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WORKING PAPER

Thoughts on the choice of form of an INDC

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Working Paper

This working paper intends to support in-country teams involved in building their Intended Nationally Determined Contributions (INDCs) by exploring the different possible forms these contributions could take. It builds on discussions initiated under the MAPS Programme in the INDC Lab (Lima, July 2014), together with subsequent research and national experiences in Peru, Chile, Colombia and South Africa.

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Developing countries exploring pathways to climate compatibility

1. CONTEXT

Since the 15th Conference of the Parties in 2009, several governments have proposed commitments to reduce greenhouse gas (GHG) emissions which differ from the traditional pledges discussed under the UNFCCC[1] negotiations. This has resulted in a broad spectrum of commitment forms under consideration for the development of Intended Nationally Determined Contributions (INDCs)[2]. The considerations for choosing a particular form are multiple, interdependent and context specific, and related literature is incipient.

Following this introduction, Section 2 identifies the main considerations in the choice of a form. Section 3 outlines a subset of three economy-wide commitment forms[3], namely 'Intensity targets', 'Deviation below a BAU specified ex ante' and 'Trajectories'. Section 4 discusses advantages and disadvantages of each form. Finally, Section 5 proposes a set of components that climate mitigation practitioners might examine while developing and agreeing their contributions.

2. MAIN CONSIDERATIONS INFORMING THE CHOICE OF FORM

Mitigation contributions are defined by multiple characteristics. Höhne[4] includes type, scope, time dimension, range and conditionality, and level of bindingness as key ones. All characteristics, together with rules underlying the scale of effort, level of transparency provided and considerations of what others do, need to be considered in the appraisal of ambition and fairness of individual INDCs.

However, there is little doubt that scale of mitigation effort[5] should be the main determinant in assessing the ambition and fairness of national contributions. Practitioners designing a contribution for their country should first consider the scale of the mitigation effort their country is willing to undertake, and the fairness of this effort from a global perspective. MAPS[6] country processes are an example of a way to build a sound basis with which to address the question of quantification of contributions. In MAPS, this was done by developing baseline and mitigation scenarios through a combination of extensive research and stakeholder engagement. Some of the MAPS countries have built 'required by science' and 'required by equity' scenarios to contextualize these proposed mitigation efforts. This work provides a greater understanding of different mitigation efforts and their social and economic implications, against which ambition and equity can be measured.

[1] United Nations Framework Convention on Climate Change.

[2] ~~In COP19, all Parties agreed to initiate or intensify domestic preparations for their intended nationally determined contributions, without prejudice to the~~ In COP19, all Parties agreed 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 at COP21 (decision 1/CP.19).

[3] For a more comprehensive list of mitigation commitments, see Höhne, N., Li, L., Larkin, J. 2014; and Levin, K. & Finnegan, J. 2013.

[4] Höhne, N., Li, L., Larkin, J. 2014. "Characteristics of Mitigation Commitments." Working Paper. Washington, DC: Agreement for Climate Transformation 2015 (ACT 2015).

[5] In this paper, the scale of mitigation effort is also referred as the "numbers".

[6] Four Latin American countries are currently involved in MAPS type processes. These processes involve high-level stakeholders in the research process of determining mitigation scenarios for their countries. For more information on the Mitigation Action Plans & Scenarios Programme see www.mapsprogramme.org

Due to processes involving stakeholders, a sense of support in each country can be achieved. The form of the contribution should not be, by itself, a primary indicator of the level of ambition.

The specific profile of defined GHG emissions over time can be presented and packaged in many different ways (see Box 1). This presentation and packaging seems to greatly influence the perception of ambition. An example exists in the UNFCCC negotiations. The way a contribution is presented and communicated to the UNFCCC and domestic constituencies, leads to varying levels of acceptance and has legal implications. Therefore, we can confirm that the form and its presentation will in fact have an effect on the levels of ambition too.

Box 1: Visual representations of forms of contributions, for the same level of ambition

Figure 1 illustrates different ways of representing a contribution. Although the different forms look significantly different, they do in fact represent the same scale of mitigation effort, the so-called "Sustainable Scenario" used by the PlanCC project in Peru[7]. For example, in the case below a 46% reduction compared to BAU equals an 8% increase of emissions relative to the base year.

