Developing INDCs: a guidance note

Bakkegaard, Riyong Kim; Bee, Skylar; Naswa, Prakriti; Ngara, Todd; Olhoff, Anne; Sharma, Sudhir; Desgain, Denis DR

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DEVELOPING INDCS

A GUIDANCE NOTE

Photo credit: Philip Roeland, (Flood in Bangkok street, traffic)

ADAPTATION

MITIGATION

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DEVELOPING INDCS

A GUIDANCE NOTE

Co-Authors for Section 1 on Developing INDCs for Adaptation:

Riyong Kim Bakkegaard, UNEP DTU Partnership

Skylar Bee, UNEP DTU Partnership

Prakriti Naswa, UNEP DTU Partnership

Todd Ngara, UNEP DTU Partnership

Anne Olhoff, UNEP DTU Partnership

Co-Authors for Section 2 on Developing INDCs for Mitigation:

Sudhir Sharma, UNEP DTU Partnership

Denis Desgain, UNEP DTU Partnership

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INTRODUCTION

At COP-19, as the Parties discussed the milestones and timetables for preparation of the 2015 agreement applicable to all Parties, it was agreed that such global efforts would first be addressed by means of the domestic preparations of parties' 'intended nationally determined contributions' (INDCs).

COP-19 invited all Parties 'to initiate or intensify domestic preparations for their intended nationally determined contributions, without prejudice to the legal nature of the contributions, in the context of adopting a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties towards achieving the objective of the Convention as set out in its Article 2 and to communicate them well in advance of the twenty-first session of the Conference of the Parties (by the first quarter of 2015 by those Parties ready to do so)'.

Breaking with the past, the new agreement will cover all Parties. INDCs do not explicitly differentiate among country groups. Parties at COP-20 agreed 'to reaching an ambitious agreement in 2015 that reflects the principle of common but differentiated responsibilities and respective capabilities, in light of different national circumstances'.

There is no precedent for the phrase 'intended nationally determined contributions' in the global climate regime. The term 'contribution' is mentioned in the Convention Article 4.2(a):

> **'The developed country Parties and other Parties included in Annex I commit themselves specifically as provided for in the following:**
>
> **(a) Each of these Parties shall adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs.'**
>
> **These policies and measures will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions consistent with the objective of the Convention, recognizing that the return by the end of the present decade to earlier levels of anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol would contribute to such modification, and taking into account the differences in these Parties' starting points and approaches, economic structures and resource bases, the need to maintain strong and sustainable economic growth, available technologies and other individual circumstances, as well as the need for equitable and appropriate contributions by each of these Parties to the global effort regarding that objective. These Parties may implement such policies and measures jointly with other Parties and may assist other Parties in contributing to the achievement of the objective of the Convention and, in particular, that of this subparagraph;'**

As mentioned in the decision, the INDCs of countries entail the specific contribution that each Party will propose towards achieving the objective of the Convention, taking into account Parties' national circumstances, capabilities and the observance of the principle of CBDR&RC (Common But Differentiated Responsibilities and Respective Capabilities). Thus the contribution of each country will be determined nationally in accordance with national circumstances and taking CBDR&RC into account.

The nature of the contribution, i.e., whether it will be voluntary or internationally legally binding, is still to be determined by the Parties through negotiations (Decision 1/CP.19, Further Advancing the Durban Platform).

The objective of this note is to explain the elements of the Lima Decision and its implications for developing INDCs. Further, the note explains different ways in which countries could express the mitigation and adaptation components of their INDC. Developing countries, given their development needs and low capability, would need means of implementation (MoI) for adaptation and to take ambitious mitigation actions. Developing countries would include MoI needs in the context of mitigation and adaptation. The note explains briefly how countries can identify their unconditional contributions.

THE LIMA DECISION

The Lima decision outlines some of the important elements that would guide the development of INDCs. These elements are listed below:

1. **(i) Each Party's INDC will represent a 'progression beyond the current undertaking' of that Party.**
1. **(ii) Least-developed countries and small-island developing states may communicate information on strategies, plans and actions for low greenhouse gas emissions development reflecting their special circumstances.**
1. **(iii) Parties could communicate their 'undertakings in adaptation planning' or include an 'adaptation component' in their INDC.**
1. **(iv) Information in Parties' INDCs should facilitate 'the clarity, transparency and understanding' of the INDC.**

Further, the Lima decision also outlined information that could, as it is not binding, be included in the INDC document. This information is aimed at providing direction to Parties and ensures an aggregate assessment of adequacy in relation to the 2/1.5°C long-term temperature goal. These are:

- quantifiable information on the reference point (including, as appropriate, a base year)
- time frames and/or periods for implementation
- scope and coverage
- planning processes
- assumptions and methodological approaches, including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals
- how the Party considers that its INDCs are fair and ambitious, in light of its national circumstances, and
- how it contributes to achieving the objective of the Convention as set out in its Article 2.

As already noted in Decision 1/CP.19 in Warsaw, the INDCs will have to be communicated to the UNFCCC in a clear, transparent and understandable way. The INDC's submissions will be made available electronically by being communicated and showcased in an 'INDC portal' in the UNFCCC website. In Lima, the Secretariat was tasked with preparing a synthesis report by 1st November 2015 on the aggregate effect of the INDCs communicated by the Parties until 1st October 2015. Thus, if the Parties want their INDCs to be reflected in this synthesis document, they should be communicated to the Secretariat on or before 30th of September 2015.

SECTION I. DEVELOPING INDCS ON ADAPTATION

Riyong Kim Bakkegaard, Skylar Bee, Prakriti Naswa, Todd Ngara and Anne Olhoff

PART I. GETTING STARTED

1. BACKGROUND

1.1 KEY CONCEPTS

The Lima Call for Climate Action 'invites all Parties to consider communicating their undertakings in adaptation planning or consider including an adaptation component in their intended nationally determined contributions' (1/CP.20, para 12).

The inclusion of adaptation is optional, and countries may have different rationales for including an adaptation component in their INDC (see Section 2). It is also flexible, being left open to countries either to include adaptation in their INDC or to communicate their undertakings in adaptation. Furthermore, the reporting format is also flexible. Finally, adaptation components of INDCs are surrounded by a number of 'unknowns'. More specifically, it is not yet clear:

- What the function of adaptation INDCs will be within the UNFCCC
- Whether adaptation INDCs will undergo review
- Whether adaptation INDCs will inform Adaptation Committee and/or UNFCCC decisions
- What the role of adaptation INDCs will be vis–á-vis funding bodies, including the Green Climate Fund (GCF)?

The optionality, flexibility and unresolved issues imply that it is left open to countries to interpret the function of their adaptation INDC in accordance with national priorities, as well as their preferences regarding how adaptation should be addressed in the Global Agreement.

1.2 OUTLINE

The purpose of this guidance note is to outline key considerations in structuring the adaptation component of an INDC; provide an overview of the types of information countries can build on when preparing an INDC; and illustrate how adaptation is being addressed by countries through examples both in relation to INDCs and at the national planning level.

Some countries have elected to structure their adaptation components in line with the informational elements proposed in the Lima Call for Action. Building on this, the 2015 Report, 'Designing and Preparing Intended Nationally Determined Contributions', undertaken jointly by WRI and UNDP, breaks these elements down into six categories for adaptation planners and practitioners (Levin et al., 2015). Similar categories are highlighted in the INDC guidance note prepared by the Climate and Development Knowledge Network (CDKN) and Ricardo-AEA (CDKN and Ricardo-AEA, 2015). The structure suggested by UDP further develops the WRI/UNDP structure, but puts more emphasis on what could be included in each category by providing case studies and examples and showing how these could be developed into an outline for an INDC adaptation component.

Photo credit: AmazonCARES


Photo credit: Ctrilogy

Table 1. INDC adaptation template

CATEGORY	PURPOSE
Rationale and process for developing INDCs on adaptation	Clarify and specify why adaptation is included in the INDC.
Summary of climate change trends, impacts and vulnerabilities	A brief summary of key current and projected climate risks, impacts, and vulnerabilities.
Reporting on long-term and near-term adaptation visions, goals and targets	Communicate ambitions for the future, highlight national undertakings and report on the need for, for example, capacity development, finance and technology support in order to reach the goals and targets.
Reporting on current and planned adaptation undertakings and support	Report on planned adaptation activities and document pre-existing support, and review recent provisions for adaptation, in terms of amount, type and source of support.
Gaps and barriers	Identify gaps and barriers, prioritise these barriers or gaps, and use them to identify needs.
Summary of needs	Define what' needs' encompass, consider needs across sectors, and targets to meet these needs.
Monitoring and reporting progress	Give an overview of M&E for identifying adaptation activities, as well as describing the indicators that can be used for adaptation.

2. RATIONALE AND PROCESS FOR DEVELOPING INDCS ON ADAPTATION

2.1 FORMULATING THE RATIONALE

A key first step in developing an INDC on adaptation is for the country to clarify and specify why it wants to include adaptation. The rationale provides an overall framework for the content and development of the INDC on adaptation. As mentioned in the introduction to this guidance note, the flexibility surrounding adaptation INDCs implies that countries can use them to highlight national priorities as well as adaptation priorities. Box 1, below, summarises some of the possible rationales for developing an INDC on adaptation.

Box 1. Examples of rationales for developing INDCs on adaptation expressed by countries

- Move from planning to action by outlining goals, objectives, targets, activities, and a timeline, which may be based on, for example, the NAP process or other relevant national climate change processes and strategies
- Raise the profile of adaptation planning, action and needs at the national and international level and articulate a long-term vision of nationally appropriate climate-resilient development
- Gain international recognition for existing national actions and investments on adaptation
- Specify needs for support, such as information, capacity, technology and financial needs for completion and implementation of the national adaptation plan and/or activities
- Contribute to a platform for sharing lessons learned and for addressing shared challenges

Source: based on Levin et al. 2015

2.2 DECIDING ON THE PROCESS

The design of the process for developing an INDC on adaptation is country-specific and will vary according to national circumstances, institutional structures and adaptation priorities, including key climate change vulnerabilities, risks, impacts and needs. As illustrated in the next section, countries have different entry points for developing their INDCs on adaptation (for example, in terms of the status of the National Adaptation Plan (NAP) process and other adaptation planning, strategy and action processes), and these should be taken into account in the design of the process for INDC development.

The design of the process should also take into account the available resources, including, but not limited to, time, funding, expertise and human resources, and existing information on climate change and adaptation at the national and sub-national levels.

Further information on how to organise the process of developing an INDC is provided in Levin et al. (Chapter 2, 2015).

