



# FAIRNESS, INCLUDING EQUITY, AND AMBITION IN THE MITIGATION COMPONENT OF THE PARIS AGREEMENT

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Submission of the Group of Governance on Climate Change of the Universitat Politècnica de Catalunya to the call for inputs from Parties and observer States, UN Agencies and other international organizations and non-Party Stakeholders and observer Organizations, to the first global stocktake, according the Decision 19/CMA.1, paragraph 19: requested the Chairs of the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation to issue a call for the inputs referred to in paragraphs 36 and 37 of the same decision.

## FOREWORD

As an observer organization to the UNFCCC, the Group of Governance on Climate Change (GGCC) of the Universitat Politècnica de Catalunya (UPC) presents the following submission to answer the questions on equity raised by the SB Chairs and provides recommendations about how to include the principle of equity within the Parties' discussions. The questions answered within this submissions are the following:

- Guiding questions for the **information collection and preparation component**. These questions are part of the revised non-paper document for the preparation of the first GST<sup>1</sup>.

### Mitigation guiding questions

4. *What is the projected increase in the global average temperature, consistent with the aggregated effect of NDCs (para 36(b)) and how can Parties enhance climate ambition and action to reach the goals set out in Articles 2.1(a) and Article 4.1, in the light of best available science and equity, and in the context of sustainable development and efforts to eradicate poverty?*

### Cross-cutting guiding questions

27. *What information was provided by Parties on fairness considerations, including equity (§36(h)), and how has it been reflected in their actions?*

- Guiding questions for **technical assessment component**. The question below belongs to the revised non-paper guiding questions for the technical assessment component<sup>2</sup>.

### Cross-cutting guiding questions

18. *How are fairness considerations, including equity, being reflected in Parties' NDCs?*

Based on these questions, this submission has been structured as follows. Firstly, an analysis of fairness considerations, including reflection on equity, in Parties' NDCs is presented. Secondly, an analysis of the Global Carbon Budget (GCB) consumed by the aggregate of the current NDCs has been carried out, followed by an evaluation of how the GCB is distributed among countries grouped by income level. Thirdly, an assessment of the carbon budget that each NDC implies with respect to an allocation of the GCB made according to equity criteria is presented. Finally, given the verification of a lack of equity perspective in the design of the mitigation component of the individual NDCs, a proposal to enhance climate ambition in the light of the best available science and equity is presented by the GGCC.

<sup>1</sup> [https://unfccc.int/sites/default/files/resource/REV\\_Non-paper\\_on\\_Preparing\\_for\\_GST1\\_forSBs\\_15Sept.pdf](https://unfccc.int/sites/default/files/resource/REV_Non-paper_on_Preparing_for_GST1_forSBs_15Sept.pdf)

<sup>2</sup> [https://unfccc.int/sites/default/files/resource/Draft%20GST1\\_TA%20Guiding%20Questions.pdf](https://unfccc.int/sites/default/files/resource/Draft%20GST1_TA%20Guiding%20Questions.pdf)

## KEY MESSAGES

- The remaining Global Carbon Budget (GCB) compatible with the temperature stabilization goal of the Paris Agreement is a key planetary limit that UNFCCC Parties should consider when reviewing and updating the mitigation commitments of their NDCs.
- The implementation of current updated NDCs entails, by 2030, a consumption of 97% of the remaining GCB compatible with the 1.5 °C goal (>67%). This situation reflects the fact that ambition in mitigation commitments needs urgently to be reviewed and increased by Parties.
- Increasing ambition in mitigation commitments of NDCs should be guided and reflect the principle of equity as the Paris Agreement states.
- The analysis performed by the GGCC/UPC, on the argumentations that Parties provide about the 'fairness and ambition' of their commitments, and based on the GGCC's quantitative assessment of individual NDC cumulative emissions, show that the implementation of the mitigation component of the Paris Agreement is not in line with the principle of equity embedded in the legal agreement.
- Following the advice of the Legal Response International, it is proposed that the CMA creates an ad-hoc working group on equity. The aim of this group should be to establish some key references on the "fair-share" of the GCB that would correspond to each country on the basis of equity according to their Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) (LRI, 2023). Such key reference on fair-share should be the basis for Parties defining their mitigation ambition increase.
- The analysis of the GGCC from the UPC shows that:
  - The group of high-income countries, which account for 15.4% of the current world population, would take 25.3% of the aggregate cumulative emissions until 2030 with their current mitigation commitments in the updated NDCs. This is not in line with the principle of equality, while this same group of countries has already been responsible for 41.6% of the cumulative historical emissions.
  - Lower-middle-income countries and low-income countries account for more than half of the world population in 2020, yet they will only represent 29.1% of the cumulative emissions until 2030 with current updated NDCs.
  - Low-income countries, which are the ones that lack the most basic infrastructures for development, are still taking a share of the carbon space significantly lower than that allocated according to their population share.
  - Overall, most updated NDCs are not considering the principle of equity since they have not taken into account the dimensions of equality, capacity, and historical responsibility when formulating their NDCs. They do not address the issue of the right to development either.

## EXECUTIVE SUMMARY

The Group of Governance on Climate Change (GGCC) has developed this submission with the aim of providing an in-depth overview on fairness and ambition into the implementation of the mitigation component of the Paris Agreement (PA). This submission also intends to give recommendations on how to address the lack of equity references within Parties' NDCs and hence in the implementation of the Agreement as a whole.

