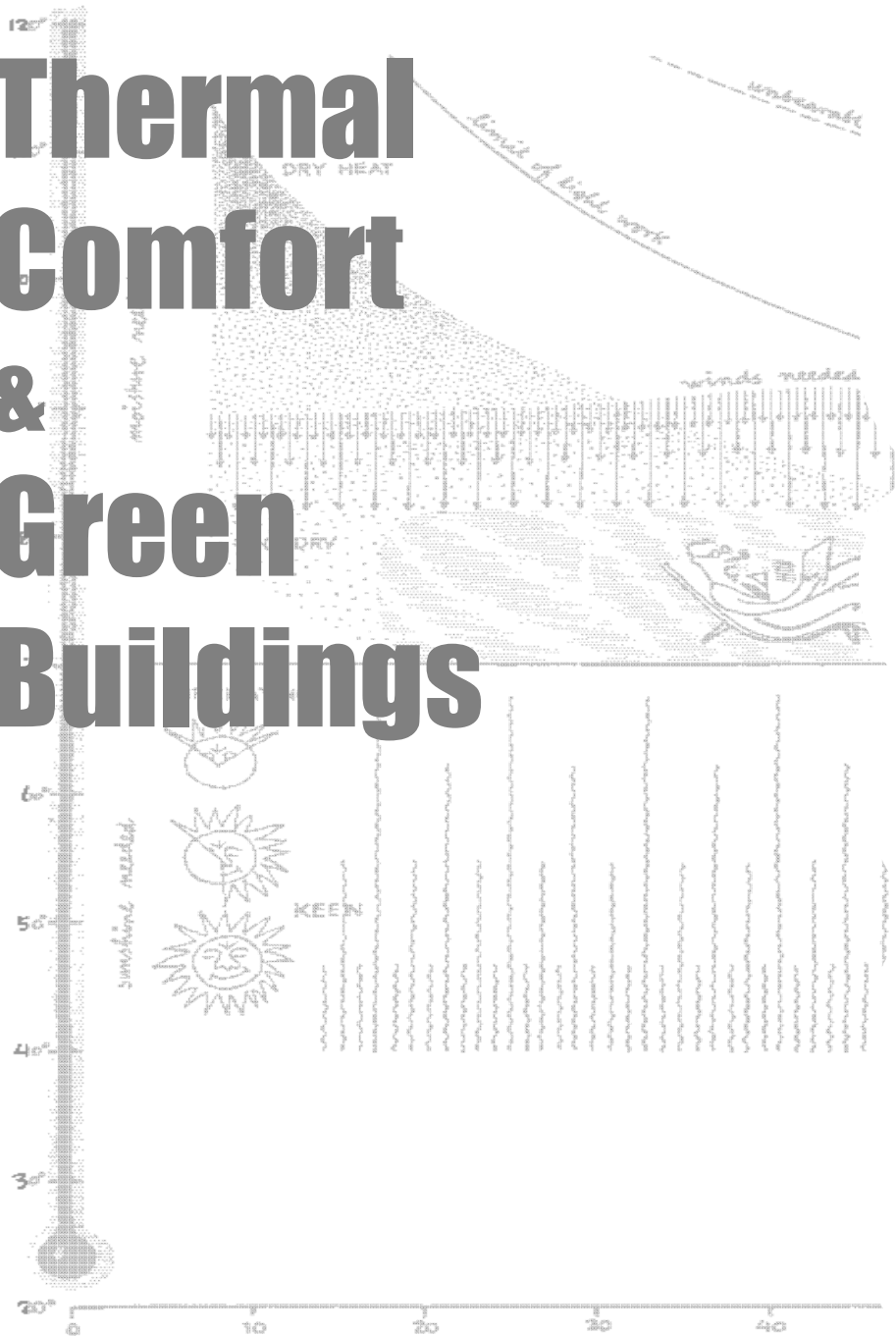
