

April 26, 2023

Questions relating to the Climate Action Tracker

Question as received from Applicants

In its answers Switzerland states that there is “no agreed methodology for calculating a fair emissions reduction budget assigned to each country” and that “every effort to calculate national budgets contains a strong element of subjectivity” referring to the studies performed by the Climate Action Tracker, Climate Analytics and the study by Rajamani et al. (2021). In relation to the Climate Action Tracker, Switzerland states that “the NGO Climate Action Tracker has seven specific effort-sharing categories (...) the classification of countries into each of these categories is questionable and the methodology unclear (...) on its website, the organisation itself acknowledges that there is no single agreed framework on what constitutes a fair contribution to global efforts”.

We are aware of the methodology of the CAT as described on its website including the fact that its results are based on the assessment of effort sharing studies in the IPCC Fifth Assessment Report (WG III, Chapter 6) and new studies and analysis since the publication of that report (as described on the CAT website here: <https://climateactiontracker.org/methodology/cat-rating-methodology/fair-share/>)

In addition to what is described there;

Question 1: Could you, as a member of the CAT consortium, provide a description of the CAT consortium and the scientific underpinning of the CAT methodology? In addition, could you comment on the specific critique of Switzerland on the CAT methodology as described here.

Response on behalf of the CAT consortium

The Climate Action Tracker (CAT) is an independent scientific project that tracks government climate action and measures it against the globally agreed Paris Agreement aim of “holding warming well below 2°C, and pursuing efforts to limit warming to 1.5°C.” The CAT was founded in 2009 and is a collaboration of two renowned research organisations: Climate Analytics and NewClimate Institute. The CAT also receives support from the Institute for Essential Services Reform. Past consortium members have included the Potsdam Institute for Climate Impact Research (2009–2016) and Ecofys, a Navigant company (2009–2019). The CAT is funded by the Federal Government of Germany via the International Climate Initiative, the Climate Emergency Collaboration Group via Rockefeller Philanthropy Advisors, the ClimateWorks Foundation, and the European Climate Foundation. 47 policy, science, and modelling experts are involved in developing and updating the CAT. Several of these experts are also IPCC authors.

CAT team members (e.g Prof. Dr. Niklas Höhne) have over 20 years scientific experience with allocating emissions to countries based on equity principles. They prepared the meta-study and developed the

categorisation¹ that was later used in several IPCC reports², and which forms the basis for the CAT methodology.

The following paragraphs respond to the specific critique made by Switzerland.

Re: No agreed methodology for calculating fair shares

The UN Framework Convention on Climate Change, which is universally agreed, includes the principle of “common but differentiated responsibilities and respective capabilities”. This principle is globally accepted. Equity on the basis of the principle of common but differentiated responsibilities needs to be considered regardless of the uncertainties. If a national emissions target falls outside of the full range of possible interpretations of equity, then it is definitely not in line with the UNFCCC and the Paris Agreement.

In addition, States cannot apply the most convenient equity approach to their own circumstances. If each State picks the equity interpretation most preferable to it, the 1.5°C limit would be missed by a significant margin. The unique strength of the CAT’s methodology is that it covers all major countries (80% of current emissions) and therefore can put Switzerland’s targets into a global perspective and provide an estimated global warming level.

The CAT’s methodology applies the best available science to determine a State’s fair share. The CAT applies a synthesis framework which considers a wide range of perspectives of what could be considered fair, including equity principles such as historical responsibility, capability and equality, and weights them equally. This constitutes the most neutral way of combining different views of equity.

The CAT’s analysis is based on over 40 studies used by the 5th Assessment Report of the IPCC (chapter 6 of WG III, Höhne et al. (2013)), new studies that have been published since, and additional analyses the CAT has performed. The categorisation of principles used by the CAT is that developed by Höhne et al. (2014)³, which was the basis for the framework used in the IPCC’s AR5 WGIII chapter 6 on effort-sharing. 23 individual studies underlie the CAT methodology, though in some instances a study provides several different equity approaches, all of which are included in the methodology. Categories are given an equal weighting in our framework to avoid favouring any particular equity principle over another, as well as to develop the most thorough equity framework possible in line with the best available science.

The CAT’s methodology focuses on emissions emitted within a State’s boundaries, i.e. it pursues a territorial approach. Thus, it should be noted that the CAT’s methodology is favourable to States such as Switzerland, who do not have a large industry sector but instead import much of their goods and services and thus have significant consumption-based emissions that are not considered under CAT’s methodology.