3. ENTRY POINTS FOR INDC DEVELOPMENT

Developing the adaptation INDC can build on existing relevant data and analysis, such as national objectives and priorities, resource mobilisation strategies, or, if available, National Communications, National Adaptation Programmes of Action (NAPAs) or National Adaptation Plans (NAP), as well as Poverty Reduction Strategy Papers (see also Table 2). This will aid efficiency and avoid resource intensive data-collection efforts and analysis, and it can assist the Parties in identifying the sectors and climate-resilience strategies that could be prioritized by the INDC (Levin et al., 2015).

What elements a country chooses to include or emphasise in the adaptation component of its INDC will vary. OECD countries, for example, might be more likely to use the adaptation component of their INDC to underline their support for climate reslience internationally and summarise their commitments. Alternatively, LDCs may be more interested in highlighting national adaptation actions and outlining potential climate risks and the resources necessary to increase or build adaptive capacity. Depending on the country context, not all elements need be included.

Not all countries will have the same starting or entry point when it comes to preparing an INDC on adaptation, as this will depend upon the degree of adaptation planning already underway in the country. The existence of a NAP process, or a similar process for climate resilience, could greatly influence how countries approach their adaptation components and the rationales behind them (Levin et al., 2015). However, NAP development can be at very different stages.

Table 2 illustrates how countries can use different entry points for adaptation planning to support INDC development.

Table 2. Entry points and examples of adaptation INDC development

NAP OR SIMILAR PROCESS	NATIONAL CLIMATE CHANGE OR ADAPTATION STRATEGY	LIMITED OR NON-EXISTENT ADAPTATION STRATEGY
Countries with an NAP or similar process can draw much of their information for their INDC from this, including: • Summary of existing analysis and on-going activities • Consultation of and priorities of key stakeholders • Key targets and timeframe • Communication of future planning processes It is important to note that an INDC is a communications process, whereas a NAP is a planning process. This is a key difference to take into account when using a NAP process to inform an INDC.	Those countries that lack a NAP but have a national climate change or adaptation strategy or similar can consider using these resources to communicate information such as: • Existing goals and objectives • Intended plans and processes • Prevailing data collection and current analyses • Given the time and resources, new analytical efforts The inclusion of these options is sure to vary given the availability of resources, such as time, funding, and existing knowledge on climate resilience.	Countries with a limited, low-quality, outdated or non-existent adaptation strategy still have options for developing their INDCs. This can lay the groundwork for developing a future strategy or NAP by: • Outlining potential planning processes • Developing a timeline • Summarising any available climate vulnerability data • Undertaking a review of existing adaptation strategies Given the limited timeframe and resources faced by many countries, a basic approach that does not require extensive new data and analysis can still result in a meaningful INDC.
POTENTIAL RESOURCES		
• National Communications to UNFCCC • National and subnational assessments • Adaptation project reports or evaluations • National planning documents • National policies, regulations and procedural guidelines	• National databases or studies (e.g. Climate Public Expenditure and Institutional Reviews) • National assessment and/or stakeholder consultation processes	• Reports by national, multinational and civil-society organisations • Academic research • National, sub-national or local assessment studies • International databases (i.e. CRED)
CHILE	**SOUTH AFRICA**	**GABON**
APPROACH		
• Commit to a planned adaptation approach[1] • Existing policy, strategy, and implementation processes • Office of Climate Change, along with the Environmental Education Division of the Ministry of Environment, undertook a public consultation process along with educational workshops and presentations for relevant ministries. Resources: • National Adaptation Plan (NAP) • Sectoral Plan for Biodiversity • Sectoral Plan for Agroforestry	• Existing policy, strategy, and implementation processes • Mapping of governance arrangements for adaptation • Goals for mainstreaming adaptation in development policy • Assessment of needs and costs of priority adaptation sectors • Quantified adaptation investments for the past five years. Resources: • National Climate Change Response White Paper • Long Term Adaptation Scenarios (LTAS) Project • National Environmental Management Act (NEMA)	• Existing policy, strategy and implementation processes • Establish a legal framework and monitoring tools, as well as training and information for Coastal Adaptation • Include territories in the exclusive economic zone in national adaptation actions Resources • National Adaptation Strategy for Coastal Zone Management • National Communications • Africa Adaptation Programme
GOALS/TARGETS		
• Nine sectoral adaptation plans for priority sectors • Sources of finance for these plans • Concrete actions to increase the resilience of the country • Methodologies and indicators for vulnerability, adaptive capacity and resilience • Identification of four key stages on adaptation efforts	• Develop guidance framework for meeting adaptation obligations • For key identified sectors, produce incremental adaptation costs and needs for 2020-2030	• Establish a development plan for coastal urban areas, including conservation projects, waste management and M&E • Develop conservation projects for mangroves for coastal protection, species protection • Establish specific facilities for coastal waste management, monitoring of nesting marine turtles and create a coastal observatory for the marine environment. • Establish National Fund for Sustainable Development, with a focus on the state budget, private investment, donor contributions or loans.

Adapted from: Department of Climate Change, 2015; Levin et al., 2015; National Committee on Climate Change, 2015; République Gabonaise, 2015.

[1] Adaptation that is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state.

PART II. DEVELOPING CONTENT

The following sections provide guidance on the components of the adaptation INDC template (shown in Table 1), along with illustrative examples.

4. SUMMARY OF CLIMATE CHANGE TRENDS, IMPACTS AND VULNERABILITIES

As illustrated above, the development of INDCs on adaptation can draw on existing processes, strategies and sources of information (see Table 2 for examples). Countries may choose to include a brief summary of key current and projected climate risks, impacts and vulnerabilities based on available studies, National Communications to the UNFCCC or other sources. A focused summary provides a relevant context for the information in the subsequent adaptation INDC sections.

5. REPORTING ON LONG-TERM AND NEAR-TERM ADAPTATION VISION, GOALS AND TARGETS

Including a long-term vision and short- to medium- and long-term adaptation goals and targets is a means to communicate ambitions for the future, to highlight national undertakings and to report on the need for, for example, capacity development, finance and technology support, in order to reach these goals and targets (see also Box 2). As part of this process, countries may want to consider how their national INDC goals are linked to global goals (Box 3).

Box 2. Including an adaptation component

"An adaptation component can include an outline and justification of the national vision for reducing the identified threats and impacts, including a description of the nationally determined needs, options, and priorities for increasing the resilience of vulnerable communities, regions, or sectors. Given the nature of adaptation action, the timeframe for long-term goals in this case may differ from the timeframe for long-term goals for mitigation. … In cases where countries have not yet established evidence-based goals, a clear vision statement can help to guide further adaptation planning and action". (Levin et al. 2015:81)

Box 3. Linking national INDC goals to global goals

"An adaptation component can include an outline and justification of the national vision for reducing the identified threats and impacts, including a description of the nationally determined needs, options, and priorities for increasing the resilience of vulnerable communities, regions, or sectors. Given the nature of adaptation action, the timeframe for long-term goals in this case may differ from the timeframe for long-term goals for mitigation. … In cases where countries have not yet established evidence-based goals, a clear vision statement can help to guide further adaptation planning and action". (Levin et al. 2015:81)

Considerable national and international attention is being paid to the need for improved monitoring and evaluation, and increasingly to reporting on adaptation. It is therefore important to consider these aspects in an integrated way in the identification and specification of goals and targets for adaptation (see also Section 9).

5.1 A TYPOLOGY OF ADAPTATION GOALS AND TARGETS

Goals and targets may be outcome-, process- or needs-based. They can be defined at the national, sector or cross-cutting levels, and may be quantitative or qualitative. Table 3 provides examples of goals and targets according to these dimensions. Timeframes will be goal- or target-specific and depend on national specifics. To illustrate, the INDC of the Federal Democratic Republic of Ethiopia (Ethiopia, 2015) distinguishes between long-term goals and short to medium and longer-term action and goals. The long-term goal, for which a specific time frame is not indicated, is designed to ensure that adaptation to climate change is fully mainstreamed into development activities, thereby resulting in vulnerability reduction and contributing to an economic growth path that is resilient to climate change and extreme weather events. The short-term goal is to build the capacity necessary to mainstream climate change adaptation into all public and private development initiatives. The medium to longer-term goals up to and beyond 2020 build on three pillars: flood, drought and other cross-cutting interventions that together can increase the resilience and reduce the vulnerabilities of livelihoods and landscapes (Ethiopia, 2015). Ethiopia's INDC on adaptation is accordingly also an example of the application of cross-cutting risk- or impact-based focus areas, chosen in preference to the primarily sectoral approaches adopted by, for example, Chile, South Africa and Gabon (see Table 2).


Photo credit: WorldFish

Table 3. Typology and examples of adaptation goals and targets

GOAL/TARGET	EXAMPLE OF GOAL/TARGET		
		QUALITATIVE	QUANTITATIVE
Outcome-based Linked to the ultimate objective of the Convention (Art. 2) and national priorities Might be expressed as an aspirational or visionary ambition or as an initial step toward a more concrete, measurable target	National	Resilience to climate change is enhanced to secure livelihoods and sustainable development	National measures of impacts and damage from climate hazards show year-on-year improvements
	Sectoral	The exposure of the population living in coastal areas to high risk to climate hazard is reduced The adaptive capacity of forest dependent communities to face climatic variability is enhanced	The population living in coastal areas identified as high risk to climate hazard is reduced by X percent by year Y, with greater reductions in informal settlements Areas at high risk to climate hazards are identified and infrastructure spending is increased in these by X percent by year Y
	Cross-cutting risks and impacts	An institutional framework for penetration of micro-insurance is developed	Strengthen the adaptive capacity of at least 50% of municipalities in the category of 'most vulnerable' (Mexico INDC, 2015) Implement tax on fossil fuels by W year to generate X amount of fund for an adaptation fund to be used for Y activities in Z sectors
Process-based Focus on enhancing adaptation planning, strengthening governance, building systems that support adaptive capacity, and mainstreaming climate risk management into broader development activities Easier to track than many outcome-based goals and can be used to provide more immediate feedback	National	Adaptation priorities and plans presented in the NAPA are implemented in year X	Mainstreaming of adaptation and vulnerability indicators in the National Monitoring, Reporting and Verification (MRV) system currently under development First National Adaptation Plan is developed and implemented by 2020
	Sectoral	Establish a system for improvement, monitoring and research of conventional crop and livestock production systems and processes Develop guidelines for compensatory afforestation	Implementation of arid region mapping process in X districts of the country Implement upgrade of information dissemination tools in emergency situations in X departments by the year Y in Z geographic zones
	Cross-cutting risks and impacts	Mainstream climate change adaptation in sectoral developmental policies	All levels of government (national, regional, local) have instituted disaster risk management systems by year Y
Needs-based Based on obtaining or accessing sufficient resources (information, capacity, technology, and finance) to fully support identified adaptation needs Probably require a provision requiring that they are reviewed and adjusted periodically in light of aggregate mitigation commitments, projected emission pathways, etc., likely to lead to shifting estimates of need over time	National	Build national capacity to support NAP process	Full funding is obtained for the cost of the first five years of the NAP process 75 percent of identified NAPA projects are funded by year X
	Sectoral	Support R&D for technologies in water conservation Develop a governance framework for management of waste water	A climate-related university training program is in place by year X, and Y students have graduated by year Z Implement a system of M&E indicators for X sector by Y year in Z districts
	Cross-cutting risks and impacts	Promote regional and international cooperation for technology transfer in X,Y,Z sectors Establish insurance funds to mitigate climate change and natural disaster risks in aquaculture (Vietnam 2nd NC, 2010)	A climate-related university training program is in place by year X, and Y students have graduated by year

In practice, countries are likely to choose a combination of outcome-, process-, and needs-based goals. Referring to Table 3, an overarching visionary outcome-based goal at the national level to enhance resilience to climate change in order to secure livelihoods and sustainable development could be complemented with time-specific qualitative and quantitative goals and targets around outcomes, targets and needs at the national, sectoral, local and/or cross-cutting levels.

