

# Hitting toughest climate target will save world \$30tn in damages, analysis shows

Almost all nations would benefit economically from keeping global warming to 1.5C, a new study indicates

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Wed 23 May 2018 18.00 BST

Last modified on Wed 23 May 2018 21.13 BST



Dunlaw Wind Farm at Soutra Hill North in the Scottish Borders. The US president has claimed that climate action is too costly. Photograph: Murdo Macleod for the Guardian

Achieving the toughest climate change target set in the global Paris agreement will save the world about \$30tn in damages, far more than the costs of cutting carbon emissions, according to a new economic analysis.

Most nations, representing 90% of global population, would benefit economically from keeping global warming to 1.5C above pre-industrial levels, the research indicates. This includes almost all the world's poorest countries, as well as the three biggest economies – the US, China and Japan – contradicting the claim of US president, Donald Trump, that climate action is too costly.

Australia and South Africa would also benefit, with the biggest winners being Middle East nations, which are threatened with **extreme heatwaves beyond the limit of human survival**.

However, some cold countries – particularly Russia, Canada and Scandinavian nations – are likely to have their growth restricted if the 1.5C target is met, the study suggests. This is because a small amount of additional warming to 2C would be beneficial to their economies. The UK and Ireland could also see some restriction, though the estimates span a wide range of outcomes.

The research, **published the journal Nature**, is among the first to assess the economic impact of meeting the Paris climate goals. Data from the last 50 years shows clearly that when temperatures rise, GDP and other economic measures fall in most nations, due to impacts on factors including labour productivity, agricultural output and health.

The scientists used this relationship and 40 global climate models to estimate the future economic impact of meeting the 1.5C target - a tough goal given the world has already experienced 1C of man-made warming. They also assessed the long-standing 2C target and the impact of 3C of warming, which is the level expected unless current plans for action are increased.

“By the end of the century, we find the world will be about 3% wealthier if we actually achieve the 1.5C target relative to 2C target,” said Marshall Burke, assistant professor at Stanford University in the US, who led the new work. “In dollar terms, this represents about \$30tn in cumulative benefits.”

The estimated **cost of meeting the 1.5C target** is about \$0.5tn over the next 30 years,” he said: “So our evidence suggest the benefits of meeting the targets vastly outweigh the costs.”

“We also calculated what’s going to be the additional economic cost if we hit 3C instead of 2C. This will cost the globe an additional 5-10% of GDP, relative to 2C; that is tens of trillions of dollars. These are very large numbers,” he said.

The researchers acknowledge there are significant uncertainties in their economic modelling, but said

they are confident that keeping climate change to 1.5C is very likely to benefit the vast majority of the world's people.

The exact size of the benefit will depend, for example, on whether new technologies are created that help societies adapt to global warming, such as clean, cheap air conditioning, or whether climate tipping points are passed, bringing more severe damage such as rapid sea level rise. "The caveats apply to both the impacts and the adaptation," said Prof Noah Diffenbaugh, also at Stanford University.

The economic analysis did not include the impacts of climate change on areas that are harder to quantify, such as the natural ecosystems that are vital for clean air and water and fertile soils, or the health benefits of burning less fossil fuel. Including these would make the benefits of action even greater.

Prof Maximilian Auffhammer, at the University of California Berkeley, US, and not part of the research team said: "Translating the impacts of climate change into economic damages is challenging. Pinning down just how large the effects of climate will be on the long-term growth of GDP needs to be a high priority for future work."

"I think the authors of this study are doing the best job possible, by basing their estimates on a rigorous analysis and clearly stating their assumptions," said Prof Wolfram Schlenker, at Columbia University, US.