency for International Cooperation)
GPA	Good Practice Analysis
ICA	International Consultation and Analysis
ICAT	Initiative for Climate Action Transparency
ICCA	International Council of Chemical Associations
IISD	International Institute for Sustainable Development
IMELS	Italian Ministry for the Environment, Land and Sea
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
LAC	Latin America and the Caribbean
LCA	Life cycle assessment

LCDS	Low Carbon Development Strategies
LEAD	USAID Low Emissions Asian Development program
LECB	Low Emission Building Programme
LEDS	Low Emission Development Strategies
LEDS GP	Low Emission Development Strategies Global Partnership
M&E	Monitoring and evaluation
MDGs	Millennium Development Goals
MMA	Ministerio del Medio Ambiente (Ministry for Environment, Chile)
MRV	Measuring, reporting and verification (also: monitoring, reporting and verification)
NAI	Non-Annex I
NAMA	Nationally Appropriate Mitigation Action
NC	National Communication
NCSP	National Communications Support Programme
NCSP	The National Communications Support Programme
NDC	Nationally Determined Contribution
PoA	Programme of Activities
REAL	Remote Expert Assistance on LEDS
SDGs	Sustainable Development Goals
SNC	Second National Communication
SNICHILE	National Inventory System of Chile
TCCCA	Transparency, Consistency, Completeness, Comparability and Accuracy
TFI	Task Force on National Greenhouse Gas Inventories
TGO	Thailand Greenhouse Gas Management Organization
TNC	Third National Communication
TTE	Team of Technical Experts
U.S. EPA	United States Environmental Protection Agency
UDP	UNEP DTU Partnership
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNOPS	United Nations Office for Project Services
USAID	U.S. Agency for International Development

VCS	Verified Carbon Standard
WBCSD	World Business Council for Sustainable Development
WMO	World Meteorological Organization
WRI	World Resources Institute
CIF	Climate Investment Funds

Introduction to the Guide

This resource guide aims to give an overview of tools, guidelines and programs that contain useful information to support efforts to measure, report and verify (MRV) greenhouse gas (GHG) emissions and other impacts of mitigation actions. The guide was compiled following a request from the National Council for Clean Production (CPL)[1] in Chile under the Remote Technical Assistance on LEDS (REAL) service of the Low Emission Development Strategies Global Partnership (LEDS GP). This guide serves to provide the CPL with resources that can inform the country's efforts to strengthen their MRV system in particular for the impacts of the Clean Production Agreement (APL). This Nationally Appropriate Mitigation Action (NAMA) is a voluntary agreement that is negotiated and signed between public agencies and the representative organization of the companies in a particular economic sector. The agreement is intended to implement clean production and sustainable development through respective targets and verifiable actions within a specified period.

While this resource guide cannot outline institutional and technical details of an MRV system for this specific mitigation action, it compiles global experience, guidance and tools available to shape elements of such a system[2]. The guide briefly describes essential concepts used throughout this document, before introducing selected resources on MRV more generally, on GHG accounting in particular, on reporting and verifying under the United Nations Framework Convention on Climate Change (UNFCCC), on experience from a number of countries, and on the assessment of development impacts. While the last section touches upon integrating social, economic and environmental impacts in MRV systems, the focus of this guide is on GHG emission related MRV. While these impacts beyond emission reduction are considered essential to low emission development, this broad topic cannot be explore in-depth in this guide, but is the subject of a separate interactive training at the LEDS GP Latin America and the Caribbean (LAC) regional event in Panama in September 2016[3].

The resources selected cover a number of issues related to MRV, including challenges and specifics of data collection, issues concerning baselines and uncertainties of data collected. It compiles information from both national level GHG inventories and reporting, as well as GHG accounting and protocols on the facility level.

How to use this guide?

Each section briefly introduces a mix of guidance documents, existing programs and interactive tools and software, their focus and origin. These introductions are based on

[1] The CPL is an institution under the Ministry of Economy and the Economic Development Agency (CORFO) of Chile.

[2] The resources introduced in this document are sourced directly from a number of organizations, institutions and authors and remain their intellectual property. Readers are advised to access and cite these resources directly, rather than referring to secondary summaries in this guide.

[3] Material from this training will be made available via the LEDS GP website after the event. For more information, visit: www.ledsgp.org or contact the Benefits Working Group at: benefits@ledsgp.org

information contained in the respective resources and on websites. Most resources are freely available online and a link to the original websites and information quoted is provided alongside their description. Some information and resources was gathered in communication with a number of experts in the field and respective links to their affiliated organizations are provided. All resources are available for download at: http://tinyurl.com/LEDSGPMRVresourceguide

Essential Concepts

This section gives a quick overview of terms used throughout this guide. For more information on mitigation-related concepts and approaches, visit the INTERNATIONAL PARTNERSHIP ON MITIGATION AND MRV and UNFCCC GLOSSARY OF CLIMATE CHANGE ACRONYMS websites.

MRV

In the context of climate change mitigation, Parties to the Convention are expected to measure, or strictly speaking to monitor, both emissions or avoided emissions of GHGs and the financial, capacity building and technology support provided for respective mitigation measures. This will be essential to track whether global mitigation efforts are in line with the target of staying well below 2-degree warming as set out in the Paris Agreement. Under the Convention, reporting on mitigation actions, emissions projections and GHG inventories should be submitted in the form of National Communications (NCs) every four and Biennial Update Reports (BURs) every two years. Verification of these reports is intended to ensure reported information and the methodologies used are valid.

> *MRV is a term used to describe all measures which states take to collect data on emissions, mitigation actions and support, to compile this information in reports and inventories, and to subject these to some form of international review or analysis. Despite its seemingly technical nature, MRV is yet one of the most important and contentious issues in any international arrangement on climate change. Consistently keeping track of Parties' emissions and actions is key to build transparency and confidence in the international climate regime.* (International Partnership on Mitigation and MRV, 2014a)

MRV is essential to building transparency and confidence as countries move toward achieving targets expressed in (Intended) Nationally Determined Contributions ([I]NDCs) and Low Emission Development Strategies (LEDS). However, it is a highly technical and contested process that is not uniform across countries and sectors and setting up appropriate MRV systems often requires capacity development support. An International Consultation and Analysis (ICA) process for Non-Annex I Parties to the Convention aims to identify capacity building needs through a Team of Technical Experts (TTE) that analyze country BURs.

> *MRV should also provide a framework to quantify emissions reductions of individual contributions, attribute them consistently to individual Parties , avoiding double counting, and add up the emissions reductions toward closing the ambition gap. Accounting means to put an emissions reduction number on an action, thereby being*

able to add up numbers from different actions and countries, and, hence, to understand if actions are sufficient or if collaboration must be enhanced to close the emission gap. Such a so-called MRV and Accounting framework will finally help to quantitatively coordinate individual countries' national activities for the global objective of limiting global warming to below 2°C and potentially to allocate scarce resources efficiently. (International Partnership on Mitigation and MRV, 2014a)

NAMAs

Nationally Appropriate Mitigation Actions (NAMAs) emerged in the Bali Action Plan as a relatively flexible term for measures that contribute to reducing GHG emissions and a long term transformation toward low carbon growth in line with unique country conditions and sustainable development targets. NAMAs are carried out on a voluntary basis by developing countries and implemented either unilaterally or with technical or financial support and require a respective MRV system to be put in place. NAMAs are explicitly intended to align mitigation and development goals and can be important tools to implementing economy-wide LEDS and NDCs beyond 2020. In this context, NAMAs specifically call for the integration of so-called co-benefits to mitigation. These co-benefits, also simply termed benefits, can be positive social, economic and/or environmental impacts beyond emission reduction and can be the central drivers to developing country policy making and should be integrated into MRV efforts.

LEDS

Similar to NAMAs, there is no precise definition of Low Emission Development Strategies, (LEDS). Rather, they are understood to be national, long-term cross-sectoral strategies aimed at decoupling economic growth and development from GHG emission growth. LEDS, or Low Carbon Development Strategies (LCDS) are loosely framed as overarching policy instruments aimed at sustainable, climate compatible development. They can provide a long sighted framework and guidance for sustainable low carbon development and climate-resilient economic growth that can encompass mitigation measures such as NAMAs and align with NDCs.

Typically, LEDS comprise most or all of the following elements:

- *A compilation of emissions data and projections*
- *Economy-wide, broad long-term mitigation goals (in the range of 15 to 30 years)*
- *A survey of cost-efficient mitigation options and their prioritization*
- *The stipulation of concrete short- and mid-term mitigation actions*

(International Partnership on Mitigation and MRV, 2014b)

(Co-)Benefits

Co-benefits refer to the positive effects that a policy or measure aimed at one objective might have on other objectives, without yet evaluating the net effect on overall social welfare. Co-benefits are often subject to uncertainty and depend on, among others, local circumstances and implementation practices. Co-benefits are often referred to as ancillary benefits.

Source: Allwood, Dubash, Bosetti, Gómez-Echeverri, & von Stechow, 2014

The literature uses a number of terms to depict the associated benefits and costs that arise in conjunction with GHG mitigation policies. These include co-benefits, ancillary benefits, side benefits, secondary benefits, collateral benefits, and associated benefits. In the current discussion, the term “co-benefits” refers to the non-climate benefits of GHG mitigation policies that are explicitly incorporated into the initial creation of mitigation policies. Thus, the term co-benefits reflects that most policies designed to address GHG mitigation also have other, often at least equally important, rationales involved at the inception of these policies (e.g., related to objectives of development, sustainability, and equity). In contrast, the term ancillary benefits connotes those secondary or side effects of climate change mitigation policies on problems that arise subsequent to any proposed GHG mitigation policies.

Policies aimed at mitigating GHGs, as stated earlier, can yield other social benefits and costs […], and a number of empirical studies have made a preliminary attempt to assess these impacts. It is apparent that the actual magnitude of the ancillary benefits or co-benefits assessed critically depends on the scenario structure of the analysis, in particular on the assumptions about policy management in the baseline case. This implies that whether a particular impact is included or not depends on the primary objective of the program. Moreover, something that is seen as a GHG reduction program from an international perspective may be seen, from a national perspective, as one in which local pollutants and GHGs are equally important.

Source: Intergovernmental Panel on Climate Change - IPCC, 2016a

Climate policy intersects with other societal goals creating the possibility of co-benefits or adverse side-effects. These intersections, if well-managed, can strengthen the basis for undertaking climate action. Mitigation and adaptation can positively or negatively influence the achievement of other societal goals, such as those related to human health, food security, biodiversity, local environmental quality, energy access, livelihoods, and equitable sustainable development; and vice versa, policies toward other societal goals can influence the achievement of mitigation and adaptation objectives. These influences can be substantial, although sometimes difficult to quantify, especially in welfare terms. This multi-objective perspective is important in part because it helps to identify areas where support for policies that advance multiple goals will be robust

Source: Intergovernmental Panel on Climate Change - IPCC, 2014

MRV Tools, Guidelines and Programs

This section provides information on tools, guidelines and other knowledge products, as well as existing programs that focus on MRV of mitigation measures and NAMAs in particular. The following information is sourced directly from respective websites and/or interviews with experts involved and includes links to all related resources that provide important lessons learned and useful information for the improvement of MRV systems. Please refer to sources indicated for original formulation and correct citation.

PROGRAM: Information Matters

The project aims – as its primary goal – to strengthen the in-country capacities for enhanced climate reporting in the selected partner countries. So far the project has provided technical support to four partner countries during its first phase (2013-2016): CHILE, the DOMINICAN REPUBLIC, GHANA and the PHILIPPINES. During its second phase (2016-2017), it will provide support to four additional countries: Colombia, Egypt, Georgia and Vietnam.