The document begins with an analysis of fairness considerations, including equity, being reflected in the Parties' NDCs. The analysis shows that on average 84% of Least Developed Countries (LDCs) and Small Islands Developing States (SIDS) made reference to four principles of fairness (Sustainable Development, Equity, Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC), and Special Circumstances and Vulnerability) introduced by the ILA Declaration on Legal Principles Relating to Climate Change. On the contrary, these references were included to a lesser extent by other Developing countries (67% on average) and by very few Developed countries (20%). At the same time, Parties with less historical responsibility and less economic capacity to face the challenges of climate change are also those that provided more references on fairness, including equity, supported by principles of international environmental law in their NDCs. Very few countries with high historical responsibility and economic capacity included references to any principles related to fairness in their NDC's argumentation.

The second section of this document addresses the concept of Global Carbon Budget (GCB). According to the IPCC Sixth Assessment Report (AR6) the remaining GCB from the beginning of 2020 that is compatible with the PA goal of limiting the global temperature increase to 1.5 °C, with a 67% probability, amounts to 400 GtCO<sub>2</sub>. However, considering that current annual global CO<sub>2</sub> emissions are around 40 GtCO<sub>2</sub>, the remaining GCB compatible with the 1.5 °C goal is running out fast and therefore there is urgent need to ensure a fair distribution of the remaining GCB.

The third section presents the GCB consumption that current updated NDCs imply in the 2020-2030 period. Cumulative emissions that current unconditional commitments imply amounts to 387 GtCO<sub>2</sub>, meaning that by 2030 humanity will have already consumed 97% of the GCB compatible with the 1.5°C goal.

The share of the GCB that every country takes allows the assessment of equity and the level of ambition of the NDCs. The GGCC/UPC has developed the Equitable Distribution of the Global Carbon Budget (ED-GCB) model to assess the ambition of NDCs on the basis of equity. The ED-GCB model distributes the remaining GCB among Parties based on four different dimensions of equity related to climate change mitigation: equality, responsibility, capacity and the right to sustainable development. The ED-GCB model allocates a share of the remaining GCB to each of the Parties and then compares how much each Party's NDC is taking with respect to the share that they should take based on equity. The results show that some Developed countries will consume up to five times the carbon budget allocated to them by the ED-GCB model. On the other hand, Developing countries in Sub-Saharan Africa and South Asia would consume amounts well below their carbon budget allocated according to equity. Thus, a major concern is the tiny carbon budget consumption that NDCs of LDCs and SIDS imply. The continual low level of emissions of these countries could limit their right to development.

A key takeaway is that in order to achieve the 1.5 °C goal (>67% likelihood), mitigation ambition of Parties needs to increase by 43% on average, but on the basis of equity this percentage must be different depending on each country. Our studies clearly show that developed countries, which have a large economical and technological capacity and are responsible for a large share of historical cumulative emissions, have to redouble the ambition of their mitigation commitments in order to give carbon space to some developing countries, specially LDCs and SIDS, in order to improve their level of well being and in light of their right to development.

The fourth and final section of the document presents ideas on how to enhance the mitigation ambition in the PA implementation in light of the best available science and equity, where the creation of a 'Working Group on Equity' stands out as a proposal to address the lack of fairness and ambition that the current implementation of the PA reflects as it is presented along this document.

## 1. ANALYSIS OF FAIRNESS CONSIDERATIONS, INCLUDING EQUITY, BEING REFLECTED IN THE PARTIES' NDCs.

The Paris Rulebook, in its Annex "Information to facilitate clarity, transparency, and understanding of Nationally Determined Contributions (NDCs), referred to in Decision 1/CP.21, Paragraph 28" (ICTU), in particular Paragraph 6, states that Parties must report on "How the Party considers that its Nationally Determined Contribution is fair and ambitious in the light of its national circumstances". Specifically, in section 6.b Parties are requested to provide fairness considerations, including reflection on equity.

The Group of Governance on Climate Change (GGCC) of the Universitat Politècnica de Catalunya (UPC) has developed an analysis of the information contained in the updated NDCs submitted after the adoption of the Paris Rulebook. This analysis is focused specifically on the Fairness and Ambition section of the NDCs.

The NDCs analyzed represent new or updated NDCs reported by 171 Parties (41 Annex I Parties and 130 non-Annex I Parties) that entered in the provisional NDC registry between January 2019 and December 2022. Note that 27 members of the European Union are only counted individually in this analysis. The main findings are presented below.

First, it is important to highlight that only 148 Parties included a section on Fairness and Ambition in their NDCs. It should also be noted that 100% of Annex I Parties have included this section in their NDCs, while a total of 82% of non-Annex I Parties (107 Parties in total) have included it.

In relation to fairness considerations, in 2014, the International Law Association (ILA) adopted the ILA Declaration on Legal Principles Relating to Climate Change (International Law Association, 2014). In this declaration, four principles closely related to fairness in the mitigation dimension were identified (Rajamani *et al*, 2021). These principles are Sustainable Development, Equity, Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC), and Special Circumstances and Vulnerability.

The following analysis has been conducted by classifying Parties into three groups according to the UNCTADstat (2022) classification: Developed countries, Developing countries, and the third group that includes Least Developed Countries (LDCs) and Small Islands Developing States (SIDS). It is interesting to separate the LDCs and SIDS from the other developing countries taking into account that the Paris Agreement recognizes them as particularly vulnerable to the adverse effects of climate change and with significant capacity constraints. Moreover, Decision 18/CMA.1 of the Paris Rulebook, about the enhanced transparency framework, gives LDCs and SIDS a high level of flexibility in their reporting processes.

