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DIFFERENT TYPES OF NATIONALLY DETERMINED CONTRIBUTIONS TO ADDRESS CLIMATE CHANGE

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Different Types of Nationally Determined Contributions to Address Climate Change

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This short article addresses four issues. First, it summarizes transparency provisions discussed in the latest Conferences of the Parties (COP19 to COP21) of the United Nations Framework Convention on Climate Change (UNFCCC). From that recompilation, it is possible to conclude that the UNFCCC moves towards the establishment of stricter transparency requirements for national climate policies. The second topic is a description of the main greenhouse gases reduction metrics, the information needed to make them equivalent, and a summary of advantages and limitations that may determine the choice of a given GHG target form over another. The third issue is a description of the facts. This is, what percentage of world´s countries chose each type of target and what were the national characteristics that seem to have an impact on targets´ metric choice. Finally, a difference is established between transparency and uncertainty characteristics of each nationally determined contribution form.

1. INTRODUCTION

According to *Transparency International*, "Transparency is about shedding light on rules, plans, processes and actions. It is knowing why, how, what, and how much. Transparency ensures that public officials, civil servants, managers, board members and businessmen act visibly and understandably, and report on their activities.". At the same time, the Business Dictionary online defines transparency as "Lack of hidden agendas and conditions, accompanied by the availability of full information required for collaboration, cooperation, and collective decision making."

Transparency in national climate policies is key at the national level since it allows government to monitor its climate programs and enhance in that way the domestic implementation of its policies. But, transparency is also crucial at the international scene for two main reasons: 1) to compare the compromises among countries (and, as a consequence, build trust among them to avoid free riding effects) and 2) to calculate collective greenhouse gases (GHG) emissions´ reduction (i.e., lack of clarity of national emissions´ reduction can hinder accounting of the global GHG reduction objective needed to achieve the 2 degree goal[1]).

There were several provisions regarding INDCs and NDCs´ transparent communication:[2]

[*] The points of view of the author do not necessarily represent those of Universidad del Cema.

[1] The international community agrees that, in order to avoid massive damages due to climate change, the average increase of global temperature should be kept below 2 degree Celsius with respect to pre-industrial levels (Copenhagen Accord, Point 1).

[2] INDCs (Intended Nationally Determined Contributions) were each country's post-2020 plan for action on climate change. Its submission´s deadline was March 31, 2015. After each country submitted its INDC, the UN analyzed how those contributions add up and discovered it that was not enough to address the goal of reducing the increase of global average temperature to 2 degrees Celsius with respect to pre industrial levels. Hence, countries as a whole, once they ratify the Paris Agreement (open to signature from April 22, 2016 to April 27, 2007), must present final INDCs, called

- COP 19 in Varsaw (decision 1/COP19/2013, point 2b)) established that all parties would submit INDC "in a manner that facilitates the clarity, transparency and understanding of the intended contributions,…".
- COP20 at Lima reiterates the same message and added more specifications regarding this issue. In effect, in point 14 of Lima Call for Climate Action, there is an explicit mention: "the information to be provided by Parties communicating their intended nationally determined contributions, in order to facilitate clarity, transparency and understanding, may include, as appropriate, inter alia, 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…". Moreover, the issue of transparency was mentioned multiple times in the Annex that contained the "Elements for a draft negotiating text" for COP21 at Paris.
- Finally, COP21 Paris Agreement clearly states (art 4, point 8) that "In communicating their nationally determined contributions, all Parties shall provide the information necessary for clarity, transparency and understanding in accordance with decision 1/CP.21 and any relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement.". Similar claims are included in: art 4, point 13 or art. 6, point 2. But more importantly, Article 13 establishes a broad "transparency framework for action and support". Transparency refers on one side to the presentation of NDC, but also to accounting of adaptation actions, as well as financial, capacity building and technology transfers. Of this article, the most important points are: point 3, that states that fulfillment of transparency will be implemented "in a facilitative, non-intrusive, non-punitive manner, respectful of national sovereignty, and avoid placing undue burden on Parties" (this softens the transparency requirement); point 7, which includes provisions for technical expert reviews of the information provided; and, point 13 on adoption of procedures related to transparency ("The Conference of the Parties … shall, at its first session, … adopt common modalities, procedures and guidelines, as appropriate, for the transparency of action and support.").

