



Overheating in UK homes: occurrence, causes and solutions

Good Homes Alliance: New Homes and Our Health
University of Sheffield

July 2017

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Sustainability + Architecture

**UWE
Bristol**

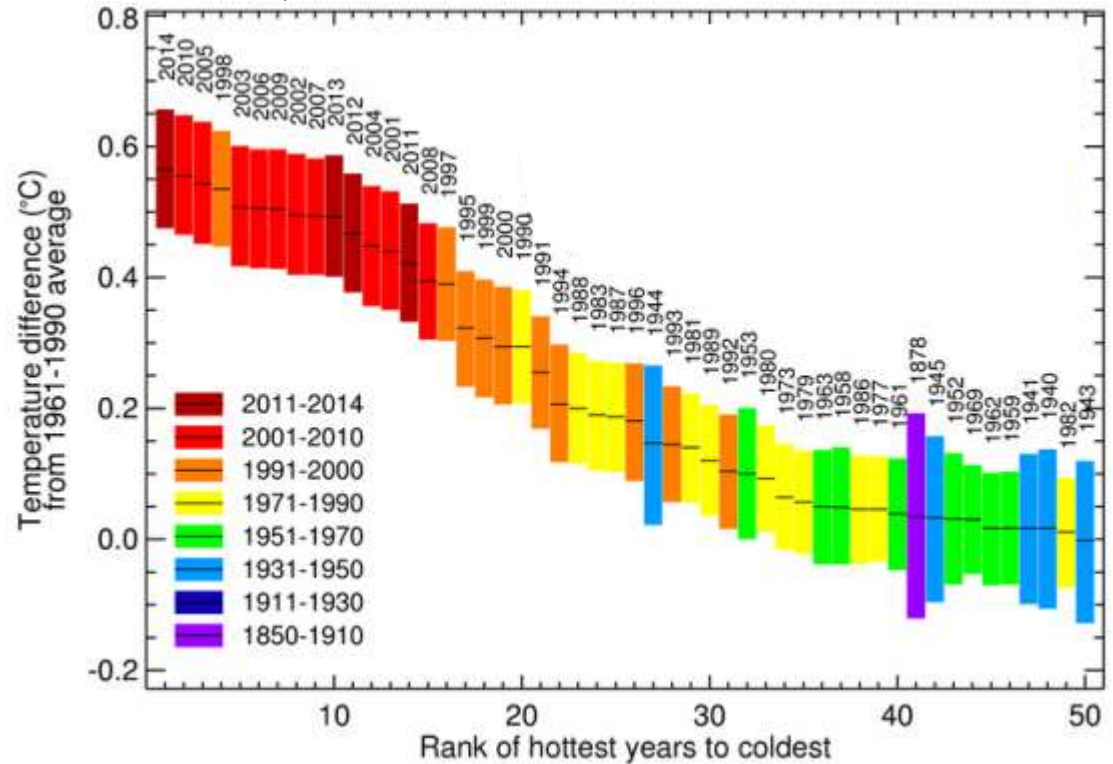


**OVERHEATING
IN HOMES**
THE BIG PICTURE
FULL REPORT



OVERHEAT IN HOME THE BIG PIC

FULL REPORT



Source: Met Office 2014 Report

