

No space for ANY offsets in IPCC's remaining carbon budget

The world cannot offset its way to 1.5 °C.

As the climate crisis continues to worsen across the globe, the Intergovernmental Panel on Climate Change (IPCC) completes its work on the Synthesis Report (SYR) for the Sixth Assessment cycle. What we already know from the underlying research in Working Group I though is that the opportunity to limit warming to 1.5 °C is rapidly disappearing. In the draft SYR¹ that was released to governments at the end of 2022, the IPCC frames the core climate challenge of this decade this way:

“the remaining carbon budget will be rapidly depleted given current emissions and existing and planned fossil fuel infrastructure.”²

In this brief, we assess carbon offsets — “the reduction, avoidance or removal of a unit of greenhouse gas (GHG) emissions by one entity, purchased by another entity to counterbalance a unit of GHG emissions by that other entity”³ — in the context of the rapidly declining carbon budget. [See Box 1]

Carbon offsets and the remaining carbon budget

Carbon offsets, which companies and others buy instead of reducing their own emissions, are barely mentioned in the thousands of pages of the Sixth Assessment Report because they are not a climate solution: offsetting emissions is not the same as preventing and actively reducing emissions.

Depending on temperature goals (e.g., 1.5 °C or 2 °C of warming) and the degree of certainty required for remaining below particular temperature thresholds, IPCC models suggest that the remaining carbon budget runs out within the next ten years, or shortly thereafter.⁴ For a 50% likelihood of remaining below 1.5 °C of warming, without overshoot, the remaining budget indicated by modeling is about 500 Gt CO₂.⁵ Very roughly, yearly global emissions are close to 40 Gt CO₂.⁶ Acknowledging the inherent limitations of such projections, if emissions of almost 40 Gt a year continue, the remaining carbon budget will be gone by 2035. In other words, to keep temperature rise below 1.5 °C, emissions must decline to zero, or as close to zero as possible before exceeding that budget.

Box 1: A Few Terms

What is a Carbon Budget? A carbon budget refers to the maximum amount of CO₂ (and other greenhouse gas) emissions associated with keeping to within a specific temperature limit. The 'remaining carbon budget' is the amount of CO₂ that can still be put into the atmosphere. For the 1.5 °C limit, almost all of that global emissions budget has already been spent.

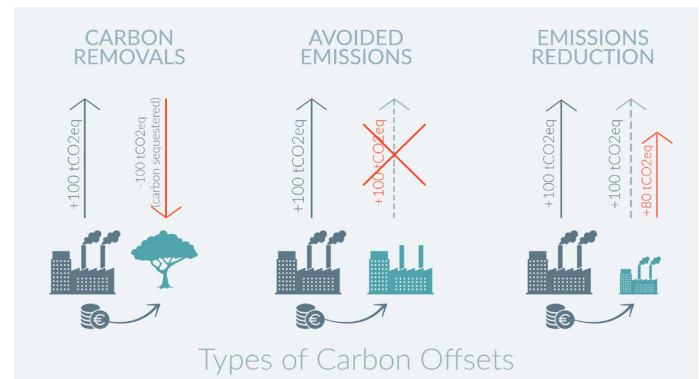
Carbon offsets are defined by the IPCC as “the reduction, avoidance or removal of a unit of greenhouse gas (GHG) emissions by one entity, purchased by another entity to counterbalance a unit of GHG emissions by that other entity.”

The IPCC defines anthropogenic **removals** as “the withdrawal of greenhouse gases (GHGs) from the atmosphere as a result of deliberate human activities.” The most common example is a growing forest, which sequesters carbon in both above-ground biomass and soils. Land-based removals are not permanent and therefore do not compensate for ongoing emissions.

Carbon offsets are designed to have one entity carry on with their emissions, while paying another entity to do something that reduces emissions or removes CO₂ from the atmosphere and is therefore “good” for the climate: protecting forests, supporting the purchase of clean cookstoves, or planting trees, for example.

But ... “the remaining carbon budget will be rapidly depleted given current emissions.” Any ongoing emissions use up the remaining carbon budget. Offsets don't change that. If offsets greenwash ongoing emissions of countries or companies, that's not a climate solution. It doesn't matter if the polluter buys an offset with the best green certification or calls itself “high integrity”,⁷ or if the credit is a junk Verra offset.⁸ If the offset is used to justify ongoing emissions, it makes the global warming problem worse.

Figure 1: Offsetting emissions is not the same as reducing emissions.



Some carbon-offset projects, such as agroforestry projects that plant trees, remove CO₂ from the atmosphere, at least temporarily. A majority of offset projects do not reduce emissions or remove any additional CO₂ from the atmosphere.⁹ These include avoided emissions projects, such as forest protection projects (avoided deforestation).¹⁰ Many carbon-offset projects reduce emissions, but do not remove CO₂ from the atmosphere, such as solar energy projects that replace fossil fuel energy, or clean cookstove projects that reduce the burning of trees and charcoal. *Source: Sophie Scherger, Institute for Agriculture and Trade Policy, Carbon farming: How big corporations are driving the EU's carbon removals agenda, Figures 1 & 2, pp.4-5, 2022.*

Promoters talk about offsets as if emissions over here will be effectively canceled out by some other activity over there. But those emissions still happened regardless. [see Figure 1] Avoiding emissions or reducing emissions in another place does not change that. Offsetting via removals also falls short in a number of ways, as we discuss in the next section.

Carbon offsets and carbon removals

Some carbon offset credits sold come from projects that promise to remove CO₂ from the atmosphere. This is the only type of offset project that, on the face of it, looks as if it can compensate for, that is, offset, ongoing emissions.

But the IPCC is very clear about the limits of CO₂ removal, and this is an essential point linked with the main point of this briefing—there is no remaining carbon budget left for offsetting.

Box 2: In the climate change context, the word offset is used as a noun and a verb.

Carbon offsets are credits bought by entities to be able to claim that the purchase cancels out the damage done by their ongoing emissions.

Sometimes the word “offset” is used as a verb, in its more general sense (in English) of “compensate for.” Using the word “offset” in this more general sense of “compensation” can muddy the water between **offsets** and **removals**.

In the WGIII report, and reiterated in the WGIII SPM and likely in the SYR¹¹, the IPCC says this:

“Within ambitious mitigation strategies at global or national levels, CDR [carbon dioxide removal] cannot serve as a substitute for deep emissions reductions ...”¹²

In other words, CO₂ removal cannot compensate for ongoing emissions, for at least three reasons.¹³

CO₂ removal methods that are currently deployed include afforestation, reforestation, and agroforestry methods. All these methods can sequester carbon in ecosystems, which is reversible when trees and other organisms are harvested or die. The increase in temperatures and rainfall variability make reversibility even more prevalent, from forest fires and drought-induced die off, among other impacts. Fossil emissions are permanent, so these natural removals are not equivalent and cannot compensate for those emissions.¹⁴

Moreover, carbon uptake in natural and managed ecosystems is slow. Trees take time to grow. Even large-scale tree planting right now or next year, would not deliver meaningful sequestration for decades, long past the time when the 1.5 °C threshold is passed.

Finally, the total amount of CO₂ removals currently possible is extremely limited and primarily achieved

through agroforestry, forest restoration, reforestation, and afforestation.¹⁵ The amount of annual fossil emissions significantly dwarfs a tiny removal capacity.¹⁶

Hyped technologies for CO₂ removal, such as bioenergy with carbon capture and storage (BECCS) and direct air carbon capture and storage (DACCS), remain unproven and likely would be unfeasible at scale, given their demand for immense amounts of land (BECCS), water (DACCS and BECCS), and energy (DACCS), and the significant human rights concerns associated with these demands. These technology-based removals are presented as offering more “permanent” removals, yet still present serious risks. BECCS and the related demand for land risks human rights violations related to land grabs, and can have knock-on effects on food security. The technologies are also unproven at scale, and the transportation (pipelines) and storage of carbon can raise risks around leakage, permanence, and liability.¹⁷

Deep, rapid reductions that get emissions close to zero are needed, and needed now, so that natural removals will be able to make a contribution in the second half of the century.¹⁸ At present, and for the foreseeable future (unless one believes in imaginary carbon unicorns),¹⁹ there is only enough sequestration capacity to counterbalance a relatively small amount of residual fossil fuel emissions.

