

CCAG

Climate Crisis
Advisory Group

REPORT

The Global Climate Crisis and the Action Needed

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Setting the

scene



The Climate Crisis Advisory Group recognises that in the face of the overwhelming evidence documenting human-caused climatic change and the erosion of the Earth's living conditions, we, as a scientific community have the responsibility to support calls for urgent climate action.

We emphasise that the scientific findings, gathered by the extensive work of many climate researchers from a wide range of disciplines, need to be used to inform direct, vast and unprecedented policy actions.

The world may already have crossed a series of climate tipping points, resulting in a grave threat to civilisation and a state of planetary emergency. Only by acting quickly and robustly will we be able to stabilise climatic conditions, ensure a just transition and protect vital biodiversity and ecosystem functions for the next generation.

The window of opportunity for action is still open but only just. Action needs to be exponential through scalable solutions.

Over the past decades, significant changes have been observed in several climate system tipping elements, including melting of the ice sheets of Greenland and West Antarctica, slowdown of the Atlantic Meridional Overturning Circulation (AMOC), dramatic declines in Arctic Sea ice cover and associated amplification of Arctic warming, melt events of the Siberian permafrost, wildfires across the world of unprecedented scale and intensity, repeated mass bleaching of the Great Barrier Reef, and dieback of the Amazon rainforest.

We face a climate crisis

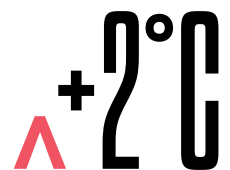
Ice sheets and ocean currents at risk of climate tipping points could destabilise each other as the world heats up, leading to a domino effect with severe consequences for humanity.

Tipping points may occur as global heating pushes temperatures beyond a critical threshold, leading to accelerated and irreversible impacts. Interactions between these climate systems could lower the critical temperature thresholds at which each tipping point is passed.

Ice poses potential starting points for tipping cascades and is of particular importance for the stability of the climate system as a whole. With sea ice across much of the Arctic region melting fast (and moreover, not re-establishing itself in long-enough cycles to restore older ice layers), a vicious circle is emerging in which more dark water is exposed to the sun's heat, leading to even more heating of the planet. Some large ice sheets in Antarctica may have already passed their tipping points or are at acute risk of crossing their temperature thresholds within the UNFCCC Paris Climate Agreement range of 1.5 to 2°C, which would result in large and unstoppable sea-level rises in coming decades and centuries. With global warming continuing unabated, there is increased risk that these tipping elements might soon cross a critical threshold, resulting in severe consequences for the global climate, ecosystems and human societies.

Scientific evidence further suggests that one tipping point, such as the release of methane from thawing permafrost, may fuel others, worsening human-caused climate warming and leading to a cascade with knock-on implications beyond the climate system, such as major changes in rainfall generation, heatwaves, disease patterns and extreme events.

At the same time as the impact of rising sea-levels will be widespread, other climate effects will make themselves felt, too. Sea level rise is one of the most severe impacts of climate change, with meltwater issuing from big ice sheets impacting ocean dynamics and currents in unprecedented ways. Rising waters threaten to inundate small-island nations and coastal regions before the end of the century. At the same time, the impact will be directly and indirectly impacting the state of other fragile ecosystems such as the Amazon rainforest which is close to a critical level of deforestation. In temperate forests, especially in North America, a drier and warmer atmosphere causes more wildfires and pest outbreaks, potentially turning some regions from a sink for carbon to a source.



+2°C

In the tropics, coral reefs as we know them today are predicted to be wiped out by 2°C of global warming.

The picture emerging is one of rapid changes to ecosystems, that ultimately hold the keys for staying on the right side of climate tipping points.