5.2 PRIORITISATION OF ADAPTATION GOALS AND TARGETS

In many cases it may be necessary to conduct a prioritisation process to select the goals and targets for inclusion in the INDC on adaptation. Box 6, below, illustrates how a simple process for prioritising adaptation action areas may be conducted, based on Japan's National Adaptation Plan process (MoE Japan, 2015). Other prioritisation tools are mentioned in the following sections.

Box 4. Prioritizing adaptation measures: example building on Japan's National Adaptation Plan process approach

Categorising and prioritizing sectors and adaptation actions is a useful way to organize the priority targets that could be included in a national INDC. This can be done through a stakeholder workshop or expert panel discussion. Japan categorised adaptation measures against three simple criteria:

1. **Significance – social, economic and environmental**
2. **Urgency – timing when the impact appears and timing when actions are required**
3. **Confidence levels – based on IPCC AR5 criteria**

A simple table below provides an illustrative example of the process of categorization. One can add categories, sectors and sub-sectors as needed.

CATEGORIES	SECTORS	SUB-SECTORS	PREDICTION (OF IMPACTS)	SIGNIFICANCE	URGENCY	CONFIDENCE
Agriculture, forestry and fisheries	Agriculture	coffee	rising temperature and drought export industry facing $XXX losses	high	very high	high
		rice	declining water resource for irrigation yields will decline by…	very high	very high	high
	Fishery	aquaculture	saltwater intrusion into ponds due to sea level rise yields expected to decline by X%	very high	high	medium
	Forestry	non-timber forest products	changing forest distribution	low	medium	medium

5.3 REPORTING ON ADAPTATION-MITIGATION BENEFITS

Countries may also consider inclusion of adaptation-mitigation co-benefits in their INDCs (see Box 5). Recent climate talks in Bonn welcomed joint mitigation-adaptation approaches put forward by Bolivia as non-market-based approaches which encompass methods to develop national plans and strategies to support mitigation and adaptation linkages, as well as the provision of sustained ex-ante finance based on the performance of joint mitigation and adaptation indicators developed and based on national circumstances (CIFOR, 2015; Plurinational State of Bolivia, 2012, 2015). Though Bolivia's proposal mainly affects actions in land use and forestry, the dual need for mitigation and adaptation and their inter-relationships have been recognised (e.g. Klein et al., 2007), and opportunities to harness the synergies between mitigation and adaptation are beginning to emerge (see Box 6).

Box 5. Considering and including adaptation-mitigation co-benefits

Some activities undertaken primarily for mitigation purposes might be associated with adaptation benefits. If that is the case, adaptation benefits may be indicated in the adaptation INDC. Forestry is one of the sectors where there is a large recognised potential for adaptation co-benefits of mitigation actions. For example, forestry activities undertaken to deliver greenhouse gas impacts may also provide a range of ecosystem-based adaptation benefits and services, depending on their location (Ricardo-AEA and CDKN 2015).

Conversely, some adaptation activities may lead to reductions in greenhouse gas emissions or increase greenhouse gas sinks, or in other words provide mitigation co-benefits. For example, implementation of conservation programs and improvements in natural resource management, including agro-forestry, watersheds and soils, may be associated with mitigation co-benefits. Mitigation benefits from such activities should be included in the INDC on mitigation to avoid any potential for double-counting.

Box 6. Examples of adaptation mitigation synergies

In agriculture - fallow systems are transformed to continuously cultivated areas (to maximise production under heavier precipitation conditions), increasing the ability of soils to sequester carbon (Rosenzweig and Tubiello 2007).

In forestry and land use - using drought-resistant varieties of tree species in planted forests to improve tree species' resilience to water stress while increasing the potential for carbon sequestration (Locatelli et al., 2011). Building of mangrove plantations that protect coastal areas from storms and simultaneously sequester carbon (Locatelli et al., 2011).

In energy - rural renewable electrification can provide substantial emissions reductions whilst providing adaptation benefits (Klein et al., 2009). Sustainable charcoal briquettes produced from agricultural waste are economically competitive compared to wood charcoal, resulting in reduced clearing of natural forests while providing access to cheap source of energy for rural populations (Illman et al., 2013).

In waste treatment - organic waste from landfill is diverted to a composting plant in order to produce organic compost. This reduces methane emissions from anaerobic processes at the landfill. In addition, the use of organic compost increases the moisture retention and fertility of the soil it is added to, reducing vulnerability to drought and increasing carbon sequestration rates (Ayers and Huq, 2008).

6. REPORTING ON CURRENT AND PLANNED ADAPTATION UNDERTAKINGS AND SUPPORT

The objective of this section is to demonstrate how countries can report on planned adaptation activities and document pre-existing support. Summarising the existing support available for INDC development provides an opportunity to review recent provisions for adaptation in terms of amount, type and source of support. This also helps identify which actions require additional support (the gaps; Section 5), thereby informing the section on needs (Section 6). As adaptation activities are often already integrated into development programmes, national reports, databases and program-specific studies can provide the data on existing support.

The level of detail to include in the summary of support is at the discretion of countries, but it could be structured categorically, by sector, or by documenting support for pre-existing planning or implementation activities. The following sections highlight different types of support, including financial, regulatory and technical support, and give examples of each.

6.1 EXAMPLE: FINANCIAL SUPPORT IN TANZANIA

While financing for climate change and adaptation can come from a variety of external sources, some countries have begun using the national budget and current expenditure on climate change adaptation as a starting point. The Climate Public Expenditure and Institutional Review (CPEIR) process encompasses methods to quantify climate change related expenditures in the national budget (Bird et al., 2012). In an ODI report in 2014, it was found that three sub-Saharan countries, Ethiopia, Uganda and Tanzania, are actually diverting their scarce national budgets to financing climate change adaptation. One of these countries, Tanzania, revealed that in the 2009-2011 national budget the country had an estimated annual expenditure on climate change of $383 million, 5.5% of which was government expenditure (Bird, 2014; Yanda et al., 2013). Table 4, below, describes the process used by Tanzania.

Table 4. Tanzania climate expenditure: lessons learned

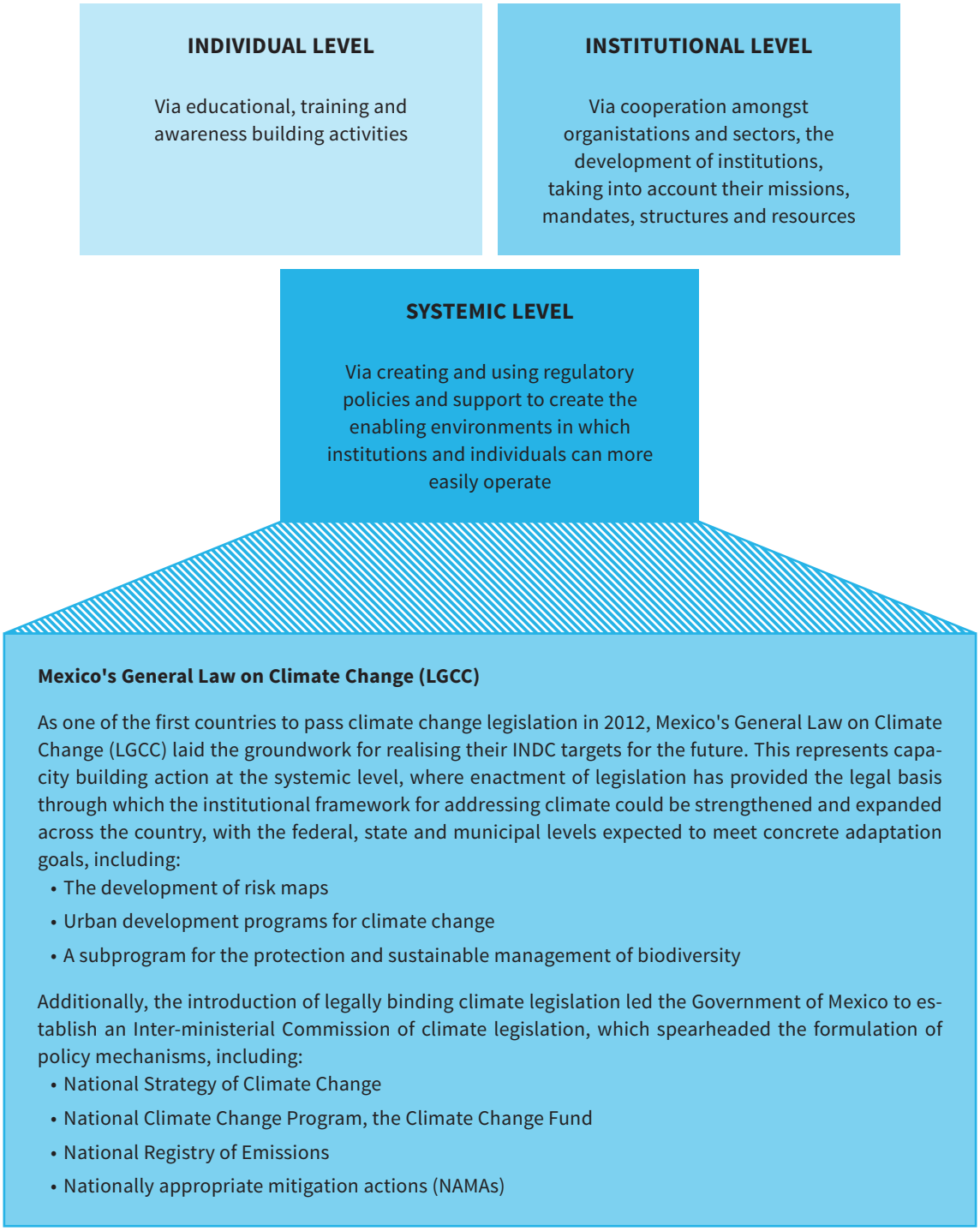
BUDGET ALLOCATION	• Climate change-relevant expenditure increased steadily as a proportion of the total budget from 4.2% in 2009 to 6.5% in 2012 • Domestically sourced finance declined by 4% over the period, while foreign-financing grew by 61%, reflecting considerable development partner support
MINISTRIES	• Tanzania identified fifteen ministries based on policy engagement and four-year spending patterns • Expenditures were categorized based on their relevance to climate change and their focus on either mitigation or adaptation • A first estimate of climate change-relevant expenditure was then generated • From this, Tanzania was able to identify the top four ministries dominating government spending on change-relevant actions The top four were: 1. Ministry of Water & Irrigation 2. Ministry of Energy & Minerals 3. Ministry of Agriculture 4. Prime Minister's Office
PROJECT RELEVANCE	• The share of high-relevance projects (where addressing climate change is a main objective of the expenditure) increased from 5 to 13% of the total climate change-related budget between 2009 and 2012 • The majority of climate change-relevant expenditure was still concentrated in low-relevance projects
MITIGATION VS. ADAPTATION	• Separating spending on mitigation from spending on adaptation revealed that the composition of climate change-relevant expenditure shifted over the four-year period to projects that appear to combine both sets of activities, such as forestry and conservation