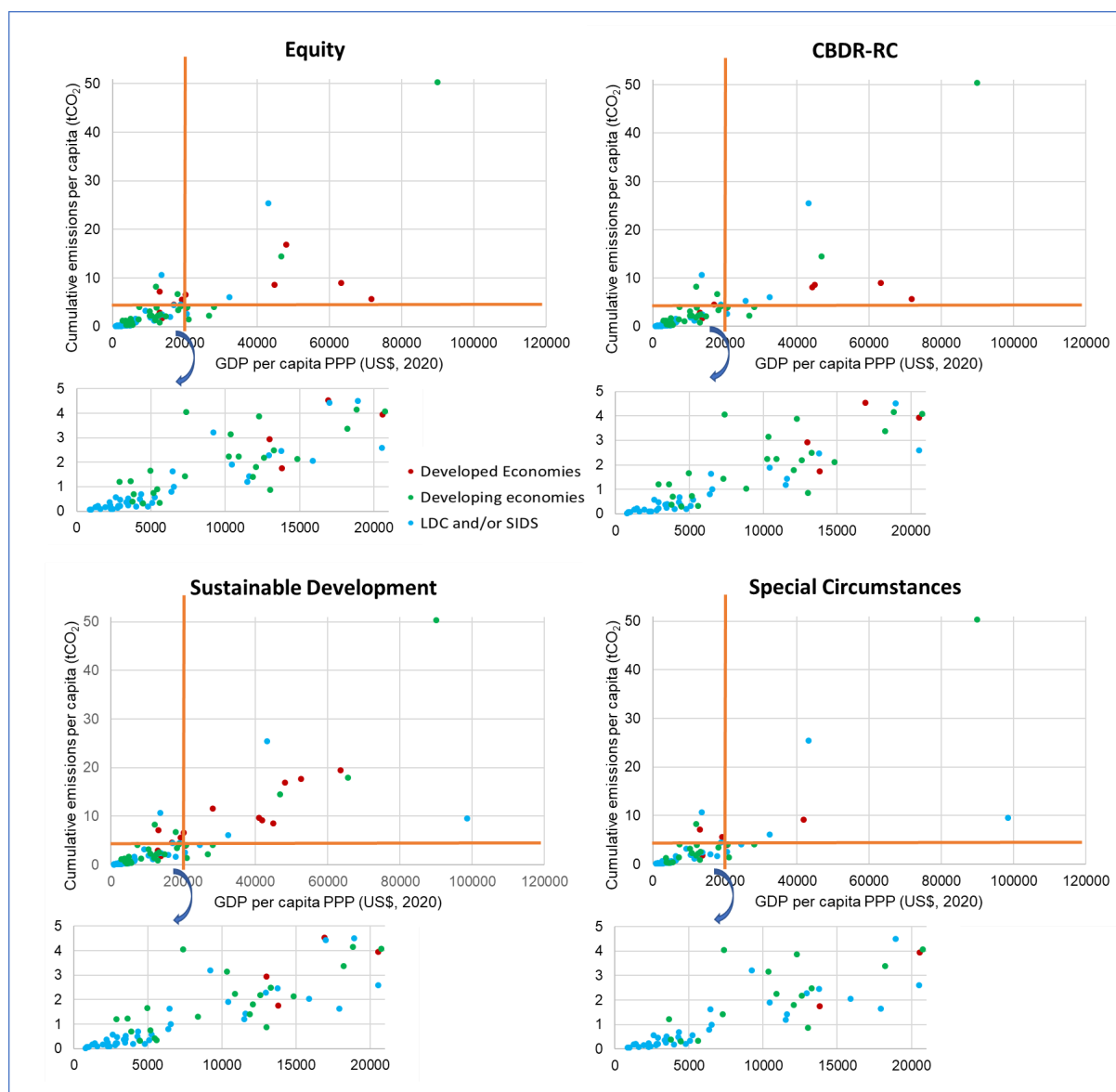
Table 1 shows the number of Developed countries, Developing countries, and LDCs and SIDS that have included any kind of reference to these principles (either explicitly or implicitly) in the Fairness and Ambition section of their NDCs. Such references also include indicators supported by these principles.

**Table 1.** The number of countries that made reference to the principles of Sustainable Development, Equity, CBDR-RC, and Special Circumstances and Vulnerability, within the Fairness and Ambition section of their updated NDCs. In parentheses, the percentage of countries that refer to each of these principles is indicated, in relation to the total number of countries in each group that include a section on Fairness and Ambition in their NDC.

	Sustainable Development	Equity	CBDR-RC	Special Circumstances and Vulnerability	AVERAGE
<b>Developed Countries</b>	15 (31%)	11 (22%)	9 (18%)	5 (10%)	<b>10 (20%)</b>
<b>Developing Countries</b>	32 (73%)	30 (68%)	29 (66%)	26 (59%)	<b>29 (67%)</b>
<b>LDCs &amp; SIDS Countries</b>	52 (95%)	46 (84%)	39 (71%)	48 (87%)	<b>46 (84%)</b>

Among the countries that included the section of Fairness and Ambition, the vast majority (over 70%) of LDCs and SIDS included references related to any of the four principles mentioned above. For instance, the principle of Sustainable Development was included by 95% of these countries. At the same time, most Developing Countries (more than 50%) referred to these principles. However, this situation is very different for Developed Countries, considering that the most common principle included in the fairness justifications of these countries (Sustainable Development) is barely used by 31% of them.

