Thermal Comfort & Green Buildings

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The discussion today

- What is comfort?
- What is Thermal Comfort?
- Why thermal comfort?
- Where is comfort in green design or retrofit?
- Green KPI’s and thermal comfort?
- Conclusion.
The Happy Planet Index
What is comfort?

- Comfort has been defined as: ‘that condition of mind that expresses satisfaction with the environment’

CIBSE guide A

Condition of mind not body?
What is thermal comfort?

- At least 80% of occupants feel thermally comfortable, or do not experience discomfort?

It is a result of activity level, clothing, air temperature, mean radiant temperature, air velocity and relative humidity.

Do you feel comfortable at this hall?
Why thermal comfort?

- Basic need of human being;
- Increased creativity and productivity;
- Higher health and wellbeing levels; and
- Less absence and leave.
WHERE IS COMFORT IN GREEN BUILDINGS (new or retrofit)?

COMFORT = ENERGY???
BENCHMARKS?

LEED 2009 for NEW CONSTRUCTION AND MAJOR RENOVATIONS

A system for certifying DESIGN, CONSTRUCTION, & OPERATION of the greenest buildings in the world

LEADERSHIP in ENERGY and ENVIRONMENTAL DESIGN

INDOOR COMFORT
YES

VERIFICATION
YES

OUTDOOR COMFORT
NO
IEQ Credit 7.1: Thermal Comfort-Design

Intent:
To provide a comfortable thermal environment that promotes occupant productivity and well-being.

Requirements:
Design heating, ventilating and air conditioning (HVAC) systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy.
IEQ Credit 7.2: Thermal Comfort-Verification

Intent:
To provide for the assessment of building occupant thermal comfort over time.

Requirements:
Provide a permanent monitoring system to ensure that building performance meets the desired comfort criteria. Agree to conduct a thermal comfort survey of building occupants within 6 to 18 months after occupancy. Residential projects are not eligible for this credit.
BRE Environmental & Sustainability Standard

BES 5063: ISSUE 2.0

BREEAM Gulf 2008 Assessor Manual

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Hea 10 – Thermal comfort

Intent:
To ensure, with the use of design tools, that appropriate thermal comfort levels are achieved.

Requirements:
Man 1 - Commissioning

Intent:

Simple Systems (naturally ventilated) – External Consultant/Facilities Manager

Review thermal comfort, ventilation, and lighting, at three, six and nine month intervals after initial occupation, either by measurement or occupant feedback.
BENCHMARKS?

Code for Sustainable Homes
Technical guide
May 2009
Version 2

A guide to zero energy housing

INDOOR COMFORT  NO
VERIFICATION  NO
OUTDOOR COMFORT  NO
BENCHMARKS?

The Pearls Design System for Estidama
New Buildings Rating Method

ESTIDAMA

SUSTAINABLE BUILDINGS AND NEIGHBOURHOODS

For Emirate of Abu Dhabi
Developed by ADUPC

INDOOR COMFORT

VERIFICATION

OUTDOOR COMFORT

YES

YES

YES
Intent:
To reduce heat in urban open space through passive cooling strategies.

Credit Requirements:
• a minimum 75% of the hard surface area in projected shade measured at 1:00 pm at the Equinox,
• Semi-enclosed or enclosed areas provided with breeze openings to allow air movement.
• vegetated walls, permanently mounted exterior ceiling or water features.
LB-23: Occupant Comfort and Control

Intent:
To reward projects that provide personally directed thermal comfort and control to occupants.

Credit Requirements:
Demonstrate individual supply and control of air supply, rates, air temperature, or radiant temperature
LB 24: Thermal Comfort Modeling

Intent:

To reward projects that are designed to provide optimal thermal comfort for their use.

Credit Requirements

Demonstrate with thermal modelling during Standard Operating Hours of Occupancy for 98% of the year PMV values achieved using standard clothing and metabolic rate value:

1 CREDIT POINT = PMV between -1 and +1
2 CREDIT POINTS = PMV between -0.5 and +0.5
CONCLUSION

- Comfort is certainly one of the main reasons to build or retrofit a building;
- Indoor and outdoor comfort both should matter for designers in all cases;
- Green design KPI’s are still progressing on comfort; and
- Designers/Architects must rethink about comfort as it is not only MEP’s responsibility.
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