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Understanding possibilities: Thermal comfort using climatic design with low energy supplementation

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#### Highlights

Climatic design in temperate climates can eliminate need for air-conditioning

During extreme outdoor conditions thermal comfort temperatures may be exceeded

Occupant behavioural adaptation must go hand-in-hand with climatic design

**Abstract:** This paper uses an example of an architect designed and occupied suburban house in the temperate climate of Perth, Western Australia to demonstrate how climatic design and low-technology active systems can deliver thermal comfort in average climatic conditions. However when thermal conditions are more extreme acceptable temperature ranges may not be met. Thermal monitoring in the house over eight days of extreme temperatures in summer and winter shows that acceptable temperature ranges may not be met in winter. During extreme winter conditions south facing rooms fall below comfort conditions by up to 3K in the late night and early morning. The conclusion drawn is that in naturally ventilated buildings personal and psychological behavioural adaptation must go hand-in-hand with climatic design. This behavioural adaptation may become more important in the future if current climatic extremes become the new normal.

**Keywords:** energy efficiency, housing design, passive cooling, passive heating, adaptive thermal comfort

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