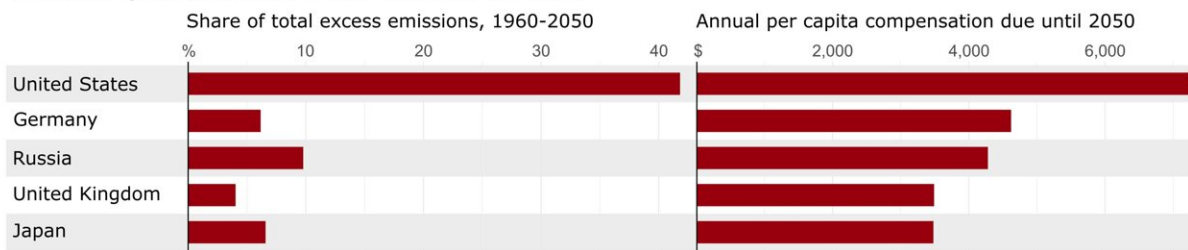


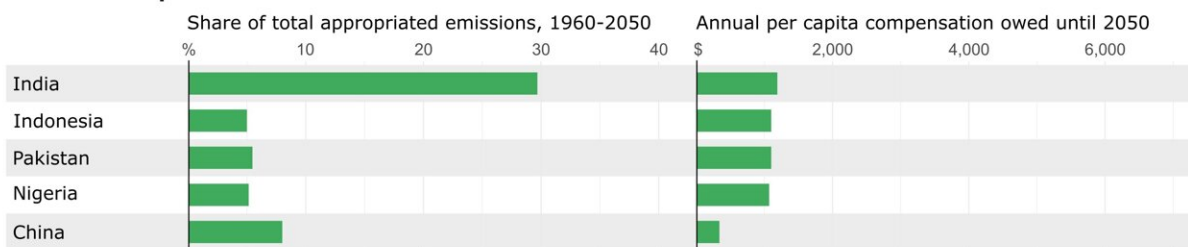
Climate justice: Global North owes \$170 trillion for excessive carbon dioxide emissions, says study

June 5 2023

The top 5 overemitting countries would be liable to pay \$131tn for appropriating excess shares of the atmospheric commons in a 'net zero' scenario



The top 5 low-emitting countries would be entitled to receive \$102tn for sacrificing their fair shares of the atmospheric commons in a 'net zero' scenario



Graphic by Andrew Fanning. Source: Fanning and Hickel, Compensation for atmospheric appropriation, *Nature Sustainability* (2023).

The compensation that could be paid by the top five over emitting countries - and the compensation received by the top five low emitting countries. Credit: Dr Andrew Fanning

Industrialized nations responsible for excessive levels of carbon dioxide emissions could be liable to pay a total of \$170 trillion in compensation

or reparations by 2050 to ensure climate change targets are met, say researchers.

This money, which amounts to nearly \$6 trillion per year or about 7% of annual global gross domestic product (GDP), would be distributed as compensation to low-emitting countries that must decarbonize their economies far more rapidly than would otherwise be required.

Financial redress for the losses and damages that [climate](#)-vulnerable countries face due to the excessive CO₂ emissions of others is seen as an increasingly important part of international climate change negotiations. Delegates at the COP 27 talks in Egypt last year agreed to establish a [Loss and Damage Fund](#) for countries affected by climate change.

Researchers—led by an academic at the University of Leeds—have published in the journal *Nature Sustainability* a major study into how an evidence-based compensation scheme could work across nearly 170 countries.

They have also developed an [interactive website](#) which allows people to explore which countries could be entitled to receive compensation and how much, and which countries could be liable to pay. (Until the embargo lifts, the password to access the website is: compensation2023)

It is the first scheme where countries historically responsible for excessive CO₂ emissions are held liable to fund compensation.

The study was led by Dr. Andrew Fanning, Visiting Research Fellow in the Sustainability Research Institute at the University of Leeds, and Research & Data Analysis Lead at the Doughnut Economics Action Lab in Oxford.

He said, "For the world to avoid the worst impacts of climate change, all

countries must urgently stop burning fossil fuels and other activities that emit greenhouse gases into the atmosphere. But not all countries have contributed equally to this problem."

