

Edge Debate 38
Canada House, 28 October 2008

COMFORT
IN A LOW-CARBON SOCIETY

Making good enough
better than just right

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www.usablebuildings.co.uk

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we’re not entitled to” ... R BUNN*

*“Evening out fluctuations has become
an egalitarian enterprise which it is heresy to question.”*

MICHAEL YOUNG, *The Metronomic Society* (1988).

- Always on 365/24/7.
- Providing comfort to defined standards.
- Enhancing productivity.

*“There is something inelegant in the mass of energy-consuming
machinery needed at present to maintain constant RH ...
something inappropriate in an expense which is
beyond most of the world's museums.”*

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Comfort in context *on a simplified scale*

- 
- **Neutral** (*comfortable*) - *sensory deprivation?*
 - Slightly uncomfortable (*boiled frog*)

CRISIS OF DISCOMFORT (*comes sooner with no control*)

- Irritably uncomfortable
 - Increasing discomfort, until ...
 - Medical problems (*e.g. heat stroke, hypothermia*)
-

Comfort in context *and on the positive side ...*

- 
- Medical problems (*e.g. heat stress, frostbite*)
 - Discomfort and stress (*too much of a good thing*)
 - Delight (*exhilarating differences: theatre, holiday*)
 - Comfortably unbalanced (*e.g. comfortably warm or cool*)
 - **Neutral** (*comfortable*) - *sensory deprivation?*
 - Slightly uncomfortable (*boiled frog*)

CRISIS OF DISCOMFORT (*comes sooner with no control*)

- Irritably uncomfortable
 - Increasing discomfort, until ...
 - Medical problems (*e.g. heat stroke, hypothermia*)
-

Comfort is not very important: You need to avoid “*crises of discomfort*” (D. HAIGH, 1981)*

HOW?

Using perceived control & adaptive opportunity, e.g:

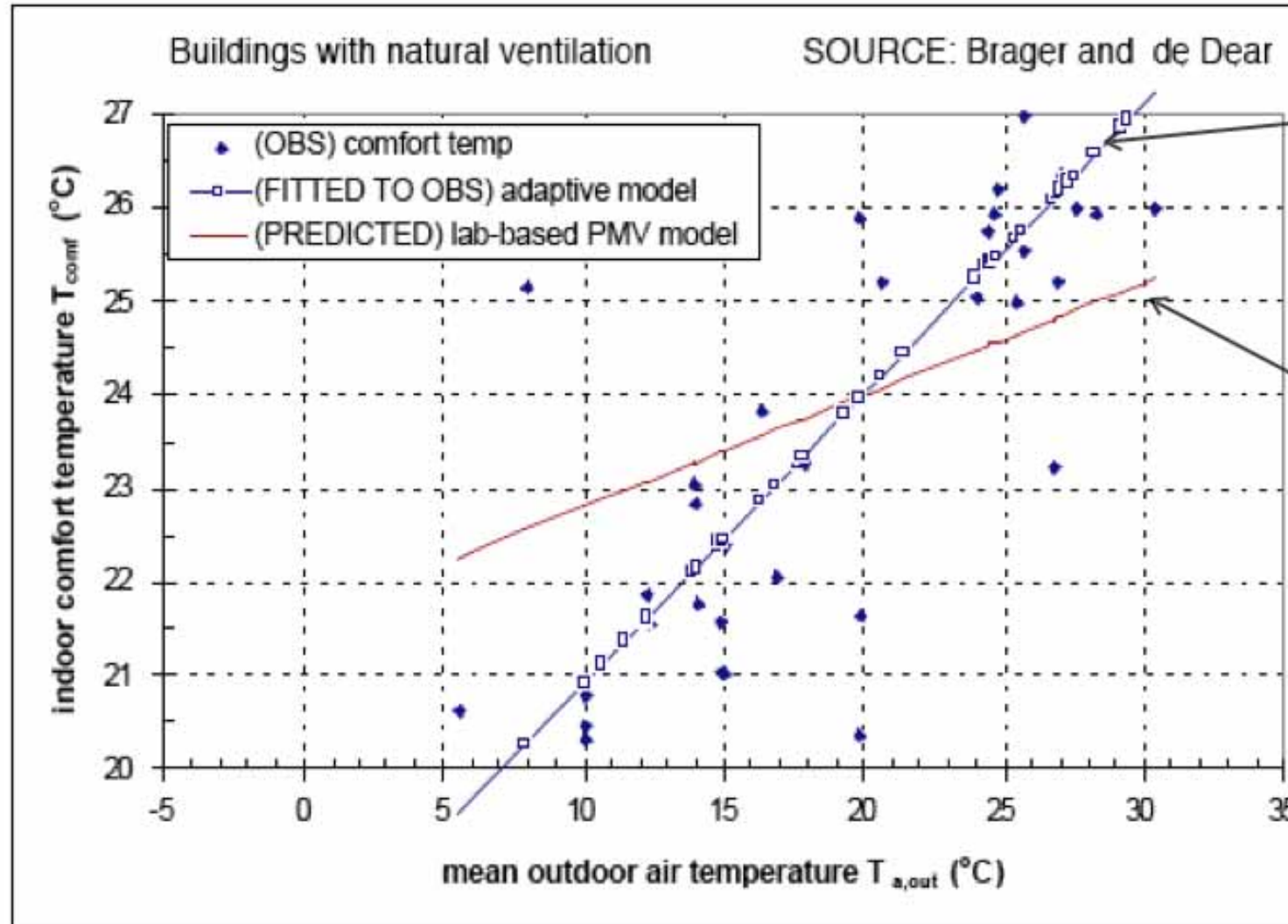
- Adjust a passive system (*windows, blinds etc*).
- Adjust M&E services (*central, local or task*).
- Contact the facilities manager (*rapid response needed*).
- Adjust posture, clothing, activity etc.
- Move about, or go somewhere else (*possible at home, in some modern work environments, in Australia! ...*).
- Eat or drink (*hot or cold*), take a shower ...