Adapted from: Bird, 2014 and Yanda et al., 2013

6.2 EXAMPLE: BUILDING CAPACITY IN INSTITUTIONS AND STRENGTHENING REGULATORY FRAMEWORKS

Knowledge-sharing, capacity development and institutional strengthening are key to successfully mainstreaming climate resilience at the institutional level. The Convention conceptualises capacity-building on three levels, as seen in Figure 1, including an example of Mexico's climate-change legislation, which represents a fundamental step in creating the enabling conditions to allow Mexico to reach its INDC targets.

Figure 1. Levels of capacity building



Adapted from: Levin et al., 2015 and USAID, 2012

6.3 EXAMPLE: TECHNOLOGICAL SUPPORT IN MAURITIUS

Technology needs assessments (TNAs) and existing technology action plans can help lay the foundation for recognizing and evaluating pre-existing technological support and anticipating future needs (UNEP, 2014).

Table 5. Adaptation options for the agricultural sector in Mauritius

CATEGORY	Adaptation Technologies' Needs	STATUS
WATER USE AND MANAGEMENT	Improve water conveyance system	Implemented
	Micro-irrigation (drip and sprinkler)	Low-level implementation
	Rainwater harvesting and improved field ponds for water storage	Launched
PLANNING FOR CLIMATE CHANGE VARIABILITY	Reinforcing pest and disease monitoring and early warning system	Implemented for major crops, SMS pilot launched
	Improve agro-meteorological information network for forecasting and early warning (data collection, processing and dissemination)	Not yet implemented
SUSTAINABLE CROP MANAGEMENT	Enhance R&D in breeding of varieties/breeds better adapted to drought, heat, disease	Implemented for key crops
	Reinforce conservation of locally adapted varieties and seed production of locally adapted crop varieties.	Implementation on-going
	Low-water-consuming crop species and varieties	Not yet implemented
SUSTAINABLE LIVESTOCK MANAGEMENT	Livestock disease management/training	Implementation on-going
	Livestock insurance scheme	Not yet implemented
SUSTAINABLE FARMING SYSTEMS	Mixed farming	Low-level implementation
	Tree planting and tree management/pruning	Implementation on-going
LAND USE MANAGEMENT	Wetland restoration and afforestation	Implementation on-going
	Watershed management and agroforestry	Not yet implemented

Source: adapted from Government of Mauritius and UDP, 2012

An example of technology needs assessment is Mauritius, a small island developing state (SIDS) highly vulnerable to the impacts of climate change. Consequently adaptation technologies were the primary focus of its TNA. Table 5 highlights the prioritisation of technologies in the agriculture sector. Listing identified technology needs and their status of implementation can help in summarising existing technological support and informing technological needs (see Section 8). Those projects not yet implemented, in grey, are taken up further in Section 7.

7. GAPS AND BARRIERS

Gaps occur when a target differs from what is actually happening. In the context of INDCs, this can be characterised as the difference between the INDC adaptation target (Section 5) and the actions currently in place (Section 6 on current plans and support) or programmed that are working towards the target. Gaps can include information access, technology access, funding gaps and skills gaps, among others. Within broader gaps, one may also find barriers that adversely affect or prevent the implementation or realisation of an adaptation target. In the INDC context, such barriers can occur to the provision of finance, technology and capacity-building support. Some barriers can be overcome domestically, while others may require further support and can therefore form the basis of determining needs (Section 8 on needs).

7.1 HOW TO IDENTIFY AND PRIORITIZE A GAP OR BARRIER

Gaps and barriers are only apparent once a clear understanding of the target is in place. As a first step, in identifying and understanding the nature of individual gaps and barriers, it is therefore necessary to

1. **develop a common understanding of the adaptation target that has been set, both at the national level and at sectoral or project-specific levels.**

This could be done by reviewing the targets that have been drafted under Section 5. Following this,

2. **brainstorm the activities and actions needed to meet those targets.**

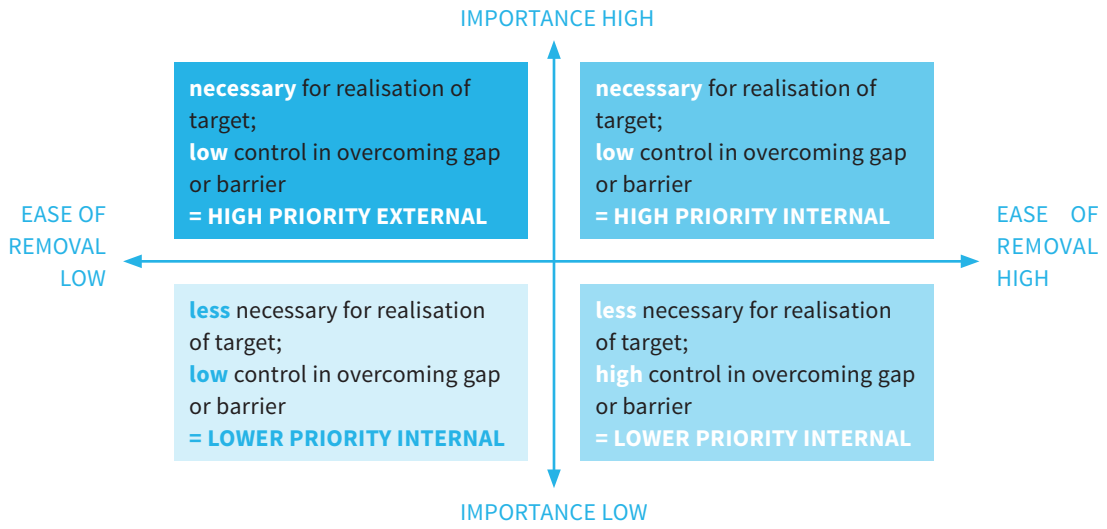
Many of the activities and actions may already be underway or in near-term plans and have been identified in Section 6. Focus on which further activities and actions are needed to realise the adaptation target. Then,

3. **collectively brainstorm and list the gaps and barriers that are obstructing realisation of those activities and actions.**

Brainstorming can be done in expert and stakeholder interviews, focus-group discussions and analysis of recent policy papers, feasibility analyses, case studies etc. Once gaps and barriers have been identified, a process of prioritising the gaps and barriers to be addressed can be started together with relevant stakeholders. Prioritization can be done against two gradients: 1) importance: the urgency of overcoming the barrier or filling the gap in order to realise the target; and 2) ease of removal: the country's own level of control in overcoming the gap or barrier. Then, using the simple categorisation matrix in Figure 2,

4. **categorise gaps and barriers against the level of control in overcoming barrier or gap and necessity in realising the target.**

Figure 2. Prioritisation matrix of gaps and barriers



1. **Finally, develop a list of priority gaps and barriers, based on the following categorisations:**
   - Gaps and barriers that fall within the **top right quadrant** are necessary for a target to be realised, and the country has a high level of control in overcoming the gap or barriers. That is, the means for overcoming such gaps and barriers should exist within the country and therefore should be highly prioritised and addressed quickly. These means can be derived from or build upon existing support within the country, identified in Section 6.
   - Gaps and barriers that fall in the **top left quadrant** are also necessary for a target to be realised, but the country has less control and means to fill the gap or barriers. These can form the basis for the needs that are expressed in the INDC, as explained in Section 8.
   - **The lower two quadrants** represent the gaps and barriers that need to be addressed but are not essential for a target to be realised but that differ in relation to the level of control a country has in filling the gap or overcoming a barrier. However, those under the country's control should be addressed with a lower priority where the needs related to filling gaps and barriers outside the control of a country could be met through other adaptation and development projects e.g. the Technology Needs Assessment, development projects, etc.

More comprehensive methods do exist, such as prioritization through multi-criteria analysis (MCA) and barrier analysis, which is commonly used in the Technology Needs Assessment for prioritizing technologies and analysing barriers to technology diffusion (see Annex B).

8. SUMMARY OF NEEDS

The needs of a country in realising its adaptation targets can be both short- and long-term and could be met with a mixture of existing support in the country and requests for external support in the form of technology, capacity-building and finance.

In theory, the need for external support should equal the difference between the target (i.e. what should be achieved to realise the adaptation target) and the existing adaptation measures and near-term plans in a country working towards this target. In essence, these needs are based on the measures needed to fill the gaps and barriers listed in the top left quadrant of Figure 2 in Section 7, and they can be broadly categorised under finance and investment needs, capacity needs and technology needs.

8.1 FINANCE AND INVESTMENT NEEDS

The Lima call for climate action,

'Urges developed country Parties to provide and mobilize enhanced financial support to developing country Parties for ambitious mitigation and adaptation actions, especially to Parties that are particularly vulnerable to the adverse effects of climate change; and recognizes complementary support by other Parties' (1/CP.20, para 12).

In light of this, there is no one way of quantifying or estimating the amount and type of finance needed to meet targets, and the lines between different types of spending are often blurred (Levin et al., 2015). Methods to determine sources of international climate finance and private-sector finance are detailed in the UNDP/WRI guidance note (see Levin et al., 2015). However, an immediate list of priority finance and investment needs can be derived from the prioritised list of measures needed to fill the gaps and barriers that cannot be met by domestic sources (see Section 7, Figure 2).

