

Commentary

UNFCCC must confront the political economy of net-negative emissions

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Recent demands by developing countries, like India, that developed countries need to reach net-negative emissions, must be negotiated seriously under the UNFCCC. Failure to acknowledge that limiting global average temperature rise to 1.5°C leaves very little carbon budget for equitable redistribution risks further ambiguity on how to achieve the Paris Agreement's goals.

Developing countries are in a bind. The latest Intergovernmental Panel on Climate Change (IPCC) Working Group I report shows that the global warming level of 1.5°C will probably be exceeded before 2040. Limiting warming to 1.5°C corresponds to a carbon budget of just 400–500 GtCO₂ from 2020, and annual emissions are currently about 40 GtCO₂. In light of this rapidly shrinking carbon budget for 1.5°C, developing countries could call for developed countries to aim for net-negative emissions. This could allow developing countries more carbon space—but creating such space risks developed countries using this for their own ends, as an additional source of carbon flexibility and to further delay steep emissions reductions, before eventually failing to follow through on massively ramping up carbon dioxide removal (CDR). Yet failure to discuss that there will be very little budget left to redistribute (Figure 1) after the Paris Agreement's first Global Stocktake (GST), to be initiated at COP26 and completed in 2023, lets developed countries off the hook for failures in mitigation and in addressing their historical responsibility. Approaches that equitably allocate the remaining global carbon budget to limit temperature rise to 1.5°C can result in large negative remaining carbon budgets for developed countries.¹ Recently, at the International Energy Agency and Conference of the Parties (COP) “Net-Zero Summit” preceding the upcoming COP26, the Indian Minister for Electric Power tried to bring attention to this fact, calling for developed

countries like the United States or for the European Union to achieve net-negative emissions, because this would grant developing countries greater access to the atmospheric carbon space. This suggestion was received favorably by the US Special Presidential Envoy for Climate and has since been also demanded by China's Special Envoy on Climate Change. However, it remains unclear how an equitable distribution of mitigation efforts can be tackled given the potential for net-negative emissions and the extent to which established principles offer guidance.

Fairness as a core principle

The principles of common but differentiated responsibilities and respective capabilities (CBDR-RC) and equity lie at the heart of the UN Framework Convention on Climate Change (UNFCCC) and the Paris Agreement.¹ Greater mitigation efforts from developed countries can enable developing countries to at least partly benefit from the fossil-based path to the industrialization enjoyed by developed nations and, more recently, China. The Paris Agreement notes that developed countries must reach peak emissions before developing countries (Article 4.1) and that they shall provide financial resources to assist developing countries to both mitigate and adapt to climate change (Article 9), in continuation of their existing obligations under the convention. However, since the signing of the Paris Agreement, developed countries have failed to follow through on financial support, with even the OECD's own esti-

mates of provided climate finance falling 20% short of the goal of \$100 billion annually by 2020.³ Mitigation efforts from developed countries have also been deemed insufficient to meet the Paris Agreement's long-term temperature goal.¹

Ever since it was adopted in 1992, the CBDR-RC principle has been plagued by disagreement on how exactly it should be operationalized, beyond a core understanding that developed countries should take the lead on mitigation efforts and provide financial, technical, and capacity support to developing countries. Negotiators have routinely had to revert to constructive ambiguity in order to pass the UNFCCC consensus requirement, hiding rather than resolving conflict over how CBDR-RC should inform questions of who should do what and by when. Since concluding the Convention in 1992, parties have floated vastly divergent interpretations of CBDR-RC based on measures such as GDP, current territorial emissions, per-capita emissions, historical contributions to climate change, and various combinations of these measures. Such conflict is very likely to resurface again during the first GST under the Paris Agreement. The process of reviewing the overall progress made on mitigation, adaptation, and means of implementation and support⁴ will make it evident that current efforts are insufficient to achieve the Paris Agreement goals.

Broader budgeting approach

Equitable distribution of responsibilities under the UNFCCC have been brought

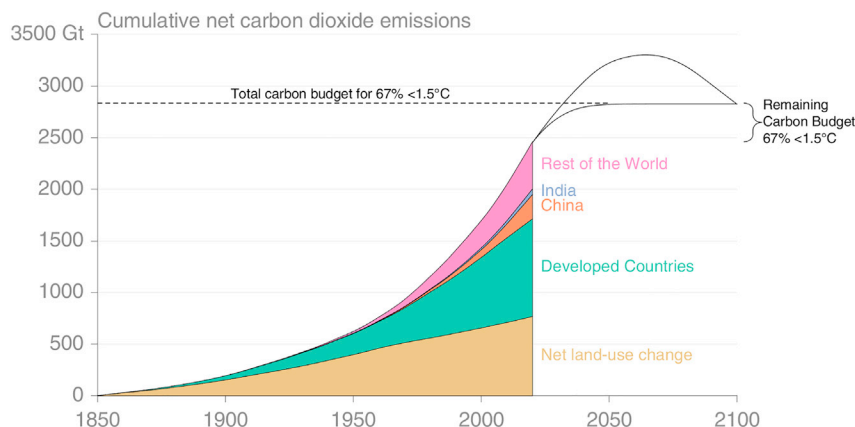


Figure 1. Cumulative historical emissions from 1850 and future pathways to limit temperature rise to 1.5°C