Loose control with adaptive opportunity can give greater occupant satisfaction with less energy dependency ...

BUT achieving consensus in shared spaces is tricky.

* SOURCE: D Haigh, *User response in environmental control*, in D Hawkes & J Owers (ed), *The architecture of energy* (1981).

Results from laboratories and AC buildings don't tell the whole story

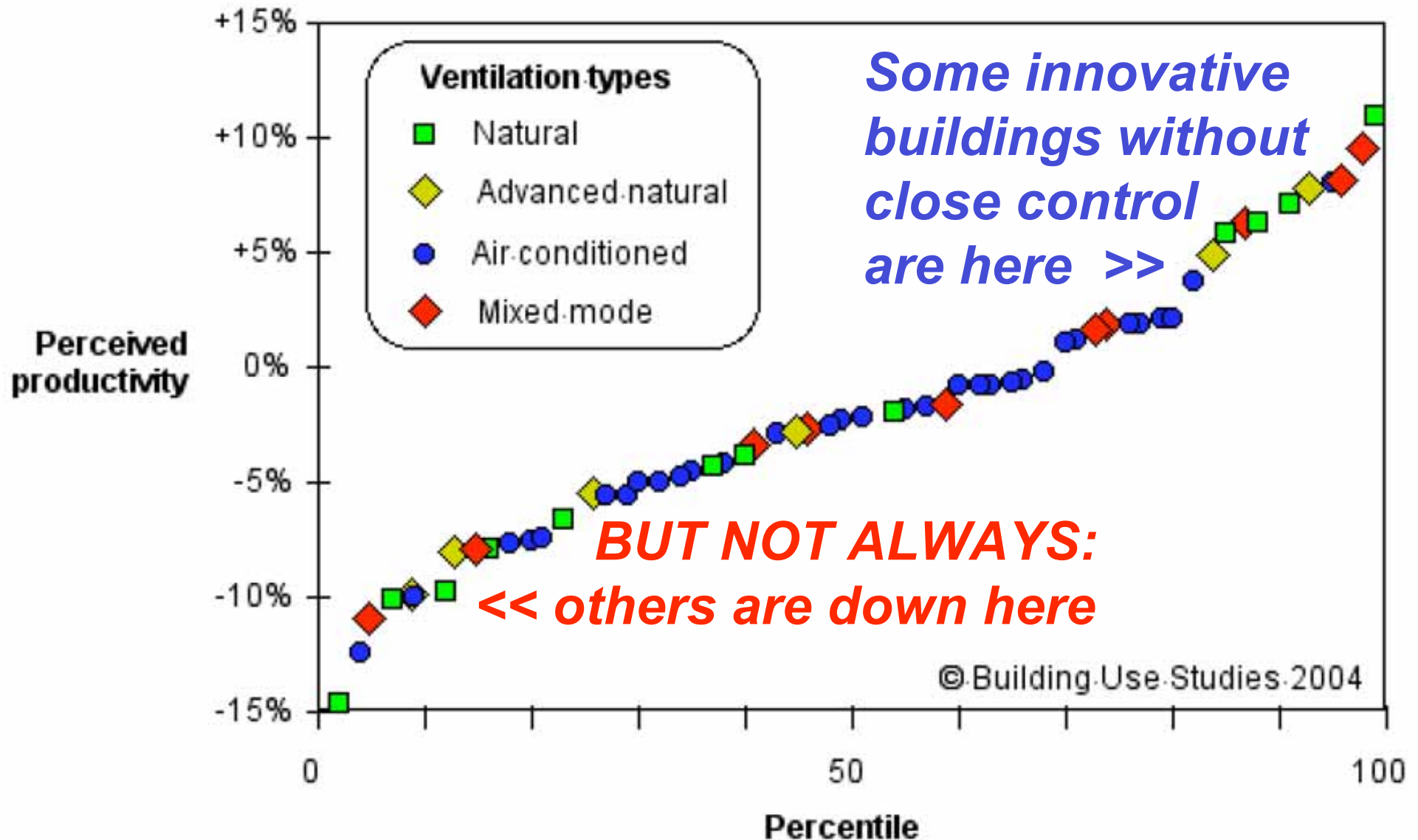


The curve is steeper (i.e. has a greater range of comfort conditions) in real (observed) situations than in the predictions from laboratory experiments.

This means that people are more likely to be tolerant when they have more control, **even if the conditions themselves are not measurably better!**

Adaptive controls can work well

each point is the average for a building



And in the USA ...

each point is the average for a building



And in Australia too ... *mixed mode services on-demand prove very economic*

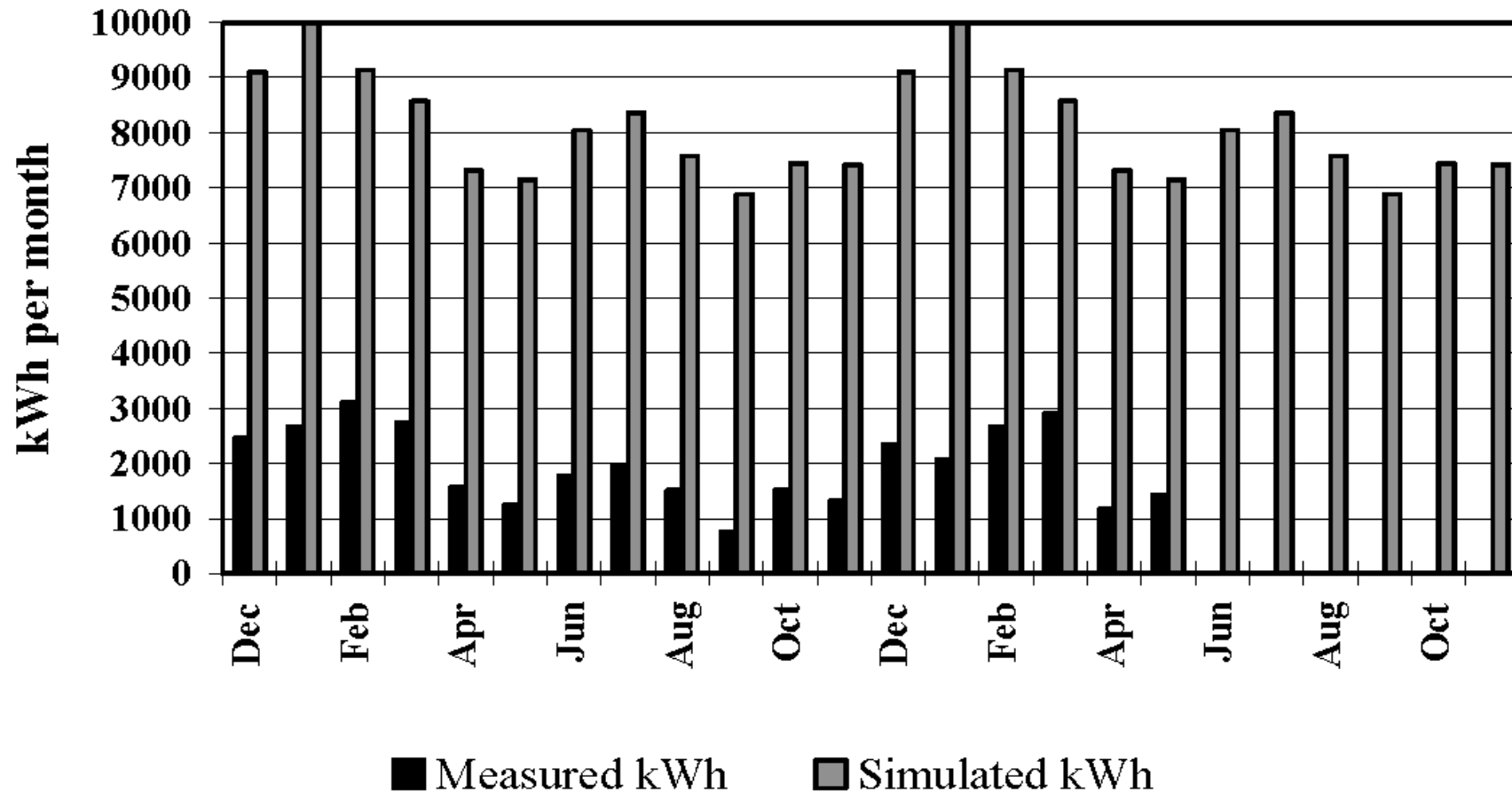


Figure 10. Actual month by month energy consumption used by the supplementary cooling and heating system in the study area compared with estimates from a simulation model of a conventional air conditioning system.

Where looser control works and occupants report better conditions

- Design intent has been made clear to occupants, and where possible is intuitively obvious.
- Controls are clear to the user and manager, and give good feedback on what to do and what is happening.
- Facilities management is adequately resourced, respects users and responds rapidly and effectively to their needs.
- Default states are restored manually or automatically, to avoid unnecessary stress and/or energy waste.
- Organisations monitor performance in use, and make an effort to ensure that things are working and occupants are informed.

Encourage people to adapt

Linking technical and behavioural change

Heelis building facilities manager **Liz Adams** educated the staff on what to expect from their new home.

“We told users not to expect stable conditions. We call it a ‘layers building’ as it won’t suddenly react to changes in weather conditions, but take a while to heat up and cool down. So we remind people in September to bring in a cardigan.

“In the Autumn, when the outside temperature drops overnight, the building won’t necessarily react immediately. So out come the cardies.



Changing attitudes and practices. CONSIDER ...

- CONTEXTUAL *before* UNIVERSAL
 - PASSIVE *before* ACTIVE
 - ROBUST *before* OPTIMAL
 - LOCAL *before* GENERAL
 - DEMAND-RESPONSIVE *before* JUST-IN-CASE
 - SOCIAL *before* TECHNICAL
 - AUTONOMY *before* DEPENDENCY
 - INFORMATION *before* AUTOMATION -
develop controls as decision-support systems
 - ADAPTATION *before* PROVISION or REBUILD
-

A low-carbon society: *Learning to live within our means*

- Take account of the context, the clock and the seasons.
- Use passive systems where possible.
- Match any energy use to supply availability.
- Consider on-demand energy systems (in space as well as time), not blanket provision.
- As a general rule, the less highly-processed the internal environment the better.
- **COMFORT IS NEGOTIABLE:**
Get away from dangerous prescriptive or performance-based “comfort” standards, *especially international ones!*

*Achieving adequate comfort with energy and carbon reduction must be a societal objective, not a by-product.
Don't leave standards to the engineers, or the lawyers!*

Letter to *The Independent* yesterday

Unrealistic expectations of the British weather

You report (25 October) that up to four million people in the UK may now be affected by Seasonal Affective Disorder (SAD), up from 500,000 a decade ago.

Has anyone looking at the increased incidence of SAD considered its relationship with the emergence of an apparently widespread conviction that anything other than hot, sunny weather is well-nigh intolerable? In a climate like ours, this is a wholly unrealistic perspective, which arguably increases the susceptibility to SAD, yet it goes largely unchallenged. Even the weather forecasters bolster false expectations by regularly referring to wet,

chilly or windy weather in seasons other than summer as “disappointing”, when in fact it’s generally to be expected. As for temperature, these days we rarely have truly cold winters yet “chilly” is the new “cold”, adding yet another misperception of our climate.

The end result is a populace living and working in massively overheated buildings for some six months of the year, with all too many people convinced that the weather is terrible and blighting their lives. No wonder they become depressed. Those of us enjoying the delights of autumn are regarded as faintly eccentric by others

bemoaning the imminence of winter, while to admit a frisson of pleasure in anticipation of winter chill is considered frankly mad.

Yet there is so much to enjoy, indoors and outside. “Indoor” interests flourish in winter. You don’t have to be a winter-sports enthusiast to enjoy wrapping up against the cold for an invigorating walk followed by a warm glow on returning home. Our climate isn’t the finest but neither is it the worst and making the best of it makes it, and us, feel better.

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