Accounting of Nationally Determined Contributions

Guidance for the Establishment of an Accounting for NDCs for absolute or relative mitigation targets with a baseline

Öko-Institut e.V.

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

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Published by
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
Friedrich-Ebert-Allee 36+40
53113 Bonn, Deutschland
T +49 228 44 60-0
F +49 228 44 60-17 66
E info@giz.de
I www.giz.de

Dag-Hammarskjöld-Weg 1 - 5
65760 Eschborn, Deutschland
T +49 61 96 79-0
F +49 61 96 79-11 15

Accounting Rules for the Achievement of the Mitigation Goals of Non-Annex I Countries
Periférico 5000, Piso Anexo,
Col. Insurgentes Cuicuilco, Coyoacán
04530, Mexico City, Mexico
T +52 55 5536 2344
F + 52 55 5536 2344
E giz-mexiko@giz.de
I www.giz.de/mexico

Responsible
Daniel Blank, Project Director
daniel.blank@giz.de

Main Authors
Jakob Graichen (Öko-Institut e.V.), Daniel Blank (GIZ)

Authors
Verena Graichen, Ralph Harthan, Anke Herold (Öko-Institut e.V.)

Layout and Design
Uli Stehlik, Mexikuli Design, Mexico City

This project is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of Germany (BMU) supports this initiative, based on a decision by the German Bundestag.

In cooperation with:
Ministerio de Ambiente y Desarrollo Sostenible (MADS), Colombia
Dirección de Cambio Climático (DCC) del Ministerio de Ambiente y Energía (MINAE), Costa Rica
Instituto Nacional de Ecología y Cambio Climático (INECC), México

Published in July 2018

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ACRONYMS

AFOLU	Agriculture, Forestry, and Other Land Uses
BAU	business-as-usual
SLCP	Short-lived Climate Pollutant
CDM	Clean Development Mechanism
COP	Conference of the Parties
ETF	Enhanced Transparency Framework
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GWP	Global Warming Potential
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
ITMOs	Internationally Transferred Mitigation Outcomes
JI	Joint Implementation
LDC	Least Developed Country
MRV	Measurement, Reporting and Verification
NATINV	National Emissions Inventory of Greenhouse Gases
NDC	Nationally Determined Contributions
OECD	Organisation for Economic Co-operation and Development
PaM	Policies and Measures
SIDS	Small Island Developing States
tCO_2e	Tons of CO_2 equivalents
UNFCCC	United Nations Framework Convention on Climate Change

A. INTRODUCTION

The commitments assumed on issues of climate change mitigation in the context of the Paris Agreement require new procedures for monitoring and reporting progress in achieving them. These mitigation commitments are expressed as mitigation targets within the Nationally Determined Contributions (NDC). The Paris Agreement, through Article 4.13, establishes the requirement for the accounting for the NDC.

An *Ad hoc* Working Group has been entrusted by the Conference of the Parties with preparing recommendations for accounting orientation, as well as drafting modalities, procedures and guidelines for the Enhanced Transparency Framework (ETF) established by the Paris Agreement. The latter should be based on the current MRV system (1/CP.16, Paragraphs 40 to 47 and 60 to 64 and 2/CP.17, Paragraphs 12 to 62) and eventually supersede it, as well as biennial reports or biennial update reports.

Both inputs by the *Ad hoc* Working Group were still pending by mid of 2018. It is important to highlight that those inputs will guide developing and developed countries; the new requirements described above eventually apply to all countries. Yet the ETF will include flexibility for developing country parties that are in the need of such flexibility, especially the Small Island Developing States (SIDS) and the least developed countries (LDCs).

Although we encounter at an early stage of accounting and ETF development, it is not too bold to state that for any country, it is very much appropriate to join efforts in transparency and accounting and anchor both with existing systems and procedures.

This document is developed within the above context, with the idea of starting from existing frameworks and promoting the early development of feasible proposals for NDC accounting. It was drafted in the framework of the **Accounting Rules for Achievement of the Mitigation Objectives of Non-Annex 1 Countries** project, in which Mexico, Colombia and Costa Rica are the focal countries.

This guide provides structure to a possible process for drafting the NDC Accounting applicable to mitigation targets, expressed as the deviation from a GHG emissions trend baseline or base year emissions and, as such, is applicable to a significant part of developing and emerging countries.

A.1 TRANSPARENCY IN THE PARIS AGREEMENT

Article 13 of the Paris Agreement establishes the Enhanced Transparency Framework (ETF) to „foster mutual trust and promote effective implementation" of the Agreement. The ETF comprises two parts:

- Transparency of action, referring to acts for mitigating and adapting to climate change (Article 13.5); and
- Transparency of support, referring to the assistance received and provided (Art. 13.6).

Among other requirements, the ETF requires from each Party the submission of a National Inventory Report (of greenhouse gas emissions) and of necessary information to track progress in the implementation and achievement of the NDC (Art. 13.7), as well as information on the effects of climate change and adaptation (Article 13.8).

The Ad hoc Working Group of the Paris Agreement is developing recommendations for the modalities, procedures and guidelines of the ETF. These should be based on the experiences of the existing MRV framework, according to decisions 1/CP.16 (Paragraphs 40 - 47 and 60 - 64) and 2/CP.17 (for 12 - 62). It is important to note that existing MRV system will be superseded by the ETF modalities, procedures and guidelines, and should promote the following principles (UNFCCC 2016, Paragraphs 92, 95 and 98):

- **Continuous Improvement:** Information and transparency should be improved over time. Thus, the frequency and quality of reports must be maintained or enhanced over time. This improvement will be guided by transparency, accuracy, completeness, coherence and comparability criteria.

- **Flexibility:** Reflecting different countries' capacities, the transparency framework offers flexibility to developing Parties, especially the SIDS and LDC. This flexibility covers scope of the information, frequency of reports, level of detail and technical examination.

- **Environmental Integrity:** The modalities, procedures and guidelines should avoid double counting for both emissions and reductions. They should also be coherent in the methodology communicated in the NDC and the methodology used to report on the progress made.

- **Efficiency:** Avoid duplication and undue burdens for the Parties and for the UNFCCC Secretariat. This applies especially to the duplication or overlapping of reports, as there were no other prior obligations for developing countries.

Apart from specifying the information to be delivered and its format, the ETF defines review processes. A first process is a technical expert review of the National Inventory Report, the information on achievement of the NDC, and the support provided for those developing countries that require it in light of their capacities. It also includes assistance in determining capacity building needs. The second is a facilitative and multilateral examination of the support provided and the application/ implementation and compliance of the NDC, in which all Parties can participate.

[1] Decision 1/CP.21, Adoption of the Paris Agreement. Report of the Conference of the Parties on its twenty-first session, held in Paris from 30 November to 13 December 2015.
Downloaded from: *https://unfccc.int/decisions?search=&f%5B0%5D=session%3A3955*

Figure 1: Reports and Information Review in the ETF

Source: Öko-Institut, based on the Paris Agreement

A.2 ACCOUNTING FOR THE NDC

For purposes of this guide, **accounting is defined as the process, rules and principles applied to track the progress in the achievement of the NDC mitigation targets.** Art. 4 of the Paris Agreement supports this definition, placing accounting in the context of NDC climate change mitigation targets.

For the further discussion, it is important to differentiate accounting from transparency, or rather accounting from the ETF. While the ETF incorporates accounting through Art. 13.7(b), it has a much broader focus, including the National Inventory Report, adaptation, support and review of information. NDC accounting as per the above is only for the mitigation targets of the NDC. For further details, we recommend the paper on *Deciphering MRV, accounting and transparency for the post-Paris era*.

