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Benefits and Pitfalls of an EU Emissions Budget Approach

Oliver Geden, Brigitte Knopf and Felix Schenuit

Following the conclusion of the 'Fit for 55' package, European Union (EU) climate policy will enter its next phase. One of the most important decisions will be how to set the economy-wide emissions reduction target for 2040, which will form the starting point for the next round of revisions of all EU climate policy legislation. The European Climate Law stipulates that the European Commission shall propose a 2040 target that is based, among other things, on a "projected indicative Union greenhouse gas budget for the 2030–2050 period", informed by a report of the newly established European Scientific Advisory Board on Climate Change. While cumulating emissions resulting from different future trajectories can help to assess ambition levels, strictly deriving a 'science-based' EU emissions budget from the global carbon budget has several pitfalls. The debate on the design of EU climate policy after 2030 should not put too much focus on the 'appropriate' target for 2040 but on how to further develop the governance architecture, strengthen policy instruments, and bolster public support.

As the numerous and complex legislative processes that came to constitute the 'Fit for 55' package come to an end, the next key political challenge for the European Green Deal is emerging: deciding on the EU's 2040 emissions reduction target. The European Climate Law, adopted in 2021, sets out important elements of the target structure, stating that the European Commission propose an intermediate target for 2040 (Art. 4.3) while also referencing the long-term temperature target of the Paris Agreement, a Union-wide net-zero emissions target for 2050, and a vision for achieving net-negative emissions thereafter (Art. 2). Domestically, the 2040 target will set the benchmark for the next round of revisions of all pieces of EU climate policy legislation. Externally, the 2040 target decision is deeply intertwined with the EU's next Nationally Determined Contribution (NDC) under the Paris Agreement, due in 2025.

During the negotiations on the European Climate Law, the European Parliament proposed setting a legally binding 2040 target based on a greenhouse gas (GHG) budget that would be set by a panel of scientific experts. The European Commission, on the other hand, originally proposed to set, through delegated acts, a "trajectory towards climate neutrality" that would be updated no later than six months after the conclu-

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sion of each Global Stocktake under the Paris Agreement. Member States were not overly keen to change the decision-making process on the EU-wide emissions reduction target, which had been determined by way of consensus among all heads of state and government at the European Council. The compromise between Member States and the European Parliament therefore eventually resulted in the 2040 target becoming an element of the European Climate Law; but the concept of the emissions budget was given a much weaker role than originally envisaged by the Parliament. The *European Scientific Advisory Board on Climate Change* (ESABCC), newly established by the European Climate Law, has the explicit mandate to support EU institutions in calculating a GHG emissions budget.

The Law entered into force in July 2021 and defined the *projected indicative Union greenhouse gas budget for the 2030–2050 period* as the "indicative total volume of net greenhouse gas emissions (expressed as CO_2 equivalent and providing separate information on emissions and removals) that are expected to be emitted in that period without putting at risk the Union's commitments under the Paris Agreement." In addition to the indicative character of the budget, the adopted version of the Law does not, in contrast to the European Parliament's proposal, foresee that the GHG emissions budget will play a unique role in setting the 2040 target — it is presented only as one of thirteen elements to consider (Art. 4.5 a-m). Furthermore, a political decision on the EU's Nationally Determined Contribution for 2035 could be made by the Council before any formal agreement on the 2040 target has been reached with Parliament.

However, given the prominence of the carbon budget approach in global (and sometimes national) climate policy debates and considering the history of the European Climate Law negotiations, it is to be expected that the emissions budget will receive considerable attention despite its marginal role in the legal text. Therefore, it is important to highlight the benefits and pitfalls of an emissions budget approach on the EU level.

Limitations of a budget approach

Global warming levels such as 2°C or 1.5°C can be translated into global budgets of cumulative CO_2 emissions, providing the volumes of carbon that can still be put into the atmosphere. The Intergovernmental Panel on Climate Change (IPCC) provides regular updates of such *remaining carbon budgets* to stay below selected temperature thresholds. Yet methodologies (and budget sizes) keep changing, while non-CO_2 emissions like methane or nitrous oxide are only indirectly accounted for. Moreover, questions about appropriate national (or EU-level) emissions budgets cannot be answered scientifically. The Paris Agreement sets a global long-term temperature goal, compliance with which requires collective global effort. Assigning a precisely quantified national or European responsibility depends on assumptions that are not genuinely scientific but value-laden and political — and not provided by the IPCC. Closer examination of these dimensions cautions against deriving EU or Member State emissions budgets from the global level and trying to implement them as strictly 'science-based' limits that cannot be questioned by governments or parliaments.

No basis in Paris Agreement

The remaining carbon budget to meet a given temperature target with a given probability has a real physical limit and is therefore scarce. This necessarily implies a global distributional conflict over emission rights. If a remaining carbon budget were the basis of negotiations under the United Nations Framework Convention on Climate Change (UNFCCC), it would always result in a zero-sum game: What one country gets cannot be used by another. Not surprisingly, this approach has failed to gain traction in the UNFCCC.

Instead, the Paris Agreement follows a pledge and review approach, which is based on largely voluntary mitigation commitments (NDCs). These are to be strengthened

by signatories every five years in a ratcheting-up mechanism. In the *Global Stocktake*, every five years the collective outcome of these national contributions is compared with the global emissions pathway deemed scientifically necessary. The first Global Stocktake will be concluded at the 28th Conference of the Parties (COP28) to the UNFCCC in late-2023 and will then initiate a new round of strengthened NDCs that will need to be submitted by 2025. In setting mitigation targets, the guiding UNFCCC principle of *common but differentiated responsibilities and respective capabilities* (CBDR-RC) applies. While this principle was never quantified under the UNFCCC, the Paris Agreement explicitly mentions that developed countries should "continue taking the lead" in reducing emissions.

Multiple possible allocation principles

The allocation of the EU's precisely quantified responsibility depends on several assumptions. The question of what the EU's fair contribution to achieving the global long-term temperature goal should look like cannot be answered unambiguously since it depends very much on the equity and fairness criteria applied in such calculations. In the scientific literature, these span from a mere *per capita* approach (usually favouring developed countries) to the full inclusion of historical emissions (favouring developing countries). Considering the historical responsibility of early industrialized countries for climate change (i.e. choosing a starting date of 1750 or 1850) would usually leave no allowances for the EU in a 1.5°C-compatible emissions budget. Furthermore, a comprehensive equity approach would also need to factor in the respective national mitigation potentials and costs, as well as the macroeconomic situation of all countries.

Varying methodologies and volumes

Contrary to widespread perceptions among climate policymakers and the media, global carbon budgets do not provide a sufficiently stable starting point. Translating the Paris Agreement's long-term temperature goal ("holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C") into carbon budgets already involves genuinely political decisions, be it about the 'appropriate' warming level (1.5°C, 1.75°C, or 2°C) or the sufficient likelihood of target achievement (50 per cent, 67 per cent, or 83 per cent). Furthermore, the remaining carbon budgets determined by the IPCC change over time due to scientific advancements. The remaining carbon budgets provided in the IPCC's 5th Synthesis Report (2014) were significantly increased in the Special Report on 1.5°C (2018) and were then again revised slightly upwards in the following IPCC Working Group I Report (2021), especially for a 67 per cent likelihood. If a CO_2 budget for the EU were directly linked to the IPCC's calculations, this would inevitably amount to significant (upward or downward) adjustments after every major IPCC report. Strictly deriving the EU's remaining CO_2 budget from the IPCC's global carbon budget is therefore not a suitable approach to creating a reliable policy trajectory. Furthermore, and often overlooked, there is no global GHG emissions budget. For methodological reasons, the IPCC budgets cover only CO_2 (as it accumulates in the atmosphere) while EU climate policy covers all major greenhouse gases, including nitrous oxide and short-lived climate forcers like methane. In mitigation pathways, achieving net-zero GHGs is more ambitious (and occurs later) than net-zero CO_2, because remaining non-CO_2 emissions (largely from agriculture) need to be counterbalanced by CO_2 removal. While achieving net-zero CO_2 emissions globally would likely lead to temperature stabilization, reaching and sustaining net-zero GHG emissions globally would

— under the emissions metrics used in the UNFCCC and in the EU — lead to a slight temperature decrease.

