

Darwin Home Comfort Rating Forum

Darwin Hilton
30 March 2023



Forum Agenda



Introduction to home comfort performance indicators

Jo Kieboom
Department of Infrastructure, Planning and Logistics (DIPL)

Field validation

Adj. Professor Dr Terry Williamson
University of Adelaide

System design and analysis

Assoc. Professor Dr Wendy Miller
Queensland University of Technology

Questions

Live demonstration

Dr Dong Chen, CSIRO
Ray Fogolyan, Home Star Rating Australia

Where to from here?

Jo Kieboom, DIPL

Panel discussion



Darwin Living Lab

Introduction to home comfort performance indicators

30 March 2023

Jo Kieboom
A/ Director Ecological Sustainability
Strategic Asset Management
Infrastructure, Investment and Contracts
Department of Infrastructure, Planning and Logistics

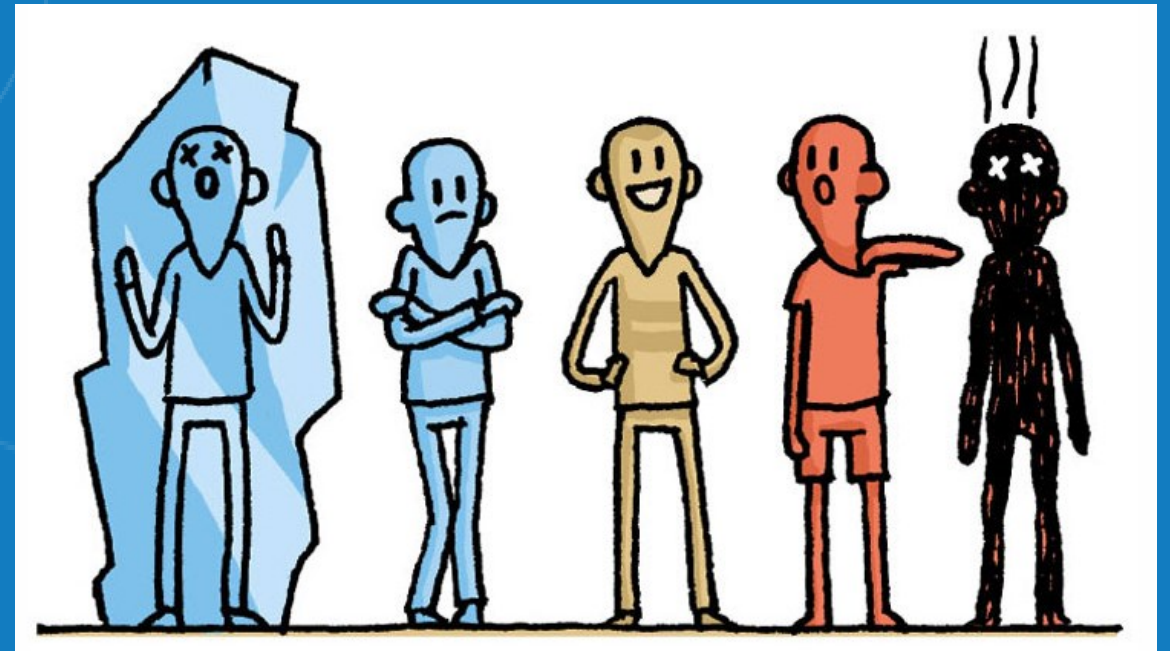


Image: <https://www.phsc.co.uk/thermal-comfort-in-your-workplace>

Darwin Living Lab

The Darwin Home Comfort Rating Project is part of the work of the Darwin Living Lab.