In consultation with the partners, specific needs and priorities for national MRV systems and preparation of GHG inventories are identified and improved through tailored in-country capacity-building workshops and trainings. These further aim to enable the partner countries to define procedures, methodologies and responsibilities to institutionalize their reporting system with special focus on the requirements for national-level reporting on GHGs and mitigation to the UNFCCC in the BURs and NCs. Peer-to-peer exchange, e.g. in the form of workshops, and sharing lessons learned are additional key features of the Project.

The project is implemented in closer cooperation with the United Nations Development Programme's (UNDP) LOW EMISSION CAPACITY BUILDING PROGRAMME (LECB) and the NATIONAL COMMUNICATIONS SUPPORT PROGRAMME (NCSP) in the respective project countries. LECB and NCSP build the technical and institutional capacities of countries to enable them to collect, manage and report the necessary data for planning and implementing mitigation actions. Through this cooperation synergies and benefits resulting from mutually complementary activities are maximized. GIZ further collaborates with the World Resources Institute (WRI) on monitoring and reporting issues related to the project. In addition, the project is closely connected to INTERNATIONAL PARTNERSHIP ON MITIGATION AND MRV (hereafter: Mitigation Partnership). To support implementation of the project in the partner countries and to disseminate experience and lessons learned more widely to a larger number of countries, a number of tools and guidance materials were developed under the project:

STOCK TAKING TOOL: An analytical tool that countries can apply to identify priority actions for national MRV systems including for LEDS and NAMAs. Its aim is to guide countries in assessing the current national mitigation architecture and to provide an information basis for planning and implementing mitigation actions.

BIENNIAL UPDATE REPORT (BUR) TEMPLATE: A template developed on the basis of the UNFCCC guidelines for the preparation of biennial update reports (UNFCCC decision 2/CP.17, annex III.). This template sets out a proposed BUR structure and provides guidance on how to present the required information, including using tables. It also contains guiding questions to assist in the drafting of the chapters. It further builds upon experience of the project partner countries and sharing of lessons learned at regional workshops, as well as from applying the Stock Taking Tool.

The guidance document PREPARING FOR THE ICA PROCESS: REQUIRED EFFORTS AND CAPACITIES NEEDED aims to guide Non-Annex I Parties in preparing for the ICA process under the UNFCCC, and shows what efforts and capacities might be required as part of their preparation.

The BUR Process Guidance Tool has been developed to support countries in the process of preparing a BUR and undergoing the International Consultation and Analysis (ICA), while at the same time enhancing domestic MRV systems. It guides users through a six step process, helping to understand what the key steps are, what to consider when implementing those steps, and what the required potential time duration would be, taking into account specific national circumstances.

Source: International Partnership on Mitigation and MRV, 2016a

The third capacity building mission in Chile in April 2015 focused on the design of an MRV framework for NAMAs, the setup of an institutional structure for MRV of support, and the review of Chile's GHG inventory. The workshop report includes presentations of lessons learnt within the pilot application for accounting and reporting on policies and actions using the WRI GHG Protocol on energy efficiency mitigation action, and provides information on the calculation of uncertainty for GHG emissions and capture inventories. The workshop included a session that introduced new tools for managing the National Inventory System of Chile (SNICHILE) and a practical exercise on how to calculate uncertainty within the GHG sector inventories led by Oscar Zarzo (GIZ-Germany) and Ricardo AEA. (GIZ - Deutsche Gesellschaft fuer Internationale Zusammenarbeit, 2015)

The Information Matters Project supports the Chilean Ministry of Environment (MMA) in their efforts to build an overarching MRV system for mitigation actions including NAMAs, applying mainly the WRI Policy and Action Standard. As a result and in cooperation with another MMA project supported by the UK Foreign and Commonwealth Office, the project has developed a framework for MRV for mitigation actions. The Directrices para un Marco Genérico de MRV para NAMAs en Chile calls upon all NAMA developers to use the MRV methodology proposed for mitigation projects and to report to the MMA in regular cycles as specified by the framework. The framework provides information on selecting indicators, developing baselines and targets, approving MRV plans, on the assessment of impacts, continuous improvement and includes templates and a checklist for validation.

Knowledge platform: International Partnership on Mitigation and MRV

In the framework of the Petersberg Climate Dialogue in May 2010 in Bonn/Germany, South Africa, South Korea and Germany launched the Mitigation Partnership. The overall aim of the Partnership is to support a practical exchange on mitigation-related activities and MRV between developing and developed countries in order to help close the global ambition gap. The Partnership is comprised of approximately 90 countries, the majority of which are from developing countries. The Mitigation Partnership has no formal character and is open to new countries. The MMA represents Chile as a member of the Partnership.

The activities contribute to the design and effective implementation of:

- 'Intended Nationally Determined Contributions' (INDCs)
- 'Low-Emission Development Strategies' (LEDS),
- 'Nationally Appropriate Mitigation Actions' (NAMAs),
- And 'Measuring, Reporting and Verification' (MRV) systems.

The Mitigation Partnership brings together climate experts from a variety of countries to foster mutual learning between peers, identify best practices, establish a shared mitigation-related knowledge base, and disseminate lessons learnt.

Source: International Partnership on Mitigation and MRV, 2016b

The Mitigation Partnership website provides an extensive library of resources related to the topics above, including knowledge products on MRV such as the report on ELEMENTS AND OPTIONS FOR NATIONAL MRV SYSTEMS BASED ON THE AUTUMN SCHOOL OF THE INTERNATIONAL PARTNERSHIP ON MITIGATION AND MRV "MRV – TODAY, TOMORROW AND THE FUTURE". This document summarizes the October 2012 Autumn School's key findings and provides additional know-how and technical guidance on the design and setup of domestic MRV systems. Tiered approaches have been included as examples, showing how countries can start with simplified approaches and improve their MRV system over time. The document covers 'MRV basics'; describes the design and setup of a domestic MRV system; takes a more technical look at how to monitor, report and verify emissions, emission reductions, removal of barriers to emission reductions, and co-benefits; discusses specific aspects of MRV related to public climate finance; and provides additional resources.

TOOL: MRV Tool

The MRV TOOL provides developers and implementers of NAMAs with brief step-by-step instructions on how to develop an MRV-System. The tool navigates users to the relevant information, knowledge, instruments, and publications available. The tool is structured into three key sections:

1. MRV of Emissions,
2. MRV of NAMAs,
3. MRV of Support.

This structure was applied to supply users with more data and accessible instruments for certain aspects of the development of MRV systems. For more information on MRV trainings, please contact: climate@giz.de

The MRV Tool is interactive and available in Spanish (the guide to using the tool and the table of contents are available in the English version) online: https://mitigationpartnership.net/mrv-tool-how-set-national-mrv-systems

Figure 1: Sample of the MRV Tool in Spanish

Source: GIZ - Gesellschaft fuer Internationale Zusammenarbeit, 2014a

TOOL: NAMA Tool - Steps for Moving a NAMA from Idea towards Implementation

The NAMA-Tool provides developers and implementers of NAMA with brief step-by-step instructions on how to develop a NAMA. The tool navigates users to the relevant information, knowledge, instruments, and publications available.

The process is structured into ten steps. The 10-step approach is designed to supply users with more data and accessible instruments for certain aspects of the NAMA development.

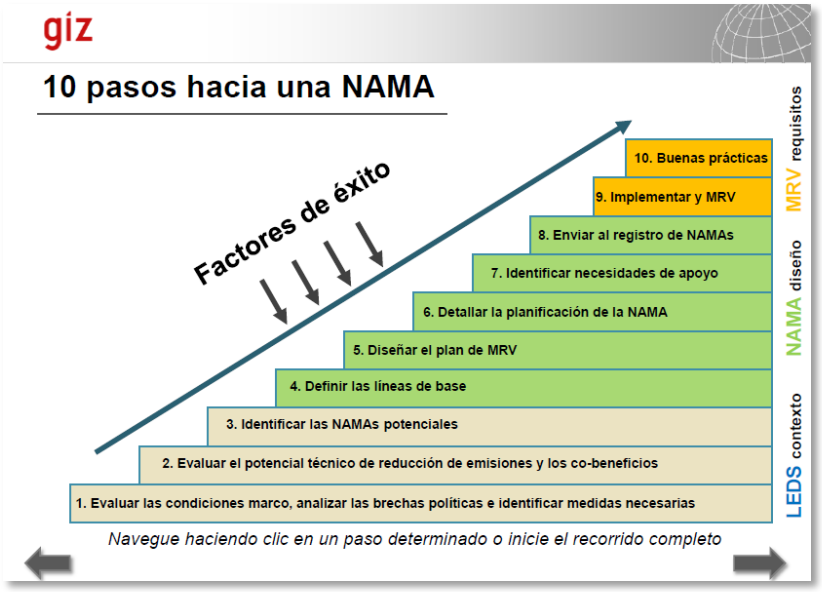
Even though this tool helps prepare for the implementation of NAMAs, it is first and foremost a navigation tool, guiding practitioners through the process of developing a NAMA. It is not an instrument for the implementation of NAMAs itself.

The tool is related to a two-day training which simulates the process of NAMA development along the ten steps and includes presentations, working groups and a variety of interactive elements. See examples of NAMA Trainings in Peru and Costa Rica.

For more information on NAMA trainings, please contact: climate@giz.de

The interactive tool is available in English in its updated version from August 2016 and in Spanish in its 2014 version. The tools are availebl for download here: https://mitigationpartnership.net/nama-tool-steps-moving-nama-idea-towards-implementation

Figure 2: Sample of the NAMA Tool in Spanish



Source: GIZ - Deutsche Gesellschaft fuer Internationale Zusammenarbeit, 2014b

PROGRAM: Initiative for Climate Action Transparency

In response to the critical need to support improved transparency and capacity building under the Paris Agreement, in 2015 the Children's Investment Fund Foundation (CIFF) and the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) founded the INITIATIVE FOR CLIMATE ACTION TRANSPARENCY (ICAT). Two additional donors, the Italian Ministry for the Environment, Land and Sea (IMELS) and the ClimateWorks Foundation, joined the initiative at the end of 2015. The implementing partners are UNEP DTU Partnership (UDP), Verified Carbon Standard (VCS) and World Resources Institute (WRI). The Climate, Community & Biodiversity Alliance and Rainforest Alliance are also supporting partners and will contribute to specific aspects of the initiative. The United Nations Office for Project Services (UNOPS) manages the trust fund through which the work is funded.

The Initiative aims to strengthen the capacity of developing countries to assess their climate actions (in the context of their NDCs) and report their progress in line with the Paris Agreement. This work involves working closely with governments, along with public agencies, higher education institutions and civil society bodies, to strengthen institutional arrangements, processes and procedures. The Initiative supports in-country capacity development programs through training modules on measurement, reporting and verification (MRV) of policies and actions, and knowledge sharing of good practice and lessons learned.

ICAT is partnering with countries in Africa, Asia and Latin America & Caribbean to undertake capacity building and pilot test the methodological framework. Thus far, 17 countries have been formally invited to join the initiative:

- from Africa: Ghana, Kenya, Morocco, Mozambique, Rwanda, Senegal, Tanzania
- from Asia: Cambodia, Indonesia, Philippines, Sri Lanka
- from Latin America & Caribbean: Costa Rica, Colombia, Dominican Republic, Ecuador, Mexico, Peru

Currently, USD 16,5 million has been committed to ICAT from the four founding donors, but the initiative is open to new partners. ICAT will run for a minimum of four years with three main focus areas. First, it will develop methodological frameworks to measure, report and verify domestic climate actions, as well as conduct pilot testing programs. Second, monitoring, reporting and verification programs will be implemented through training, capacity building and domestic programs. Third, ICAT will take lessons learned to the international community.

