Climate overshoot

The way back below 1.5°C

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CLIMATE ANALYTICS

Overshooting the Paris Agreement's 1.5°C limit is now unavoidable. How high warming peaks, how long it stays above 1.5°C and how soon it falls back below 1.5°C determine the damage. An earlier, lower peak and a fast decline below 1.5°C will limit – but not eliminate – lasting harm. This requires a rapid transition away from fossil fuels, and cost-effective solutions exist.

Overshoot is now unavoidable, but its height and duration are still up to us. Human-induced warming reached 1.37°C in 2025, and long-term warming will exceed 1.5°C around 2030 even under the most ambitious pathways. The International Court of Justice has confirmed 1.5°C as the primary temperature goal of the Paris Agreement, and in the COP30 Global Mutirão decision Parties resolved to limit both the magnitude and the duration of any overshoot. There is a strong legal argument that exceeding 1.5°C increases the obligation on all countries to act now with the highest possible ambition. Current policies lead to at least 2.6°C by 2100, and even full delivery of all pledges and net zero targets leads to 1.9°C: a permanent overshoot, unless countries raise their ambition now.

Warming can still return below 1.5°C by 2100. Under our highest possible ambition pathway (HPA-2025), warming peaks at around 1.7°C around 2040, returns below 1.5°C after about 37 years and falls to about 1.2°C by 2100. The 11 Very Low emissions pathways from the next generation of scenarios for the IPCC AR7 confirm this picture, reaching about 1.3°C by 2100. But delay has a cost: compared with the 1.5°C pathways from the IPCC AR6, five years of delay have raised peak warming by at least 0.1°C and lengthened the overshoot by around a decade.

Limiting height and duration of the peak is not enough: bringing temperatures back below 1.5°C by 2100 is essential, and this is what highest possible ambition means. It requires cutting emissions by a little under 20% by 2030 and 49% by 2035, relative to 2025, including deep cuts in methane. Reaching net zero CO_2 by mid-century or before stops warming; net zero greenhouse gases by the 2070s or before bring temperatures back down.

Every tenth of a degree matters. Some impacts follow the peak, others keep building for as long as warming stays high, and some do not reverse at all. Record-breaking heat is already more than four times as frequent as in pre-industrial times, but would become less frequent than today with warming at about 1.2°C by 2100. The rate of sea-level rise has more than doubled since satellite measurements began, and it continues for centuries after temperatures fall. Stabilising at 1.5°C would not be enough, as it is far too dangerous: warming has to keep falling, below 1.5°C by 2100 and towards around 1°C in the long term, to limit the risks from sea-level rise and ice sheet loss.

A low peak and short overshoot may offer an escape window from tipping. Coral reefs may already have reached their tipping point, estimated at 1–1.5°C, and the West Antarctic ice sheet could have a collapse threshold close to 1.5°C. The lower temperatures peak and the faster they fall, the better the chance of avoiding dangerous tipping of these systems, the Amazon and the Atlantic overturning circulation.

No country is safe. SIDS already lose 1–9% of GDP each year to disasters, and 69% of deaths from climate-related disasters over the past 50 years occurred in LDCs. Major emitters are also counting the costs, and cutting emissions fast is in their own interest.

The solutions exist, the pace does not yet. Renewables are close to being on track for the COP28 tripling goal, but efficiency is well off track, electrification must speed up fourfold and methane is still rising. Carbon dioxide removal is essential to bring temperatures down, but only alongside a fossil phase-out and rapid emission cuts. Solar radiation modification is a dangerous distraction.

What needs to happen

- **Close the 2035 gap:** cut emissions 49% from 2025 levels by 2035.
- **Transition away from fossil fuels:** set national road maps with timelines, stop new fossil fuel development and eliminate subsidies.
- **Deliver the key levers:** renewables, efficiency, clean electrification, methane cuts and an end to deforestation.
- **Plan for carbon dioxide removal now:** within sustainability limits, as a complement to emission cuts, never a replacement.
- **Scale up finance for the most vulnerable,** especially SIDS and LDCs.

The task now is to keep overshoot as low and as short as possible, and to bring warming back below 1.5°C by 2100.