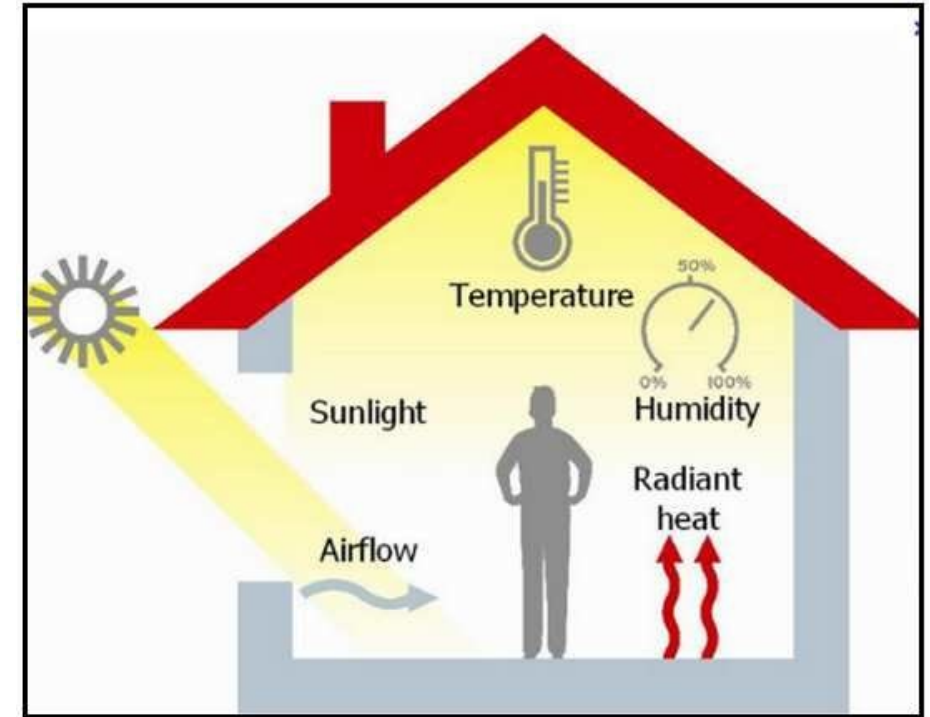
The Darwin Living Lab was established to foster improvements in the liveability, sustainability and resilience of the city.

The Darwin Living Lab is an initiative under the Darwin City Deal and is a 10-year collaboration between CSIRO and the partners of the Darwin City Deal: Australian Government, Northern Territory Government and the City of Darwin. The City Deal was signed by the Prime Minister of Australia, Chief Minister of the Northern Territory and Lord Mayor of the City of Darwin in November 2018.

Why develop Comfort Ratings?

Voluntary, 'for information' comfort ratings are important because:

- Not everyone can afford to rely on air conditioning
- Homes over-heating can affect people's health, quality of life and willingness to live and work in the Territory
- Homes should be as comfortable as possible during black outs
- Energy use from air conditioning is a major contributor to greenhouse gas emissions
- Climate change is going to increase the significance of these issues
- There is a weak correlation between energy ratings and comfort



[Image: The most important environmental factors affecting thermal comfort | Download Scientific Diagram \(researchgate.net\)](#)

Comfort Ratings also:

- Provide separate feedback on bedroom and living area performance
- Enable evidence-based assessments of the passive comfort performance of different design approaches
- Educate stakeholders about good climate sensitive design for Darwin housing