Source: ICAT - Initiative for Climate Action Transparency, 2016

For more information, contact: Rhys Gerholdt, rgerholdt@wri.org, +1 202 341 1323

The ICAT implementing partners are currently developing a Sustainable Development Impacts Guidance document on how to assess the sustainable development (i.e., social, environmental, economic) impacts of policies and actions. Examples include air pollution, jobs, health, access to energy, poverty reduction, and protection of ecosystems. The guidance will enable users to assess all relevant impacts in an integrated way and is planned to be published in 2019.

GUIDANCE: MRV for NAMAs - Tracking Progress while Promoting Sustainable Development

MRV for NAMAs is being discussed both as a way to track the implementation and success of actions supported through bilateral agreements as well as in the official UNFCCC context. Accordingly, this paper seeks to address MRV of NAMAs in two distinct contexts: 1) bilateral reporting of progress on supported NAMAs based on agreement between NAMA host countries and developed country NAMA financial supporters, and 2) MRV of NAMAs required by the UNFCCC as part of reporting on national emissions by developing countries. The MRV process between NAMA implementers and NAMA supporters is potentially quite flexible and can be tailored to the specific NAMA under development as well as to the needs of both Parties. For example, while GHG reduction is a key goal of NAMAs, demonstrating progress on sustainable development may be important to garnering domestic political support for NAMAs and attracting domestic investments necessary for implementation. In contrast, the international MRV process will focus on GHG emissions and on building the capacity of developing countries to collect, report and verify emissions over time. This paper offers recommendations for effective MRV in each context.

In the context of bilateral agreements, Center for Clean Air Policy (CCAP) proposes a broader approach to MRV for NAMAs that includes metrics for: 1) Actions and Progress, 2) GHGs and 3) Sustainable Development (economy, health, equity, etc.).

Visit the CCAP website for more resources and information: http://ccap.org/

Source: Winkelman, et al., 2011

Guidance on GHG Inventories and Accounting Protocols

This section provides an overview of recognized guidance documents and standards for GHG accounting, as well as a selection of respective tools and protocols to monitor and report GHG reductions from mitigation actions. These resources are not necessarily tailored to a specific sector or country context, but can provide vital information on the technical aspects of GHG accounting from establishing baselines and choosing indicators to building inventories and collecting GHG data. The following information is sourced directly from respective websites and/or interviews with experts involved and includes links to all related resources that provide important lessons learned and useful information for the improvement of MRV systems. Please refer to sources indicated for original formulation and correct citation.

GUIDANCE & TOOLS: Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) is the international body for assessing the science related to climate change. The IPCC was set up in 1988 by the World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) to provide policymakers with regular assessments of the scientific

basis of climate change, its impacts and future risks, and options for adaptation and mitigation. IPCC assessments provide a scientific basis for governments at all levels to develop climate related policies, and they underlie negotiations at the UN Climate Conference.

Source: Intergovernmental Panel on Climate Change - IPCC, 2013

The IPCC has completed four assessment reports, developed methodology guidelines for national greenhouse gas inventories, special reports and technical papers. For more information on the IPCC, its activities and publications, please see the IPCC homepage.

The IPCC has three working groups and a task force:

- Working Group I (WG I) : The science of climate change
- Working Group II (WG II) : Impacts, adaptation and vulnerability
- Working Group III (WG III) : Mitigation of climate change
- Task Force on National Greenhouse Gas Inventories (TFI)

The objectives of the TFI are:

- to develop and refine an internationally agreed methodology and software for the calculation and reporting of national GHG emissions and removals; and
- to encourage the widespread use of this methodology by countries participating in the IPCC and by signatories of the UNFCCC.

Source: Intergovernmental Panel on Climate Change - IPCC, 2016b

In 2006, the IPCC published Guidelines for National Greenhouse Gas Inventories that build on the previous Revised 1996 IPCC Guidelines and the subsequent Good Practice reports in an evolutionary manner to ensure that moving from the previous guidelines to these new guidelines is as straightforward as possible. These new guidelines cover new sources and gases as well as updates to previously published methods where technical and scientific knowledge have improved. This guidance assists countries in compiling complete, national inventories of greenhouse gases.

The guidance has been structured so that any country, regardless of experience or resources, should be able to produce reliable estimates of their emissions and removals of these gases. In particular, default values of the various parameters and emission factors required are supplied for all sectors, so that, at its simplest, a country needs only supply national activity data. The approach also allows countries with more information and resources to use more detailed country-specific methodologies while retaining compatibility, comparability and consistency between countries. The guidance also integrates and improves earlier guidance on good practice in inventory compilation so that the final estimates are neither over- nor under-estimates as far as can be judged and uncertainties are reduced as far as possible. Guidance is also provided to identify areas of the inventory whose improvement would most benefit the inventory overall. Hence limited resources can be focused on those areas most in need of improvement to produce the best practical inventory.

The IPCC also manages the IPCC Emission Factor Database (EFDB). The EFDB was launched in 2002, and is regularly updated as a resource for inventory compilers to use to assist them by providing a repository of emission factors and other relevant parameters

that may be suitable for use in more country-specific methodologies. See also the AIR POLLUTANT EMISSION FACTOR LIBRARY managed by the Finnish Environment Institute.

The 2006 Guidelines are the latest step in the IPCC development of inventory guidelines for national estimates of greenhouse gases. In the opinion of the authors, they provide the best, widely applicable default methodologies and, as such, are suitable for global use in compiling national greenhouse gas inventories. They may also be of use in more narrowly-defined project based estimates, although here they should be used with caution to ensure they correctly include just the emissions and removals from within the system boundaries.

The IPCC Guidelines provide GENERAL GUIDANCE AND REPORTING and cover five sectors:

1) ENERGY, including stationary and mobile combustion, fugitive emissions, CO2 transport, injection and geological storage;
2) INDUSTRIAL PROCESSES AND PRODUCT USE, including mineral industry emissions, chemical and metal industry emissions, non-energy products from fuels and solvent use, electronics industry emissions, emissions of fluorinated substitutes for ozone depleting substances, and other product manufacture and use;
3) AGRICULTURE, FORESTRY AND OTHER LAND USE (AFOLU), including generic methodologies applicable to multiple land-use categories, consistent representation of lands, forest land, cropland, grassland, wetlands, settlements, other land, emissions from livestock and manure management, N2O emissions from managed soils, and CO2 emissions from lime and urea application, harvested wood products;
4) WASTE, including waste generation, composition and management data, solid waste disposal, biological treatment of solid waste, incineration and open burning of waste, wastewater treatment and discharge.

Table 1: General structure of sectoral guidance chapters

Methodological Issues
» Choice of Method, including decision trees and definition of tiers » Choice of Emission Factor » Choice of Activity Data » Completeness » Developing a Consistent Time Series
Uncertainty Assessment
» Emission Factor Uncertainties » Activity Data Uncertainties
Quality Assurance/Quality Control, Reporting and Documentation
Worksheets

The Guidelines are available in six official United Nations languages, including Spanish.

Supplementary to the Guidelines, users can download worksheets in spreadsheet format as supporting material.

Source: Intergovernmental Panel on Climate Change - IPCC, 2006

In March 2016, the TIF released Version 2.17 of the IPCC INVENTORY SOFTWARE which implements the simplest Tier 1 methods in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and as such is useful to users of all versions of the IPCC Guidelines. The TFI is currently working on making it compatible with the Tier 2 methods in the 2006 IPCC Guidelines.

Download the INVENTORY SOFTWARE and the USER MANUAL on the TFI website.

Source: Intergovernmental Panel on Climate Change - IPCC, 2016c

For more publications, software and guidance on GHG inventories, such as the TECHNICAL BULLETIN ON USE OF FACILITY–SPECIFIC DATA IN NATIONAL GREENHOUSE GAS INVENTORIES and the GOOD PRACTICE GUIDANCE AND UNCERTAINTY MANAGEMENT IN NATIONAL GREENHOUSE GAS INVENTORIES (also available in Spanish), visit the IPCC TIF website.

See the Annexes of the FIFTH ASSESSMENT REPORT OF WORKING GROUP III ON MITIGATION for information on metrics and methodology and technology-specific cost and performance parameters.

GUIDANCE & TOOLS: The Greenhouse Gas Protocol

THE GREENHOUSE GAS PROTOCOL (GHG Protocol) is the most widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas emissions. A decade-long partnership between WRI and the World Business Council for Sustainable Development (WBCSD), the GHG Protocol is working with businesses, governments, and environmental groups around the world to build a new generation of credible and effective programs for tackling climate change.

It serves as the foundation for nearly every GHG standard and program in the world - from the INTERNATIONAL STANDARDS ORGANIZATION to THE CLIMATE REGISTRY - as well as hundreds of GHG inventories prepared by individual companies.

The GHG Protocol also offers developing countries an internationally accepted management tool to help their businesses to compete in the global marketplace and their governments to make informed decisions about climate change.

WRI and WBCSD, through the GHG Protocol Initiative, works with governments, industry associations, NGOs, businesses, and other organizations around the world to build credible, effective, and robust GHG accounting and reporting platforms that serve as a foundation to address climate change.

The GHG Protocol has developed a number of standards designed to provide a framework for businesses, governments, and other entities to measure and report their greenhouse gas emissions in ways that support their missions and goals. ONLINE LEARNING opportunities exist for some standards to learn more about GHG accounting, life cycle standards and more.

Table 2: GHG Protocol Standards

Standard name	Description	Best for	Online learning product
Corporate Accounting and Reporting Standard	The Corporate Standard provides instruction on how a company should perform a GHG inventory; it covers scopes 1 and 2 (see also the Scope 2 Guidance.)	Businesses	Corporate Standard Training Webinar
Corporate Value Chain (Scope 3) Standard	This standard provides instruction on how a company should perform a scope 3 GHG inventory, which includes emissions from throughout a company's value chain.	Businesses	Corporate Value Chain (Scope 3) Standard Online Course
Product Life Cycle Standard	The Product Life Cycle Standard instructs users on accounting for the emissions of a product's full life cycle; users can learn to focus efforts on the greatest GHG reduction opportunities in order to develop more sustainable products.	Businesses	Product Life Cycle Online Course
Project Protocol	The Project Protocol is the most comprehensive, policy-neutral accounting tool for quantifying the greenhouse gas benefits of climate change mitigation projects.	Businesses or Government	
GHG Protocol for Cities (GPC)	The GPC provides a robust framework for accounting and reporting city-wide greenhouse gas emissions. It seeks to help cities develop a comprehensive and robust greenhouse gas inventory in order to support climate action planning.	Government	Coming soon
Mitigation Goal Standard	The Mitigation Goal Standard provides instructions on assessing progress toward national and subnational greenhouse gas reduction goals. The standard can help governments set emission-reduction targets, meet domestic and international emissions reporting obligations to groups like the UNFCCC, and ensure that efforts to reduce emissions are achieving their intended results.	Government	Mitigation Goal Standard Online Course
Policy and Action Standard	The Policy and Action Standard provides a standardized approach for estimating the greenhouse gas effect of policies and actions.	Government	Policy and Action Standard Online Course

Source: The Greenhouse Gas Protocol, 2012

Greenhouse Gas Protocol is currently scoping the need for a new standard to help companies quantify and report the avoided emissions of goods and services. To join the mailing list and receive information on the survey results and any future standard development, please complete the online form on the GHG Protocol website. For additional questions, please contact Cynthia Cummis at ccummis@wri.org.