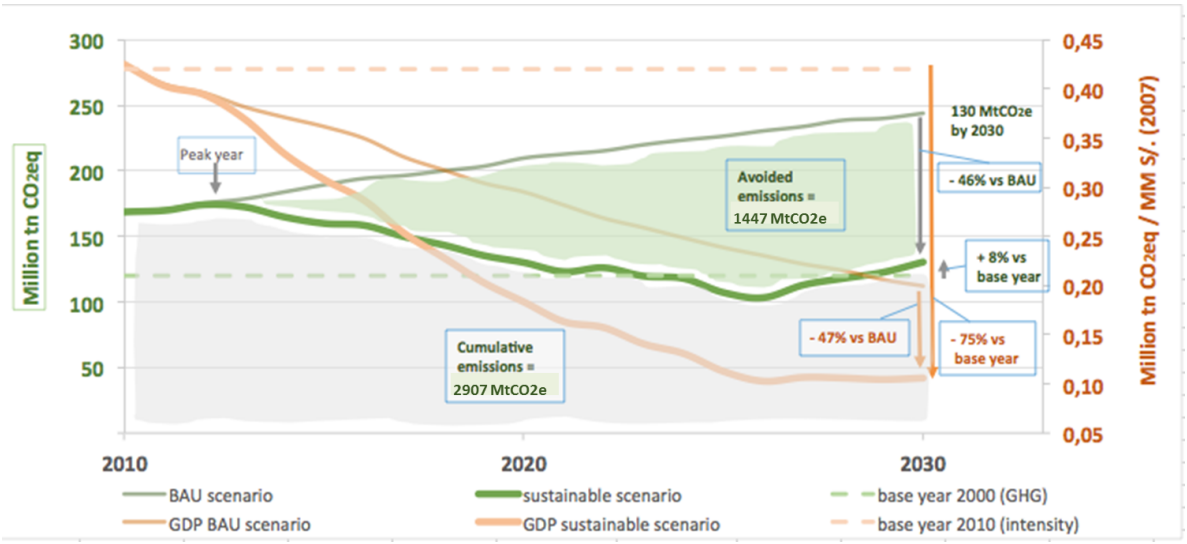

Figure 1: Illustration of different forms of contribution

The main considerations in the choice of the form of INDCs in this working paper have been structured according to science, national policy development and information-related requirements. In so doing, the analysis isolates form of contribution from other characteristics, in particular scale. It is important to be mindful that form will only provide a comprehensive picture of mitigation effort when combined with the full suite of characteristics.

1. Science-driven requirements

The latest IPCC AR5[8], concludes that cumulative GHG emissions together with the emissions level up to 2050 and beyond, are the main variables needed to assess progress in reaching the 2°C target. The UNEP Gap Report[9] states that global

[7] The "Sustainable Scenario" corresponds to one of the scenarios developed by the PlanCC project in Peru. For more information, see: www.planccperu.org. The choice of this scenario was arbitrary for this working paper.

[8] Intergovernmental Panel on Climate Change, Fifth Assessment Report, Working Group I.

[9] The Emissions Gap Report 2014. UNEP.

emissions need to peak by 2020 for a least-cost chance of limiting warming to 2°C and it is politically understood that the time for peaking may be longer for developing countries.

From this perspective, the environmental integrity of individual INDCs will be safeguarded if the form of contribution provides information and guarantees regarding the cumulative GHG emissions for an entire period. So without specifying the pathway, or emissions for each year over the period, the environmental outcome is uncertain. That means, that single-year forms of contribution, which only limit emissions in one year, do not embed environmental integrity.

In addition, the timing and level of peak emissions becomes central to the question of environmental integrity. Therefore, we argue that peaking of emissions is needed for any form of INDC from the science-perspective. President Xi Jinping recently announced that China's GHG emissions would peak by 2030 or earlier, though without specifying the level at which they should peak.

2. National policy development-driven requirements

Although the scale of effort is key to enable effective policy development at national (and sub-national) levels, the chosen form should also be considered. To date, there is little research on the impact of the form of commitments to policy development outcomes, and how the different domestic audiences may respond.

In-country practitioners need to understand the extent to which flexibility[10] might be needed to ensure an optimal transition to a low carbon society. Flexibility could be used to avoid lock-ins and to strengthen buy-in from implementing agents. Flexibility is often presented as a simple trade-off with the science requirements or ambition, but we argue this is not always the case, in particular if a country adopts a long-term vision and makes sure it stays within the available carbon budget.

A main strategic consideration for the choice of form is expected to be the associated risks to the economic and social development of the country. From a domestic perspective, economy-wide contributions seem to be more flexible than other contributions (sectoral targets, or policies or mitigation actions) in the sense that the country can decide where to reduce emissions, or adjust existing climate policy in the light of economic and social developments across sectors and response of different sectors to the transition to a low carbon economy.

Flexibility should not be confused with ambiguity. We reason that ambiguity in the definition and communication of the form (as well as scale of effort) may lead to inaction. Greater levels of transparency have indisputable benefits for national policy development, in particular for private sector engagement.

Lastly, the choice of form will need to examine policy implications for the LULUCF[11] sector, as a particular economic and social sector, as well as major emission source in many developing countries. It is assumed that business as usual development and mitigation potential assessments will most probably assess the LULUCF sector separately from other sectors given its peculiarities. In principle, accounting should be comprehensive across all carbon pools, although some countries may require time to develop accounting systems, starting with areas where they have best data.

[10] Flexibility refers here to the possibility to adapt the national (or sub-national) underlying strategy when needed in order to optimize the achievement of both development and climate goals.

[11] Land Use Land Use Change and Forestry.

3. Data and information requirements

Data is the basis with which to define and quantify the mitigation contribution. In order to achieve informed, robust and legitimate decisions, building baseline and mitigation scenarios to understand emission reduction potentials, costs and socio-economic implications of mitigation actions, is needed for any form of economy-wide contribution. Establishing base-year data, projections and calculating possible emissions reductions is challenging. The three forms examined in this paper require projections, based on assumptions, for a range of emissions drivers and depend on modeling techniques, which can range from simple to complex. For any form of contribution, reporting underlying data and assumptions of the baseline and mitigations actions would generate much greater transparency.

Updating initial projections will be essential to assess progress towards the contribution and remaining emission reduction efforts. This could consist of a domestic exercise to evaluate existing and planned actions and policies, as well as market and economic developments, and consider necessary adjustments. The continuous exercise of updating data and information has to be expected regardless of the form of contribution.

Developed countries have more experience in developing GHG emission baselines and projections than developing countries. Data availability, data quality and related capacities vary across countries, and indisputably, the choice of form of the contribution should be commensurate to these factors. One could say that the wider the scope, the larger the number of sources and technologies included in the assessment. Therefore a larger and more comprehensive dataset will be needed. Similarly the longer the time horizon of the contribution, the longer the historical and projected data series. And more importantly, the kind of data sets (either national, regional or sector-level) that provide sufficient confidence to back contributions.