Darwin River, Northern Territory | YourHome
yourhome.gov.au



About Homes NT: Darwin Home Builders
abouthomesnt.com.au



Houses for Sale in Darwin - Greater ...
m.realestate.com.au

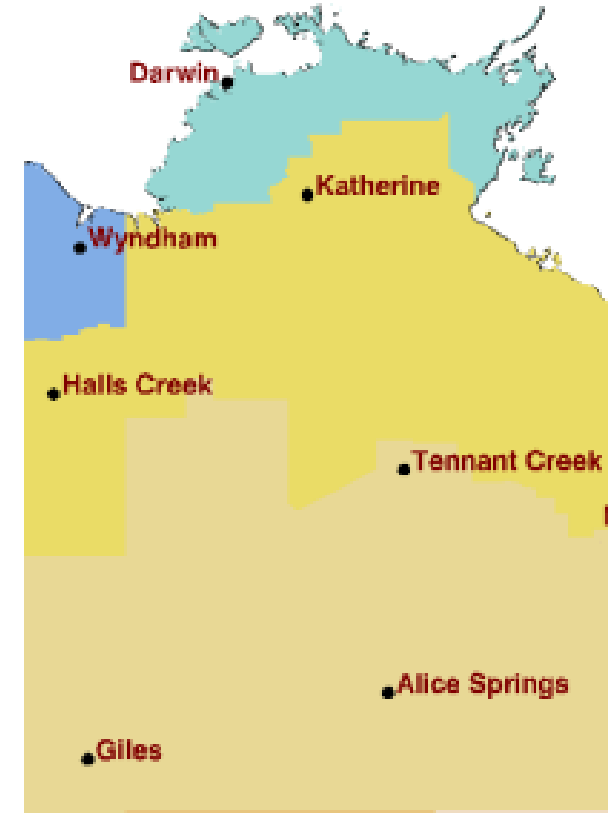


18 hours ago
197 Rental Properties in Darwin ...
domain.com.au

Key Project Outcome

Home comfort performance indicators are now included in a trial version of CSIRO's accredited Nationwide House Energy Rating Scheme (NatHERS) software, AccuRate, for NatHERS Climate Zone 1 postcodes (aqua region on map).

It is hoped that other accredited NatHERS software providers will build the Comfort Ratings into their software.