Accounting in the Paris Agreement

In accordance with Art. 4.13 of the Paris Agreement, *„Parties shall account for their nationally determined contributions. In accounting for anthropogenic emissions and removals corresponding to their nationally determined contributions, Parties shall promote environmental integrity, transparency, accuracy, completeness, comparability and consistency, and ensure the avoidance of double counting (...)"* (UNFCCC 2016).

These last criteria represent the accounting principles. The orientation on NDC accounting is specified in Paragraphs 31 and 32 of Decision 1/CP.21. The application of this orientation or any other COP accounting guidance will only be mandatory from the second NDC onward, but Parties may choose to apply them from their first NDC. The orientation, currently under development, should ensure:

- Agreement with common methodologies and measurement systems evaluated by the Intergovernmental Panel on Climate Change (IPCC) for the accountability of anthropogenic emissions and removals;

- Coherence in methodologies and reference bases, between communication and application of the nationally determined contributions;

- Inclusion by the Parties of all categories of anthropogenic emissions or removals in their NDCs, or justification of the exclusions, if applicable. When a source, sink or activity has been accounted for, it must continue to be included.

In its Article 6, the Paris Agreement establishes a mechanism to transfer mitigation outcomes internationally between countries (cooperative approaches). This cooperative approach requires that in NDC Accounting the Parties *"„ensure environmental integrity and transparency, including in governance, and (…) apply robust accounting to ensure, inter alia, the avoidance of double counting, consistent with guidance adopted by the Conference of the Parties"* (Article 6.2). In short, it requires robust accounting to be able to include international transfers of mitigation outcomes.

In relation to international transfers, the COP recommends:

- that the mitigation be real, measurable and permament;

- that the reductions be additional to those that would otherwise occur; and

- that these reductions be verified and certified.

A.3 THE GUIDE

A.3.1 FOUR STEPS TOWARDS A NATIONAL ACCOUNTING SYSTEM

Returning to the above, four general steps are suggested to the **domestic** accounting system and render it transparent:

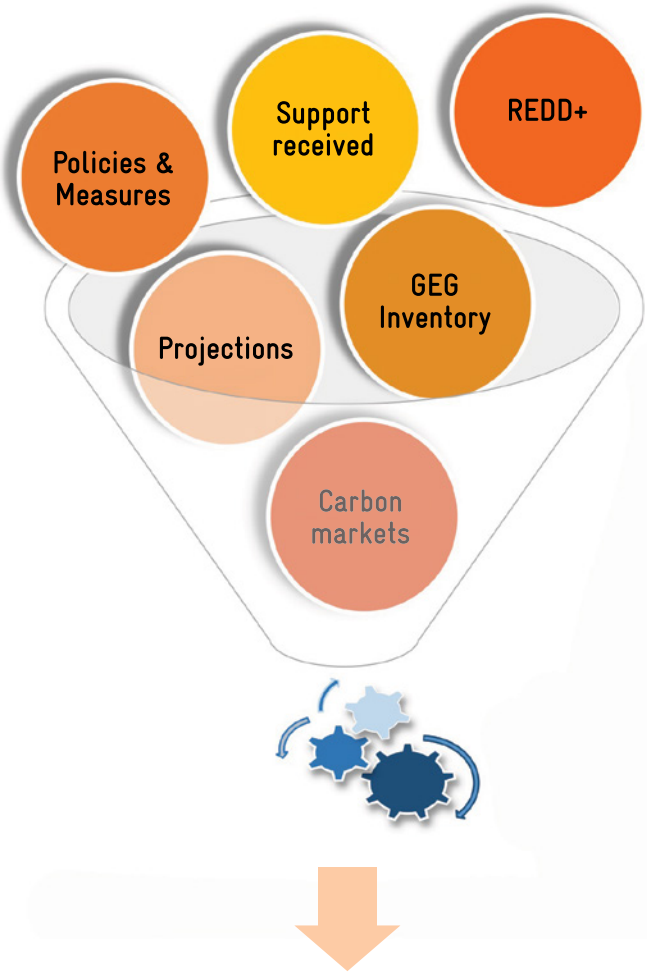
Step 1. **Detailing the Target**: Provides proposals on how to evaluate and increase the target's clarity in order to contribute to a common understanding of its ambition and achievement.

Step 2. **Defining the Calculation**: Three data sources offer to calculate the achievement of the target (or progress towards it, if considered at several points in time). These can theoretically combine in three different ways so to render three calculation methods. The guide presents arguments to facilitate selection among those sources and methods, both in single- and concurrent multiple-target situations.

Step 3. **Structuring the Data**: Based on the target, parameters and their requirements have to be determined. The document offers criteria on the minimum quality and consistency of the data over time. This step also includes the definition of responsibilities and institutional functions, a topic that due to its volume and specificity is typically addressed at the country level in a sheer number of studies.

Step 4. **Calculating Achievement of the Target**: Once the accounting methodology and its institutional part have been established, they can be applied to calculate progress towards the achievement of the NDC target at a certain moment in time.

Figure 2: Aspects Addressed by National NDC Accounting Systems



THE ACCOUNTING SYSTEM

1. Details the target and the NDC
   Addresses: What does my target say?
2. Defines the method to calculate progress
   Addresses: How do I count?
3. Defines data requirements and criteria
   Addresses: What do I need?
4. Defines roles, processes and responsibilities
   Addresses: Who does what?
5. Determines achievement of the target
   Addresses: What progress is there in achievement?

Source: Öko-Institut

A.3.2 HOW TO USE THE GUIDE

The guide delves into steps 1 to 3, proposing a procedure to arrive at a robust accounting. Throughout these steps, it places the accounting system within the domestic system that monitors mitigation efforts, to avoid double efforts and take advantage of synergies between the existing and the new.

Step 4 is merely the application of Steps 1 to 3 to the actual and current data for each country and, therefore, cannot be shown here. However, a tool was developed through the information generated and described that specifically serves this application purpose to actual and current data (see *www.transparency-partnership.net*).

Each step is structured in the same manner:

a. Begin with clarification of the important terms and present the relevant antecedents;

b. Apply the „deviation from a baseline“ target type to the relevant context; and

c. Conclude with a summary in the form of an action table on each aspect of recommended clarification.

A.3.3 RESTRICTIONS

The bases are still under negotiation and drafting: The Special Working Group was only tasked with making recommendations for NDC Accounting guidelines in 2018. By mid-2018, when this Guide was completed, these recommendations had not yet been shared. The Guide's bases are taken from the decisions in COP15 and later, in addition to existing experiences, and give good indications on the timely development of accounting systems.

Application to „deviation from a baseline“ targets: In principle, Steps 1 to 3 are applicable to all types of mitigation targets in the current NDCs, as long as they are quantifiable. This Guide, however, applies only to targets measured as reductions against a baseline, solely because of the popularity this type of target has experienced in developing countries. The baseline is often a business-as-usual (BAU) scenario, where the country in question seeks to reduce its emissions and/or increase its absorptions below or above, respectively, that projected trend line.

Accounting for the AFOLU sector: Accounting for the agricultural, forestry and other land use sectors (AFOLU) is very different from other areas, and is complex. For this reason, the project developed a particular guide on this topic entitled „Accounting of the land-use sector in nationally determined contributions (NDCs) under the Paris Agreement“. It will be available for download from September 2018 onwards at *www.transparency-partnership.net*.