In summary, COP´s documents indicate that international climate change negotiations move towards more transparency. But, is that already happening? Is transparency veiled by the need for flexibility?

Section 2 of this short article goes over the information that is needed to define one part of what would be covered by the "Paris transparency framework" (GHG targets), compares them, and lists the advantages and limitations of each metric. The following Section (Section 3) reviews submitted INDCs and NDCs. It summarizes what metric has been chosen by each country and what could have determined that choice (for example, income level or GDP and emissions´growth). Finally, Section 4 concludes with a "transparency ranking" of the target types, speculates on what could be the reasons of opacity in INDCs/NDCs and give some suggestions for post Paris negotiations.

formally nationally determined contribution (NDC). The year 2020 is the last date for the first NDC submission. And, NDCs will be updated from then, every five years.

2. INFORMATION NEEDED FOR EQUIVALENCE AMONG TYPES OF TARGETS

The main types of GHG targets are set with respect to a base year scenario in the past, a baseline scenario in the future, or a base (historical) year emissions intensity objective (generally with the goal of reaching a lower Emissions to GDP ratio). Table 1 summarizes them and makes explicit the formula that describes each type of target, and the specific information required in each case.[3]

As can be concluded from Table 1 (and has been recognized by others), targets can be translated into any other metric without affecting ambition if detailed information is known and provided.[4]

Table 1. Different types of INDCs´ GHG target metrics

Type of GHG target	Concept	Formula for expected emissions at the target final year	Key Information
Base year emissions target	Reduce emissions by a quantified amount relative to a base year (in the past)	$E_T^{BY} = (1 - \lambda^{BY}) \cdot \overline{E_B}$	Base year emissions ($\overline{E_B}$) % reduction (λ^{BY})
Baseline scenario target	Reduce emissions by a quantified amount relative to a BAU (future) scenario	$E_T^{BS} = (1 - \lambda^{BS}) \cdot E_T^{BAU}$	Projected Emissions at the target year (E_T^{BAU}) % reduction (λ^{BS})
Base year Emissions Intensity target	Reduce emissions intensity by a specified amount with respect to a base (past) year	$E_T^{EI} = (1 - \lambda^{EI}) \cdot \overline{I_B} \cdot GDP_T$	Base year emissions´ intensity ($\overline{I_B}$) GDP at the target year (GDP_T) % reduction (λ^{EI})
Others	Fixed level target (absolute level of reduction or carbon neutrality) Trajectory target (emission reduction in multiple year targets or a period, often with peak targets) Combinations of the above		

Source: Own elaboration.

[3] Herzog et al (2006) structure the discussion on targets around four issues: target metric (how the target is measured); stringency (emissions reduction required); scope (type of gases and sectors it encompasses); and legal character (if it is voluntary or compulsory). Here, we will focus our discussion on targets´ metric.

[4] Equivalence is established by choosing ʎ that make equal formulas in the third column of Table 1.

Note: B, T, BY, BS, EI denote base year, target year, base year target, baseline scenario target, and emissions´ intensity target.

On one hand, even if countries had the willingness to transparently communicate their national contribution, not all information for all forms of target is known at the moment the contributions are announced. Uncertainty (defined by IPCC AR5 as "a cognitive state of incomplete knowledge that can result from a lack of information or from disagreement about what is known or even knowable") is a quite distinct issue than the lack of transparency. A GHG target can be communicated in a transparent way, but its implied emissions being unclear due to underlying uncertainty. This can happen in two cases: baseline scenario targets and (dynamic) base year emissions intensity targets. More precisely, for the Emissions Intensity Target, the GDP at the moment the target has to be met (GDP_T) is an unknown variable at the time the target is designed. Similarly, emissions under the baseline scenario (E_T^{BAU}) are projected with a model that, even if fully disclosed, is based on "best guess" assumptions, whose accuracy is not guaranteed until time passes.[5]

