

Climate change

Major climate changes inevitable and irreversible - IPCC's starkest warning yet

Monday 9 August 2021, by [CARRINGTON Damian](#), [HARVEY Fiona](#), [MORTON Adam](#), [READFEARN Graham](#) (Date first published: 9 August 2021).

Report warns temperatures likely to rise by more than 1.5C bringing widespread extreme weather.

[Figures and graphs are not reproduced here.]

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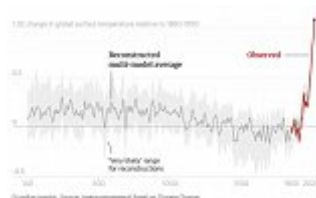
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Human activity is changing the Earth's climate in ways "unprecedented" in thousands or hundreds of thousands of years, with some of the changes now inevitable and "irreversible", climate scientists have warned.

Within the next two decades, temperatures are likely to rise by more than 1.5C above pre-industrial levels, breaching the ambition of the 2015 Paris climate agreement, and bringing widespread devastation and extreme weather.

Only rapid and drastic reductions in greenhouse gases in this decade can prevent such climate breakdown, with every fraction of a degree of further heating likely to compound the accelerating effects, according to the International Panel on Climate Change, the world's leading authority on climate science.

Human influence has warmed the climate at a rate unprecedented in at least the past 2000 years



The [comprehensive assessment of climate science published on Monday](#), the sixth such report from the IPCC since 1988, has been eight years in the making, marshalling the work of hundreds of experts and peer-review studies. It represents the world's full knowledge to date of the physical basis of climate change, and found that human activity was "unequivocally" the cause of rapid changes to the climate, including sea level rises, melting polar ice and glaciers, heatwaves, floods

and droughts.

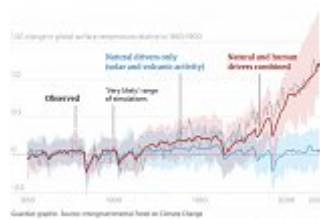
World leaders said the stark findings must force new policy measures as a matter of urgency, to shift the global economy to a low-carbon footing. Governments from 197 countries will meet this November in Glasgow for vital UN climate talks, called [Cop26](#).

Each nation is asked to come to Cop26 with [fresh plans to reduce greenhouse gas emissions](#) to a level that will limit global heating to no more than 1.5C above pre-industrial levels, the ambition of the Paris climate agreement and a goal the IPCC emphasised was still possible, but only just.

António Guterres, the UN secretary general, warned: “[This report] is a code red for humanity. The alarm bells are deafening, and the evidence is irrefutable: greenhouse gas emissions from fossil fuel burning and deforestation are choking our planet and putting billions of people at immediate risk.”

He called for an [end to new coal plants](#) and to new fossil fuel exploration and development, and for governments, investors and businesses to pour all their efforts into a low-carbon future. “This report must sound a [death knell for coal and fossil fuels](#), before they destroy our planet,” he said.

Climate model simulations show how human factors have contributed to a rise in global surface temperatures



Boris Johnson, prime minister of the UK, hosts of Cop26, said: “Today’s report makes for sobering reading, and it is clear that the next decade is going to be pivotal to securing the future of our planet ... I hope today’s report will be a wake-up call for the world to take action now, before we meet in Glasgow in November for the [critical Cop26 summit](#).”

John Kerry, special envoy to US president Joe Biden, said: “The IPCC report underscores the overwhelming urgency of this moment. The world must come together before the ability to limit global warming to 1.5C is out of reach ... Glasgow must be a turning point in this crisis.”

Temperatures have now risen by about 1.1C since the period 1850 to 1900, but stabilising the climate at 1.5C was still possible, the IPCC said. That level of heating would still result in increasing heatwaves, more intense storms, and more serious droughts and floods, but would represent a much smaller risk than 2C.

Richard Allan, a professor of climate science at University of Reading, and an IPCC lead author, said each fraction of a degree of warming was crucial. “You are promoting moderate extreme weather events to the premier league of extreme events [with further temperature rises],” he said.

