CLIMATE ANALYTICS

Briefing

What has the Paris Agreement done for us?

22 ways it is changing the 21st century for the better

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About Climate Analytics

Climate Analytics is a global climate science and policy institute. Our mission is to deliver cutting-edge science, analysis and support to accelerate climate action and keep warming below 1.5°C.

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Executive summary

Ten years on, the Paris Agreement is working, but not nearly fast enough. Since 2015 it has become the essential organising framework for global climate action: uniting countries behind the 1.5°C temperature limit and net-zero goals, reshaping science and policy, helping mobilise climate finance and clean-technology investment, and driving national reforms that otherwise would not have happened. If the Agreement did not exist, we would need to create it.

The heart of Paris is the 1.5°C limit, and under the Agreement, progress has occurred. Countries have moved from a patchwork of targets to economy-wide, absolute emission-reduction goals, and projected 21st-century emissions under both current policies and targets have fallen markedly since 2015. Policies now in place point to a possible global emissions peak before 2030. As a result, expected warming by 2100 has dropped by nearly one full degree – from ~3.6°C pre-Paris to ~2.7°C under current policies – with an optimistic pathway near ~1.9°C if all pledges, including net-zero promises, are fully met.

Yet ambition lags. Under current policies, the world is headed toward about 2.7°C of warming this century, with disastrous consequences for ecosystems, economies and vulnerable communities. All analyses ahead of COP30 show a large gap between current pledges and the Agreement's 1.5°C temperature limit. This is not a failure of the Agreement's design; it is a failure of collective ambition to match its aims.

Insufficient short-term action since 2015 has likely added about 0.1°C of warming and has made limiting warming to 1.5°C without some overshoot increasingly unlikely. Scientific understanding – catalysed in part by Paris – now shows far larger differences in risks and impacts between 1.5°C, 2°C and higher warming. People are already experiencing severe impacts. Lowering mid- to late-century warming by roughly 1°C reduces future heat, water stress, sea-level rise, biodiversity loss and tipping-point risks; however, unless the near-term warming rate is cut rapidly through large emission reductions, impacts will remain severe for many.

Because global emissions did not peak in the past decade, a temporary overshoot of 1.5°C is now very likely. Overshoot means briefly exceeding 1.5°C before returning below it; what matters is how high it goes and how long it lasts. The priority must be to keep peak warming as close as possible to 1.5°C to minimise the magnitude of overshoot and reduce its duration by reaching net-zero CO_2 around 2050 and net-zero greenhouse gases in the 2060s so that warming peaks near 1.5°C mid-century and falls below 1.5°C before 2100. Every 0.1°C increment escalates risk, including the likelihood of crossing tipping points, especially for the most vulnerable.

Paris has mobilised action beyond national governments. International bodies are translating the temperature goal into rules and standards; courts are clarifying duties and consequences; major political groupings are institutionalising Paris-aligned aims; and subnational actors and civil society are advancing where national pace lags.

Finance has improved but remains below need for a just transition. The Agreement established a loss and damage mechanism and funding arrangements – an essential step for vulnerable countries – that are not yet fully operational or funded. Governments must accelerate economic transformation and support those without the capacity to do so. The Paris Agreement has helped drive the switch from fossil fuel investment that was dominant 10 years ago to the point that clean tech investment exceeds fossil fuel investment now - but once again, progress has not been fast enough.

Unfortunately, fossil fuel interests continue to fight against planetary policy at scale. Although Parties agreed in 2023 to begin to transition away from fossil fuels, exporting countries still scramble to approve new oil and gas developments which will undermine the ability of the world to limit warming to 1.5° – and if unchecked, will push the world towards at least 2.5° warming. Warning lights are flashing: emissions are far from a 1.5°C trajectory.

The critical test for COP30 is whether Parties will confront rising emissions and close the ambition gap to align with 1.5°C. The Paris Agreement must rapidly build on its decision to transition away from fossil fuels: phase out fossil energy, transform productive systems while protecting nature, expand finance, and strengthen resilience. Delivering on these priorities will preserve Paris as the indispensable multilateral anchor of climate action and the catalyst for a just, durable transformation.

Introduction

This report takes stock of the Paris Agreement at its tenth anniversary and explains what it has changed – within countries, across institutions, and throughout the economy. We focus on benefits directly attributable to the Agreement: how governments have responded to its calls for action by setting and tightening emissions targets, implementing policies, and participating in transparency and stocktake processes – and what those responses mean for risk reduction.

We situate these Paris-driven changes within a broader decade of transformation: rapid technology advances and cost declines, growth in clean energy and production, sharper understanding of climate risks and responses, and wider engagement across society. We examine how the Agreement's emphasis on target-setting, transparency, and cycles of increasing ambition has catalysed action across multiple levels of governance – from multilateral arenas to national institutions, subnational leaders, the private sector, and civil society.

At a time of eroding trust in multilateralism and rising geopolitical tension, the stakes are high. Climate change is a transboundary problem tied to cumulative global emissions which demand a multilateral response as the Paris Agreement is.[1] Effective treaties align priorities, clarify responsibilities, mobilise resources for equitable action and foster the trust needed for compliance[2]. Weakening the Paris framework would yield a more fragmented and inequitable response – and a higher risk of the worst impacts.

The following pages document some of the most important, measurable contributions from the Paris Agreement in terms of the politics and science of climate change, including greenhouse gas emissions trajectories and related temperature implications; reduced risk and adaptation requirements; and engagement and universal participation.

1. Unified the world behind a shared framework for climate action

Today, climate change is recognised as both a global crisis and a shared challenge. Nearly 35 years of diplomacy have worked to bridge deep political divides – especially among major powers with different histories, emissions, and development needs, while

[1] https://doi.org/10.1098/rsta.2012.0064
[2] https://academic.oup.com/book/36180

also striving to balance the distinct vulnerabilities and urgent needs of developing countries. The UNFCCC (1992), Kyoto Protocol (1997), Bali Action Plan (2007), and Copenhagen Accord (2009) were key steps toward the 2015 Paris Agreement that unifies all countries into a single framework.

The Paris Agreement emerged out of a long and difficult process and provides core elements of a shared understanding and a cohesive framework for coordinating and supporting global action aimed at achieving a common set of goals (Box 1).

Box 1. Core political signals of the Paris Agreement

- **A temperature limit and an emissions trajectory**
  Holding global temperature rise to 1.5°C, peaking of global emissions as soon as possible and reaching net zero greenhouse gas emissions in the second half of this century y define a safety pathway for humanity, guiding the transition toward clean energy systems, healthy ecosystems, and sustainable, efficient economies.
- **Universal engagement**
  Nearly all nations are part of the Agreement and have committed to prepare, communicate, and implement national climate plans based on equity, common responsibilities and capabilities. They have also agreed to be transparent through regular reporting and global stocktakes, and to cooperate through capacity building, technology transfer and finance.
- **Aligning finance with climate goals**
  Paris calls for all financial flows – public and private – to be consistent with low-emission, climate-resilient development. It establishes collective targets to support developing countries implement the provisions of the agreement.
- **Scaling up adaptation**
  Countries agreed to strengthen resilience, reduce vulnerability, and integrate adaptation into development processes, guided by Article 7's global goal on adaptation to enhance collective progress and support.
- **Loss and damage**
  The Agreement recognises that some climate impacts cause unavoidable losses that go beyond what communities can adapt to. It calls for action to prevent, minimise, and address loss and damage – from extreme events to long-term changes such as rising sea levels – with special support for the most vulnerable countries

2. Set 1.5°C warming limit to minimise harm and guide mitigation and adaptation efforts

The Paris Agreement's long-term temperature goal is to "hold the increase in the global average temperature to well below 2°C above pre-industrial levels" and to "pursue efforts" to limit warming to 1.5°C.[3]

This limit is paired with an operational pathway:[4] global emissions should peak as soon as possible and then fall rapidly toward net zero around mid-century. The Paris limit and this emissions trajectory were put in place to minimise the injustice created by higher levels of warming to the most vulnerable.[5]

The 1.5°C limit sends a clear signal to governments and other stakeholders about the direction of travel,[6] guiding global, regional, national and sectoral policies to cut emissions, the scale and speed of technology deployment, and related measures.

At the same time, it sets a safer limit of warming to help protect us from the worst impacts of a warming climate. Scientific research assessed by the Intergovernmental Panel on Climate Change (IPCC[7]), finds that climate-related risks to people and ecosystems is substantially lower at 1.5°C – fewer deadly heatwaves, less sea-level rise, far better chances for the survival of coral reefs and food and water security – while also making adaptation more feasible and effective at 1.5°C than at higher warming levels.

As a recent paper in *Science* concludes, "the pursuit of efforts to limit warming to 1.5°C is, and remains, a critical part of the [Paris Agreement], directing efforts in mitigation, adaptation, and broader climate governance"[8]

In their 2025 Advisory Opinion on climate, the International Court of Justice (ICJ) indicated that the 1.5°C limit now guides international conduct. States that fail to exercise due diligence – by adopting 1.5°C-consistent plans, regulating private actors,

[3] Article 2 (a) of the Paris Agreement
[4] Article 4.1 of the Paris Agreement.
[5] https://climateanalytics.org/publications/latest-science-on-the-1-5-c-limit-of-the-paris-agreement
[6] https://climateanalytics.org/publications/latest-science-on-the-1-5-c-limit-of-the-paris-agreement
[7] The IPCC is United Nations body whose objective is to provide policymakers with authoritative, policy-relevant scientific assessments on climate change – its causes, impacts, and options for adaptation and mitigation – to inform global action and decision-making.
[8] https://www.science.org/doi/10.1126/science.ady1186

curbing fossil-fuel subsidies, or restraining exploration – may commit internationally wrongful acts from which legal consequences arise.[9]

Box 2. Global warming: where are we and where are we headed?

In 2024, the world's average temperature was about 1.5°C warmer than pre-industrial times, making it the hottest year on record.[10] This spike reflects both long-term human-driven warming and natural climate variability, such as El Niño, which can temporarily boost global temperatures. The Paris Agreement defines the 1.5°C as limited to human-caused warming averaged over two to three decades, not to any single year – meaning the Paris limit has not yet been crossed[11]. Of the 1.5°C observed in 2024, roughly 1.36°C can be attributed to human activity.

Current policies of countries are leading the world towards about 2.7°C of global warming by 2100. Rapid emission reductions are needed in the short term to avoid this outcome and limit warming as close as possible to 1.5°C. Ongoing emissions under current policies are warming the world at the rate of about 0.27°C per decade, so on present trends, the 20-30 year average global temperature increase is very likely to reach 1.5°C above pre-industrial by the early 2030s.

Because of the failure to peak and decline global emissions over the last decade, high cumulative emissions have locked in additional warming, making it increasingly unlikely that the world can avoid even a temporary overshoot of 1.5°C.[12] The imperative now is to minimise how far and how long temperatures exceed 1.5 °C by reaching global net-zero CO_2 no later than 2050 and net-zero greenhouse gases in the 2060s. This pathway would slow and then halt warming around mid-century as close as possible to 1.5°C, with temperatures falling back below that level before 2100.