IN 2020 >

- > One quarter of the Great Barrier Reef suffered severe bleaching in the most widespread outbreak ever witnessed, the third mass bleaching event in five years.
- > Environmental degradation, the instability of natural resources and competition exacerbated by climate impacts have started to contribute to forced migration and social conflict.
- > Record heat accumulated in the seas, which absorb more than 90% of heat resulting from human-caused climate warming.
- > Sea ice in the Arctic reached its second lowest minimum on record, while hundreds of billions of tonnes of ice were lost in Greenland and Antarctica, further pushing up global sea levels.
- > Severe flooding hit large parts of Africa and Asia, helping trigger a locust plague in the Horn of Africa, which occurred after several years of drought affecting food security among local communities, causing local food riots in the midst of the pandemic.
- > Extreme drought affected many parts of South America, with estimated farming losses nearing \$3bn in Brazil alone, and further losses in Argentina, Uruguay and Paraguay.
- > The largest wildfires ever recorded burned in forests of North America and Southeast Australia, some with such fierce power that they were comparable to a moderate volcanic eruption.
- > Australia broke heat records, including a temperature of 48.9°C in Western Sydney.
- > The North Atlantic hurricane season had its largest number of named storms on record with 30, and a record 12 made landfall in the US.
- > Record temperatures over 30-35°C were recorded both in the Siberian and European Arctic.
- > Cyclone Amphan hit India and Bangladesh and was the costliest tropical cyclone on record for the North Indian Ocean, while Typhoon Goni, which crossed the Philippines, was one of the most intense cyclones ever to hit land.

The level of greenhouse gases in the atmosphere required to push temperatures beyond the thresholds agreed by the international community has already been crossed.

Even well below 2°C and aiming for 1.5°C of global warming - i.e. in the Paris agreement target range, there will likely be a significant risk of triggering further cascading climate tipping points.

The planet has already heated by around 1.25°C and the temperature is certain to rise further, due to past emissions and because atmospheric greenhouse gas levels are still on the rise; temporary reductions in emissions - due to the COVID-19 economic crisis for example - at best only slow down the rate of increase.

On current unconditional pledges, the world is heading for around 3.2°C temperature rise. Technologies and policy knowledge exist to cut emissions, but transformations must begin now.

Despite the sharp, temporary drop in greenhouse gas emissions of around 6% in 2020 compared to 2019, global emissions have not yet peaked, and the world remains on pace for additional warming in coming decades. A valuable lesson from the pandemic is that we do have the ability to change at a global scale.

We know, unequivocally, that the climate crisis will hurt the world's most vulnerable populations first and hardest, while being a major, and in some cases potentially existential challenge, for all people in the world. Protecting and safeguarding

developing nations and Indigenous communities needs to be an utmost priority whilst ensuring future climate investments are reaching the people who need them most.

Globally we will need to reduce our carbon emissions deeply and rapidly, a reduction that will require fundamental change by governments, businesses, individuals and civil society. On average, individual carbon footprints would need to go down by a factor of 30 to help put the planet on a path to curb the ever-worsening impacts of climate change, according to new findings published by the United Nations Environment Program. Of course, this average value masks very different contexts, responsibilities, and abilities to reduce emissions. More specifically, currently, the emissions attributable to the richest 1 percent of the global population account for more than double those of the poorest 50 percent. Shifting that balance will require deep and rapid emissions reductions implemented in a fair and balanced manner that recognises different pathways to transformation in differing local and national circumstances and contexts, and respects the full spectrum of rights, including those of Indigenous and local-traditional communities. This involves, among other things, making policy decisions through a lens of climate and energy justice and involving and engaging individuals and communities.



The world is heading for around 3.2°C temperature rise.

Nations would need to roughly triple their current emissions-mitigation pledges to limit the Earth's warming to well below 2°C above the preindustrial average. To reach the goal of holding warming to 1.5°C – which the Paris Agreement urges States to strive for – countries would need to increase their targets at least fivefold.

Global greenhouse gas emissions have risen about 1.4 percent annually on average over the past decade. Based on countries' current promises, the world remains on a trajectory to experience a temperature rise this century of about 3°C – an amount that many experts say would have disastrous effects on much of the planet.

Collectively this means we need to start cutting emissions by close to pandemic amounts (6.4 percent) every single year for the next 30 years, to begin to meet the Paris Agreement's more ambitious long-term temperature

goals and to limit warming to 1.5°C degrees Celsius above preindustrial levels. Every year that we delay beginning sustained global emission reductions places a burden on the future pace of emissions reductions required to meet the Paris Agreement.

Past failure to cut emissions means it is now inevitable that some greenhouse gases will also need to be removed from the atmosphere in addition to rapid emission reductions. While steps to achieve carbon net-zero pledges are crucial, there is one problem: net-zero greenhouse gas emissions by 2050 is no longer enough to halt the irreversible and long-term impacts of the climate crisis and it is essential to consider aiming to reach carbon net zero by 2035 to 2040.



