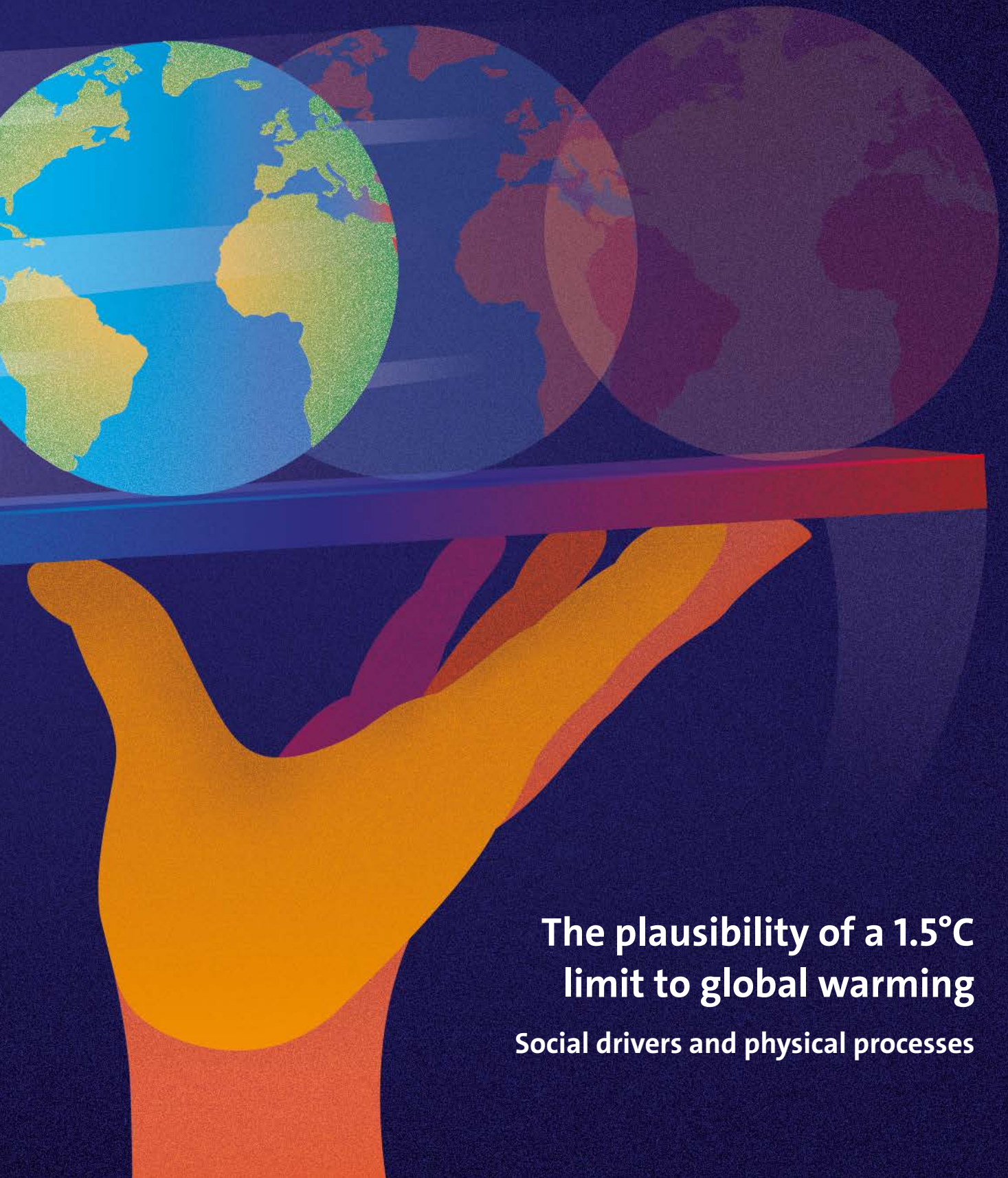


2023

---

# HAMBURG CLIMATE FUTURES OUTLOOK



**The plausibility of a 1.5°C  
limit to global warming**  
Social drivers and physical processes



## BOX I How the Hamburg Climate Futures Outlook corresponds to other global assessments of climate futures

The Hamburg Climate Futures Outlook contributes to the field of assessments on climate futures and related global challenges. While building on the insights of this rich and long-established research field, and on a previous Outlook edition, the current Outlook is unique in that it establishes an integrative framework to assess the plausibility of climate futures. We address the overarching question: “What affects the plausibility of attaining the Paris Agreement temperature goals?” In answering this question, we establish the CLICCS Plausibility Assessment Framework for the analysis of the dynamics of social drivers and physical processes leading toward or away from specific climate futures. We start with a theoretical model of change and hold available empirical evidence against the main assumptions of this model. Empirical evidence comes from research conducted in CLICCS, from systematic literature reviews, and from an evaluation of available global assessments such as the IPCC Sixth Assessment Report (IPCC, 2021b, 2022b), the UNEP Emissions Gap Report (UNEP, 2022), and reports from the Climate Action Tracker (e.g., CAT, 2022b).

There are three critical aspects of the Hamburg Climate Futures Outlook that make its contribution to the existing reporting landscape unique.

### Plausibility rather than feasibility

Some existing reports explore aspects of climate futures using the concept of *feasibility*. In the IPCC Special Report on Global Warming of 1.5°C (SR1.5 henceforth; IPCC, 2018b) and, most recently, in its AR6 WGIII, feasibility “refers to the potential for a mitigation or adaptation option to be implemented” (IPCC WGIII AR6 SPM, 2022d, Footnote 71). The AR6 WGIII comprehensively assesses potential enabling conditions for and barriers to the feasibility of mitigation measures, especially in its Chapter 3 (Riahi et al., 2022), while AR6 WGII assesses enabling conditions for climate-resilient development pathways in Chapter 18 (Schipper et al., 2022). However, the AR6 does not assess societal dynamics affecting the plausibility of climate futures, and in particular it does not assess the plausibility of mitigation measures being implemented in the future. The Outlook is unique in that it offers a comprehensive assessment of enabling and constraining conditions of social drivers and physical processes that affect the plausibility of a given climate future. In this vein, not only barriers (or the absence thereof) but a wide range of factors influencing the pathways toward or away from specific

scenarios are considered, so that a feasible pathway may not necessarily be plausible.