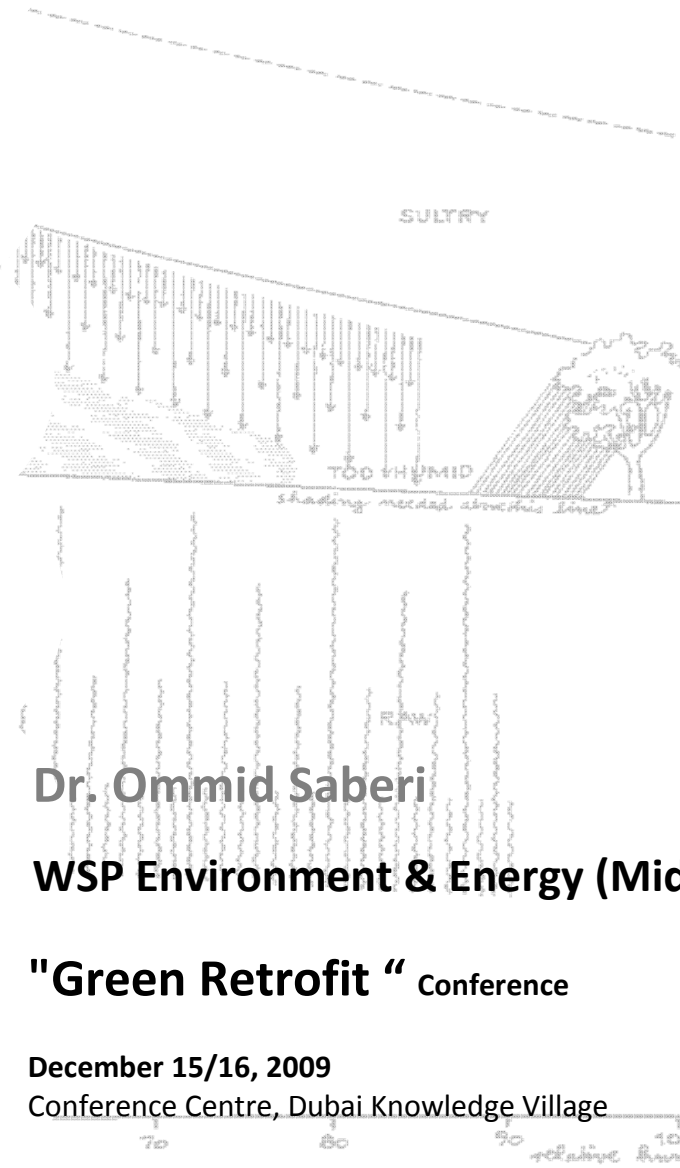


