Statement on the Approach Used by Switzerland to Calculate its 'Implicit Carbon Budget' in its Additional Information

Joeri Rogelj and Setu Pelz

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I. Overview

1. This statement provides context-setting commentary on Switzerland's Additional Information, submitted on 24 June 2025. Specifically, this statement provides:

   (a) A summary of what Switzerland has presented in relation to its targets and 'implicit carbon budget';
   (b) A comparison between (i) Switzerland's approach and (ii) calculations of national carbon budgets by reference to the remaining global carbon budget for 1.5 °C (i.e., effort sharing approaches); and
   (c) An overview of transparent and internally consistent fairness and feasibility assessments, by reference to the *Scientific advice for the determination of an EU-wide 2040 climate target and a greenhouse gas budget for 2030–2050* by European Scientific Advisory Board on Climate Change (ESABCC).[1]

II. Commentary

A. Summary of what Switzerland has presented in relation to its targets and 'implicit carbon budget'

2. The Swiss government states that its 'climate targets can be translated into a carbon budget available for each period'. Essentially, Switzerland has determined a notional national greenhouse gas (GHG) budget by calculating the cumulative emissions that would arise if it achieved its targets on a straight-line basis. We note here that the term 'carbon budget' typically refers to CO_2 emissions only, whereas Switzerland uses the phrase 'implicit carbon budget' to encompass all GHGs.
3. The national GHG emissions reduction targets (compared to the reference year 1990) that Switzerland uses to calculate this GHG budget are: -20% by 2020; -50% by 2030; -75% by 2040 and net zero by 2050. These reduction targets compare and are less ambitious than the corresponding European Union's GHG emissions reduction targets (compared to the reference year 1990) of: -20% by 2020, at least -55% by 2030, and net zero by 2050, with an additional target range of -90% to -95% by 2040 recommended by the ESABCC.[1]
4. Switzerland estimates that the achievement of these targets would equate to emissions of: 359 Mt CO_2eq between 2021 and 2030; 199 Mt CO_2eq between 2031 and 2040; and 61 Mt CO_2eq between 2041 and 2050. Adding these values together, Switzerland estimates an 'implicit carbon budget' (i.e., a GHG budget) of 620 Mt CO_2eq for the period between 2021–2050.

[1] European Scientific Advisory Board on Climate Change (2023), *Scientific advice for the determination of an EU-wide 2040 climate target and a greenhouse gas budget for 2030–2050*, available here: https://climate-advisory-board.europa.eu/reports-and-publications/scientific-advice-for-the-determination-of-an-eu-wide-2040

B. Comparison between (i) Switzerland's approach and (ii) calculations of national carbon budgets by reference to the remaining global carbon budget for 1.5 °C (i.e., effort sharing approaches)

5. Switzerland has taken its existing targets as the starting point to calculate an implied national GHG budget. By comparison, an effort sharing approach to determining a national carbon budget would take the global carbon budget or a global emissions pathway consistent with limiting warming to a given global temperature limit (e.g., limiting warming to 1.5 °C) as the starting point.
6. A transparent and internally consistent effort sharing approach to calculating a national carbon budget broadly requires four steps, which require normative decisions to be made:

   (a) The first step involves specifying normative choices regarding the methodology for how to interpret, estimate and establish fair shares across states[2]. Considerations in this context are manifold, including requirements under international, regional and national law, international environmental law principles (such as the precautionary principle, or the do no harm principle) and principles discussed in the Paris Agreement (such as common but differentiated responsibilities and respective capabilities (CBDR-RC) and equity)[3].

   (b) The second step is to identify a relevant temperature limit (such as 1.5 °C) and to select the percentage that represents the appropriate likelihood with which that temperature limit would need to be avoided (the Intergovernmental Panel on Climate Change, IPCC, presents a value-neutral range of likelihoods 17%, 33%, 50%, 67%, 83%)[4].

   (c) The third step is to select a year from which the remaining global carbon budget or pathway is divided. This could be, for example, 1990 (the year of publication of the first IPCC Assessment Report), 2015 (the year the Paris Agreement was adopted) or another year determined suitable as a starting point for responsibility to notionally begin if this is a relevant principle in consideration.

   (d) The final step is to apply an approach to allocate a share of the global carbon budget or pathway to all states in a manner that is consistent with considerations and choices made across steps (a)–(c). Importantly, choices across steps (a)–(c) must be internally consistent.

