



Energy demand of the German and Dutch residential building stock under climate change

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In order to mitigate climate change, extraordinary measures are necessary in the future. The building sector, in particular, offers considerable potential for transformation to lower energy demand.

On a national level, however, successful and far-reaching measures will likely be taken only if reliable estimates regarding future energy demand from different scenarios are available.

The energy demand for space heating and cooling is determined by a combination of behavioral, climatic, constructional, and demographic factors. For two countries, namely Germany and the Netherlands, we analyze the combined effect of future climate and building stock changes as well as renovation measures on the future energy demand for room conditioning of residential buildings until 2060.

We show how much the heating energy demand will decrease in the future and answer the question of whether the energy decrease will be exceeded by an increase in cooling energy demand. Based on a sensitivity analysis, we determine those influencing factors with the largest impact on the future energy demand from the building stock.

Both countries have national targets regarding the reduction of the energy demand for the future. We provide relevant information concerning the annual renovation rates that are necessary to reach these targets. Retrofitting buildings is a win-win option as it not only helps to mitigate climate change and to lower the dependency on fossil fuels but also transforms the buildings stock into one that is better equipped for extreme temperatures that may occur more frequently with climate change.

For the Netherlands, the study concentrates not only on the national, but also the provincial level, which should facilitate directed policy measures. Moreover, the analysis is done on a monthly basis in order to ascertain a deeper understanding of the future seasonal energy demand changes.

Our approach constitutes an important first step towards deeper insights into the internal dynamics of the building sector and its climate sensitivity.