An imperative of the INDC process is to be able to determine whether the sum of all the individual contributions put the international community on the track to meet, at minimum, the 2°C limit. Provision of minimum data and information and transparency are key to this process. Similarly, other requirements emerge from the need to monitor progress towards the national contributions within the international context.

3. ASSESSMENT OF DIFFERENT FORMS OF CONTRIBUTIONS

The assessment of each of the forms of contributions will explore data-related requirements in these three processes: development of the INDC, definition of ex-ante information to be able to assess adequacy at global level, and the ex-post monitoring of the achievement of the contribution. The latter is then related to existing MRV requirements associated to Biennial Update Reports (BUR). National (or sub-national) internal data systems to monitor progress towards contributions are not necessarily assessed, but BURs do include information on domestic MRV. Below, we present three forms of contributions: intensity targets, deviation below a BAU specified ex-ante, and trajectories.

1. Intensity target

The intensity target consists of emissions reductions related to a specific output. For sectors, these might be GHG emissions per megawatt-hour or per ton of steel, or cement. For the economy as a whole, targets are generally presented as carbon intensity of Gross Domestic Product (GDP).

When used as a national target, the carbon intensity of GDP is a contribution to reduce emissions per unit of GDP by a specified quantity relative to a base year[12]. GDP metrics and methodology would need to be specified, including the use of local or international currency, and its translation if appropriate.

The "emissions efficiency" is inversely proportional to that of "carbon intensity". This efficiency should ideally increase (more output per unit of carbon dioxide (CO_2)) as emissions growth "decouples" from GDP growth.

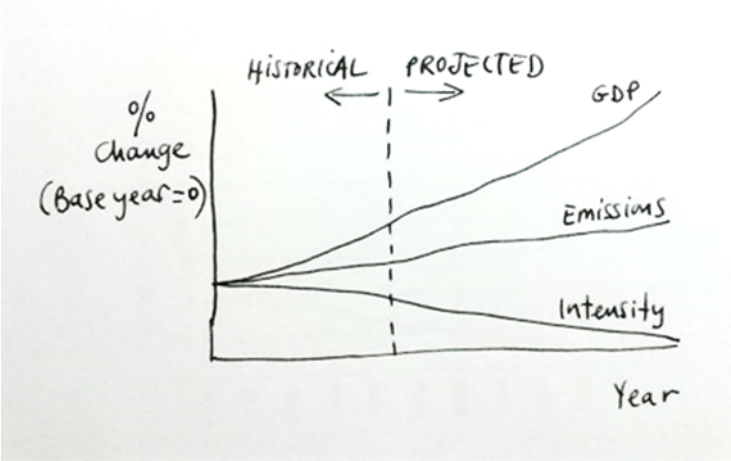

Figure 2: Intensity target

Examples of intensity targets (Cancun pledges):

- China has committed to reduce its CO_2 emissions per unit of GDP by 40 to 45% from 2005 levels by 2020.
- India has made a commitment to reduce its GHG emissions per unit of GDP 20% to 25% below 2005 levels by 2020. It added that emissions from the agriculture sector would not form part of the assessment of its emissions intensity.

Studies show that in developed economies, emissions intensity per GDP peak during industrialization and generally decline post-industrialization. In the case of developing economies, emissions intensity could peak during economic development, even in the absence of explicit GHG emission reduction goals, for example if clean technology is accessible and affordable. Policies to reduce emissions could in turn lead to better economic incentives that improve economic and social efficiency and productivity.

Forms of targets that decouple GDP growth from emissions have been proposed by developing countries with high absolute annual emissions. Some perceive the ambition of this form of contribution to be low, as no absolute emissions cap is directly set. The rationale of using such a target is to illustrate that a certain level of development is achieved whilst producing less GHG emissions. It signals that low carbon development paths may be compatible with continued economic growth and could trigger efforts for innovation and transformational change within the countries where it is used. Countries willing to be ambitious might specify stringent intensity improvement, annual change rates or give certainty by combining this form with an emissions peaking time and level.

[12] Levin, K. & Finnegan, J. 2013. "Designing National Commitments to Drive Measurable Emissions Reductions after 2020." Working Paper. Washington, DC: World Resources Institute. Available online at wri.org/publication/measurable-emissions-reductions-after-2020.

For countries with unstable economies, for example countries with long periods of hyperinflation, the metrics and methodology for GDP estimates might undermine the potential outcome of any mitigation-relevant policy developments with regards to achievement of the contribution.

The sustainable scenario exemplified in Box 1 would look as follows for an 'intensity target' contribution form.

