

# Findings from a Post Occupancy Evaluation of adaptive restoration and performance enhancement of a 19th century 'Category B' listed tenement block in Edinburgh

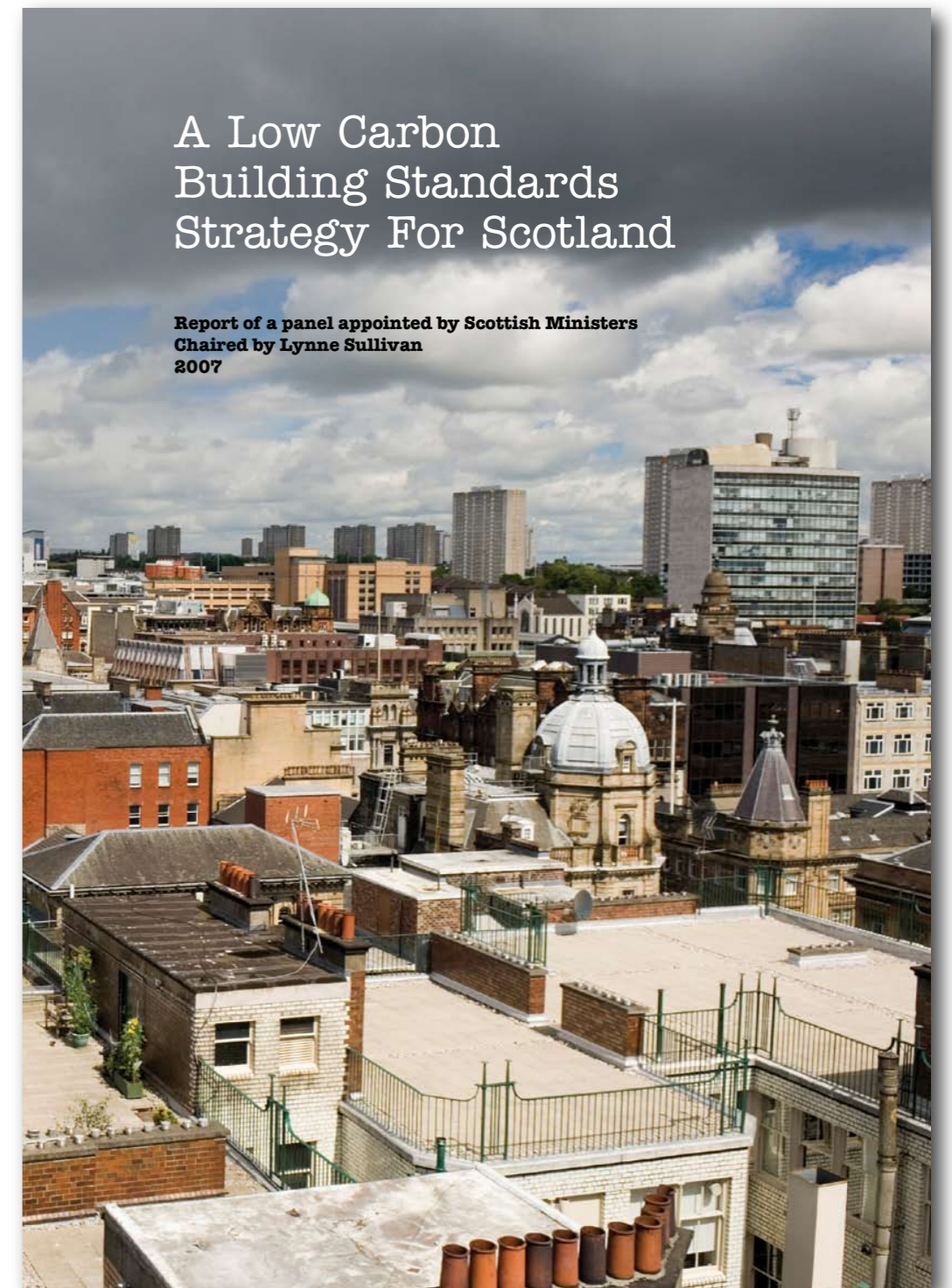
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# setting the scene