Civil society groups urged governments to act without delay. Doug Parr, chief scientist at Greenpeace UK, said: “This is not the first generation of world leaders to be warned by scientists about the gravity of the climate crisis, but they’re the last that can afford to ignore them. The increasing frequency, scale and intensity of climate disasters that have scorched and flooded many parts of the world in recent months is the result of past inaction. Unless world leaders finally start to act on these warnings, things will get much, much worse.”

Stephen Cornelius, chief adviser on climate change at WWF, added: “This is a stark assessment of the frightening future that awaits us if we fail to act. With the world on the brink of irreversible harm, every fraction of a degree of warming matters to limit the dangers.”

Even if the world manages to [limit warming to 1.5C](#), some long-term impacts of warming already in train are likely to be inevitable and irreversible. These include sea level rises, the melting of Arctic ice, and the warming and acidification of the oceans. Drastic reductions in emissions can stave off worse climate change, according to IPCC scientists, but will not return the world to the more moderate weather patterns of the past.

Ed Hawkins, a professor of climate science at the University of Reading, and a lead author for the IPCC, said: “We are already experiencing climate change, including more frequent and [extreme weather events](#), and for many of these impacts there is no going back.”

This report is likely to be the [last report from the IPCC](#) while there is still time to stay below 1.5C, added Joeri Rogelj, director of research at the Grantham Institute, Imperial College London, and an IPCC lead author. “This report shows the closer we can keep to 1.5C, the more desirable the climate we will be living in, and it shows we can stay within 1.5C but only just – only if we cut emissions in the next decade,” he said. “If we don’t, by the time of the next IPCC report at the end of this decade, 1.5C will be out the window.”

Monday’s report will be followed next year by two further instalments: part two will focus on the impacts of the climate crisis; and the third will detail the potential solutions. Work on the report has been hampered by the Covid-19 pandemic, which delayed publication by some months, and forced scientists to collaborate mainly online and through video conferencing.

Fiona Harvey Environment correspondent

• The Guardian. Mon 9 Aug 2021 09.00 BST:

<https://www.theguardian.com/science/2021/aug/09/humans-have-caused-unprecedented-and-irreversible-change-to-climate-scientists-warn>

IPCC report’s verdict on climate crimes of humanity: guilty as hell

Analysis: report exposes the failure to act on the climate crisis - political leaders are now in the dock.

As a verdict on the climate crimes of humanity, the new Intergovernmental Panel on Climate Change report could not be clearer: guilty as hell.

The repeatedly ignored warnings of scientists over past decades have now become reality. Humanity, through its actions, or lack of action, has unequivocally overheated the planet. Nowhere on Earth is escaping rising temperatures, worse floods, hotter wildfires or more searing droughts.

The future [looks worse](#). “If we do not halt our emissions soon, our future climate could well become some kind of hell on Earth,” says Prof Tim Palmer at the University of Oxford.

This would be the sentence for these climate crimes, but it has yet to be passed down. The world can avoid the harshest punishment, but only just. Immediate repentance for the delays that have brought the world to the brink is required in the form of immediate and deep emissions cuts.

The key aspect of the IPCC report is that the 42-page summary is agreed, line by line, by every government on the planet, with the scientists vetoing any politically convenient but unscientific proposal.

As a result, governments that continue to fail to take action have nowhere left to hide – the crystal-clear report has bust all of their alibis. “Too many ‘net-zero’ climate plans have been used to [greenwash pollution](#) and business as usual,” says Teresa Anderson at ActionAid International.

The report exposes such plans with its stark statement that immediate action is the only way to avoid ever-worsening impacts, of which today’s wildfires in [California](#), [Greece](#) and [Turkey](#), floods in [Germany](#), [China](#) and [England](#), and heatwaves in [Canada](#) and [Siberia](#) are merely a foretaste. As Greta Thunberg says, the climate crisis must be treated as a crisis.

The action required is well known and the IPCC report must be the spur for it to be taken, says António Guterres, the UN secretary general: “This report must sound a death knell for coal and fossil fuels, before they destroy our planet. If we combine forces now, we can avert climate catastrophe. But, as the report makes clear, there is no time for delay and no room for excuses.”