1. STEP 1: SPECIFYING THE TARGET

1.1 ASPECTS TYPICAL OF A 'DEVIATION FROM A BASELINE' TARGET

It is initially advisable to verify there is no ambiguity in the target's formulations, which generally results from insinuating information without explaining it specifically, making it difficult for third parties to deduce. Certain verification issues are proposed to cover this. In addition, „baseline deviation" type targets imply an estimation of future development (economic and emissions, for example); this attempt to approach reality or a *counterfactual* situation involves several assumptions. A transparent baseline requires reporting these assumptions and their corresponding levels of uncertainty. This aspect was also included in this step.

1.1.1 CLARIFICATION 1: ASSIGNMENT OF THE PaM TO THE BASELINE OR MITIGATION SCENARIO

To calculate the baseline, it is necessary to differentiate correctly which policies and measures (PaM) are part of the baseline emissions and which ones will be considered towards achieving the mitigation target, or which part of each policy or measure corresponds to each category. One of the following methods can be applied:

a. **Defining a dividing point**: Define that all PaM adopted to a certain point (for example, the base year, the year when a climate strategy was adopted, or the year of the last change of government) are part of the baseline, while the PaM adopted after this point will be credited to achievement of the target. The definition of the dividing point/ year should be justified (for example, year in which the climate change strategy came into force).

b. **Defining quantitative limits for PaM based on their reductions**: Based on the expected emissions reductions of a policy or measure, determine which part counts towards the baseline and what part counts towards the mitigation target (for example, for a solar panel development policy, it could be determined that the first 100,000 panels count towards the baseline and all additional panels count toward achieving the target). The separation between both should be explained.

c. **According to PaM type of objective**: Differentiate if a policy or measure's main objective is climate change mitigation, and if so must be counted towards achievement of the mitigation target. Include the other PaM in the

baseline. It is advisable to justify the differentiation and specify in detail which ones are part of the mitigation scenario and which are not.

1.1.2 CLARIFICATION 2: COHERENCE BETWEEN NDC AND NATINV PROJECTIONS

Each projection is based on a reference point or base year. For the projection to guarantee the mitigation target's integrity, the reference point or base year emissions must correspond to the (historical) emissions reported in the NATINV (National Emissions Inventory of Greenhouse Gases, Spanish acronym). The projection and NATINV should consider the same sectors and apply the same sectorial definition, and include the same gases and methodologies to quantify emissions or removals.

1.1.3 CLARIFICATION 3: IDENTIFYING THE MAIN BASELINE PARAMETERS

When preparing the baseline, the parameters that most affect its development should be identified. This may be necessary later to update the projection (see below). Updates typically include the evolution of GDP along with population growth and fuel prices.

It should be borne in mind that the same parameters also influence the mitigation scenario. When quantifying accumulated mitigation through a series of PaM (see Chapter 2), the same parameters should be used.

Example: The baseline is calculated on the assumption that between 2010 and 2030 there will be an annual economic growth of 5%. The result of a policy should be determined on the same basis, that is, on an economic growth of 5% per year. If not, part of the differential in the calculated reductions would be due to the parameter, instead of real reductions.

1.1.4 CLARIFICATION 4: BASELINE VALIDITY PERIOD

There are two generic baseline forms for the long term: fixed and dynamic. A fixed baseline does not change over time, whereas a dynamic one adjusts the actual development against that assumed in all (or some) parameters. Each form has specific advantages and disadvantages in its use in the NDC as explained in Table 1.

Table 1: Comparison of Fixed and Dynamic Baselines

BASELINE	PROS	CONS
FIXED	• Allows easy quantification of baseline emissions for future years covered by the baseline. • No resources (human and financial) are required for repeated updating. • Facilitates global balance of reductions because it is more predictable (and quantifiable in tons of CO_2e).	• Generates high uncertainty in long-term projections, may can even exceed the target or impacts of PaM.
DYNAMIC: WITH UPDATES UPON AVAILABILITY OF NEW INFORMATION	• Adapts to real conditions over time. • Allows adjustment of parameters.	• Implies an adequate management and institutionalization of the process. • The possible adjustment of the parameters and the recalculation of the baseline result in greater uncertainty in the overall balance.
DYNAMIC: WITH UPDATES ON CHANGES IN THE MAIN PARAMETERS	• Recalculates the baseline with new values for the main parameters, without changing the projection methodology. • Provides more certainty than the previous option on update conditions and regularity.	• Emissions level cannot be determined from the beginning.

1.2 STEP 1 SUMMARY

In order to comply with the transparency criterion in NDC accounting, the following Step 1 clarifications are recommended:

Table 2: Step 1 Action Plan to promote Accounting Principles

ASPECT	CHECK	POSSIBLE ACTIONS
PaM included and excluded from the target	JUSTIFICATION: In almost all countries, the drafting of the NDC involved policies and mitigation measures already in force. Therefore, there is a risk of diluting the situation's impacts with and without the NDC. CLARIFY: Identify the main policies and measures, and define them for each policy, measure or parts, applying at least one of the following three options: A. Which PaM (current and/or future) are part of the baseline, which of the mitigation scenario? B. What (expected) PaM impacts (current and/or future) are part of the baseline? Which are part of the mitigation scenario? C. What types of PaM objectives will be counted towards the baseline, and which ones toward the mitigation scenario? In addition: • How were those PaM included that started before the base year, but continue to have an impact? How were those included whose implementation period was extended: included/excluded completely or partially? In case of having different mitigation targets, for example, a non-conditioned target and a conditioned one: • Which PaM will count towards the non-conditioned target? Which ones will count towards the conditioned one?	1. Review descriptions of PaM (delimitations, baselines, assumptions, impacts). 2. Review the term for which there is an expected and an actual impact for each PaM. 3. Clearly assign the PaM to the baseline or the mitigation scenario. 4. Document
Coherence between projection and NATINV	JUSTIFICATION: NATINV is usually the best data source to estimate the country's emissions, with a history of several years of applying internationally recognized methodologies. Therefore, congruence between the baseline projection and the NATINV strengthens the baseline. CLARIFY: • Is the emissions level in the projections' base year equal to the corresponding value in the NATINV? • Is there consistency between the baseline and the NATINV in terms of methodologies, activity data and emission factors? If not, investigate and justify.	Analyze consistency and record it in official documentation In cases of major inconsistencies, improve the NATINV and/or the baseline.
Main baseline parameters	JUSTIFICATION: The baseline greatly influences reduced emissions in this type of target. Therefore, it is important to see how it was built and what parameters it depends on. CLARIFY: • What main parameters (GDP, population, etc.) were used to calculate the baseline? • What main parameters were used to calculate the mitigation scenario? • How were these parameters identified? Were they substantiated by sensitivity analysis?	1. Know the economic model used for the projection and its parameters. 2. Know the process used for identifying the parameters. 3. Document the process. 4. Evaluate the cost-benefit of a sensitivity analysis and possibly apply it. 5. Describe the correlation with Step 3 ("Data requirements").
Baseline validity period	JUSTIFICATION: The baseline type selection (fixed or dynamic) has a potentially significant impact on reduced emissions, with each option offering certain advantages and disadvantages. It is important to know and compare these before making the decision. CLARIFY: • Will the baseline remain fixed or will it be updated? • In case of updating it, what are the conditioning factors of the update, if they exist?	1. Know the advantages and disadvantages of updating the baseline. 2. Describe the basis of the decision.

2. STEP 2: DETERMINING THE CALCULATION METHOD

2.1 GENERAL CALCULATION CONSIDERATIONS: PROGRESS EVALUATION

The management of climate change policy benefits from different information types of progress evaluations in climate action. These types, of which there are three in principle in the area of climate change mitigation, are described in Tabla 3.