It should be noted, however, that even emission pathways consistent with warming of 1.5°C imply significant climate impacts and risks, however they are substantially lower

[9] Advisory Opinion on Climate Change, delivered on 23 July 2025, available at https://www.icj-cij.org/sites/default/files/case-related/187/187-20250723-adv-01-00-en.pdf
[10] https://wmo.int/publication-series/state-of-global-climate-2024
[11] https://unfccc.int/sites/default/files/resource/cp2022_L17E.pdf
[12] https://climateanalytics.org/publications/latest-science-on-the-1-5-c-limit-of-the-paris-agreement

than under higher global warming. This highlights the importance of erring on the side of caution and stringently cutting emissions in line with a 1.5°C pathway.[13]

3. Turned climate action into a universal endeavour with a strong legal basis

The political agreement reached in Paris bridged a fundamental divide between nations. By recognising the responsibility and capacities of different nations, it enabled all countries to engage using the tool set to deliver its goal. Over the past 10 years, the response of governments has been unprecedented in the historical context of global environmental governance, as seen by the engagement of all countries: to date, 195[14] governments have ratified the agreement, leaving just three countries out. Only one government– the US – has regrettably decided to withdraw[15].

The Agreement also recognises the essential role of non-state actors – such as cities, regions, businesses, investors, and civil society – in achieving its long-term climate goals. Within the UNFCCC process, initiatives such as the Local Communities and Indigenous Peoples Platform[16] serve as a key channel for sharing traditional knowledge and strengthening the voice of underrepresented groups in the Paris process. Beyond the UNFCCC process itself, the concerted engagement of civil society, subnational governments and the private sector increasingly support global temperature goals as will be described in the final part of this document.[17]

The ICJ Advisory Opinion on climate indicates that the Paris Agreement provides a strong basis for action by Parties:

> *"States parties to the Paris Agreement have an obligation to act with due diligence in taking measures in accordance with their common but differentiated responsibilities and respective capabilities capable of making an adequate contribution to achieving the temperature goal set out in the Agreement".*[9]

[13] https://doi.org/10.1038/s41558-022-01566-4
[14] https://unfccc.int/process/the-paris-agreement/status-of-ratification
[15] The withdrawal of the US will be effective in January 2026.
[16] https://lcipp.unfccc.int
[17] https://iopscience.iop.org/article/10.1088/1748-9326/abe57b;

4. Promoted net zero targets and commitments

“Net zero” commitments are pledges to cut human-caused greenhouse-gas (GHG) emissions and increase removals so that, by a set date, the remaining emissions are balanced by sinks, reaching net-zero CO_2 (and ultimately net-zero GHGs).

The Paris Agreement hardwires this logic in Article 4.1, calling for rapid reductions so that at the global level sources and sinks balance in the second half of the century.[18]

Net zero turns the Paris temperature goal into a concrete destination that guides near-term policy, investment, and planning. The timing of achieving net zero CO_2 and net zero greenhouse gas matters. To peak warming as close as possible to 1.5°C, net zero CO_2 needs to be achieved by 2050. To ensure warming is below peak levels by 2100, net zero greenhouse gas emissions need to be achieved globally by 2070. Developed countries will need to reach net zero earlier than developing countries.

The Agreement asks countries to prepare so called long-term strategies showing how they will reach net zero. These strategies help align medium-term investment choices – NDCs, sector plans, infrastructure – with the need to phase out greenhouse-gas emissions. So far, 79 countries have prepared such strategies,[19] and net zero targets have been adopted by thousands of nonstate actors[20], creating a shared, longer-term framework for action and accountability.

A long-term end-state matters because "political and financial decision cycles are short" as Mark Carney (then Governor of the Bank of England) put it in 2015. The catastrophic impacts of climate change will be felt beyond the traditional horizons of most actors – imposing a disproportionate cost on future generations that the current generation has no direct incentive to fix”. [21]

5. Triggered scientific understanding of very high risks above 1.5°C of warming

Before the Paris Agreement, only limited research existed on the climate impacts under 1.5°C compared to higher warming levels, evidencing a critical knowledge gap. The first IPCC *Special Report on Global Warming of 1.5°C* was requested by the

[18] https://direct.mit.edu/glep/article/22/3/38/110033/Accelerating-Climate-Action-The-Politics-of Article 4.1 of the Paris Agreement.
[19] https://unfccc.int/process/the-paris-agreement/long-term-strategies
[20] https://climateaction.unfccc.int/Initiatives?id=Race_to_Zero
[21] https://www.bloomberg.com/news/newsletters/2025-06-19/carney-s-risk-warning-reverberates-as-global-regulators-disagree-over-climate

Conference of the Parties (COP) to the UNFCCC as part of COP21's decision text, accompanying the adoption of the Paris Agreement.[22]

This report and its underlying scientific literature contributed substantially towards an improved understanding of the difference in severity between climate impacts at 1.5°C and 2°C , underlining the importance and urgency to deepen efforts towards the Paris-Agreement 1.5°C temperature limit in order to avoid increasing economic costs and human suffering.

Moreover, the latest IPCC reporting cycle – the Sixth Assessment (AR6[23]), covering literature from 2013–2021 – shows with higher confidence than the previous cycle (AR5, 2006–2013) that climate risks are more severe, even at lower levels of warming. It also finds that projected impacts rise sharply above 1.5°C, reinforcing why the Paris Agreement's 1.5°C limit remains highly – indeed increasingly – relevant given this new evidence. In short, risks increase with every increment of warming and escalate beyond 1.5°C.

Figure 1 summarises the worsening risks of warming between ~1.2°C and 4.5°C for unique systems, extreme weather events, distributional impacts, aggregate impacts, and large-scale singular events. The drop from ~3.6°C to ~2.7°C (or ~1.9°C optimistically) avoids significant impacts across these five "Global Reasons for Concern," by reducing risks from very high to high or moderate.

[22] See https://www.ipcc.ch/about/history/ .

[23] https://www.ipcc.ch/report/sixth-assessment-report-cycle/

Risks increase with every increment of warming, and escalate above 1.5°C

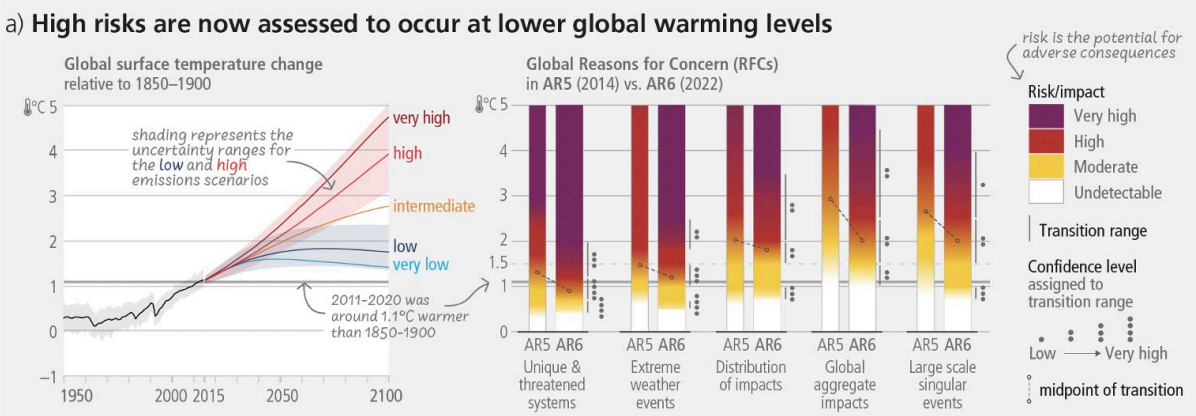

Figure 1. Source: IPCC, Synthesis Report, Sixth Assessment Report. https://www.ipcc.ch/report/sixth-assessment-report-cycle/

6. Lowered projected 21st century warming by nearly one degree

The efforts of governments to reduce emissions should be ultimately evaluated by how much they curb warming and reduce climate risk.

Before 2015, projections pointed to about **3.6°C** of warming by 2100, with temperatures rising beyond that. Since then, policies now in place put projected warming near **2.7°C** by 2100, and an **optimistic** pathway – based on long-term pledges and strategies – lands around **1.9°C**. These shifts suggest the Paris Agreement has already shaved roughly **1°C** off expected long-term warming.

Figure 2 illustrates the improvement so far: compared to calculations back in 2009 of the long-term warming implied by pre-Paris mitigation commitments, current analyses of the latest mitigation targets and policies are now taking us toward 0.9°C less warming; with possibilities of an additional reduction in 0.5°C if long term targets are implemented; and a further decline by 0.2°C in the best-case scenario.

Progress in lowering global warming from governmental responses

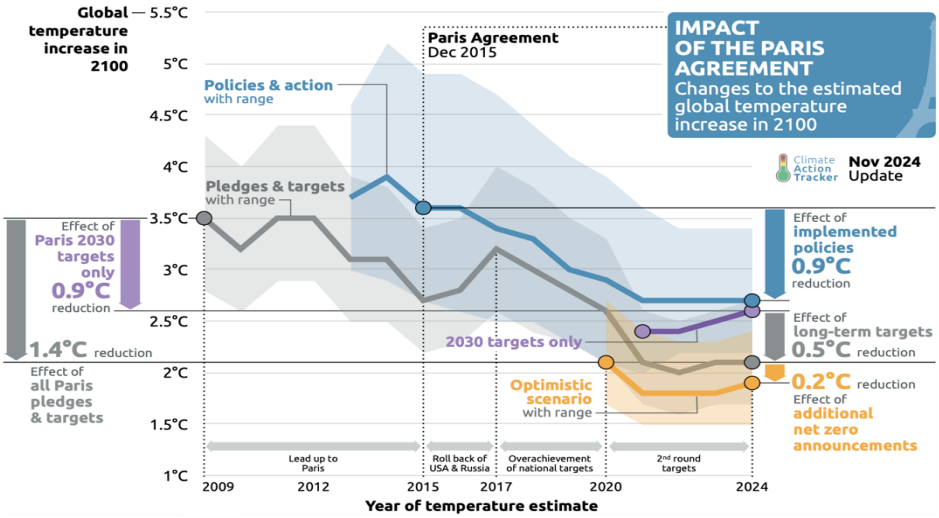

Figure 2. Source: Climate Action Tracker, 2024. Warming Projections Global, November 2024. https://climateactiontracker.org/documents/1277/CAT_2024-11-14_GlobalUpdate_COP29.pdf

It must be stressed that warming of 2.7°C by 2100 remains alarming: the last time that global surface temperature was sustained at or above 2.5°C higher than 1850–1900 levels was over 3 million years ago.[24] Fortunately, policies and actions in place imply that the highest warming outcome previously feared for 2100, of above 4°C or even 5°C, is no longer considered likely.[25]

7. Provided clear guidance to the global scientific community

The scientific community has used the policy guidance enshrined in the Paris Agreement as research motivation to map out emission pathways that can limit global warming to 1.5°C with a certain likelihood.[26] These pathways indicate that the world

[24] https://www.ipcc.ch/report/ar6/wg1/

[25] https://www.nature.com/articles/s41586-025-08928-w

[26] These pathways allow for no or a limited temporary exceedance ("overshoot") of that warming limit. In the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, these

must cut carbon dioxide emissions steeply this decade, so they reach net zero by 2050, while capturing residual emissions through, for example, forest growth or technologies that remove carbon from the atmosphere (see Figure 3). Total global GHG emissions need to roughly halve by 2030 relative to 2019 levels, and reduce by around 60% by 2035, before reaching net zero around the 2070s.[27]