Every choice made now matters. Helen Clarkson, the CEO of the Climate Group, which represents 220 regional governments and 300 multinational businesses, covering 1.75 billion people and 50% of the global economy, says: “Every decision, every investment, every target, needs to have the climate at its core.”

The gravity of the situation laid out in the report blows away blustering over the supposed costs of climate action. In any case, not acting will cost far more. “It’s suicidal, and economically irrational to keep procrastinating,” says Prof Saleemul Huq, director of the International Centre for Climate Change and Development at the Independent University, Bangladesh.

For those governments and businesses that still chose inaction, the IPCC report may well end up being used as key evidence against them in real courtrooms. “We’ll be taking this report with us to the courts,” says Kaisa Kosonen at Greenpeace.

“By strengthening the scientific evidence between human emissions and extreme weather the IPCC has provided new, powerful means to hold the fossil fuel industry and governments directly responsible for the climate emergency,” she says. “One only needs to look at our recent [court victory against Shell](#) to realise how powerful IPCC science can be.”

Hope remains, just. Christiana Figueres, who was UN climate chief when the Paris deal was sealed in 2015, says: “Everything we need to avoid the exponential impacts of climate change is doable. But it depends on solutions moving exponentially faster than impacts.”

The IPCC’s report means all the evidence that will ever be needed is now in place. “The continued dithering to address climate change is no longer about the lack of scientific evidence, but directly tied to a lack of political will,” says Kristina Dahl of the Union of Concerned Scientists.

That means political leaders are now in the dock and the vital [UN Cop26 summit](#) in Glasgow in November may be the last hearing at which they can avoid the judgment of history.

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<https://www.theguardian.com/environment/2021/aug/09/ipcc-reports-verdict-on-climate-crimes-of-humanity-guilty-as-hell>

Climate crisis 'unequivocally' caused by human activities, says IPCC report

Intergovernmental Panel on Climate Change states every corner of the planet is already being affected and it could get far worse.

"It is unequivocal." Those stark three words are the first in the Intergovernmental Panel on Climate Change's new report. The climate crisis is unequivocally caused by human activities and is unequivocally affecting every corner of the planet's land, air and sea already.

The report, produced by hundreds of the world's top scientists and signed off by all the world's governments, concludes that it could get far worse if the slim chance remaining to avert heating above 1.5C is not immediately grasped.

The scientific language of the report is cold and clear but cannot mask the heat and chaos that global heating is unleashing on the world. We have already caused 1C of heating, getting perilously close to the 1.5C danger limit agreed in the Paris climate deal. Downpours of rain have been accelerating since the 1980s.

Accelerating melting of ice has poured trillions of tonnes of water into the oceans, where oxygen levels are falling - suffocating the seas - and acidity is rising. Sea level has already risen by 20cm, with more now irreversibly baked in.

The greenhouse gas emissions spewed out by fossil fuel burning, forest destruction and other human activities are now clearly destabilising the mild climate in which civilisation began, the report shows. Carbon dioxide levels in the air are now at their highest point for at least 2m years.

When was the last time we saw heating this fast? At least 2,000 years ago and probably 100,000 years. Temperatures this high? At least 6,500 years. Sea level rising so fast? At least 3,000 years. Oceans so acidic? Two million years.

All this is already hurting people everywhere, the report spells out. Heatwaves and the heavy rains that lead to flooding have become more intense and more frequent since the 1950s, affecting more than 90% of the world's regions, according to the report. Drought is increasing in more than 90% of the regions for which there is good data. It is more than 66% likely that the number of major hurricanes and typhoons has increased since the 1970s.

So what of the future? Some heating is already inevitable. We will definitely hit 1.5C in the next two decades, whatever happens to emissions, the IPCC finds. The only good news is that keeping to that 1.5C is not yet impossible.

But it will require "immediate, rapid and large-scale reductions" in emissions, say the scientists, of

which there is no sign to date. Even cutting emissions, but more slowly, leads to 2C and significantly more suffering for all life on Earth.

If emissions do not fall in the next couple of decades, then 3C of heating looks likely – a catastrophe. And if they don't fall at all, the report says, then we are on track for 4C to 5C, which is apocalypse territory.