Table 3: Types of Progress Evaluations in Climate Action Mitigation

TYPES OF EVALUATIONS	ADDRESSES THE QUESTION	RESULT/ PARAMETER	CONCEPT	PARIS AGREEMENT	LEVEL
ACHIEVEMENT OF (NDC) MITIGATION TARGET	How much progress did the country make in achieving its target?	Degree of achievement and reduced tCO_2e	NDC Accounting	Art. 4	NDC
MITIGATION OF PaM (UNDER THE NDC)	How did the country reduce its emissions?	Accumulated GHG mitigation of PaM	Action MRV (pre-Paris)	Art. 13*	PaM
EVALUATION OF PaM (UNDER THE NDC)	How efficient and effective was the country in achieving its target (and aspects)?	Efficiency and effectiveness on certain sustainability criteria	Evaluation (of PaM)	Does not apply	Not defined

*It remains to be specified to what extent the MPG of the ETF will require information about the actions implemented.

In order to describe good practices, we compare the three types of progress evaluations to each other. The degree of application for each type varies significantly between countries, and the three types are not always applied by countries. Sometimes, only the first two are found (and are reported). These will be mandatory in the future, implemented by the Paris Agreement under restrictions expressed regarding PaM and related to Art. 13. In simple terms, both are aimed at quantifying the reductions achieved (in tCO_2e), with the second typically accompanied by methodological and data challenges while offering interpretative advantages on the performance of implemented activities, and leaving out unintended effects or those not covered by specific policies and/or measures. The third type, the evaluation of PaM, is not required by the Paris Agreement. In contrast with and in addition to the first two types, it attempts to understand why a policy or measure did or did not also include criteria in addition to the GHG impact in the analysis (e.g., the socio-economic and ecological impact: number of jobs generated, avoided road congestion, respiratory diseases

avoided). The evaluation of policies and measures is more powerful depending on the quality of the results and (on allowing) deduction of their appropriate consequences.

Therefore, both from the national and future international perspectives determined by the Paris Agreement, there is an overlap between the first two types. For their potential role in the compliance of requirements of the Paris Agreement, also in terms of one type contributing to the other, both will be discussed in parallel in this section. Viewing them together, serves to exploit synergies from early on, observing the national needs and existing structures (of the existing framework pre 2020).

2.2 ACCOUNTING FOR TARGETS OF THE TYPE 'BASELINE DEVIATION'

To explain the different calculations available to determine baseline deviation, it is first important to understand what the NDC is. The NDC is made up of the country's contributions to the international fight against climate change (and possibly to adaptation to climate change, which the Guide does not deal with in depth for the reasons mentioned above). These contributions have typically been expressed as one or several mitigation targets. To achieve said target or targets, mitigation measures and/or policies are implemented to generate a reduction of emissions or an increase in the removals in the country, in contrast to the development of emissions and removals in an inactivity scenario.

In summary, the NDC is comprised of mitigation targets whose achievement is sought through the implementation of mitigation policies and measures. However, it is important to bear in mind that the development of emissions will not depend exclusively on the mitigation actions implemented, but also on factors not controlled by such policies and measures, such as population growth or changes in habits (outside of a specific policy), or unintended side effects of PaM, among many other examples.

2.2.1 *UNDERSTAND* THE THREE CALCULATION METHODS

General Notice: Different formulas are presented and discussed below to determine *Progress (t)*, where t is a moment in time (for example, a year). Among the „deviation from a baseline" type targets, there are some that were expressed in the first NDCs in absolute and relative figures, or sometimes in a combination of both types. Applying the formulas as described, these yield the *Advance (t)* in a relative metric (percentage). To calculate the advance in absolute figures (tCO2e), you need only ignore the division (remove the divisor).

In theory, the difference between the baseline and the NATINV is the impact of the PaM applied. In this sense, the two types of evaluations of progress presented in the previous section should provide the same result when calculating achievement of the NDC mitigation target against the baseline. Two of these three data categories (NATINV, PaM, baseline) are sufficient to calculate progress towards the target. By combining the three categories freely, three theoretical options offer. However, generally only one is recommended for NDC accounting, another used for under special circumstances, and the third is not recommended under any circumstances. We will detail them below.

Formula 1 - Inventory Reduction against BAU

$$\text{Advance}(t) = \frac{\text{BAU}(t) - \text{Inventory}_{\text{GEI}}(t)}{\text{BAU}(t)}$$

Where:

BAU(t)	Emissions (and absorptions) from baseline in tCO_2e at time *t*,
$\text{Inventory}_{\text{GEI}}(t)$	Emissions (and absorptions) from NATINV in tCO_2e at time *t*

The Paris Agreement requires accounting for anthropogenic emissions and removals corresponding to the NDC, in accordance with common methodologies and measurement systems evaluated by the IPCC and approved by the CMP (1/CP.21, Paragraph 31). The methodologies evaluated by the IPCC are those used for the NATINV estimation. In addition to the inventory data, this formula uses the NDC baseline and is therefore consistent with formulating this type of target. Therefore, and for reasons of robustness that will be discussed later, **Formula 1** is recommended for accounting purposes.

Formula 2 - GHG Impact of PaM against Inventory

$$\text{Advance}(t) = \frac{\text{Impacts}_{\text{PaM}}(t)}{\text{Inventory}_{\text{GEI}}(t) + \text{Impacts}_{\text{PaM}}(t)}$$

Where:

$\text{Impact}_{\text{PaM}}(t)$	Aggregated GHG impact of PaM on tCO_2e at time *t*

Instead of the baseline (added from the NDC), this formula uses the impacts of the policies and measures. As explained above, it is possible to recreate a baseline by adding the (mitigation) effects of the PaM to the NATINV. This option highlights the actions taken by the country. It requires, logically, quantification of these net effects of the PaM. This quantification, however, also starts from the establishment of a baseline, although that is typically at the level of each policy or measure. To apply **Formula 2**, an advanced and structured MRV system for PaM is required, at least for the most significant PaM in terms of mitigation.