More carbon space for developing countries can be created by ambitious near-term commitments from developed countries that help redistribute the limited remaining budget or through an overshoot period with future deployment of net-negative emissions from developed countries. Cumulative CO₂ emissions are based on the Global Carbon Project,² and the remaining carbon budget for 1.5°C with a 67% chance (IPCC AR6 WG1) is added to the cumulative emissions to give a bottom-up estimate of the total carbon budget. Non-CO₂ emissions cause additional warming, which is included in the temperature limit shown here. The land-use change emissions are not allocated to countries in this analysis due to uncertainties, but around 10% would be allocated to developed countries and 80% to the rest of the world.

into greater focus by the long-term temperature goal of the Paris Agreement, which catalyzed shifting the climate debate's focal point from 2°C to 1.5°C, the latter becoming the primary policy benchmark with the publication of IPCC's Special Report on 1.5°C warming (SR1.5) in 2018. Although this helped shed light on climate change impacts and adaptation needs arising long before 2°C is reached, this shift has made the mitigation challenge much greater. Climate policymakers are confronted not only with a rapidly depleting carbon budget for 1.5°C—current nationally determined contributions (NDCs) imply emissions of 455 GtCO₂ between 2020 and 2030,⁵ compared to a budget of just 400 GtCO₂ (67% chance of limiting to 1.5°C) to 500 GtCO₂ (50% chance)—but also the necessity to account for the occurrence of a temperature overshoot that could only be reversed by achieving net-negative CO₂ emissions in the second half of the century, when the global level of CDR would start exceeding residual emissions.

Although the carbon budget has not been central to UNFCCC negotiations so far, the concept has become a core heuristic device in the global climate debate.⁶ As the remaining carbon budget to keep temperature increase to an agreed level, it shapes analyses on how to fairly distribute a depleting amount of “emis-

sions allowances.” By looking at the total carbon budget associated with a distinct warming level, it also allows the uneven distribution of past emissions to be taken into account and, with it, the question of developed countries' historical responsibility for climate change.^{1,7} It has therefore empowered discussions about distributive responsibilities for emissions well past the standard horizons for policy development. The hypothetical option that countries could extend their mitigation efforts beyond net-zero emissions and one day remove more CO₂ from the atmosphere than they continue emitting opens up arguments that historical carbon debts could be repaid through net-negative emissions. At least in theory, this could free up some more carbon space for developing countries such as India within the overall global budget, potentially allowing them to move from lower-middle income status to upper-middle income economies. Without this additional space, China would be the last major economy to benefit from a fossil-fuel-based path to upper-middle income status. For smaller climate vulnerable nations whose equitable share of emission allowances might be of less practical import to staying within the carbon budget, the timing and scale of net-negative emissions is still relevant, because it affects the extent of climate

damages through its impacts on the magnitude and duration of the temperature overshoot period. Figure 2 illustrates these issues conceptually. Meeting the 1.5°C target without net-negative emissions (Figure 2A) involves steep decarbonization for almost all parties and a lower and earlier emissions peak for developing countries such as India. Alternatively, if developed countries go net-negative while the whole world aims for net-zero, developing countries will be able to transition at a slower pace and have longer timelines for continued residual emissions (Figure 2B). Finally, if developed countries and China go net-negative at significant scales, taking global emissions into net-negative territory, developing country emissions could peak at a higher level and much later before transitioning to net-zero (Figure 2C).

A risky bet

Developed countries have delayed adequate climate action for the past two decades with a well-established inconsistency between talk, decisions, and actions.⁸ Without political safeguards, explicitly promising long-term net-negative emissions could turn into another mechanism to delay the drastic emissions cuts needed and limit the scale of mitigation in the near term. Because the Paris Agreement itself does not clarify limits for the duration or magnitude of temperature overshoot, the prospect of net-negative emissions could turn into a never-ending promise of paying back initial “carbon debt” sometime later.⁹ Developing countries must therefore be wary of moving from demanding immediate and steep emission reductions to shifting attention toward CDR. An increasing reliance on future net-negative emissions could therefore mean that developing countries are left waiting for massive CDR deployment to bring down temperatures. Although the science on climatic tipping points is highly uncertain, allowing for a temperature overshoot period certainly increases the risk of triggering serious irreversible ecological and social impacts. There is also the risk that an overshoot could lead the world to a new high temperature and lower welfare equilibrium, wherein there are diminishing incentives for policymakers in developed countries to ramp up mitigation options such as CDR.¹⁰ Gaining carbon space in