Overall, it is clear that the group of countries that most referenced each of these principles is the LDCs and SIDS group (84% of countries on average). Then, around 67% on average of Developing countries mentioned these principles within their NDCs. And finally, a very low percentage, 20% on average, of Developed countries referred to these principles within their NDCs.



**Figure 1.** Mapping of countries that refer to any principles of fairness in the Fairness and Ambition section of their NDC. The vertical orange line indicates the value of the global average GDP per capita, while the horizontal orange line represents the global average of emissions per capita. The colored points indicate the classification of countries in three groups: Developed (red), Developing (green) and LDCs & SIDS (blue). The lower graphs zoom in the lower left section of the upper graphs. Source: GGCC-UPC.

Figure 1 illustrates how the Parties that included a reference to the cited principles in their NDC, are distributed according to two indicators:

- **Cumulative CO<sub>2</sub> emissions per capita in the period 1990-2019.** This indicator can be used to inform about the historical responsibility of the country (Gütschow J *et al.*, 2021).

- **GDP-PPP per capita.** This indicator reports on the country's capacity to address climate change mitigation and/or adaptation measures (World Bank, 2023).

The orange lines indicate the average value of the global GDP-PPP (USD, year 2020) (vertical line) and the global average of emissions per capita (horizontal line). Both values were calculated with the data available from the 196 countries which are Parties to the UNFCCC. The countries are classified as Developed, LDCs and SIDS, and Developing (excluding LDCs and SIDS) countries. The colors of the points indicate the group to which each country belongs.

In general, and as observed in Figure 1, the results of the analysis of the NDCs show that the Parties that provided any kind of reference or consideration on fairness in their NDCs, including equity, supported by principles of international environmental law, are mostly those with less historical responsibility and less economic capacity to face the mitigation challenges and the effects derived from the current climate crisis. More specifically, LDCs and SIDS countries, with more flexible requirements on transparency, are those that more frequently appeal to fairness principles. This fact is understandable when considering their high levels of vulnerability and low capacity to deal with the climate crisis. On the other hand, it is proven that there are very few countries with a high historical responsibility and economic capacity that include references to any principles related to fairness in their arguments.

## 2. THE GLOBAL CARBON BUDGET AS A REFERENCE FOR EQUITY

There is a direct and linear relationship between the average global temperature increase and the cumulative CO<sub>2</sub> emissions released into the atmosphere since the industrial revolution.

In accordance with the Sixth Assessment Report (AR6) of the IPCC, the Global Carbon Budget (GCB) refers to the maximum amount of cumulative net global anthropogenic CO<sub>2</sub> emissions that would limit global temperature rise to a given level. It is important to note that objectively the cumulative historical emissions up until now have mainly been released into the atmosphere by industrialized countries. Thus, the remaining GCB is the total quantity of CO<sub>2</sub> emissions that could still be released while keeping warming below a specific temperature level (IPCC 2021).

According to the AR6, the remaining GCB from the beginning of 2020 that is compatible with the Paris Agreement goal of limiting the global temperature increase to 1.5 °C, with a 67% probability, amounts to 400 GtCO<sub>2</sub>. Bearing in mind that current annual CO<sub>2</sub> emissions are around 40 GtCO<sub>2</sub>, the remaining GCB compatible with the 1.5 °C goal is a very small quantity that is running out fast. Consequently, and given the enormous development challenges that are currently ongoing in the world, there is a need to ensure a fair distribution of the remaining GCB.

The consumption of the remaining GCB allows us to track how far we are from exceeding the long-term temperature goal of the PA (Winkler and Marquard 2012; Kanitkar and Jayaraman 2019; Dickau et al. 2022). Because of that, the Synthesis Reports on the Aggregate effect of NDCs published by the UNFCCC Secretariat always included an assessment of the level of consumption of the GCB that the current NDCs imply (UNFCCC, 2022, 2021, 1016, 2015).

There is a large extent of literature that highlights the unequal historical distribution of cumulative emissions around the world (IPCC 2022; Friedlingstein et al. 2022) and that points out the need to give carbon space to developing countries for their development (Rao and Baer 2012; Winkler et al. 2013; Bruckner et al. 2022). In the next section, we show how the share of the remaining GCB that each country takes when implementing its current mitigation commitment in their NDCs can be used as a basis for determining its national climate equity perspective.

### 3. EQUITY-BASED ANALYZES OF THE CURRENT NDCs MITIGATION COMPROMISES

The Group of Governance on Climate Change (GGCC) has conducted two different analyzes of the current NDCs mitigation compromises in the light of equity. The first one, grouping countries according to their income levels, and the second, by comparing the cumulative emissions that the NDCs entails with a carbon budget allocated to countries according to equity criteria.

