Overheating in the Australian and NZ residential context

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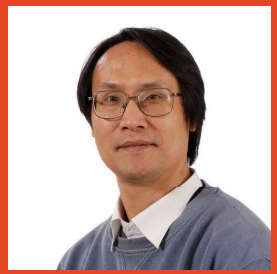
Indoor Environmental Quality

School of Architecture, Design and Planning







IEQ Lab
Richard de Dear
Jungsoo Kim
Thomas Parkinson
Jing Xiong

CSIRO
Dong Chen

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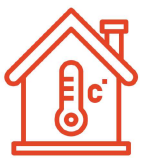
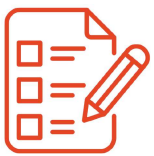
IEQ lab research themes



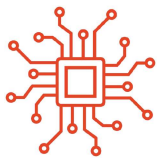
Indoor Environmental Quality

Exploring the thermal, lighting, acoustics, and air quality of indoor environments across a range of building types (offices, homes, schools etc.)



Occupant Perception & Behaviour

Understanding the relationship between occupants and indoor environments, and their effect on health, wellbeing, and performance



Measurement Technologies

Novel solutions to monitor environments using a range of equipment, from low-cost wireless devices to laboratory-grade systems

IEQ lab

SAMBA – sensor unit

BOSSA – post-occupancy survey

endorsed by NABERS and Green Building Council of Australia and NZ

Please rate your satisfaction with indoor environmental conditions

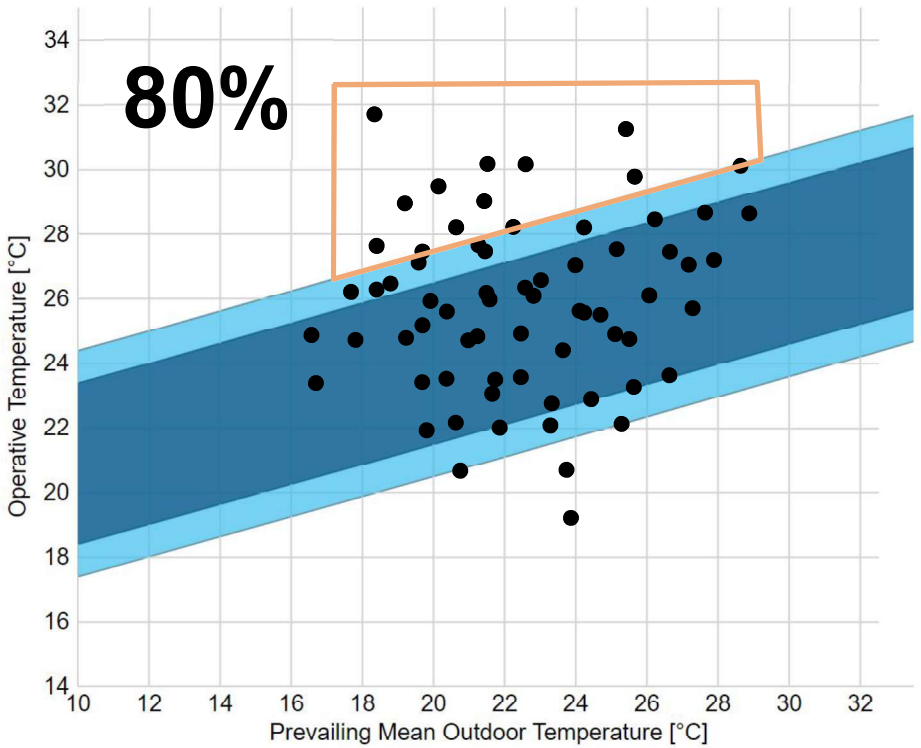
Very dissatisfied	Dissatified	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Satisfied	Very satisfied
○	○	○	○	○	○	○

