

Accepted Manuscript

Title: Changing climate: The effects on energy demand and human comfort

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PII: S0378-7788(14)00228-X
DOI: <http://dx.doi.org/doi:10.1016/j.enbuild.2014.03.009>
Reference: ENB 4901

To appear in: *ENB*

Received date: 28-10-2013
Revised date: 6-3-2014
Accepted date: 7-3-2014

Please cite this article as: K. Kalvelage, U. Passe, S. Rabideau, E.S. Takle, Changing climate: The effects on energy demand and human comfort, *Energy and Buildings* (2014), <http://dx.doi.org/10.1016/j.enbuild.2014.03.009>

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Changing climate: The effects on energy demand and human comfort

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Abstract

Typical climate conditions for the 20th century do not adequately describe the potential extreme conditions that will be encountered over the lifetime of buildings constructed today. We develop future typical meteorological year datasets that describe ambient environmental conditions that we utilize in the design and modifications of buildings to maintain human thermal comfort. Our use of multiple climate model scenarios provides uncertainty of the calculations of future energy demand. Going beyond previous studies, our results show that future energy demand by current buildings in the U.S. will decline for heating, and will increase for cooling. The increased air temperature poses a new challenge of increased humidity that will cause uncomfortable interior conditions for occupants. We identify the building features required for maintaining current thermal comfort understanding in future U. S. climates.

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