

5 Big Findings from the IPCC's 2021 Climate Report

August 9, 2021 By Kelly Levin, **David Waskow** and **Rhys Gerholdt** Cover Image by: Sudarshan Jha/Shutterstock

Finding

Topic **Climate**

Headlines related to recent extreme weather appear to come out of a science fiction book: Even the richest [countries](#) in the world can't control widespread fires — they're [even burning](#) in the Arctic. Deadly [flooding](#) in Germany and Belgium in July 2021 completely washed away buildings and cars, and more than 1,000 people remain missing. Hundreds died in [flooding](#) in China. The U.S. Pacific Northwest, known for its cool climate, hit over 100 degrees F for several days. And the Arctic lost an area of sea ice equivalent to the size of [Florida between June and mid-July 2021](#).

These changes are happening with average warming of just 1.1 degrees C (1.98 degrees F) over pre-industrial levels. The newest report from the Intergovernmental Panel on Climate Change (IPCC), world's most authoritative body on climate science, finds that this is just a taste of what's to come.

The IPCC Working Group I sixth assessment report shows that the world will probably reach or exceed 1.5 degrees C (2.7 degrees F) of warming within just the next two decades. Whether we limit warming to this level and prevent the most severe climate impacts depends on actions taken this decade.

Only with ambitious emissions cuts can the world keep global temperature rise to 1.5 degrees C, the limit scientists say is necessary for preventing the worst climate impacts. Under a high-emissions scenario, the IPCC finds the world may warm by up to 5.7 degrees C (10.3 degrees F) by 2100 — with catastrophic results.

Of course, every fraction of a degree of warming comes with more dangerous and costly consequences. In just a decade's time, we'll be looking back on today's apocalyptic headlines thinking how stable things were back in 2021.

The report offers policymakers a clear-eyed view of the current state of global climate change and lays out the transformational action governments must take to avoid a calamitous future. Here are five things you need to know:

1) We're on course to reach 1.5 degrees C of warming within the next two decades.

In the scenarios studied by the IPCC, there is a more than 50% chance that the 1.5 degrees C target is reached or crossed between 2021 and 2040 (with a central estimate of the early 2030s). Under a high-emissions scenario, the world reaches the 1.5 degrees C threshold even more quickly (2018-2037).

If the world takes a carbon-intensive pathway (SSP5-8.5), global warming could climb to 3.3-5.7 degrees C (5.9-10.3 degrees F) higher than pre-industrial levels by the end of the century. To put that in perspective, the world has not experienced global warming of more than 2.5 degrees C (4.5 degrees F) for more than 3 million years, a period with a very different climate system.

At the same time, the report shows that even with stringent emissions-reduction measures, we have already baked a lot of warming into the climate system. We are guaranteed to face more dangerous and destructive extreme weather events than we are seeing today, underscoring the need to invest much more in building resilience.

2) Limiting global warming to 1.5 degrees C by the end of the century is still within reach, but requires transformational change.

On the other hand, if the world takes very ambitious action to curb emissions in the 2020s, we can still limit warming to 1.5 degrees C by the end of the century. This scenario includes a

potential overshoot of 1.6 degrees C between 2041 and 2060, after which temperatures then drop below 1.5 degrees C by the end of the century.

Small-scale efforts won't be sufficient; we'll need rapid, [transformational change](#).

The world's remaining carbon budget — the total amount we can emit and still have a likely chance of limiting warming to 1.5 degrees C — is only 400 gigatonnes of carbon dioxide (GtCO₂) as of the beginning of 2020 (a figure which can vary by 220 GtCO₂ or more if you factor in action on non-CO₂ emissions such as methane). Assuming recent global emissions levels of [36.4 GtCO₂ per year](#), this amounts to about 10 years before we exhaust the budget. While global emissions dipped due to COVID-19, they have bounced back quickly.

We must redefine the way in which we use and produce energy, make and consume goods and services, and manage our land. Limiting the dangerous effects of climate change requires the world to reach net-zero CO₂ emissions and make major cuts in non-CO₂ gases like methane. [Carbon removal](#) can help compensate for harder-to-abate emissions, such as through natural approaches like planting trees or technological approaches like direct air capture and storage. However, the IPCC notes that the climate system will not immediately respond to carbon removal. Some impacts, such as sea level rise, will not be reversible for at least several centuries even after emissions fall.

While achieving the 1.5 degrees C target will be difficult and will require managing trade-offs, it also provides a massive opportunity: Transformation can lead to better-quality jobs, health benefits and livelihoods. Governments, corporations and other actors are slowly recognizing these benefits, but we need greater, faster action.

3) Our understanding of climate science — including the link to extreme weather — is stronger than ever.

It is now unequivocal that human-caused emissions, such as from burning fossil fuels and cutting down trees, are responsible for recent warming. Of the 1.1 degrees C of warming we've seen since the pre-industrial era, the IPCC finds that less than 0.1 degrees C is due to natural forcings, such as volcanos or variations in the sun.

