Beyond ‘doing both’– framing carbon removal carefully

Abstract

There is a common framing in communications about carbon dioxide removal (CDR) which amounts to saying 'we need to do both' CDR and emissions reductions, but without explaining further what this means or how to achieve it. This leaves the impression that such framing is empty and performative, doing little to counteract the risk of mitigation deterrence, i.e. that the pursuit of CDR undermines and delays emission reductions, which the framing is meant to address. This article substantiates and illustrates this claim, and develops recommendations for how to frame CDR more carefully. Such careful framing crucially involves indicating the relatively minor role CDR can play compared to emissions reductions on the path to net zero. Finally, we reflect on the barriers to and importance of these recommendations being taken up.

Introduction

Since the Paris Agreement’s adoption in 2015, the establishment of ‘net zero’ as the dominant framing of climate policy has made carbon dioxide removal (CDR) a necessary part of future climate responses, given the impossibility of eliminating absolutely all greenhouse gas emissions. The contribution that CDR can make to climate policy is crucial. However, the social and environmental consequences of removals are not equivalent to those of reductions (Carton et al. 2021), the amounts of sustainable removals will be limited (Deprez et al. 2024, Dooley et al. 2022), and future amounts of available CDR are highly uncertain (Fuhrman et al., 2025). Still, it can be tempting for governments and businesses to over-rely on CDR in efforts to achieve net-zero (Stuart-Smith et al. 2025, Day et al. 2024). A we ‘need to do both’ framing around CDR and emissions reductions is common, but often lacks substance. This gives the impression of empty rhetoric that does little to address the risk that pursuing CDR could delay essential emission cuts.

CDR appears to align continued fossil fuel use and high-emission production and consumption with climate policy objectives, undermining emission reduction efforts (Carton et al. 2023; Palm et al. 2024; Hougaard 2024). But CDR may fail to be deployed on a large enough scale, leaving societies locked into high-emissions pathways (Grant et al. 2021, Schleussner et al. 2024). The risk that over-reliance on CDR may cause delay to emissions reduction is expressed through a growing body of research on ‘mitigation deterrence’ (McLaren 2016, Markusson et al. 2018). Paris Agreement 1.5°C pathways that are viable in the context of the coupled biodiversity and climate crises are those that do not over-rely on CDR (Deprez et al. 2024, Dooley et al. 2024). Mitigation deterrence could be causing a very substantial 0.3-1.5°C overshoot of the 1.5°C limit (McLaren 2020, Grant et al. 2021). Carbon removal is therefore crucially important, both as a (relatively minor) part of the climate mitigation solution, but also as a large part of the problem of delay.

The risk of mitigation deterrence can ensue from the pursuit of CDR, that is, just the expectation that there will be CDR available in the future can be enough to deter and delay emissions reductions, even before much investment has occurred. The stronger the assumption about equivalence and substitutability between CDR and emissions reductions, the bigger the risk of over-reliance on CDR (McLaren 2016, Carton et al 2021), and the bigger the impact if CDR fails to materialise (Schleussner et al. 2024). The precise mechanisms for causing deterrence varies by the type of CDR (e.g. different risks of storage failure, or different rebound effects, see

McLaren 2020), but there is also a risk from CDR as an overall category, since a state or business may not care or even specify what kind of CDR they plan to use to offset their emissions. Finally, while CDR has a crucial role under net zero policy, as mentioned above, it is far from the only thing that could deter mitigation; emissions reductions/avoidance offsets, or other technology promises could too (Low and Boettcher 2020).

There is a substantial literature on the framing of CDR. It covers framing in both relatively technical, expert contexts (e.g. Bellamy 2022), or in public understanding (e.g. Cox et al. 2022, Low et al. 2024, Shrum et al. 2020). Many different frames have been identified, including CDR techniques as either natural or engineered (alternatively technical, or novel), and CDR as a climate solution or useful in other ways (e.g. Waller et al 2021). While some studies identify framings of CDR as a substitute for emissions reductions (Bellamy and Raimi 2023, Carton et al 2023), only von Rothkirch et al. (2024) address the specific question of how framings promoting the simultaneous use of removals and emissions reduction might downplay the deterrence risk.

While some awareness about deterrence risks exists among CDR stakeholders, including scientists, policy makers and entrepreneurs (e.g., von Rothkirch et al. 2024), a key concern remains that 'discursively addressing mitigation deterrence risks might help legitimize CDR without leading to coordinated action to reduce [these risks]' (von Rothkirch et al. 2024). In this opinion piece, we discuss how communication on CDR at times mentions these risks, but often only in a relatively limited and fleeting manner. In contrast, precise framings would state the reasons that make CDR inadequate to do the heavy lifting, recognise the established mitigation hierarchy of prioritising reductions over removals (IPCC, 2022) and clarify what prioritising steep reductions specifically entails.

