

Submission to the 18th meeting of the Research Dialogue (SBSTA 64)

Views on possible themes from the Potsdam Institute for Climate Impact Research

Following the invitation to Parties to submit, by 14 March 2026, views on possible themes for the eighteenth meeting of the Research Dialogue to be held in conjunction with SBSTA 64 (mandate: FCCC/SBSTA/2025/4), the Potsdam Institute for Climate Impact Research (PIK) is pleased to provide topics for consideration.

PIK is a leading international research institute focusing on the integrated analysis of climate change, its impacts, and pathways toward sustainable development. Its work combines climate and Earth system science with economic and policy analysis to generate evidence-based insights into the interactions between climate, ecosystems, and human societies. Through this interdisciplinary approach, PIK aims to support policymakers with robust scientific knowledge relevant to mitigation and broader sustainability transitions.

The topics proposed below reflect this perspective and are intended to contribute to the Research Dialogue under SBSTA by highlighting areas where emerging research can inform climate mitigation efforts and implementation.

PIK would welcome the opportunity to further contribute to the Research Dialogue and engage with Parties and other stakeholders in advancing the science–policy interface under the UNFCCC.

- **Transitioning away from fossil fuels: how far to go?**

Transitioning away from fossil fuels is a crucial step in limiting climate change and delivering the 1.5°C target, as recognised in the UNFCCC’s UAE consensus at COP28. However, the scale and speed of this transition remain uncertain: in the latest IPCC assessment, many Paris-aligned pathways still allowed for continued fossil fuel use, relying on large-scale carbon dioxide removal (CDR) to offset emissions. The role of fossil fuels thus needs to be reassessed in the light of recent emission trends and technological developments.

We aim to contribute to this discussion with new Paris-aligned pathways that explore different options for transitioning away from fossil fuels. Our results at the global and European Union scales show that achieving climate targets requires a rapid and deep decline in fossil fuel use through electrification based on renewable energy and the development of alternative fuels. We also examine how demand-side measures can alleviate the cost of the transition.

- **Updated scenarios assessing the alignment of recent policy and technology trends and country plans (e.g. NDCs) with the Paris Agreement to limit overshoot**

The recent round of NDCs is incomplete, as key countries like India have not submitted updated targets. As of March 2026, global ambition remains insufficient to achieve emissions reductions needed by 2035. Recent US climate policy rollbacks,

geopolitical fragmentation and national priorities on security and de-risking reshape the context for global climate mitigation. Based on these developments, a temporary overshoot of the 1.5°C limit under the Paris Agreement appears very likely. A key question is the magnitude of this overshoot if current policy gaps persist, as it will determine the scale of future net carbon removals and burden on subsequent generations. Positive technology developments, such as the growing electrification of transport, offer mitigation opportunities but may be insufficient to prevent overshoot.

In this context, integrated assessment models (IAMs) provide Paris-aligned decarbonisation pathways, but several limitations remain, including assumptions of implausibly rapid transition in the mid-2020s, unrealistic near-term technology trajectories, or unsustainable high levels of bioenergy use. Findings from the Scenario Compass Initiative (SCI) demonstrate that the viable scenario space narrows dramatically once scenarios are tested against historical data and near-term technology trends. In particular, pathways consistent with low temperature overshoot and long-term stabilisation at 1.5°C — or well below 2°C — are confined to a substantially narrower set of mitigation options than the broader ensemble suggests. This demonstrates how climate action aligned with Paris targets only has a limited range of technology and policy options to choose from.

- **Equity and finance - the potential and limits of international climate finance to integrating equity considerations into new mitigation pathways**

Equity is a grand scientific challenge to explore policy options and find solutions to multi-dimension trade-offs. Mitigation action and climate finance are two key pillars of international climate policies. Equity issues about the sharing of mitigation efforts are multifold and affect multiple socioeconomic groups. Governments can help to mobilize financial means for investments to enable low carbon investment and to support social cohesion. New mitigation pathways explore the trade-offs and aim to gain insights into the sources of climate finance and the purposes to use these means to enable mitigation action and balance the various trade-offs. The multi-dimensional trade-off analysis targets to discover sweet-spots where different interests are best served to a substantial degree rather than to optimize single-dimensional objectives. These sweet spots can serve as a starting point for constructive policy discussions and find new solutions for the complex policy issues.