IEQ lab

Adaptive thermal comfort model

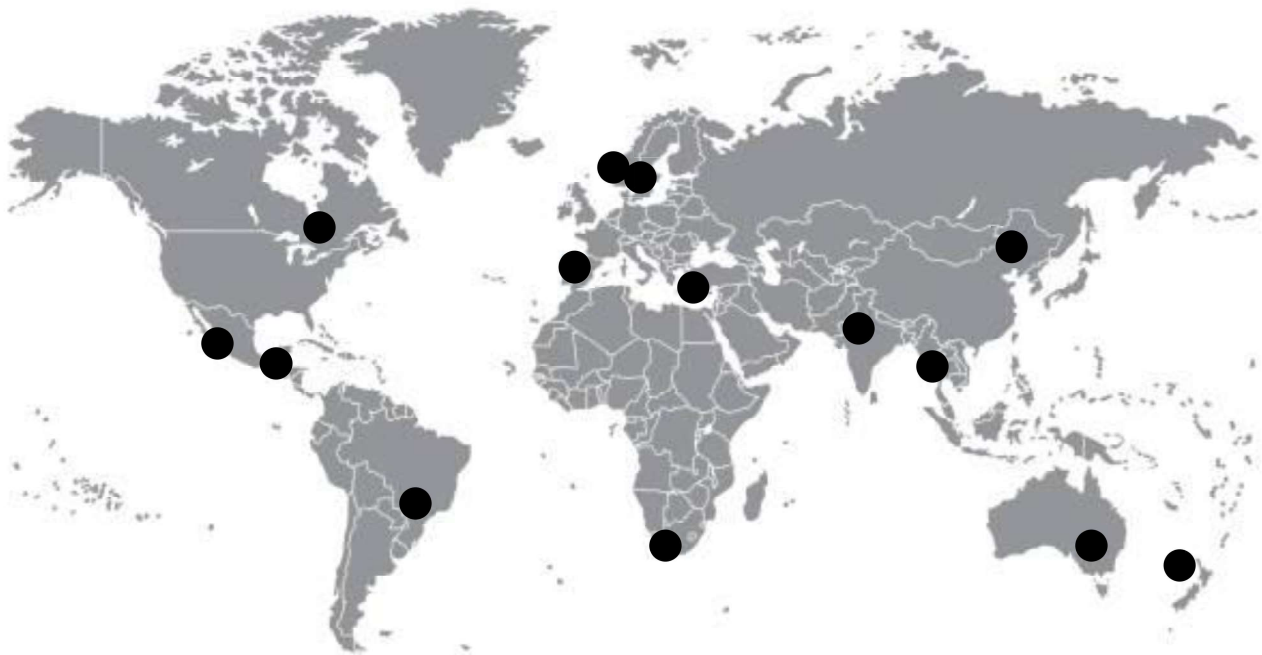
Naturally ventilated buildings

Integrates ASHRAE 55



How to predict and avoid overheating?

CIBSE overheating guideline criteria – TM52 and TM59

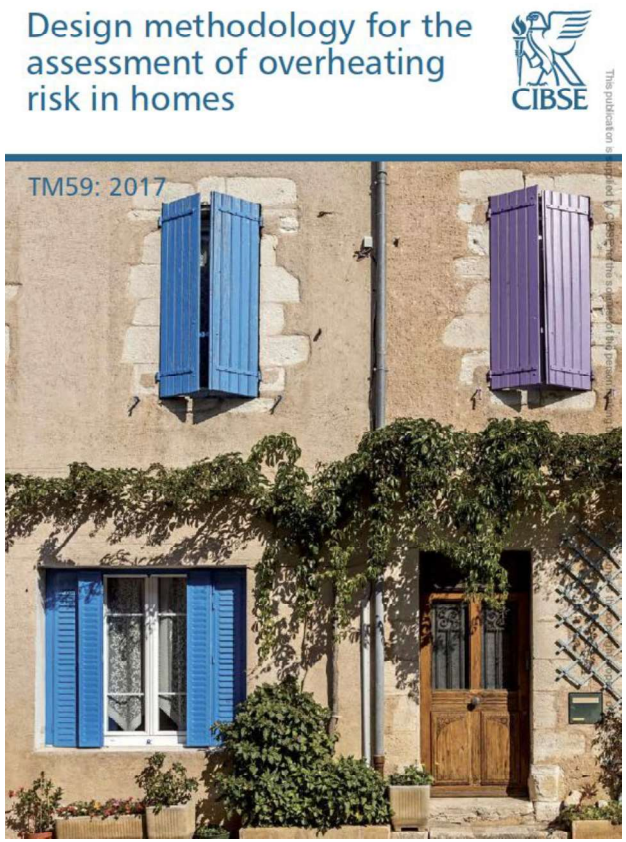


Overheating guidance for homes

- **CIBSE TM59** offers a set of criteria for assessing the overheating risk in naturally-ventilated (NV) homes

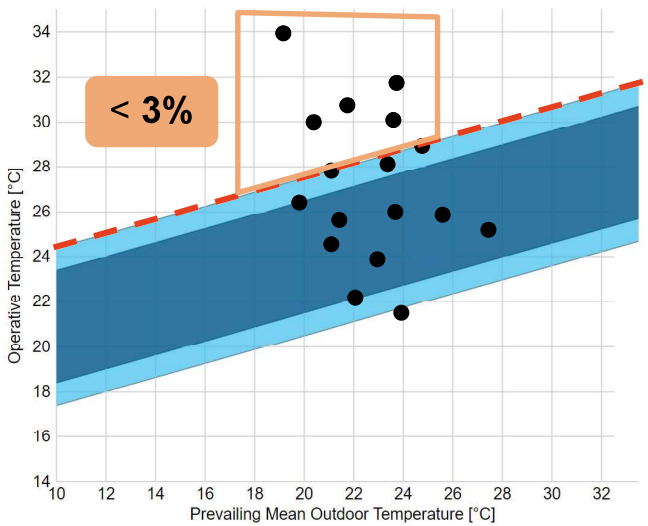
- Proposed to avoid overheating in UK

- Can we use it for Australian residential buildings?