The GHG Protocol website also offers a collection of calculation tools to calculate emissions in a multi-step process. The CORPORATE STANDARD provides guidance on how to incorporate quality control issues and the activity data required for an accurate and useful inventory to estimate emissions.

Every tool is comprised of an Excel workbook and a PDF guidance document. Each PDF provides step-by-step guidance on the use of a tool and should be consulted first. Most companies will need to apply more than one tool to cover their emissions.

There are different resources for navigating the GHG Protocol tools:

- SECTOR TOOLSETS: Provide sector and industry-specific toolkits with more detailed guidance on what tools to use for development of a more complete GHG inventory.
- THIRD PARTY DATABASES: List of Third Party Databases to assist users in collecting data for product life cycle and corporate value chain (scope 3) GHG inventories.
- FREQUENTLY ASKED QUESTIONS: List of the most frequently asked questions regarding using GHG Protocol tools.
- ALL TOOLS: Complete listing of GHG Protocol tools.

Source: The Greenhouse Gas Protocol, 2012

PROGRAM & TOOLS: U.S. EPA National GHG Inventory Capacity Building

The United States Environmental Protection Agency (U.S. EPA) has developed a capacity-building approach to help countries build sustainable GHG inventory management systems. The Agency also builds capacity through technical support to enhance data collection for estimating GHG emissions and sinks for agriculture, forestry, and other sectors. This work complements activities that non-Annex I countries are taking under the UNFCCC.

Through this capacity-building program, EPA is partnering with the U.S. Agency for International Development (USAID), the UNFCCC, and other partners and donors to provide technical assistance in various regions and countries. EPA has ongoing activities with country partners in Southeast Asia, Eastern and Southern Africa, and will also participate in a multi-agency effort in the Andean Region.

EPA's approach has two components. First, EPA works with each country to improve its institutional capacity to manage the GHG inventory compilation process and to establish a sustainable system for producing regular national GHG inventories. Second, EPA provides technical assistance in collecting data, developing analytical methods, and documenting the inventory process so that countries can continue to build upon their efforts for the future.

EPA provides tools and technical assistance to complement these two components, including:

- Working with inventory compilers to document their national inventory systems using the National System Templates, which facilitates identification of key gaps and areas for targeted assistance.
- Collaborating with countries to obtain and process high-quality satellite data and aerial imagery needed to implement the IPCC land-use methodologies.
- Training country experts on the Agriculture and Land-Use National GHG Inventory software tool, enabling countries to estimate emissions and removals from all AFOLU categories.

These tools, developed in conjunction with USAID, are consistent with UNFCCC reporting guidelines and are available through the links below.

A major component of U.S. EPA's approach is to build sustainable national GHG inventory management systems using the pre-defined National System Templates (also available in Spanish and French) as a starting point. Completed templates can be compiled into a single National Inventory System Report, which provides a comprehensive documentation of each critical component for managing development of the GHG inventory development process. These tools are consistent with IPCC and UNFCCC guidelines for national GHG inventory development.

This template workbook covers the following topics and is supplemented by a number of tools and guidance documents which can be downloaded from the U.S. EPA website.

Table 3: U.S. EPA Template and Tools

Guidance & tools	Description
Institutional Arrangements for National Inventory Systems En Español	Assists inventory teams in assessing and documenting the strengths and weaknesses of existing institutional arrangements and to help plan arrangements for future inventory development to ensure continuity and integrity of the inventory, promote institutionalization of the inventory process, and facilitate prioritization of future improvements.
National GHG Inventory Coordinator: Responsibilities and Qualifications En Español	Describes the roles and key responsibilities for the National GHG Inventory Coordinator in order to effectively manage and coordinate development of a National GHG Inventory.
Sector Roles and Responsibilities:	These documents describe the likely roles and key responsibilities for each sector lead for the

AGRICULTURE (En Español) ENERGY (En Español) INDUSTRIAL PROCESSES (En Español) LULUCF (En Español) WASTE (En Español)	National GHG Inventory (Energy; Industrial Processes and Product Use; Agriculture; Land Use, Land-Use Change, and Forestry; and Waste). The primary role of each Sector Lead is to manage and coordinate development of GHG emission estimates for their respective sector.
METHODS AND DATA DOCUMENTATION En Español	Assists inventory teams in documenting and reporting the origin of methodologies, activity datasets, and emission factors used to estimate emissions or removals. Future inventory teams can refer to the completed template for each source and sink category to determine what information was collected, how the data were obtained, and what methods were used, as well as to reproduce estimates.
DESCRIPTION OF QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES En Español	Guides countries through the establishment of a cost-effective QA/QC program to improve transparency, consistency, comparability, completeness, and confidence in national GHG inventories. The template includes supplemental checklists with recommended QA/QC procedures that are specific to management roles, such as the Inventory Coordinator and QA/QC Coordinator, as well as sector leads.
DESCRIPTION OF ARCHIVING SYSTEM En Español	Facilitates reproducing and updating GHG emission estimates to be easily recreated, safeguards against data and information loss, and facilitates development of subsequent inventories by future inventory staff. An archive system is an inexpensive yet critical step toward a sustainable National Inventory System.
KEY CATEGORY ANALYSIS En Español KEY CATEGORY ANALYSIS TOOL En Español	Identifies the sources and/or sinks that have the greatest contribution to national emissions, and thus should be the focus of improvement efforts. The template and tool are consistent with IPCC Guidelines. The KCA Tool enables a country to determine key categories from GHG inventory estimates.
NATIONAL INVENTORY IMPROVEMENT PLAN En Español	Synthesizes findings and describes specific priorities for future capacity-building projects based on the needs identified in the first five templates, and facilitates continual inventory improvements.

Source: US Environmental Protection Agency - EPA, 2016

EPA assists countries to overcome data collection barriers and enhance their capacity to transition to higher-tier methods for key categories. There are two general parts to this approach (find respective tools on the website):

- Identification of data needs and strategies: EPA works with national experts to identify critical data needs for applying the IPCC methods and then assists them with assembling the data.
- Software tools: EPA has supported the development of software tools that simplify the task of estimating emissions from agriculture, land-use change and forestry, and solid waste.

GUIDANCE & TOOLS: Consultative Group of Experts on National Communications from NAI countries

The UNFCCC's Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention (CGE) is a constituted expert body of the Convention with the overall goal of improving the process of preparing Second and subsequent NCs by providing technical advice and support to non-Annex I (NAI) Parties.

The materials contained in the CGE TRAINING PACKAGE ON NATIONAL GHG INVENTORIES intends to provide the reader with the best possible synthesis of all the IPCC methodologies and tools available which could be of use for NAI Parties and experts in the process of preparation of their national GHG inventories.

The training document includes links to presentations, handbooks, simulations, tools, a glossary and quizzes related to GHG accounting across a number of sectors from energy (fuel combustion and fugitives), industrial processes, agriculture, LULUCF, and waste, and UNFCCC software and manuals. The document and other material on GHG inventories can be accessed through the National Communications Support Programme (NCSP) website.

The CGE has also developed a TRAINING HANDBOOK ON MITIGATION ASSESSMENT FOR NON-ANNEX I PARTIES that gives an overview of mitigation assessment under the UNFCC, as well as concepts, structure and steps to assessment including developing baseline scenarios. The handbook provides information on mitigation options across IPCC sectors, highlight barriers and provides methods and tools for the energy and non-energy sector, as well as information on preparing NCs. The handbook as well as other materials on mitigation analysis can be found on the NCSP website.

Source: United Nations Development Programme (UNDP) National Communications Support Programme - NCSP, 2016

PROGRAM & TOOL: The Climate Registry GHG Protocols

The Climate Registry (TCR) is a non-profit organization governed by U.S. states and Canadian provinces and territories that designs and operates voluntary and compliance GHG reporting programs globally, and assists organizations in measuring, reporting and verifying the carbon in their operations in order to manage and reduce it. TCR also consults with governments nationally and internationally on all aspects of GHG measurement, reporting, and verification.

TCR protocols outline best practices in GHG accounting and their voluntary reporting program requirements. Each protocol is developed by achieving a consensus among industry, environmental and government stakeholders. Protocols must also go through a rigorous public comment period before being adopted.

Protocols include a GENERAL REPORTING PROTOCOL, an ELECTRIC POWER SECTOR PROTOCOL, a LOCAL GOVERNMENT OPERATIONS PROTOCOL, and an OIL & GAS PRODUCTION PROTOCOL. TCR provides its reporting protocols and curated default emission factor database to the public free of charge upon registration. The TCR website also provides a number of useful resources for GHG accounting, including a REPORTING TOOLKIT, information on VERIFICATION, a WEBINAR LIBRARY, INFORMATION ON WATER-ENERGY GHG PROTOCOL DEVELOPMENT and OTHER GUIDANCE DOCUMENTS.

TCR Protocols are adapted to specific country and sector contexts, taking into account existing policies and data availability to provide a reporting platform and a customized GHG reporting and verification protocol. TCR has recently cooperated with the Government of Thailand to support the development of a national GHG protocol (see case study below).

Source: The Climate Registry, 2016

GUIDANCE: EMEP/EEA Air Pollutant Emission Inventory Guidebook

THE EUROPEAN MONITORING AND EVALUATION PROGRAMME (EMEP) AND EUROPEAN ENVIRONMENT AGENCY (EEA) AIR POLLUTANT EMISSION INVENTORY GUIDEBOOK provides concise guidance on how to compile an atmospheric emissions inventory and has been prepared by the Convention's Task Force on Emission Inventories and Projections, with detailed work by the Task Force's expert panels and the EEA. The Guidebook is compatible with, and complementary to, the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and has two key functions:

- to provide procedures to enable users to compile emission inventories that meet quality criteria for Transparency, Consistency, Completeness, Comparability and Accuracy (TCCCA criteria);
- to provide estimation methods and emission factors for inventory compilers at various levels of sophistication.

The Guidebook does not provide guidance on the estimation and reporting of emissions of the direct gases responsible for global warming and climate change. These are included in the separate IPCC Guidelines. If substances are implicated in both climate change and regional pollution then cross-referencing is provided in the most appropriate specific guidance.

Note that air pollutant inventories and GHG inventories are different in a number of important ways; air pollutant inventories, in particular, need to take into account emission abatement, and more of the emission-related information is derived from facility reporting.

All guidebooks can be accessed via the EEA website.

Source: European Monitoring and Evaluation Programme (EMEP) & European Environment Agency - EEA, 2013

GUIDANCE: GHG Data Management - Building Systems for Corporate/Facility-Level Reporting

The World Bank's PARTNERSHIP FOR MARKET READINESS has released GREENHOUSE GAS DATA MANAGEMENT: BUILDING SYSTEMS FOR CORPORATE/FACILITY-LEVEL REPORTING. Drawing on lessons learned from more than 10 jurisdictions – including Chile, China, Germany, Mexico, South Africa, Turkey, and the US – the report provides guidance on how to design, develop, and implement data management systems that support industry GHG reporting programs.

GHG data arise from the measure or estimate of the amount of GHG emissions generated by different activities and sources – such as energy generation, industrial processes and product use, agriculture, forestry and other land use, and waste. The role that GHG data play in ensuring transparency and accountability has become even more important as countries work to implement the Paris Agreement and achieve their post-2020 mitigation targets.