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[2] 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), 983–1004. https://doi.org/10.1080/14693062.2021.1970504

[3] Pelz, S., Ganti, G., Pachauri, S., Rogelj, J., & Riahi, K. (2025). Entry points for assessing 'fair shares' in national mitigation contributions. *Environmental Research Letters*, 20(2), 024012. https://doi.org/10.1088/1748-9326/ada45f

[4] See IPCC (2021) 'Summary for Policymakers', *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Edited by V. Masson-Delmotte et al. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press. Available at: https://doi.org/10.1017/9781009157896.001. Table SPM.2

7. Taking this framework into account alongside the information in Switzerland's Additional Information, we can conclude that Switzerland did not take an effort sharing approach to calculate its 'implicit carbon budget'. Switzerland did not document systematically how normative considerations were applied as part of their quantification exercise. It did not take a remaining global carbon budget or pathway associated with limiting warming to a given temperature limit (e.g., 1.5 °C) with a given probability (e.g., 50%) as its starting point. It did not explain their choice of an appropriate year to begin allocation. Nor did it apply (by extension of not taking a remaining global carbon budget or appropriate pathway as a starting point) an approach to allocate a share of the global remaining carbon budget or corresponding pathway.
8. We note here that the evidence submitted by the applicants in *KlimaSeniorinnen v Switzerland* presented national carbon budgets for Switzerland that did take an effort sharing approach. Two national carbon budgets were presented, using 67% and 83% likelihoods of limiting temperature rise to 1.5 °C. The year from which onwards the budget was divided was 2020 (as this was the starting year of the global carbon budget estimates presented in the IPCC's Sixth Assessment Report). The applicants used an 'equal per capita' approach, which essentially divides the global remaining carbon budget amongst countries based on their current population (which reflects the principle of equality, but is unlikely alone to reflect other legal principles such as CBDR-RC). The final national carbon budget estimates presented were 440 Mt CO_2 (67%) and 330 Mt CO_2 (83%).
9. [Verein KlimaSeniorinnen Schweiz has also submitted to the Committee of Ministers a report by Dr Setu Pelz, Dr Yann Robiou Du Pont and Dr Zebedee Nicholls, entitled *Estimates of fair share carbon budgets for Switzerland*. This report also took an effort sharing approach to present national carbon budgets for Switzerland, using the approach of the ESABCC's report, *Scientific advice for the determination of an EU-wide 2040 climate target and a greenhouse gas budget for 2030–2050* (see footnote 1), as a basis. This report was conducted in line with the steps described in 6 (a)–(d). The estimates of the national carbon budget presented were all based on the global carbon budget for a 50% likelihood of limiting temperature rise to 1.5 °C. The year at which the budget was divided was in 2015 (the year the Paris Agreement was adopted). The report presented four estimates of the national carbon budget, based on four separate methodologies that reflected equality, responsibility, capability and a combination of responsibility and capability. Estimates of Switzerland's national carbon budget, from the start of 2023, ranged from 260 Mt CO_2 (using an 'equal per capita' approach) to -990 Mt CO_2 (using an approach reflecting capability and responsibility).

C. Overview of transparent and internally consistent fairness and feasibility assessments by reference to the ESABCC's Scientific advice for the determination of an EU-wide 2040 climate target and a greenhouse gas budget for 2030–2050

10. The ESABCC made recommendations to the EU in respect of its 2040 targets by reference to (i) a 'fair share' assessment of the EU's share of the remaining carbon budget from 2020 and (ii) a scenario-based feasibility assessment of modelled

domestic mitigation pathways, which sought to estimate the maximum levels of emissions reductions that the EU would be able to achieve within its territory.