Formula 3 - Impact GHG of PaM against BAU

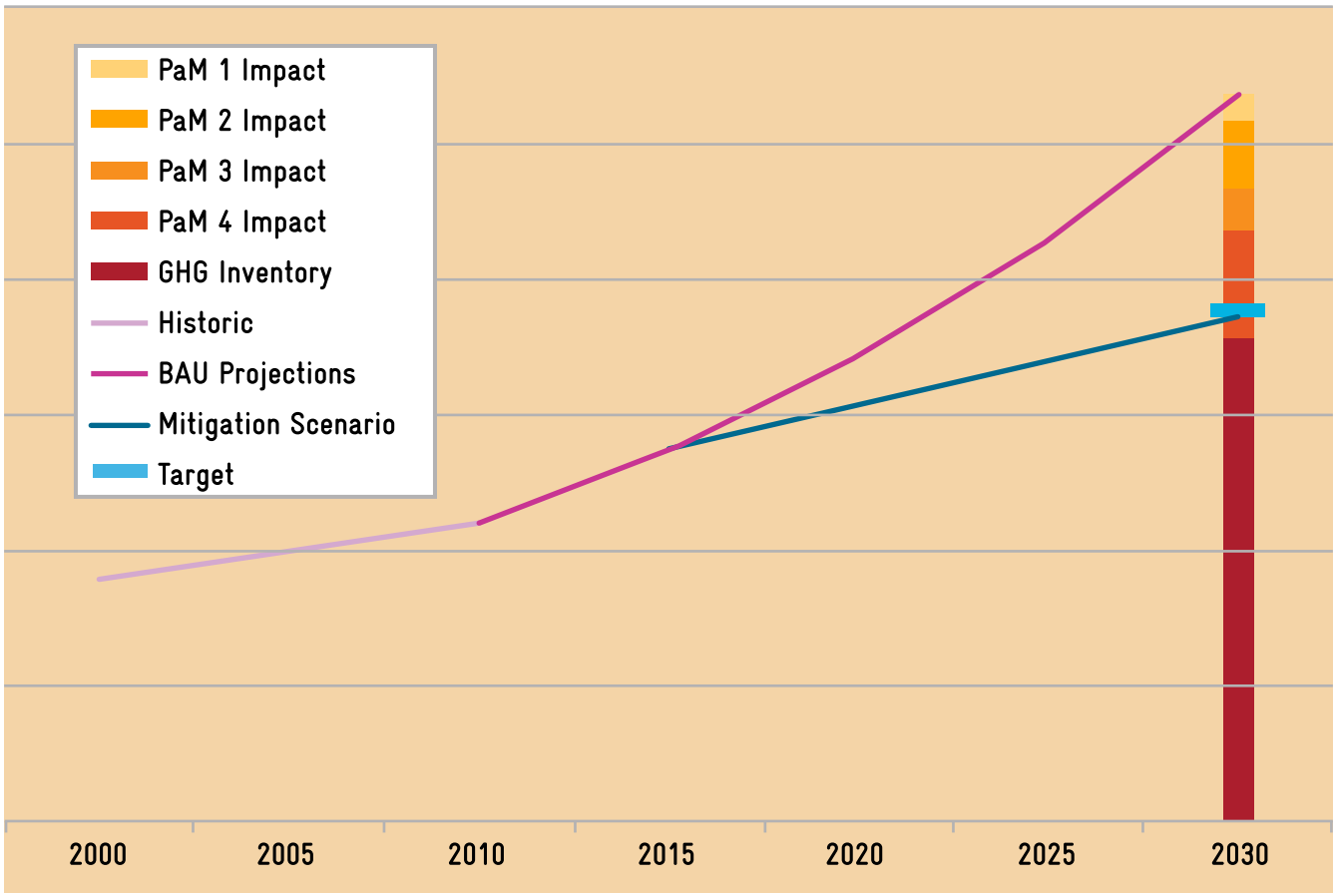
$$\text{Advance}(t) = \frac{\text{Impacts}_{\text{PaM}}(t)}{\text{BAU}(t)}$$

This formula - although theoretically possible - is not recommended due to the low quality of the input data, which are rooted in the assumptions involved in the baseline, and the overlap problem of quantifying the PaM effects (see the *Policy and Action Standard* of the World Resources Institute).

2.2.2 COMPARING THE THREE DATA SOURCES OF THE THREE CALCULATION METHODS

Before discussing the arguments in favor of a certain combination of the three data sources, a graphic illustration of their relationship helps to better understand their formulas and variables.

Figure 3: List of the Three „Baseline Deviation" Mitigation Data



Fuente: Öko-Institut

Theoretically, the three formulas generate the same result - that is, the *Advance (t)* is identical. However, in reality they will result in different *Advance (t)* figures due to errors and uncertainties in the data. The magnitude of their difference can vary from non-significant to a very high level. To better understand the roots of the differences between the three formulas, the following general considerations about the determinants used in the formulas are useful:

- Datum 1. **GHG Inventory**: Generally, the inventory has a much higher certainty level than the emissions projections (baselines). This is because the NATINV is based on historical values and, therefore, does not require assumptions about the development of certain parameters towards the future. Compared to the quantification of the mitigation effects of PaM, it includes, by default, the interaction between the sectors and all factors that impact emissions development, and does not consider only those factors controlled by a policy or measure.

The methodologies used in the inventory are IPCC based, the result of the global scientific exchange, and have two decades of experience in their application with continuous improvement. The IPCC guidelines and methodologies include measures to reduce the level of uncertainty, improve the quality of data, and apply quality control and assurance processes.

- Datum 2. **Impacts of PaM on GHG emissions**: Generally, the complexity of estimating PaM impacts increases with the amount of PaM considered. Typically, each action needs to develop its own methodology, due to their unique nature. Many times, existing methodologies can be used but have to be adapted to national circumstances, and there is no centralized or generally accepted control and verification body for this, such as the IPCC. While the GHG inventory is based on national (or regional, subject to cross-control against the national level) statistics, it is often necessary to collect own data for each action monitored along the entire chain of primary, secondary, and so on, effects. This circumstance affects the cost of these data sources.

There are guides such as the World Resources Institute's (WRI) *Policy and Action Standard* that make methodological proposals to minimize the negative impacts described above. The drafting of this standard received contributions from many countries in the world. However, it does not make methodology proposals, neither national nor regional nor sectoral. It only structures the process, noting the general problems of double accounting and overlaps between PaM. That is, there are no universal methodologies to quantify the aggregate PaM impacts (in a country), but the compilation of individual project methods be accessed only at the level of typical actions, for example the Clean Development Mechanism (CDL).

The PaM impact is the difference between emissions with the PaM and the baseline emissions (in the counterfactual situation), to which the additional emissions due to the implementation and operation of the PaM have to be added (adapted from Equation 3.1, *Policy and Action Standard*):

$$TNR = TNE - NBE$$

Where:
TNR: Total net reduction of emissions (tCO_2e)
TNE: Total net emissions of the scenario with PaM (tCO_2e)
NBE: Total net emissions from the base scenario without the PaM (tCO_2e)

The equation requires calculating the net sums as an aggregation of the emissions and removals, and the total as an aggregation of all the sources and sinks attributable to the PaM within the activity delimitations. It can be seen that the PaM impact is determined in comparison with the absence of this PaM, that is, a counterfactual situation or a baseline. It is practically impossible to verify these baseline assumptions against reality and, typically, this also results in a difference between the ex-ante and ex-post calculation (see Figure 3.2, P*olicy and Action Standard, Greenhouse*

Gas Protocol, World Resources Institute). Instead of a NDC-wide baseline, we work with a multitude of baselines or counterfactual situations, typically specified for each policy or measure. Comparing the NDC's target baseline with the multiple PaM baselines is a big challenge, even in cases where the NDC baseline is made up of sectoral projections, because the resolutions still do not correspond.

Finally, there are PaMs that only generate an impact in interaction with other PaMs. In this case, it is difficult to attribute the effects to one or the other policy or measure. In addition, within a set of interacting PaMs you can find PaMs without a direct impact when considered in isolation (for example, awareness campaigns).

Example of double counting/overlapping: A policy to promote renewable energy reduces the CO2 emissions attributed to electricity generation (in the country). At the same time another policy promotes energy efficiency in the industry. An individual calculation of the impact of the two policies overestimates the total reduction because both cover the same initial source (the generation of electricity in the network where the industry connects).

- **Datum 3. Projections/Baseline:** BAU projections, by definition, describe an unreal (counter-factual) world based on assumptions that will always involve certain uncertainties, in both ex-ante and ex-post projections. There could be the will to generate an ex post projection to verify the quality of the model used for the original (ex ante) projection. However, they will not always overlap completely. Some typical inputs to a GHG emissions projection are GDP development, population growth, energy efficiency, introduction of eco-technologies and fuel prices. The development of many of these input data over time is quite uncertain. For example, GDP projections by the OECD (Organization for Economic Cooperation and Development) and the IMF (International Monetary Fund) show a typical error of 1.6 percentage points in two-year terms. According to the IMF, economic recessions are particularly difficult to predict. Considering that most of the projections in the context of current NDCs have a horizon of 15 to 20 years, it is easy to visualize the high level of uncertainty involved. Other key parameters, such as the development of clean technologies, are even more difficult to foresee.

Estimating the magnitude of the difference between the three formulas is very difficult for specific cases; this depends on many factors and real examples are missing. **Table 4** shows an example, with invented figures, which shows the differences among the *Advance (t)* results according to the calculation method.