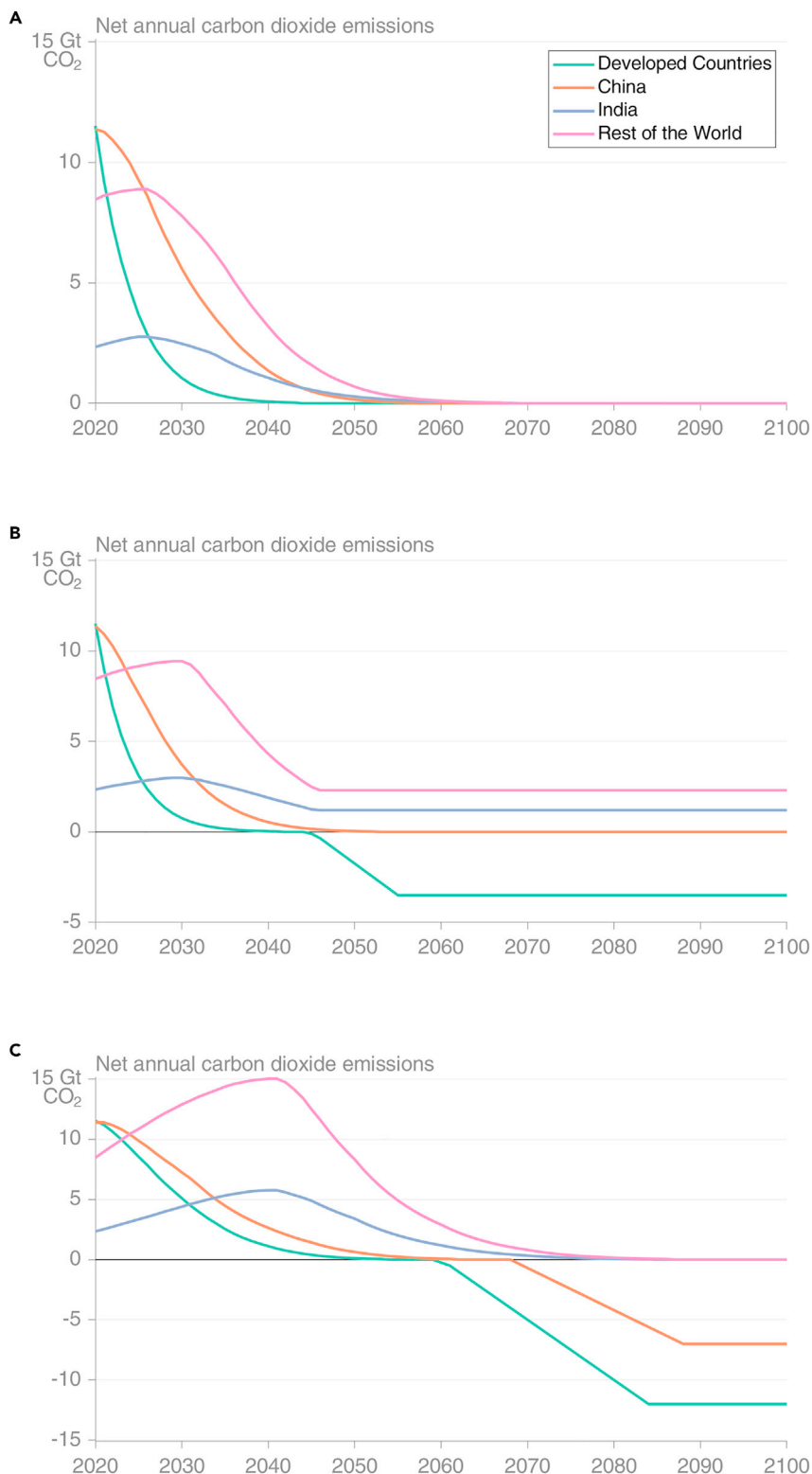


Figure 2. Widening the negotiating space for distributing the 1.5°C carbon budget
Stylized emission pathways and the expansion of carbon space for developing countries such as India if other actors go net-negative. The remaining carbon budget is restricted to 400 GtCO₂ by 2100 in all three cases, corresponding to a 67% chance of limiting warming to 1.5°C.
(A) Emission pathways without net-negative emissions involve rapid decarbonization and an emissions peak possibly as early as 2025 for India and the rest of the world.

a world headed toward net-zero emissions might also not be the most desirable option. If the developed world largely phases out fossil fuels and enacts carbon border adjustments, developing countries that continue to substantially rely on fossil fuels could be left further behind economically. Simply put, in a world moving toward net-zero carbon, trade agreements adjusted for emissions, and green finance, carbon space or “rights to emit” will be a depreciating asset.