We develop a typology of varieties of the 'do both' framing, arranged along a spectrum from inadequate and vague to precise and present examples of good practice. The typology and examples build on framings collected from recent scientific, governmental, and corporate publications. We argue that the discussion about CDR and deterrence is now mature enough for CDR stakeholders to be more careful in their communication about what legitimate roles CDR can play or not in climate policy.

How are the relative contributions of emission reductions and removals communicated?

1. *'Buying time'*

Today, it is rare to hear statements explicitly calling for CDR to compensate for slow emissions reductions. However, many scenarios in the IPCC deploying large-scale CDR de facto allow for slower transition away from fossil fuels (see e.g., Deprez et al. 2024). Overshoot scenarios often rely on optimistic assumptions about future CDR compensating for inadequate early mitigation (Overshoot Conference, 2025). In the past, other technologies, such as carbon capture and storage and solar radiation management methods, have been suggested as a way to buy time for the implementation of other adaptation and decarbonisation strategies (Bauer 2005, Neuber and Ott 2020).

2. *'Just do both'*

It is still common to introduce – or 'frame' – CDR with a vague imperative to 'do both', i.e. to both develop CDR and make efforts to reduce emissions (WEF, 2023; ICDK, 2024). For example, the CDR market platform company Carbonfuture (2024) writes:

> '*It's essential to turn off the tap that's constantly adding more water, but even that won't work unless we also unplug the drain to let it all flow out. Therefore, large-scale carbon removal needs to be deployed in tandem with other mitigation methods*'.

Such a framing does not clarify the priority of emissions reductions on the road to net zero, and thus allows misinterpretations of CDR doing the heavy lifting.

3. *'Both CDR and rapid, deep emissions reductions'*

Other framings are somewhat clearer about the need for large and rapid emissions cuts, yet foreground the role of CDR. For example, researchers Prütz et al. (2024) write '*To comply with the Paris Agreement and to limit global warming to 1.5 °C, rapid and deep reductions in gross CO_2 emissions need to be complemented by active carbon dioxide removal (CDR) from the atmosphere*'. In turn, bioenergy with carbon capture and storage (BECCS) developer Airfix (2024) writes:

> *'It is essential that we drastically reduce global carbon emissions to meet global climate commitments. The latest climate science tells us that emission reductions alone will not be enough to limit global warming to 1.5°C and to reach net zero. We must also remove billions of tons of excess CO_2 from the atmosphere'*.

4. *'Emissions reductions first'*

Further framings spell out that emissions reduction needs to make the most important contribution. For example, the insurance company Axa (2024) states that emissions should be reduced '*first and foremost*'. Similarly, the Swiss Federal Office for the Environment (2022) states:

> *'[CDR] is not a panacea. The possibilities offered by [CDR] as a pillar of our climate policy are limited. There is therefore no way around avoiding greenhouse gases. This remains the central element of Swiss climate policy'*.

These framings are clearer in the prioritisation of emissions reductions over removals. They lack precision in that they: frame out the politics, trade-offs and conflicts that limit the potential of CDR (Carton et al. 2023), and fall short in describing what 'reductions first' concretely entails. The risk of mitigation deterrence is serious enough to merit more careful framing.

How can framings be further improved?

We propose that stakeholder framings of CDR must be **explicit** (qualitatively or quantitatively) **about the relative magnitude of the contribution of emissions reduction versus CDR**, clearly indicating the limits of CDR and why steep emission cuts are the near-term priority. The table below provides examples of good practice, which capture elements of responsible framing.

Table - Examples of good practice CDR framings

'Nature based solutions (NbS) are not a substitute for the rapid phase out of fossil fuels [...] NbS play a vitally important role in helping to mitigate climate change this century, but their contribution is limited by a finite land area and is relatively small compared to what can be achieved by the rapid phase out of fossil fuel use. Furthermore, unless we drastically reduce GHG emissions, global heating will adversely affect the carbon balance of many ecosystems, turning them from net sinks to net sources of GHGs'. - *A good example of stating the limits of CDR, and their consequences for emissions reductions*	Seddon et al. (2021)
'With 2019 emissions topping 59 billion tonnes, even a worldwide cooperative effort to pour every available resource into various forms of carbon removal wouldn't come close to handling the entire problem. Carbon removal is a required piece of the puzzle, but practically, rapid and significant reductions in emissions will still be our primary tool in the fight against climate change'. - *Another good example of stating the limits of CDR, and their consequences for emissions reductions*	Kelland M (2023)
'Deploying [Direct Air Capture hubs] to remove CO_2 from the atmosphere is pointless until society has almost completely eliminated its polluting activities. ... We must stop talking about deploying CDR as a solution today, when emissions remain high—as if it somehow replaces radical, immediate emission cuts'. - *A good example of clearly stating the hierarchy of emissions reductions over CDR in the near term*	Ho D (2023)
'Bioenergy with carbon capture and storage (BECCS) is not a substitute for immediate and rapid decarbonisation of industry via increased efficiency, novel production methods, and, above all, reduced consumption, and waste. [...] With or without BECCS, the transition to a "net-zero" society requires confronting the hard limits of our resource-constrained world'. - *A good example of specifying what steep emissions reductions entail, and that cannot be replaced by CDR*	Tanzer et al. (2021)

Framings must also – where possible – be **explicit about the amount of emissions reduction required, when they are needed, and from what key sectors** (phasing out fossil fuels, halting deforestation, shifting diets, etc.) (Carton et al. 2023). For example, the Club of Rome's COP28 Statement (2023) made an authoritative contribution to the debate stating that '*The most recent assessments of pathways to limit warming at 1.5°C show that by 2050 all unabated use of coal needs to be completely phased-out, while oil and unabated gas need to be phased down by 60-90%*'. Such a statement leaves little room for interpreting that the bigger problem we face today in climate policy is getting CDR deployed at scale.

Beyond these minimum requirements, we make the following recommendations for how to limit mitigation deterrence risks when writing about CDR:

1) Be explicit about the limited role that CDR can play '*on the margins of substantial emissions reductions*' (Bellamy and Raimi 2023; see also Shindell and Rogelj 2025), and acknowledge the sustainability limits of CDR deployment, taking into account both ecological constraints and social justice concerns (Deprez et al. 2024). Developing a sustainable CDR budget would provide a concise reference point as to the best available knowledge about the ultimate limits of CDR (Deprez et al. 2024, Caldecott and Johnstone 2024). Framings should also acknowledge the uncertainty of CDR upscaling and risks of CDR non-delivery (Grant et al. 2021).

2) Clarity is needed about the maximum amounts of residual emissions that are acceptable, from which sectors, at what times, whilst recognising uncertainties. Leaving the market to decide residuals through the purchase of CDR offsets is inequitable. Residual emissions should come from essential activities, rather than those seen as expensive or politically difficult (Lund et al. 2023). The limited amount of sustainable CDR should only be used to compensate for truly hard-to-abate emissions until we reach net zero (Deprez et al., 2024; Shindell and Rogelj 2025). This is important also because we need to preserve CDR capacity for the negative emissions needed after reaching net zero (Schleussner et al. 2024).

3) Finally, authors should refer to the political economy of mitigation deterrence (Carton et al. 2023). Certain industries and countries have repeatedly obstructed efforts to reduce emissions (Roberts et al, 2025), and we can't afford to equivocate about this. Top of the list are the largest oil and gas companies and the richest petrostates, but the well-known list goes on.

Will better CDR framings work?

Better framing of discussions of CDR by stakeholders is necessary to create a shared understanding of CDR's specific, limited role, but will not by itself solve the problem of mitigation deterrence. Careful framing alone cannot guarantee a 'lagom' (Swedish word, meaning not too much nor too little) proportion of CDR to emissions reductions. The risk of ending up with too little CDR is clear, especially closer to the time of net zero when we will need considerable amounts. The lacklustre history of carbon capture and storage applied to point sources of fossil-derived CO_2 does not bode well. But it is also easy to see how we could end up with too much *unsustainable* CDR that causes negative impacts on biodiversity and food security through reliance on large areas of land (Deprez et al., 2024; Dooley et al. 2024) or projects that do not in practice deliver removals. In order to bootstrap the development of CDR, it is necessary to promote the possibility these techniques offer, and so exaggerations and downplaying of risks are virtually unavoidable. Yet humility is needed about the scope for knowing the precise amount that can be deployed and what is a lagom level of sustainable CDR to argue for.

Under what conditions can mitigation deterrence be avoided, and a sustainable removals budget be implemented? A context is needed that does not favour empty promises or imprecise cautions. Careful CDR framing is crucial, as one among several important actions. Further popular mobilisation in support of ambitious climate policy and ensuing policy action is needed. Unregulated voluntary offset markets are not helping, and instead regulation (to avoid unsustainable or ineffective removals) and public planning (to get the amounts right) will be critical. Separation of carbon removal targets from emissions reductions targets is needed for creating transparency and ensuring the need for emission reductions are not obscured by CDR

(McLaren et al. 2019, Allen et al. 2024). This would expose assumptions about incumbent industries, making net zero climate politics more transparent, and help government planning.

International cooperation is essential to advance these agendas. Framing CDR with clarity about the relative magnitude and priority of emission reduction versus removals is critical for ambitious mitigation strategies. While the risk of mitigation deterrence cannot be eliminated, vague pledges to pursue both emission cuts and CDR risk diluting accountability and undermining action. Clear and disciplined framing of CDR as a complement—not a substitute—for deep emissions reductions is therefore imperative.

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