Emission trajectories consistent with limiting global warming to 1.5°C

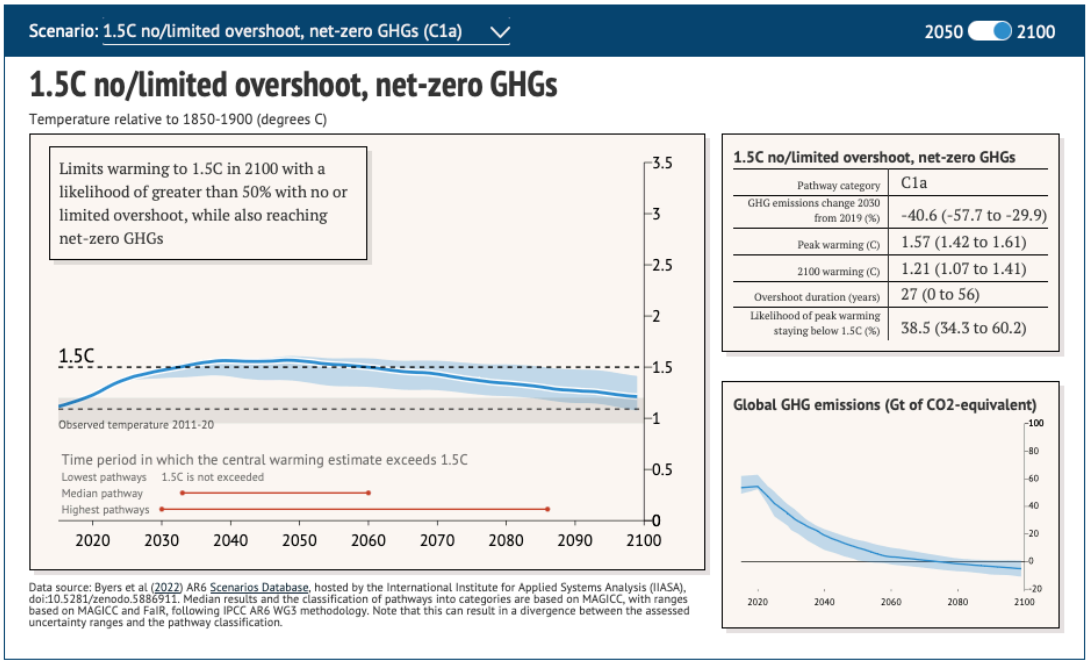

Figure 3. Source: Carbon Brief, https://interactive.carbonbrief.org/one-point-five-pathways/index.html.

Meeting these challenging timeframes requires rapid and far-reaching transformations across all sectors of society, including a shift to clean energy, the phase-out of coal, improvements in energy efficiency, large-scale electrification, the protection and restoration of forests, and changes in how we produce and consume food.[28]

are pathways, largely within the so-called category C1a, which limit warming to 1.5°C (>50% likelihood) with no overshoot or limited overshoot <0.1°C and achieve net zero GHGs in the second half of the century followed by negative GHG emissions.

[27] https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf

[28] Intergovernmental Panel on Climate Change (IPCC). *Global Warming of 1.5 °C: An IPCC Special Report on the Impacts of Global Warming of 1.5 °C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. Edited by Valérie Masson-Delmotte, Panmao Zhai, Hans-Otto Pörtner, Debra Roberts, Jim Skea,

8. Equipped governments with common tools for action, accountability and ambition

The Paris Agreement identifies several tools to guide Parties in delivering on its long-term temperature goal. This toolbox, whose main elements are summarised in Box 3, provides a common, consistent and clear mechanism for all governments to act. Before the Paris Agreement, the actions of government and stakeholders were to a certain degree fragmented and subject to uncertain cycles.

Box 3. Main Paris tools to hold warming to 1.5°C:

- **Nationally Determined Contributions (NDCs)** are national climate plans making medium-term commitments, typically providing economy-wide emissions-reduction targets and covering all major emitting sectors, from energy supply and use to agriculture, food systems, and land ecosystems.
- **Long-term strategies**, which provide a clear vision of an economy-wide transformation that is free of greenhouse gases by 2050.
- **A five-year ratchet cycle**, which regularly evaluates (through the **Global Stocktake**) collective ambition and provides guidance to governments on adjusting their efforts consistent with limiting global warming to 1.5°C.
- **Enhanced Transparency Framework (ETF),** through which governments communicate biannually, among others, their national emissions; policies to meet their targets; financing needs or, for donors, financing contributions, and other information.
- **Cooperation mechanisms**, which enable governments to join efforts through, for example, carbon markets where actors trade credits to offset their emissions.

One clear way to assess the Agreement's effectiveness is to model the greenhouse-gas trajectories resulting from the targets included in Parties' NDCs. Back in 2015, governments began with a wide mix of target types – e.g., reductions relative to business-as-usual or sector-specific goals – but have steadily shifted toward economy-wide, absolute emissions-reduction targets, typically expressed as percentage cuts from a base year.

Priyadarshi R. Shukla, Anna Pirani, et al. Geneva: World Meteorological Organization, 2018. https://www.ipcc.ch/sr15/

Figure 4 shows the resulting emission trajectories as assessed in 2017, 2020, and 2024, and how they have consistently tightened over time. For example, the projected 2050 emissions implied by national targets have fallen by roughly half, from 51.4 $GtCO_2e$ (2017 estimate) to 25.8 $GtCO_2e$ (2024 estimate).

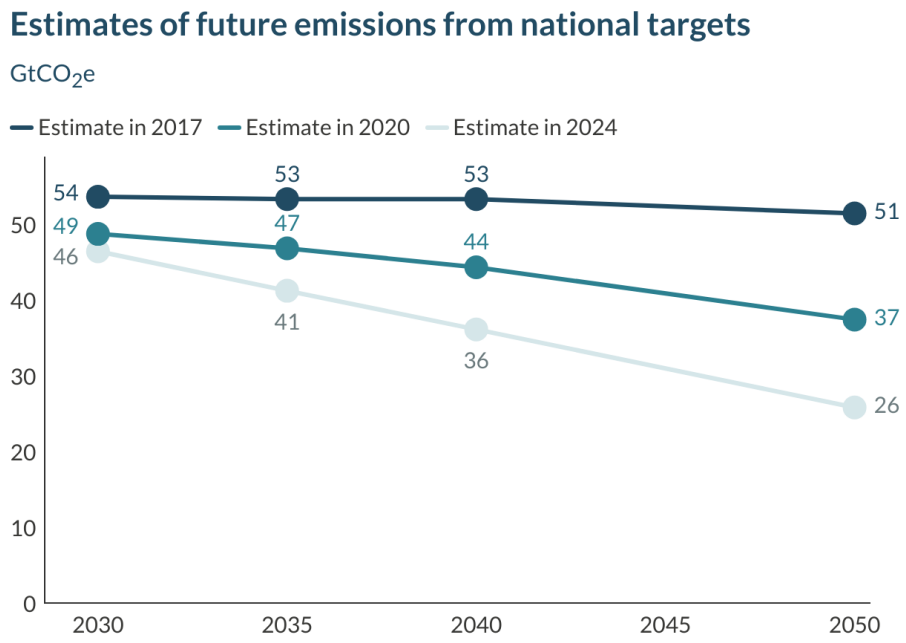

Figure 4. Estimates from the Climate Action Tracker of future emissions using low range of pledges and targets. Data source: Climate Action Tracker.

9. Drove rising ambition through the Paris review process

Another lens to evaluate the success of the Paris Agreement is the ambition gap – the difference between emissions levels required to limit warming to 1.5°C and the levels implied by NDCs, enacted policies, or an optimist scenario which considers all targets, including net zero announcements. In this short report we focus on the ambition gap relative to NDCs.

For a two-thirds chance of holding warming below 1.5°C, the IPCC's indicates global emissions should fall to roughly to 27 $GtCO_2e$ by 2030, 21 $GtCO_2e$ by 2035, and 9.38 $GtCO_2e$ by 2050[29]. Comparing these benchmarks with the NDC-implied trajectories used in Figure 5 yields the ”NDC ambition gap“ and its evolution over the past decade. Figure 6 shows that while gaps for 2030, 2035, and 2050 persist, they have consistently narrowed. This improvement is most notably marked for **2050**, by when the gap has reduced by about half – from **37.93 $GtCO_2e$ (2017)** to **~16.39 $GtCO_2e$ (2024)**.

[29] Estimate for the median pathway, as extracted from the Climate Action Tracker.

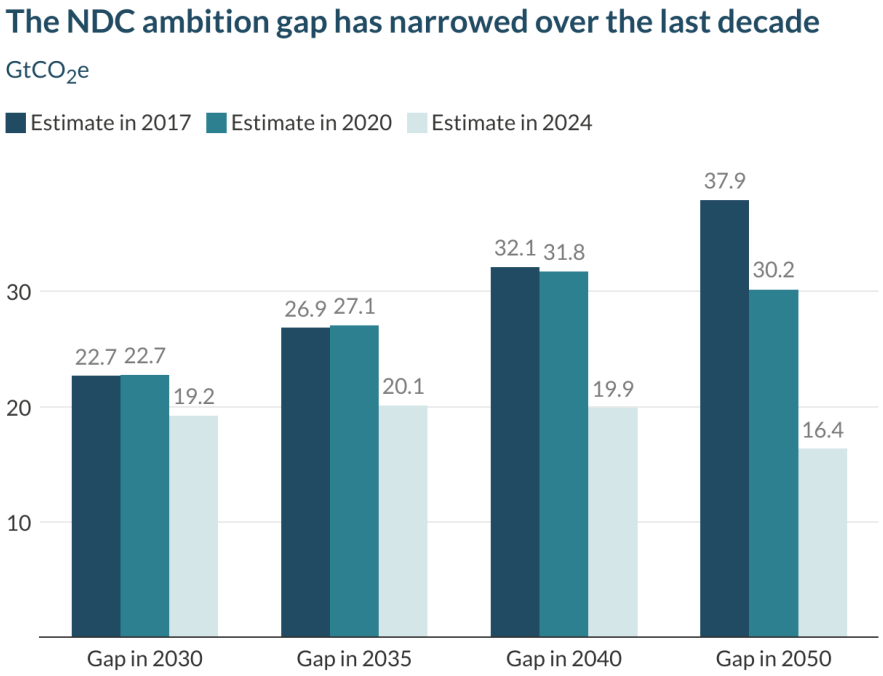

Figure 5. NDC ambition gap – the difference between emissions levels required to limit warming to 1.5°C and the levels implied by NDCs. Data source: Climate Action Tracker.

10. Incentivised national policy to drive transformation

Since Paris, national policymaking has accelerated and consolidated climate action, shaping how economies grow while reducing exposure to climate risks. The requirement to formulate and update NDCs has catalysed active domestic decision-making and long-term planning[30]. Countries have adopted climate laws and strategies, created dedicated institutions, set national targets, and issued sectoral regulations. The increase in national policy making relevant for climate change is evident: by early 2017, **Climate Change Laws of the World** recorded about 1,200 laws and policies across 164 countries. By June 2023, the same database reported 3,100. Today, there are over 5000 laws and policies, covering all emitting sectors.

Expected emissions under enacted policies have improved since the Paris Agreement's adoption. Notably, post-2020 assessments indicate that global emissions could peak before 2030 (see Figure 6). As with NDC targets, projected 2050 emissions have fallen each year – from 62 $GtCO_2e$ (2017 estimate) to 44 $GtCO_2e$ (2024 estimate).