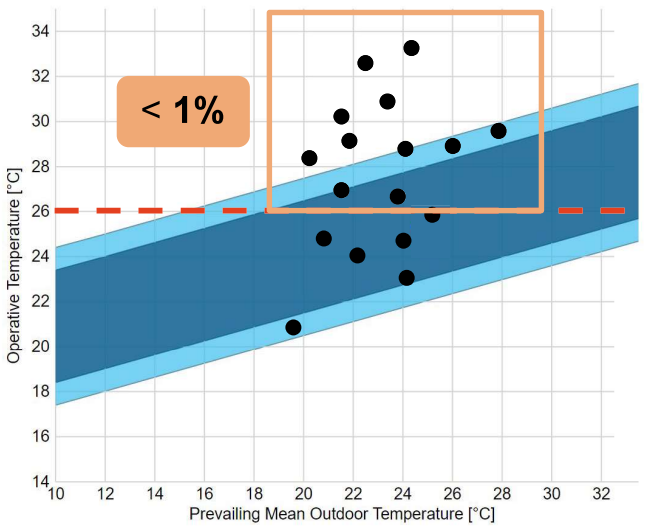


CIBSE TM59 criteria for NV homes

Living room and bedroom
Daytime
Summer / 7am-10pm



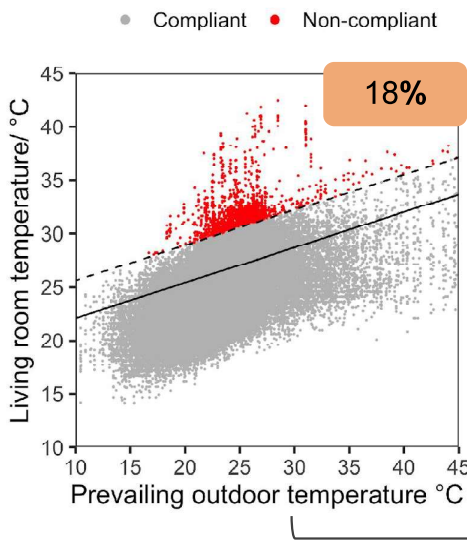
Bedrooms
Nighttime
Summer / 10pm-7am



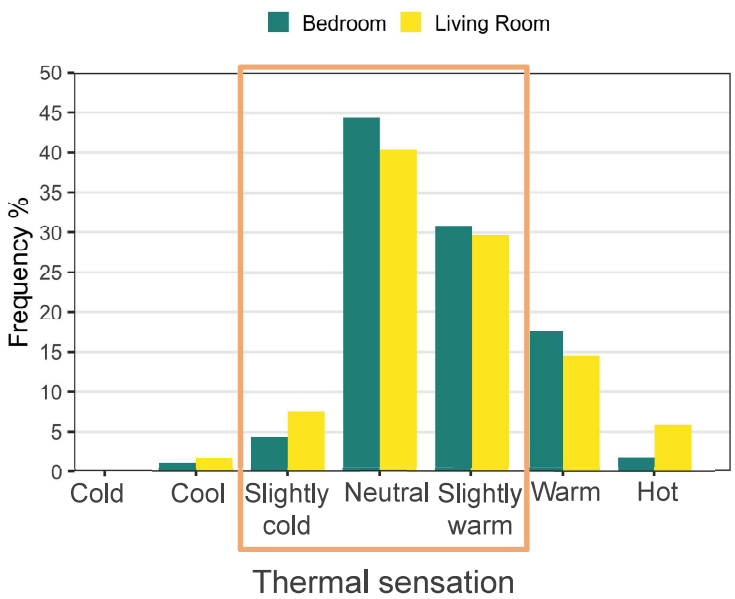
Validation based on field data

	Themal sensation	Themal sensation + sleep quality	Total
Period	2 years	1 month+5 days	
# dwellings	85	77	162
# living rooms	75	-	75
# bedrooms	87	48	135
# thermal sensation votes	1208	397	1605
# sleep quality votes	-	397	397
What was measured?	- Indoor air temperature - Meteorological data - Questionnaires: thermal perception and satisfaction		