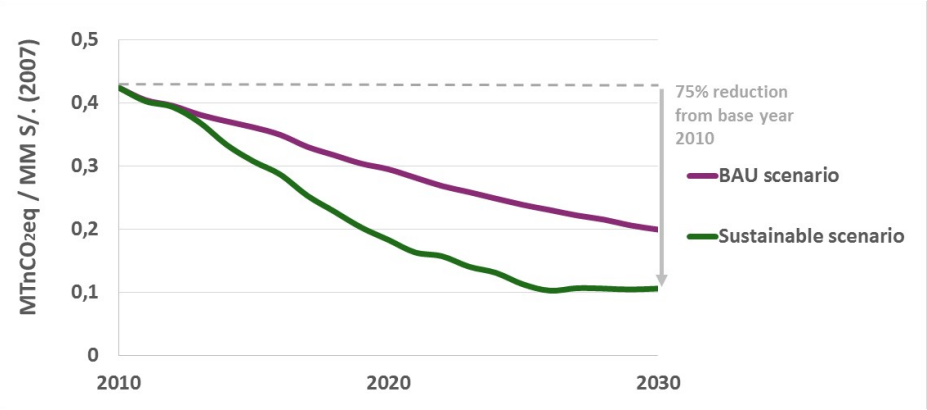

Figure 3: Sustainable scenario presented as an intensity target

2. Deviation below a BAU specified ex ante

This technical option refers to a relative reduction of emissions compared to a business as usual (BAU) which has been defined and communicated ex-ante. The fact that the BAU is presented, and not updated over time for the purpose of the goal setting, means that absolute emissions levels are defined for a certain year. This form also provides more information for the scrutiny of the expected level of effort, compared to for example, QELRO-type of form. It could also make explicit the country considerations around early actions, and their contribution to the future commitment.

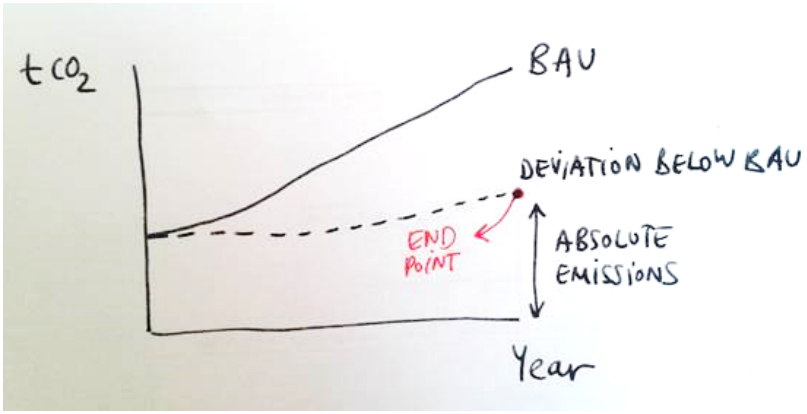

Figure 4: Deviation below BAU scenario

As previously explained, single-year targets in absolute emissions lack environmental integrity. In response to this, several developed countries have taken on quantified economy-wide emission reductions targets (QEERTs), typically expressed as x% below 1990 levels by 2020 (or below 2005 levels). As figure 5 illustrates, very different emission paths are possible - subject to the rigidity of the economy– a linear trend, lower emissions, or high emissions, suddenly declining near the end. An additional problem of this is the fact that high emissions paths, compatible with an end point, could lead to irreversible lock-ins that turn out to be critical when we approach the longer term, and even the achievement of the single-year target has turned to be unattainable. The BAU scenarios serve the purpose of understanding the amount of avoided emissions over a period, although it is not a commitment of cumulative avoided emissions.

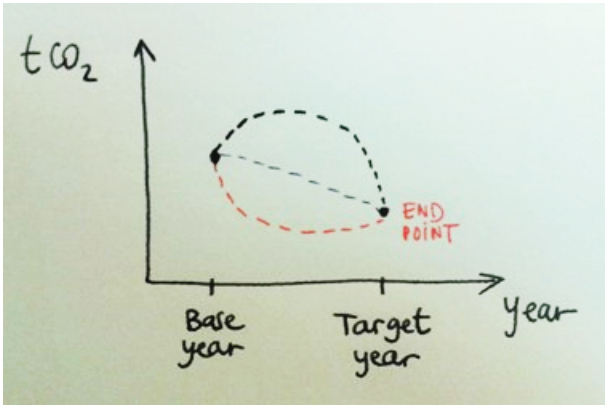

Figure 5: Single-year target

The BAU scenario is a set of reasonable assumptions and data that best describe future changes in emissions most likely to occur in the absence of activities taken to meet a mitigation goal[13]. A mitigation scenario set against a BAU provides insights on the pathway that a country might follow to achieve a target. Pathways will nevertheless be revised during national policy development, and countries using the below BAU form should factor measures against the concerns of single-base year type of forms.

In a contribution below BAU, the consideration of specifying ex-ante the BAU scenario – as opposed to an unknown BAU - is particularly relevant for the form. An unknown BAU implies the impossibility of quantifying ex-ante the scale of emission reduction to be achieved. The unknown BAU lacks clarity and gives a fear of 'gaming'. Although this unknown BAU provides more flexibility and less risk at the international level, it will nonetheless not be addressed in this working paper due to the lack of environmental integrity and the uncertainties it generates for domestic policy development.
Examples of deviation below BAU targets (Cancun pledges):

- Brazil announced a target to reduce emissions growth by 36% to 39% below BAU levels by 2020, and presented BAU figures - a level estimated to bring down Brazil's emissions to 1994 levels. It also specified actions that would help Brazil achieve the desired deviation.
- Chile has committed to achieve a 20% deviation below the BAU emissions growth trajectory by 2020, as projected from year 2007. The country has developed several BAU scenarios under MAPS Chile[14] project, however has not yet communicated to the UNFCCC the BAU scenario against which the Cancun pledge is calculated.
- South Africa announced a target to reduce emissions growth 34% below business-as-usual emissions growth trajectory by 2020 and 42% by 2025. BAU figures were subsequently included in domestic policy.