The financing needs of developing countries in implementing INDCs are likely to feature and need to be expressed. In the current submitted INDCs of Gabon and Mexico, finance needs have been expressed in various ways, as shown in Box 7.

Box 7. Finance and investment needs as stated in Mexico's and Gabon's INDCs

For Mexico, the **increase of investment** in disaster prevention is of utmost relevance, as well as the development of an insurance market against hydro-meteorological and catastrophic risks, in which the private sector is invited and expected to play a relevant role.

Gabon will establish a **National Fund for Sustainable Development** to part channel and part **stimulate financial flows** dedicated to reducing emissions and promotion sustainable development. Funds will come from (1) the state budget, (2) private investment and sustainable private financing (e.g. electricity revenues), (3) revenue from credits from the domestic market, (4) donor contributions or loans.

Gabon will also request **multilateral aid**, from Green Climate Fund (GCF) to support projects in:

- Renewable energy, in particular hydropower,
- Treatment of waste water and other waste,
- Energy efficiency,
- Technology transfer,
- Land use, both in the planning of land use, such as agricultural and forestry projects.

Source: République Gabonaise, (2015); Department of Climate Change, (2015).

8.2 CAPACITY NEEDS

Capacity needs address what is required to fill the gap in knowledge, training, awareness, education and empowerment that may exist in a country. Further capacity needs can go beyond the individual to address the institutional and systemic dimensions, as shown in Section 6.2. Priority capacity needs can also be derived from the prioritization exercise above to ensure that the needs expressed will help the country achieve its adaptation INDC targets. An example of capacity targets and consequent needs by Mexico is given in Box 8.

Box 8. Capacity target and needs by Mexico

"… Mexico will, inter alia, strengthen the adaptive capacity of at least by 50% the number of municipalities in the category of 'most vulnerable'."

"Mexico requires international support for the development of its own technologies as well as for technology transfer and innovation to increase its adaptive capacity."

Source: Department of Climate Change, (2015).

8.3 TECHNOLOGY NEEDS

The obvious starting point in identifying the technology needs would be to look at the needs expressed under the Technology Needs Assessment (TNA) project and assess their overlap with the priority list of technology needs identified in the prioritisation process of measures to address the gaps and barriers above (see Section 7). This comprehensive and systematic approach allows technology needs to be identified, evaluated and prioritised using a country-driven and participatory process. Taking the example of the Mauritian TNA in Section 6.3, technology needs could be made up of needs identified, but not implemented, such as low-water consuming crop species and varieties, or livestock insurance schemes.

Those countries that have not yet conducted a TNA could turn to national communications or other adaptation planning documents that might have expressed needs relating to technology.

9. MONITORING AND REPORTING PROGRESS

Plans for the monitoring and reporting of adaptation activities may be included in the INDC. Different approaches are currently used to monitor adaptation, and the INDC provides an opportunity for countries to move towards a more rigorous and robust system of monitoring and review (CDKN and Ricardo-AEA 2015).

Adaptation monitoring and evaluation (M&E) assesses whether adaptation measures have achieved the desired results and whether resources have been used optimally. In addition, adaptation M&E can also support project and programme management and facilitate learning on what does or does not work. The learning aspect is particularly important, as adaptation is still a relatively new territory in the policy field. Box 9 describes how M&E is approached in the Philippines.

Box 9. M&E in the Philippines

The Philippines' National Climate Change Action Plan (NCCAP) focuses on seven strategic areas of food security, water sufficiency, ecological and environmental stability, human security, climate-friendly industries and services, sustainable energy, and knowledge and capacity development. The road map for the period 2011-2028 for adaptation and mitigation actions in these priority areas has an M&E system integrated into the planning process. The National M&E system is based on the 'Results-based Management' approach and aims to evaluate the efficiency, effectiveness and impacts of the action plan every three years, in addition to having annual monitoring reports.

The indicator system for the national M&E system includes output and outcome indictors. Apart from this, a standard indicator system is being developed to incorporate M&E systems in ongoing climate change efforts to facilitate comparison, decision-making and tracking progress. Core indicators for measuring vulnerability to the climate (Climate Change Vulnerability Indices) of a location are also being developed for the priority areas in order to have realistic and coherent indicators for vulnerability and adaptation assessment.

Source: GIZ (2014)

The core question addressed by adaptation M&E is whether adaptation has actually taken place, i.e. whether vulnerability has been reduced or adaptive capacity has been strengthened. For instance, adaptation M&E attempts to determine whether an adaptation project has helped its target group to cope better with the likely impacts of climate change.

Lastly, the monitoring and evaluation of adaptation policies and programmes is crucial once it has been initiated. Countries need to ensure that resources are targeted to actions that provide the best opportunities to increase the resilience of vulnerable people. As noted by CDKN and Ricardo-AEA (2015), monitoring and reporting should ideally include metrics that can be used to track progress in both the implementation and effectiveness of adaptation activities.

Due to the diversity and cross-cutting nature of adaptation responses, there is a wide spectrum of potential indicators and metrics for adaptation. Therefore, adaptation indicators need to be chosen based on the purpose and context. They can be classified according to what they are measuring:

- **Climate impact indicators:** indicators that measure the effects of climate change (e.g. damage caused by natural hazards; impacts on human health; impacts on agricultural production and income)
- **Adaptation response indicators:** what kinds of adaptation interventions are being undertaken; indicators can assess the effectiveness, efficiency and sustainability of interventions.

In addition, indicators may usefully be structured according to the typology of goals and targets presented in Section 5.

Box 10. Monitoring adaptation in the Sundarbans estuary in West Bengal in India

A good example of indicators is the monitoring adaptation of the Sundarbans estuary in West Bengal in India. The estuary faces increasingly frequent storms and heavy rains. Proposed adaptation measures include controlling flooding, building freshwater storage and introducing salt-tolerant crop varieties. Biophysical indicators include sediment deposition rates, increased availability of freshwater through project activities, and yield improvements on saline soils, which are monitored and interpreted to assess the effects of adaptation measures. Results are used to compare the performance of different adaptation options and to aid subsequent decision-making.

Source: GIZ (2011)

Photo credit: CIFOR 2 (deforestation in Brazil)

SECTION II. DEVELOPING INDCS ON MITIGATION

Sudhir Sharma and Denis Desgain

PART I. GETTING STARTED

1. KEY CONCEPTS

1.1 PROGRESSION BEYOND CURRENT UNDERTAKING

There is no defined or agreed understanding of what each country´s contribution should be. Thus there are no specific rules to guide the development of a contribution, except that the INDC should 'represent a progression beyond the current undertaking of that Party'. In the negotiations this has been referred to as the 'no-backsliding' rule. The underlying concept is that each Party should progressively increase its efforts to limit and reduce its GHG emissions.

For example, developed countries have undertaken to effect economy-wide emissions reductions for the period up to 2020. Thus the mitigation contribution of developed countries in their INDCs should be expressed as an economy-wide emissions reduction target and should result in emissions reductions below what these countries have committed themselves to achieve by 2020. For example, if a developed country has undertaken, in accordance with the Cancun outcomes, a commitment to reduce GHG emissions by 17% below 2005 by 2020, its INDC for the next period should be an economy-wide emissions reduction of greater than 17% below 2005. This ensures that emissions in a developed country will continuously fall compare to a historic base year till it achieves zero emissions.

What does it mean for developing countries? Developing countries, though not all, have submitted NAMAs in response to the Cancun Agreement. These NAMAs are included in FCCC/SBI/2013/INF.12/Rev.3 document and define countries' mitigation undertakings for the pre-2020 period. Thus in the case of developing countries too, the INDC's mitigation component should result in further actions on emission reductions beyond those included in the NAMAs mentioned above. As emissions in most developing countries are expected to grow, the NAMAs reflect how countries are reducing the growth rate of emissions so as to achieve an early GHG emissions peak. Thus the INDCs should reflect how a country's mitigation contribution further limits the growth of emissions or peaks its emissions, in accordance with its national circumstances and the CBDR & RC principle.

Most of the larger developing-country economies submitted NAMAs to reduce their emissions compared to BAU. For example, Mexico's NAMA stated that it would reduce its emissions by 30% below its BAU emissions in 2020 provided sufficient support was available to implement identified actions. Mexico's INDC has outlined that it will reduce its emissions by 25% below BAU in 2030 using its own resources. Further, if international support is available, the reduction will be enhanced to 40% below BAU in 2030. In this case the country shows 'progression' by putting forward a reduction goal based on its own resources, so called unconditional reductions. The pledged reduction will reduce its emissions below 2020 levels, as some analyses show.

Smaller developing countries have submitted a list of actions and policies as NAMAs for the pre-2020 period. In most of these cases the actions were contingent on availability of the means of implementation. In these countries, at the minimum, the actions proposed in the INDCs should go beyond those that would be implemented as part of currently supported mitigation actions. For example, if one of the elements of a country NAMA was to implement 5000 MW (of a total potential of 10 GW) of hydropower and 500 MW (of a total potential of 2 GW) of wind power if support is available, then the proposed INDC should result in the creation of capacities beyond 5000 MW of hydro and 500 MW of wind, assuming the country has been able to receive support to implement actions listed in pre-2020 NAMAs.

A key concept of progression expressed in the context of developing countries is the presentation of unconditional mitigation contributions, i.e., mitigation actions that countries intend to implement using their own resources. This aspect is discussed further in the section below.

1.2 CONTRIBUTION TO ULTIMATE OBJECTIVE OF THE CONVENTION

The Lima decision requests each country to explain in their INDC how it 'contributes towards achieving the objective of the Convention as set out in its Article 2' and how it is 'fair and ambitious'.

Article 2 of the Convention states that the 'ultimate objective of this Convention [is] stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'. Though it has not been explained further what such level of concentration would be, the Cancun Outcome stated that countries will work towards limiting the increase in temperatures below 20C. Some countries, especially those that are highly vulnerable to climate change impacts, had argued that the goal should be to limit the increase below 1.50C, as this improves their chances of survival.

Thus this provides an opportunity for the countries to frame their vision of what should be the context for countries in preparing their INDC mitigation and adaptation components. This information could be defined in a temperature goal and also in terms of the carbon budget or emission pathway that the world should follow to achieve the ultimate objective of the Convention. This also provides a context for countries to explain how in this context the contribution for mitigation is fair.