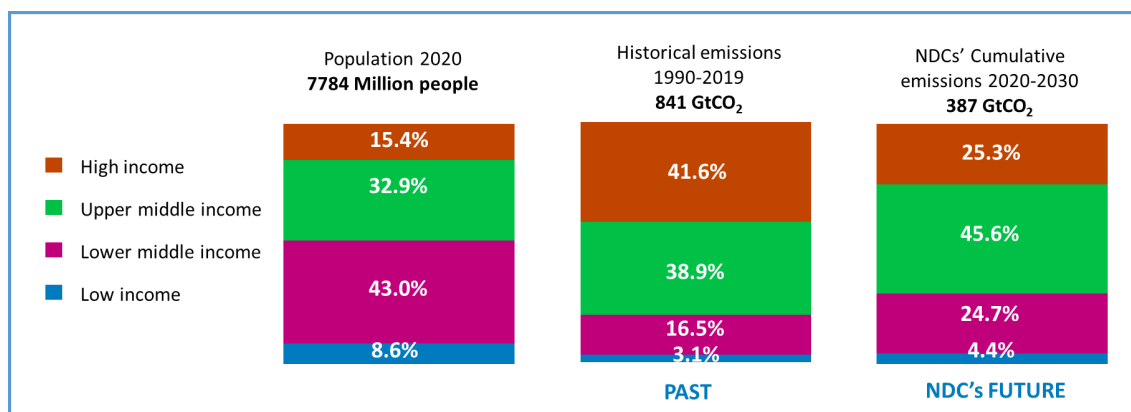
In this section an analysis of the cumulative CO<sub>2</sub> emissions that the current updated NDCs entail in the 2020-2030 period is presented.

The aggregated effect of the unconditional NDCs indicates that the intended cumulative CO<sub>2</sub> emissions foreseen by the current NDCs from 2020 to 2030 totals 387 GtCO<sub>2</sub>. This allows us to affirm that by 2030, humanity will have already consumed 97% of the GCB compatible with limiting the increase in global temperature to 1.5°C (with a probability of 67%), which according to the AR6-WGI is 400 GtCO<sub>2</sub> (IPCC 2021). If current NDCs are not revised again to increase the mitigation ambition, in 2030 it will be too late to achieve the 1.5°C goal.

#### Equity analysis grouping countries according to their income level

Below, the analysis of the percentage distribution of the 387 GtCO<sub>2</sub> implied by the unconditional commitments in updated NDCs for different groups of countries, shown in Figure 2 (Column 3), is introduced. For each group, the percentage of historical emissions during the period 1990–2019 is also presented with respect to the total emissions in the same period (Figure 2, Column 2). The percentage of the population in 2020 that corresponds to each analyzed group of countries is shown in Column 1.

It is important to note that this analysis is made only using historical data. Historical GHG emissions data are obtained from the Climate Watch portal (2022) and population from the UNDESA World Population Prospects (2019). Countries are grouped according to their income level based on the World Bank classification (World Bank 2022).



**Figure 2.** Column 1, shows the percentage distribution of the population in 2020; Column 2, indicates the historical cumulative emissions (1990–2019); and Column 3, the cumulative emissions according to the unconditional NDCs; for the groups of countries according to their income level (World Bank, 2022). Source: GGCC-UPC.

Thus, this analysis shows that:

- The high-income countries account for 15.4% of the current world population but would take 25.3% of the cumulative emissions until 2030, which is not compatible with the principle of equality. In addition, these countries have already been responsible for 41.6% of the cumulative historical emissions, so it cannot be said that the current NDCs address the responsibility dimension.
- The upper-middle-income countries, including China, qualitatively follow a similar pattern to that of the high-income countries, although the percentage differences between the columns are lower.



- The lower-middle-income countries, including India, and low-income countries, are in the opposite situation to that described above. These groups of countries account for more than half of the world population in 2020 (43.0% and 8.6%, respectively) yet, they will only represent 29.1% (24.7% and 4.4%, respectively) of the cumulative emissions until 2030, being historically responsible for 19.6% (16.5% and 3.1% respectively) of global emissions.
- In the 2020–2030 period, the share of the carbon space used by high-income countries decreases when compared to that used between 1990–2019. But compensation for the poorest countries following their development needs, historical responsibilities, and their population level, has not been achieved.
- Therefore, our analysis finds that the current NDCs are not equitable because they do not take into account the dimensions of equality and historical responsibility. Besides, they do not address the issue of the right to development. The poorest countries, which are the ones that lack the most basic infrastructures for development, are still taking a share of the carbon space lower than that allocated according to their population share.

### Equity analysis using an equitable distribution of the Global Carbon Budget

This section presents a more detailed analysis carried out with a different approach from the previous one. To do so, the model of Equitable Distribution of the Global Carbon Budget (ED-GCB) developed by the GGCC research group from the UPC has been used. The four different dimensions under equity in relation to climate change mitigation selected for this model, and explained below, are the ones described within AR5 of the IPCC. (IPCC, 2014).

#### Responsibility

This first dimension aims to relate responsibility for contributing to climate change via GHG emissions of a country to its historical contribution to the problem. It considers the historical and present GHG emissions of a country and can be measured using the cumulative historical emissions per capita of that country.

#### Capacity

The amount of resources that a country can mobilize in favor of mitigation and adaptation measures. This dimension could be measured using cumulative GDP per capita.

#### Equality

Equality is understood as the fact that *“each human being has equal moral worth and thus should have equal rights”*. Thus, each human being should tend to the same GHG emissions level. The population of a country with respect to the global population could be used to measure this dimension. (AR5 IPCC, 2014).

#### Right to development

It is the right of all countries to meet the needs of present and future generations. As stated in the IPCC, *“The right to development appears in international law in the UN Declaration on the Right to Development, the Rio Declaration, and the Vienna Declaration, and is closely related to the notion of need as an equity principle, in that it posits that the interests of poor people and poor countries in meeting basic needs are a global priority.”* The Sustainable Development Goals (SDG) Index and the Human Development Index (HDI) can be used to calculate this dimension. (AR5 IPCC, 2014).