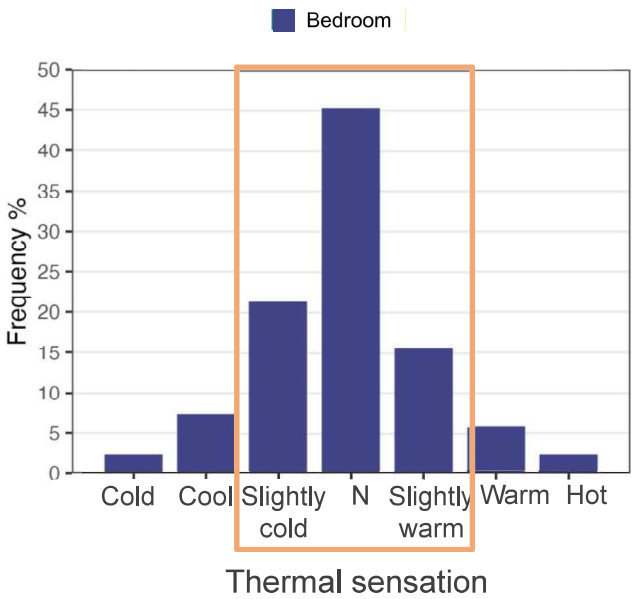
Indoor temperature records against TM59 Limits



Comparison with questionnaire responses - sensation

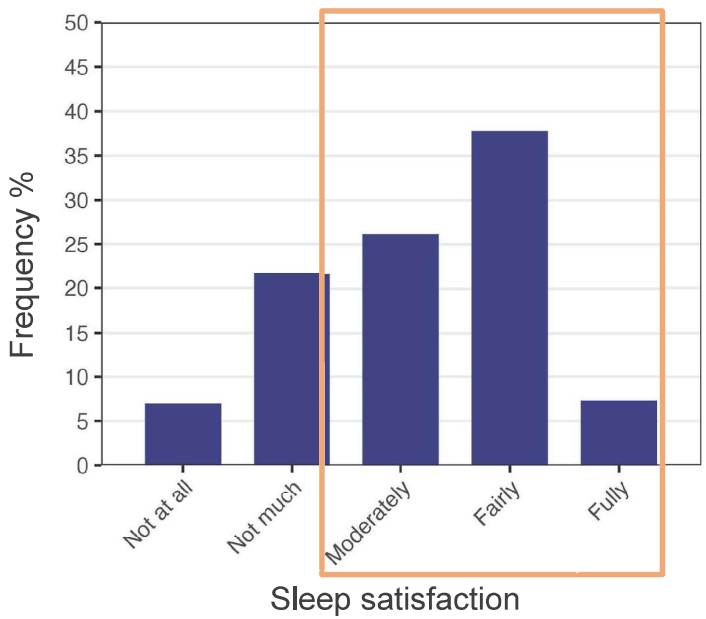


Daytime ~80% satisfied

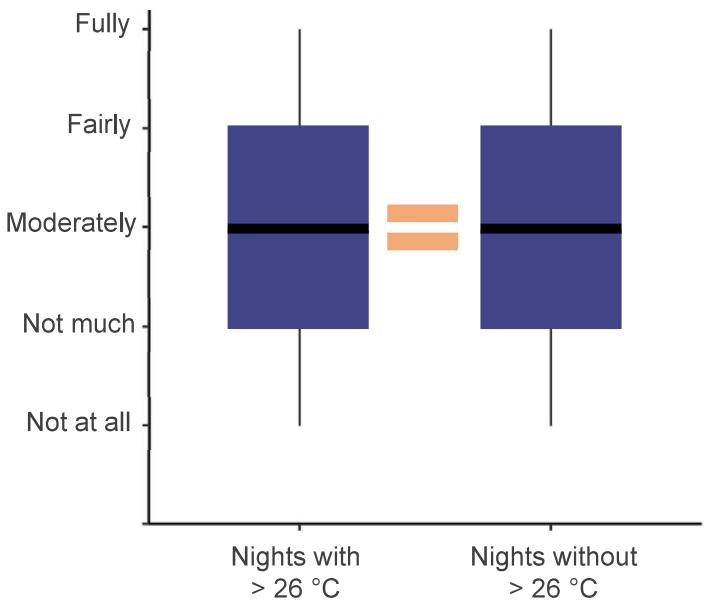


Nighttime ~80% satisfied

Comparison with questionnaire responses – sleep quality



Nighttime ~70% satisfied



No correlation

Takeaways

- A significant gap between CIBSE TM59 and actual residents' experience of thermal conditions.

- The 26°C limit for bedrooms is too restrict

- Sleep quality was unaffected by temperatures >26°C

- Adaptations are needed according to real data from different locations

What is next?

- Live in Great Sydney
- Work from home 2 days/week
- Have Wi-Fi at home

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Thank you!

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