[30] https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2018/04/Global-trends-in-climate-change-legislation-and-litigation-2018-snapshot-3.pdf?utm_source=chatgpt.com

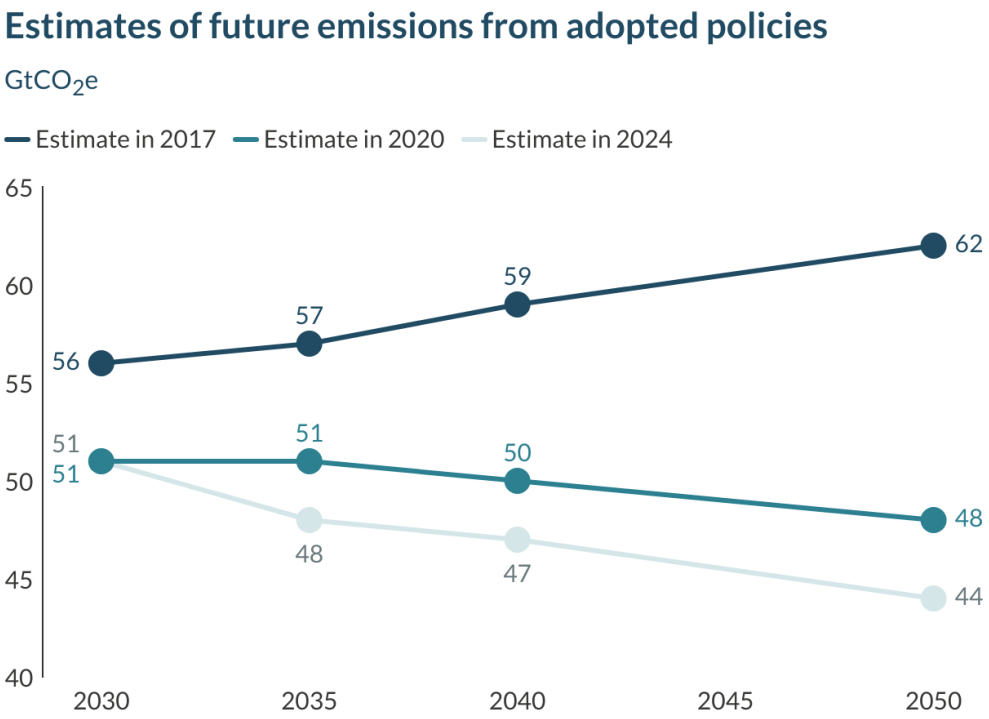

Figure 6: Estimates of future emission from adopted policies. Data source: Climate Action Tracker.

It must be stressed, however, that governments have not put enough implementation policies in place to reach the targets in their NDCs. For example, the latest estimate for emission levels in 2030 from NDCs is equal to 46 $GtCO_2e$ (Figure 4) while for policies and action is 51 $GtCO_2e$ (Figure 6), which corresponds to a difference of 5 $GtCO_2e$.

11. Established loss and damage as the heart of global climate justice

Loss and damage broadly refers to the harm occurring from observed impacts and projected risks of climate change. This harm can be economic and estimated by market prices, or can be non-economic, such as loss of life, biodiversity loss and cultural heritage loss, which are not easily quantified using financial approaches yet are highly relevant to those affected[31]. The Paris Agreement addresses loss and damage through Article 8 – the outcome on loss and damage, where the Agreement recognises the importance of averting, minimising and addressing loss and damage associated with climate change.[32] The Paris Agreement, through the inclusion of this dedicated Article,

[31] https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Annex-II.pdf
[32] https://unfccc.int/files/adaptation/groups_committees/loss_and_damage_executive_committee/application/pdf/ref_8_decision_xcp.21.pdf

thus established loss and damage as a key pillar under the UNFCCC alongside mitigation and adaptation.

Through Article 8, the Paris Agreement anchored the already existing Warsaw International Mechanism for Loss and Damage associated with climate change impacts (WIM) as the permanent policy mechanism on loss and damage. The WIM has the mandate to advance knowledge generation, coordination and support to address Loss and Damage. Article 8 outlined areas of cooperation and facilitation to enhance understanding, action and support around loss and damage: these areas include events that may cause permanent loss and damage; non-economic losses; and comprehensive risk assessment and management. Further, the WIM's subsidiary body of the Santiago Network became a key mechanism to provide technical assistance for the implementation of relevant approaches to avert, minimise and address loss and damage.

Secondly, the Paris Agreement created the framework for the Conferences of Parties serving as the meeting of the Parties to the Paris Agreement (CMA), who have the mandate to guide the WIM as well as to create mechanisms to address topics of climate change relevant to the Parties, including loss and damage. Although Article 8 of the Paris Agreement itself does not provide a basis for liability or compensation, the CMA mechanism borne of the Paris Agreement, specifically CMA4, allowed for the establishment of new funding arrangements for assisting developing countries that are particularly vulnerable to negative climate change impacts to respond to loss and damage. This led, at CMA5, to the establishment (at COP27) and operationalisation (at COP28) of the Fund for responding to Loss and Damage (FRLD)[33], to finance recovery initiatives from climate-related losses and damage.

12. Reduced socioeconomic impacts from global warming

By bending projected warming down by roughly 1°C, the Paris Agreement has already cut expected climate risks on multiple fronts – fewer people exposed to deadly heat and water stress, lower sea-level rise and coastal flooding, reduced biodiversity loss, and lower odds of crossing dangerous tipping points. This does not negate the reality that people are suffering severe climate impacts now; they are. It means that, alongside today's harms, some future suffering has already been avoided – and the faster we close the gap to 1.5°C, the more harm we can prevent.

[33] https://www.frld.org/

The developments on the projected warming levels over time from the Climate Action Tracker (CAT) has shown (see Figure 2), that the Paris Agreement has been a major driver in reducing the global warming levels from around 3.9°C in 2014 and 3.6°C in 2015 to about 2.7°C (2024) for the current policies scenario (see Figure 6), reducing global warming by almost 1°C since it has been adopted. Taking pledges into account, the avoided warming would be even better (see section 2).

While limited scientific literature is available for quantifying the avoided climate impacts for these specific global warming levels, the newest update of the Climate Impact Explorer (CIE) web tool (available online starting Nov 5th, 2025) from Climate Analytics & IIASA allows exploring the avoided impacts by comparing different climate scenarios. As an example, we compare the 2024 CAT current policies scenario to a scenario with an end-of century global warming level of 3.8°C[34], which is close to the CAT's 2015 current policies projections at the time the Paris Agreement was adopted (3.6°C) or shortly before in 2014 (3.9°C). While the updated CIE features over 40 indicators with global coverage, here we illustrate the avoided impacts by looking at selected countries and example indicators.

In terms of **dangerous heat risk** levels in Brazil (Figure 7) the updated CIE shows that in the 2024 CAT Current Polices Scenario, the projected number of days with dangerous heat stress levels would increase from around 23 days in 2015 to 67 days (by 2050) and 133 days (by 2100). In contrast, under the scenario of 3.8°C of warming the projected number of days with dangerous heat stress levels would be 104 days annually by 2050 (55% higher than Current Policies and a four-fold increase compared to 2015) and 184 days by 2100 (38% higher than Current Policies and an eight-fold increase compared to 2015), resulting in dangerous heat risk levels almost half of the entire year in Brazil. This results in an avoided heat stress risk of around 37 days every year (mid-century) and 80 days every year (end of century) when comparing the 2024 Current Policy scenario to the 3.8°C warming scenario.

[34] We use the „NGFS Current Policies (high climate response)“ scenario from the updated CIE (available as of Nov 5th, 2025) for this, which introduces a „what-if“ scenario of a world with high sensitivity of the climate system, i.e., a scenario-version based on the 20% of climate model simulations that result in the strongest plausible warming response to emissions, leading to a global warming level of 3.8°C by 2100.

Projected number of days with dangerous heat stress levels for Brazil in 2050 will almost double in a 3.8°C world compared to one following current policies

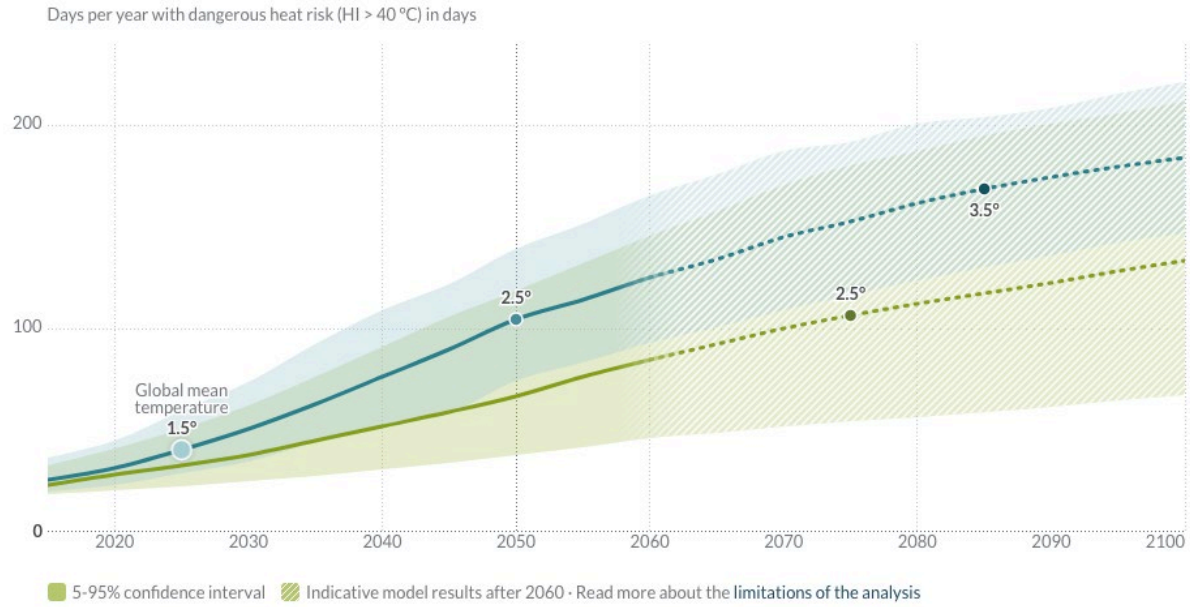

Figure 7: Projected number of days with dangerous heat stress levels[35] for Brazil comparing the Climate Action Tracker current policies scenario 2024 (green) and a scenario with a warming level of 3.8°C (blue)
Source: Climate Impact Explorer (Update launched on Nov 5th, 2025)

In the case of **drought risks in Spain** (Figure 8), the updated CIE shows that in the 2024 CAT Current Polices Scenario, the projected area under extreme drought (as share of total land area) would be almost 50% by 2050 and around 75% by 2100. In contrast, under the scenario of 3.8°C of warming the projected land share under extreme drought by 2050 would be almost 69% (almost 20 percentage points higher) and 86% by 2100 (almost 11 percentage points higher).

[35] Number of days per year at which the daily maximum Heat Index exceeds the 'danger' threshold of 40 °C. The Heat Index, is based on a definition by NOAA and relies on daily maximum temperature (tasmax) and relative humidity (hurs), and is widely used for heat risk warnings.