There is also the critical issue of the technical and socio-political feasibility of CDR at the scale of several hundred gigatons assumed by the IPCC SR1.5. Developed countries are still reluctant to accept responsibility for the large-scale delivery of net-negative emissions.¹¹ CDR capacity is also treated in the abstract as infinite, but real-world capacity will be limited by factors including land availability for afforestation or biomass, availability of excess renewable energy for CDR technologies such as direct air capture (DAC), trust in monitoring and verification, and social and political support for the cost and new infrastructure required for CDR,¹² to name a few. Even if CDR technologies like bioenergy with carbon capture and storage (BECCS) or DAC with carbon storage become more cost effective, there is no social license yet to operate such technologies in the developed world at the required scale.

At least from an economic perspective, equitable outcomes on climate change mitigation do not necessarily imply an equitable allocation of the carbon budget, if strong substitute goods such as financial capital and technology for abatement or adaptation can be provided instead. However, in practice, the poor record of support from developed countries means this is easier said than achieved. Even so, the GST could be the appropriate time to begin negotiations on the relevant exchange rates for converting the “currency” of remaining emissions

(B) Emission pathways with developed countries going net-negative by the middle of the century allow for a slower transition toward net-zero for India and the rest of the world and an emissions peak slightly delayed to 2030.

(C) Emission pathways with both developed countries and China going net-negative in the second half of the century and at scales leading to global net-negative emissions of nearly 500 GtCO₂ allow for a higher emissions peak for India and the rest of the world possibly as late as 2040.

allowances and emerging “removal obligations” to technological or financial support (for mitigation, adaptation, and loss and damage among others) in its stead.

Negotiating net-negative seriously

The political economy of CDR and net-negative emissions has received little attention in the post-Paris negotiations. This is despite its central role in potentially reversing a temperature overshoot and allowing for an equitable distribution of the mitigation burden. And although there has been increasing attention that CDR—as a way to balance residual emissions—will be needed even to reach net-zero targets,¹³ current NDCs from developed countries contain little to no mention of CDR commitments.¹⁴ However, there are already a small number of climate policy frontrunners vaguely promising to aim for net-negative emissions in their respective climate laws, including the European Union aiming to achieve net-negative emissions after 2050 and Sweden and Germany aiming to get there after reaching net-zero already by 2045. Although such individual pledges can be seen as positive signs, the credibility of promising long-term net-negative emissions hinges on three yet-unaddressed issues that need to be confronted in negotiations within the UNFCCC and other international fora.

First, to create more robust expectations, all developed countries in the UNFCCC need to signal if they are willing to aim for reaching net-negative CO₂ emissions around mid-century, and developing countries need to indicate their target dates for emissions levels converging to net-zero. As long as parties to the Paris Agreement are not willing or able to meet this minimum requirement, there is no political basis to assume that a net-negative-emissions trajectory will be reached globally.

Second, developed countries need to indicate the levels of net-negative emissions they plan to achieve after mid-century, in a new round of national long-term strategies to be submitted to the UNFCCC. These strategies should not

only highlight policies for upscaling CDR but also indicate the removal volumes simply used to compensate for residual emissions and those on top of that which will help in achieving net-negative levels. Furthermore, developed countries should indicate to which extent they intend to deploy CDR domestically.¹³

Third, developed countries need to transparently lay out plans for near-term mitigation, featuring separate targets for emissions reductions and CDR in the next round of NDCs due by 2025, better enabling developing countries, researchers, and civil society to scrutinize these plans.¹³ Given the cumbersome UNFCCC negotiations on the implementation of the Paris Agreement’s Article 6, it seems premature to assume that international market mechanisms would allow developed countries to meet their fair shares of CDR by setting up projects in developing countries, as the predecessor under the Kyoto Protocol clearly failed to meet sufficient environmental integrity standards.¹⁵

In the absence of significantly accelerated near-term mitigation, the implied role of net-negative emissions in limiting the temperature increase to 1.5°C by the end of the century, and achieving this outcome equitably, continues to grow. When, in the context of the GST, it will become clear that NDCs don’t add up to anything near a pathway that can realistically achieve 1.5°C, conflicts over CBDR-RC and equity will resurface in the UNFCCC and other international fora, just as has been the case on several occasions in the past. Without serious attention paid to how to distribute responsibilities to achieve the goal of limiting warming to 1.5°C, it is questionable whether it will be achieved at all.

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