

Formulation of a Nationally Determined Contribution to the mitigation of Climate Change. Colombian case.

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Overview

Climate change requires worldwide efforts in order to reach greenhouse gases (GHG) mitigations. During the 21st UNFCCC Conference of the Parties (COP 21), held in Paris in December 2015, a new global mitigation agreement was reached. It was required to the Parties (the countries) to prepare and make public its Intended Nationally Determined Contributions (INDC) in advance to the COP 21. The contributions are mitigation efforts that each country defined as appropriate to get committed with. The agreement reached within the COP 21 accepted the goals communicated by the Parties (the Countries) as official commitments.

The formulation of the INDC was complex. Being Nationally Determined, it was not any “rule” regarding the kind of goal to be chosen, the coverage (in terms of GHG or sectors included), the timeframe, etc. However, it was stated that each country shall aim to formulate its contribution in order to be ambitious, equitable, fair and to facilitate its verification.

Colombia undertook a four years process that derived into the definition of its INDC. This were communicated to the international community by october 2015. In a nutshell, Colombia committed with a reduction of 20% below its expected Business as Usual emissions in 2030, included all the sectors and the six main GHG gases.

This paper summarizes the process followed to define (to construct) the entire INDC. The authors of this document were the leaders of the research team that provided the information to the decision makers in charge of adopt the Colombian INDC. The process included sectoral and macroeconomic modeling process, theoretical exercises and political negotiations. This paper aims to briefly summarize the whole process by detailing the modeling approach developed and the quantitative results that defined the current Colombian INDC (and the set of alternatives proposed to the stakeholders and government).

Starting from the base that an INDC should be totally defined from scratch at a national level, and that there is no "template" or predefined structure for it, the process were divided into a group of stages. Colombian approach included: 1- Definition of the colombian emissions baseline 2- Definition of the type of goal adopted in the INDC. 3. Construction of supplementary scenarios to assess the theoretical (required by science) mitigations required to Colombia under considerations of equity and historical responsibility. 4-The evaluation of the several mitigation actions that could be undertaken by the different economic sectors 5- Construction of the national mitigation scenarios (obtained by implementing sectoral actions at the same time in a national level) 6- Macroeconomic assessment of the selected national mitigation scenario and 7-A preliminary exercise for inter-sectoral burden assignment (the latter was done after the submission of the INDC and is relevant for its implementation).

The remainder of the paper proceeds as follows. After the introduction, section 2 is devoted to present a general view of the process followed in Colombia to define its INDC. This paper focuses on the production of the scientific information used to take the adoption decision. Section 3 presents the modelling approach and the results for the energy sector. Section 4 presents the tool used to aggregate the results from the sectoral models and to define the possible mitigation scenarios and its costs and requirements and the macroeconomic evaluation performed. Finally, the analysis of the results and the conclusions are presented in section 5.

Methods

Use of several modelling tools.

- 1- Sectoral bottom up models were used. Specifically for the energy sector (which is the interest of this paper) these models were used: MARKAL, MPODE, MAED, HOMER, MEEAVE, and a group of specifically developed end use/activity based models (including representations of oil and coal mining activities, refineries, and transportation). The remaining sectors used their own approaches. As the study were undertaken at a national level, information was shared among the several research groups in order to assure consistency of assumptions and to include interactions between activities in several sectors.

- 2- A tool to aggregate results of the several emitter sectors (i.e Energy, Industrial Processes, Land Use Change and Agriculture and, Waste) were developed, and will be presented. This scenario building tool was used to aggregate the results obtained by the several sectoral models and to facilitate the communication and negotiation processes. By using this tool, several mitigation were defined and its costs and mitigation trayectores were calculated.
- 3- A Computable General Equilibrium model was used to assess the macroeconomic impacts of the implementation of the proposed INDC mitigation scenario.
- 4- Several theoretical calculations were used to: define several Required by Science mitigation scenarios (considering a set of equity and responsibility pondering factors) and for make a preliminary proposal for sectorial assignation of the national mitigation goal.