On the other hand, leaving aside speculations with respect to the "best" choice of base years and (end) target year, lack of transparency is difficult to introduce in base year targets (because past emissions are reported to UNFCCC in national inventories), but feasible under the other two main forms of targets. There may be lack of transparency with respect the measurement of GDP. Concretely, as it has been documented (Maddison and Wu 2008 for China, Sturgess 2010 for Greece and Coremberg 2014 for Argentina), some developing countries have problems with official national account statistics. Hence, GDP may not be an entirely reliable indicator, and so may compromise the follow-up monitoring of intensity targets. And, an even higher risk of ambiguity exists for the model and assumptions used to project the baseline scenarios. The overestimation of baseline scenario targets, if it exists, would be very difficult to monitor.

According to Levin et al (2015), the choice of a target "may be based on a variety of factors such as practicality, simplicity, transparency and flexibility". The next step here is to analyze what would be the advantages and the limitations of each type of target according to some of the published literature. Knowing them, should helps to analyze motivations behind the choice of a target over another.

The advantages and disadvantages of fixed targets have been widely studied in the environmental economics literature. Lutter (2000) foresees two problems associated with fixed caps: 1) "economic risk" (if income increases more than expected, abatement would be higher than expected and so would be the corresponding costs of abatement), and 2) "environmental risk" (if a country suffers an unexpected low growth period, abatement can become negative and that country would sell emissions permits "without undertaking real reductions": emissions may be greater than in the absence of such commitments). Governments tend to give higher priority to certainty in economic costs, as these have political costs. Avoiding the second likely impact of fixed targets ("hot air" or

[5] Levin et al (2015) differentiate between static baseline scenario (projected at the moment the target is designed, but then maintained fix) and dynamic baseline scenario (for which a model is set when the target is designed, but later on the scenario is updated according to emissions´ drivers changes). Here, we think in a dynamic type of target, because a static baseline scenario target is similar to a fixed level target.

allowances for emissions above expected levels) is not a priority for individual negotiators, as the "extra" allowances have financial value, despite their adverse effect on the world environment.

Intensity targets allegedly have the virtue of favoring green growth and avoiding "hot air" in uncertain backgrounds, like those of many developing economies. Intensity caps, contrary to fixed caps, do not set a country´s allowable emissions level, but determine it as a linear function of GDP. "Pure" or "linear" intensity targets imply determining emissions intensity, while fixed targets imply capping emissions. However, Ellerman and Sue Wing (2003) show, that if GDP is higher (lower) than expected, an absolute cap implies higher (lower) effort levels than an intensity cap, and thus higher (lower) costs. Hence, the superiority of one approach over the other depends on what the actual economic outcomes are, as compared to the expected ones. Intensity caps seemed less advantageous than they had been thought to be. Their apparent resolution of the "twin uncertainties" was questioned. As a result, several alternatives to pure intensity targets were envisaged, one of which is generalized –not linear- intensity caps (Jotzo and Pezzey 2007).

Table 2. Advantages and disadvantages of the different types of targets

Type of target	**Advantages**	**Limitations**
Base year	Emission reduction clearly determined in advance. Tracking progress towards the fulfillment of the target based only on GHG inventories	Economic risk (if GDP increase is high, abatement is high) Environmental risk (if GDP increase is low, there could be excess emission allowances: "hot air")
Baseline scenario	Emission reduction is not clearly determined	Developing baseline scenarios requires modeling assumptions BAU scenario is usually not very transparent Incentives to overestimate it Static baseline scenario (fixed at the moment the target is set) is much better than a dynamic one
Intensity	Decreases economic risk (higher GDP, higher allowed emissions)	Emission reduction is not clearly determined because it depends of GDP The target depends on another indicator that is not necessarily reliable (cases of Argentina or China, already documented) If actual emissions do not depend

		linearly of GDP, there is environmental risk Emissions intensity reduction does not imply emissions reduction

Source: Own elaboration.