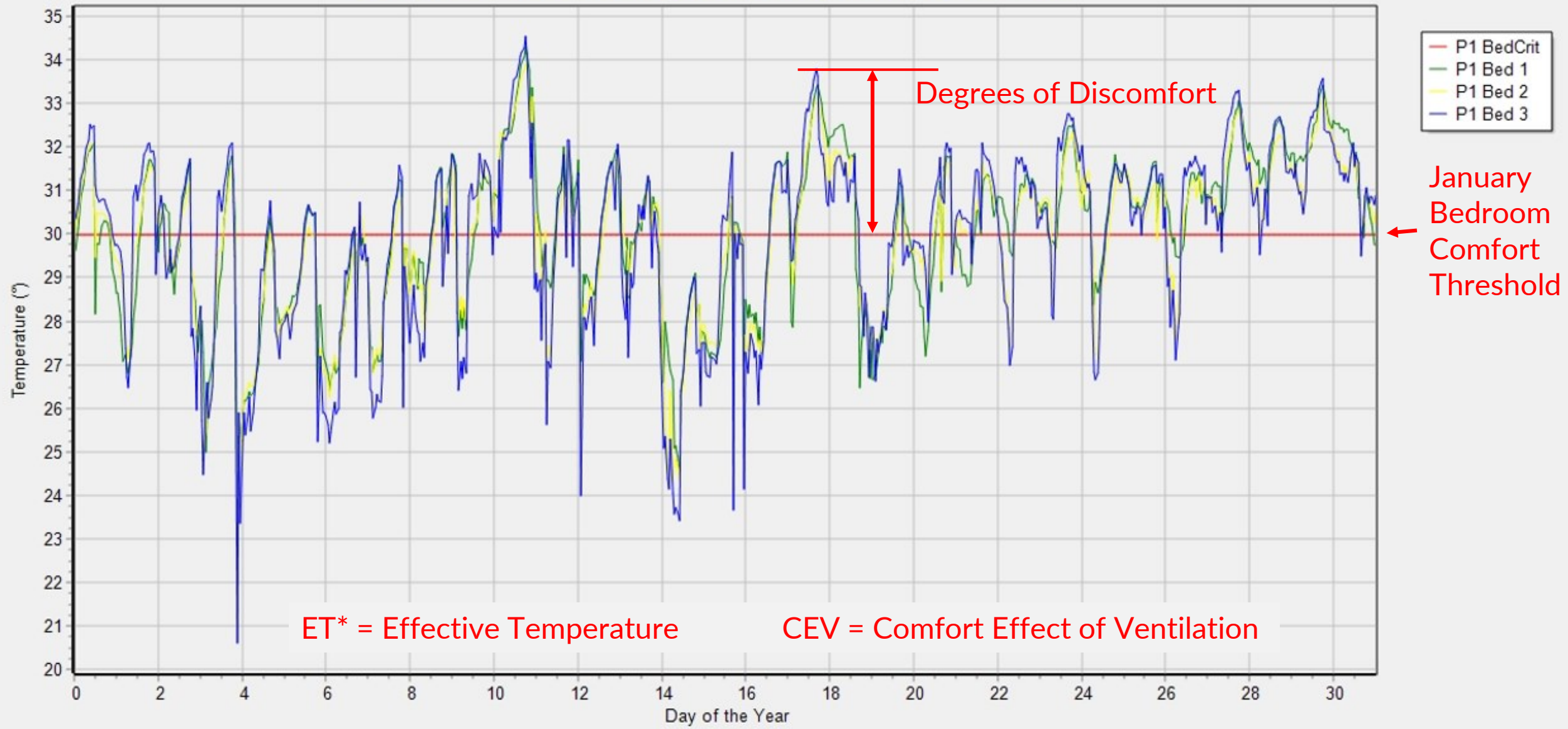
Project Technical Reference Group

Jo Kieboom (Chair)	Senior Engineer Ecological Sustainability – DIPL (Infrastructure Investment and Contracts, Strategic Asset Management)	- Chair: NT House Energy Rating Industry Reference Group (2006 – 2008) - NT rep.: NatHERS software development Technical Reference Group (2002-2008)
Dr Zhengdong (Dong) Chen	Senior Principal Research Scientist - Building Simulation, CSIRO Energy	Lead CHENATH developer
Dr Terry Williamson	Adjunct Professor School of Architecture and Built Environment, University of Adelaide	Supervisor of multiple Phd research projects on Darwin residential building comfort
Dr Wendy Miller	Associate Professor, School of Architecture and Built Environment, Queensland University of Architecture	Member: - International Energy Agency Annex 80 Resilient Cooling Task Force - Australian Institute of Refrigeration, Air conditioning and Heating - Resilience Special Task Group
Dr Mahsan Sadeghi	CERC Postdoctoral Fellow, CSIRO Energy	Thermal comfort measurement expert
Ray Fogolyan	Accredited NT house energy rating assessor (Home Star Rating Australia)	NatHERS Technical Reference Group member and past ABSA Chair

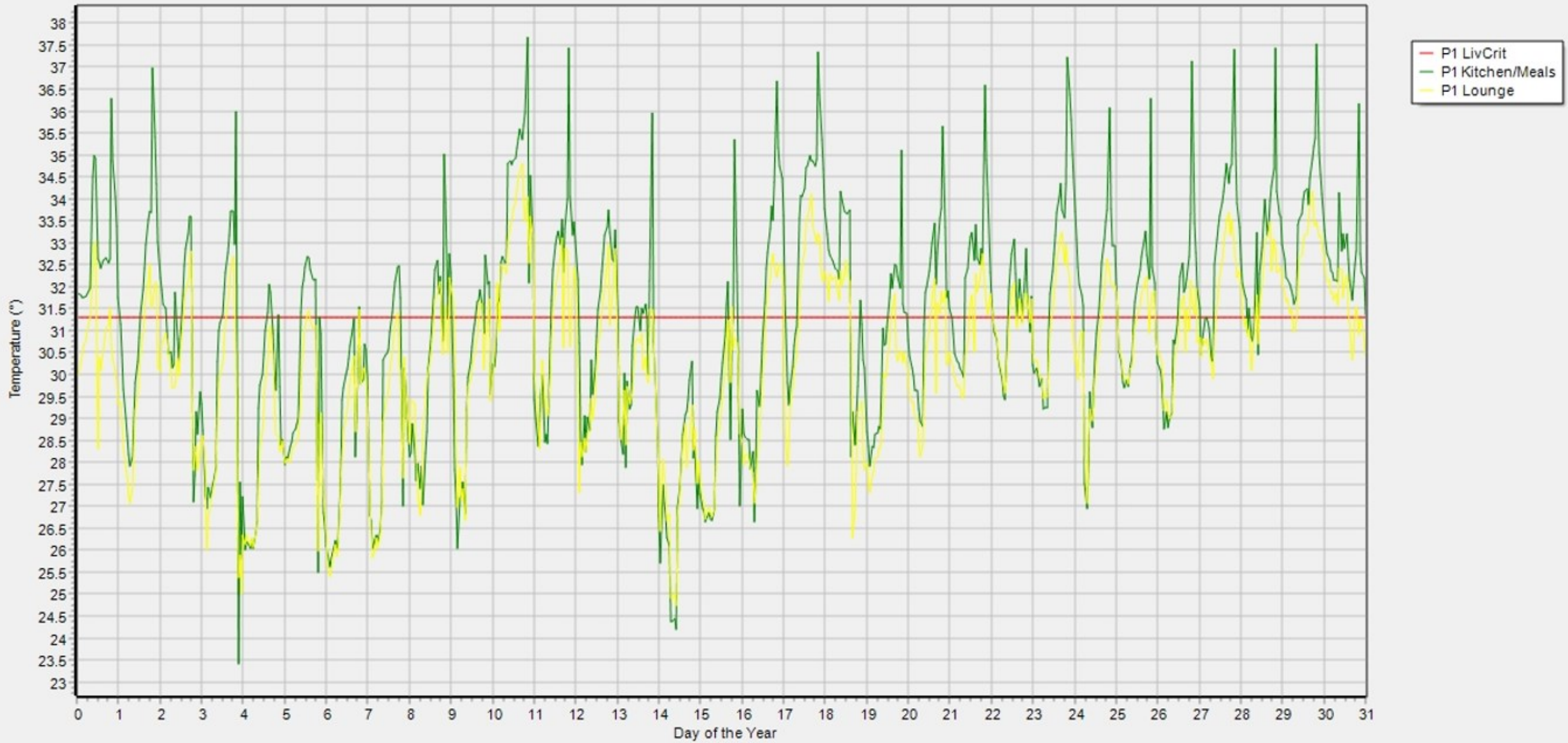
How rate thermal comfort?