Cumulating instead of budgeting

While the global CO_2 budget can be determined in principle under the given uncertainties and while it is a useful concept in representing the urgency of the global climate problem, simply breaking down the global CO_2 budget by individual entity *(budgeting)* and trying to create strict 'science-based' budgets is not a suitable approach for the climate policy of the EU and its Member States. However, *cumulating* (i.e. converting planned European or national mitigation pathways into indicative projected total CO_2 or GHG emissions over several years or decades) can be a viable way of representing EU or Member State ambition levels. When compared to the prevalent fixation on distant annual targets that is often found in European climate policy, the approach of cumulating emissions has two major advantages that are often cited by proponents of strictly derived emissions budgets. First, cumulating allows for better comparability of different proposed pathways leading to the same target year for CO_2 or GHG emissions neutrality, thereby shifting the focus from the target year itself to the overall level of ambition. This allows for a better comparison of different political entities (such as the European Union and the United States) in terms of their climate action ambitions. Second, this approach still allows for proposed trajectories at EU and Member State levels to be compared with what would be necessary under different global equity criteria.

The cumulative approach would make it not only possible to assess a country's level of ambition but also to quantify what additional international obligations would follow from this, for example, in helping to establish a low-carbon economy in developing countries, which is a goal of the Just Energy Transition Partnerships (JETPs). Even though the Paris Agreement follows a pledge and review approach, there is a national responsibility to make an appropriate contribution to global climate change mitigation, which should be oriented towards the highest possible ambition (Paris Agreement, Art. 4, para. 3).

The independent ESABCC advisory board has taken an approach in line with these considerations, recommending a range and not a single number for the EU's emissions budget. The range considers multiple dimensions of fairness and feasibility. The ESABCC's advice is based on the physical limits of the global budget, while the EU's 'fair share' is derived assuming different allocation schemes. In addition, the advisory board gives a range for the cumulative EU budget based on different pathways for a net-zero GHG trajectory. The ESABCC concludes that a fair contribution to climate change mitigation requires ambitious reductions in domestic emissions, complemented by measures outside the EU.

Focus on climate governance instead of an emissions budget

Given the problems that arise from rigidly deriving domestic emissions budgets from global carbon budgets, it is more appropriate to take the already existent policy instruments and trajectories as a starting point. Since these are already established policies and plans, they are much more important in governing the transition towards net-zero GHG emissions by 2050 than any budget calculation. These policy instruments set specific targets, including those established in the Directives on the Emissions Trading Systems (ETS I and II), under the Effort Sharing Regulation on sectors beyond the ETS, and under the Regulation on Land Use, Land-Use Change, and Forestry (LULUCF). Targets and long-term trajectories have recently been revised under the 'Fit-for-55' legislative package and will be revised once again in the second half of the 2020s for the time period between 2031 and 2040. In some cases, a concrete year for a revision is already set.

A key dimension of these revisions will be how instruments are linked and incrementally integrated. A yet unanswered question concerning the governance architecture is how and where carbon removal that counterbalances residual emissions will be addressed. This facet of EU climate policy is likely to play a strategic role in future efforts to combine currently separate instruments and policy pillars. Member States' *National Energy and Climate Plans* (NECPs) to be submitted by mid-2024 will provide key information in this respect. The national targets and modelling efforts to be documented in the 27 NECPs will help to explore emerging preferences and coalitions that will shape the next phase of the EU's climate policy. For more robust EU climate governance, a more systematic approach that allows for mutual learning from implementation experience across Member States and sectors is needed, for example through more frequent mandatory evaluation and peer review, including the allocation of public finance for climate action.

To summarise, the political debate on the design of EU climate policy after 2030 should not focus primarily on the 'appropriate' target level for 2040 as long as it is ambitious enough to realise net-zero GHG emissions by 2050. Rather, European climate policymakers in the Council, Parliament, and Commission should prioritise further developing the governance architecture, strengthening policy instruments, and bolstering public support for what is likely to become the most challenging phase of EU climate policy yet.

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