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- need for climatic response
- legislative approach to reduction in energy use and CO<sub>2</sub> output
- relevance of existing stock
- relevance of specific typologies



conflicting interests

# THE GREAT DEBATE ON THE FUTURE OF ARCHITECTURE



**CONSERVATION**

**VS**



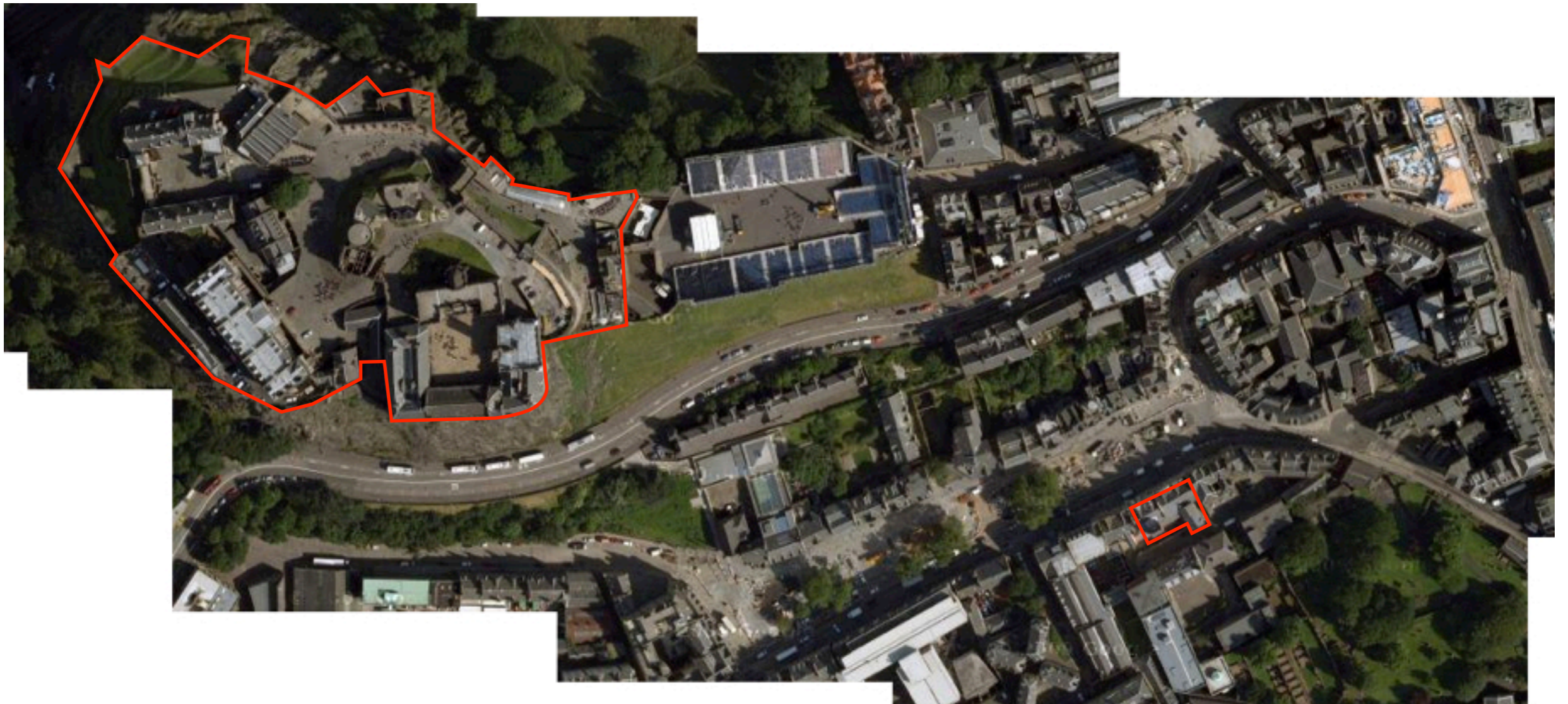
**SUSTAINABILITY**

**WILL THESE TWO MIGHTY LOBBIES EVER BE UNITED? - JOIN THE DEBATE**

# our scenario

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- a 19th century masonry tenement - adaptive rehabilitation
- within a UNESCO world heritage site



# our scenario

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- design of low energy supported housing accommodation
- incorporation of thermally efficient envelope, MVHR, GSHP & sunspaces
- impact of design aspirations?
- what were suspected problems?
- how were these investigated?