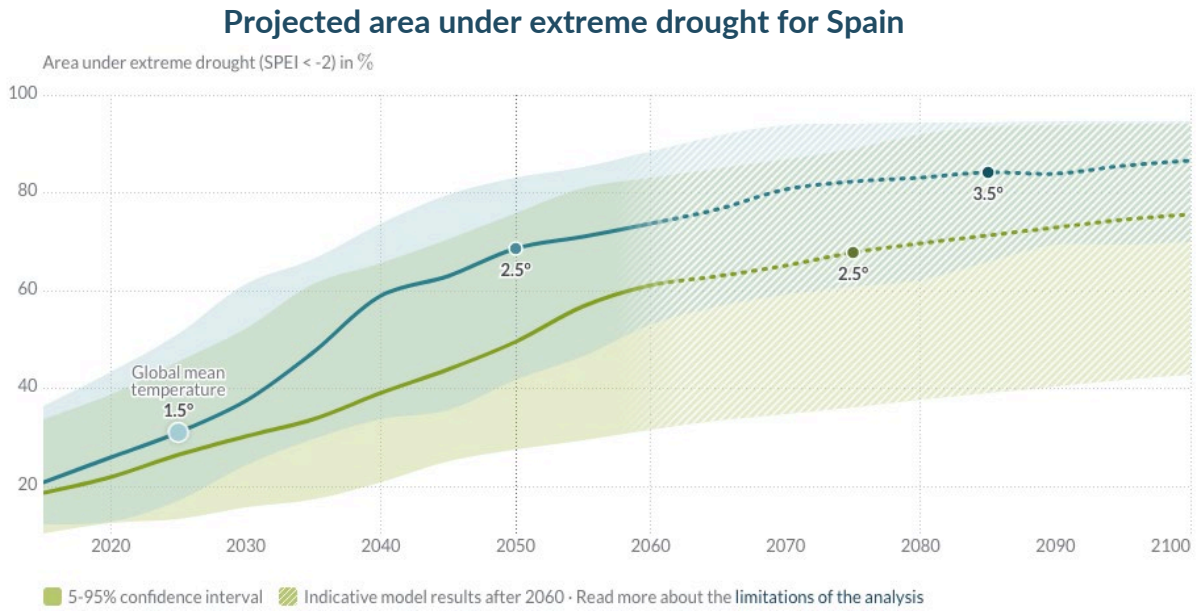

Figure 8: Projected area under extreme drought (SPEI < -2) (expressed in percent) for Spain comparing the Climate Action Tracker current policies scenario 2024 (green) and a scenario with a warming level of 3.8°C (blue)
Source: Climate Impact Explorer (Update launched on Nov 5th, 2025)

The examples only illustrate how substantial the avoided impacts thanks to the Paris Agreement likely are, while the counterfactual will hopefully never be observed. **While we still have a long way to go towards the Paris-Agreements temperature limit of 1.5°C, the avoided climate impacts thanks to the Paris Agreement should not be underestimated.** The following section provides further evidence from the literature underpinning that the already avoided impacts from reducing expected warming levels thanks to the Paris Agreement are substantial and that every centi-degree of further reduction matters significantly.

13. Lowered the risk of extreme events and sea level rise

The intensity and likelihood of temperature extremes grow quickly with warming. Global analyses indicate that, compared with warming of 1.5°C, heat extremes roughly double in intensity at 2°C and quadruple at 3°C.[36] In some regions, the change can be two to three times larger[37]. In the pre-Paris world, global temperature trajectories were roughly 16 times more likely than in the pre-industrial period to produce record-hot events. This probability has now been reduced to about seven times. The Climate Impact Explorer again showcases the difference between the heat risks under the CAT

[36] https://doi.org/10.1038/s43017-025-00681-y
[37] https://www.ipcc.ch/report/ar6/wg1/

current policies compared to a scenario with very ambitious mitigation action below 1.5°C global warming by 2100. Using the example of days with dangerous heat stress levels in Brazil again, with very ambitious mitigation action the risks could be lower substantially compared to the current levels of ambition.

Projected number of days with dangerous heat stress levels for Brazil will fall by almost half by 2050 if we follow a 1.5°C pathway compared to current policies

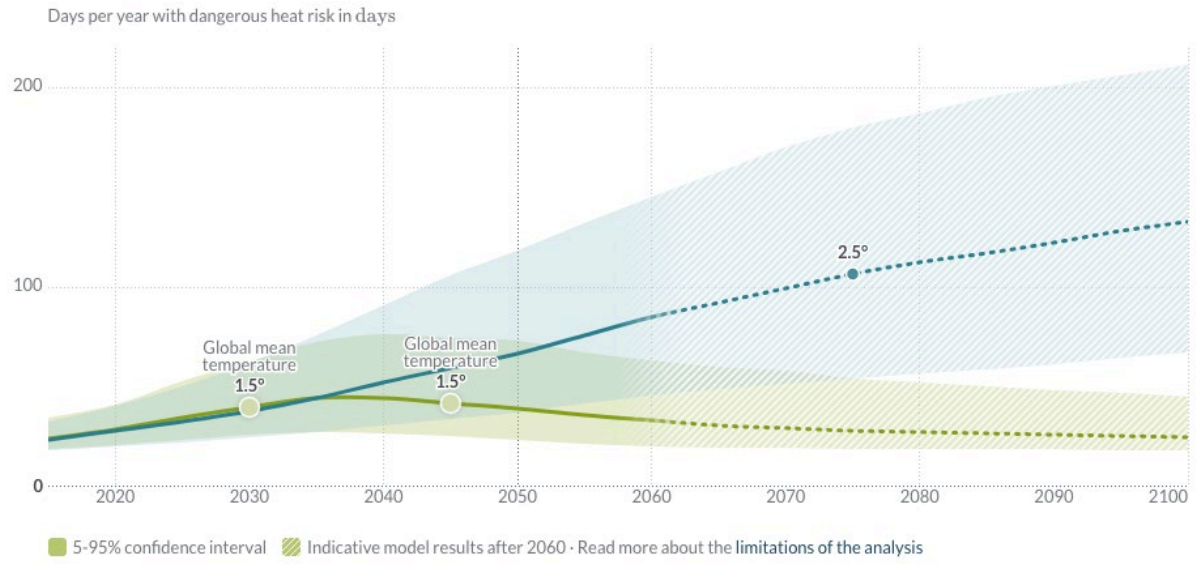

Figure 9: Projected number of days with dangerous heat stress levels[38] for Brazil comparing the CAT current policies scenario 2024 (blue) and a below 1.5°C scenario[39] (green)
Source: Climate Impact Explorer (Update launched on Nov 5th, 2025)

Heavy rainfall events also increase in frequency with increasing warming, but in a non-linear way. Without adaptation, flood damages could be roughly twice as high at 2°C and up to four times as high at 3°C relative to 1.5°C[40]. Agricultural and ecological droughts (driven by soil-moisture deficits) become more frequent and widespread as the planet warms – affecting some regions at 1.5°C, several at 2°C, and about half of inhabited regions at 4°C.[41] Keeping global warming to 1.5°C in 2100 means the share of

[38] Number of days per year at which the daily maximum Heat Index exceeds the 'danger' threshold of 40°C. The Heat Index, is based on a definition by NOAA and relies on daily maximum temperature (tasmax) and relative humidity (hurs), and is widely used for heat risk warnings.
[39] Here we show the "NGFS Low demand" scenario (https://www.ngfs.net/ngfs-scenarios-portal/explore/)
[40] https://www.ipcc.ch/report/ar6/wg3/chapter/summary-for-policymakers/
[41] https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/

the global population exposed to droughts and river flooding could be reduced by roughly two-fifths.[42]

The Paris Agreement has already contributed to slowing or reducing some of these inevitable changes.

The IPCC has indicated that up to 3m of sea level rise could be avoided over the next 2,000 years if warming is limited to 1.5°C instead of 2°C. But even a trajectory in line with the Paris Agreement can be expected to lead to around 0.5m of sea level rise in 2100 relative to 1900 levels, and several metres over the coming centuries.[43] Mean sea levels have already risen by around 0.2 m since the beginning of the twentieth century. Climate policies put in place since adoption of the Paris Agreement may have succeeded in avoiding around 0.12m of sea level rise by 2100 compared to climate the pre-Paris time. Furthermore, the full implementation of existing NDCs and LTS could avoid another 0.12m of rising sea levels.[44]

An important factor contributing to sea level rise is ice sheet instabilities. In an extreme scenario of warming above 4°C by 2100, they can potentially induce around 1.8m of global mean sea level rise and can increase to more than **15m by 2300, compared to 1900 sea level**.[45] Progress with the implementation of the Paris Agreement implies that these extremes are now deemed implausible.[46]

14. Lowered the risks of biodiversity loss and ecosystem degradation

Global warming is today an important contributor to biodiversity loss in every region of the world, which escalates with every additional increment of warming.[47] In fact, of the tens of thousands of species in terrestrial ecosystems, between 3-14% are at a very high risk of extinction at global warming levels of 1.5°C. This risk increases to nearly 3-18% at 2°C, 3-29% at 3°C, and 3-39% at 4°C of warming[48]. A reduction of the expected global warming from 3.6°C to 2.7°C has reduced extinction risk by about 10%.

[42] https://doi.org/10.1007/s10584-017-2115-9
[43] https://doi.org/10.1038/s43247-025-02299-w
[44] https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf
[45] Ibid
[46] https://doi.org/10.1038/d41586-020-00177-3
[47] https://www.ipcc.ch/report/ar6/wg2/chapter/summary-for-policymakers/
[48] Ibid

Coastal and ocean ecosystems are similarly threatened. Coral reefs provide home to about a quarter of all marine species and support the livelihoods of hundreds of millions of people. At current levels of global warming, warm water coral reefs have already been subject to a global bleaching event since 2023 and may have crossed a tipping point with unprecedented die-back.[49] Ocean acidification also contributes to the degradation of these systems.

A Paris-aligned path – one that brings temperatures back below 1.5°C late this century – would offer a real chance of recovery. **Lower emissions sharply curb acidification and protect marine life.** Oceans absorb almost one quarter of CO_2 in the atmosphere from burning fossil fuels. Ocean water pH has fallen from ~8.2 in pre-industrial times to <8.1 today, which is 30% more acidic.[50] This already breaches safe boundaries for marine ecosystems.[51]. Paris-level policies reduce expected 2100 acidification by ≥30% relative to pre-Paris, with full NDC/LTS delivery yielding another ~0.1 pH benefit. Surface pH can recover later this century on ambitious paths, but deep-ocean acidification remains largely irreversible for centuries to millennia.[52]

15. Lowered economic and social impacts especially for the most vulnerable

Lower levels of warming preserve water security and stabilise food systems. Heatwaves, droughts, floods, and sea-level rise heighten water risks and strain food systems, with markedly higher food-insecurity risk at 2°C than 1.5°C, owing to the effects of temperature, precipitation, extreme weather events, and higher CO_2 concentrations on food availability and macro- and micro-nutrient sufficiency.[53] An extra half-degree of warming could lead to an additional 10 – 40 million undernourished people globally[54]; lower projected warming since Paris already improves future water and food outcomes.[55] Vulnerable population groups have been especially impacted by climate change. [56]

[49] https://global-tipping-points.org/
[50] https://www.eea.europa.eu/en/analysis/indicators/ocean-acidification
[51] https://www.planetaryhealthcheck.org/
[52] https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf
[53] https://www.ipcc.ch/sr15/
[54] https://iopscience.iop.org/article/10.1088/1748-9326/aac4bd
[55] https://www.ipcc.ch/report/ar6/wg2/chapter/summary-for-policymakers/
[56] https://link.springer.com/article/10.1007/s11069-023-06070-2

Limiting warming to 1.5°C instead of 2°C by 2100 could cut the share of people exposed to heatwaves by about two-thirds (61–63%) and reduce cooling energy demand ~31%.[57] Regional and global analyses show large avoided costs at lower warming, with the biggest gains in warmer regions of Europe, America, and Southeast Asia.[58] [59]

Lower global warming levels also result in higher avoided losses on worker productivity.[60][61] Even at 1.5°C of warming, the estimated losses in labor hours due to heat in some tropical areas can increase by at least 4 percentage points relative to current climate (i.e., current losses of less than 2% of work hours compared to more than 6% in a 1.5°C scenario). At 2.7°C, work hours lost can reach between 12-16%.[68] Preventing heat-related illnesses in the workplace requires taking breaks, at the expense of labour productivity. The estimated costs are lower for lower warming levels. If temperature is kept to 1.5°C in 2100, rather than to 2°C, the cost to GDP could be reduced by 0.3%.