### Assessment of social drivers and physical processes

In the current Outlook, we are interested in the plausibility of a combination of emissions and temperature goals, and to achieve this, we synthesize the assessments of social drivers and physical processes. As far as global emissions are concerned, existing reports often assess what is practically and technically required to achieve net carbon zero—such as coal phase-out and decarbonization of transport and industry. Examples include the IPCC SR1.5 (IPCC, 2018b), the UNEP Emission Gap Report (UNEP, 2022), and the Stockholm Environment Institute (SEI) Production Gap Report (SEI et al., 2021). We add to that an assessment of ten key social drivers that would motivate and legitimate such a change (Section 6.1). With regard to global temperature, the plausibility of attaining the Paris Agreement temperature goals depends also on climate sensitivity, which in turn depends on the complex interactions and feedback mechanisms in the climate system. To address the question “What affects the plausibility of attaining the Paris Agreement temperature goals?”, we assess the current knowledge of six physical processes, which fulfill one or more of the following criteria: (i) the process is veiled in deep uncertainties, (ii) the process is a potential tipping element, (iii) or the process receives a lot of attention in the public discourse shaping climate risk perception (Section 6.2).

### Analytical not normative

Futures research may not only ask which futures are plausible, but eventually also focus on which futures are desirable. In this vein, climate futures research eventually takes a deliberate normative stance, which often focuses on social motives or intentions that fundamentally influence the likelihood of a specific future scenario (Robinson, 2003). For example, the reports of the initiative The World in 2050 focus on exploring science-based strategies and pathways toward achieving time-bound goals, such as deep decarbonization by 2050 or the UN Sustainable Development Goals (SDGs) by 2030 (TWI—The World in 2050, 2018; 2020). These global reports provide comprehensive assessments focused on how future scenarios can be achieved and under which conditions. In particular, they emphasize which transformations

and innovations are needed for directing development toward a just, resilient, and sustainable future for all (TWI—The World in 2050, 2018; 2020). The Outlook recognizes the importance of social motives and intentions for societal transformation, but it emphasizes the presently available evidence of relevant social and physical dynamics. Unlike a road map for the realization of desirable futures, the Outlook consists of an integrated assessment of the plausibility of specific climate futures.

**Authors:**

**Andrés López-Rivera**, Eduardo Gonçalves Gresse, Anna Pagnone, Jan Wilkens, Anita Engels, Jochem Marotzke