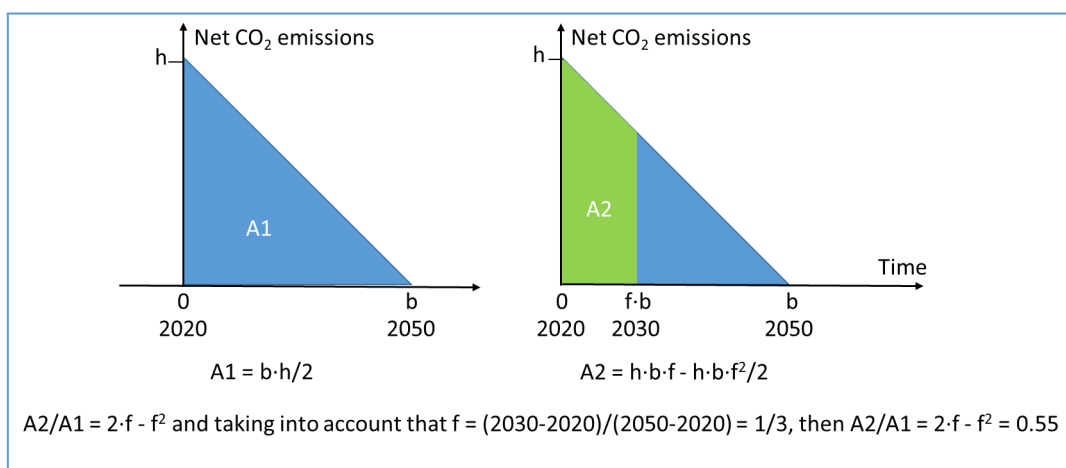
Table 2 below illustrates these four different dimensions and the metrics used to evaluate each of them. It is worth noting that, considering the current NDCs, these proposed indicators for measuring each of the dimensions of equity are rarely used by countries in their fairness justifications.

**Table 2.** The four dimensions of equity according to the AR5-IPCC and a set of indicators that enables their operationalization when distributing the remaining GCB and also when making considerations of fairness and ambition. Source: GGCC-UPC.

<b>Responsibility</b>	<b>Capacity</b>	<b>Equality</b>	<b>Right to Development</b>
Historical and present GHG emissions of a country	The more one can afford to contribute to solving the climate problem, the more one should	Each human being should aim to the same GHG emissions level	The interest of poor people and poor countries in meeting basic needs are a global priority
<i>Cumulative historical emissions per capita</i>	<i>Cumulative GDP per capita</i>	<i>Population of a country with respect to the global population</i>	<i>SDG, HDI, ...</i>

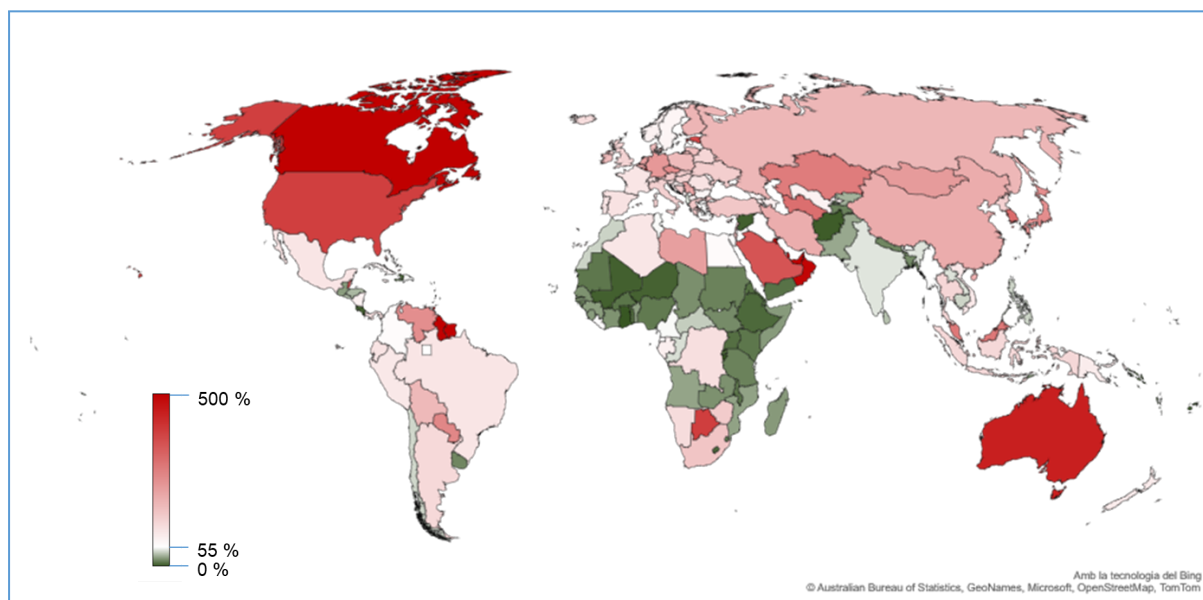
The ED-GCB model distributes the GCB among all countries in the world using these four equity components described. As a result, the carbon budget is obtained, compatible with the global objective of 1.5 °C (>67% likelihood), which would be available for each country, from now until reaching neutrality in CO<sub>2</sub> emissions. Having a distribution of the available GCB made on the basis of equity criteria can really help to assess the extent to which countries' NDCs can be considered equitable, or not.

Considering that, in order to reach the 1.5 °C objective we need to reach CO<sub>2</sub> emission neutrality globally by 2050, it is easy to determine that the set of the first updated NDCs, which are implemented between 2020 and 2030, at most they should use 55% of the available GCB (see Figure 3).