As is shown in Table 2, if anyone advocated that all Parties should reframe their targets to converge to simpler types (with the argument of ambiguity), the first opposition would come on the side of flexibility.

The next section reviews what GHG targets´ metric have countries actually chosen.

3. INDCs METRICS STYLIZED FACTS

According to WRI INDC´s compilation (http://cait.wri.org/indc/), 189 countries submitted communications related to INDC to the UNFCCC (162 countries plus EU28). Of those, in total, 154 economies established GHG targets (sometimes combined with Non-GHG targets: -limits related to specific sectors: for example, renewable energy goals- or specific Actions regarding the fight against climate change alone).

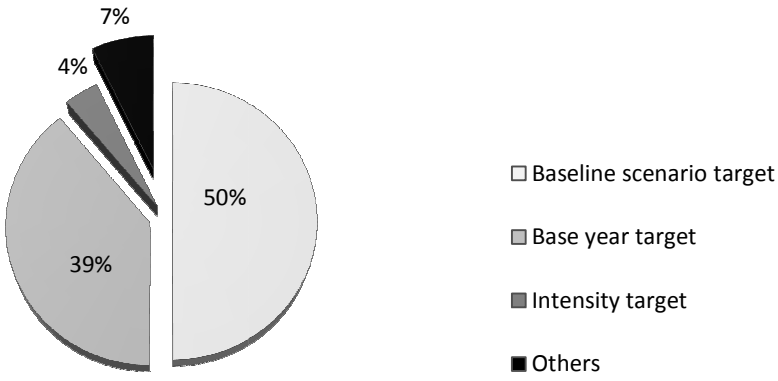
Among those who submitted GHG targets, 50% chose a baseline scenario target, while 38% of economies relate their INDC to a base year and only 4% to emissions´ intensity (see Figure 1a). Figure 1b assesses what percentage of world income corresponds to each contribution metric. It is clear when comparing Figures 1a and 1b that countries submitting base year emissions target are those with higher income levels because they are 39% of all countries, but represent 75% of the world income (measured in 2005 US dollars) in 2012. There is also a link to what percentage of world emissions corresponds to each one of the type of targets. In that respect, Figure 1c confirms that those countries with base year targets have a relatively high share of world emissions (note that "Others" includes China, which submitted a combined target).

Another interesting way to visualize INDCs metrics is to think what type of country chose which type of target. A general idea on this matter can be summarized by classifying economies according to their income level as it is done by the World Bank, and the evolution of emissions, GDP and emissions´ intensity.

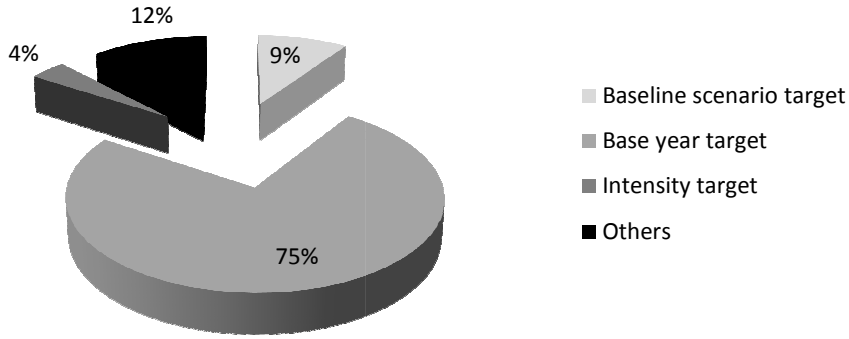
As shown in Figure 2a (already seen indirectly in Figure 1b), the higher the income of countries the lower the chances they choose a baseline scenario target. And, as shown in Figure 2b, countries for which emissions´ have decreased over the period 2000 to 2012 are those that most likely adopt base year targets, whereas those whose emissions have increased tend to opt for baseline scenario targets.