This guide advises countries seeking to develop robust and reliable GHG data management infrastructure to underpin GHG reporting programs—an often resource and time-intensive process.

Readers can find information on:

- *Ensuring the system is responsive to an evolving regulatory environment,* such as additional reporting sectors, changing thresholds, or a transition from voluntary to mandatory reporting.
- *Mitigating the costs of acquisition, development and maintenance*, which are hugely variable and dependent on the scope of functionality and the development approach (in-house vs. outsourced). A number of funding options were identified by the countries interviewed for this report, including annual appropriations, equity injections, or revenues from carbon pricing policies.
- *Assessing data exchange and integration needs to decide if it is desirable to build a GHG data management system that can exchange data with another system*, such as a non-GHG pollutant system, or an energy management or fuel tracking system, which may already contain much of the data needed to produce GHG emissions inventories.

Integrating data collection systems can ensure consistency between different reporting obligations, and can often benefit reporters by reducing duplication and the reporting burden. But jurisdictions often encounter challenges related to reconciling differences between the different reporting obligations in terms of scope, time schedule, or units used to report.

Source: The World Bank Group, 2016

GUIDANCE: Addressing the Avoided Emissions Challenge

The International Council of Chemical Associations (ICCA) and the WBCSD released today their first-ever guidelines for chemical companies worldwide and other interested

stakeholders on how to measure, manage and communicate avoided GHG emissions of value chains where chemical products are used.

ADDRESSING THE AVOIDED EMISSIONS CHALLENGE provides guidelines on how to calculate emission reductions in the value chain, by comparing two solutions with the same user benefit. The difference in emissions between two alternative solutions are the greenhouse gas emissions that the industry can avoid.

Since many chemical products are intermediates, it has been difficult to calculate emission reductions in the complete value chain, including from downstream activities. As part of a value chain, chemical products can assist emission reductions, but are not solely responsible for them. That is why many leading chemical companies called for sector guidelines on calculating emission reductions enabled by chemical products.

In response, the ICCA and the WBCSD Chemical Sector project, called *Reaching Full Potential,* formed a task force in early 2012 to develop practical guidelines to improve consistency in the assessment and reporting of avoided emissions. The task force drew upon existing life cycle assessment (LCA) studies, company presentations, and expertise from participating chemical companies. Its work culminated in the joint guidelines released today.

Minimizing environmental impacts whilst furthering developments in science and technology for people to live longer, healthier and more prosperous lives, is critical to a sustainable future. The chemical industry contributes to almost every modern technology, and has long been developing innovative products that improve sustainability. With that in mind, the industry supports the use of LCA methodologies because these enable the assessment of companies to measure the environmental impact of products and technologies over their complete life cycle, including production, use and end-of-life handling.

Source: World Business Council of Sustainable Development - WBCSD, 2013

TOOLS: CDM Tools

MRV for NAMAs can build on experience from Clean Development Mechanism (CDM) projects.

The CDM allows emission reduction projects in developing countries to earn certified emission reduction (CER) credits, each equivalent to one tonne of CO2. These CERs can be traded and sold, and used by industrialized countries to a meet a part of their emission reduction targets under the Kyoto Protocol.

The mechanism stimulates sustainable development and emission reductions, while giving industrialized countries some flexibility in how they meet their emission reduction limitation targets.

Source: United Nations Framework Convention on Climate Change - UNFCCC, 2016

The tools available on the UNFCCC CDM website are used to calculate, determine, demonstrate, estimate, identify and/or test information relating to a CDM project activity and are usually referenced in an approved methodology or a form. The resources include tools to identify baseline scenarios and emission factors across various sectors.

Guidance on UNFCCC Reporting

This section provides an overview of guidance documents and procedures for reporting to the UNFCCC, including NCs, which can be help countries to track climate change impacts from GHG emissions to adaptation options in line with sustainable development. The following sources on NCs, BURs and the ICA can inform the design and structure of MRV systems and provide input to GHG inventories. These resources are not necessarily tailored to a specific sector or country context, but are general guidelines focusing on developing country Parties to the Convention. The following information is sourced directly from respective websites and includes links to all related resources that provide important lessons learned and useful information for the improvement of MRV systems. Please refer to sources indicated for original formulation and correct citation.

GUIDANCE: The National Communications Support Programme

THE NATIONAL COMMUNICATIONS SUPPORT PROGRAMME (NCSP) is funded by the Global Environment Facility (GEF) and is jointly managed by UNDP and UNEP. The primary objective of the NCSP is to provide technical support to Parties not included in Annex I (NAI) to the UNFCCC for preparing their Second (or Third) National Communications (SNCs or TNCs).

The GEF Secretariat, UNDP, UNEP, UNFCCC Secretariat, the Consultative Group of Experts on National Communications from NAI countries (CGE) and donor countries are represented on NCSP's Advisory Committee. Guided by the principles of country-drivenness, comprehensiveness and cost-effectiveness, the NCSP makes provisions of and delivers an integrated package of support services through the following activities:

- Undertaking technical consultations with NC teams for the development of overall and thematic implementation strategies at the early stage of the NC process;
- Developing and disseminating guidance documents to assist NC teams in planning and implementing SNC projects;
- Developing and managing Knowledge Networks on the key thematic areas of National Communications (NCs) to facilitate learning, exchange of information and sharing of good practices and lessons learned;
- Providing on-site technical backstopping to overcome technical "bottle-necks";
- Maintaining a helpdesk to provide distance technical backstopping by responding to technical queries from NC teams;
- Planning, developing, delivering and evaluating in-depth technical training workshops; Planning, developing, delivering and evaluating workshops on the initiation of the SNC process;
- Organizing technical review of NC drafts.

The design and planning of the NCSP's support activities are responsive to needs for assistance directly from NAI countries, guided by the Advisory Committee and informed by analysis of relevant activities undertaken by partner organizations. The NCSP develops and delivers technical and policy assistance with regional centers of excellence and regional and international experts. The NCSP always encourages NAI NC teams and partner organizations to provide feedbacks and suggestions on how the NCSP could best assist the timely delivery of quality SNCs (TNCs).

Source: National Communications Support Programme - NCSP, 2016

The main components of National Communications include:

- Greenhouse Gas Inventory
- Mitigation Analysis
- Vulnerability & Adaptation Assessment
- Information related to technology transfer and to a Technology Needs Assessment (often also carried out separately from the NC)
- Approaches for mainstreaming climate change into national/development planning
- Education and public awareness raising
- Information on systematic observation, research programs, and constraints and gaps in financing, technology, and capacity development
- Technical Assistance and Financing Needs

To support countries in their reporting process, the NCSP has published a document of LESSONS LEARNED AND EXPERIENCES FROM THE PREPARATION OF NATIONAL COMMUNICATIONS FROM NON-ANNEX I PARTIES TO THE UNFCCC. This document draws on the first hand experiences of individuals involved in the preparation of National Communications. These have been gathered from multiple sources, including the input of many NC coordinators, national experts and partner agencies including UNFCCC, UNEP and others, who have contributed their time and insights through interviews, e-mails and an October 2012 global workshop on experiences relevant to NC processes.

This document is structured according to the main topics identified by countries with regards to lessons learned and best practices, including the following chapters:

- *Managing the National Communication Process*, which explores issues of inter-ministerial coordination, institutional arrangements, and stakeholder participation.
- *Strengthening Capacity through the National Communication Process*, which considers issues of individual and institutional capacity building.
- *Ensuring the Technical Rigor of the National Communication*, which includes data considerations, experiences at the technical level (including those from GHG inventories, mitigation analyses, vulnerability and adaptation assessments, and approaches to mainstreaming climate change into national development planning), as well as aspects of quality assurance.
- *Moving from Communications to Actions*, which investigates how to promote national climate change actions and mobilize financial resources based on the NC process and its outcomes.
- *Conclusions and Recommendations*, based on the previous chapters, which identifies areas in which further work is needed on National Communications.

Source: Olbrisch, 2012

A related publication, the NCSP COUNTRY PAPERS: PREPARATION OF NATIONAL COMMUNICATIONS FROM NON-ANNEX I PARTIES TO THE UNFCCC - A COMPILATION OF LESSONS LEARNED AND EXPERIENCES FROM SELECTED COUNTRIES provides insights into country experience regarding:

- Institutional Arrangements and Stakeholder Engagement
- Greenhous Gas Inventory

- » Vulnerability & Adaptation Assessment
- » Using the National Communications as a Tool to Integrate Climate Change Into National Planning
- » Capacity Building and Other Lessons Learned
- » Data Management

The experiences of countries with a view to mainstreaming climate change and sustainable development targets and strategies can provide useful information how to align efforts to achieve co-benefits in mitigation actions with the UNFCCC MRV processes.

Source: National Communication Support Programme - NCSP, 2012

Find more publications such as the UNFCC USER MANUAL FOR THE GUIDELINES ON NATIONAL COMMUNICATIONS FROM NON-ANNEX I PARTIES and the UNFCCC Resource Guide for Preparing the National Communications from Non-Annex I Parties (MODULE 1: THE PROCESS OF NATIONAL COMMUNICATIONS FROM NON-ANNEX I PARTIES; MODULE 2: VULNERABILITY AND ADAPTATION; MODULE 3: NATIONAL GREENHOUSE GAS INVENTORIES; MODULE 4: MEASURES TO MITIGATE CLIMATE CHANGE) on the NCSP website.

GUIDANCE & TOOLS: CGE Training Materials for the Preparation of National Communications from Non-Annex I Parties

The CGE have compiled a range of training materials designed to facilitate the preparation of NCs by non-Annex I Parties in accordance with the guidelines of the Conventions. The materials, including handbooks, software, tools and presentations also cover the mainstreaming of climate change and development impacts and are available in Spanish and French from the UNFCCC website.

Table 4: CGE Training Materials for the Preparation of NCs

Training Materials on Vulnerability and Adaptation Assessment	Training Materials on National GHG Inventories	Training Materials on Mitigation Assessment
Chapter 1 - Introduction • Handbook Chapter 2 - Planning, including selecting vulnerability and adaptation frameworks • Handbook • Presentation Chapter 3 - Baseline socioeconomic scenarios • Handbook • Presentation	UNFCCC software • NAIIS Web application • Conversion tool Cross-cutting issues • National arrangements • Building sustainable national GHG inventory management systems • IPCC EFDB • Key category analysis • Uncertainty assessment	Training Handbook • Mitigation handbook Module A - Mitigation of climate change • Presentation Module B - Mitigation in Context of National Communications and the UNFCCC • Presentation

Chapter 4 - Climate change scenarios

- Handbook
- Presentation

Chapter 5 - Coastal resources

- Handbook
- Presentation

Chapter 6 - Water resources

- Handbook
- Presentation

Chapter 7 - Agriculture

- Handbook
- Presentation

Chapter 8 - Human health

- Handbook
- Presentation

Chapter 9 - Integration

- Handbook
- Presentation

Chapter 10 - Communication

- Handbook
- Presentation

- Quality assurance/quality control procedures
- Data gaps
- Exercise – Key category analysis

Energy Sector

Fuel combustion

- Presentation
- Handbook
- Test

Fugitive emissions

- Presentation
- Handbook
- Test

Exercise – Energy sector

Industrial Processes Sector

- Presentation
- Handbook
- Exercise
- Test

Agriculture Sector

- Presentation
- General issues
- Inventory simulation
- Exercise
- Test

LULUCF Sector

- Presentation
- Handbook
- ALU software
- Exercise
- Test

Waste Sector

- Presentation
- Handbook

Module C - Mitigation Assessment: Concepts, Structure and Steps

- Presentation

Module D - Mitigation Options, Issues and Barriers by Sector

- Presentation

Module E - Mitigation Analysis: Methods and Tools

- Presentation

Module F - Reporting on Mitigation in National Communications

- Presentation

Module G - Building national arrangements for the mitigation assessment

- Presentation
- Template A: Key Sectoral Emissions Analysis
- Template B: Institutional Arrangements for Mitigation Activities
- Template C: Mitigation Assessment Methods and Data Sources
- Template D: Mitigation Analysis Archiving System
- Template E: National Plan for Further Mitigation Assessment

Exercise

- Screening exercise
- Screening blank
- Screening mitigation options
- LEAP

• Exercise • Test

The CGE has also compiled a list of other key training material and methodological documents.