¹ den Elzen, M.; Höhne, N. (2008). Reductions of greenhouse gas emissions in Annex I and non-Annex I countries for meeting concentration stabilisation targets: An editorial comment. *Climatic Change*, 91(3–4), 249–274. <https://doi.org/10.1007/s10584-008-9484-z>

den Elzen, M., Höhne, N. (2010). Sharing the reduction effort to limit global warming to 2°C. *Climate Policy*, 10(3), 247–260. <http://www.tandfonline.com/doi/abs/10.3763/cpol.2009.0678>

Höhne, N., den Elzen, M., Escalante, D. (2014). Regional GHG reduction targets based on effort sharing: a comparison of studies. *Climate Policy*, 14(1), 122–147. <https://doi.org/10.1080/14693062.2014.849452>

² IPCC WGIII, AR4, ch 13 box 13.7
IPCC WGIII, AR5, ch 6, figure 6.28 and 6.29

³ Niklas Höhne, Michel den Elzen & Donovan Escalante (2014) Regional GHG reduction targets based on effort sharing: a comparison of studies, *Climate Policy*, 14:1, 122-147, DOI: 10.1080/14693062.2014.849452

Re: Great degree of subjectivity

Switzerland's claim that the CAT's analysis contains "a strong element of subjectivity" due to the assessment not reflecting "an agreed methodology for evaluating states' climate change efforts" is a misrepresentation of the CAT's methodology.

Subjectivity is eliminated in the CAT's approach by using a wide range of equity principles that are all weighted equally. Developing a synthesis framework of all relevant equity approaches based on the best available science is the most objective way of establishing a state's fair share of the global effort.

From Switzerland's NDC, it can be followed that, in theory, Switzerland supports integrating equity considerations into its climate targets. However, Switzerland does not provide the calculations as to how its targets are equitable. The CAT views its methodology as building on Switzerland's principal support for equity by providing a mathematical basis for its fair share. This is because a State's fair share must ultimately be based on modelling and mathematical calculations and not on theoretical support for any equity methodology alone.

Re: The CAT's methodology used to determine a State's fair share is unclear

Switzerland claims that the classification of countries into each of the seven specific effort-sharing categories used by the CAT is questionable and the methodology unclear. We reject this notion, as the method is clearly described in the peer reviewed scientific literature⁴.

The CAT uses seven specific effort-sharing categories in line with those presented in chapter 6 of the IPCC's AR5 WGIII. To avoid favouring any particular equity principle over another, as well as to develop the most thorough equity framework possible according to the best available science, a synthesis framework is applied which considers all existing relevant equity methodologies.

After weighting each equity category equally, we prevent extreme values, either at the most stringent or least stringent end of the range, from distorting a country's fair share range by excluding results which fall outside the 5th to 95th percentiles. The CAT provides a demonstration of how it determines the fair share range for each State on its website, as well as a full description of its methodology and the list of literature used to determine the "fair share range"⁵.

This fair share range defines a comparable ambition level range for all countries. Thus, setting a mitigation target level for all major countries at the same relative position in this range is considered an "equal level of ambition". For each level, the CAT methodology estimates the global emission trajectory over the century and is able to relate it to a global warming level. This finally allows the identification of an equal level of ambition for all countries which limits global warming to 1.5°C.

A recent contribution to the literature, entitled "National 'fair shares' in reducing greenhouse gas emissions within the principled framework of international environmental law"⁶ (hereafter referred to as "Rajamani et al."), examines the ambition level required of countries according to principles of international environmental law. The analysis relies on the same approach as the CAT, with an aim to determine an appropriate ambition level for countries from the perspective of ensuring that the sum of individual contributions is collectively compatible with the Paris Agreement's target. A key similarity between the CAT's assessments and Rajamani et al. is that both studies draw from the full spectrum of equity perspectives provided in the scientific literature, rather than basing their analysis on a specific,

⁴ Niklas Höhne, Michel den Elzen & Donovan Escalante (2014) Regional GHG reduction targets based on effort sharing: a comparison of studies, *Climate Policy*, 14:1, 122-147, DOI: 10.1080/14693062.2014.849452

⁵ CAT, CAT rating methodology, Fair share, available at <https://climateactiontracker.org/methodology/cat-rating-methodology/fair-share/>

⁶ Rajamani, L., *et al*, National 'fair shares' in reducing greenhouse gas emissions within the principled framework of international environmental law. *Climate Policy* 21(8), 983-1004 (2021)

more limited set of normative assumptions, as other studies do. In both cases, approaches based solely on grandfathering or cost-effectiveness are excluded as these are not considered consistent with any fair share principles. Rajamani et al. are particularly stringent in their application of criteria for consistency with international environmental law principles (see section 3.1 in Rajamani et al.).