The 'below BAU' format has been attractive for some developing parties as it reflects the trend of growing emissions resulting from rapidly growing demand for energy and other services in pursuing development goals. Fixed emissions reductions or limitations may prove difficult to sell nationally, and has strong connotations under the UNFCCC. BAU targets can provide flexibilities and assurances for reluctant sectors within a country, and therefore a possible appropriate form for a period during which countries are still industrializing. Consideration should be given to the time-frame when countries need to peak – and thereafter move into absolute reductions against a historical year.

[13] Levin, K. & Finnegan, J. 2013. "Designing National Commitments to Drive Measurable Emissions Reductions after 2020." Working Paper. Washington, DC: World Resources Institute. Available online at wri.org/publication/measurable-emissions-reductions-after-2020.

[14] www.mapschile.cl

Parties should bear in mind that using BAU-related targets is cost- and time-intensive, given the number of assumptions that need to be defined, agreed and communicated. Presenting and visualizing this contribution as a number relative to base year is not usual among developing countries, even when the level of emissions has been fixed for a certain year by specifying the BAU. We believe this is due to the connotation of this form under UNFCCC negotiations and the perception of lenient contribution as emissions continue to grow over 1990, 2000 and 2010 levels (Box 1).

The Sustainable scenario exemplified in Box 1 would look as follows for a 'deviation below BAU' contribution form.

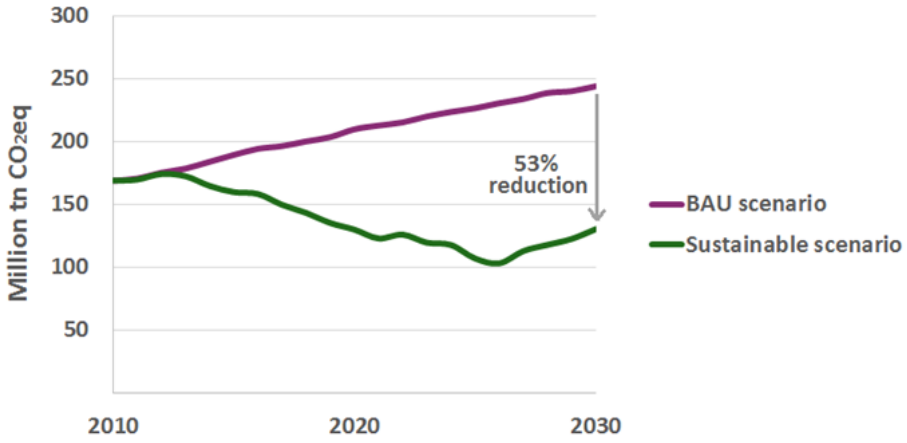

Figure 6: Sustainable scenario presented as a deviation below BAU

3. Trajectories

This form of contribution considers the commitment of a country to a long-term emissions trajectory[15]. A desired emissions trajectory is put forward in a schedule to a protocol, over a long period, e.g. 2015 (or 2020/1) to 2050. A trajectory might include different phases over time. A trajectory form with increasing emissions numbers in the short-term is not very different to the deviation below BAU or intensity target. In case where industrialisation still requires increased activity, and given the rigidity of the economies and systems, no form of contribution would actually generate significant differences in the total amount of GHG emissions.

Flexibility would suggest that countries committing to this form would bind themselves to cumulative emissions over a period, rather than precise emission levels every year. For rigour, the country would commit to a long-term emissions goal, e.g. x00 Mt CO_2-eq in 2050, whilst emissions in each year of the trajectory should be fully specified, adding elements to balance flexibility and rigour. These elements will be very important for the further development of national climate policy. The area under a trajectory implies a carbon budget, which can be related to global carbon budgets remaining, according to IPCC AR5 WGI[16]. Alternatively, countries could specify intermediate years with upper and lower ranges, and year in which emissions peak.

[15] In this working paper, we use the term 'trajectory' and 'pathway' interchangeably.

[16] Intergovernmental Panel on Climate Change, Fifth Assessment Report, Working Group I.

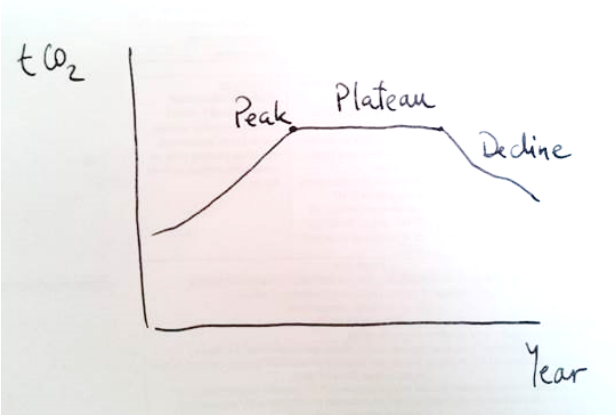

Figure 7: Peak, plateau and decline trajectory

Examples of trajectories (Cancun pledges):

- A peak, plateau, decline trajectory was referenced in South Africa's nationally appropriate mitigation action communicated to the UNFCCC after Copenhagen, and is part of its national climate policy, with upper and lower ranges. Peak, plateau, decline specifies that emissions should peak in the period between 2020 and 2025, remain stable for around a decade, and then decline in absolute terms.
- The United States in communicating its target of 17% reduction below 2005 levels by 2020, added the following information in a footnote: "The pathway set forth in pending legislation would entail a 30% reduction in 2025 and a 42% reduction in 2030, in line with the goal to reduce emissions 83% by 2050". Taken together, the United States has specified percentage reductions from a historical base year (as opposed to using a baseline) for four years. President Obama announced in November 2014 that the US would reduce emissions by 26-28% below 2005 levels by 2025; less stringent than indicated earlier in 'pending legislation'.