Data from HadCRUT4, Met Office and Climatic Research Unit, UEA

Climate change headlines for the UK

Hotter drier summers

Wetter warmer winters

Extreme events more likely

Sea level rise



© Kathr Vel

Photograph: Aurelien Guichard



Twin Challenges of Climate Change

Mitigation

Reduce emissions

Adaptation

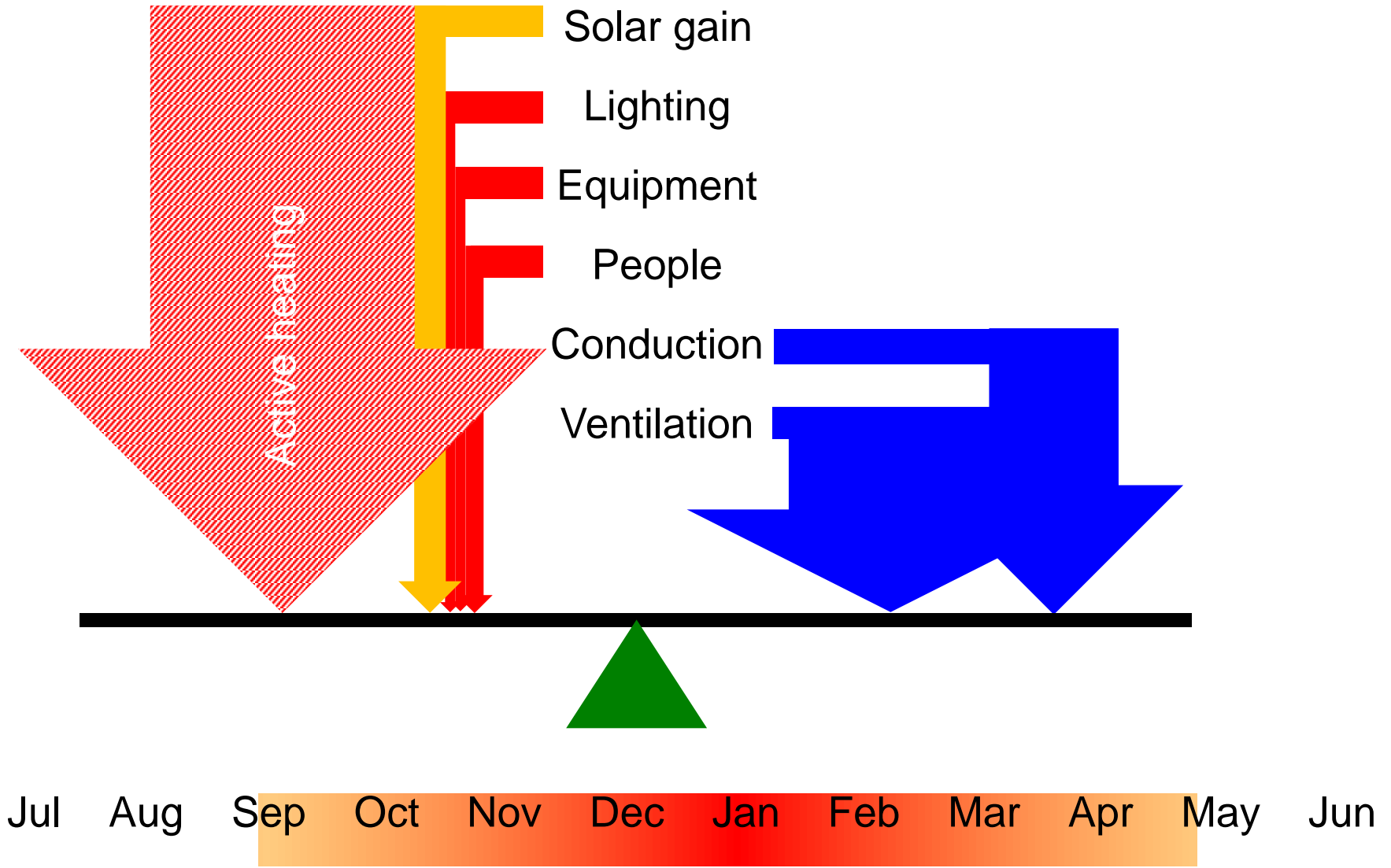
Design for a changing climate

Exploit the overlap

Avoid the conflicts.

