Reviewer’s report

Title: Building-related health impacts in European and Chinese cities: a scalable assessment method

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Reviewer: Jan Semenza

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Building-related health impacts in European and Chinese cities:
A scalable assessment method

Major Compulsory Revisions

This paper describes an interesting decision support tool for the evaluation of building stock impacts on health-end-points along with their associated energy use and GHG emissions. The objective of the study is to assess whether the software tool is applicable to URGENCHE cities for dynamic projections: Basel (Switzerland), Kuopio (Finland), Rotterdam (Netherlands), Stuttgart (Germany), Thessaloniki (Greece), Suzhou (China), and Xi’an (China). Of particular importance was the stated objective to develop a model that should be usable for policy comparisons by non-health experts on a city level with city-specific data.

The tool was only applied to the two smallest cities of the URGENCHE consortium with very similar GHG emissions. It would have been desirable to apply the tool to different URGENCHE cities with different demographic, meteorological and emission profiles. According to the authors, applying the model in a new city requires some modelling skills; thus it is not clear whether the stated objective of usability has been met. For the user of this decision support tool it is important to know which input variable would be particularly influential on outcome values. Conducting a sensitivity analysis could shed some light on which input values are critical for model output. It would also increase the degree of confidence one may have in the model output values and the strength of evidence this may provide in support of policy decision. It would be valuable to have a validation of the results resented in this paper.

Specific comments:

Abstract:

“Our objective was...” It sounds like there were a number of objectives (plural). Please see the 5 objectives listed on page 6 in the Methods section.

“Health impacts were not large in the two cities, but also clear differences between policies were seen.” What were those? Please elaborate.
Methods:
A lot of the text repeats data that are presented in the tables. Please avoid duplication.
There seems to be some inconsistency in the numbers presented in the table and in the text (e.g. annual mean temperature in Basel: 9.5°C vs 9°C). Please verify.

Implementation:
“Extensive amount of data was collected from the two cities used as examples when constructing the model.” In the interest of reproducibility, where can this information be found?

Operation:
“In the next chapter, we will show the main results of these two cities and discuss the other Urgenche cities where no quantitative modelling was done.” What chapter do the authors refer to? It sounds like the text came out of a report.

Results
Kuopio
“The BAU renovation policy would keep the heat demand of the building stock in Kuopio nearly constant in around 800 GWh/year between 2010 and 2050, as the increased volume would cancel out the increased energy efficiency (Figure 4.).” Please explain; this sentence seems confusing. Should it read: “The BAU renovation policy would keep the heat demand of the building stock in Kuopio nearly constant in around 800 GWh/year between 2010 and 2050, as the increased energy efficiency would cancel out the increased volume (Figure 4.).”? “The active renovation policy would reduce the heat demand by around 30 % in spite of the prognosed (-> projected) doubling of the building stock.” Does this account for the energy use of the renovations? Figure 4 does not convey a 30% reduction in heat demand between 2010-2049 except for the year 2050, which seems to be an outlier. Please explain the precipitous drop of energy use that year.

Basel
It would be desirable to have comparable projections between the cities. How come the projections run to 2030 for Basel but to 2050 for Kuopio?

In the Basel section disability-adjusted life years are discussed for both Basel and Kuopio. Other cities such as Stuttgart and Thessaloniki are also discussed in this section. It might be worthwhile to create a new subheading for the DALY data.

Discussion
It would be nice to have a discussion of the results of the modelling output and a comparison between the different cities. Of particular interest would be an
analysis of the policy implications. Please describe the pros and cons of different urban policies on energy use, GHG emissions, DALY, etc.

Conclusion

“In conclusion, we were able to develop an online model that fulfils its objectives and is capable of producing useful guidance on practical building-related policy questions on city level.”

How did you test whether the objectives were fulfilled? “Our objective was to develop a generic open impact model to estimate health impacts of emissions due to heat and power consumption of buildings. Especially, the model should be usable for policy comparisons by non-health experts on city level with city-specific data. It should give guidance on the particular climate mitigation questions but at the same time increase understanding on the related health impacts. The model should follow the building stock in time, make comparisons between scenarios, propagate uncertainties, and scale to different levels of detail.” Did you test it with non-health experts on city level with city-specific data? Did it give guidance on the particular climate mitigation questions? Help to understand the related health impacts? Did it make comparisons between scenarios? Propagate uncertainties, and scale to different levels of detail?

By summarizing some of these key findings the paper would become more accessible to the general reader and add to the literature in this field.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests