

Review 1

=====

Comments for the Authors

The subject is interesting, and the paper well written.

My major concern is about the embodied impacts calculation within this study where one can not understand input hypotheses, method, scope, and the share of embodied impact within the results. Also, as the study target the 2080 horizon, a dynamic approach to the carbon content of the grid can't be avoided.

We appreciate your input and the opportunity to improve our writing. Please see our specific responses to your comments below. We have also added one additional plot to the paper that shows the adaptation performance of the strategy sets alongside the mitigation performance.

Please, also consider the following specific comments:

--> The title of this paper is not consistent with the title of the conf.tool page.

Thank you for pointing this error out. We have replaced the title in conf.tool with the paper title.

--> The lack of details about simulation inputs decreases the result's usability. More details about the embodied carbon of building components for instance is required, especially if data sources come from a very large scope around the world.

For brevity this information was left to citations. The inputs come from regional sources first and then where other data was required reach out to foreign sources. Table 1 has been updated to be more explicit about the sources associated with each strategy.

--> The lack of embodied carbon data and its consequences on the study should be discussed within the discussion section.

Embodied carbon of components and technologies was included as an input to the study using cradle-to-gate numbers.

--> Are you performing LCA of your retrofitting scenarios? If so following which norm? What is your scope, the lifetime of the building, etc...

The study only accounted for cradle to gate emissions. Buildings were assigned new embodied emissions after 30 years from construction or most recent retrofit for assumed retrofits such as envelope - in the event that these were not affected by a strategy. This detail was only briefly noted in the original submission and has now been given more attention in the discussion/limitations section.

--> Future carbon content of the grid should lower over time. It means that deep envelope retrofit efficiency will do the same. At the 2080 horizon, the low carbon content of the grid should not be overlooked. At least in a very simple way with a linear regression towards a full decarbonated grid.

BC's grid intensity hasn't moved markedly in the past few years. The standard in the BC Hydro (electrical grid) portfolio is for 93% "clean energy". BC Hydro reports that this is in fact larger (98%). The carbon intensity of the electricity grid is expected to drop closer to 0, due to a 20% decrease in fossil fuel use for generation by 2050.

--> In the end, what happens if the grid is fully carbon-free? It remains embodied carbon only. This should also be discussed.

We agree that this is an important discussion point, particularly as BC's electricity is very near this threshold and is often thought of as ostensibly carbon free. The discussion has been amended to include more on this topic.

--> Within the results, a split between operational and embodied emissions would be very insightful to understand which retrofitting measure is contributing to what.

The most significant reduction in emissions we saw was due to fuel switching. Expanded analysis on the embodied carbon implications of the strategies associated with this practice is outside of the scope of this study, but certainly relevant to the issue at hand where we are seeing the utilization of a more or less clean grid. We have noted one such case in which embodied emissions are likely contributing (mass timber) to a decrease in overall emissions as well as one case where we see an increase (seawater cooling loop).

Review 2

=====

Comments for the Authors

Well written and interesting paper, few questions and recommendations for the revision of the paper:

We appreciate your input and the opportunity to improve our writing. Please see our specific responses to your comments below. We have also added one additional plot to the paper that shows the adaptation performance of the strategy sets alongside the mitigation performance.

Urban Energy Model => morphed climate files were produced: please explain in more detail the morphing process for developing the future climate files and add the limitations of the approach. For the purposes of brevity we relate the details for the morphing procedure back to the original literature for the method that was used. We have updated the methods though to include more details on the underlying climate model data (a 25 member ensemble of global climate model output data from the latest generation of models - those that will support IPCC AR6). However, the discussion has been updated with the limitations of this approach as the limitations of the underlying climate model data are particularly important to note for a coastal and mountainous region such as Southwestern BC.

Total annualized cost: the value for the discount rate seems high, please add source for this assumption. The paper does not mention the assumed growth rate for the energy cost: please add which annual growth rate has been assumed. Indicate in the paper if the rates are real or nominal rates.

Discount rate was initially determined in consultation with the local developers. This detail has been added to the methodology. Energy cost growth rate was left out. This has been added to limitations. TAC uses real rates. This has been indicated in methods.

Figure 5 - marginal abatement cost to meet 80% reduction => why is 'adjust setpoints' not selected / taken into account in this analysis?

This figure shows combinations of strategies that if implemented would bring the community to an 80% reduction of emissions by 2050 under the best-case climate scenario. None of the strategies are necessarily selected, but rather show up because they are a part of strategy sets that meet this threshold. Adjust setpoints was not a part of any of those cases. This deserves closer attention and has been added to the discussion.

A final language check is recommended to correct a few typos noticed in the text.

We appreciate the recommendation and have made an effort to clear up typos and misunderstandings in the text.