# process

- monitoring of physical parameters
- comparative analysis of predicted vs actual energy consumption
- assessment of user satisfaction



Date of issue: 21.9.2011

## ENERGY RATING

Address of dwelling:  
Flat 1, F1A, FIRST Floor  
F1A, FIRST Floor

**The Energy Rating of this dwelling\* is**

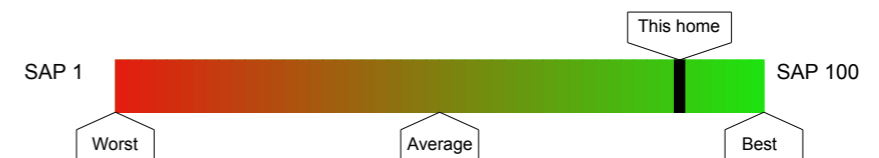
# 87

on a scale of 1 to 100 - the higher the rating the more energy efficient the home.

The assessment is based on energy costs for space heating, water heating and lighting assuming standard occupancy and standard climate conditions.

The energy rating was calculated in accordance with current building regulations by

What is the energy performance of this home in comparison with other homes?



For more information on energy ratings contact your local energy efficiency advice centre on 0800 512 012

\*calculated according to SAP 2005

# findings

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## thermal comfort - prevailing conditions

Room	Comfort Temp (°C)	Mean Temp (°C)	$\Delta T^1$ (°C)	Absolute Max (°C)	$\Delta T^2$ (°C)
Living Rm	21.00	22.62	+1.62	28.00	+7.00
Kitchen	18.00	22.87	+1.87	29.10	+11.10
Hall	18.00	23.45	+5.45	31.20	+13.20
Sun Space		21.24		40.90	
Bedroom 1	18.00	22.58	+4.58	27.20	+9.20
Bedroom 2	18.00	21.41	+3.41	26.20	+8.20

mean and absolute thermal conditions over monitored period  
(comfort standards as BS 5449:1990)

# findings

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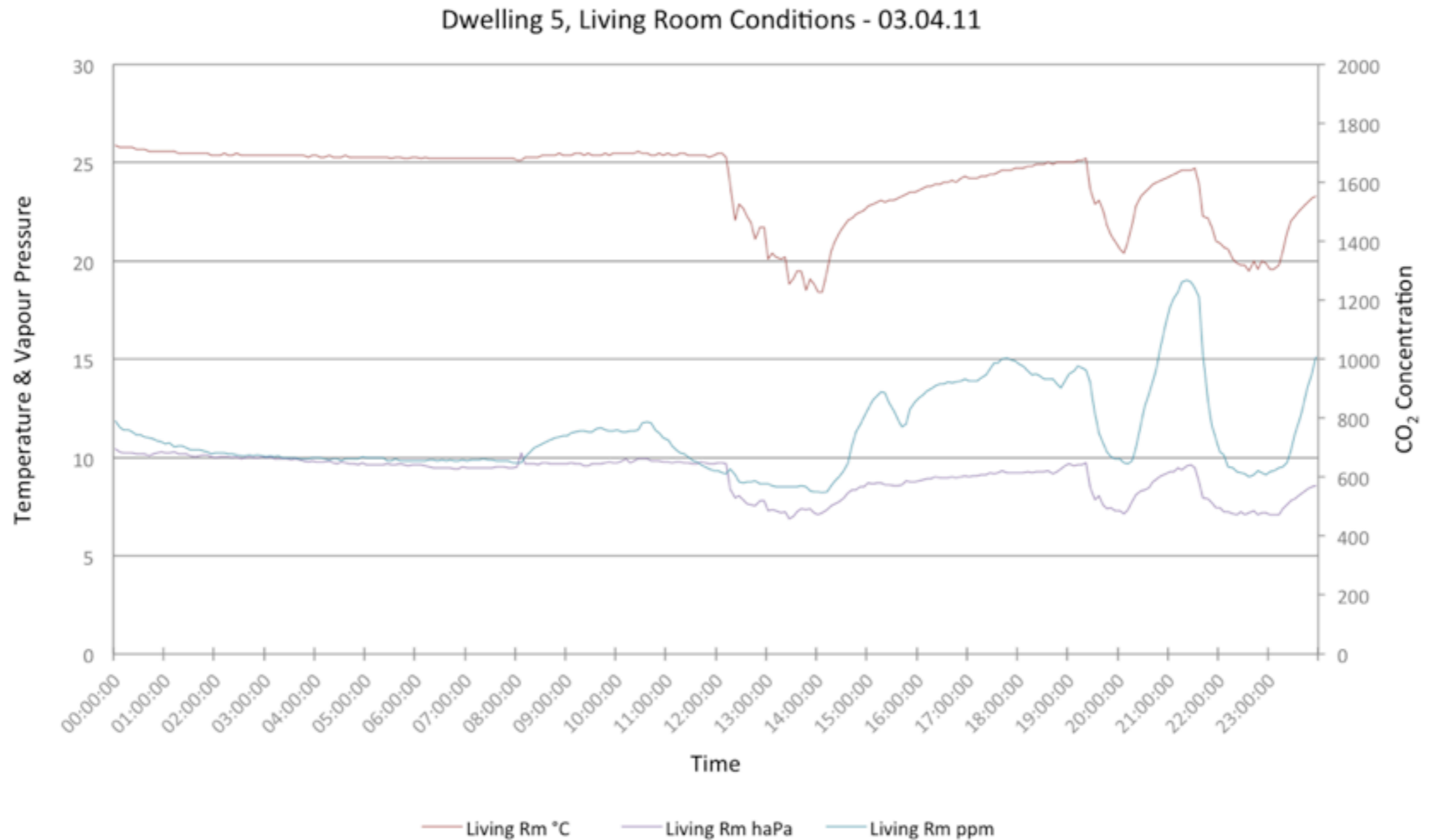
thermal comfort vs user behaviour