The report is clear there are no cliff-edges to the climate crisis. Each tonne of carbon pumped out increases the impacts and risks of extreme heat, floods and droughts and so every tonne of carbon matters. It will never be too late to act, the report shows. Instead, the real question is how bad will it get?

For example, extreme heatwaves expected once every 50 years without any global heating are already happening every decade. With 1.5C warming, these will happen about every 5 years; with 2C, every 3.5 years; and with 4C, once every 15 months. More heating also means more disruptions to the monsoon rains on which billions depend for food.

More emissions also means the land and oceans become weaker at soaking up that carbon pollution, making heating even worse. With immediate rapid cuts, the natural world can still soak up 70% of our emissions. With no cuts, that falls to just 40%.

One of the most blunt sections of the report begins: “Many changes due to past and future greenhouse gas emissions are irreversible for centuries to millennia.” This particularly affects the world's oceans and ice, which absorb 96% of global heating, meaning ice will keep melting and the oceans rising towards our many crowded coastal cities.

The likely range is between 28cm and 100cm by the end of the century. But it could be 200cm by then, or 500cm by 2150, the report warns. Extreme sea level events, such as coastal flooding, that occurred just once per century in the recent past are projected to happen at least annually in 60% of places by 2100.

“That might seem like a long way away but there are millions of children already born who should be alive well into the 22nd century,” says Prof Jonathan Bamber, at the University of Bristol, UK, and a report author.

The many scientific advances since the last comprehensive IPCC report in 2013 mean better projections for specific regions of the world. It finds nowhere is safe. For example, even at 1.5C of heating, heavy rain and flooding are projected to intensify in Europe, North America and most regions of Africa and Asia.

“We can no longer assume that citizens of more affluent and secure countries like Canada, Germany, Japan and the US will be able to ride-out the worst excesses of a rapidly destabilising climate,” says Prof Katharine Hayhoe, chief scientist at The Nature Conservancy. “It's clear we're all in the same boat – facing a challenge that will affect every one of us within our lifetimes.”

The report is the sixth by the IPCC but the first to assess the risk of tipping points thoroughly. These are abrupt and irreversible changes to crucial Earth systems that have huge impacts and are of increasing concern to scientists. The collapse of major Atlantic currents, ice caps, or the Amazon rainforest “cannot be ruled out”, the report warns.

“For the tipping points, it's clear that every extra tonne of CO₂ emitted today is pushing us into a minefield of feedback effects tomorrow,” says Prof Dave Reay, at the University of Edinburgh, UK.

So what can be done? The final section of the IPCC report addresses how future climate change can be limited. It finds that 2,400bn tonnes of CO₂ have been emitted by humanity since 1850, and that we can only leak another 400bn tonnes to have a 66% chance of keeping to 1.5C.

In other words, we have blown 86% of our carbon budget already, though the report says the science is clear that if emissions are slashed then temperatures will stop rising in a decade or two and the increases in deadly extreme events will be strongly limited.

“Unless there are immediate rapid and large-scale reductions in greenhouse gas emissions, limiting warming to 1.5C will be beyond reach,” says Abdalah Mokssit, secretary of the IPCC.

“But we never dictate any policy to any country – it is for the governments to take the decisions.”

The scientists have now spoken, louder and clearer than ever before. Now it is for the politicians to act.

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<https://www.theguardian.com/environment/2021/aug/09/climate-crisis-unequivocally-caused-by-human-activities-says-ipcc-report>

‘Not too late’: Australian scientists call for urgent action to avoid worst of climate crisis

A lead author of latest IPCC report says humans ‘still in the control cabin of the planet’ but there is no limit to the damage possible.

Australian scientists have stressed it is “not too late” to take action to stem the worst of the climate crisis and called on leaders to “wake up” after a landmark global science report found widespread and rapid changes were already occurring across the planet.

The latest assessment by the Intergovernmental Panel on Climate Change, the world’s leading authority on climate science, found human activities were unequivocally heating the planet and causing changes not seen for centuries and in some cases thousands of years.

Human-induced climate change is already affecting weather and climate extremes in every region across the globe, helping cause increased heatwaves, heavier rainfall events and more intense droughts and tropical cyclones, the report found.