[2] Paulo Júlio, Pedro Esperança (2012): Evaluating the forecast quality of GDP components: An application to G7 (GEE_PAPERS No. 47). Available at http://econpapers.repec.org/scripts/redir.pf?u=http%3A%2F%2Fwww.gee.min-economia.pt%2FRePEc%2FWorkingPapers%2FGEE_PAPERS_47.pdf;h=repec:mde:wpaper:0047, last accessed on 27 Apr 2016.

[3] IMF (2014): IMF Forecasts: Process, Quality, and Country Perspectives: IEO Evaluation Report. Independent Evaluation Office Reports: Independent Evaluation Office reports. Washington, D.C: International Monetary Fund.

Table 4: Calculation Method Example with Different Results for Advance (t)

INPUT DATA	
BAU	806 Mt
Target	742 Mt
NATINV	726 Mt
Impact PaM	61 Mt

RESULT	VALUE	FORMULA
Formula 1	9.9%	(BAU – NATINV) / BAU
Formula 2	7.7%	PaM / (Inventory + PaM)
Formula 3	7.5%	PaM / BAU
Target	8.0%	

2.2.3 *DETERMINE THE APPROPRIATE CALCULATION METHOD (AND OTHER ASPECTS)*

Although there are no real examples for comparing the three data soruces, the following guidance can facilitate selection of the appropriate formula:

1. **Review the general purposes well:**
Use Table 3 for guidance.

2. **Review the accounting arguments:** Use Table 5 for guidance. We suggest applying the formula that provides more robustness to ensure environmental integrity, or considering the strengths and weaknesses of each formula according to comparison of the three data sources. Typically, this will be Formula 1, which is aligned with the Paris Agreement and its emphasis on the importance of GHG inventories (see Decision 1/CP.15, Paragraph 31 and Article 13.7). Only in those cases where a country has a high quality *ImpactsPaM* monitoring system and if the impact of the uncertainties involved in the baseline is to be reduced, can Formula 2 be a good alternative. Still, it holds a major challenge in aligning the NDC target baseline with the baselines involved in calculating each *ImpactsPaM*. Formula 3 combines the two sources that present the highest levels of uncertainty and, therefore, is not recommended.

3. **Observe the general level and the accounting level:** Both levels, the general that seeks to meet the objectives set forth in the comparison of the types of progress evaluation in climate change mitigation and NDC accounting, are supplementary. There are approaches to maximize these mutual benefits such as, for example, the one described on *www.transparency-partnership.net* under the term *inventoriability* (we recommend to search the site for this term. There will be a specific publication on the website by the end of 2018).

Table 5: Calculation Method: Recommended Use of each Formula in Accounting

FORMULA	RECOMMENDED USE	ARGUMENTS
(BAU - INVENTORY) / BAU	"Default" formula for all countries with "deviation from baseline" target type	• Methodologies evaluated by the IPCC • Decades of experience • Consistency with the NDC
PaM / (INVENTORY + PaM)	Possibly applicable in countries where the uncertainty of the actions' impacts is less than the uncertainty of the baseline	• Possibly inconsistent with the NDC: Verify, especially consistency between the NDC baseline (aggregate) and the PaM baselines • Observe the level of costs
PaM / BAU	Not recommended	• Combination of parameters with the highest levels of uncertainty • High requirements for the MRV system • High cost and increased complexity with the amount of PaM

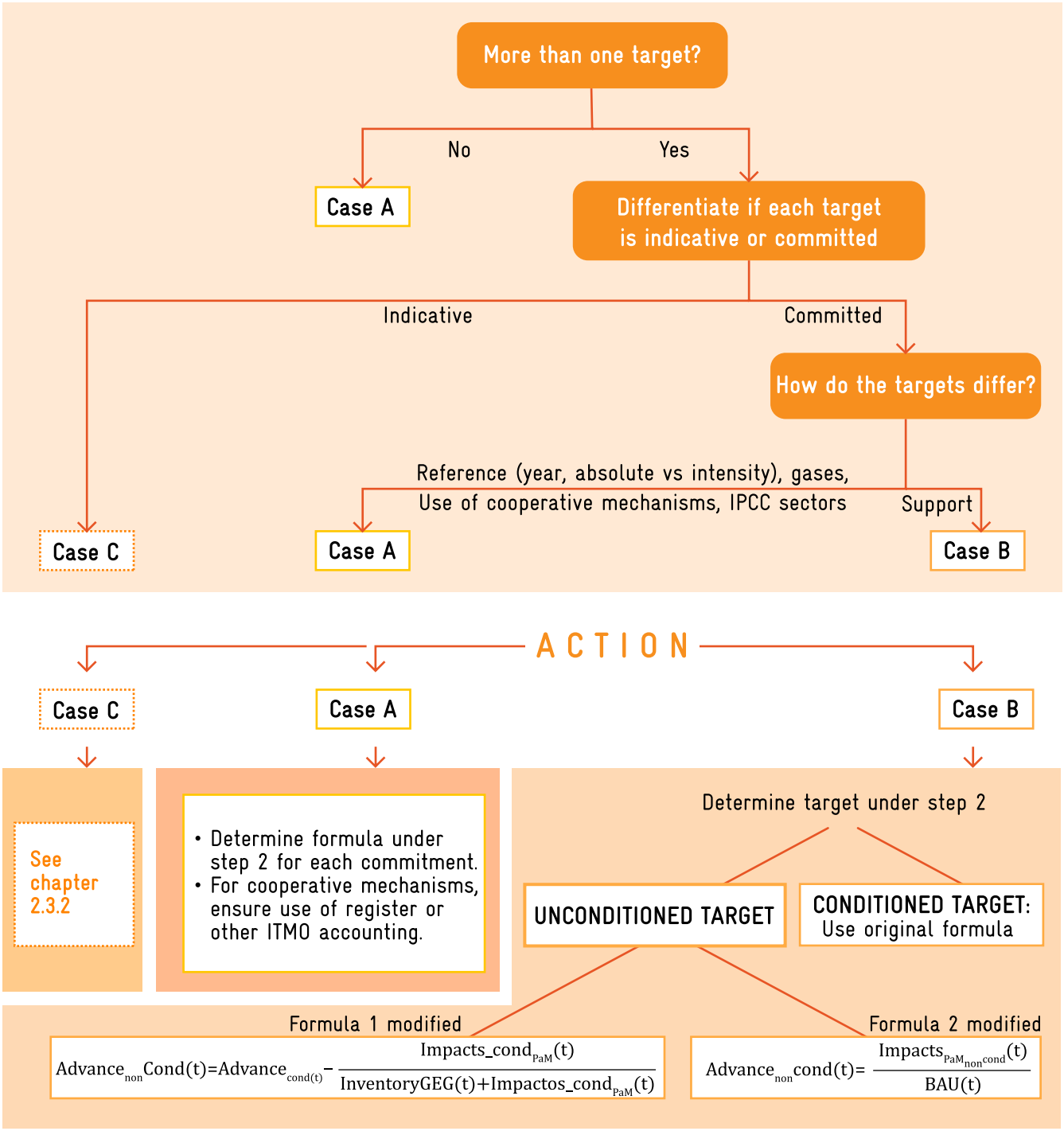
2.3 ACCOUNTING FOR MULTIPLE TARGETS

The current NDCs often specify several mitigation targets. Colombia's NDC, for example, defines a reduction of 20% of projected emissions for the year 2030 but, subject to international support, the target increases to a reduction of 30%, i.e. there is an unconditional and a conditional target (that depends on certain provisions that need to be fulfilled externally). Mexico's NDC, for example, specifies, in addition to the 22% GHG reduction target of projected emissions, a reduction in emissions of Short-lived Climate Pollutants, specifically black carbon, i.e. the targets differ in terms of the climate pollutants covered. There are also targets that express to the same intention, declaring it once in absolute figures and again in relative figures.