Source: United Nations Framework Convention on Climate Change - UNFCCC, 2014a

GUIDANCE & TOOLS: CGE Training Materials for the Preparation of Biennial Update Reports from Non-Annex I Parties

Similar to the training materials above, the CGE also provides resources to assist the preparation of BURs, also available in Spanish and other languages from the UNFCCC website.

Table 5: CGE Training Materials for the Preparation of BURs

Institutional Arrangements	Mitigation Actions and their Effects	Technical and Capacity Building Needs and Support Received
• Handbook • Presentation	• Mitigation actions and their effects	• Handbook • Presentation

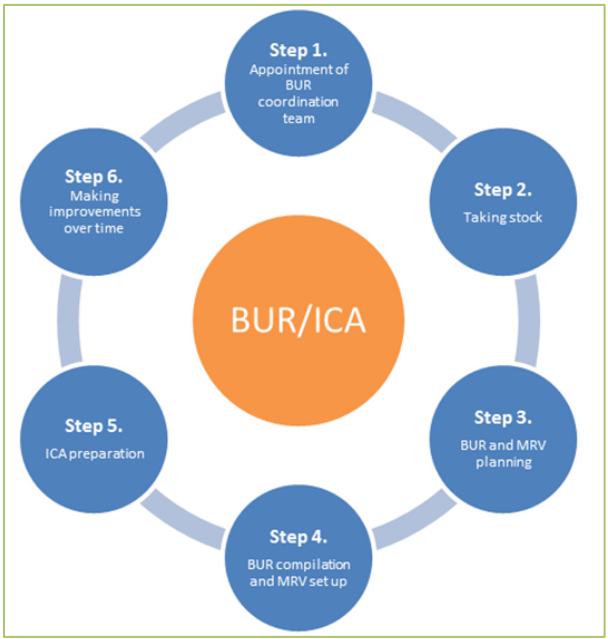
Source: United Nations Framework Convention on Climate Change - UNFCCC, 2014b

TOOL: GIZ BUR Process Guidance Tool for Non-Annex I Parties

This BUR PROCESS GUIDANCE TOOL developed by GIZ in 2016 assists countries in preparing for the process of compiling a BUR and preparing for undergoing the ICA. This tool has been developed based on the experience gained and country-feedback received during the Information Matters Phase 1 project, which aims to strengthen capacities for enhanced climate change reporting. More information on the project can be found on the Information Matters website.

The tool specifically focuses on the process aspects of compiling BURs and undergoing the ICA, aiming to help readers understand what the key steps are, what to consider in implementing these steps and understanding the potential duration of these steps under specific national circumstances, to allow for smoother planning. The tool does not aim to provide detailed guidance on the specific requirements related to BURs and ICA or on the implementation of the key steps. For this

Figure 3: Steps of the BUR process



purpose it provides references directing users to other tools, guidance and publicly available information.

The tool covers the following steps:

Step 1: Getting started: Appointing the BUR coordination team

Step 2: Taking stock: Identify existing MRV structures, processes and capacities

Step 3: Making a Plan: Plan for the BUR compilation and the MRV system set-up

Step 4: Implementation: Compilation of the BUR and set up of the MRV system

Step 5: Get ready to learn from others: Preparing for the ICA

Step 6: Applying lessons learnt: Improvement over time

Source: Wartmann, Watterson, Salas Reyes, & Wilkins, 2016

GUIDANCE: GIZ Preparing for the ICA Process

The GIZ guidance document PREPARING FOR THE ICA PROCESS: REQUIRED EFFORTS AND CAPACITIES NEEDED aims to guide non-Annex I Parties in preparing for the ICA process under the UNFCCC, and what efforts and capacities might be required to this end. The paper draws upon experiences from the Information Matters project. The paper first describes the ICA process in detail, taking into account experience with implementation of the ICA process available so far. It then considers how countries can get ready to participate in the ICA process by identifying necessary preparation steps and related capacity needs.

Source: Salas Reyes, et al., 2015

Case Studies and Country Experience

This section presents additional case studies and good practice analyses that provide experience and lessons learned from the MRV process in various sectors and countries. The following information is sourced directly from respective websites and/or interviews with experts involved and includes links to all related resources that provide important lessons learned and useful information for the improvement of MRV systems. Please refer to sources indicated for original formulation and correct citation.

THAILAND: GHG Inventory Program

In Thailand, TCR worked with the Thailand Greenhouse Gas Management Organization (TGO) and ICF International under the auspices of USAID'S LOW EMISSIONS ASIAN DEVELOPMENT (LEAD) PROGRAM, TCR developed all components of Thailand's revised voluntary GHG reporting program, the Revised Carbon Footprint for Organizations (CFO) program (Version 2). The program will help TGO collect high-quality, standardized

GHG data that in turn will help inform their future climate policies and allow industry to make good decisions about how and where they reduce their GHGs.

Key project components included GHG reporting, verification and accreditation guidance documents that are specific to Thailand's context and industry sectors; a customized GHG reporting platform; a training curriculum and extensive reporter, verifier and administrator resources and tools; and a communications and outreach strategy. TCR also facilitated in-person training sessions with TGO as well as the reporting and verification communities in Thailand.

In Thailand, USAID LEAD provided capacity building to bolster the national voluntary reporting program and support TGO in creating a comprehensive reporting system. The undertaking included a training component for industry and verification bodies and TCR handed the reporting program and platform over to national bodies upon completion. The reporting program covers the Thai industry sector with a focus on the hospitality subsector, it processes GHG impacts including data on electricity use and energy efficiency, but does not account for other resource impacts.

Lessons learned include the insight that the appropriate accounting and reporting platform can mitigate challenges of data collection faced by national entities. In this context, a program such as the one provided by TCR can use pre-calculated emission data, but the built-in calculation engine can also process activity data such as energy bills. This calculation engine needs to be configured to the country context and requires specific information such as emission factors to create possible scenarios. One major challenge remains the cost of customizing and building such a program over several years. The case showed that an important success factor for voluntary agreements and GHG reporting is the promotion of leadership and incentives such as improved reputation.

CHILE: UN LECB Online Tool for GHG Calculation

The LECB Programme was launched in January 2011 as part of a joint collaboration between the European Union and UNDP. This collaborative, country driven programme aims to strengthen technical and institutional capacities at the country level, while at the same time facilitating inclusion and coordination of the public and private sector in national initiatives addressing climate change. It does so by utilizing the global networks and substantial experience that UNDP has established through our wide portfolio of projects and programs around the globe. The LECB Programme is part of the Climate Change and Disaster Risk Reduction cluster of UNDP and gains insight from and builds on global programs and initiatives already developed by UNDP and donor countries.

Chile decided to participate in the Low-Emission Capacity-Building Project to support elements of the National Climate Change Action Plan and of its voluntary contribution to global mitigation: Implementing Chile's National GHG Inventory System, while improving the transparency of initiatives on GHG inventories and mitigation actions from the private sector. Also, through the participation in the project Chile plans to strengthen capacity on MRV (measureable, reportable and verifiable) systems and to support the MRV side of mitigation actions related with energy efficiency and fossil fuels combustion in the country. Ultimately, the objective is to integrate climate change into development planning, to harmonize the positions of different stakeholders with regard to climate change and to contribute to the development of a Low-Emission Development Strategy in Chile.

PLANNED OUTPUTS OF THE PROJECT

The outcomes of the project activities are the following:

Outcome 1: Defining and operationalizing a National Inventory System

- » Output 1 Capacity building in relevant public institutions responsible for the inventory and inventory teams.
- » Output 2 Design methodology for the GHG inventory development in priority sectors.
- » Output 3 Pilot GHG inventory development in priority sectors.
- » Output 4 Validation of the pilot activity's results.
- » Output 5 Dissemination of knowledge generated in the National Inventory System, to improve GHG inventory associated actions.

Outcome 2: Designing and initializing Voluntary Carbon Management Program

- » Output 1: Constructing an emissions calculation tool.
- » Output 2: Initializing the use of the tool through trainings.
- » Output 3: Disseminating the tool and its first results more broadly.

Outcome 3: Conceptualizing MRV system for specific national NAMAs

- » Output 1: Developing a MRV system for national NAMAs and training of those responsible for existing NAMAs on the MRV system.
- » Output 2: Designing and building a national registry platform for NAMAs.

Outcome 4: Formulating Low Emission Development Strategy

- » Output 1: Designing a Low Emission Development Strategy (LEDS) for Chile.
- » Output 2: Using a participatory approach for the dissemination of the LEDS.

Source: Low Emission Capacity Building Programme - LECB, 2016

A new online tool will soon enable private and public sector organizations in Chile to use the same methodology for calculating their greenhouse gas emissions to international standards. The Voluntary Carbon Management Programme tool was developed through the UN LECB Programme and, as it is rolled-out nationwide, the government expects it will gain better emissions oversight, as the nation seeks to meet its international commitment of cutting 20% of its emissions by 2020.

In Chile, with the standardized tool now online for the pilot testing with 43 organizations, and a wider rollout program under development, the country has taken a critical step towards being able to generate important information that will contribute to its international emissions reduction commitment.

Source: Low Emission Capacity Building Programme - LECB, 2014

GLOBAL & CHILE: Global Good Practice Analysis

The GLOBAL GOOD PRACTICE ANALYSIS (GPA) is a joint initiative by the Mitigation Partnership and the UNDP LECB and documents 40 examples of mitigation-related good practices worldwide, which demonstrate how INDCs, LEDS, NAMAs and MRV systems are being effectively designed and implemented across a range of national contexts. The interactive web platform provides an overview of the background and

methodology of the study, as well as on main conclusions and lessons learnt. More detailed information on the individual cases and their success factors can be found in case factsheets available for download. The good practice cases are also available in Spanish. Visit the interactive platform here: https://mitigationpartnership.net/gpa

The GPA includes a number of case studies on MRV in selected countries, highlighting activities, challenges and how they were overcome and lessons learnt for replication. A CASE STUDY ON MRV IN CHILE analyzes the development of the national carbon management program (Programa Nacional de Gestión del Carbono) for the estimation of GHG emissions, monitoring of carbon footprints and identification of mitigation opportunities by public and private sector entities.

An accompanying webinar series aims to share the results of the GPA and highlight the respective case studies as well as to provide a platform for practitioners in the field to ask specific questions to national colleagues and engage in peer-to-peer exchange over the course of 6-7 months. The first webinar held on 27 January 2016 featured the case of Chile. The full webinar presentation and a recording of the webinar are available online.

Source: International Partnership on Mitigation and MRV & UNDP LECB, 2015

GLOBAL: GHG-Inventories for the Waste Sector in Non-Annex I Countries

The GOOD PRACTICE STUDY ON GHG INVENTORIES FOR THE WASTE SECTOR aims to provide comprehensive guidance to policy makers and practitioners in developing countries (NAI Parties) for the preparation of national GHG inventories for the waste sector.