- Comfort Rating for each room is based on the sum of the *Degree hours of Discomfort* (DD) (without air conditioning), above the relevant *Comfort Threshold*, each hour of a year.
- DD unit is Effective Temperature ⁽¹⁾
- Methodology considers the impacts of temperature and humidity – as well as typical occupant clothing levels and metabolic rates for each room type.

ET* - CEV Temperature Profiles from 1 Jan to 31 Jan - BED ROOMS EXAMPLE



ET* - CEV Temperature Profiles from 1 Jan to 31 Jan - LIVING ZONES EXAMPLE



2022 Darwin Living Lab Symposium Poll Results

Multiple-choice poll



Thermal comfort (3/3)

0 3 8

What do you think would be the best basis for Darwin bedroom Comfort Ratings?

The comfort performance of the worst bedroom



The average comfort performance of all bedrooms



Comfort Rating Certificate

Kitchen - Living Room

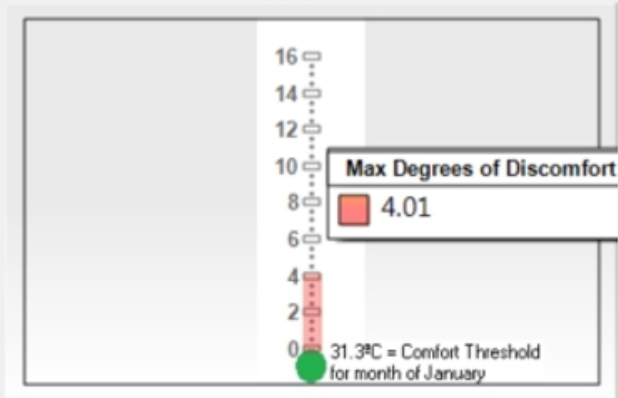
8.8 Comfort Rating



93.7% of Time Comfortable



Worst Hour



Worst Bedroom

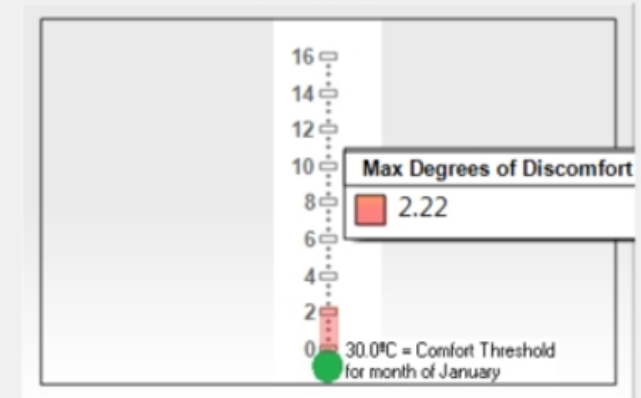
7.3 Comfort Rating



95.8% of Time Comfortable



Worst Hour



- Performance indicators assume rooms are occupied for the same hours as assumed for Energy Star Ratings - living zones: 7am – midnight; and bedrooms: 4pm – 9am.
- Kitchen – Living room thermal loads assume the same cooking appliance heat loads used in Energy Star Ratings.

Degree hours Discomfort (DD), % of Time Comfortable and Worse Hour results are provided for all living and bedrooms

