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## *Have We Crossed a Dangerous Warming Threshold? Here's What to Know.*

Recent temperature rises have come uncomfortably close to a key benchmark: 1.5 degrees Celsius. It's a bad sign for the world's climate goals, but it's not game over. Not yet.



Heavy rain and severe flooding followed an atmospheric river in Santa Barbara, Calif. last week. Philip Cheung for The New York Times



By **Raymond Zhong**

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Our planet's hottest January on record also helped global warming pass a different, unwelcome milestone, according to data released on Thursday by the European Union climate monitor: Over the past 12 months, the average temperature worldwide was more than 1.5 degrees Celsius, or 2.7 degrees Fahrenheit, higher than it was at the dawn of the industrial age.

That number carries special significance in the international effort to stop dangerous climate change. Under the 2015 Paris Agreement, nations agreed to try to limit global warming to 1.5 degrees Celsius compared with preindustrial times, or at least to keep it comfortably below 2 degrees Celsius.

The latest temperature data doesn't mean we've already passed that lower limit. Still, it is a potent symbolic reminder that, barring huge changes to the climate or the world economy, we are headed that way in the coming years.

Here's what to know.

## **What are the 1.5 and 2 degree targets?**

It might be helpful to start with what they aren't, which is thresholds encoded somewhere in the laws of nature. Instead, they represent warming levels that would bring consequences that are unacceptably difficult for societies to manage, as decided and agreed upon by the nearly 200 nations that signed the Paris accord.

Deadlier hot spells. Higher sea levels. Greater loss of biodiversity. Longer droughts and fiercer storms. Scientists agree that these and other effects of a hotter Earth would increase significantly if warming continued very much beyond recent levels. The temperature targets therefore represent guardrails for humanity to avoid for the sake of our communities, ecosystems and landscapes.

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### **Latest News on Climate Change and the Environment**

**A significant threshold.** Over the past 12 months, the average temperature worldwide was more than 1.5 degrees Celsius, or 2.7 degrees Fahrenheit, higher than it was at the dawn of the industrial age. That number carries special significance, as nations agreed under the 2015 Paris Agreement to try to keep the difference between average temperatures today and in preindustrial times to 1.5 degrees Celsius, or at least below 2 degrees Celsius.

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In fact, though, many of these physical consequences of warming are already intensifying as we continue adding heat-trapping gases to the atmosphere by burning fossil fuels. That's why scientists and diplomats often stress that, even if we someday heat the planet past 1.5 degrees of warming, it will still be worth trying to restrain temperatures from rising beyond 1.6, or 1.7, or 1.8.

## **What would it mean to pass those thresholds?**

The key thing about the Paris goals is that they're long-term aims. So, technically speaking, we'll be sure we've passed them only after a certain number of years have gone by — even, perhaps, only after a decade. Researchers say we shouldn't declare failure anytime the mercury bobs above 1.5 degrees for a day, a month or even 12 months.

A multitude of factors — the intermittent climate phenomena El Niño and La Niña, volcanic eruptions, plagues and pandemics, not to mention sheer random chance — influence the planet's precise temperatures year to year. Those factors aren't what the Paris goals are about.

Different climate monitoring agencies also produce slightly different estimates of how hot the planet is at any point, depending on how they combine and analyze the mountains of meteorological data collected by satellites, sensors and weather balloons. That means the time when we could pass those points might vary somewhat depending on who's measuring.

According to the European Union's Copernicus Climate Change Service, for instance, 2023 was 1.48 degrees Celsius warmer than the preindustrial base-line. But according to Berkeley Earth, a research group in California, it was 1.54 degrees Celsius warmer.

## **How close are we to passing them?**

When averaged over the past several years, humans have caused warming of about 1.2 or 1.3 degrees Celsius since the Industrial Revolution, most estimates suggest. And, based on the current pace of carbon emissions, it will only be a few more years before we have altered the atmosphere's chemistry so much that even drastic cuts to emissions wouldn't be enough to stop warming from eventually creeping above 1.5 degrees.

The first official report card on nations' progress toward achieving the Paris goals, issued last year, was not upbeat. Governments' current climate pledges would put the world on track for 2.5 degrees Celsius or so of warming by 2100, the report card said. And that is assuming nations follow through on their stated plans for cutting emissions, a task that is proving difficult more than eight years after the Paris Agreement was signed.

**Raymond Zhong** reports on climate and environmental issues for The Times. More about Raymond Zhong

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