Conclusion

We’re in the midst of a climate crisis that is wreaking havoc on the planet and negatively impacting people and communities from Vanuatu to Lapland and Patagonia to Kinshasa and everywhere in between. And the science is clear: there is no room for offsets in a 1.5 °C world. No amount of wishing or hoping for an imaginary carbon unicorn will make it true. Rapid decarbonization and zero deforestation is the only way to not overshoot the carbon budget. And a world in overshoot is not one we want to see.

Endnotes

1. The SYR is the final document to be released from the sixth assessment cycle of the IPCC. www.ipcc.ch
2. This quote is from the draft SYR Summary for Policy Makers (SPM) that went to governments and organizations for final review. This text will be negotiated during the final approval session and is unlikely to emerge in the same simple and straightforward form.
3. IPCC. 2022. Annex I: Glossary [van Diemen, R., et al. (eds)]. In IPCC. 2022. Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, et al. (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.020
4. The carbon budget hypothesis is based on a model—a simplification of a very complex reality—and all IPCC projections to date have been superseded by reality, largely because models and projections rely on politically informed and selected data points. The world is already past 1 °C of warming, so the concept of a remaining carbon budget is itself contestable, given current and accelerating climate change.
5. From the draft SYR, paragraph B.5.2. “The remaining carbon budgets from the beginning of 2020 for limiting global warming to 1.5 °C are 500 Gt CO₂ for a 50% likelihood and 1150 GtCO₂ for a 67% likelihood of limiting warming below 2 °C.”
6. “Global energy-related CO₂ emissions grew by 0.9% or 321 Mt in 2022, reaching a new high of over 36.8 Gt.” International Energy Agency. 2023. CO₂ emissions in 2022. <https://www.iea.org/reports/co2-emissions-in-2022>
7. Integrity Council for the Voluntary Carbon Market. 2022. The core carbon principles. <https://icvcm.org/the-core-carbon-principles/>
8. SourceMaterial. 2023. The Carbon Con: The world's biggest companies, from Netflix to Ben & Jerry's, are pouring billions into an offsetting industry whose climate claims appear increasingly at odds with reality. <https://www.source-material.org/vercompanies-carbon-offsetting-claims-inflated-methodologies-flawed/>
9. Schwartzkopff, F. 2022. ‘Crazy’ carbon offsets market prompts call for regulation. January 6. Bloomberg Green <https://www.bloomberg.com/news/articles/2022-01-06/-crazy-carbon-offsets-market-prompts-calls-for-regulation#xj4y7vzkg>
10. SourceMaterial. 2023. The Carbon Con. It is also (conveniently?) forgotten that the uptake of CO₂ by natural forests is already accounted for in land sector accounting and claiming it as an offset would contravene the principle of additionality.
11. From the SYR SPM draft for government review “B.5.3 Only deep, rapid and sustained GHG emissions reductions would limit the warming close to 1.5°C or less than 2°C across the century (high confidence).”
12. Babiker, M., et al. 2022. Chapter 12: Cross-sectoral perspectives. In IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, et al. (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.005. Page 1262.
13. Carton, W., et al. 2021. Undoing equivalence: rethinking carbon accounting for just carbon removal. *Frontiers in Climate* 3.
14. Fossil emissions stay in the atmosphere hundreds to thousands of years. Land-based sequestration is on the order of days to hundreds of years. Geological carbon and biological carbon are not and should not be treated as fungible.
15. “Afforestation, reforestation, improved forest management, agroforestry and soil carbon sequestration are currently the only widely practiced CDR methods.” IPCC. 2022. Summary for Policymakers. In: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, et al. (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.001. C.11.1, page 36.
16. Dooley, K. et al. 2022. The Land Gap Report. Available at www.landgap.org.
17. Center for International Environmental Law and Heinrich Böll Foundation. 2023. Lost in Translation. <https://www.ciel.org/reports/lost-in-translation-lessons-from-the-ipcc-sixth-assessment/>
18. “Peters_Glen (Glen Peters). “We need both emission reductions & Carbon Dioxide Removal (CDR)’ is the duality I find increasingly problematic.” Twitter, February 3. https://twitter.com/Peters_Glen/status/1621424184302735360
19. Friends of the Earth International. 2021. Chasing carbon unicorns. <https://www.foei.org/publication/chasing-unicorns-carbon-markets-net-zero/>

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