A large body of shows that global economic damages rise exponentially with temperatures.[62] This means that the difference in economic damages between 3.6°C and 2.7°C would likely more than double.

A recent paper[63] estimates that every 1°C increase in global average temperatures imply 12% loss of GDP. This already shows that under current policies enacted after Paris, the expenditure of hundreds of trillions of dollars has been avoided. To minimise costs, 1.5°C remains the guide. Some authors [64] estimate $36.4 trillion of avoided damages from reducing warming from 2°C to 1.5°C, while others [74] estimate a 5 % improvement in GDP per capita.

In addition to impacting GDP, climate impacts may have cumulative and compounding effects on long-term economic growth.[65] Känzig and Bilal (2024) also find that disasters associated with global warming do not stimulate growth. Instead, national income, productive capital and investment all dwindle. The economic costs of climate change are

[57] https://doi.org/10.1007/s10584-017-2115-9
[58] https://www.researchgate.net/publication/327455389_The_Economics_of_15C_Climate_Change
[59] https://www.thelancet.com/journals/lanchi/article/PIIS2542-5196(17)30156-0/fulltext
[60] https://pubmed.ncbi.nlm.nih.gov/28857058/
[61] https://www.researchgate.net/publication/327455389_The_Economics_of_15C_Climate_Change
[62] https://www.ipcc.ch/report/ar6/wg3/chapter/summary-for-policymakers/
[63] https://ideas.repec.org/p/nbr/nberwo/32450.html
[64] https://doi.org/10.1038/s41586-018-0071-9
[65] https://www.nber.org/papers/w20352

also unequally distributed, with poorer and hotter countries more impacted,[66] leading to higher rates of inequality, poverty and a potential poverty trap.[67]

Estimated implications for global GDP of mitigation measures, co-benefits and climate damages

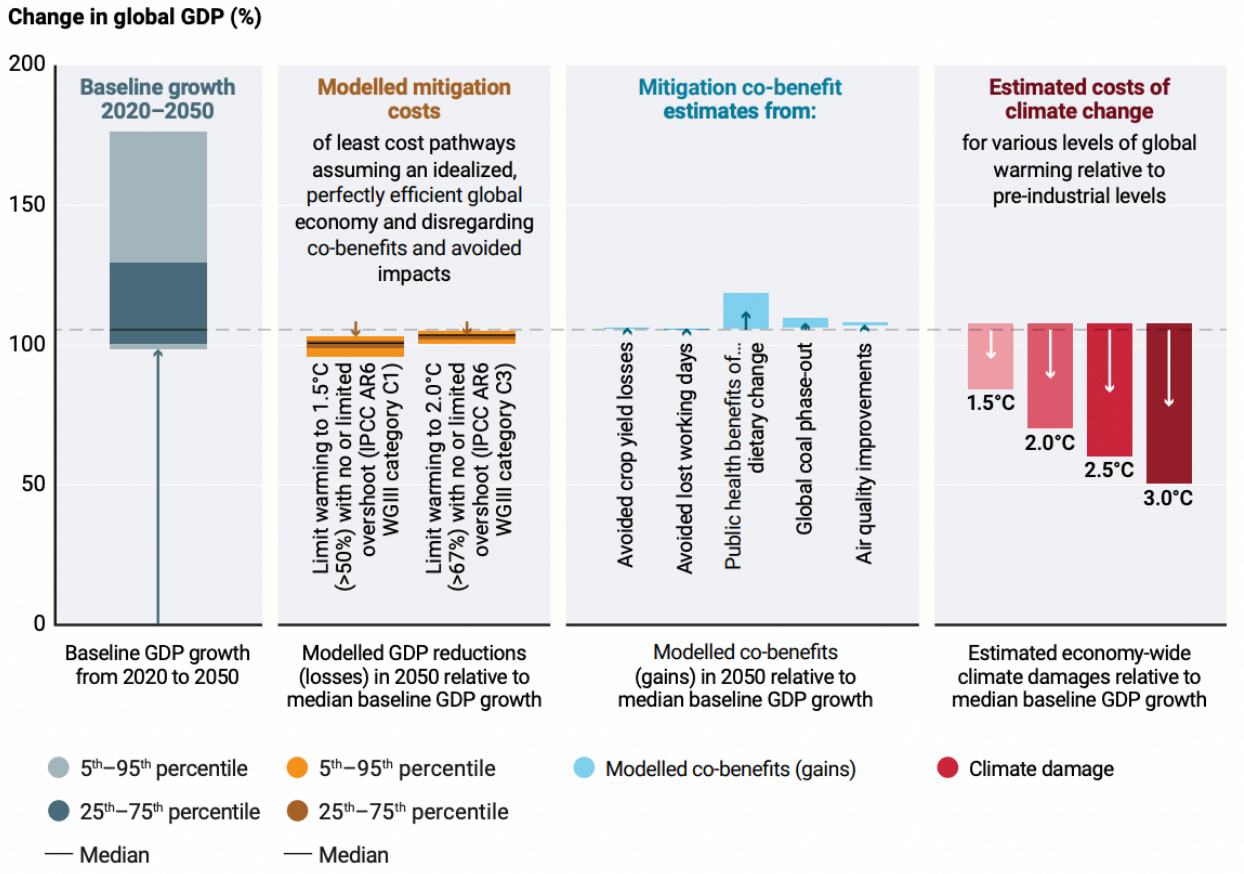

Figure 9. Estimated implications for global GDP of mitigation measures, co-benefits and climate damages.
Source: Emissions Gap Report 2022.

16. Lowers risk of crossing irreversible tipping points

Tipping points are critical thresholds beyond which a system reorganises abruptly and sometimes irreversibly[68]. Multiple Earth-system components show tipping behaviour. The Amazon rainforest, under combined climate and land-use pressure, could experience dieback between 1.5 – 2°C, with large areas shifting toward savannah.

[66] https://doi.org/10.1038/s41558-024-02151-7
[67] https://doi.org/10.3929/ethz-b-000738110
[68] https://apps.ipcc.ch/glossary/

Tipping one component can trigger impact chains: for example, AMOC collapse would disrupt European weather and the West African monsoon, threatening food security. [69]

A Paris-consistent, 1.5°C-aligned pathway would significantly lower the risks of crossing such thresholds, especially for ice sheets, coral reefs, permafrost, whose tipping points may be around 1.5°C of sustained global warming. It should be noted that even the 1.5°C limit cannot eliminate these risks.[70] Recent scientific studies indicate that some tipping points may be crossed at temperatures close to 1.5°C or reached in coming decades, causing inevitable and irreversible changes. **Warm-water corals are indicated to have already reached a tipping point under current warming**[71]**.** For some systems it cannot be ruled out that tipping points have already been crossed or could be crossed at current levels of warming, such as the Atlantic Meridional Overturning Circulation (AMOC), which presents consistent weakening.[72] Recent evidence indicates that global warming above 1°C is already too high to prevent polar ice sheets from melting, accelerating sea-level rise.[73]

Current policies have lowered projected 2100 warming from ~3.6°C to ~2.7°C, reducing – though not removing – the likelihood of crossing tipping points. Given uncertainties in exact thresholds and the risk that even temporary overshoot could trigger irreversible change, the present trajectory remains unsafe and could still set off multiple tipping events (major ice-sheet collapse, coral-reef die-off, permafrost thaw, mountain-glacier loss).

Because tipping elements can interact, **tipping cascades** – where one tipped system destabilises others – are plausible, strengthening the case for faster mitigation. Crossing these thresholds would strain adaptation, push human and natural systems toward or beyond their limits, and increase loss and damage. [74]

In short, even 1.5°C may not be "safe," and today's ~1.4°C warming already risks triggering several tipping elements. **Stringent mitigation remains the best way to limit these risks related to tipping points.**

[69] https://global-tipping-points.org/
[70] https://doi.org/10.1126/science.abn7950
[71] https://global-tipping-points.org/
[72] https://global-tipping-points.org/
[73] https://doi.org/10.1038/s43247-025-02299-w
[74] https://doi.org/10.5194/esd-15-635-2024, 2024

17. Cut the future cost of adapting to a changing climate

The reduction in projected warming, from 3.6°C to 2.7°C, has helped reduce the climate risks and impacts to which adaptation will be needed. But increasing global warming will constrain adaptation options and make these options less effective and costlier. Fully achieving the Paris Agreement would significantly limit loss and damage and keep more human and natural systems from reaching their adaptation limits.

For example, for small islands and regions dependent on glacier and snowmelt, limited freshwater resources will pose potential hard limits for adaptation above 1.5°C. Just as some ecosystems such as corals, coastal wetlands, rainforests, and polar and mountain ecosystems will reach hard adaptation limits above 1.5°C, some ecosystem-based adaptation measures will also lose their effectiveness. [75]

The prospects for **development pathways that are climate-resilient** will be progressively constrained with every increment of global warming and in particular above 1.5°C and will not be possible in some regions with more than 2°C of global warming.[76]

Bottom line: a safer 1.5°C world remains challenging but decisively better. Across biodiversity, sea level, acidification, extremes, tipping points, and macroeconomics, the Paris-driven drop in projected warming delivers measurable avoided impacts already – and much larger benefits if policies strengthen to a 1.5°C-aligned path. Any overshoot must be small and brief to curb long-lived risks and enable partial recovery of vulnerable systems.

18. Reenergised multilateral and local climate leadership

At the international level, several organisations have responded directly to the Paris Agreement usually in reference to the long-term temperature goal. The **International Maritime Organization (IMO), for example,** aligned its 2023 GHG Strategy with the 1.5°C limit, aiming to peak international shipping emissions as soon as possible and reach net-zero "by or around 2050."[77] In April 2025, the IMO adopted a Net-Zero Framework to establish legally binding fuel-intensity requirements for ships above a threshold tonnage under MARPOL Annex VI. On the other hand, the **International Civil**

[75] https://www.ipcc.ch/report/ar6/wg2/chapter/summary-for-policymakers/
[76] Ibid.
[77] IMO 2023 Strategy on the Reduction of GHG Emissions from Ships, MEPC 80/17/Add.1, Annex 15.

Aviation Organization (ICAO) adopted a Long-Term Aspirational Goal of net-zero CO_2 by 2050, recognizing in Assembly Resolution A41-21 that earlier goals were insufficient and raising ambition consistent with the Paris 1.5°C limit.

International courts have also elevated Paris as a legal guidepost. The **International Tribunal for the Law of the Sea (ITLOS)**, the **International Court of Justice (ICJ)**, and the **Inter-American Court of Human Rights** recognise the Agreement's role (alongside customary international law) in directing climate action. The ICJ has indicated that the 1.5°C limit now guides international conduct. States that fail to exercise due diligence – by adopting 1.5°C-consistent plans, regulating private actors, curbing fossil-fuel subsidies, or restraining exploration – may commit internationally wrongful acts from which legal consequences arise.[78] These consequences may include reparation, guarantees of non-repetition, and cessation of the wrongful act or acts.[79]

At the same time, major political and economic groupings – including the G7, G20, African Union, and Association of Southeast Asian Nations – have integrated Paris-aligned climate objectives into their governance functions, though with varying strength, and have also institutionalised climate action within their agendas, set up initiatives and established cooperation principles.[80] Some have also adopted sectoral targets such as reducing energy intensity by 2025 in the case of ASEAN; or tripling renewable energy capacity globally by 2030, a target by the G20 which was eventually adopted by governments under the Paris Agreement.

