

## Authors' Responses

### **Reviewer Comments in black, authors' responses in red**

Let me start by saying that I acknowledge this review process must have been particularly hard to the authors due to the three long and in some ways rather conflicting reviews. I really admire the depth the authors have gone to revise the paper, consider the feedbacks, and produce this new version. I am particularly happy the authors decided to follow the advice and consider a wide range of scenarios now, making their analyses much more relevant and useful. This is indeed a completely different paper from the first version, and a far, far better one at that. I recommend acceptance for publication in ESD and only have a very few comments below. I think this is now going to be a great addition to the literature! Also, great title!

We are grateful for Mr. Visioni review of our resubmitted manuscript and very happy to have successfully addressed the referees concerns with our revisions.

Some comments:

L 23: "pan-generational" doesn't sound like a very scientific term

We have changed it to "multi-generational".

L 24-25: this is just a repetition of what you just said in the phrase before. I would use the abstract to discuss the results a bit more in depth (as you do in the conclusions, there are plenty of other facts from your study that can go here!) and not make twice the same point.

We want to thank Mr. Visioni for pointing out the repetition and have updated the last part of the abstract including removing the second to last sentence. The last sentences now read: "Since the evolution of mitigation under SRM, the availability of carbon removal technologies and the effects of climate reversibility will be mostly unknown at its initialisation time, it is impossible to predict how 'temporary' SRM deployment would be. Any deployment of SRM therefore comes with the risk of multi-century legacies of deployment, implying multi-generational commitments of costs, risks and negative side effects of SRM and NNEs combined."

The introduction now does a much better job at framing the problem and presents a much more balanced overview of the issue – thanks for updating the references. Also, they clearly now state what the study does and acknowledge the limitations.

The way in which now you extrapolate to 2500 makes much more sense and is really robust, whatever one might think of extending these scenarios so far away in

the future. Figure 1 does a nice job at explaining what you've done, but can be improved: enlarge the single panels a bit, separate them clearly with borders, and perhaps add arrows (which would entail a reordering) to more clearly indicate the "extension" process for a-b-c and d-e-f and how they then combine in panel g.

We are very happy that the introduction now fulfills the referees expectations and that the revised scenario extensions are appreciated. We have updated the figures as suggested.

Line 171 – replace "earliest" with "no sooner than"

Done

Figure 2, same for Figure 1. It is better to "frame" the different plots in different boxes otherwise it might be hard to follow. But otherwise this figure is so clear and nice!

Done

Line 315 - deployments

Done

Line 331 – reference needs to be in brackets

Done

Line 368-369 - I would say this ethical risk needs to be balanced out with the idea of imposing climate change-related risks, forced migrations and perhaps unbearable conditions to generations who did not contribute to the problem to begin with.

We want to thank Mr. Visoni for raising this issue. We have added: "This ethical risk needs to be considered in conjunction with the additional climate change-related risks from ongoing warming also imposed on future generations who did not contribute to the problem to begin with."

Line 376 – no comma after "both"

Done

Line 380 – also see MacMartin et al. (2022), where a phase-out scenario is explicitly simulated.

MacMartin, D. G., Visoni, D., Kravitz, B., Richter, J., Felgenhauer, T., Lee, W. R., Morrow, D. R., Parson, E. A., and Sugiyama, M.: Scenarios for modeling solar radiation modification, P. Natl. Acad. Sci. USA, 119, e2202230119, <https://doi.org/10.1073/pnas.2202230119>, 2022

Thank you for pointing us to this specific literature reference, we have added it.