

Asymmetry in carbon dioxide emissions and removals could skew climate targets: research

June 23 2021



Credit: CC0 Public Domain

Changes in climate resulting from carbon dioxide (CO₂) emissions into the Earth's atmosphere are not equal to the climate changes from deliberate CO₂ removals—and assuming such a balance could lead to different climate outcomes that may skew climate targets, according to new Simon Fraser University-led research.

"Because of the complexity of the Earth's system, things are not as simple as "one ton of CO₂ in, equals one ton of CO₂ out," says Kirsten Zickfeld, a distinguished professor of climate science in SFU's

Department of Geography, and lead author of a new paper published this week in the journal *Nature Climate Change*. "CO₂ emissions are more effective at raising atmospheric CO₂ concentration than CO₂ removals are at lowering it."

According to Zickfeld, this "asymmetry" implies that a larger amount of CO₂ removal is required to compensate for a given amount of CO₂ emissions if the atmospheric CO₂ concentration is to remain unchanged.

Researchers used a series of climate model simulations to test whether the change in climate resulting from CO₂ emissions and removals is asymmetric. Their results showed that the rise in the atmospheric CO₂ concentration following an [emission](#) is larger than the decline following a removal of the same magnitude.

Findings of the study infer that balancing a given amount of CO₂ emissions with an equal amount of CO₂ removals could lead to a different climate outcome than avoiding the CO₂ emissions.

"Our study suggests that assuming exact balance between CO₂ emissions and an equal amount of CO₂ removals in a net-zero framework risks blowing climate targets," she says.

While Zickfeld says that balancing emissions with CO₂ removals of the same magnitude could lead to different [climate](#) outcomes, further study is needed to learn more about the extent of this effect.

More information: Kirsten Zickfeld et al, Asymmetry in the climate–carbon cycle response to positive and negative CO₂ emissions, *Nature Climate Change* (2021). [DOI: 10.1038/s41558-021-01061-2](https://doi.org/10.1038/s41558-021-01061-2)

Provided by Simon Fraser University

Citation: Asymmetry in carbon dioxide emissions and removals could skew climate targets: research (2021, June 23) retrieved 21 June 2024 from <https://phys.org/news/2021-06-asymmetry-carbon-dioxide-emissions-skew.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.