It is vital to reduce greenhouse gas concentrations from the current level of approximately 500ppm down to below 350ppm CO₂ equivalent in order to have a good chance of safeguarding a manageable planet for human development.

The Climate Crisis Advisory Group believes we need agile international political and financial action to mitigate the consequences of climate change through

Reduction,

Removal and

Repair measures

REDUCE

Deep and rapid emissions cuts are critically important (but not sufficient to prevent severe harm to particular societies and ecosystems)

- > Strong and rapid action to cut emissions of carbon dioxide and other greenhouse gases in order to slow down the rate of global warming over the next twenty years with immediate effect.
- > Focus on near-term policies and actions (i.e. cutting global emissions by half each decade from 2020 onwards) which can be adopted to rapidly decrease emissions by over 90% while also delivering on the UN Sustainable Development Goals.
- > Support and maintain the existing and preserved carbon sinks and storages in natural ecosystems which are often also biodiversity hotspots
- > Enable the realisation of the rights of Indigenous and local communities in this historic transformation
- > Enable and support net zero pathways for nations and regions which are tailored to their circumstances, contexts and constraints, and are just, fair and peaceful, engaging the insights and resources of local communities
- > Enable and support a vast transformation of the energy sources used to power the global economy, going far beyond business-as-usual technological progress
- > Increased action and support, first and foremost from developed countries, is urgently needed. Pre-2020 reductions, net of Economies in Transition, greenhouse gas emissions reductions reached only 1.6% since 1990. The pace of decarbonisation in the advanced and emerging economies has to be far more aggressive than in their net-zero commitments so far.
- > Such ambitious mitigation pathways are characterized by energy demand reductions, decarbonization of electricity and other fuels, electrification of energy end use, deep reductions in agricultural emissions protecting food security, and some carbon storage on land or sequestration in geological reservoirs. Energy efficiency and reduced demand for land- and greenhouse gas-intensive consumption goods facilitate limiting warming to as close as possible to 1.5°C.