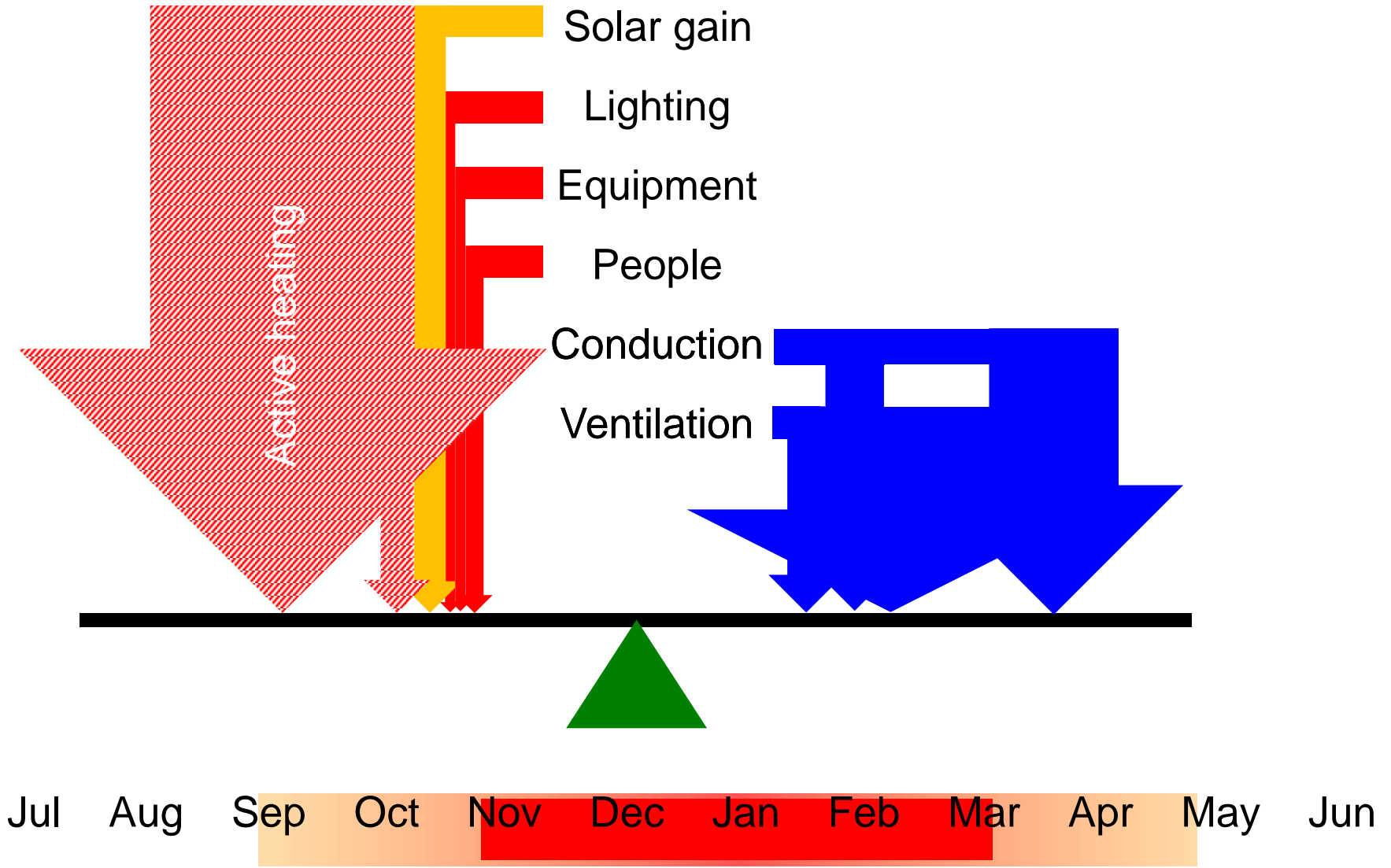
Comfort: a balancing act

Winter
Recent construction



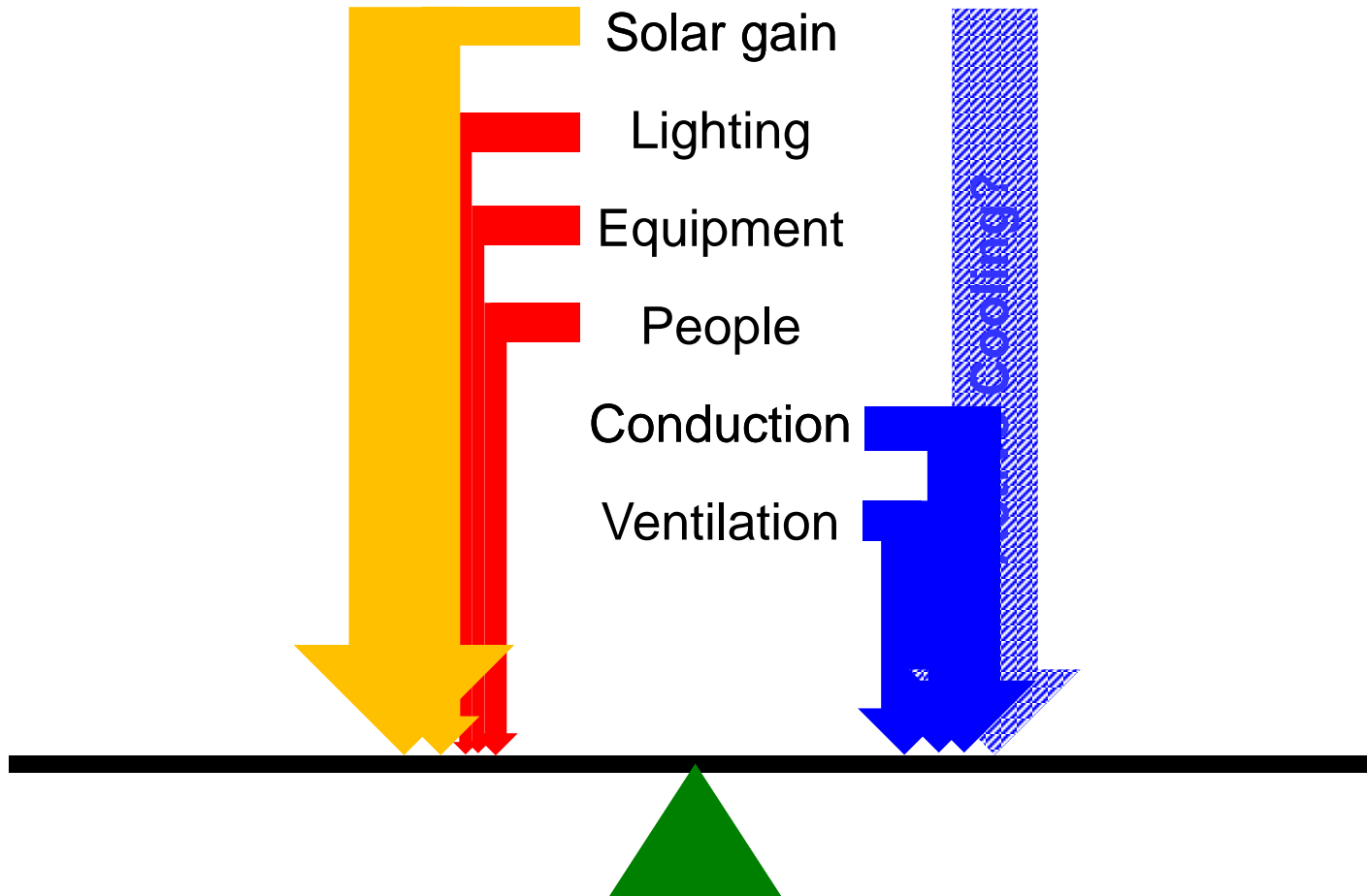
Comfort: a balancing act

Winter
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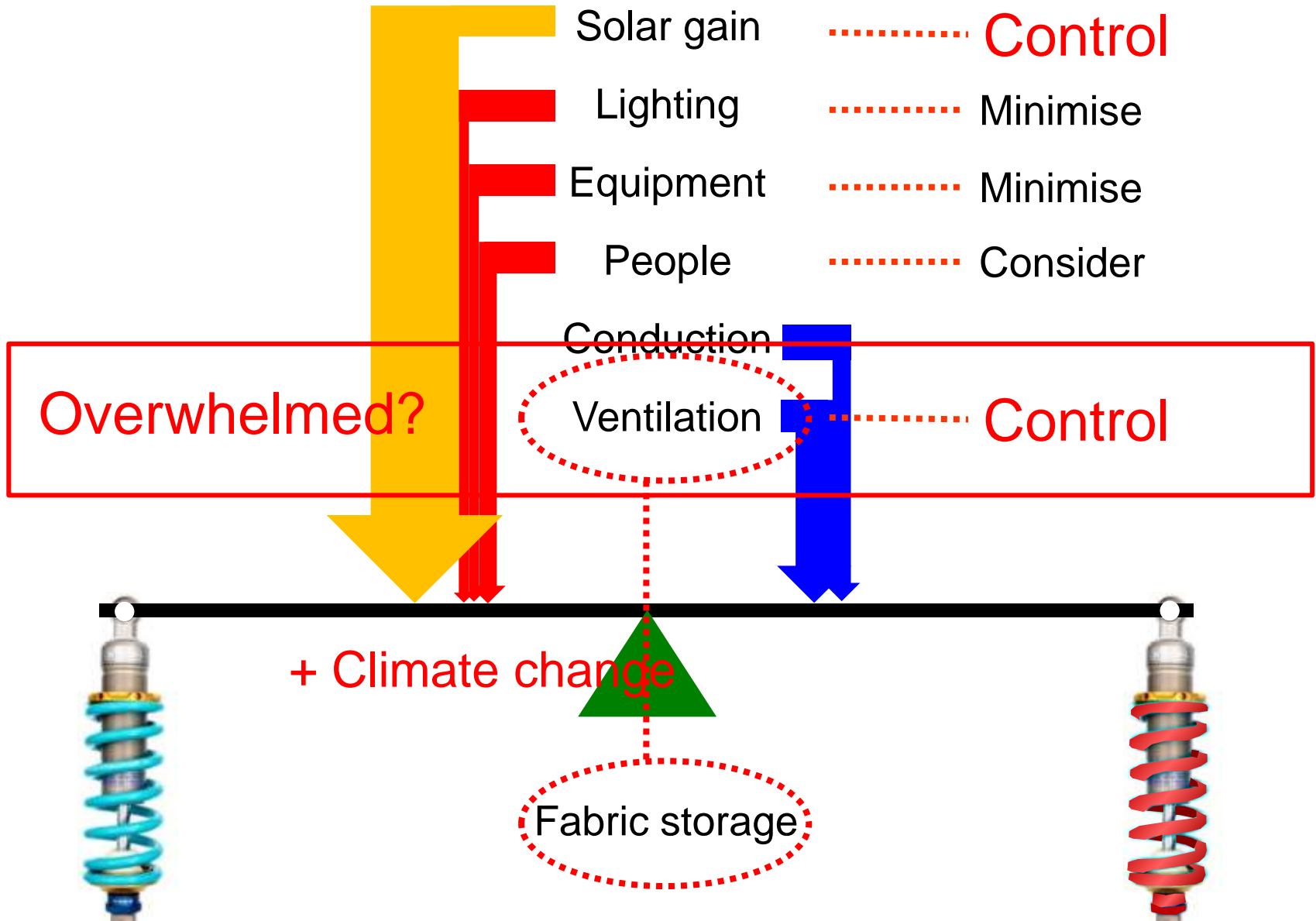
Comfort: a balancing act

Summer
New construction



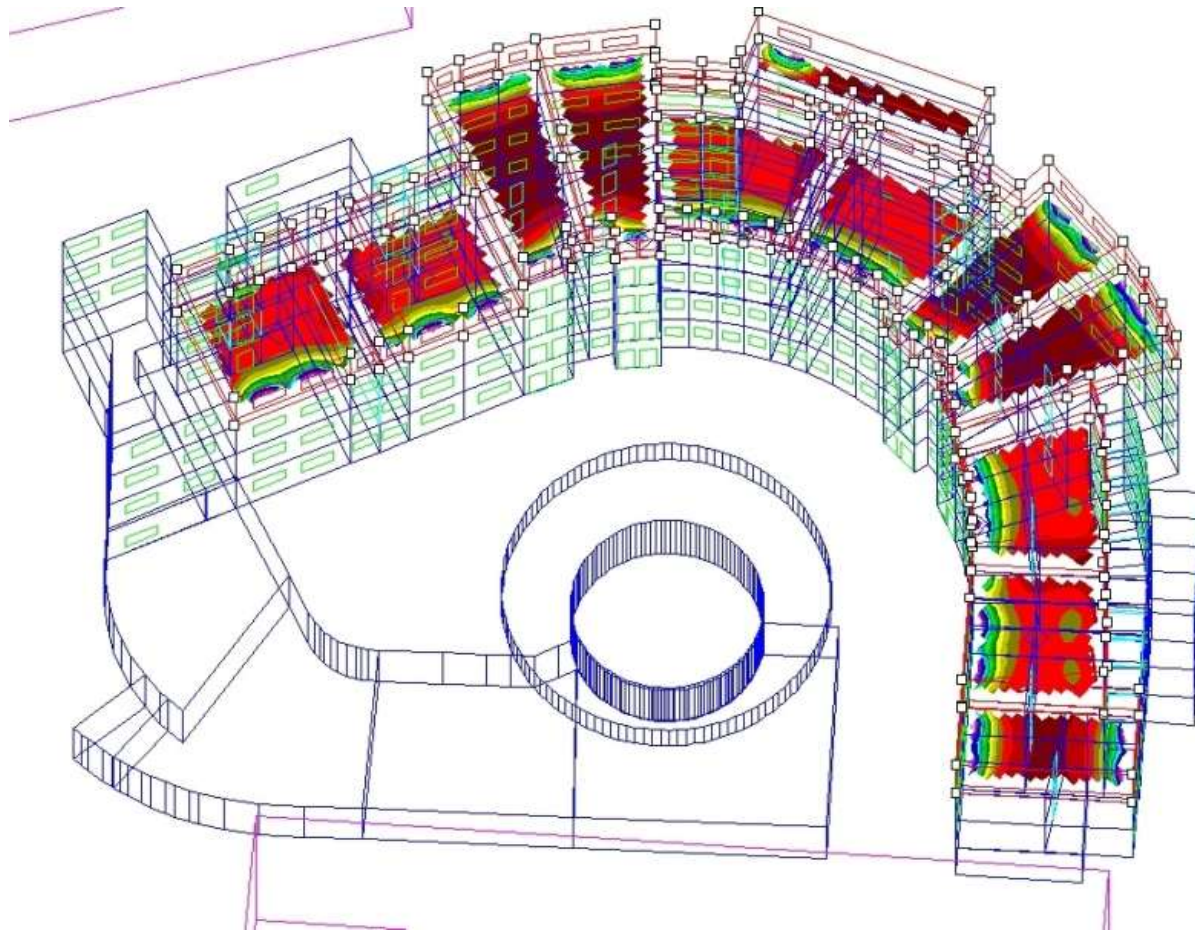
Comfort: a balancing act

Summer
New construction



Modelling as a design tool

... not just for verification



Current and future weather files for dynamic simulation