Benefits from trajectory targets relate to the idea that deep changes are possible in the long-term, while flexibility is important in the short- and medium-term for developing countries. The long-term allows not only structural changes in the economy, but also technology leaps. These can have a great impact on emissions. This form makes explicit the commitment of the country regarding the peaking year, which is key as outlined in Section 2. Whereas it may show that emissions might still grow in the short-term, it unpacks the emission levels by 2050. For countries willing to provide a clear long-term signal and its conforming to limiting warming to 2°C, this form is most useful.

The sustainable scenario exemplified in Box 1 would look as follows for a 'trajectory' contribution form.

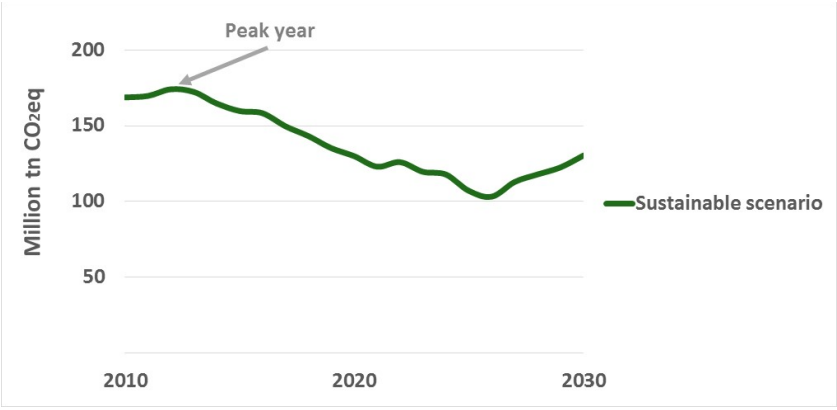

Figure 8: Sustainable scenario presented as a trajectory

4. HOW TO CHOOSE THE FORM OF MITIGATION CONTRIBUTION?

Different forms of contributions create different perceptions amongst stakeholders, and may have different legal implications. These implications need to be assessed from both a domestic and international perspective. A domestic perspective will scrutinize the risks associated to the development of the country and the dynamics and potential of local policy-making. National (and sub-national) policy development will need to factor potential lock-ins between short and medium (or long) term and flexibility requirements among sectors to include mitigation contributions. Government decision-makers will take into account the national acceptance of a certain contribution. Decision-makers will also respond to the international perspective, where comparability with other countries, alignment and partnerships, leverage of international action, build-up from previous commitments and historic negotiating positions will play important roles. Finally, decision-makers will need to assess the legal implications of measurement, reporting and verification (MRV) of the contribution.

Table 1 summarizes the advantages and disadvantages of the three forms of contributions examined in this paper according to the main considerations outlined in Section 2: science, national policy development and data & information requirements.

Table 1: Advantages and disadvantages of three forms of contributions

INTENSITY TARGETS	DEVIATION BELOW A BAU, SPECIFIED EX-ANTE	TRAJECTORIES
EX-ANTE ASSESSMENT: DOES THE FORM ENABLE AN ASSESSMENT OF ADEQUACY AT GLOBAL LEVEL?		
It becomes complex and generates uncertainty as the absolute level of emissions depends on GDP or population projections. If GDP or population projections are not presented, ex-ante assessment becomes even more controversial.	It is possible, as absolute GHG emissions in a certain year are known. This assumes that all countries have the same target year, otherwise extra assumptions are needed.	This form provides the most information because it defines cumulative emissions over a period, which is a good way to control the contribution to climate change effects and to estimate the world-remaining cumulative emissions.
SAFEGUARDING ENVIRONMENTAL INTEGRITY: CUMULATIVE GHG EMISSIONS & PEAKING		
Expected cumulative emissions over the contribution period are largely unknown. The peaking of the intensity indicator might be explicit or not. However, even if the peaking of the intensity indicator is known, the peaking of absolute GHG emissions cannot be assured for a specific year. The peaking of an intensity indicator is generally expected to happen before the peaking of the emissions.	Expected cumulative emissions over the contribution period are in principle unknown. The BAU counter-scenario provides insights on emission savings over the period. The peaking of GHG emissions might be explicit or not. The longer the time horizon for the target, the more revealing the potential peaking strategy of the country. A commitment to a peak year could be added to this form to increase environmental integrity.	Expected cumulative emissions over the contribution period are better known. Trajectories, particularly if they cover a longer timeframe, highlight the relevance of peaking of emission in the long term for all Parties. Peaking is explicitly part of the form, and time and level of peaking should be stated.