Thermal Comfort & Green Buildings



46. Schematic bioclimatic index.



Dr. Ommid Saberi

WSP Environment & Energy (Middle East)

"Green Retrofit " Conference

December 15/16, 2009

Conference Centre, Dubai Knowledge Village

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



 **THE HAPPY PLANET INDEX 2.0**

Why good lives don't have to cost the Earth

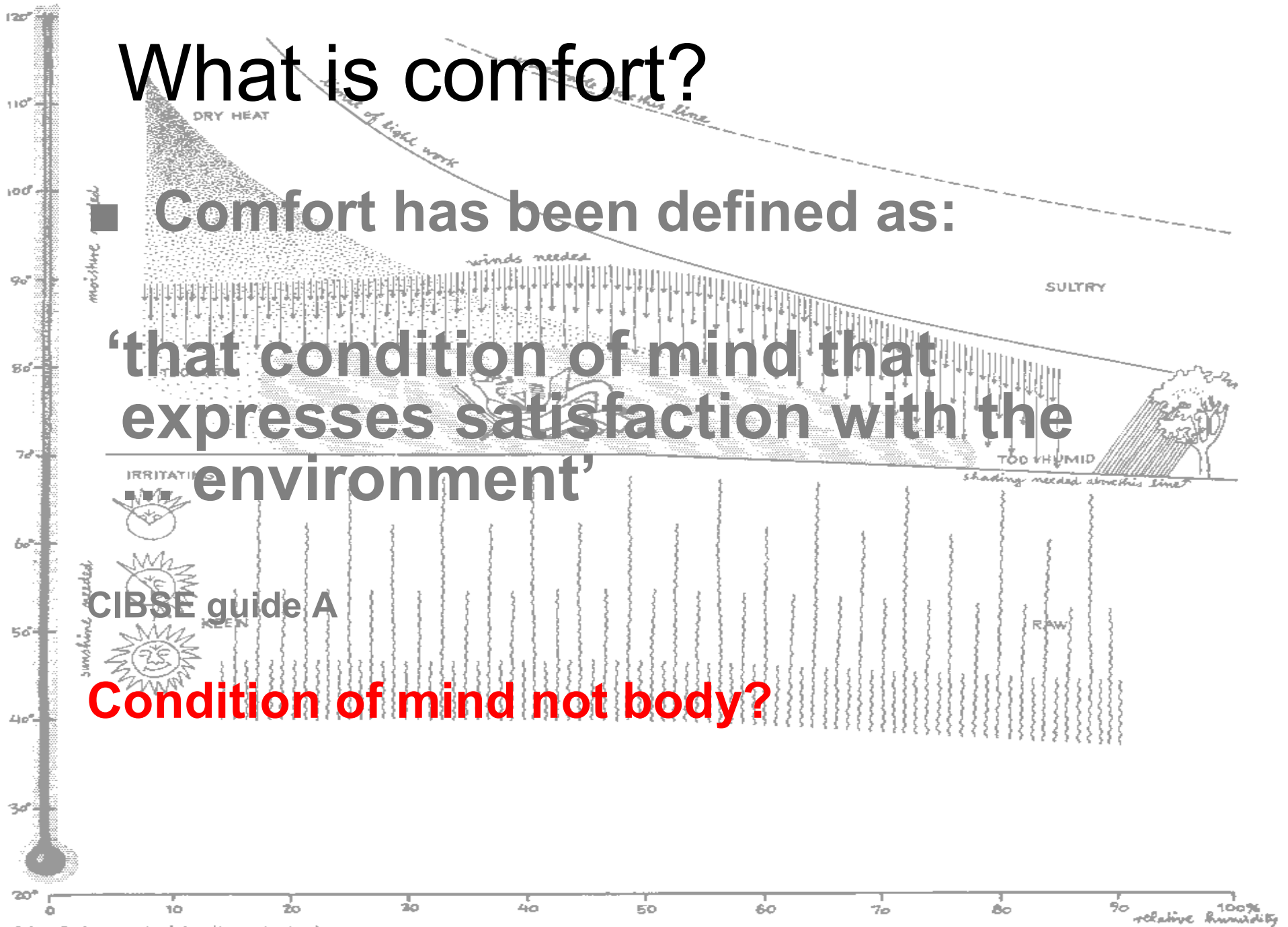
What is comfort?

■ Comfort has been defined as:

‘that condition of mind that expresses satisfaction with the environment’

CIBSE guide A

Condition of mind not body?



46. Schematic bioclimatic index.

➤ What is thermal comfort?

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

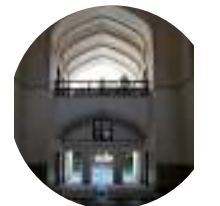
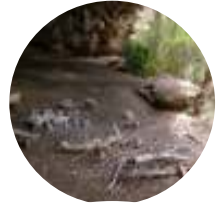
It is a result of activity level, clothing, air temperature, mean radiant temperature, air velocity and relative humidity

Do you feel comfortable at this hall?

