

Dear topical editor,

Thank you for your helpful comments, shown in italics below. Find our replies directly below each comment.

*In addition to the comments by the reviewers and the executive editor, please also take into account the following considerations when preparing the submission of responses and an updated version of the manuscript:*

*- There are references to the code in the style "number plus module name" throughout the manuscript. It is not clear what the logic of the numbering is, so I'd suggest to provide an explanation and/or an overview figure or table with all (or at least the most relevant and referenced) modules.*

A description of the modular structure of REMIND will be included in the revised version of the manuscript including an explanation of the style of our module realizations "number plus module name".

*- In the section on steady-state and equilibrium, you should introduce the general-equilibrium concept early on (not in the last paragraph). Also, this section should cross-reference the "perfect-foresight" assumption of REMIND.*

Section 3.1.2 will be revised accordingly.

*- Table 2 does not have a very complicated structure and could be replaced by a sentence or a list.*

We agree that table 2 clearly could be replaced by a sentence or a list but we prefer a table with the advantage that it is much easier to grasp.

*- The "additional tax of 50% of the current carbon price" on net-negative CO2 emissions (page 29, line 777f) seems to be a very arbitrary modelling choice. Please provide a rationale for this value.*

The rationale for the additional tax of 50% of the current carbon price on net-negative emissions is two-fold: firstly, as soon as total emissions turn net-negative, carbon pricing is not providing revenues anymore but requires net government spending. Secondly, geophysical reasons speak for rather limiting overshooting cumulative emissions budget. The 50% is simply the middle ground between treating net-negative emissions the same as emission reductions or not allowing for net-negative emissions at all, i.e. a tax of 100% which would remove all revenues. We added this motivation to the revised version of the manuscript.

*- The term "internally consistent" may be more intuitive than "self-consistent".*

The term "self-consistent" is changed to "internally consistent" in the revised version of the manuscript.

*- The phrase "investments turn out regrettable" (p13, line 337) and "capital is enlarged" (page 18, line 465) should be revised.*

The first sentence is changed to “As prices change earlier, it turns out that some investments went in the wrong direction (e.g. wrong technology) and adjustments are made in the next period.” The second sentence is changed to “Investments increase capital stocks which depreciate according to the depreciation rate...”.

*- The sentence "the marginal of the (variable of) taxed activities is impacted by the tax [...]" (page 19, line 499) is not clear.*

We have changed this sentence to "Nevertheless, the marginal of the variable (but not the parameter) of taxed activities is reflecting the tax rate which leads to the intended adjustment effect in the CONOPT solution."

*- The phrase "these assets are then stranded" (page 23, line 573) should be revised.*

We have changed this sentence to "Capacities are phased out before they reach the end of their technical life-time by the optimization if the value of their outputs is lower than the costs of variable inputs, reflecting a situation of asset stranding. This happens especially in 'delayed' scenarios, which start optimization only at a future point in time."

*- Subsection header 3.4 should be renamed, as this section also includes non-GHG emissions.*

We have changed the header of subsection 3.4 to "Representation of emissions".

*- "roughly a doubling" (page 33, line 850) should be revised.*

We changed the sentence to "... and climate policy in line with 1.5°C results in twice as much deployment compared to ..."

*- Section 5 is quite short and the section title "Discussion" is therefore not adequate.*

The title of section 5 will be changed to “Conclusions” in the revised version of the manuscript.

*- The programming language(s) should be clearly stated in the section "Code and data availability".*

We added the sentence “The REMIND code is implemented in GAMS and code and data management uses R.” to the section “Code and data availability” in the revised version of the manuscript.

*- Please use the year of the latest update of the model description when citing the IAMC wiki (currently, it does not have a year in the reference)*

We corrected the reference.