Results

- 1- Business as usual emissions curve identified for all the sectors. Energy is divided into: Mining of oil, coal and gas, oil refining, power generation, and consumption in transportation, industries, residencies and other sectors.
- 2- Supplementary national required by science mitigation scenario was calculated
- 3- 100+ mitigation action were evaluated and its temporal impacts, mitigation potentials, and implementation costs (fix and variables) were assessed.
- 4- Mitigation actions were grouped to conform factible Mitigation Scenarios. Information regarding implementation costs and mitigation potentials were obtained.
- 5- Once selected one mitigation scenario, and using the information from the sectoral models, a CGE was used to assess the macronomic impacts of the implementation of these measures.
- 6- A preliminary set of assignation rules were formulated in order to indicate the path toward the assignation of emission righths that could lead the implementation of a Market Mechanism to fulfill the National commitment (start of the future work)

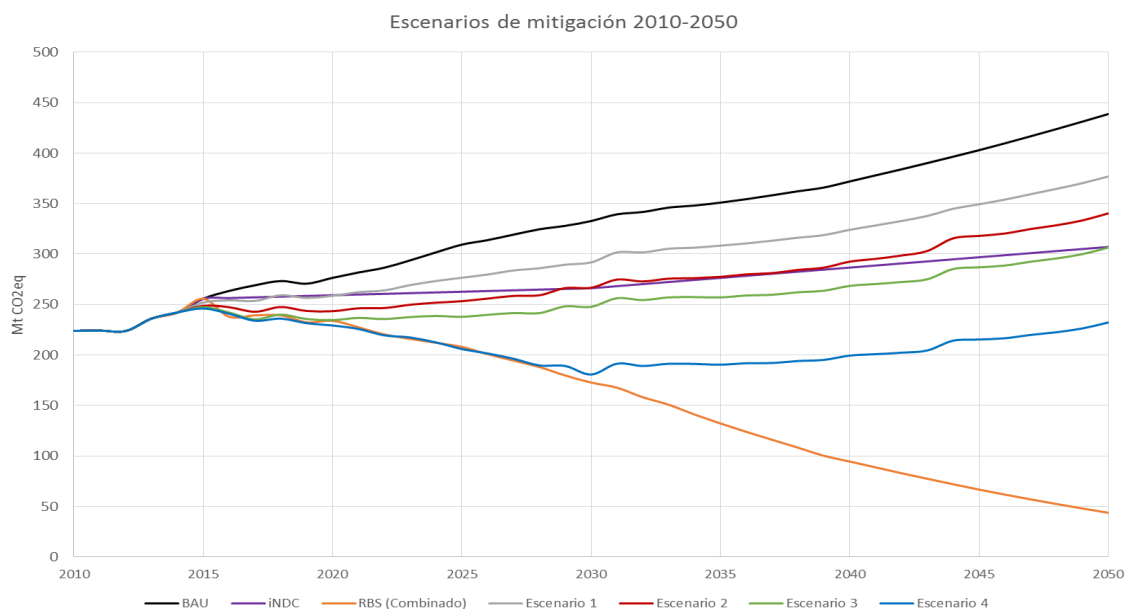


Figure 1. Colombian GHG emission scenarios 2010-2050. Information regarding costs and specific mitigation actions for each scenario is available, and will be included in the full paper

Conclusions

As result of the technico-economic assessment performed in this study, a oficial baseline for Colombia GHG emissions were identified. By no taking any action to mitigate climate change, the national emissions in the country will increase in 50% by 2030 its levels if compared to those of 2010.

Being Colombia a deveoping country, it is not factible (at reasonable costs) to commit with abatements compared with a base year nor a peaking in its emissions. The type of goal defined was a reduction compared to the baseline. This reduction was set as 20% because from this point onwards the implementation cost would be out of the national capacity. However, further mitigation opportunities were identified an a more ambitius goal were adopted if internationally support (financial, technological) is received.

Further conclusions and process details can be obtained by contacting the first author..