Figure 1. Countries´ INDCs by GHG target metric

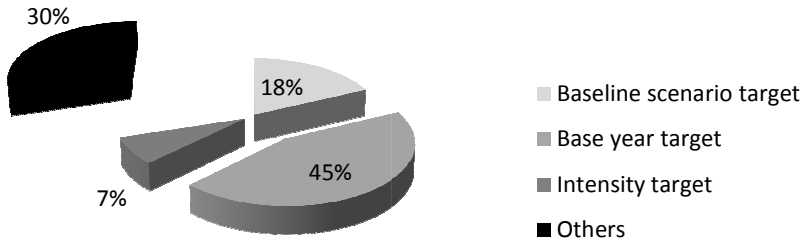
a. Distribution of countries according to their type of GHG target



b. Distribution of the world income by type of GHG target



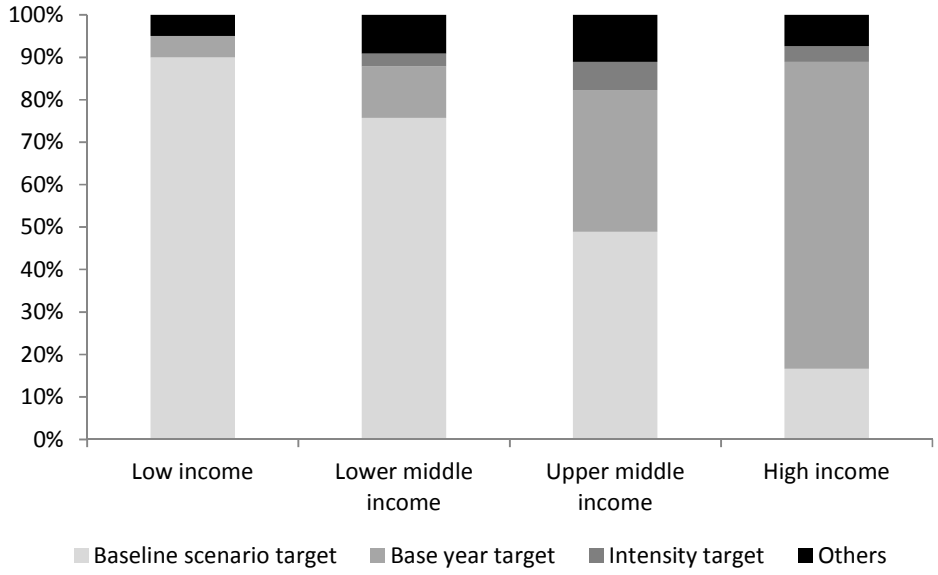
c. Distribution of world emissions by GHG target



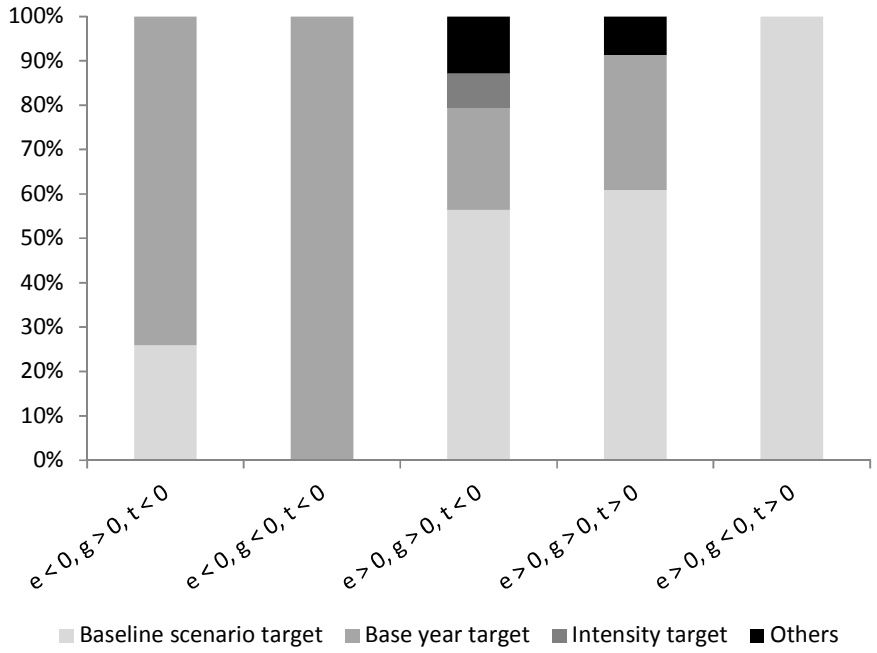
Source: Own calculations based on countries GHG targets as classified in WRI INDC´s compilation (http://cait.wri.org/indc/) combined with data from the World Bank Development Indicators Database.
Note: Six countries do not have GDP estimation for 2012 and that information is absent for emissions of seven nations.