In Australia, it found average temperatures above land had already increased by about 1.4C since 1910. Annual changes in temperature were now above what could be expected from natural variation in all regions across the continent.

A resident watches a wildfire near the village of Pefki on Evia island, Greece, on 8 August.

A regional fact sheet released alongside the report said heatwaves and dangerous fire weather had

increased, the bushfire season had become longer, and marine heatwaves were more common. Sea levels were rising faster in Australia than the global average and sandy shorelines were already retreating in many areas.

As the century goes on and temperatures and emissions rise further, heat extremes and heavy rainfall events were projected to increase, and there would be more sand and dust storms. The impact of the La Nina and El Niño cycles on Australia's rainfall – which has fallen across the southern part of the continent, particularly in Western Australia – were expected to become even more pronounced. Droughts affecting ecosystems and agriculture would probably increase as global warming hits 2C.

Globally, the report found temperatures would continue to increase until at least mid-century under all future scenarios. It also found global heating of 1.5C and 2C above pre-industrial levels – the benchmarks referred to in the Paris agreement – would be exceeded this century unless there were deep reductions in carbon dioxide and other greenhouse gases.

Cop26 summit crucial

Dr Joëlle Gergis, of the Australian National University and a lead author of the report's chapter on changes in rainfall, said 1.5C was "very likely" to be breached by the early 2030s. She said the report should be "a wake-up call for the world" ahead of the UN's Cop26 climate summit scheduled for Glasgow in November.

"What happens there determines the future of humanity," she said.

"If this report, and the evidence from around the world right now, does not convince this generation of political leaders that we have to stabilise the climate then I don't think anything else will. This is as clear as we can be. Now it's up to our political leaders to act."

Dr Pep Canadell, a coordinating lead author of a chapter of the IPCC report and the director of the Global Carbon Project based at CSIRO, said the report showed humans were "still in the control cabin of the planet and climate system", but may not be unless there was urgent action to cut emissions.

He said the "fingerprint of humans" was already clear in climate extremes and weather events, including floods, heatwaves and fires.

"Every decimal of a degree that we are avoiding is a win for us and a win for the planet," Canadell said. "The important thing to understand is there is no bottom end to how much damage we can create."

Shayne McGregor, an associate professor at Monash University and another report lead author, said a key message was that it was "not too late" to act. He said large-scale, rapid and sustained emissions reductions were needed.

"I think there's this idea that once we get to 1.5C it's some kind of cliff edge [but] every action we do moving forward is beneficial," he said. "Every half a degree or 0.1 of a degree of warming we can reduce or minimise, the better off we are."

The Australian emissions reduction minister, Angus Taylor, said the report reinforced the need for "a coordinated, global effort to reduce emissions". Taylor said the government was committed to achieving net zero emissions as soon as possible and preferably by 2050 – slower than the change scientists say is needed in global emissions to avoid temperature degrees well above 2C.

He said the Morrison government was committed to its 2030 commitment of a 26-28% cut in emissions compared with 2005 levels.

The Greens said the IPCC report made it clear the government's current 2030 target was a "death sentence" for Australia. Scientists have previously advised Australia cut emissions by at least 50% by 2030 for the country to place its part in attempting to breach the goals of the Paris agreement.

The Loy Yang power station in Traralgon, Victoria. A UN-backed report has ranked Australia last on climate action

Australia ranks last for climate action among UN member countries

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Labor's climate spokesperson, Chris Bowen, said the report was "yet more evidence of the costs of inaction, and it's past time the government stop spinning and start delivering for Australians". He said a "bare minimum" commitment should be committing to net zero emissions by 2050.

"Australians deserve better than a government that tries to spin its way through as about 70% of global GDP decarbonises, and existing export markets dry up," Bowen said.

Adam Bandt, the leader of the Greens, said the report exposed the "stark reality" that without emergency action the globe would head beyond 1.5C of warming, potentially within a few years. He called on the government to "double or triple" its 2030 targets.

"The rest of the world understands that if we don't do more by 2030, we all go over the climate cliff, so the Liberals' 2030 denial and Labor's 2030 silence are putting Australian lives at risk," he said.

Adam Morton and Graham Readfearn

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