

# Getting serious about limiting global warming, the world could save itself more than \$20 trillion

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Fighting global warming is starting to sound like a lucrative investment. A new study from Stanford University finds that keeping global

warming a half-degree beneath the Paris climate agreement's 2-degree Celsius target could potentially save more than \$20 trillion globally.

The findings, described in the journal *Nature*, go beyond the environmental and health benefits to highlight the economic rewards for reducing global [warming](#).

Since the Industrial Age, Earth's [temperature](#) has risen at an alarming rate, thanks largely to the greenhouse gases produced by human activity. Scientists already have documented how global warming and other aspects of climate change are allowing for the spread of disease, impacting sleep, affecting agriculture, killing corals and playing a role in [extreme weather events](#).

The 2015 Paris climate agreement set out to place limits on the amount of warming over this century—2 degrees Celsius over preindustrial levels by the year 2100. It also set a more ambitious target of reducing that increase to 1.5 degrees Celsius in that same time period. Countries were free to implement their own programs to reach that target, but previous research has shown that those collective commitments would be able to limit the rise only to 3 degrees Celsius by century's end. (President Donald Trump announced his decision to pull out of the accord last year.)

These efforts will require a lot of money, lead author Marshall Burke of Stanford University said in a briefing. And while such efforts would theoretically reap environmental rewards, he and his colleagues wanted to pin down what the global return on investment could really be.

To find out, researchers used historical data to calculate how much a change in temperature affected [gross domestic product](#), or GDP, the total value of goods and services a country produces in a year. They then used that information to estimate how a continuing rise in temperature

would affect those countries in the future.

The scientists found that if temperatures stayed within the more ambitious 1.5 degree Celsius target rather than the 2 degree mark, there's a good chance that these reductions would save the world roughly 3 percent of global GDP, or around \$30 trillion dollars, Burke said. If the global temperatures are kept only within the 3 degree Celsius target, scientists say, it likely would cost an extra 5 percent to 10 percent of global GDP.

"That's tens of trillions of dollars," Burke said. "So these are very large numbers."

The scientists also found a high likelihood that 71 percent of countries, representing 90 percent of the global population, would face less economic harm if the [temperature increase](#) were kept to 1.5 degrees. Poorer countries benefited the most, they added.

"The low-latitude countries, which are already warm and already poor, in many cases, are highly likely to benefit from lower levels of warming because of the fact that they're highly likely to incur damages for higher levels of warming," said study co-author Noah Diffenbaugh of Stanford University.

Keep in mind, previous work estimates the cost of implementing these initiatives to be somewhere around half a trillion dollars over 30 years, Burke said—a tiny fraction of the amount of money that those efforts would save.

"Based on the published estimates, our evidence would suggest that the benefits of meeting the more stringent targets vastly outweigh the costs," Burke said.

In general, those countries that were already warm were more likely to benefit from a reduction in temperature; cold countries, such as Iceland, on the other hand, benefited from a little warming.

Scientists who were not involved in the paper praised the work while pointing out a number of its limitations.

For example, it's difficult to accurately predict how future technological growth could shave off some of that temperature increase, said Maximilian Auffhammer of the University of California, Berkeley and the National Bureau of Economic Research.

"Future adaptation will probably involve innovative technologies with lower costs than those that are currently used," he wrote in a commentary. "Such technologies might include, for example, air conditioners powered by carbon-free electricity that are more energy efficient than present-day devices. Adaptation could therefore result in lower economic damages than are predicted."

Wolfram Schlenker of Columbia University pointed out that GDP is a good measure if you assume that the prices of goods and services "fully reflect the costs of their production and use—and, as in the case of fossil fuel prices, that isn't always the case, he wrote in a commentary.

On the other hand, by limiting their analysis to economics, the researchers might actually be lowballing the amount of benefit from reducing [global warming](#).

"These estimates would be even bigger if the non-market benefits of reduced fossil-fuel use—for example, for human health and ecosystems—were considered," Schlenker wrote.

**More information:** Marshall Burke et al. Large potential reduction in

economic damages under UN mitigation targets, *Nature* (2018). DOI: [10.1038/s41586-018-0071-9](https://doi.org/10.1038/s41586-018-0071-9)

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