The fair share ranges assigned to individual countries by the CAT's methods and Rajamani et al. are comparable with differences relating to the method used to relate emissions levels to future warming levels. These different methods are described in Hohne et al 2022⁷. Both the Rajamani et al. and CAT approaches serve to complement each other in developing a holistic fair share range for individual countries.

Questions relating to the report by Climate Analytics, A 1.5°C compatible Switzerland

Question as received from Applicants

In its answers, Switzerland states that *"like the IPCC in its reports, Climate Analytics makes assumptions about societal and political developments in order to construct the climate scenarios. However, in the case of the IPCC, these assumptions are very robust and provide a range of scenarios and multiple model runs to arrive at the value presented. The Climate Analytics analysis has several shortcomings. In particular, the analysis does not provide a statistical range in its projections. The modelling is almost linear with a starting point in 2020 and an end point in 2030. It is not clear how Climate Analytics has accurately calculated a modelled trajectory for 1.5°C of warming"*.

It is unclear from the phrasing of these comments to which modelling Switzerland is specifically referring, particularly because neither the A 1.5°C compatible Switzerland report nor the Climate Analytics 1.5°C national pathway explorer does contain a graph with a starting point in 2020 and an endpoint in 2030. Such a pathway can, however, be found in the Climate Action Tracker figure on Switzerland (last updated June 2022). For this reason we ask you to provide two separate answers in relation to the following question. One as if the comment relates to model results on domestic emission reductions as depicted in Figure 1 of A 1.5°C compatible Switzerland, and one as if the comment relates to the figure in the report of the Climate Action Tracker on Switzerland.

Question 2: Could you provide a description of the scenario selection and methodology of defining a 1.5°C modelled trajectory for domestic emission reductions in Switzerland. In doing so, please also comment on the critique of Switzerland as quoted in the above and provide an explanation of the difference between modelled domestic emission reduction and modelled fair share contributions.

Response on behalf of Climate Analytics and the CAT consortium

Re: A 1.5°C compatible Switzerland

The 1.5°C domestic pathways we develop are derived from scenarios assessed by the IPCC and included in its databases; we downscale these scenarios to the national level using well established scientific methods (described in detail on our website, e.g. here: <http://1p5ndc->

⁷ Hohne, N., Gidden, M. J., den Elzen, M., Hans, F., Fyson, C., Geiges, A., Jeffery, M. L., Gonzales-Zuñiga, S., Mooldijk, S., Hare, W., & Rogelj, J. (2021). Wave of net zero emission targets opens window to meeting the Paris Agreement. *Nature Climate Change*, 11(10), 820–822. <https://doi.org/10.1038/s41558-021-01142-2>

pathways.climateanalytics.org/methodology/, and, for example, in Gidden et al. (2019)⁸). This means that the pathways we develop are based on the same socio-economic assumptions as the IPCC's scenarios. We evaluate a full range of pathways from the IPCC's database, although we exclude from our analysis those scenarios that are not compatible with the Paris Agreement (for example, those that overshoot 1.5°C to a high degree) and those that do not meet sustainability constraints defined by the IPCC.