2.3.1 NDC TARGETS

Summarizing the aforementioned, the diversity of NDC also expresses by a wide range of countries that submitted more than a single mitigation target with the NDC. In terms of NDC accounting this implies a number of different accounting cases that are summarized in a decision tree. For each case or each branch of the decision tree a specific action is suggested. The decision tree is illustrated in Figure 4.

Figure 4: Calculation Method for Multiple Targets



For those targets, where the ramifications of the decision tree end with 'Case C', the reader is referred directly to chapter 2.3.2. In all other cases, to support the decision taking, to improve the understanding of the implications and characteristics of each type of additional targets, and to improve the target accounting, the following is suggested:

- **Indicative target vs. target with international commitment nature:**

Example: The country is committed to reducing its emissions by 24% by 2030. This corresponds to a 30%reduction in carbon intensity in the productive sector.

Each additional target can serve to increase understanding of the country's commitment and ambition. In this sense, it is favorable to specify several targets.

In accounting issues, however, there is merit in evaluating which of the targets governs the other or which is only proactive. It could be argued that an indicative target does not require any proprietary accounting.

- **Disaggregated targets vs. combined target:**

Example: The country is committed to reducing its emissions by 24% by 2030. It reduces its GHG emissions by 22% and its CCVC emissions by 50%.

The NDC does not exclude non-GHG gases; this was different for the Kyoto Protocol. Mexico, for example, in addition to reducing GHG, committed to reducing black carbon as a Short-lived Climate Pollutant (SLCP). The latter are more of a local impact with local co-benefits.

In accounting terms, the question arises whether only the combined target is a commitment, or if the disaggregated ones are also. The combined target has the advantage of being able to balance one with another and, therefore, offers more flexibility in terms of implementation. Specifying disaggregated targets, in turn, gives more transparency, especially in the black carbon example, which at the date of this Guide does not yet have an IPCC-established Global Warming Potential (GWP).

- **Conditioned Target:**

Example: The country is committed to reducing its emissions by 24% by 2030. Subject to the provision of international support, the reduction could be increased to 35%.

Most countries established conditional targets in isolation or in conjunction with an unconditional target. The conditions, in most cases, have not been specified/quantified.

In accounting matters, it would be important to know how the efforts and, above all, their effects, are assigned to one or the other target, in whole or in part.

[4] Graichen, Jakob; Cames, Martin & Schneider, Lambert (2016): Categorization of INDCs in the light of Article 6 of the Paris Agreement.

2.3.2 INDICATIVE TARGETS AND SUB-TARGETS OUTSIDE THE NDC'S SCOPE

In case the additional targets are of purely indicative nature, then the same applies as for purely domestic or sub-NDC targets (for example, for implementation purposes a country might define sectoral or regional sub-targets so to share responsibilities among numerous entities). Neither of those two target types is understood as commitment towards the Convention. So in short, NDC accounting (in accordance with Article 6 of the Paris Agreement) is not necessary, here. Actually, tracking progress of such sub-NDC targets represents a fourth type of progress evaluation in Climate change mitigation, additional to the three types exposed in Table 3. The completed version of the table renders Table 6.

Table 6: Types of Progress Evaluations in Climate Action Mitigation (2)

TYPES OF EVALUATIONS	ADDRESSES THE QUESTION	RESULT/ PARAMETER	CONCEPT	PARIS AGREEMENT	LEVEL
ACHIEVEMENT OF (NDC) MITIGATION TARGET	How much progress did the country make in achieving its target?	Degree of achievement and reduced tCO_2e	NDC Accounting	Art. 4	NDC
MITIGATION OF PaM (UNDER THE NDC)	How did the country reduce its emissions?	Accumulated GHG mitigation of PaM	Action MRV (pre-Paris)	Art. 13*	PaM
EVALUATION OF PaM (UNDER THE NDC)	How efficient and effective was the country in achieving its target (and aspects)?	Efficiency and effectiveness on certain sustainability criteria	Evaluation (of PaM)	Does not apply	Not defined
ACHIEVEMENT OF NDC SUB-TARGETS	What was the contribution of the sectors / regions to NDC achievement?	Degree of achievement and reduced tCO_2e by sector / region	Sectorial / regional "accounting"	Does not apply	Sector / region

*It remains to be specified to what extent the MPG of the ETF will require information about the actions implemented.

Tracking the achievement of sub-NDC targets or purely indicative targets, although it is not within the scope of the Article 4 accounting, is at best integrated in the application of step 1 and especially step 2. While it is clear that all relevant decisions involved in those steps need to be taken for the circumstances of the NDC targets, it is generally helpful to also integrate sub-NDC targets into the application of the guide. The central question that arises is: **How can sub-NDC target decisions be aligned with decisions on the NDC targets?**

This means that those data sources that have been selected in step 2 above would also be applied to the sub-NDC targets. For example, when the decision was to apply formula 1 to an economy-wide NDC mitigation target with a baseline deviation, the NDC sub-targets could be deduced from the national GHG inventory, which conforms the most important data source of this formula and to seek coherence of the sub-targets' baselines with the baseline of the NDC target. This said, it becomes obvious that such an approach is only feasible if the NDC sub-targets are defined following the definition of the NDC target. Else, the application of the aforementioned INVENTORIABILITY GUIDE could help improve the coherence between both resolutions.

2.4 SUPPLEMENT: ACCOUNTING FOR AN ABSOLUTE TARGET

Many countries have an absolute target, either expressed in CO_2e emissions or relative to the emissions level in a historical year. The main difference with the „deviation from the baseline" type target is that assumptions about emissions developments or their impacts are not needed in the absence of mitigation actions. Therefore, one can directly compare the level of emissions according to the NATINV with the target, taking into account the use of cooperative actions under Article 6 of the Paris Agreement (see Chapter 4).

2.5 STEP 2 SUMMARY

For compliance with the transparency in NDC accounting criteria, the following clarifications should be made in Step 2:

Table 7: Step 2 Action Plan to promote Accounting Principles

ASPECT	CHECK	POSSIBLE ACTIONS
Calculation method: Know the theoretical options	JUSTIFICATION: There are different formulas that will practically always yield different results. This is not desirable, in the sense of robust accounting. The formula used must be determined in advance. CLARIFY: Separate the calculation methods from the types of progress evaluations according to the different purposes.	A. Know the three types of progress evaluations and their purposes; and B. Know the three theoretical formulas and the arguments for their application in the accounting context.
Calculation Method: Availability of the formulas' data	JUSTIFICATION: The calculation method decision depends very much on the availability of information. CLARIFY: Describe the availability and quality of input data required for the three calculation formulas (include aspects such as double-counting/overlaps between GHG impacts of PaM and sensitivity of the baseline).	Find out the national circumstances at the level of the arguments presented about each formula (quality of the MRV system of the PaM, uncertainties of the baseline, etc.); and determine the formula.
GHG Impacts of PaM (under the NDC)	JUSTIFICATION: Although they will probably not apply to NDC accounting, there are arguments in favor of early evaluation of installing a tracking system for the main PaM and, if so, to recognize opportunities for integration with the accounting system. CLARIFY: • Can the GHG impact of the PaM (main) be quantifiably compared to the NDC baseline (which is probably at another resolution/level)? • Is the quality of aggregate GHG impacts of PaM well known (i.e., the magnitude of overlaps)? • Can the PaM contribution be quantified in reductions expected within the framework of the NDC, and does it represent close to the totality? • What is the (additional) cost of this type of tracking?	1. Try to quantify parameters exposed in the questions described to strengthen the decision on selection of the calculation method. 2. Apply the backup formula to make the country's action more transparent, even if it is separate from accounting. Interpret the difference between both results by responding to: a. Is the difference explained by PaM that were not included? b. Are there (systematic) errors in the quantification of the PaM Impacts? c. Are there significant GHG effects not served by any PaM? d. How good is the NDC baseline quality? 3. With the objective of minimizing over time (medium-term action) the divergences between methods for the calculation, apply the inventoriability guide.
Presence of several targets (under the NDC)	JUSTIFICATION: With the presence of multiple targets in the NDC, another accounting calculation method may be necessary. CLARIFY: Apply the decision tree and the exposed solutions according to different cases.	1. In the sense of making conditions clear to potential donors or other support mechanisms (technology transfer), specify the relationship between the support received and the increase in ambition (of the conditioned target). 2. Apply decision tree.
Presence of sub-targets outside the NDC's focus (but related to the NDC's implementation)	JUSTIFICATION: The accounting of sub-targets that are outside the NDC's scope, and as such without the character of an International commitment, is not referred to as "accounting" in the sense of this guide that understands accounting as the accounting defined in Article 6 of the Paris Agreement. CLARIFY: Evaluate in how far the sub-targets outside the NDC's scope can (still) be defined in coherence with the NDC targets taking into account the relevant decisions of steps 1 and 2 of the guide. This type of targets if frequently applied to ease implementation of the NDC targets by breaking it down into easier manageable sub-targets.	Apply the actions described in section 2.3.2.

3. STEP 3: DATA REQUIREMENTS

3.1 GENERAL ASPECTS RELATED TO DATA

The principles of transparency, accuracy, completeness, consistency and comparability are mandatory for the accountability of anthropogenic emissions and removals corresponding to the NDC, i.e. accounting (compare Article 4.13, Paris Agreement). The following specifications can support your understanding:

- **Transparency:** It is expected that progress reports present information in a transparent and complete manner. The methodologies, the assumptions (especially those for the baseline), and the data are documented so they allow the calculations to be reproduced. Structural change in the information is reported.

- **Accuracy:** Countries should reduce uncertainties in their calculations by applying a control and quality assurance that improves over time; this applies to both GHG emission estimates and projections.

- **Completeness:** Both the GHG inventory and the projections must have the same level of disaggregation and (at least) the same coverage of gases and sectors as the NDC target.

- **Coherence:** Methodologies and data used in the inventory, projections and PaM should be coherent with each other over time. Procedures and conditions for recalculation due to methodological changes should be described and justified; please see also the project's guide *"Accounting of the land-use sector in nationality determined contributions (NDCs) under the Paris Agreement"*.

- **Comparability:** The methodologies and presentation of data and results must be comparable between countries. The authors recommend that countries rely on biennial update reports (BURs), while defining the new international reporting and evaluation process under the UNFCCC.

For further details we recommend the *Starting Points for GHG Accounting*.

3.2 INSTITUTIONALIZATION AND TRANSPARENCY

Due to the richness in literature on the institutionalization of MRV and transparency at the national level, the guide renounces to dedicate to this often country specific topic. This is not meant to take emphasize from this essential aspect and hint on the importance of defining clear tasks, roles and responsibilities of both institutions and personnel in those institutions with clear deadline and minimum quality criteria. In terms of transparency all kind of decisions linked to the before endeavor of institutionalization should be well documented as well as those linked to steps 1 and 2.

3.3 STEP 3 SUMMARY

Table 8: Step 3 Action Plan to promote Accounting Principles

ASPECT	CLARIFY	POSSIBLE ACTIONS
Input Data	**JUSTIFICATION:** Continuous improvement should be sought, which also applies to the quality of the data used. Therefore, it is necessary to first describe the data quality. **CLARIFY:** Version of IPCC Guidelines, standards used for the quantification of PaM Impacts, global warming factors, data sources, periodicity, data quality. **DESCRIBE** if the scope (geographic, sectoral, measures, gases) is identical between the inventory, the projections and the NDC.	• **Consult BUR/CN.** • **Describe data used in the previous steps (source, unit, periodicity, quality, use).**
Institutions	**Definir y documentar estructura institucional (arreglos para entrega de datos, roles y responsabilidades).**	**Consult BUR/ CN.**

4. COOPERATIVE APPROACHES

4.1 GENERAL ASPECTS OF COOPERATIVE APPROACHES

The reduction units sold can bring additional investment to the country's national resources and contribute to its sustainable development, as can the co-benefits of the mitigation actions. However, the sale of reduction units abroad requires greater reduction in the country to achieve the national target, since units that leave the country do not count towards reaching the target. Each unit sold abroad, since it does not count towards achievement of the NDC, diminishes the national mitigation options available for said achievement.

Projects carried out under a market mechanism tend to first make reductions at lower cost (low hanging fruits). It may turn out that only measures with higher costs are left to be carried out with national funds/measures to achieve the national contribution target. Also for this reason, and in line with the fact that the mechanism contributes to the reduction of acceptance (Article 6.4 c), a part of the reductions that contribute to the advancement of the national target can be defined. These reductions cannot be sold abroad to increase the mitigation potential in the country where only resources are lacking. Additionally, this mechanism should contribute to the overall reduction of emissions, which may mean that a part of the reductions would be canceled.

It is necessary to define what types of targets can be used for the country's NDC target, and what types of targets can be sold abroad. The Paris Agreement presents the *Internationally Transferred Mitigation Outcomes (ITMOs)*, but the details are still unknown. However, there are still many transferable emission reduction units in the carbon markets that were introduced by the Kyoto Protocol under the term Kyoto Mechanisms (Clean Development Mechanism (CDM), Joint Implementation (JI) and international emissions trading). There are several publications on the subject and the current status of the discussions. For more details consult, for example, the document *Decoding Article 6 of the Paris Agreement* published in April 2018.

4.2 CONTABILIDAD DE LOS ENFOQUES COOPERATIVOS

The installation of a *domestic carbon bond market* can offer new compensation options and reduce the national costs of achieving the NDC target. In the case of a national market under the NDC's roof, its function is that of one implementation instrument among several, but with no impact on the NDC's accounting. However, if the market allows the entry and/or exit of units and/or cover sectors not included in the NDC, it will have significant impacts on accounting. In this scenario, such a market affects either the quantity of the emissions or the NDC target.

The Paris Agreement mentions some key points in accounting issues for cooperative approaches. One of them is *"ensure environmental integrity and transparency, including in governance, and shall apply robust accounting to ensure, inter alia, the avoidance of double counting"* (Article 6.2). Other key points are **(1)** to have real, measurable and long-term mitigation, **(2)** that the reductions are additional to those that would otherwise occur, and **(3)** the existence of verification and certification mechanisms. To avoid double counting and implement the COP/CMP recommendations, it is necessary to define the processes and institutions responsible for guiding and controlling the market (for example, through a registry).

In terms of accounting, units sold abroad must be deducted from the achievement of the NDC target. Units purchased from abroad can be added to the achievement of the NDC target. Therefore, the units transferred (sold and purchased) must be included in the formulas in **Step 2**.

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Agencia de la GIZ en México
Torre Hemicor, PH
Av. Insurgentes Sur No. 826
Col. Del Valle
03100 CDMX, México
T +52 55 55 36 23 44
E giz-mexiko@giz.de
I www.giz.de/mexico
www.youtube.com/user/gizmexico