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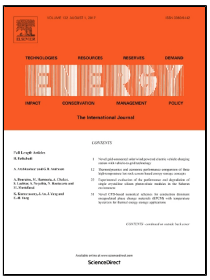

Energy use implications of different design strategies for multi-storey residential buildings under future climates

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Energy use implications of different design strategies for multi-storey residential buildings under future climates

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Abstract

The effects of climate change on the final and primary energy use of versions of a multi-storey residential building have been analysed. The building versions are designed to the Swedish building code (BBR 2015) and passive house criteria (Passive 2012) with different design and overheating control strategies under different climate scenarios. Future climate datasets are based on Representative Concentration Pathway scenarios for 2050-2059 and 2090-2099. The analysis showed that strategies giving the lowest space heating and cooling demands for the Passive 2012 building version remained the same under all climate scenarios. In contrast, strategies giving the lowest space heating and cooling demands for the BBR 2015 version varied, as cooling demand became more significant under future climate scenarios. Cooling demand was more dominant than heating for the Passive 2012 building version under future climate scenarios. Household equipment and technical installations based on best available technology gave the biggest reduction in total primary energy use among considered strategies. Overall, annual total operation primary energy decreased by 37-54% for the building versions when all strategies are implemented under the considered climate scenarios. This study shows that appropriate design strategies could result in significant primary energy savings for low-energy buildings under changing climates.

Keywords: Climate change, Representative concentration pathways, design strategies and overheating control measures, space heating and cooling, primary energy, residential building