"It is a matter of climate justice that if we are asking nations to rapidly decarbonize their economies, even though they hold no responsibility for the excess emissions that are destabilizing the climate, then they should be compensated for this unfair burden."

Levels of compensation

According to the study, the UK could be liable to pay \$7.7 trillion for excessive CO₂ emissions over the period to 2050—that is equivalent to an annual payment of nearly \$3,500 per capita each year until 2050.

The US could be liable to pay \$80 trillion over the period or an annual per capita payment of more than \$7,200 until 2050.

India historically has been a low carbon emitter and could be entitled to receive compensation of \$57 trillion, or nearly \$1,200 per capita each year until 2050.

Evidence-based system for assessing losses

The compensation system is based on the idea that the atmosphere is a commons, a natural resource for everyone to use equitably and sustainably.

To set a [monetary value](#) on the losses incurred by [low-carbon](#) emitting countries, the researchers first obtained the most recent remaining global 'carbon budgets' estimated by the Intergovernmental Panel on Climate Change (IPCC).

A carbon budget represents how much carbon could be released into the atmosphere to achieve a given climate target, such as keeping global warming to 1.5° Celsius. Starting from 1960, that carbon budget is equivalent to 1.8 trillion tons of CO₂.

The researchers then calculated an equality-based "fair share" of that total carbon budget for 168 countries, based on population size. They compared each country's fair share allocation against how much CO₂ that country has released historically from 1960, together with an ambitious scenario where it decarbonises from current levels to 'net zero' by 2050.

Some countries were within their fair share allocation, while others, most notably the industrialized nations of the global North, have already significantly overshoot their allocation—in effect, appropriating other countries' fair shares of the atmospheric commons.

For example, the UK has used 2.5 times its fair share—and the US has used more than four times its fair share. India, on the other hand, has used just under one quarter of its fair share.

Pricing the losses faced by low-emitting countries

Using carbon prices from the latest IPCC scenarios, the researchers were able to put a monetary value on each country's excess emissions in a world that respects the 1.5°C climate target.

That total figure was \$192 trillion (within a range of between \$141 trillion and \$298 trillion), with the global North responsible for 89%, or \$170 trillion, and the remainder from high-emitting countries in the global South, especially the oil-producing states, such as Saudi Arabia and United Arab Emirates.

Under the scheme, that money would be divided among the low carbon-emitting countries based on how much of their fair share allocation they would lose.

Dr. Fanning said, "We find 55 countries would sacrifice more than 75% of their fair shares, including most of sub-Saharan Africa and India. Our results show this group of low-emitting countries would be entitled to receive an average compensation of \$1,160 per capita per year, in a world that keeps [global warming](#) below 1.5 degrees."

"Meanwhile, countries that would have less of their fair shares appropriated would likewise be entitled to less compensation. We find 13 countries that would sacrifice less than 25% of their fair shares under our net zero scenario, including China, which would be entitled to receive \$280 per capita per year, on average."

'Atmospheric colonization'

Professor Jason Hickel, from the Institute of Environmental Science and Technology of the Autonomous University of Barcelona (ICTA-UAB) and co-author of the study, said, "Climate change reflects clear patterns of atmospheric colonization."

"Social movements and negotiators from the global South have long argued that countries that have produced excessive emissions owe compensation or reparations for climate-related damages, which fall disproportionately on poorer countries that have contributed little or nothing to the crisis."

"Our study focuses only on compensation that is owed for atmospheric appropriation, and this should be considered additional to broader questions about the costs of transition, adaptation and damages."

"We must also pay attention to large class inequalities within nations. Responsibility for excess emissions is largely held by the wealthy classes who have very high consumption and who wield disproportionate power over production and national policy. They are the ones who must bear the costs of compensation."

More information: Compensation for atmospheric appropriation, *Nature Sustainability* (2023). DOI: [10.1038/s41893-023-01130-8](https://doi.org/10.1038/s41893-023-01130-8) , www.nature.com/articles/s41893-023-01130-8

Provided by University of Leeds

Citation: Climate justice: Global North owes \$170 trillion for excessive carbon dioxide emissions, says study (2023, June 5) retrieved 23 April 2024 from <https://phys.org/news/2023-06-climate-justice-global-north-owes.html>

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