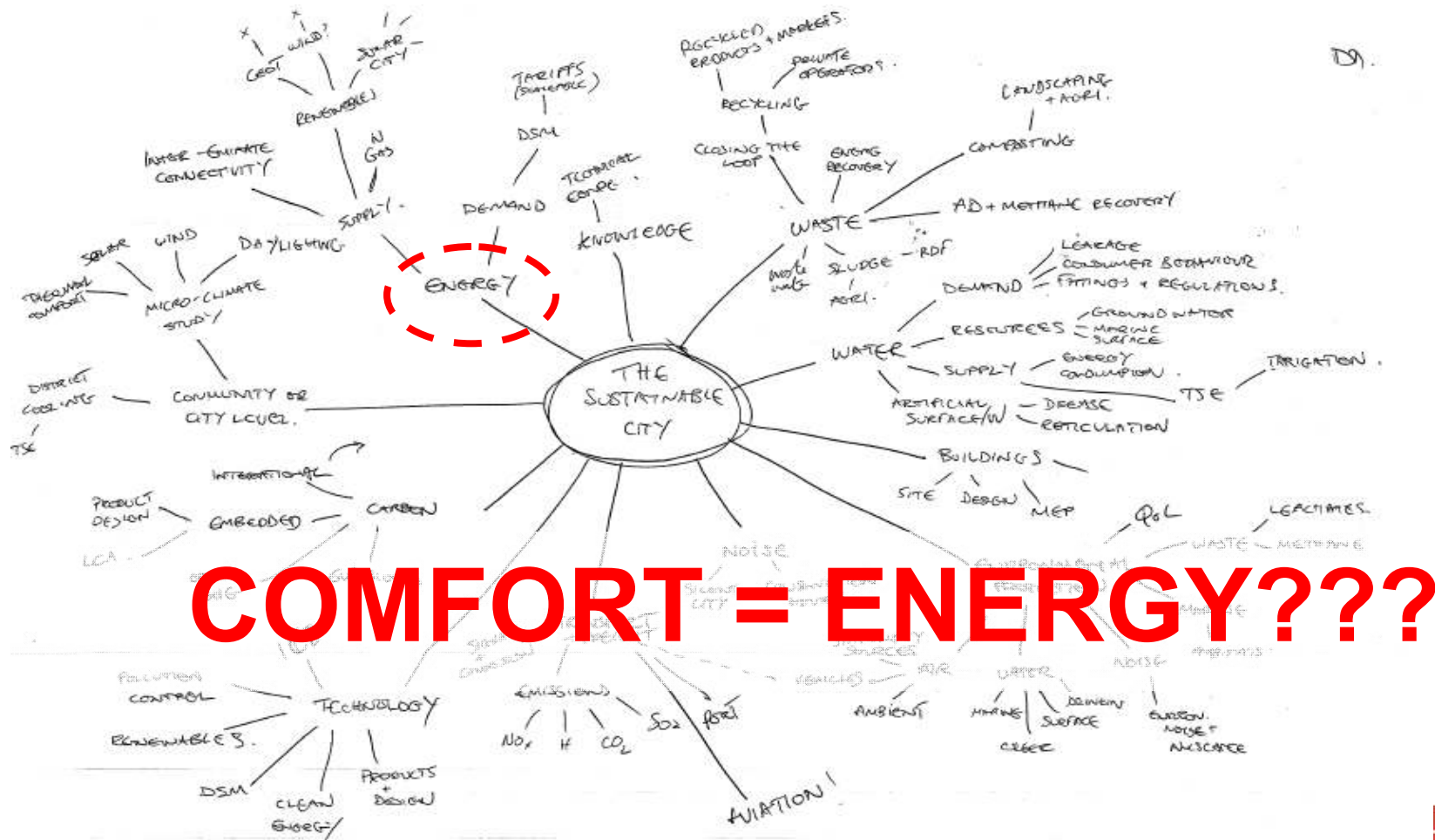


Why thermal comfort?

- 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

For Public Use and Display
LEED 2009 for New Construction and
Major Renovations Rating System
USGBC Member Approved November 2008



LEADERSHIP in
ENERGY and
ENVIRONMENTAL
DESIGN

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

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.