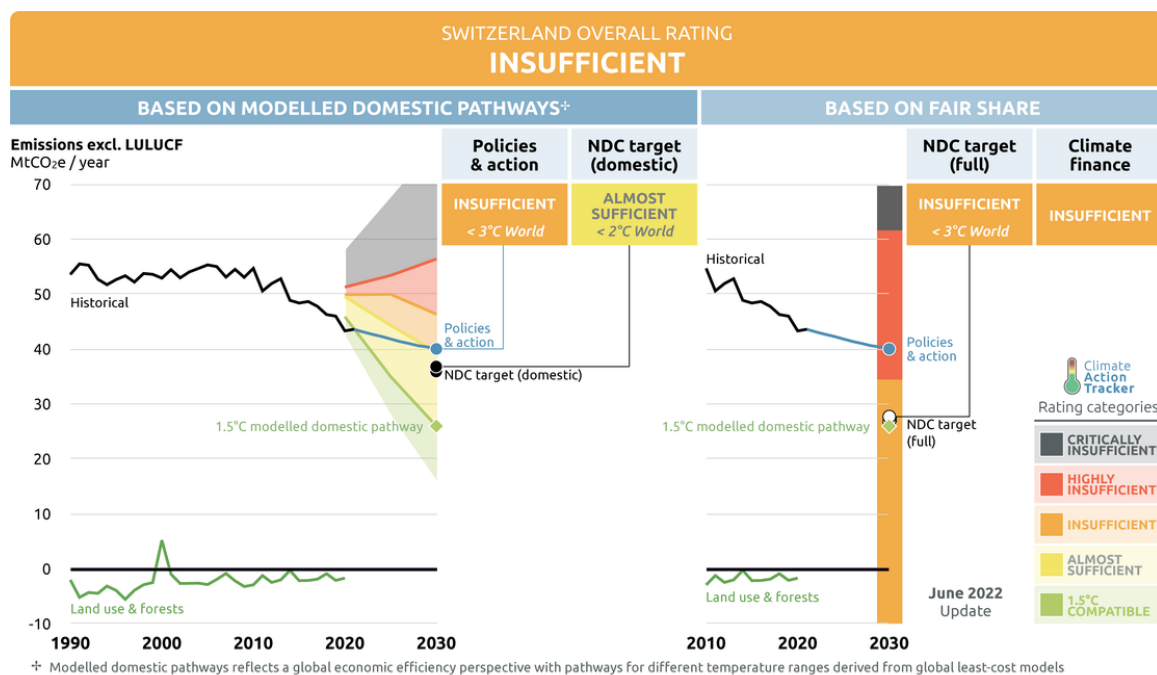
We define the threshold for what is 1.5°C compatible for a given country by taking the median of the range across pathways; this is to ensure that the derived emissions still achieve the global temperature goal when aggregated together across all assessed countries (if a country were to follow a pathway that falls in the upper end of the range, other countries would need to cut emissions faster than the median in order to maintain 1.5°C compatibility). This means our results are based on a statistical range, with the median of that range representing the least ambitious emissions reductions that could be considered 1.5°C compatible domestically.

The pathways we downscale are harmonised to historical data and have timesteps that are the same as the original global pathways they are derived from (typically 5-yearly, out to 2100 in most cases).

The 1.5°C modelled domestic pathways we calculate show what emissions reductions are needed domestically, within a country's own borders, to be globally consistent with limiting warming to 1.5°C. This is based on what is cost-effective from a global perspective (a core assumption underlying the IPCC-assessed scenarios) and does not factor in what would be a fair contribution. We separately assess what a fair contribution would be, which for developed countries like Switzerland would need to be achieved through a combination of domestic emissions reductions (following a 1.5°C compatible domestic pathway) and international support for developing countries (e.g. climate mitigation finance).

Re: *Climate Action Tracker*

The CAT rating of Switzerland is summarised in the following figure as shown on the CAT's country webpage.

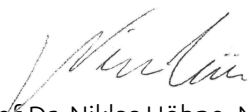


⁸ Gidden, M., Riahi, K., Smith, S. J., Fujimori, S., Luderer, G., Kriegler, E., van Vuuren, D. P., van den Berg, M., Feng, L., Klein, D., Calvin, K., Doelman, J. C., Frank, S., Fricko, O., Harmsen, M., Hasegawa, T., Havlik, P., Hilaire, J., Hoesly, R., ... Takahashi, K. (2019). Global emissions pathways under different socioeconomic scenarios for use in CMIP6: a dataset of harmonized emissions trajectories through the end of the century. *Geoscientific Model Development*, 12, 1443–1475.

The left part of the panel shows modelled domestic pathways for Switzerland that are consistent with different levels of global warming. These are calculated by downscaling 250 IPCC-assessed global pathways, which come from 8 different underlying models and cover the full range of Shared Socioeconomic Pathways (SSPs) assessed by the IPCC. This means the CAT domestic pathways are based on the same socio-economic assumptions as the IPCC's global pathways.

The lines on the left panel show the median estimate of an ensemble of scenarios for a given temperature category. We take the median as the threshold for each temperature category in order to ensure that the derived emissions still achieve the global temperature level when aggregated together across all assessed countries. The 1.5°C pathway in green uses the same method as the pathway shown in Figure 1 of the *1.5°C compatible Switzerland* (note that the CAT pathways have been more recently updated). Different from that report, the figure in the CAT only shows the pathways between the years 2020 and 2030. This is for reasons of comparability with the fair share results in the right panel which are only modelled at 2030.

The linear appearance of the CAT domestic pathways should not be interpreted as meaning the underlying modelling is linear; it is the result of the way we visualize the data and the truncation after 2030. The underlying global models usually simulate in time-steps of 5 or 10 years. This means the CAT pathways also have time-steps of 5 or 10 years (2020, 2025 and 2030), and we interpolate between data points for visualisation purposes. The underlying models are not linear and continue up to at least 2060 (most go to 2100).



Prof Dr. Niklas Höhne, NewClimate Institute
(member of Climate Action Tracker consortium)



Bill Hare, CEO Climate Analytics
(member of Climate Action Tracker consortium)