Response to Reviewers (GMD-2024-196, revision 1)

We would like to thank the Referees for their helpful comments. We are happy that Referees #1 and #2 were satisfied with our previous responses; and Referee #3 for suggesting acceptance subject to minor revisions. We have now addressed the outstanding comments.

Reviewer #3:

General comments:

Thanks for the good answers to my previous review comments.

The revised manuscript has clearly been improved. However, I was still not able to find similar details and explanations – as provided in the answers to my review comments – reflected in the revised text. All my previous comments were expecting a related edit to the main manuscript. So, I would appreciate if you could simply include the answers you provided me in the revised manuscript accordingly.

- Thank you for the further feedback, and our apologies for not incorporating some of the information provided in the response letter to the manuscript. We have now done so, as indicated in the responses below.

Below, there are specific comments related to the information and clarification that I still perceive missing in the current revised manuscript.

Specific comments:

1. In lines 48-50 you wrote: "SuCCESs also differs from these models in terms of its single-region representation, which was chosen to maintain simplicity and low computational burden". This is incorrect, as the GLUCOSE model also provide one single region representation. I believe the key differences with the GLUCOSE model are in the detailed representation of the land sector and potentially in the materials representation. Please, check the literature and revise the text in the manuscript accordingly.

- Indeed. This statement was a remnant from the first version of the manuscript, which did not reference GLUCOSE. We have now modified the text to state "SuCCESs also differs from most of these models [...]".
- As the Reviewer notes, SuCCESs has a more detailed representation of land-use and materials production compared to GLUCOSE. However, we did not acknowledge GLUCOSE in a subsequent statement regarding recent expansion of model scope to material production. We have now added a citation to GLUCOSE there, as well.

[Authors' note: there was no Specific comment #2]

3. Line 95: could you please include in the manuscript a summary of the explanation you provided me as to why you chose to opt for a more detailed land-use representation as compared to the other systems, and what are the benefits of this for the model application? This information is still missing in the current revised manuscript.

- Yes, we now include a slightly shortened version of the response in the manuscript: "The reason behind the disaggregated representation for land-use is that vegetation growth, agricultural productivity and terrestrial carbon stock dynamics differ considerably around the Earth; while energy technologies and industrial processes function in more similar ways, and energy and other resources are routinely shipped across the globe."

4. Line 96-98: again, could you please include in the manuscript a summary of the explanation you provided me as to why you chose to adopt a ten-year time-step model resolution, and what could be the benefits and drawbacks of this choice particularly in consideration of the fast pace at which the technology transitions are expected to take place in order to mitigate climate change? Also, could you clearly add in the manuscript that you solved the model assuming perfect foresight?

- Indeed, the explanation is now given in the manuscript: "This was chosen in consideration of the trade-off between computational complexity and temporal resolution. Although technological transitions can be fast, modelling the intermediate steps (e.g. annual, every 5 years) was not considered to be critical enough to warrant the higher computational burden."
- Perfect foresight is mentioned in the first sentence of section 2, which introduces the overall model type: "SuCCESs is a global, demand-driven partial equilibrium model that is solved through intertemporal optimization (linear programming) assuming perfect foresight."

5. Section 4: I would still like for the authors to remove section 4 as it is and to either integrate some of the information in section 2, under the model structure, or to simply move this section in the appendix to the paper.

- We have now moved the section into the appendix, as suggested.