BENCHMARKS?

breeam

BRE Environmental & Sustainability Standard

BES 5063: ISSUE 2.0

BREEAM Gulf 2008 Assessor Manual

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breglobal

BREEAM GULF

A system for certifying
DESIGN, CONSTRUCTION, & OPERATION
of the green buildings in the Gulf

INDOOR COMFORT

YES

VERIFICATION

YES

OUTDOOR COMFORT

NO



Hea 10 – Thermal comfort

Intent:

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

Requirements:

1. Thermal modelling to ensure comfort conditions In accordance with CIBSE Guide A “Environmental Design” or ASHRAE Handbook 2003: HVAC applications.

Man 1 - Commissioning

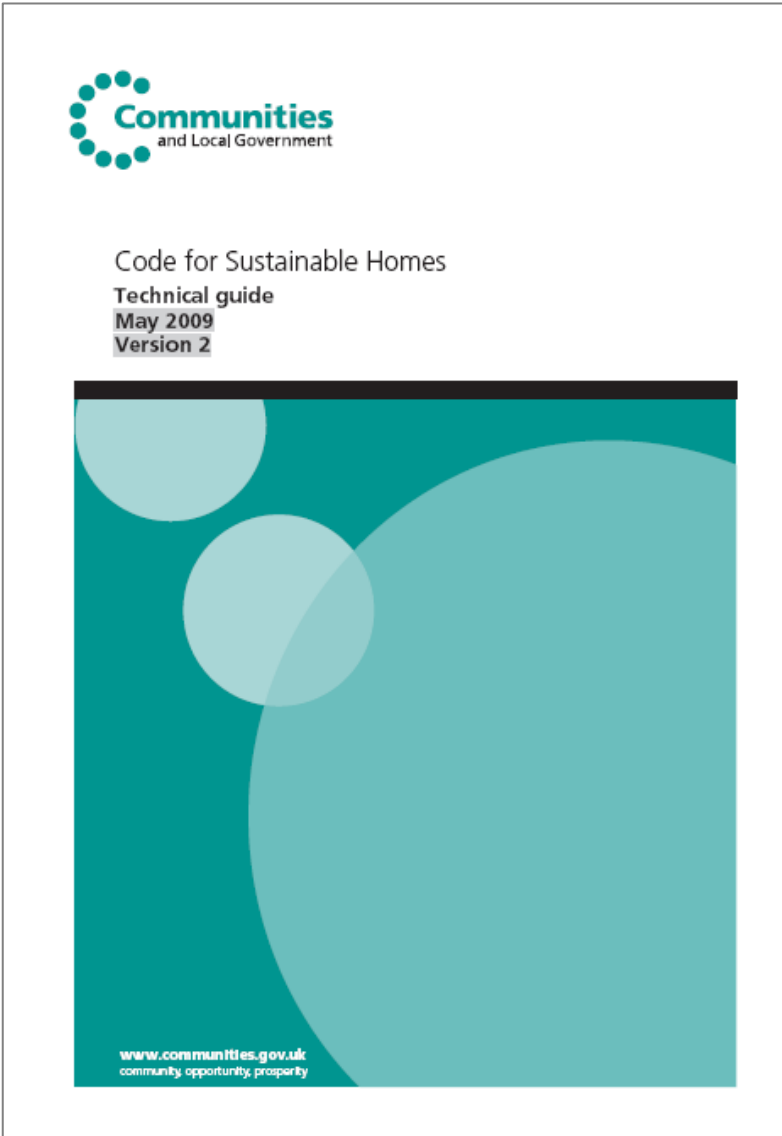
Intent:

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

A guide to zero energy housing

INDOOR COMFORT	NO
VERIFICATION	NO
OUTDOOR COMFORT	NO



BENCHMARKS?



ESTIDAMA

SUSTAINABLE BUILDINGS AND
NIGHBOURHOODS

For Emirate of Abu Dhabi

Developed by ADUPC

INDOOR COMFORT	YES
VERIFICATION	YES
OUTDOOR COMFORT	YES



LB□r1: Outdoor Thermal Comfort

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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