REMOVE

Greenhouse gas removal at scale

is urgently required, to bring

atmospheric CO₂ concentrations

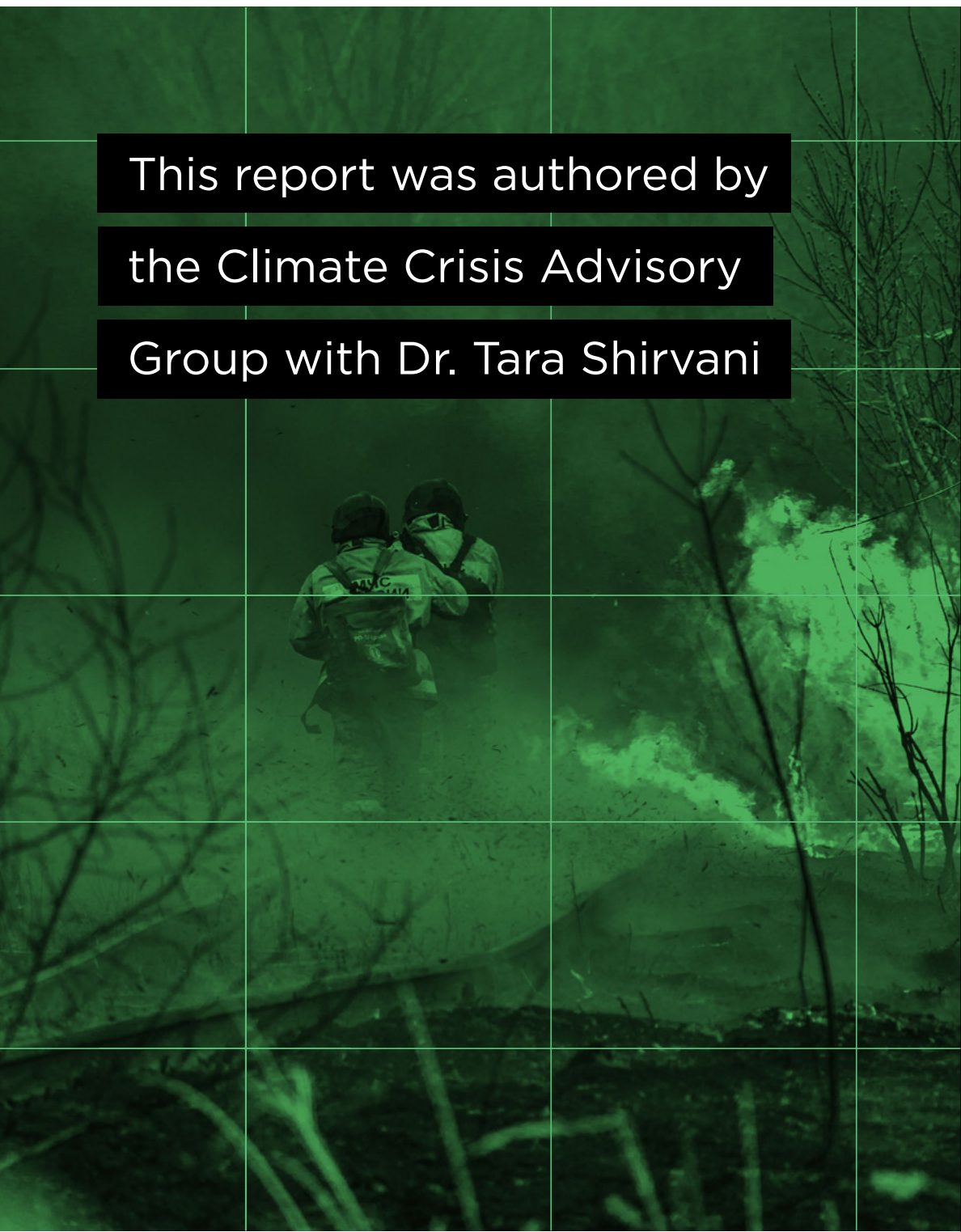
down to 350ppm by 2100

- > Development and subsequent implementation of a portfolio of greenhouse gas removal measures which can bring CO₂ levels down from their present level to below 350 ppm. Incorporate and foster a backbone of emissions removal and storage technologies such as Carbon Capture and Storage (CCS), Bioenergy with carbon capture and storage (BECCS), enhancement of biodiversity in the oceans, and Direct Air Capture (DAC) as the backbone of the negative emissions path.
- > Focus on understanding the possible role of a suite of effective methods of capturing greenhouse gases such as for example Nature-Based Solutions (e.g.: kelp, large-scale rewilding and restoration of boreal peatlands and tropical ecosystems), Bio-mimicry Solutions (e.g.: Iron Fertilization) and Engineering Solutions (e.g.: Direct Air Carbon Capture). This includes understanding possible impacts across a wider range of social, economic, biodiversity, and ecosystem dimensions.
- > Such greenhouse gas removal at scale over time must remain sensitive to considerations of fairness and equity, agency and voice, between nations, and across generations, and to mitigate potential risks.
- > These actions should be driven by local and regional communities, with support and input from relevant agencies and experts, ensuring that the free, prior and informed engagement and consent of the affected regions and peoples is at the centre of the process.
- > Removal methods should avoid unintended negative consequences follow precautionary principles at all stages for people and ecosystems.

REPAIR

Targeted repair is needed for those parts of the climate system that have gone beyond their tipping points

- > Develop and explore the potential of solutions to restore damaged climate systems, for example refreezing the Arctic and preventing major ice sheets (e.g. Greenland) from causing irreversible shifts in feedbacks due to albedo shifts, and impacts on ocean overturning of heat and catastrophic rates of sea level rise, for example with Marine Cloud Brightening - engaging with and respecting the rights, wisdom and precautionary principles of the functioning of the planet, the affected Indigenous and local communities.
 - > Strong research and development on assessing Earth system trade-offs carried out with deep precaution and careful analysis of any planetary side-effects.
 - > Strive towards a fast implementation of landscape-wide rewilding preservation - both on land and in the sea - for degraded systems to provide natural carbon sinks.
- > Develop measures and technologies that could be safely and ethically deployed to return critical elements of the climate system to an undamaged state.
 - > Enact a global moratorium on solar radiation management through the engineered installation of compounds into the stratosphere. This should in particular apply to up-scaled deployment of this technology.
 - > Enable global cooperation structures for research to develop and understand these measures, in such a way that promotes peace and stability. This should pave the way for international cooperation on small scale deployment in the future. Collaborate and engage with local and Indigenous communities first before proceeding at scale with climate repair activities.



This report was authored by
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PUBLIC MEETINGS:

- > Series taking place to be livestreamed on Youtube and Twitter on the last Thursday of each month. Beginning on Thursday 24th June, 12pm BST.

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