11. In the ESABCC's fair share assessment:

    (a) The ESABCC first considered the EU's obligations under international and EU law. This included consideration of principles enshrined in EU law, such as the polluter pays, the precautionary, and the do no significant harm principles, as well as principles drawn from the Paris Agreement (such as CBDR-RC).
    (b) Based on these principles and norms, it selected a temperature limit (1.5 °C) and likelihood (50%), defining a remaining carbon budget for the world available from the year 2015 onward, and allocating this as described below. The actual emissions between 2015-2020 where then subtracted from this allocation for each party, to arrive at a remaining carbon budget from the year 2020 onward.
    (c) Methodological approaches to effort sharing available in the literature were discussed in detail (see the underlying report to the ESABCC advice, *Evaluating equity in European climate change mitigation pathways for the EU Scientific Advisory Board on Climate Change*[5]) and culminated in a subset of approaches that could be considered aligned with the aforementioned principles and norms. This led to certain approaches being excluded from further use, including those that reflected grandfathering (i.e., allocations of carbon budgets based on historical or current emissions shares, which benefits high-emitting countries) and cost-effectiveness (i.e., emissions are reduced where it is cheapest to do so). This is because these approaches were not considered a 'standard of equity', as they are not aligned with the aforementioned principles and norms [6].
    (d) As such, only estimates of the EU's share of the remaining carbon budget that were calculated using approaches broadly categorised under 'equality', 'responsibility' and 'capability' were presented. The allocation under the 'equal per capita' approach from the year 2015 onward (the year of the adoption of the Paris Agreement) was the most lenient approach that was presented in the report. All the effort sharing approaches presented by the ESABCC estimated that the EU either had a small remaining carbon budget from 2020 or had already depleted its equitable carbon budget by 2020.

12. The ESABCC also carried out an assessment of feasible domestic GHG emission reduction pathways for the EU. Overall, the ESABCC found that the cumulative emissions under feasible domestic pathways exceeded the emissions permissible under even an 'equal per capita' allocation of the remaining budget from the year 2015, the most lenient allocation approach presented in the report. Based on its EU analysis, it recommended a 90–95% reduction of domestic GHG emissions by 2040 compared to 1990. It also recommended that ambitious domestic emission reductions be

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[5] Pelz et al. (2023), *Evaluating equity in European climate change mitigation pathways for the EU Scientific Advisory Board on Climate Change*, available here: https://pure.iiasa.ac.at/id/eprint/18830/1/report_equity_iiasa_euab%20%281%29.pdf

[6] 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), 983–1004. https://doi.org/10.1080/14693062.2021.1970504

complemented by measures outside the EU to achieve a fair contribution to climate change mitigation. Specifically, measures that were highlighted included pursuing the more demanding end of the recommended target range as well as achieving net negative emissions beyond 2050, together with support, cooperation and partnerships outside the EU.

13. The ESABCC's approach makes clear that 'responsibility', as determined through fair share assessments, and 'feasibility' need to be treated as separate, but complementary, exercises. Given that the global remaining carbon budget is small, many developed nations will not be able to meet their 'responsibility' through domestic measures alone. In order for fair share national carbon budgets to be respected, in addition to highest possible ambition at the domestic level, further efforts outside of the territory may be required.

III. Authors

Professor Joeri Rogelj is the Director of Research at the Grantham Institute for Climate Change and Environment at Imperial College London, as well as the Professor of Climate Science & Policy at the Centre for Environmental Policy at Imperial College London. He has published over 125 peer-reviewed scientific studies on the topic of climate change, greenhouse gas emissions reductions, climate change scenarios, low-carbon transformations and climate justice. Professor Rogelj was one of the coordinating lead authors on the Intergovernmental Panel on Climate Change's (IPCC) Special Report on Global Warming of 1.5 °C (SR1.5) for which he coordinated the chapter tasked with assessing mitigation scenarios compatible with limiting global warming to 1.5 °C in the context of sustainable development. He also served as a lead author on the IPCC's latest sixth assessment (AR6), both on the chapter assessing the remaining carbon budget and the annex on scenarios and modelling methods dedicated to improving the transparency of modelling assumptions and enhance the communication of scenario results. Professor Rogelj also serves as one of the fifteen independent members of the European Scientific Advisory Board on Climate Change (ESABCC), established by the 2021 European Climate Law to provide independent scientific advice on climate policy in the European Union.

Digitally signed by
Joeri Rogelj
Date: 2025.07.18
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Dr. Setu Sebastian Pelz is a Research Scholar in the Transformative Institutional and Social Solutions Research Group within the Energy, Climate, and Environment Program at the International Institute for Applied Systems Analysis (IIASA). He has contributed to research on fairness considerations in global mitigation pathways published in Science and PNAS, and to studies informing advice to the European Commission for a 2040 climate target. His work centres on equitable solutions in the context of energy access, sustainable development, and climate change mitigation.

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