**Figure 3.** These graphs illustrate how the percentage of the Global Carbon Budget available over the implementation period of the first NDCs (2020-2030) can be determined. Surface A1 (in blue) represents the total Global Carbon Budget, i.e. the cumulative emissions until reaching carbon neutrality in 2050. Surface A2 (in green) represents the cumulative emissions for the 2020-2030 period. The quotient  $A2/A1$  is the part of the Global Carbon Budget that could be consumed by the set of the first NDCs. Source: GGCC-UPC.

Being aware that what applies globally does not have to apply at a local scale, we take a consumption of 55% of the carbon budget allocated to each country, as a reference when assessing whether an NDC is ambitious enough or not. So, when the country's first NDC entails cumulative CO<sub>2</sub> emissions between 2020 and 2030 totalling 55% of the assigned carbon budget, we consider that we are dealing with an NDC in line with the objectives of the Paris Agreement. Contrarily, when consumption exceeds 55% of the allocated carbon budget, we identify a country that must increase its level of ambition. And this increase in the level of ambition should be greater the more that country exceeds 55% of the equitable allocated carbon budget.



**Figure 4.** Percentage of NDC's carbon budget consumption by 2030 with respect to the carbon budget allocated by the ED-GCB. Assuming that, in order to achieve the 1.5 °C goal, the world has to reach CO<sub>2</sub> neutrality by 2050, the carbon budget consumed by 2030, on average, should not exceed 55 % of the global carbon budget. Source: GGCC-UPC.

Figure 4 shows the percentage of consumption that the first updated NDC takes from each country's equitable allocated carbon budget. The lack of equity in the implementation of the mitigation component of the NDCs is astounding. The NDCs of countries such as Canada or Australia will consume up to five times the total carbon budget allocated to them by the ED-GCB model. In fact, there are very few countries that will consume around 55% of their equitable allocated carbon budget. This group includes Colombia, Egypt, Myanmar, the Philippines, Cameroon, among others, but no developed country is among this group. On the other hand, the NDCs of a relevant number of developing countries in Sub-Saharan Africa and South Asia will consume an amount below the 55% of their carbon budget that has been determined based on equity. The fact that some of the LDCs and SIDS remain at such low emission levels should also be a cause for concern, as this may mean a limitation of their right to development. Thus, it is possible to argue that the principle of equity embedded in the Paris Agreement is not being reflected as a whole in its implementation. This is an aspect of utmost concern that should be addressed in the GST process.

#### 4. PROPOSAL TO ENHANCE CLIMATE AMBITION IN THE LIGHT OF BEST AVAILABLE SCIENCE AND EQUITY

The different analysis presented above clearly show that the current mitigation commitments are insufficient and that they also lack a design made in the light of equity. Similarly, it is important to highlight that equity serves as a key element of effective international climate policy, and it is widely accepted that the consideration of the equity principle is essential for the establishment of a successful global climate change regime (LRI, 2023). According to our perception, a greater cooperation between Parties in order to increase their level of ambition will only emerge if the elements of such a climate change regime are perceived to be fair.

Thus, the following proposal aims to bring some light to the question of how Parties can enhance climate ambition and action to reach the goals set out in Articles 2.1(a) and Article 4.1, in the light of best available science and equity, and in the context of sustainable development and efforts to eradicate poverty.

- The bottom-up nature of the Paris Agreement must find fit with the planetary limits. One such limit is the remaining GCB compatible with the temperature stabilization goal of the Paris Agreement. The fact that the implementation of the 1st updated NDCs entails, by 2030, a consumption of 97% of the remaining GCB compatible with the 1.5 °C goal (>67%), highlights that this issue is not resolved. In

addition, both the arguments that the countries provide about 'fairness and ambition', as well as the analysis carried out based on the fairness of the NDCs, highlight that the implementation of the mitigation component of the Paris Agreement is not being done equitably. For this reason, and following the advice of Legal Response International, it is proposed that the CMA creates a special working group on equity (ad-hoc working group on equity) to establish some key references on the "fair-share" of the GCB that would correspond to each country on the basis of equity according to its CBDR-RC (LRI, 2023).

- In order to remain on track to globally achieve the 1.5 °C goal (> 67% likelihood), it is necessary that the GCB consumption made by the first NDCs as a whole does not exceed, by 2030, the 55% of the remaining GCB, ie, 220 GtCO<sub>2</sub>. Considering that the current NDCs involve cumulative emissions of 390 GtCO<sub>2</sub>, the ambition of the countries' commitments needs to increase by 43% on average. However, in the light of fairness, this does not imply that all countries must increase their mitigation ambition by 43%, but that the lead of developed countries as stated in Article 4 of the Paris Agreement should be significantly more noticeable.
- Given the absence of agreement between the Parties on how to operationalize a fair sharing of their mitigation efforts, the map in Figure 4 could be used as a guide. The map shows in red the countries that should increase their ambition, in white those that are already in line with the 1.5 °C goal, and in green those that, taking into account their development needs, could have formulated looser commitments. In order to renew the current NDCs and make them more ambitious and at the same time more equitable, all countries should intend to be within the white area range of the map.
- When arguing about the level of fairness and ambition of an NDC, the GGCC recommends doing so using indicators that are supported by principles of international environmental law contained in the *Declaration on Legal Principles Relating to Climate Change*. These indicators should make it possible to reflect not only the country's responsibility for GHG emissions, but also the socio-economic reality and the vulnerability of the country in the global context. This is considering that vulnerable populations are expected to suffer more severe consequences and sooner than those with greater access to resources. On the other hand, a wide range of indicators reflecting more than one of these principles would provide more information than only using a single indicator. At the same time, indicators that allow for comparability of information would be more useful to assess countries' fair shares. Some examples are:
  - Net GHG and CO<sub>2</sub> emissions per capita of the country. These will be compared with the global emissions.
  - Historical cumulative net GHG and CO<sub>2</sub> emissions per capita of the country to be compared with the same indicator at the global level.
  - GDP-PPP per capita of the country that will be compared with the world GDP per capita.
  - HDI and SDG Indexes and the position of the country in the HDI and SDG Indexes rankings.
  - Vulnerability Index of the country and the position of the country in the Vulnerability Index Ranking (Chen et al., 2022).