19. Sparked a global wave of climate alliances and partnerships

Since 2015, a growing constellation of coalitions has emerged to operationalise the Agreement's objectives through coordinated policy, finance, and technical collaboration. For example, the Under2 Coalition commits subnational governments to reach net zero emissions by 2050 or earlier. It grew from 12 founders to about 183 governments across 36 countries by 2023, representing nearly 2 billion people and roughly half the global economy. Ambition can be substantial: California, the world's

[78] Advisory Opinion on Climate Change, delivered on 23 July 2025, available at https://www.icj-cij.org/sites/default/files/case-related/187/187-20250723-adv-01-00-en.pdf
[79] Ibid.
[80] Amaya-Arias, Angela María, Claudio Forner, and Adriana Solano-P. *Climate Change Governance after the Paris Agreement: A Functional Analysis within Formal and Informal Intergovernmental Fora.* Bogotá: Transforma, 2024.

fourth-largest economy, targets carbon neutrality by 2045 and net-negative emissions thereafter.

Cities are also major players in global climate action. Through the Global Covenant of Mayors for Climate and Energy (GCoM), 13,500+ cities across 147 countries – covering about 1.2 billion people – have pledged climate and energy action; three-quarters aim to exceed national targets, with potential cuts up to 4.2 $GtCO_2e$ annually by 2050 versus business-as-usual. The UNFCCC's Global Climate Action Portal (launched at COP 21, building on NAZCA) now lists 43,000+ actors, including 304 regions and 14,439 cities (as of September 2025).

Finally, alliances of all types constitute a major source of cooperation and ambition. Initiatives such as the Powering Past Coal Alliance, the NDC Partnership, or the Global Methane Pledge exemplify how multilateral cooperation has been mobilised around sector-specific transitions, reinforcing Paris goals through targeted initiatives targeting energy use, land use, agriculture and finance.[81] Hundreds of alliances which bring actors across sectors and geographies are actively engaged and constitute a complex and dynamic landscape of climate action within and beyond states' action (see Figure 10).

[81] https://doi.org/10.46830/wriwp.23.00002

A map of the climate cooperation ecosystem

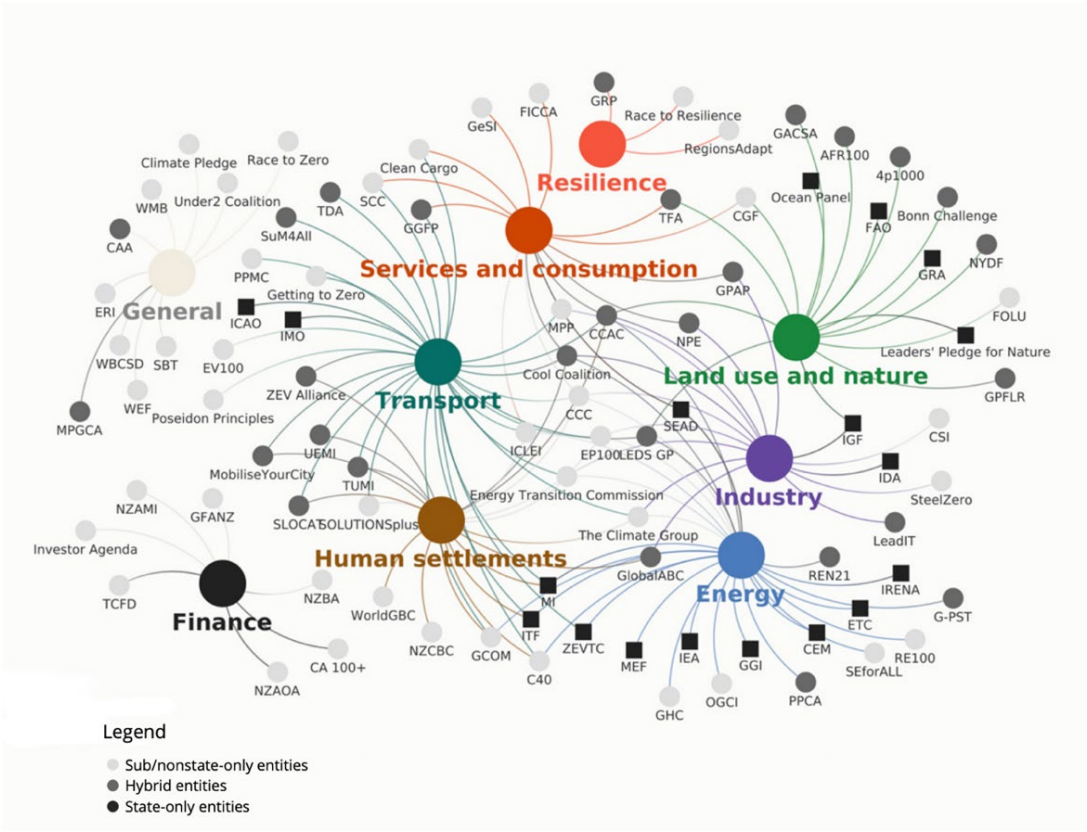

Figure 10. Source: Future of Climate Cooperation.[82]

It must be noted that the expansion of voluntary, multi-actor initiatives brings challenges like lack of coherence and accountability as well as fragmented implementation.[83] Nonetheless, the cooperative space fostered by the Paris Agreement "nurtures a global space free from friction and opposition where businesses, investors, and industry are elevated as the real partners of government".[84]

20. Inspired business leadership in the race to decarbonisation

The shared direction of travel provided by the long-term temperature goal, together with the response of governments, has "created the conditions for companies to invest

[82] https://www.futureclimatecooperation.org/climate-action-ecosystem#block-yui_3_17_2_1_1667455129072_22902

[83] https://www.sciencedirect.com/science/article/abs/pii/S1462901122000375

[84] https://direct.mit.edu/glep/article/22/3/38/110033/Accelerating-Climate-Action-The-Politics-of

and innovate, and for the markets for zero-carbon solutions to start scaling"[85]. Since the adoption of the Paris Agreement, private sector actors have engaged across multiple dimensions of climate action, notably through the adoption of targets and disclosure schemes. Increasingly, corporate leaders have framed climate action as a core element of long-term competitiveness, reputation, and risk management, with surveys showing a marked rise in CEO concern and commitment to climate-related goals since Paris.[86]

Initiatives including the UN's Race to Zero campaign, the **Science Based Targets initiative (SBTi**), and net zero alliances across finance and industry have helped mobilise this effort. In the early years after Paris, the adoption of climate targets by private companies was relatively modest, but momentum has grown over the last ten years. By 2022, over 2,000 companies had validated science-based targets. Then, in 2023 alone, that number more than doubled to 4,205, with over 2,100 companies set science-based targets for the first time. The latest report by SBTi indicates that over 10,000 companies have engaged in the process, with many having adopted near-term and net zero targets (see Figure 11)[87]. On the downside, the energy sector is the least well-represented[88] and some significant participants, including Shell and BP, have abandoned their targets.[89] Nevertheless, in June 2025, companies with science-based targets or commitments represented over 40% of the global economy by market capitalisation and 25% of global revenue.[90]

[85] https://www.systemiq.earth/wp-content/uploads/2020/12/The-Paris-Effect_SYSTEMIQ_Full-Report_December-2020.pdf
[86] https://www.deloitte.com/content/dam/assets-shared/docs/about/2025/2025-deloitte-global-c-suite-sustainability-report.pdf; https://www.pwc.com/gx/en/ceo-survey/2024/download/27th-ceo-survey.pdf
[87] Science Based Targets initiative (SBTi). (2025). *SBTi Trend Tracker 2025: Data and Trends*. Science Based Targets initiative. Retrieved from https://sciencebasedtargets.org/reports/sbti-trend-tracker-2025/data-and-trends
[88] https://sciencebasedtargets.org/reports/sbti-trend-tracker-2025/data-and-trends
[89] See Shell, https://www.ft.com/content/21c8dab8-567b-4926-925e-6f56ba36acb2?utm_source=chatgpt.com; BP: https://www.theguardian.com/business/2025/feb/26/why-has-bp-pulled-the-plug-on-its-green-ambitions?
[90] SBTi Trend Tracker (August 2025), https://sciencebasedtargets.org/reports/sbti-trend-tracker-2025/data-and-trends

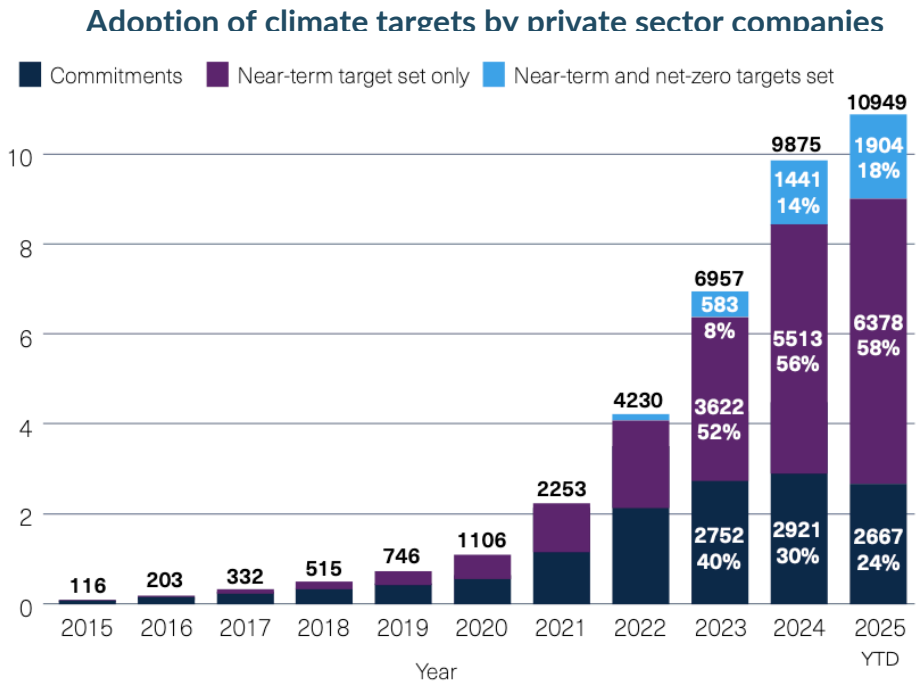

Figure 11. Source: SBTi, https://sciencebasedtargets.org/reports/sbti-trend-tracker-2025/data-and-trends

A second Paris-driven trend is the surge in corporate climate disclosure. Reporting through CDP (formerly Carbon Disclosure Project), the Global Reporting Initiative (GRI), the Task Force on Climate-related Financial Disclosures (TCFD), and the International Sustainability Standards Board (ISSB) has expanded sharply: from 2015–2024, companies disclosing via CDP grew by 300% to nearly 25,000—covering about two-thirds of global market capitalisation, 93% of the Financial Times Stock Exchange 100 (FTSE 100), and 85% of the S&P500[91]. Participation from energy and fossil-fuel firms remains limited, but rising transparency strengthens accountability and helps turn pledges into measurable action.

21. Set in motion initiatives to put the global financial system on a path to climate alignment

Climate finance has been a fundamental enabler of climate action since the inception of the UNFCCC, as many developing countries lack the capacity to invest in the energy transformation and their resilience. International finance and climate action have become mutually reinforcing since the Paris Agreement's call to **align all finance flows with low-emissions, climate-resilient development.** At its core, efforts on climate

[91] https://www.cdp.net/en/about

finance seek to mobilise enough resources for the transformation of economies while redirecting finance channelled to the use of fossil fuels and other unsustainable practices.