# findings

## thermal comfort vs user behaviour



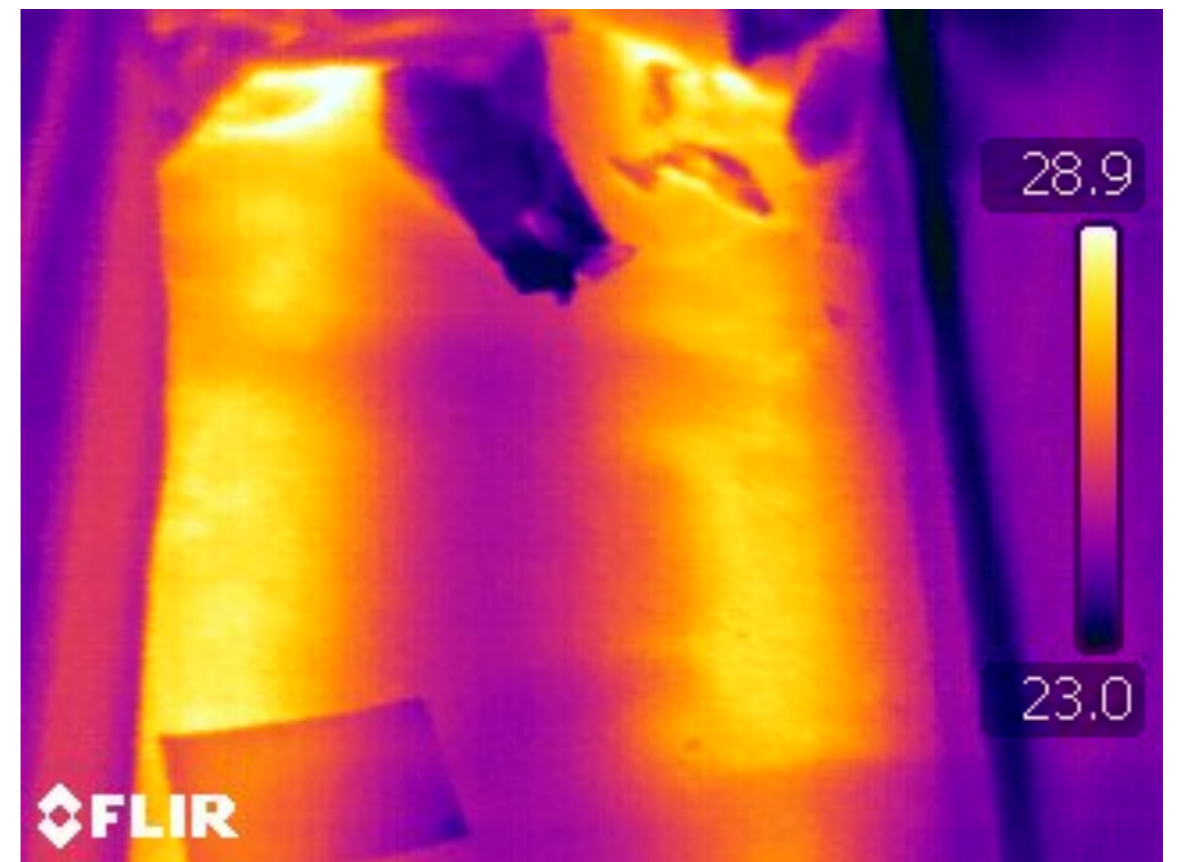
# findings

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thermal comfort problems



floor surface temperature  $T^a$

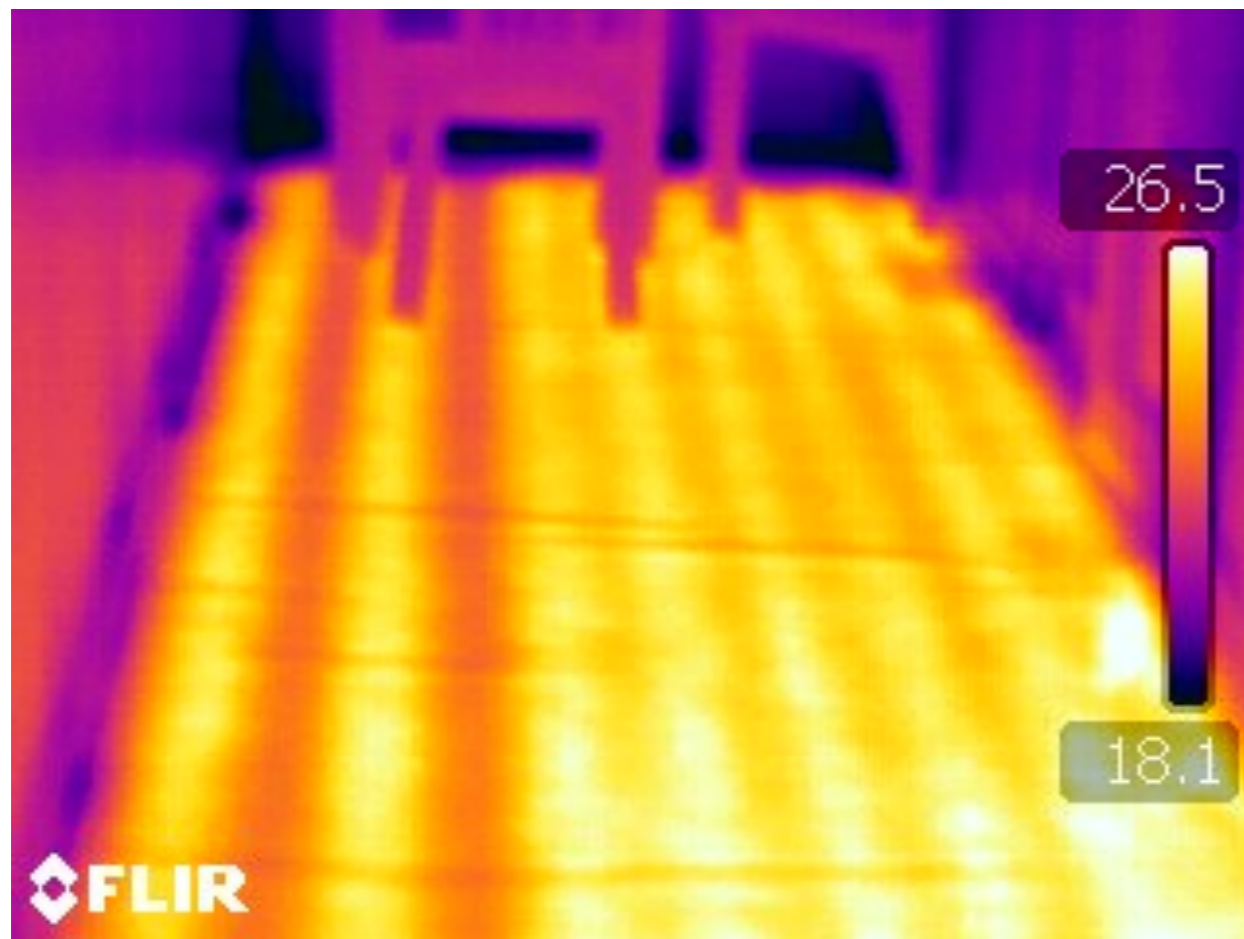


floor surface temperature  $T^a$   
+ 60 mins

# findings

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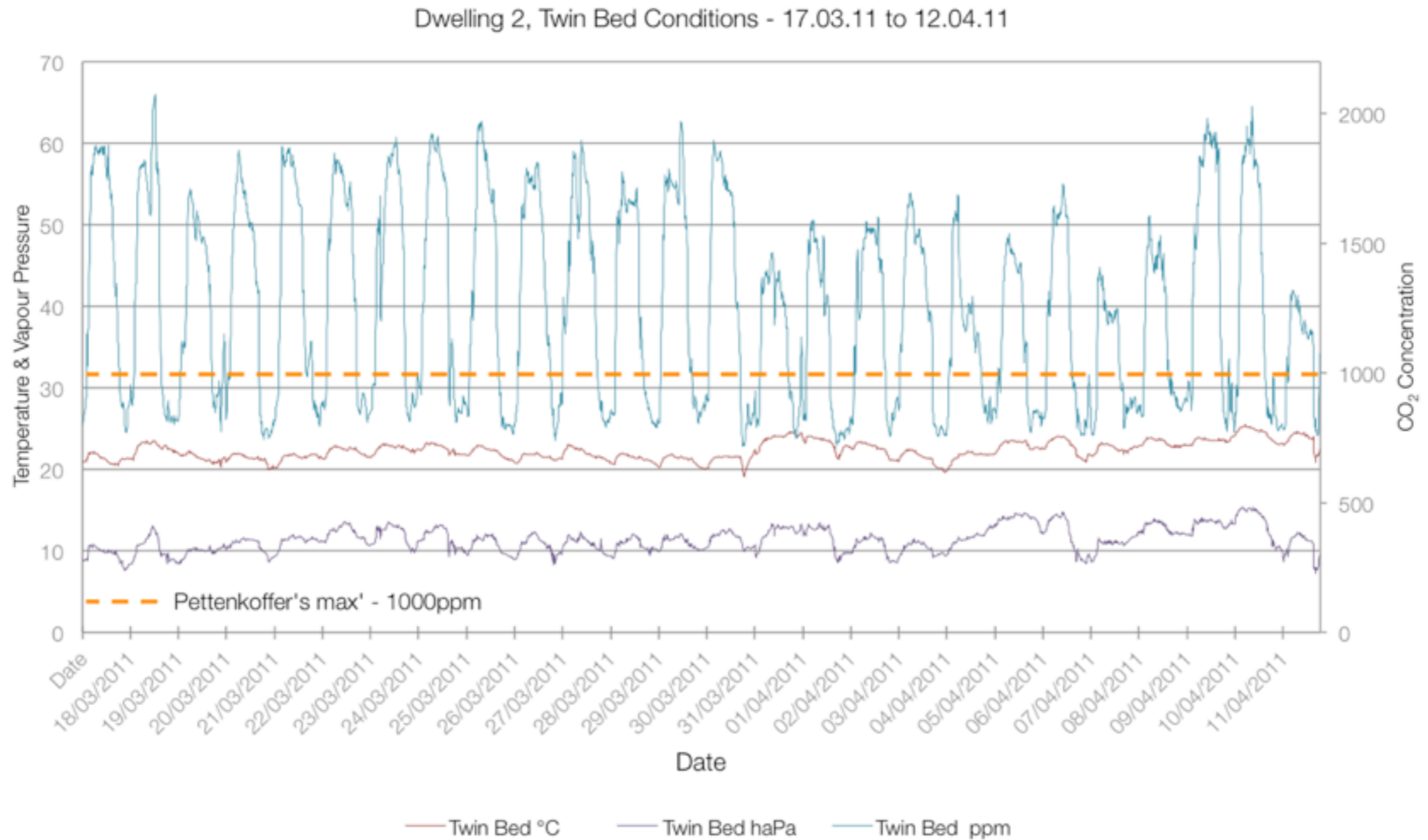
thermal comfort and passive gain



sunspace with under-floor heating system

# findings

## internal air quality



# findings

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## positive reporting

- actual energy consumption (space and water heating) 2.1 times greater than SAP predictions
- space and water heating requirements of 92kWh/m<sup>2</sup> identified
- ground source heat pump found to provided significant CO<sub>2</sub> savings compared to conventional heating systems

# conclusions

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- relevance of investigated typology national housing stock
- confirmation of usefulness of short-term, highly focussed POE studies
- identification of gap in the understanding of the relationship between thermal performance and internal environment quality
- need for designers and specifiers to understand the growing level of complexity in the application of sustainable technologies and approaches to building design

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