Figure 2.

a. Countries classified by income level and type of GHG target



b. Countries classified according to their rate of growth of emissions, GDP and Emissions Intensity for the period 2000-2012



Source: Own calculations based on GHG targets as classified in WRI INDC´s compilation combined with data from the World Bank Development Indicators Database.
Note: Six countries do not have GDP estimations and that information is absent for emissions of seven nations for 2000-2012. e, g and t denote emissions, GDP and emissions intensity cumulative annual growth rate.

Stylized facts show that 50% of countries´ INDCs are based on baseline scenarios, and that the choice of metric is related to its economic growth and to the change of emissions along time. The richer is the country, the more likely it is that he chooses a base year target. Countries with emissions declining in the 2000-2012 have selected a base year target over other metrics. However, if the trend is to increasing emissions, a baseline scenario target is more probable.

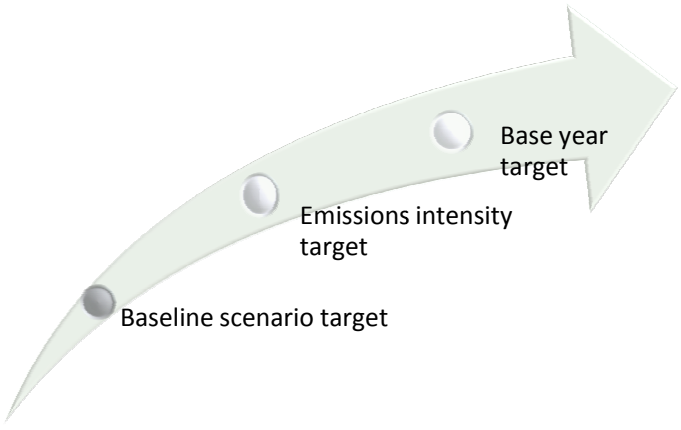
4. DISCUSSION ON TRANSPARENCY RANKING FOR NDCS´ METRICS

A move towards transparency is not yet happening in actual national climate change policies, despite of the fact that the successive COPs have introduced text in this sense in their final multilaterally agreed decisions.

This is that way because despite possible equivalences, the degree of transparency is associated with the target type (this was already pointed out by Damassa et al, 2015). This ranking from lower to higher transparency would be that shown in Figure 3. The same ranking applies with respect to uncertainty surrounding each type of target, even if the origin of the problem is another.

But, what can be leading countries to choose opaque and uncertain emissions´ levels for the future? There are at least four possible explanations: first, the need for flexibility to ensure continuous economic growth; second, to have room for negotiation if stricter rules are imposed in the future; third, the need to be politically correct (as shown in Figure 2.b, countries who choose the less transparent metrics are mostly those that have increase their emissions in the last decade, so a base year target would imply a compromise to an increase in emissions, when all the world discusses the need of an aggregate reduction)[6], fourth, simply free ride!

Figure 3. Transparency ranking for NDCs GHG target metrics



[6] Nevertheless, a compromise to limit the increase in emissions would be technically feasible (that was done in Kyoto for countries with economies in transition).

Are there "straightforward" incentives to preclude non transparent practices in the choice of NDCs metrics? Yes, with more reporting standards and more compromise on the part of each country. There is a long road ahead.

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