The climate-finance landscape is broad and complex, spanning national governments, multilateral institutions (e.g., the IMF and World Bank), financial supervisors, and private investors. Major efforts now focus on pricing and managing climate-related financial risks; integrating climate considerations into macroeconomic and financial policy; and developing and scaling instruments that mobilise capital at speed and scale. Key trends – each of which must expand significantly – include more concessional public finance; greater climate lending by multilateral development banks with risk-reduction tools such as guarantees; and deeper supervision of climate risks across the financial system. Taken together, these actions aim to shift private finance toward enabling, rather than hindering, achievement of climate goals.

The urgency to address climate change paired with the challenges of debt, representation and capacity have resulted in calls[92] to reform the so-called international financial architecture (IFA).[93] The process of reform (see, for example, UNEOSG, 2023[94]) recognises that the IFA has not kept pace with the rise of the global south and has been unable to mobilise long-term and stable finance to combat climate change. Major initiatives that are driving change include the **Bridgetown Initiative,**[95] the process for **MDB reform,**[96] and the G20 **Capital Adequacy Framework Review.**[97]

Beyond the global process of reform, the Paris Agreement has motivated several spaces of cooperation in the area of finance. For example, the **Coalition of Finance Ministers for Climate Action**[98]**,** a global alliance that integrates climate change into economic and fiscal policy, brings finance ministries of 90 countries under the *Helsinki Principles*.[99] Central banks and related organisations like the International Monetary Fund now

[92] See for example https://www.un.org/en/finance-and-foreign-ministers-call-for-remaking-the-international-financial-system
[93] The international financial architecture (IFA) comprises international organisations, such as the International Monetary Fund (IMF) and the World Bank Group, regional development banks, national financial institutions, and international, multinational, and national regulatory bodies.
[94] United Nations Executive Office of the Secretary-General, 2023. *Reforms to the international financial architecture* (Policy brief 6). https://doi.org/10.18356/27082245-29
[95] https://www.bridgetown-initiative.org/
[96] https://www.bu.edu/gdp/2024/12/09/a-roadmap-for-unlocking-the-potential-of-multilateral-development-banks-exists-and-the-g20-just-endorsed-it/
[97] https://www.dt.mef.gov.it/en/news/2022/news_caf.html
[98] https://www.financeministersforclimate.org/
[99] https://www.financeministersforclimate.org/helsinki-principles

consider climate action and climate change a key macroeconomic risk and have joined forces under the N**etwork for Greening the Financial System (NGFS)**. As of October 2025, the network had close to 148 central bank and supervisory members across 91 countries and observers.[100]

Multilateral development banks like the World Bank or the African Development Bank have also increased their engagement and commitment to climate since the adoption of the Paris Agreement. They have developed common tools to measure and track their climate lending[101] as well as principles for aligning their finance with the Paris Agreement.[102] They are actively engaged in increasing their climate finance and in the design of instruments to reduce risk such as guarantees, blended finance, insurance schemes and others. The World Bank, for example, committed in 2023 to deliver climate finance as 45% of total lending by 2025. In 2024, it delivered a record $42.6 billion in climate finance[103]. While their engagement has been subject to criticisms on grounds such as transparency[104], effectiveness and impact[105] or lack of ambition of their initiatives[106] there is no doubt that the Paris Agreement has put MBDs at the centre of climate action.

Building on Paris Agreement momentum, a number of finance sector initiatives were established, including the **Glasgow Financial Alliance for Net Zero (GFANZ),** financial institutions committed to accelerating the net-zero transition; **Net-Zero Asset Owner Alliance (NZAOA)**, institutional investors committed to transitioning their investment portfolios to net-zero GHG emissions by 2050; **Net-Zero Banking Alliance (NZBA):** supporting banks to lead on climate mitigation in line with the goals of the Paris Agreement; and the **Net-Zero Insurance Alliance (NZIA),** aiming to decarbonise insurance and reinsurance underwriting portfolios to net-zero emissions by 2050.[107] Unfortunately, with the changing political landscape in the United States, a number of

https://www.ngfs.net/en/about-us/membership

[101] https://www.adb.org/documents/mdbs-joint-tracking-climate-change-adaptation-finance

[102] https://www.worldbank.org/en/publication/paris-alignment/joint-mdb-paris-alignment-approach

[103] https://www.worldbank.org/en/news/factsheet/2024/11/12/climate-finance

[104] https://webassets.oxfamamerica.org/media/documents/bp-world-bank-unreliable-climate-finance-reporting-031022-en.pdf

[105] https://www.cgdev.org/publication/what-counts-climate-preliminary-evidence-world-banks-climate-portfolio

[106]https://www.germanwatch.org/sites/default/files/germanwatch_multilateral_development_banks_paris_alignment_methodologies_2024_0.pdf

[107] See GFANZ at https://www.gfanzero.com/about/; NZAOA at https://www.netzeroassetmanagers.org/update-from-the-net-zero-asset-managers-initiative/;.

these initiatives have faced challenges, lost members, revisited their priorities and requirements, or shut down.[108][109]

Ultimately, the true positive changes brought in by the Paris Agreement should be evaluated in the actual financial flows that are directed towards climate action. Estimates suggest that delivering on the Paris Agreement will require finance in the order of U$6T in 2030 and 8U$T in 2035.[110] A key component of the financial picture are the contributions of developed countries with the goal of mobilizing U$100B per year by 2020. The goal was delivered in 2022[111] and recently raised to U$ 300 billion annually by 2035. Although it has been criticised for its inadequacy, overreliance on loans and others,[112]it provides greater certainty and continuity for climate action.

Latest analysis of climate finance shows an unquestionable increase in resources being channelled for mitigation and adaptation. Early evaluations of climate finance indicated total finance flows of U$391 in 2014[113]. The most recent analysis shows that global climate finance almost tripled between 2018 and 2023, reaching an all-time high of US 1.9T in 2023[114], with half directed to energy systems. For the first time, in 2023, private climate investment contributions outpaced public sector investment (see Figure 12)[115].

[108] The NZBA and NZIA have rebranded and now provide resources and guidance. See Net Zero Banking Resources, https://www.unepfi.org/net-zero-banking/. See also Net Zero Insurance Resources, https://www.unepfi.org/insurance/insurance/projects/net-zero-insurance-alliance/
[109] BloombergNEF, Climate Week NYC: Navigating a Multi-Speed Transition (September 18, 2025)
[110] https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2024/11/Raising-ambition-and-accelerating-delivery-of-climate-finance_Executive-summary.pdf
[111] https://doi.org/10.1787/19150727-en
[112] https://doi.org/10.21201/2022.9752
[113] https://climatepolicyinitiative.org/wp-content/uploads/2015/11/Global-Landscape-of-Climate-Finance-2015.pdf
[114] Ibid
[115] Ibid.

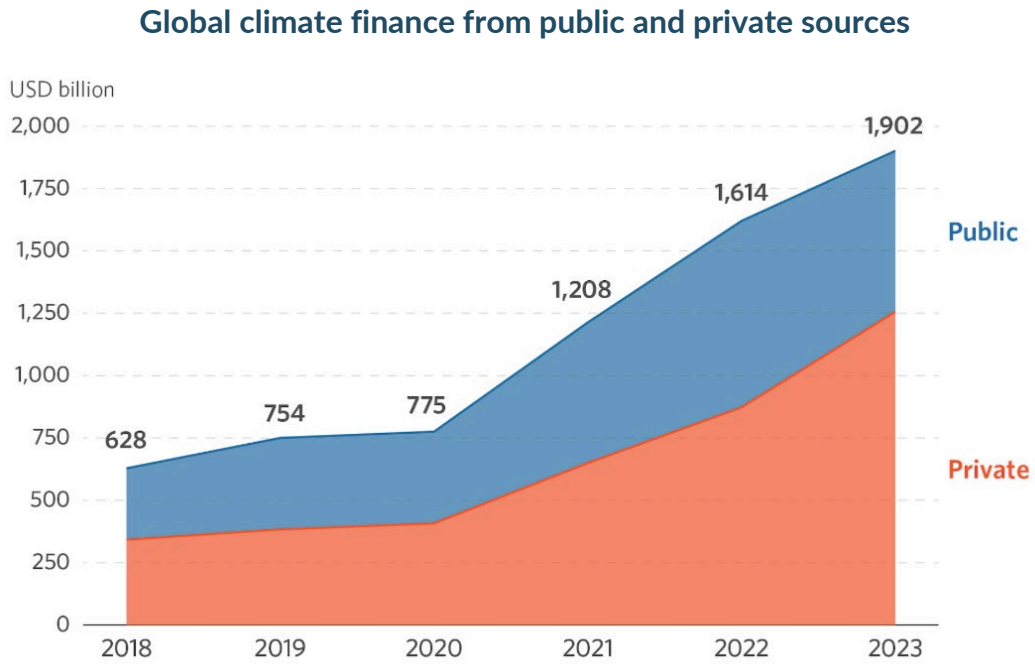

Figure 12. Source: Global Landscape of Climate Finance 2025, https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2025/

22. Influenced a massive increase in clean technology investment which now outweighs fossil fuel investment

We would like to close the financial story with a compelling positive trend. In 2015, fossil fuels attracted more investment than renewables; by 2023 the reverse was true: every dollar spent on fossil fuels was matched by about $1.70 for clean energy.[116] Today, clean technologies attract over $2 trillion annually, more than double fossil fuel investment.[117] This transformation marks one of the clearest signals of the Paris Agreement's influence in reshaping global energy systems and redirecting finance toward a low-carbon future.

[116] IEA, World Energy Investment 2023.

[117] IEA, World Energy Investment 2025 {"[a]round USD 2.2 trillion is going collectively to renewables, nuclear, grids, storage, low-emissions fuels, efficiency and electrification, twice as much as the USD 1.1 trillion going to oil, natural gas and coal")

Conclusion

The first decade of the Paris Agreement has triggered a structural shift in how the world organises to limit warming to 1.5°C and reach net zero around mid-century. It has catalysed governmental action and transparency, established rolling cycles that scrutinise and strengthen national targets, and helped cut expected warming by about 1°C, reducing risks for people and ecosystems and increasing the space for adaptation.

Paris has also rewired the wider system: international bodies are translating the temperature goal into sectoral rules (e.g., shipping and aviation); courts are sharpening states' due-diligence duties; and political groupings like the G7 and G20 are institutionalizing Paris-aligned aims, creating feedback loops between standards, capital, and technology. Subnational governments, cities, firms, and finance have become material agents of change: economy-wide targets and enacted measures have lowered NDC-implied 2050 emissions by about half since 2017; policy trajectories suggest a possible global emissions peak before 2030; and by 2023, clean investment surpassed fossil investment.

These gains are uneven and insufficient—but they are consequential and would almost certainly not have occurred at this scale without Paris.

The current path is not yet safe. Because emissions didn't peak in time, the world will likely exceed 1.5°C temporarily. Efforts must therefore ensure that CO_2 reaches net zero by 2050 and all greenhouse gases by 2060. Gaps persist between targets and enacted policies. Finance for a just transition remains below needs, and risks and tipping points are closer than once assumed. Even a temporary overshoot of 1.5°C could lock in irreversible losses for ice sheets, coral reefs, permafrost, and communities, with adaptation options narrowing and costs rising as temperatures climb.

The science embedded in Paris points to one imperative: move faster, because damages accelerate with every increment of warming. The Agreement's second decade must be defined by disciplined execution. Rising geopolitical tensions, uneven progress, and eroding trust are testing Paris just when cooperation is most needed. Weakening or abandoning it would risk undoing a decade of achievement and dismantling the only framework uniting nearly every nation behind a safer, more just future. This is the moment to recognise what Paris has built, value the progress it has enabled, and defend it as the cornerstone of an enduring global response to climate change.