INTENSITY TARGETS	DEVIATION BELOW A BAU, SPECIFIED EX-ANTE	TRAJECTORIES
A commitment to peak GHG emissions (year and/or level) or change rate of the intensity indicator over time could be added to this form to increase environmental integrity.		
NATIONAL POLICY DEVELOPMENT: FLEXIBILITY PROVIDED		
It is adaptive to changes in economic development of the countries, in the sense that the commitment is for an intensity indicator as opposite to an absolute cap. The contribution is the result of combining two parameters. Therefore, in theory, two means of control exist, though in practice GDP is a result, rather than something easily "controlled". The effort lies on achieving decoupling of growth and emissions. With poorer economic results than expected, the achievement of the contribution remains as challenging as it was, and therefore decoupling is enforced.	Theoretically less flexible than intensity target, in the sense that adaptability to economic changes will depend on the capacity to decouple emissions from economic output. With poorer economic results than expected, the achievement of the contribution is expected to be easier and decoupling might not be achieved.	Theoretically less flexible than intensity target, in the sense that adaptability to economic changes will depend on the capacity to decouple emissions from economic output. With poorer economic results than expected, the achievement of the contribution is expected to be easier. Different levels of flexibility can be accommodated, varying from a fixed pathway where annual emissions are defined for a period to a carbon budget over a period. With the latter, flexibility exist across years.
PERCEPTION		
It serves as a good indicator of the transformational changes of the economy, which is crucial in the medium and long term. The concept of intensity/ efficiency is easier to communicate and "sell" to national constituencies as a driver for increased overall efficiency and productivity. However, it reflects certain environmental laxity as it is perceived as a commitment that avoids caps on absolute emissions. It might generate transparency concerns, as countries are sensitive about critique of GDP projections.	In contributions presented relative to a BAU, all controversies associated to BAU projections are translated into target controversies. This is often the case even after BAU is specified. Experience with CDM baselines raises fears of 'gaming' of baselines (that is, make BAU artificially high, so that the mitigation case looks good). And thus, countries are sensitive about critique of national BAUs.	Sets a long-term contribution at the national level (or at least, gives the signal of a long-term vision); countries are more likely to be ambitious with long-term goals, as deeper changes are possible.
IMPLICATIONS FOR LULUCF-SECTOR		
It needs to be carefully assessed because the trends in GHG emissions from LULUCF sector are not always	It could be included or not, without further implications. Whether LULUCF-sector is covered or not, it is	It could be included or not, without further implications. Whether LULUCF-sector is covered or not, it is

INTENSITY TARGETS	DEVIATION BELOW A BAU, SPECIFIED EX-ANTE	TRAJECTORIES
linked to GDP as energy-related sectors are. The relationship between GDP and forestry emissions is typically integrated in the assessments for forestry-related activities that directly contribute to GDP (paper production, firewood) but this excludes conservation-related activities. If LULUCF is included in this target, it would be an exogenous parameter, as it does not have an obvious intensity metric.	expected to be a question of desired flexibility across LULUCF and other sectors, and domestic acceptance.	expected to be a question of desired flexibility across LULUCF and other sectors, and domestic acceptance.
EX-POST ASSESSMENT: ADDITIONAL EFFORTS TO BUR FOR MONITORING & ENFORCEMENT OF THE TARGET?		
The main variables are GHG emissions and the chosen intensity parameter (GDP), so only GDP estimations are additional to BUR. All countries have GDP numbers, based on official domestic data sources, therefore there should be low level of uncertainty in the determination of the base year data, progress and achievement of the target. Therefore, less vulnerable to criticisms of gaming.	Only national GHG emissions are needed, so no additional MRV efforts to BURs. It is to be noted that ex-post assessment here focuses on the achievement of an end point, but does not deliver a picture of actual avoided emissions. For those countries that put the emphasis on the significance of the deviation below BAU, an evaluation of avoided emissions with updated counter-factual scenarios might be considered as additional information.	Only national GHG emissions are needed, so no additional MRV efforts to those required by the BURs. The achievement of a trajectory, as opposite to an end point, requires a larger number of data points.

The comparative overview of these three forms of INDC shown in Table 1 provides additional insights to the choice of form. Firstly, it illustrates that there are no major differences across these forms regarding data requirements. Section 2 states that all these forms require extensive research, in order to make an informed decision. Regarding the ex-post assessment, only 'intensity targets' add parameters to the existing BUR requirements, and those parameters (i.e. GDP estimations) are supposed to be easily available within domestic sources and linked to well-known international practices. 'Below BAU' has a slightly greater data burden at the moment of submitting the contribution due to the specification of the BAU.

Secondly, the degree to which each form enables an ex-ante assessment based on the sum of individual INDCs increases from 'intensity targets' to 'below BAU' and 'trajectories' form, the latter being the most helpful one. This is also the case when addressing peaking of emissions. This confirms that the 'trajectories' form is the most aligned to the required by science– if only form is considered. Nevertheless, we have identified options to enhance the environmental integrity of the other forms to similar standards, namely by adding milestones over the contribution period, including the peaking year.

Thirdly, from a national policy development perspective, we conclude that flexibility to adapt to economic and technological developments can be achieved through all the forms examined in this paper. That means that each of the examined forms could give space to policy-makers to define how to reduce on an annual basis and across years. A benefit of

this is, for example, a reduced risk of high investments in the wrong period driven by rigid requirements in the short term. The exception to this would be a 'trajectories' contribution with defined annual emissions for every year. Overall flexibility remains important across the different forms as they take place at economy-wide scale, and thus, emission reduction burden can vary across sectors over time. This flexibility is constrained by milestones (such as peaking year), end point or overall carbon budget, which should guarantee the expected environmental outcome. Last, in countries where the LULUCF sector plays a significant role in the total of emissions, 'Intensity targets' might require a special adjustment to include this sector as it does not have an obvious intensity metric, whereas it can be easily integrated in the other two forms.

The greatest differences across forms of contribution seem to mainly rest on the domestic and international perception of the various forms. 'Below BAU' and 'intensity targets' have some strong connotations under the UNFCCC. These could easily be overruled perceptions could be reduced with clear up-front data and transparent MRV. At domestic level, perception of ambition and acceptability are linked to the way that the form addresses development needs, notably signaling continued growth. This concept seems to be best represented in 'below BAU' and 'intensity targets'. On the other hand, the time span of 'trajectories' can provide confidence in the capacity of the country to transition to low carbon societies, which in turn might open space for enhanced ambition.

