

# The World May Have Less Time to Address Climate Change Than Scientists Thought

A new global temperature baseline casts doubt on humanity's ability to meet the Paris target

By Scott Waldman, E&E News on July 25, 2017

Credit: MamiGibbs Getty Images

The temperature baseline used in the Paris climate agreement may have discounted an entire century's worth of human-caused global warming, a new study has found.

Countries in the Paris climate agreement set a target of keeping warming below 2 degrees Celsius by curbing carbon emissions compared to their preindustrial levels. But a new study shows that the preindustrial level used in the agreement, based on temperature records from the late 19th century, doesn't account for a potential century of rising temperatures caused by carbon dioxide emissions. Accounting for those gases, released from about 1750 to 1875, would add another one-fifth of a degree to the baseline temperature, the study found.

Published yesterday in *Nature Climate Change*, the research suggests there's less time than previously believed to address global warming, said Michael Mann, a climatologist at Pennsylvania State University.

The study estimates that there may have already been 0.2 degree Celsius of warming, or 0.36 degree Fahrenheit, built into Earth, he said. That means the Paris Agreement would have to be more aggressive, according to the study, which was also written by researchers from the universities of Edinburgh and Reading in the United Kingdom.

"When you take that into account, it turns out we have 40 percent less carbon to burn than we thought we had," Mann said. When it comes to climate change science, researchers typically use atmospheric carbon dioxide levels from the late 19th century as a guideline, because that's when instrumentation was developed to accurately measure temperatures.

Researchers use models that combined observed temperatures with simulated sea surface temperatures and surface air temperatures to determine temperatures from 1401 to 1800.

The new baseline casts doubt on humanity's ability to meet the Paris target of holding temperatures below 1.5 to 2 degrees Celsius above preindustrial levels.

"The probability of exceeding the thresholds and timing of exceedance is highly dependent on the pre-industrial baseline," the authors wrote.

Mann cautioned that there is still time to stave off the worst effects of warming, and that the Paris Agreement is the best path to get there. Still, he said, the study suggests the world's carbon budget — the amount of carbon dioxide the world can burn while keeping global temperatures below 2 degrees — may be smaller than nations realize.

The advent of the internal-combustion engine sparked a major release of carbon dioxide into the atmosphere that has warmed the Earth. The Paris climate accord is the broadest attempt in human history to limit those emissions. Re-establishing a new baseline would put more pressure on countries around the world. The study came after Trump announced he was withdrawing the United States from the Paris Agreement in order to get a "better deal."

Before the age of industrialization, the amount of atmospheric carbon dioxide was about 280 parts per million (ppm), scientists have determined. They measured air bubbles frozen in Arctic ice to ascertain that number. The early decades of industrialization, fueled by economic growth in Europe, may have added 30 to 40 ppm of carbon dioxide to the atmosphere, according to Mann.

Now, atmospheric CO<sub>2</sub> is rising at a record pace and is already at 410 ppm. It's expected to climb for decades. A growing body of research suggests that the continuing rise in atmospheric CO<sub>2</sub> could eventually make some places on the planet uninhabitable, cause sea levels to swamp coastal cities and lead to millions of refugees.

"The Paris commitments were seen as at least getting us on to the right path and putting in place a framework where we could tighten the framework in the years ahead," Mann said. "Our studies suggest it's even more urgent than we might have thought, because Paris, at least by this measure, doesn't even get us halfway there. It gets us a third of the way there."

The global pact is supposed to review the best available science every few years to inform progress toward limiting global temperature rise. The study released yesterday is exactly the type of research that could inform future negotiations, said Andrew Light, a distinguished fellow at the World Resources Institute and a former senior climate change adviser in the

Obama administration.

“There has always been a strong tie between the scientific community and the negotiations process,” he said. “The forum where most of this stuff gets hashed out is the IPCC [the Intergovernmental Panel on Climate Change] ... [and] there will be more of an ongoing opportunity for parties to think about whether or not they need to revise their targets in response to this.”

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