## REFERENCES

Bruckner B, Hubacek K, Shan Y, et al (2022) Impacts of poverty alleviation on national and global carbon emissions. *Nat Sustain* 5:311–320. <https://doi.org/10.1038/s41893-021-00842-z>

Chen, C.; Noble, I.; Hellmann, J.; Coffee, J.; Murillo, M.; Chawla, N. (2022). University of Notre Dame Global Adaptation Index (ND-GAIN). <https://gain.nd.edu/our-work/country-index/>. Accessed 22 Dec 2022.

Climate Watch (2022) Climate Watch Data. In: GHG Emiss. Washington, DC World Resour. Institute. <https://www.climatewatchdata.org/ghg-emissions>. Accessed 22 Dec 2022

Dickau M, Matthews HD, Tokarska KB (2022) The Role of Remaining Carbon Budgets and Net-Zero CO<sub>2</sub> Targets in Climate Mitigation Policy. *Curr Clim Chang Reports* 2:. <https://doi.org/10.1007/s40641-022-00184-8>.

- Friedlingstein P, Jones MW, O’Sullivan M, et al (2022) Global Carbon Budget 2021. *Earth Syst Sci Data* 14:1917–2005. <https://doi.org/10.5194/ESSD-14-1917-2022>.
- Gütschow J, Günther A, Pflüger M (2021) The PRIMAP-hist national historical emissions time series v2.3.1 (1750-2019). <https://doi.org/doi:10.5281/zenodo.5494497>
- International Law Association (2014). Resolution 2/2014, *Declaration of Legal Principles Relating to Climate Change Committee on Legal Principles Relating to Climate Change*. The 76th Conference of the International Law Association, Washington D.C., USA.
- IPCC (2014) AR5 WGIII-CH4: Sustainable Development and Equity
- IPCC (2021) AR6 WGI - Climate Change 2021: The Physical Science Basis. Summary for Policymakers.
- IPCC (2022) Summary for Policymakers. In: *Climate Change 2022. Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge Univ Press.
- Kanitkar T, Jayaraman T, D’Souza M, Purkayastha P (2013) Carbon budgets for climate change mitigation - a GAMS-based emissions model. *Curr Sci* 104:1200–1206.
- Kanitkar T, Jayaraman T (2019) Equity in Long-Term Mitigation. In: Dubash NK, Oxford University Press (eds) *India in a Warming World*. Oxford University Press, pp 92–113.
- LRI (2023). Legal Response International, "Incorporating equity into NDCs", 7 February 2023. Advice provided in response to Query Q35-22.
- Matthews HD, Tokarska KB, Nicholls ZRJ, et al (2020) Opportunities and challenges in using remaining carbon budgets to guide climate policy. *Nat Geosci* 13:769–779. <https://doi.org/10.1038/s41561-020-00663-3>
- Rajamani, L., Jeffery, L., Höhne, N., Hans, F., Glass, A., Ganti, G., Geiges, A. (2021). National ‘fair shares’ in reducing greenhouse gas emissions within the principled framework of international environmental law, *Climate Policy*, 21:8, <https://doi.org/10.1080/14693062.2021.1970504>
- Rao ND, Baer P (2012) “Decent Living” emissions: A conceptual framework. *Sustainability* 4:656–681. <https://doi.org/10.3390/su4040656>
- UNCTADstat (2022) Country Classification - Groups of Economies. <https://unctadstat.unctad.org/en/classifications.html>. Accessed 15 Jan 2023
- UNDESA (2019) World Population Prospects 2019.
- UNFCCC (2015). Synthesis report on the aggregate effect of the intended nationally determined contributions. FCCC/CP/2015/7.
- UNFCCC (2016). Aggregate effect of the intended nationally determined contributions: an update. FCCC/CP/2016/2.
- UNFCCC (2021). Nationally determined contributions under the Paris Agreement. Synthesis report by the secretariat. FCCC/PA/CMA/2021/8.
- UNFCCC (2022). Nationally determined contributions under the Paris Agreement. Synthesis report by the secretariat. FCCC/PA/CMA/2022/4.
- Winkler H, Marquard AN (2012) Methodologies for carbon budgets in South Africa Report prepared for Sustainable Energy Africa. Sustain Energy Africa Low-carbon Econ Work Program Support Natl Plan Comm.
- Winkler H, Letete T, Marquard A (2013) Equitable access to sustainable development: operationalizing key criteria. *Clim Policy* 13:411–432. <https://doi.org/10.1080/14693062.2013.777610>

World Bank (2023) GDP, PPP (constant 2017 international \$).  
<https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.KD>. Accessed 3 Jan 2023.

World Bank (2022) World Bank classification by income.