As a first step towards implementing policies and measures to reduce emissions from the waste sector, it is necessary to adequately quantify and understand the main reasons and sources of such emissions. A high-quality GHG inventory provides a solid base to answer these questions.

Since 2014, developing countries are asked to submit GHG inventories every two years as part of their Biennial Update Reports to the UNFCCC, using the methodology provided by the IPCC. Thus, all countries are applying those guidelines and need to collect and determine the same data and parameters in order to report on the required source categories in the waste sector. While national circumstances differ among developing countries, they often face similar problems, with lack of national data and technical capacities being the most common obstacles.

The purpose of the study is to support the estimation of GHG emissions in the waste sector by enhancing the understanding and demonstrating the application of the IPCC Guidelines. In addition, it analyzes examples of good practices identified in several Non-Annex I countries. It is expected that these would assist developing countries to overcome barriers in the understanding of IPCC methodologies and to learn from solutions taken by those countries presented in the study.

The study has been prepared by the Öko-Institut e.V. (Institute of Applied Ecology) and coordinated by the GIZ Information Matters project.

The study is complemented by short factsheets in English, Spanish and French.

Source: International Partnership on Mitigation and MRV, 2016c

MEXICO: Mexican-German Programme for NAMAs (ProNAMA)

In 2011 the governments of Mexico and Germany decided to jointly design the main energy efficiency-driven NAMAs in key, nationally high greenhouse gas emitter sectors: construction/retrofit of residential buildings, small and medium-sized enterprises and road freight transport; in addition to designing the domestic criteria and guidelines for NAMAs.

As a result, the MEXICAN-GERMAN PROGRAMME FOR NAMAS (PRONAMA) was created to support the Mexican counterpart institutions in e.g. setting up MRV systems, and developing capacities necessary for NAMA implementation. ProNAMA is the first multi-sectorial program and quickly became a reference for other related actions - nationally and worldwide. Some of the approaches driven by this initiative, consisted in introducing the NAMAs framework into existing programs, generating robust MRV systems, supporting parallel policies with regard to the NAMAs' targets, orientating results towards innovation, and constant adaptation to the country's priorities.

Source: International Partnership on Mitigation and MRV, 2016d

After the successful establishment of the first national system for MRV of emissions in Veracruz, the Mexican state of Jalisco is now establishing an MRV system with the support of the climate alliance. After the successful completion of a workshop with GIZ, Veracruz was the first Mexican state to build a system for MRV of emissions and for monitoring and evaluation (M&E) of adaptation measures. For one year, a team of the German-Mexican climate alliance supported the Ministry of Environment in Veracruz in the development of an MRV system. The successful final product was presented to the Ministers of Environment of Veracruz in December 2015. The MRV system aims to monitor climate protection measures and make them transparent. It documents not only the individual mitigation and adaptation actions and their results, but also examines which were the most effective. The system tracks the achievement and improvement of existing climate policy targets.

Source: GIZ - Deutsche Gesellschaft fuer Internationale Zusammenarbeit, 2016

Visit the project website for resources on the MRV system in Mexico, including information on protocols for the built environment, transport sector, and for small and medium enterprises (SMEs).

Measuring (Sustainable) Development Impacts

This section presents a by no means exhaustive list of resources such as tools and guidance documents focused on identifying, assessing and integrating development impacts beyond emission reduction in national mitigation measures and strategies. While awareness of the importance of both negative and positive social, economic and environmental impacts for planning, implementation and monitoring of low emission measures is steadily increasing, the assessment of these impacts is generally not integrated into GHG accounting and reporting processes. GHG protocols and accounting tools such as those presented above very rarely enable the measuring of impacts beyond emission reduction or energy savings. While this may change in the future, especially with regard to monitoring the co-benefits of NAMAs, most MRV systems may require a

combination of GHG monitoring and development impact assessment processes. The following section presents a few tools and other helpful resources, however, the approach chosen to identify and integrate (co-)benefit analysis will depend on the country and sector context, as well as information available beforehand (i.e. ex-ante) and the impacts to be assessed. The following information is sourced directly from respective websites and/or interviews with experts involved and includes links to all related resources that provide important lessons learned and useful information for the analysis of development impacts and the improvement of MRV systems. Please refer to sources indicated for original formulation and correct citation.

GUIDANCE & TOOL: UNEP DTU Partnership Framework for Measuring Sustainable Development in NAMAs

The research project 'MEASURING SUSTAINABLE DEVELOPMENT IN NAMAS' was initiated by the NAMA Partnership Working Group on Sustainable Development (WG-SD). The aim of the research project is to improve quantitative and qualitative measurement of the sustainable development outcomes of NAMAs, thereby enhancing understanding of how NAMAs can contribute to meeting national development goals. UDP in collaboration with the International Institute for Sustainable Development (IISD), and supported by the UNFCCC Secretariat and UNDP, have jointly carried out the research.

The Bali Action Plan agreed under the UNFCCC in 2007 agreed that enhanced action on mitigation would include NAMAs by developing country parties in the context of sustainable development. However, the question of how sustainable development impacts are to be integrated into NAMA processes remains open, as do questions regarding which impacts should be assessed and how they should be measured. A substantial body of research and best practices exist regarding how SD considerations have been integrated into the CDM, such as the Executive Board CDM SD TOOL launched in 2014 and the GOLD STANDARD certification of sustainable development benefits in mitigation projects, which can inform NAMA sustainable development assessments. The global and flexible approach to the selection of sustainable development criteria and indicators found in these standards are common to all types of mitigation actions, but they may not be directly suited to NAMAs, since globally defined standards may not be in the interests of the implementing host countries. NAMAs are much broader than the project-based CDM, potentially involving policy and sectoral actions, and may require additional or different sustainable development assessment tools

In this context, the objective of the report is to develop a framework with criteria and indicators for the assessment of the SD impacts of NAMAs, based on a review of the literature on sustainability assessment tools and approaches, and a study of the different stakeholder perspectives among developing country governments, support agencies, the private sector and civil-society organizations.

Source: Olsen, Bizikova, Harris, Boodoo, Gagnon-Lebrun, & Bakhtiari, 2015

Find the Framework and other NAMA publications in the UDP library online.

One of the authors of the report, Ms. Karen Holm Olsen, will facilitate a training on development impact assessment at the LEDS GP LAC regional event in Panama on 28

September 2016. Materials from the training will be made available online on the LEDS GP website shortly thereafter.

TOOL: UNDP NAMA Sustainable Development Evaluation Tool

UNDP has released a new tool that is designed for NAMA developers and policy makers. The tool allows users to evaluate the sustainable development performance indicators and sustainable development results achieved over the lifetime of the NAMA. The tool is linked to the Sustainable Development Goals (SDGs) and shall allow policy makers to track the effects of the NAMA on environmental conservation, economic growth, poverty reduction and public welfare.

The tools is currently being tested in several NAMAs by the Millennium Development Goal (MDG) Carbon program, which aims to harness the resources of the carbon market in order to bring long-term sustainable development, at scale, to wide range of developing countries. First lessons learned will be shared over the next few months.

Source: United Nations Development Programme - UNDP, 2014

To download the tool template, visit the UNDP website. To learn more about the tool and find case studies where the tool has been applied (e.g. in Ghana), visit the MDG Carbon discussion space.

One of the authors of the report, Ms. Alexandra Soezer, will facilitate a training on development impact assessment at the LEDS GP LAC regional event in Panama on 28 September 2016. Materials from the training will be made available online on the LEDS GP website shortly thereafter.

TOOL: CDM Sustainable Development Tool

The meeting of the Parties to the Kyoto Protocol (CMP), at its seventh session, requested the Board to continue its work and develop appropriate voluntary measures to highlight the co-benefits brought about by CDM projects and Programme of Activities (PoA) and report back to the CMP at its eighth session, while maintaining the prerogative of the Parties to define their sustainable development criteria. At the Executive Board meeting in Doha in 2012, the Board approved the voluntary tool for describing sustainable development co-benefits of CDM project activities and PoA (SD Tool).

Source: Taibi, 2014

The sustainable development tool enables CDM project developers to showcase the sustainable development benefits of their projects and programs of activities. The tool contains a short survey about the project's co-benefits, which is used to create a detailed sustainable development co-benefits report that is then published on the UNFCCC's website for public access. The SD Tool Benefits for CDM project developers For most voluntary users of certified emission reductions (CERs), which opt for offsets based on their personal or corporate preferences, information about the sustainable development benefits of the projects they support is essential. By describing the co-benefits of their project activity or program of activities – whether improving indoor air quality, providing electricity to light a room or creating employment – project developers can highlight the

additional value behind the units they offer. The SD Tool gives project developers with an opportunity to provide vital information to potential buyers and other stakeholders.

Source: United Nations Framework Convention on Climate Change - UNFCCC, 2014c

Project participants and coordinating/managing entities may request access to the SD Tool through the CDM tools website. For an alternative to using the online SD Tool, complete the document online. Create and view sustainable development co-benefits description reports online.

Find a UDP publication on REFORMING THE CDM SD TOOL online.

GUIDANCE: CSD Indicators of Sustainable Development

The Commission on Sustainable Development (CSD) has been developing and revising sustainable development indicators since 1994. The publication INDICATORS OF SUSTAINABLE DEVELOPMENT: GUIDELINES AND METHODOLOGIES presents the revised, third edition of the CSD indicators. It also provides a synopsis of their foundation. The presentation of the indicator set explicitly addresses their relation to Agenda 21 and the Johannesburg Plan of Implementation, the outcomes of the major international conferences on sustainable development in 1992 and 2002, as well as their relation to the MDG Indicators. The publication also provides guidance on applying and adapting the CSD indicators for the development of national indicator sets. The role of indicator frameworks is briefly discussed, and a succinct description of all indicators is included. Detailed methodology sheets for each indicator are […] available on the indicators section of the webpage of the UNITED NATIONS DIVISION FOR SUSTAINABLE DEVELOPMENT and will be regularly updated.

Source: United Nations Department of Economic and Social Affairs - UN DESA, 2007

GUIDANCE: MRV of NAMAs - Guidance for Selecting Sustainable Development Indicators

The CCAP paper MRV OF NAMAS: GUIDANCE FOR SELECTING SUSTAINABLE DEVELOPMENT INDICATORS builds from the earlier paper, MRV FOR NAMAS: TRACKING PROGRESS WHILE PROMOTING SUSTAINABLE DEVELOPMENT (see above) where CCAP advocated for a broader approach to MRV for NAMAs that includes metrics for:

1) Actions and Progress,
2) GHGs, and
3) Sustainable Development (economy, health, equity, etc.),

and drawing from experience with MRV in the development community, within the CDM, and the Climate Investment Funds (CIF), this paper describes processes used in the Philippines and under the CIF to spur use and monitoring of sustainable development metrics, and elaborates on specific sustainable development metrics that can be used in five key sectors: Transportation; Renewable Power Generation; Residential, Commercial and Public Building Energy Efficiency; Industrial Energy Efficiency; and Waste Management. These metrics would allow policy makers to track and highlight the effects of NAMAs on catalyzing economic growth, poverty reduction and environmental

conservation. CCAP also showcase two examples—the TransMilenio BRT of Bogotá, Colombia and the North Wind Bangui Bay wind project of Bangui, Philippines –where development metrics were chosen and used to build political and community support for actions achieving GHG emissions reductions.