5. THE INDC PACKAGE

Beyond the considerations discussed so far, there at least four cross cutting elements that should be taken into account by countries while developing and agreeing their contributions.

- Scope: INDCs could go beyond mitigation by representing a comprehensive picture of all the efforts a country undertakes to face and address climate change, for example; vulnerability & adaptation, finance & means of implementation, capacity building and technology transfer.
- Political dimension: INDCs could include institutional arrangements, national processes including stakeholders' engagement, and political ambition. The institutional arrangements for the development, and sub-sequent implementation, of the INDC are crucial. A bridge between technical teams and national decision makers is needed for endorsement and empowerment of results. Regarding the national process, there are two processes: (1) preparing and agreeing on a contribution, bearing in mind international assessment and (2) implementing –i.e. linking to national regulation. On both processes, participatory processes are relevant to assure legitimacy. Finally, ambition is a national political choice, subject to an international assessment of relative fair efforts. The decision makers should consider no regression from previous targets, adequacy to contribute to 2°C goal and a long-term socio economic vision of the country that embraces a flourishing low carbon society.
- Narratives: Internal and external narratives should support the numbers. Whilst complex, this dimension is key. The domestic narrative could address diverse national stakeholders and motivate how the contribution will build competitiveness, reduce poverty, and is aligned with existing development agendas, making the case in terms of national and / or sectoral developments plans (e.g. electricity plans, agricultural exports, etc). The international narrative should address a global audience and explain why the contribution is credible, ambitious and a fair share. Narratives are powerful to provide a long-term robust vision that legitimates short-term actions.
- Upfront Information Requirements (UFI): UFIs serve two main purposes. First is to assess adequacy to meet a global mitigation target, and second, to assess the relative fair effort by the individual country (also called level of ambition within a context of equity and sustainable development). UFIs are of utmost importance to ensure transparency at national and international level. Table 2 contains a desired set of upfront minimum information

requirements for INDC submissions. An important finding is that UFI could easily be standardized for most forms of contribution.

Table 2: Applicable upfront minimum information for each form of contribution

INTENSITY TARGETS	DEVIATION BELOW BAU, SPECIFIED EX ANTE	TRAJECTORIES
IN ORDER TO PROVIDE CLARITY, TRANSPARENCY, AND ENABLE MUTUAL UNDERSTANDING OF INDCS		
- Indication of base year - Intensity of base year - Intensity of target year - GDP or population projections - Methodology and assumptions to project GDP or population	- Emission projections of BAU, defined ex ante and methodology & assumptions to project BAU - The deviation below BAU will specify absolute emissions level for each year over the period	- Timeframe - Pathway information including a number of data points of year and emissions, including peaking year, plateau and decline year - Emissions for every year within the period, or cumulative emissions over the period
- Start year, end year and milestones - Coverage of gases - Coverage of sectors (including treatment of LULUCF) - Use of flexibility mechanisms - Any conditionality - Other information related to accounting rules and methodologies behind the numbers		
IN ORDER TO ASSESS LEVEL OF EFFORT (ON MITIGATION)		
- Information on development needs, trends and established objectives - Key assumptions for emission projections (population and GDP trends, fuel and carbon prices, energy demand, etc.) - Past trends of emissions and key parameters (GDP, population, intensities, etc) - Information on methodology and models used to calculate BAU scenario and mitigation potentials and costs - When BAU is used, comparison of BAU projections with other independent sources or results of BAU peer review. - When BAU is not used, an explanation of the method used to assess levels of efforts		

6. CONCLUSIONS

In the context of adopting the new climate agreement under the UNFCCC in 2015, countries have to choose a specific form with which to express their contribution. The form and the way it is communicated and visualized, is distinct from the scale of the mitigation effort. Both the scale of the emission reductions and the form of the contribution need to respond to the strategy of a country to domestically transition to a low carbon society.

Three features could be used to assess the form of contribution selected by parties: science-based requirements, national policy development needs, and data and information requirements. The nature of each form of contribution has implications on how it will contribute to require by science, on how it will be implemented nationally. Data requirements are similar among the different forms, therefore it does not greatly influence the choice of form. Differences regarding the science-based requirements can be overcome. This is mainly done by identifying the peaking year, being more explicit on

the path towards the goal or annexing a longer term perspective. Therefore we conclude that the main factor to inform the choice of the form is the policy development needs. It will be crucial to achieve the flexibility needed by countries in the face of the unknown, whilst ensuring environmental integrity. Whereas it might not always find a rational basis, perception and traditional negotiating positions play an important role in the choice of form of contribution.

Contributions are not only based on technical numbers but are a package that should be carefully designed, including scope, technical and political dimensions and domestic and international narratives. UFIs are relevant to ensure transparency at national and international level, serving two main purposes: assessing joint ambition level and fairness of individual contributions. We argue that UFI can easily be standardized across forms. The packaging of INDCs and the way contributions are communicated is of utmost importance as it may have an impact on the acceptance of the contribution both by domestic institutions and the international community. We have far to go in reaching our goal, and therefore we argue that the national processes embracing and advancing the development and implementation of INDCs should be strategic in nature, legitimate and aligned to the development priorities of the country.

The development of the INDC is a complex task, and we are all learning by doing. The authors will refine and mature this paper after COP20 in Lima. Any feedback will be greatly welcome as part of this improvement effort (marta.torresgunfaus@uct.ac.za; rudnick.andrea@gmail.com).