Design Summer Year 3rd hottest year in a 20 year period

CIBSE (UKCIP02) 14 locations

CIBSE (UKCP09) 14 locations

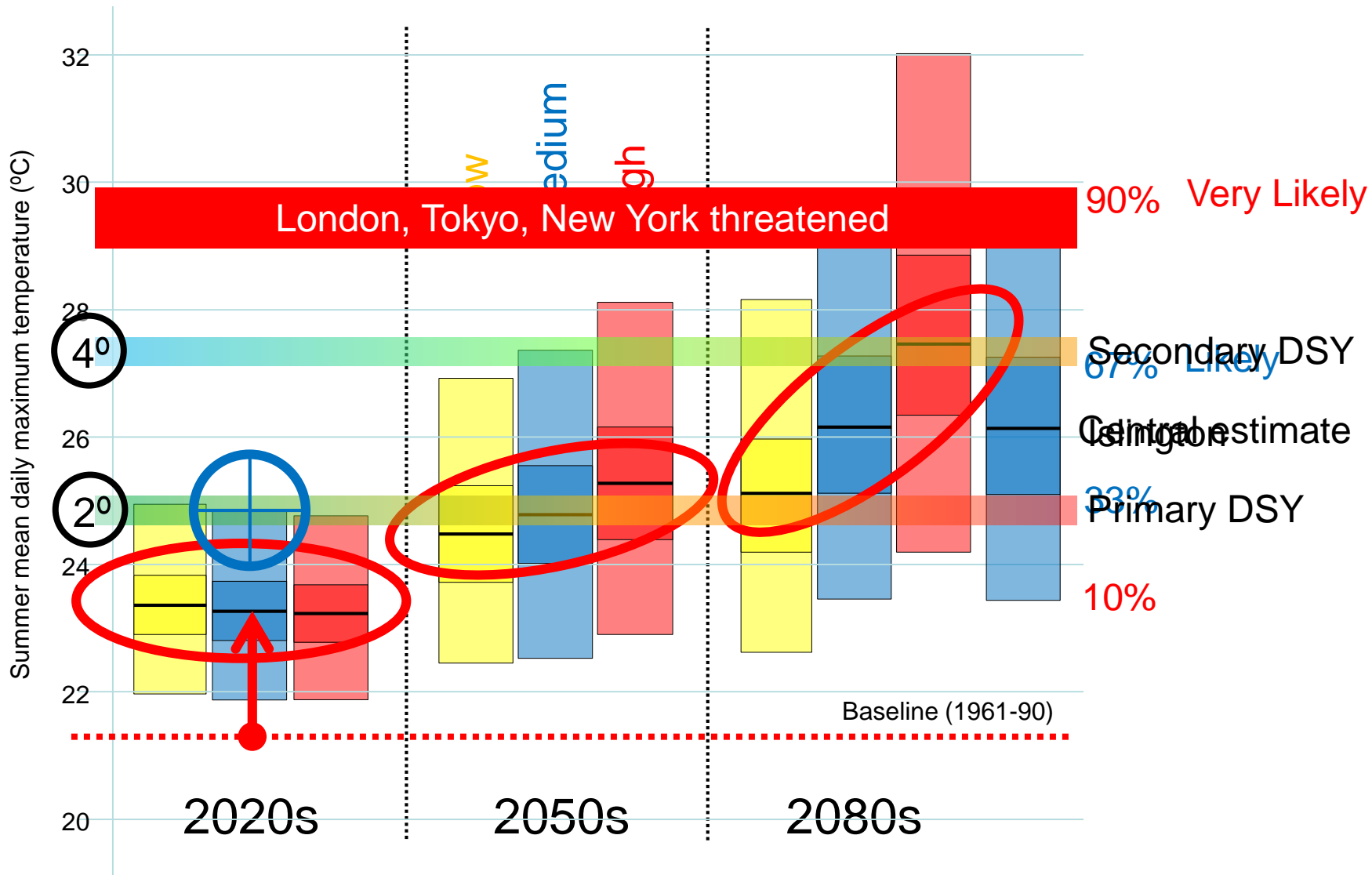
PROMETHEUS (UKCP09) Exeter 43 locations

COPSE (UKCP09) Manchester 2 (+) locations

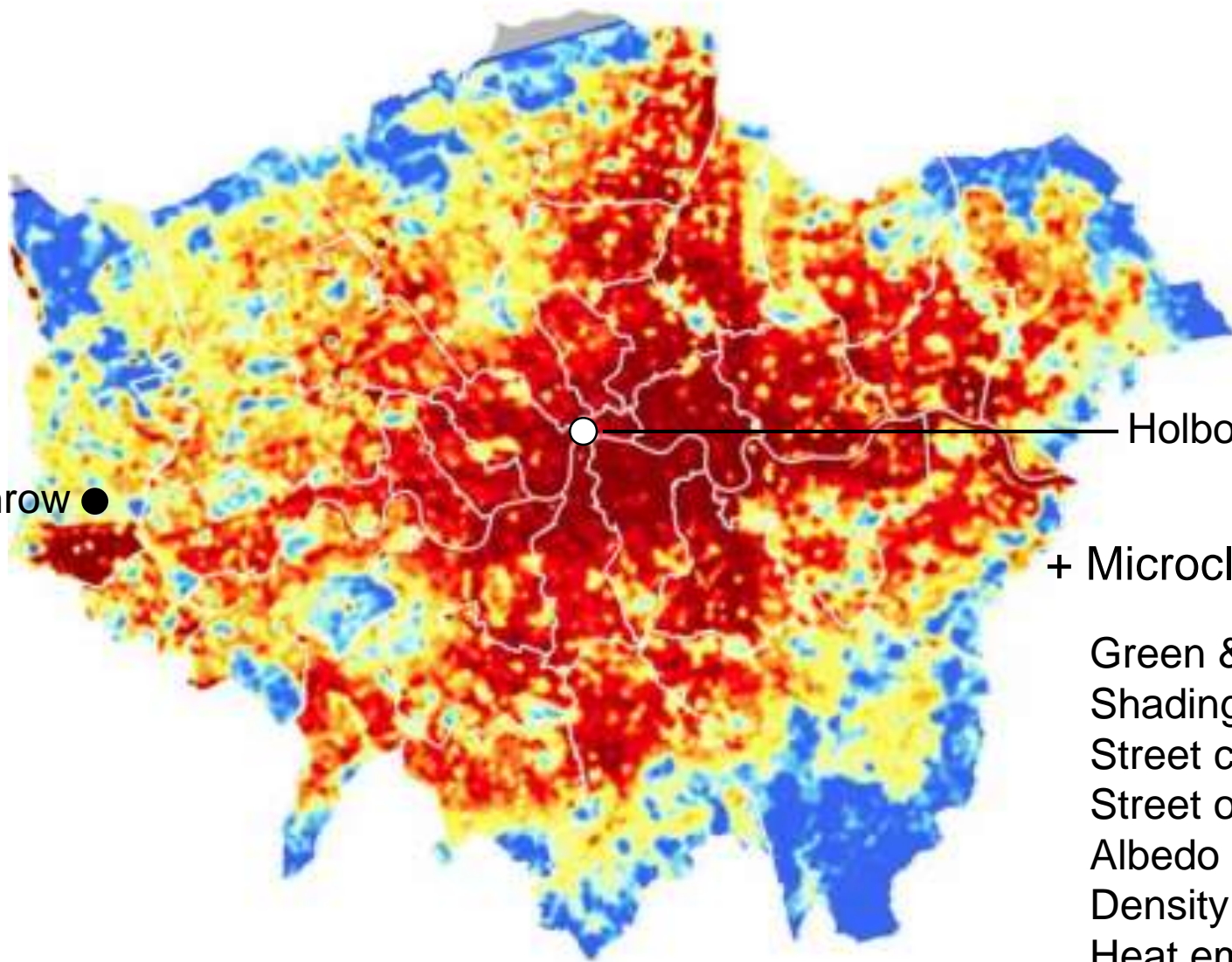
CONSISTENT?

Which Climate?

CIBSE/ UKCIP ProCLiP charts



Urban Heat Island



Holborn

Heathrow ●

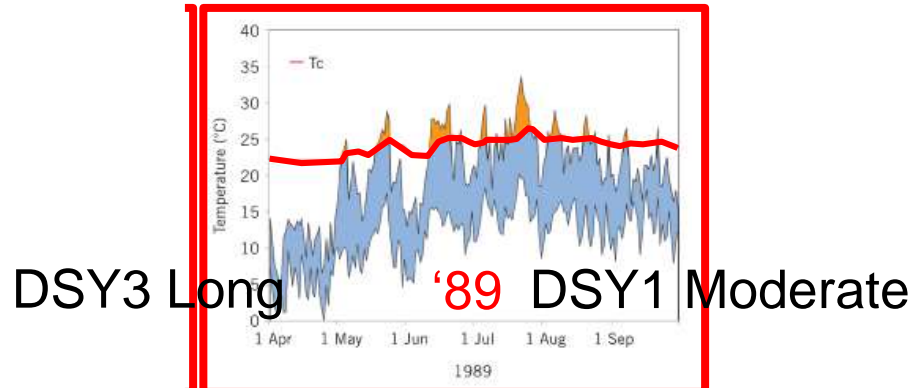
+ Microclimatic effects

- Green & blue space
- Shading
- Street canyon
- Street orientation
- Albedo
- Density
- Heat emissions.

Land Surface Temperature, 12 July 2006, 21.00 UT ASTER satellite image

Gatwick ●

Hot weather patterns – the fair test?



DSY2 Intense

What to look out for.... Canary Properties

Single aspect flats

Lots of glass Germany: max % to avoid calculation

Windows with limited or poorly controlled ventilation

Noisy and/ or dense surroundings

Communal heating without ventilation

SAP Appendix P assessment with all the boxes ticked

Top floors, particularly with poor insulation

Retrofitting insulation without dealing with ventilation

Crowded properties

Vulnerable residents.

“should not be depended on by designers to ensure a given design will provide thermal comfort”

Ref: Overheating in new homes: A review of the evidence'
NF46, NHBC Foundation, Nov 2012

Window Options (2012):

2016

Slightly open
~~Open half~~
Fully open

50% of time (1/2 effect)

Yes/ No questions:

Noise nuisance (Planning, proximity to main road etc, airport)

Security risk (Easily accessed (AD Q); secure night vent?)

If Yes, only trickle vent allowed

Curtain, blind and shutter fact changed.

CIBSE TM59 Design methodology for the assessment of overheating risk in homes



Launched 28 June

“Predominantly Natural” and Predominantly Mechanical” ventilation

Overheating criteria for both (mix of adaptive and threshold (beds))

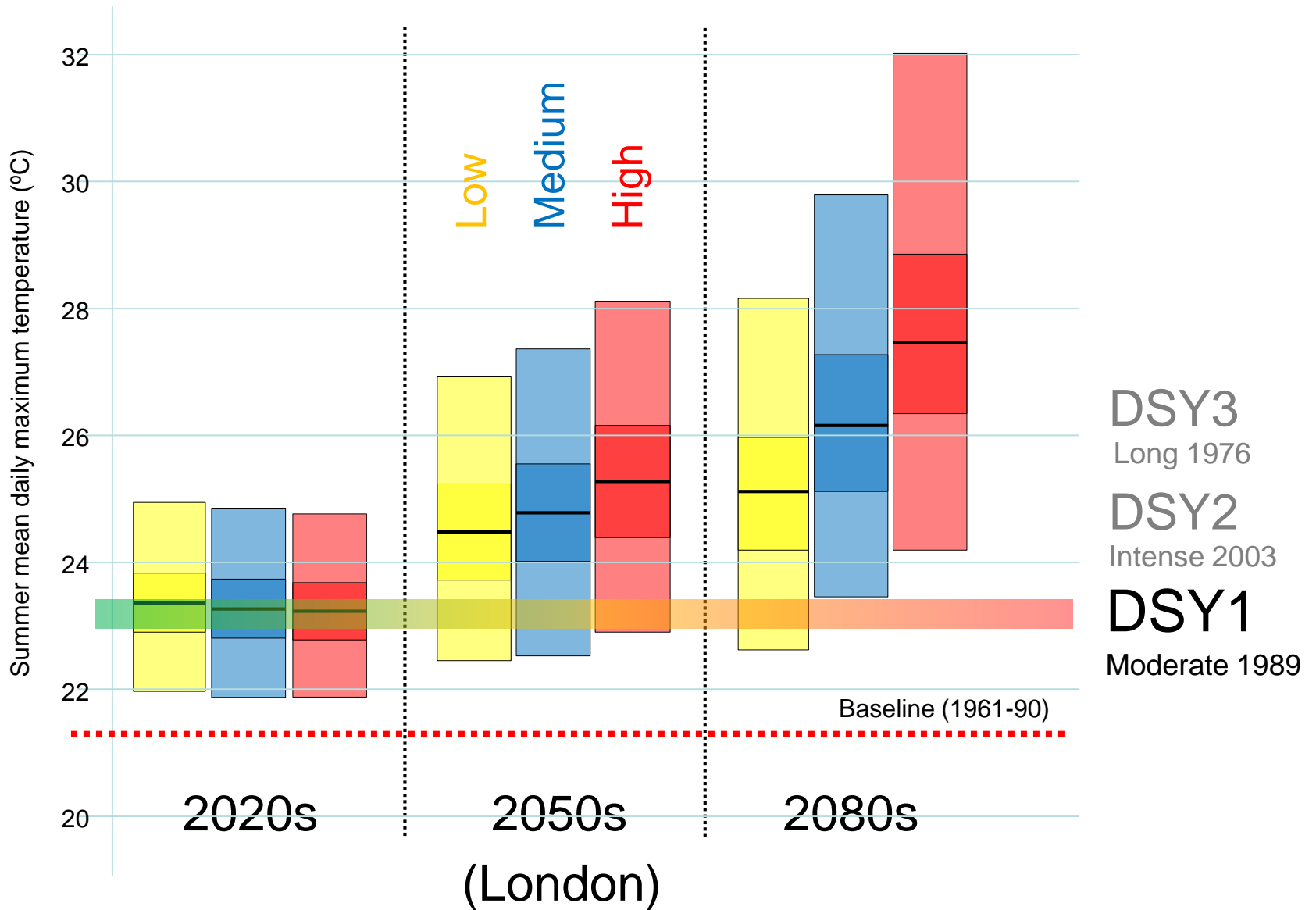
Standard occupancy and internal gains (variety of home types)

24 hours occupancy to highlight fabric issues.



Which Climate?

CIBSE/ UKCIP ProCLiP charts



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DSY1, 2020s, high emissions 50th percentile

Treatment of communal spaces and hot water distribution

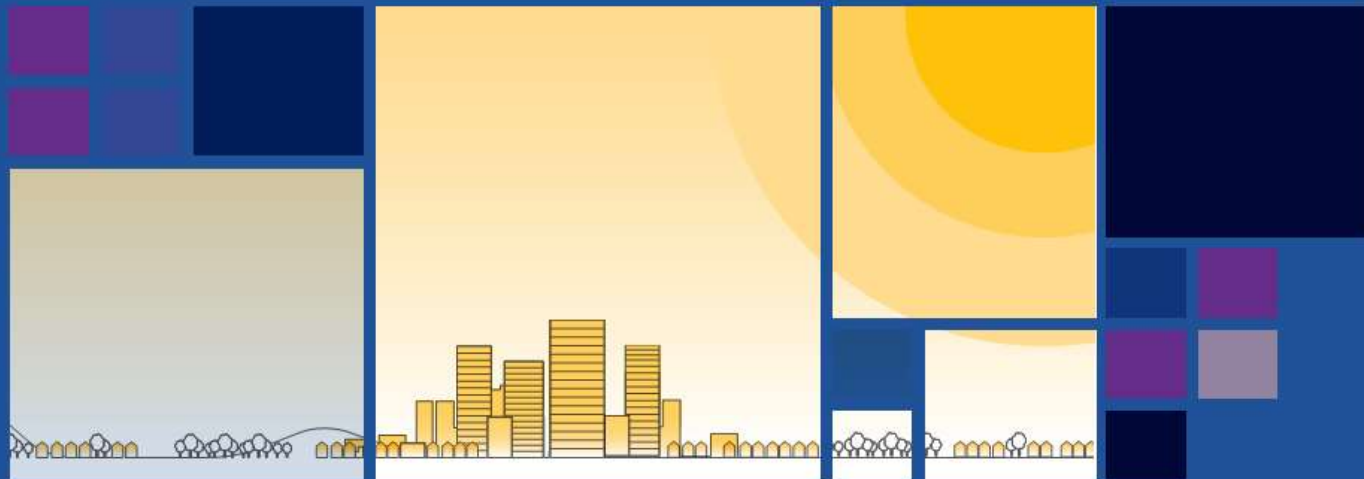
Sample size for assessing large developments

Blinds only if part of architectural solution (with and without requ'd).



Understanding overheating – where to start:

An introduction for house builders and designers



Guide



<http://www.zerocarbonhub.org/recent-publications>