For example, Switzerland's and Norway's INDCs state that their commitment is in line with the IPCC AR5 recommended emission pathway minus 40 to 70 per cent below 2010 levels by 2050. This recommendation offers a likely chance of limiting the increase in temperature to below 20C. EU INDC states that their contribution is in line with the 20C goal. Mexico's INDC does not state how its contribution meets the Article 2 objective of the convention, but only that its INDC is in line with the country's long-term goal of reducing its emissions by 50% below 2000 by 2050.

This 20C goal also provides a context for Adaptation INDCs, as it defines the level of climatic impact that a country is planning for. Thus a 20C goal implies that the country's adaptation action and goal are designed to reduce its vulnerability to an increase in temperature of up to 2 0C. This context thus provides consistency to countries mitigation and adaptation efforts.

This context could also provide a basis for countries to define their-long term emissions pathways and assess their conditional and unconditional contributions (see section below).

1.3 FAIR AND AMBITIOUS CONTRIBUTION

'Fair' refers to how each country's contribution represents its fair share of the total effort required to meet the ultimate objective of the Convention. The alternative term used is 'equitable'. As mentioned earlier, IPCC AR5 has highlighted that to have chance of limiting the increase in temperature to 20C, a global GHG reduction of 40% to 70% below 2010 would be required by 2050. It is also acknowledged that all countries have to make an effort to limit and reduce their GHG emissions, though the lead in doing so has to be taken by the developed countries.

'Fair' (or equitable) thus refers to how a country defines its share in the total global effort. As mentioned earlier, the Lima decision states that contributions should be made in the context of the principle of equity and CBDR&RC in light of national circumstances. The principle of CBDR&RC recognizes two concepts: 'responsibility' and 'capability', which underline the definition of a 'fair' contribution.

A number of indicators have been put forward by various countries and individuals to define both responsibility and capability. Responsibility is interpreted as responsibility for contributing to global warming and has usually been measured in terms of GHG emissions. Thus indicators of responsibility could be cumulative emissions (emissions over a time period), current emissions, future emissions, emissions per capita, or cumulative emissions per capita.

For example, in its INDC Switzerland states that fairness should consider responsibility and capability. Responsibility is seen as being reflected in a country's past, current and future greenhouse gas emissions. Total emissions as well as per capita emissions should be considered. Switzerland states that responsibility in terms of greenhouse gas emissions is low as it contributes around 0.1% of world's emissions, and its per capita emissions is at the world average. Also, its per capita emissions would fall further in line with its commitments. It also states that it has low cumulative emissions at 0.2% of global cumulative emissions (1990-2010). Mexico in its INDC uses current GHG emissions and per capita emissions to define its responsibility.

Capability is defined in terms of economic capability, i.e. the ability to bear the costs of climate actions on the part of the country, expressed in terms of either the size of the economy (total GDP, or as a share of global GDP) or per capita GDP. Switzerland states that the 'capacity to contribute to solving the climate problem is closely related to the ability to invest in appropriate mitigation measures, such as carbon-efficient technologies. Hence, one aspect of capacity is to take into account GDP per capita in fairness considerations'.

In the context of developing countries, the Convention states that addressing poverty and socio-economic development are the first priorities for these countries. Thus in many studies, development needs are also taken as an additional indicator of capability. Those countries with higher poverty and low HDI have greater development needs and thus are not as capable as other countries.

There are some models available that estimate the fair share of each country. Countries could use them, but they could also explain their own situations and define qualitatively how they are fair.

Ambition refers to the highest mitigation that a country could undertake given its national circumstances and its mitigation opportunities in the context of its sustainable development. The concept of ambition is to some extent linked to the cost effectiveness of mitigation. Ambition also links the mitigation contribution to long-term goals that are in line with the ultimate objective of the Convention and enables a faster transformation of the economy to a low-carbon pathway. In the context of developing countries, this implies early peaking and then a reduction in emissions. For example, Mexico has stated that its mitigation contribution is ambitious, as its unconditional contribution will enable to peak its emissions by 2025. Mexico has also included in its INDC an additional mitigation contribution which it could undertake if international support is forthcoming. This will enable the Mexican economy to transform itself more rapidly towards low carbon growth.

Thus countries can define the ambitiousness of their contributions based on the costs of undertaking emission reductions, the impact on growth, the pace of transformation to low carbon growth, and how it enables a country to achieve its long-term GHG emissions goal.

1.4 CONDITIONAL AND UNCONDITIONAL CONTRIBUTIONS

The concept of unconditional and conditional mitigation contributions has been discussed in the context of developing countries. An unconditional contribution is what countries could implement based on their own resources and what is within their own capabilities. A conditional contribution is one that goes beyond the unconditional contribution that countries are willing to undertake if international means of support are available. For example, Mexico's unconditional contribution is 25% below BAU emissions by 2030 and its conditional contribution is a further 15% reduction below BAU, i.e. a 40% reduction below BAU by 2030.

The unconditional contribution of a country is governed by the following factors: fairness of effort (linked to responsibility and capability); national circumstances (for example, a country might have high capability, but lack of access to renewable energy resources, e.g., an island state limiting its options for reducing emissions); the co-benefits of mitigation options (e.g., increasing public transport infrastructure in fast-growing urban areas to provide multiple SD co-benefits as well as reduced GHG emissions); and countries' long-term mitigation goals for transferring to low-carbon development.

In defining its mitigation contribution, countries could use a bottom-up or top-down approach. The top-down approach is based on identifying the emissions pathway for a country to achieve its long-term GHG emissions goal. The emissions pathway for a particular time period thus defines the mitigation contribution. The bottom-up approach helps identify mitigation options in the context of sustainable development that could help achieve the required emissions reductions for the defined mitigation contributions. The mitigation options thus identified would have cost implications as well as benefits to the economy. Countries could use the net impact of their mitigation contributions on their GDP (costs less benefits) as a basis for defining their unconditional and conditional contributions.

Many mitigation options, such as energy efficiency, are both economically viable (as they reduce the cost of energy, reduce investment needs for energy infrastructure, increase economic activity by introducing markets for energy efficiency measures, etc.) and provide SD benefits (reduced air pollution, increased jobs, increased energy security, etc.). These mitigation options could be a countries' own contri-

bution (Type I mitigation options). Countries could treat the other mitigation options, which might be costlier than the BAU options but result in significant SD benefits for the country too (Type 2 mitigation options), as their unconditional contributions.

Countries may also, based on their capabilities and responsibilities, define the level of cost for mitigation actions that they could consider for implementation using their own resources (Type 3 mitigation options).

Thus three types of mitigation actions could define a country's unconditional contribution. Any mitigation action beyond this that enables a country to achieve its long-term GHG emissions goal could be presented as a conditional mitigation contribution.

PART II. DEVELOPING CONTENT

2. DIFFERENT MITIGATION CONTRIBUTION TYPES FOR INDC

As mentioned earlier, the mitigation contribution of a country would be nationally determined, taking into account its national circumstances as well as past mitigation actions. In the case of developing countries, in accordance with the Cancun Agreement, developing countries were expected to undertake Nationally Appropriate Mitigation Actions (NAMAs) in the context of sustainable development and with a view to achieving deviation from business-as-usual (BAU) scenarios by 2020. Sharma and Desgain (2013) provide a good overview of the NAMAs submitted by countries.

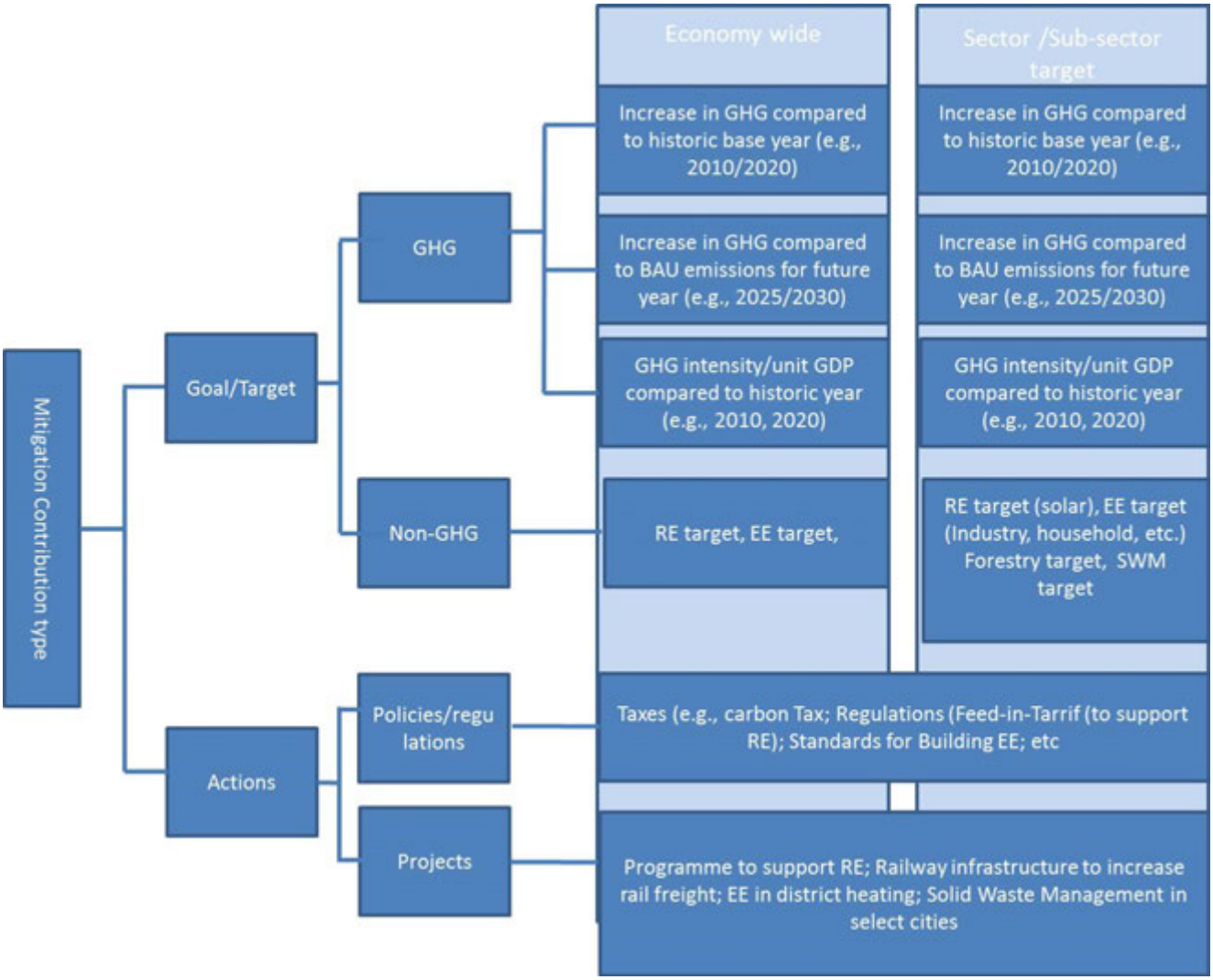
This section explains the different types of mitigation contribution which may be used for INDCs.

As shown in Figure 1, the mitigation contribution could come in two types: Goal/Target; and Actions. A **Goal/Target** is a type of mitigation contribution which is expressed quantitatively. **Actions** covers any kind of activities, projects, programmes or processes which are not expressed quantitatively and that can result directly or indirectly in a mitigation contribution.

The Goal/Target category can be divided into two types: GHG type and Non-GHG type.

A **GHG** type is a quantitative goal/target expressed as a GHG emissions target. The GHG mitigation contribution target/goal will always be expressed as a relative contribution, as it is expressed with reference to a given GHG emissions level (for example, 26%-28% GHG reduction below 2005 level in 2025 submitted by the USA). The GHG target/goal contribution can be divided into three sub-types, including GHG compared to historic base year, GHG compared to Business as Usual (BAU) emissions in future years, and GHG intensity/Unit GDP compared to a historic base year. These kinds of contributions can be estimated as an Economy-wide goal/target or a Sector/sub-sector goal/target.

Figure 1. Different types of mitigation contribution (adapted from Levin K. et al., 2015, WRI).



A **Non-GHG** type is a quantitative goal/target which is not expressed in terms of amount of GHG. This may, for example, be a target expressed as a renewable energy (RE) target or an energy efficiency (EE) target. The Non-GHG mitigation contribution type will usually be expressed as an absolute number (for example, 60% RE-based electricity by 2030). This kind of contribution can be estimated as an Economy-wide goal/target or a Sector/sub-sector goal/target.

The Actions category can be divided into two types: Policies/Regulations and Projects.

The **Policies/Regulations** type covers any initiative taken in the sectoral/national policy, financial or regulatory framework and that can impact positively on GHG emissions either directly or indirectly. This may, for example, take the form of the establishment of a carbon tax on cars in the country, the introduction of standards for building energy efficiency, etc. This type covers mitigation contributions which are expressed as neither a quantitative contribution nor a relative contribution.

The **Projects** type covers the description of any other activity, project, programme or process that can impact positively on GHG emissions either directly or indirectly. This may, for example, consist of the description of a solid waste management program in cities, the description of programme to support the development and diffusion of a RE technology, etc. This type covers mitigation contributions which are expressed as neither a quantitative contribution nor a relative contribution.

In summary, INDC mitigation contributions can be expressed in terms of six different types: GHG compared to historic base year, GHG compared to Business as Usual (BAU) emissions in a future year, GHG intensity/Unit GDP compared to a historic year, non-GHG target, policies/regulations, and projects.

A country may also choose to combine different types, for example, by stating a GHG goal/target and describing the Actions that will be implemented to achieve this target/goal. The six types of mitigation contributions are further analysed below.

3. DIFFERENT MITIGATION CONTRIBUTION TYPES

This section describes the information needed to develop each of the six types of INDC mitigation contribution. In the case of the GHG types, a brief explanation is given of the methodology used to estimate the GHG target/goal.

3.1 TYPE 1 (GHG GOAL/TARGET): GHG COMPARED TO HISTORIC BASE YEAR

In the case of type 1 (GHG compared to historic base year) the mitigation contribution is expressed as a limitation in the increase of GHG emissions (or as a reduction of GHG emissions) by a determined amount in comparison to the GHG emissions of a historic base year. It is thus expressed as both a quantitative and a relative contribution.

In order to estimate this GHG target, two parameters have to be chosen by the country: the historic base year (e.g., 1994, 2005,…) and the GHG target year (e.g., 2020, 2025,…).

METHOD (EXAMPLE):

If 2010 is chosen as the historic base year and 2030 is chosen as the GHG target year, and

If Y is the total GHG emissions of the country emitted in 2010,

Then, the target can be expressed as an increase of X% about Y by 2030.

An example of this kind of target is found in the quantified economy-wide emissions target of the EU: a 30% reduction by 2020 compared to 1990 levels.

In order to design this kind of mitigation contribution, the country will have to take the following key steps:

- **a/** Perform a national GHG inventory pattern for the historic base year,
- **b/** Perform a baseline study of the GHG emissions for all relevant GHG sectors over the period until the GHG target year,
- **c/** Identify the mitigation options in all the sectors,
- **d/** Calculate the emissions by the GHG target year,
- **e/** Estimate the cost of implementing the mitigation options and potential GHG reductions from each of the mitigation options,
- **f/** Identify the sustainable development benefits achieved through implementation of the mitigation options,
- **g/** Define the mitigation options that could be implemented by the country's own resources based on ease of implementation, the financial benefits of implementation and the sustainable development benefits.

The above analysis could be undertaken using simple Excel sheet models (such as GACMO, explained in the Annex C) or more sophisticated models, such as LEAP. The last step essentially involves expert judgement, and models can aid in arriving at the conclusions.

In this option, the target is fixed to a base year for which the GHG emissions are fixed. This implies that the target level of GHG emissions is fixed. Therefore any changes in the conditions under which the mitigation potential was estimated (GDP growth, technological changes, etc.) can impact on the actual mitigation target and the ease/difficulty of achieving it. The advantage is that monitoring progress is easy, as it only requires an annual GHG inventory estimate to assess progress.

3.2 TYPE 2 (GHG GOAL/TARGET): GHG COMPARED TO BUSINESS AS USUAL (BAU) EMISSIONS FOR FUTURE YEAR

In the case of type 2 (GHG compared to BAU emissions in a future year), the mitigation contribution is expressed as a limitation in the increase of GHG emissions (or as a reduction of GHG emissions) by a determined amount in comparison to a projected baseline (BAU) emissions scenario for the target year. It is thus expressed as both a quantitative and a relative contribution.

In order to estimate this GHG target, one parameter has to be chosen by the country: the period of the BAU and GHG mitigation scenarios (e.g., from present to 2030).

METHOD (EXAMPLE):

If 'present to 2030' is chosen as the period for developing the BAU and GHG mitigation scenarios, and

If Y are the emissions of the country estimated for year 2030 in the case of the BAU scenario,

Then, the target can be expressed as a decrease of X% below Y (BAU emissions) by 2030.

For example, Mexico INDC expresses a mitigation contribution with respect to the BAU emissions in 2030. Mexico has proposed a 25% reduction below 2030 BAU emissions.

In order to design this kind of mitigation contribution, the country will have to follow the same steps as described for calculating type 1 (GHG compared to historic base year). In this case, the calculation of the baseline (BAU) is of great importance and should be robust.

In this option, the target is set compared to BAU emissions. Estimation of BAU is a challenging task, especially if the projections are to be made for a longer future time frame. As the BAU emissions are defined ex-ante, the target is as rigid as a target set compared to the base year. Similarly the ease of monitoring is the same as for the option of the target compared to historic base year, and requires an estimate of annual inventory.

3.3 TYPE 3 (GHG GOAL/TARGET): GHG INTENSITY/UNIT GDP COMPARED TO HISTORIC YEAR

In the case of type 3 (GHG intensity/unit GDP compared to historic year), the mitigation contribution is expressed as a reduction in the intensity of GHG emissions per unit of GDP by a determined amount in comparison to the intensity of GHG emissions per unit of GDP in a historic year. It is thus expressed as both a quantitative and a relative contribution.

In order to estimate this GHG target, two parameters have to be chosen by the country: the historic year (e.g. 2005,…) and the target year (e.g., 2020, 2025,…).

METHOD (EXAMPLE):

If 2010 is chosen as the historic year and 2030 is chosen as the GHG target year, and

If Y are the GHG intensity/unit GDP in 2010,

Then, the target can be expressed as a reduction of X% below Y by 2030.

An example of this kind of target is found in the Communications received by UNFCCC from China in relation to the listing in the chapeau of the Copenhagen Accord: 40-45% reduction of carbon-dioxide emissions per unit of GDP by 2020 from the 2005 level.

In order to design this kind of mitigation contribution, the country will have to take the following key steps:

- a/ Perform the national GHG inventory pattern for the historic year,
- b/ Perform a baseline study of the GHG emissions for all relevant GHG sectors over the period until the GHG target year,
- c/ Identify the mitigation options in all the sectors,
- d/ Calculate the emissions by the GHG target year,
- e/ Calculate the GDP by the GHG target year,
- f/ Estimate the cost of implementing the mitigation options,
- g/ Identify the sustainable development benefits achieved through implementation of the mitigation options.

In this option, the target provides a certain flexibility, as it is defined with respect to the changes in GDP. Thus changes in the growth rate compared to the projections do not impact on the target. This target is thus more relevant for developing countries, as these countries expect to have a higher growth rate in the near future.

3.4 TYPE 4 (NON-GHG GOAL/TARGET)

In the case of type 4 (non-GHG goal/target), the mitigation contribution is usually expressed as an absolute target in one of the emissions sectors or sub-sectors.

For example, this might be a RE target in the electricity sector, an EE target in the building sector or a forestry target.

In order to design this kind of mitigation contribution, the country will have to take the following key steps:

a/ Perform a baseline study in the sector/sub-sector over the period until the target year,
b/ Identify the mitigation options in the sector/sub-sector,
c/ Estimate the cost of implementing the mitigation options,
d/ Identify the sustainable development benefits achieved through implementation of the mitigation options,
e/ Estimate the impact of the non-GHG target on GHG emissions and express this as tons reduced by the target year. This step is important, as this information should be provided in the INDC to enable the aggregate global emission reductions to be estimated compared to BAU in the target year and to assess the adequacy of the global mitigation contributions.

The key difference, even though the GHG reductions have to be estimated, is that the commitment is to achieve a non-GHG goal and not a GHG goal. Further, though other factors (such as economic growth, changes in technology costs and the development of new technologies) can have an impact on achieving the goal, the goal is easier to track, and it is easier to make adjustments in policies or resource allocations to achieve the goal.

3.5 TYPE 5 (ACTIONS): POLICIES, REGULATIONS OR FINANCIAL INSTRUMENTS

In the case of type 5, the mitigation contribution is expressed as policies, regulations or financial instruments designed and implemented as sectoral or national actions and having a direct or indirect positive impact on sectoral or national GHG emissions.