In addition, the science of attribution linking extreme events to human-induced warming has become much more sophisticated, thanks to greater observational data, paleoclimate reconstructions, higher-resolution models, enhanced ability to simulate recent warming and new analytical techniques. For example, human influence is likely the main driver of more frequent

and intense precipitation events, such as heavy downpours from Hurricane Harvey. There's also a connection between changing weather conditions and fire risk in the Mediterranean, United States, Australia and southern Europe. For example, one recent [study](#) found that extreme heat (which has become at least twice as likely as a result of human-induced climate change) was a key driver of the recent fires in Australia. A [preliminary study](#) suggests that the recent extreme heat in the Pacific Northwest of the United States and Canada is “virtually impossible” without human-caused climate change.

Scientists also found that human influence is the principal driver of many changes in snow and ice, oceans, atmosphere and land. For example, marine heatwaves have become much more frequent over the past century, and the IPCC notes that human activities contributed to 84-90% of them since at least 2006. Human-induced warming has very likely been the main driver of glacial retreat since the 1990s, the reduction of Arctic sea ice since the 1970s, the decline in spring snow cover in the Northern Hemisphere since 1950, and global sea level rise since at least 1970.

4) The changes we are already seeing are unprecedented in recent history and will affect every region of the globe.

Climate change has already impacted every region on Earth. We are not only smashing record after record for warming and other impacts, but the world in which we live today has no recent parallel.

The IPCC report shows that no region will be left untouched by the impacts of climate change, with enormous human and economic costs that far outweigh the costs of action. Southern Africa, the Mediterranean, the Amazon, the western United States and Australia will see increased droughts and fires, which will continue to affect livelihoods, agriculture, water systems and ecosystems. Changes in snow, ice and river flooding are projected to impact infrastructure, transport, energy production and tourism in North America, the Arctic, Europe, the Andes and more. Storms will likely become more intense over most of North America, Europe and the Mediterranean.

5) Every fraction of a degree of warming leads to more dangerous and costly impacts.

The report profiles the consequences of the world warming by 1.5 degrees C (2.7 degrees F) and how much worse the effects will be if temperatures rise by 2 degrees C (3.6 degrees F) or 4

degrees C (7.2 degrees F). Every fraction of a degree of warming really matters — whether related to the intensity and frequency of extreme precipitation, the severity of droughts and heat waves, or the loss of ice and snow. Many consequences of climate change will become irreversible over time, most notably melting ice sheets, rising seas, species loss and more acidic oceans. And the impacts will continue to mount and compound as emissions increase.

The report finds that the chance of exceeding tipping points, such as sea level rise due to collapsing ice sheets or ocean circulation changes, cannot be excluded from future planning. Their likelihood increases with greater warming. At 3 degrees C (5.4 degrees F) and 5 degrees C (9 degrees F), respectively, projections suggest an eventual near-complete loss of the Greenland Ice Sheet (which holds enough ice to raise sea levels by [7.2 meters](#) or 23.6 feet) and complete loss of the West Antarctica Ice Sheet (which holds [ice](#) equivalent to [3.3 meters](#) or 10.8 feet of sea level rise). Melting of this level will redefine coastlines everywhere.

The report also finds that our precious carbon sinks — land and oceans — are at great risk. They currently perform a remarkable service — absorbing more than half of the carbon dioxide the world emits — but become less effective at absorbing CO₂ as emissions increase. Under some scenarios studied by the IPCC, the land sink eventually turns into a source, emitting CO₂ instead of sucking it in. This can lead to runaway warming. We are already seeing this in the southeast Amazon rainforest, which is [no longer a carbon sink](#) due to a combination of local warming and deforestation. This not only affects the world's climate efforts, but poses significant food and water security risks to countries in the region, and may lead to irreversible biodiversity loss.

Heeding the Warnings from the IPCC Report

Since the [last IPCC assessment report](#) in 2014, not only has the science gotten more sophisticated, but we have continued to emit at alarming rates. This year's report is even bleaker than previous assessments and the message is clear: This is our make-or-break decade for limiting temperature rise to 1.5 degrees C. If we collectively fail to curb emissions in the 2020s and reach [net-zero CO₂ emissions](#) by around 2050, limiting warming to 1.5 degrees C slips out of reach. The impacts we'll face will make today's extreme weather seem mild.

It's now time for governments, businesses and investors to step up their action to be commensurate with the scale of the crisis we face. During these last few months ahead of the COP26 climate negotiations in Glasgow, it is crucial for countries to put forward stronger 2030 emissions-reduction targets and commit to reach net-zero emissions by mid-century, if not

sooner. These commitments need to be made with the IPCC report's findings in mind so that we give ourselves a fighting chance for a safer future.

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EDITOR'S NOTE, 8/9/21: An earlier version of this article compared the IPCC AR6's estimated timing of reaching 1.5 degrees C with the IPCC's Special Report on Global Warming of 1.5 Degrees C. While the technical summary and underlying chapters still make this comparison, the Summary for Policymakers noted that the IPCC Special Report's best estimate of exceeding 1.5 degrees C is a similar timeline to that of the AR6 report (2035).

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