In determining which metrics to include, CCAP selected indicators that are specific, measurable, cost-effective to harvest, relevant, understandable and meaningful to domestic policy-makers and contributing countries. Using the menu of sustainable development indicators provided in this paper, developing countries can begin to assess which metrics best support their national development priorities, and can be readily collected given existing data, human resources and funding. Since the technical assistance, staff support, and financial resources required to effectively measure and evaluate metrics can be significant, it is important to include these costs when securing financing for NAMA development.

Source: Cerqueira, Davis, & Winkelman, 2012

References

Allwood, J., Dubash, N., Bosetti, V., Gómez-Echeverri, L., & von Stechow, C. (2014). Glossary. In O. R.-M. Edenhofer, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA: Intergovernmental Panel on Climate Change - IPCC.

Cerqueira, J., Davis, S., & Winkelman, S. (2012). *MRV of NAMAs: Guidance for Selecting Sustainable Development Indicators.* Washington DC: Center for Clean Air Pollicy (CCAP).

European Monitoring and Evaluation Programme (EMEP) & European Environment Agency - EEA. (2013). *EMEP/EEA air pollutant emission inventory guidebook 2013 - Technical guidance to prepare national emission inventories. EEA Technical report No.12/2013.* Luxembourg: EMEP/EEA.

GIZ - Deutsche Gesellschaft fuer Internationale Zusammenarbeit. (2014a). *MRV Tool*. Eschborn: GIZ - Gesellschaft fuer Internationale Zusammenarbeit.

GIZ - Deutsche Gesellschaft fuer Internationale Zusammenarbeit. (2014b). *Acciones de Mitigación Nacionalmente Apropiadas (NAMA) Pasos a seguir para llevar una NAMA de la idea a la ejecución*. Eschborn: GIZ.

GIZ - Deutsche Gesellschaft fuer Internationale Zusammenarbeit. (2015). *Third Capacity Building Mission in Chile. Santiago de Chile, April 20 to April 24, 2015. Information Matters, Chile.* Eschborn: GIZ.

GIZ - Deutsche Gesellschaft fuer Internationale Zusammenarbeit. (2016). *Hacia un Sistema de Monitoreo, Reporte y Verificación en Jalisco*. Retrieved August 2016, from Alianza Cambio Climático México-Alemania: http://climate.blue/hacia-un-sistema-mrv-en-jalisco/

ICAT - Initiative for Climate Action Transparency. (2016). *About the Initiative*. Retrieved August 2016, from Initiative for Climate Action Transparency: http://www.climateactiontransparency.org/

Intergovernmental Panel on Climate Change - IPCC. (2006). *Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme.* Japan: Institute for Global Environmental Strategies (IGES).

Intergovernmental Panel on Climate Change - IPCC. (2013). *IPCC Factsheet: What is the IPCC?* Retrieved August 2016, from IPCC Intergovernmental Panel on Climate Change: http://www.ipcc.ch/news_and_events/docs/factsheets/FS_what_ipcc.pdf

Intergovernmental Panel on Climate Change - IPCC. (2014). Summary for Policymakers. In O. R.-M. Edenhofer, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA: IPCC.

Intergovernmental Panel on Climate Change - IPCC. (2016a). *Reports: Assessment Reports: Working Group III: Mitigation*. Retrieved August 2016, from IPCC Intergovernmental Panel on Climate Change: http://www.ipcc.ch/ipccreports/tar/wg3/index.php?idp=33#721

Intergovernmental Panel on Climate Change - IPCC. (2016b). *Task Force on National Greenhouse Gas Inventories*. Retrieved August 2016, from IPCC Intergovernmental Panel on Climate Change: http://www.ipcc-nggip.iges.or.jp/

Intergovernmental Panel on Climate Change - IPCC. (2016c). *Taskforce on National Greenhouse Gas Inventories: IPCC Inventory Software*. Retrieved August 2016, from IPCC Intergovernmental Panel on Climate Change: http://www.ipcc-nggip.iges.or.jp/software/index.html

International Partnership on Mitigation and MRV. (2014a). *Measuring, Reporting and Verification (MRV)*. Retrieved August 2016, from International Partnership on Mitigation and MRV: https://mitigationpartnership.net/measuring-reporting-and-verification-mrv-0

International Partnership on Mitigation and MRV. (2014b). *Low-Emission Development Strategies and Plans (LEDS)*. Retrieved August 2016, from International Partnership on Mitigation and MRV: https://mitigationpartnership.net/low-emission-development-strategies-and-plans-leds-0

International Partnership on Mitigation and MRV. (2016a). *Information Matters: Capacity Building for Ambitious Reporting and Facilitation of International Mutual Learning through Peer-to Peer Exchange*. Retrieved August 2016, from International Partnership on Mitigation and MRV: https://mitigationpartnership.net/information-matters-capacity-building-ambitious-reporting-and-facilitation-international-mutual-lear

International Partnership on Mitigation and MRV. (2016b). *About the Partnership*. Retrieved August 2016, from International Partnership on Mitigation and MRV: https://mitigationpartnership.net/about-partnership

International Partnership on Mitigation and MRV. (2016c). *Resources: GIZ (2015): Good Practice Study on GHG-Inventories for the Waste Sector in Non-Annex I Countries*. Retrieved August 2016, from International Partnership on Mitigation and MRV: https://mitigationpartnership.net/giz-2015-good-practice-study-ghg-inventories-waste-sector-non-annex-i-countries

International Partnership on Mitigation and MRV. (2016d). *Mexican-German Programme for NAMAs (2015) Results and Lessons Learned*. Retrieved August 2016, from International Partnership on Mitigation and MRV: https://mitigationpartnership.net/mexican-german-programme-namas-2015-results-and-lessons-learned

International Partnership on Mitigation and MRV & UNDP LECB. (2015). *Good Practice*. Retrieved August 2016, from International Partnership on Mitigation and MRV: https://mitigationpartnership.net/gpa

Low Emission Capacity Building Programme - LECB. (2014). *Voices from the Field - Chile: New tool gives Chile a streamlined system to measure carbon footprint in public and private sectors.* New York: UNDP.

Low Emission Capacity Building Programme - LECB. (2016). *Chile*. Retrieved August 2016, from LECB: http://lowemissiondevelopment.org/lecbp/countries/chile

National Communication Support Programme - NCSP. (2012). *Country papers: Preparation of National Communications from Non-Annex I Parties to the UNFCCC - A Compilation of Lessons Learned and Experiences from selected countries.* New York: UNDP.

National Communications Support Programme - NCSP. (2016). *About NCSP*. Retrieved August 2016, from National Communications Support Programme: http://ncsp.undp.org/about-ncsp

Olbrisch, S. (2012). *Lessons Learned and Experiences from the Preparation of National Communications - From Non-Annex I Parties to the UNFCCC.* New York: United Nations Development Programme (UNDP).

Olsen, K. H., Bizikova, L., Harris, M., Boodoo, Z., Gagnon-Lebrun, F., & Bakhtiari, F. (2015). *Framework for Measuring Sustainable Development in NAMAs.* Copenhagen: UNEP DTU Partnership / International Institute for Sustainable Development.

Salas Reyes, R., Wartmann, S., Watterson, J., Wilkins, G., Lichte, R., Orschulok, K., et al. (2015). *Preparing for the ICA Process: Required efforts and capacities needed.* Eschborn: GIZ.

Taibi, F.-Z. (2014). *Reporting on SD co-benefits using the new CDFM SD Tool and opportunities for monitoring to enhance the profile of CDM projects and CER price: what the buyers want! Regional Workshop on CDM and NAMAs for Latin America and the Caribbean (31 Aug-2 Sep, 2014)*. Bogotá: UNFCCC.

The Climate Registry. (2016). *The Climate Registry*. Retrieved August 2016, from The Climate Registry: https://www.theclimateregistry.org/

The Greenhouse Gas Protocol. (2012). *GHG Protocol*. Retrieved August 2016, from Standards: http://ghgprotocol.org/standards

The Greenhouse Gas Protocol. (2012). *GHG Protocol*. Retrieved August 2016, from Calculation Tools: http://www.ghgprotocol.org/calculation-tools

The World Bank Group. (2016). *Greenhouse Gas Data Management: Building Systems for Corporate/Facility-Level Reporting*. Retrieved 2016 August, from The World Bank: http://www.worldbank.org/en/topic/environment/publication/greenhouse-gas-data-management-building-systems-for-corporatefacility-level-reporting

United Nations Department of Economic and Social Affairs - UN DESA. (2007). *Indicators of Sustainable Development: Guidelines and Methodologies, Third Edition.* New York: UN DESA.

United Nations Development Programme - UNDP. (2014). *Nationally Appropriate Mitigation Action (NAMA) Sustainable Development Evaluation Tool*. Retrieved September 2016, from United Nations Development Programme: http://www.undp.org/content/undp/en/home/librarypage/environment-energy/mdg-carbon/NAMA-sustainable-development-evaluation-tool.html

United Nations Development Programme (UNDP) National Communications Support Programme - NCSP. (2016). *About NCSP*. Retrieved August 2016, from National Communications Support Programme: http://ncsp.undp.org/about-ncsp

United Nations Framework Convention on Climate Change - UNFCCC. (2014a). *CGE Training Materials for the Preparation of National Communications from non-Annex I Parties*. Retrieved August 2016, from United Nations Framework Convention on Climate Change: http://unfccc.int/national_reports/non-annex_i_natcom/training_material/methodological_documents/items/349.php

United Nations Framework Convention on Climate Change - UNFCCC. (2014b). *CGE Training Materials for the Preparation of Biennial Update Reports from non-Annex I Parties*. Retrieved August 2016, from United Nations Framework Convention on Climate Change: http://unfccc.int/national_reports/non-annex_i_natcom/training_material/methodological_documents/items/7915.php

United Nations Framework Convention on Climate Change - UNFCCC. (2014c). *Clean Development Mechanism Sustainable Development Co-Benefits Reports*. Bonn: UNFCCC.

United Nations Framework Convention on Climate Change - UNFCCC. (2016). *What is the CDM*. Retrieved September 2016, from United Nations Framework Convention on Climate Change: https://cdm.unfccc.int/about/index.html

US Environmental Protection Agency - EPA. (2016). *National GHG Inventory Capacity Building*. Retrieved August 2016, from US Environmental Protection Agency: https://www3.epa.gov/climatechange/EPAactivities/internationalpartnerships/capacity-building.html

Wartmann, S., Watterson, J., Salas Reyes, R., & Wilkins, G. (2016). *BUR Process Guidance Tool - For BUR/ICA process by non-Annex I Parties.* Eschborn: GIZ.

Winkelman, S., Helme, N., Davis, S., Houdashelt, M., Kooshian, C., Movius, D., et al. (2011). *MRV for NAMAs: Tracking Progress while Promoting Sustainable Development, Discussion Draft.* Washington DC: Center for Clean Air Policy.

World Bank Group. (2016). *Greenhouse Gas Data Management - Building Systems for Corporate/Facility-Level Reporting. Technical Note 12.* Washington DC: World Bank Group.

World Business Council of Sustainable Development - WBCSD. (2013). *WBCSD business solutions for a sustainable world*. Retrieved August 2016, from New Guide Helps Chemical Companies Report on Avoided Greenhouse Gas Emissions: http://www.wbcsd.org/Pages/eNews/eNewsDetails.aspx?ID=15911&NoSearchContextKey=true

Access all resources mentioned in this guide here:

http://tinyurl.com/LEDSGPMRVresourceguide

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