Examples of such actions are:

- Carbon tax
- Feed-in-tariff to support RE
- Standards for building EE

These actions will be identified in the context of national sustainable development. In order to define this kind of mitigation contribution, the country will have to establish a BAU scenario defined as the scenario which would occur in the absence of the new policies/regulation/financial instruments. The key steps in designing this kind of mitigation contribution will be:

a/ Define the BAU scenario (based on existing or already planned policies/regulations/financial instruments),
b/ Define the mitigation scenario, i.e. the scenario taking the new policy/regulations/financial instruments into consideration,
c/ Identify the sustainable development benefits achieved through implementation of the policies/regulations/financial instruments,
d/ Estimate the impact of these policies/regulations/financial instruments on GHG emissions reductions.

The accuracy of GHG estimates for this goal is low, as it is dependent on the impacts of policies and measures on the intended outcome. For example, compared to an RE goal, where the MW capacity to be created is clearly known upfront, a FiT policy does not lend itself to easy estimates of how much RE capacity will be created. At the same time, this type of goal provides the maximum flexibility in accommodating future changes in economic growth and other factors that would have an impact on achievement of a goal.

3.6 TYPE 6 (ACTIONS): PROJECTS AND PROGRAMMES

In the case of type 6, the mitigation contribution is expressed as projects and programmes designed and implemented as sectoral or national actions and having a direct or indirect positive impact in terms of sectoral or national GHG emissions.

Examples of such actions are:

- Programme to support RE
- Railway infrastructure to increase rail freight
- EE programme in district heating
- Solid waste management programme in select cities

In order to define this kind of mitigation contribution, the country will have to establish a BAU scenario defined as the scenario which would occur in the absence of the mitigation project/programme. The key steps in designing this kind of mitigation contribution will be:

a/ Define the BAU scenario (based on existing or already planned projects, programmes,…),
b/ Identify in the BAU scenario sources of emissions and list options for mitigation (programmes/projects),
c/ Identify the sustainable development benefits achieved through implementation of the programme/project,
d/ Estimate the impact of these projects and programmes in terms of GHG emissions reductions.

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ANNEX A. DEFINITIONS

ADAPTATION GAP

'The difference between what is needed in terms of adaptation and what is currently realised in terms of, among others, access to funds, capacity building, and monitoring and evaluation systems.' (UNEP 2013b, p.2).

BARRIER

A reason why a target is adversely affected, including any failed or missing countermeasures that could or should have prevented the undesired effect(s). (Boldt et al., 2012)

ADAPTATION-MITIGATION SYNERGY

An interaction between adaptation and mitigation such that their combined effect is greater than the sum of their effects if implemented separately (Klein et al. 2009)

ANNEX B. EXTERNAL RESOURCES IN INDC PREPARATION

1. UNDP WRI Guidance Note
2. CDKN Guidance Note
3. Guidance note on how to use the MCA for prioritizing technologies, UNEP DTU Partnership (2015)
4. Guidebook on Overcoming Barriers to the Transfer and Diffusion of Climate Technology, UNEP RISØ Centre (2012). Online at: ***http://www.tech-action.org/Publications/TNA-Guidebooks***

ANNEX C. GREENHOUSE GAS ABATEMENT COST MODEL (GACMO)

(version of 10 June 2015)
This model was developed by Joergen Fenhann, UNEP DTU Partnership, e-mail jqfe@dtu.dk, mobile: +45 4020 2789.

GACMO is used to make an analysis of the GHG mitigation options for a country to be used in the National Communication or the INDC.

GENERAL DESCRIPTION OF HOW THE MODEL WORKS

The model's outcome is a table providing an overview of the cost and impact of different mitigation initiatives, outputted in the format of a table and an Abatement Revenue Curve. The input required for the model to run is a GHG balance for the country in question.

WHO CAN BENEFIT FROM THE MODEL?

If your country has not drawn up a Business As Usual (BAU) scenario for the desired future year, you could use the first part of the GACMO model to calculate the BAU scenario.

If you country has not calculated the mitigation scenario, you could use the second part of the GACMO model. You then skip the first part and insert the total BAU GHG emissions at the bottom of the desired 'Main' sheet.

If you have not done the calculation for all your desired mitigation options, you could use the model to complete your calculations.

USE OF THE MODEL:

All cells in the worksheets where inputs are needed are in yellow. Most of these cells contain default values; these can be modified where appropriate.

Below, a range of steps required in using the model will be explained. Text marked in blue indicates that the user has to either input data or perform other actions in order for the model to run.

1. **In the sheet 'Start Year Balance' the GHG balance for your country should be inserted as the first step in use of the GACMO Model.**
   - Insert data into 'Start Year Balance': you should insert your data here. The model has been modified to fit the format of data from Enerdata.net, but data from other sources can be inserted if you prefer. The format of the data inserted has to fit the format presented in the sheet 'Start Year Balance'.
   - The balance contains columns for all fossil fuels and rows for all normal energy balance sectors.
   - The balance also contains emissions of GHG from other sectors.
   - The model will then (in 2 tables above the GHG balance) calculate the energy balance (in ktoe) and the fossil fuel mass balance (in tonnes and M3)
   - To do this, the model uses the IPCC default emission factors in tCO2/toe, and calorific values in toe/(tonne or m3), located above the tables.

2. **The next step is to insert the expected growth in energy consumption in the sheet 'Growth'.**

   Here you provide the annual growth in the periods: start year-2020, 2020-2025, 2025-2030. The % increase from start year values to 2020, 2025 and 2030 are then calculated.
   - You can override the formulas in the last 3 columns and insert the values for % increase from start year values in the columns for 2020, 2025, and 2030.
   - Using these growth factors, GACMO calculates the fuel, energy and GHG balances for 2020, 2025 and 2030 in the next 3 worksheets.

3. **In order to make the calculation for all the GHG mitigation options, the following assumptions used in all options must be entered in the 'Assumptions' sheet**
   - Country name
   - Start year for the latest GHG balance
   - Discount rate
   - Energy prices in US$/liters for crude oil, all distillates, coal, lignite and natural gas. The model uses the historic relation between the crude oil price/liter and the distillate price/liter.
   - Calorific values and GHG emissions factors for all fossil fuels.
   - CO2 emissions factor for electricity production (combined margin can be used).
   - Global Warming Potentials (GWPs) for methane (CH4) and for Nitrous Oxide (N2O).

4. **All the GHG mitigation options are located according to the types and subtypes used in the CDMpipeline ():**
   - In alphabetic order, each type has a named worksheet.
   - Each type-worksheet contains tables in succession for all the sub-types we have managed to cover.
   - If you are missing a specific sub-type that is relevant for your country, then please contact us via the e-mail above, and we will try to include the missing sub-type.
   - The sub-types included in GACMO are listed in an interactive menu at the top of each type-worksheet. You can jump down to the option by clicking on the option name in the menu.
   - In each of the technology sheets there are various values you have to insert in order for the calculations to be correct. The cells in which you have to insert values are marked in yellow.

5. **All the calculation tables for the GHG reduction options are constructed in the same way:**
   - The top line contains the name of the option.
   - The top left table contains the economic calculation, with a column for the reduction option, a column for the reference option and a column with the cost increase.
   - The next line in this part contains the investment in US$ for the reduction and for the reference option (sometimes only the increase is listed in the first column).
   - The next line shows the number of years over which the investment will be amortized.
   - The next line shows the annual payment (=levelized cost) of the investment according to the discount rate used (shown in the general inputs table to the right).
   - The next lines show the annual O&M cost, fuel costs and some the material costs.
   - The last line in this part shows the total costs.
   - The bottom left table contains the GHG emissions calculations, with a column for the reduction option, a column for the reference option and a column for the GHG reduction.
   - Below this, the resulting reduction costs in US$/ton CO2-eq. are calculated.
   - At the very bottom, some notes explaining the option are displayed if applicable. Here you will often see that a CDM PDD has been used in making the default data.
   - In order to make the calculations transparent, a table stating all the inputs is shown to the right:
   - The top part includes the inputs used for both the reference and reduction options. Several of these are taken from the 'Assumption' sheet.

- Below this the inputs for the GHG reduction option are shown.
- Below this the inputs for the reference option are shown.

6. **All the calculations in the GHG reduction options are summarized in the 'Main' table:** At the bottom of the table the total investment, total annual costs, total GHG reduction and total BAU GHG emissions taken from the balance sheet.
   - The first 2 columns show the names of the types and the included sub-types.
   - The next column shows the reduction costs in US$/tonCO2 from all the option calculation tables.
   - The next column shows the unit sizes defined in each option calculation (e.g. 1 MW, 100 ha, 1000 tons etc.)
   - The next column shows the GHG emissions reduction in each of these units.
   - The next column shows the total investment for each option in million US$.
   - The next column shows the total annual cost for each option in (million US$/year).
   - The next column shows the total size (the number of units) of the options for your country. This column is very important, as it indicates the effect (in reduction of GHG emissions) the option will have in the system.
   - The next 3 columns show the total GHG reduction for the selected options, the accumulated reduction in kt/year and in % of the total BAU (shown at the bottom).
   - The next 2 columns show diesel and gasoline saved that cannot be replaced by biodiesel and bioethanol.
   - The last 2 columns show the reduction in electricity consumption and electricity produced from fossil fuels.

7. **A Marginal Abatement Revenues (MAR) curve is calculated based on the cost of the GHG emissions reduction pr. reduction option US$/tCO2 (y-axis), and the impact of the GHG emission reduction in kt/year (x-axis).**

To make the cost-curve, you first press the 'Sort reduction options' button at the top of the 'Main' sheet.

The macro in this button will update the table to the far right of the 'Main' sheet, showing the largest marginal revenue at the top (=lowest negative marginal cost). Then go to the 'Graph' sheet and press the 'Create Abatement Cost Curve' button.

Above the button 'Create Abatement Cost Curve' a few settings for the graph are available. These are used to make sure that, when created, the Abatement Cost Curve is legible and provides the needed overview. If options that have a very small reduction impact, thus leading to a very narrow expansion on the x-axis, or that have either a very high cost or a very low marginal cost (values on the y-axis) are included, this can lead to the graph being very difficult to decipher. By experimenting with the three values in the settings box, the Abatement Cost Curve can be modified to include the most relevant options in a clear manner. If the checkbox labelled 'Include all options in graph with no thresholds' is ticked, the Abatement Cost Curve will be created with all the options included.

- Threshold for smallest values on the x-axis refers to the minimum percentage that the total amount of CO2e reductions should constitute
- Threshold for smallest value on y-axis
- Threshold for largest value on y-axis

Below the created Abatement Cost Curve are two tables. The reduction options included in the graph are listed in the one on the left, and the reduction options excluded (due to the thresholds set by the user) are listed in the one on the right.

Photo credit: Asian Development Bank (Floods in Tonga)

ADAPTATION

MITIGATION

Photo credit: DFID - UK Department for International Development (Off the grid, but on the up)