



# Emerging trends in building certification

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Bangalore 15 April 2010

## ICMQ means

Italian certification and inspection body leader in the building materials and construction industry:

- € 6.200.000 of turnover
- 1.500 certified companies (12 countries) only in construction
- 70 highly skilled and experienced full time employed auditors
- **International Green Team**: architects and engineers including 5 Leed AP, Energy Auditors, Griha Evaluator
- Wide range of certification, inspection and training services
- International accreditation
- 4 certification schemes for systems, 2 for products, 1 for buildings
- Third party inspection and design validation
- Reputation based on seriousness and competence



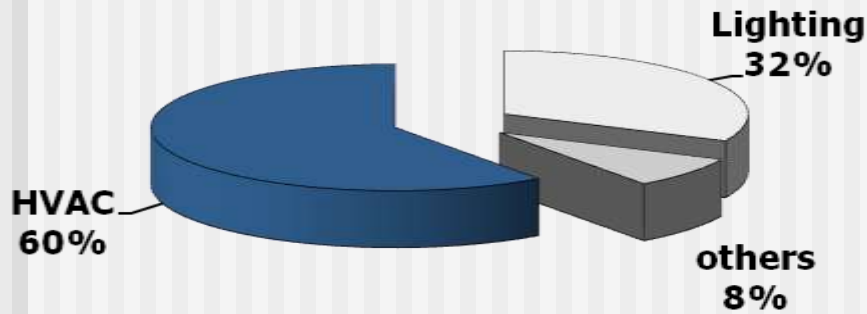
# Building performance objectives

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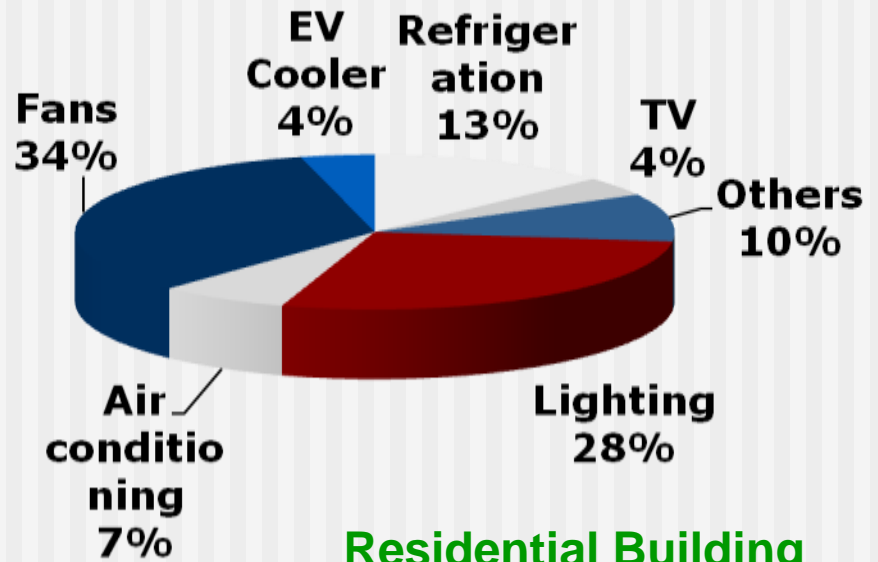
- reduce the consumption of energy and other resources
- improve indoor comfort (thermal, acoustic, lighting)
- increase safety (fire resistance)
- reduce wastage of building materials
- reduce environmental pollution

Many codes and certification schemes have been developed as a response to this problem aiming at improving the buildings' construction process to create structures that are environmentally sustainable.

# Indian scenario in building



**Commercial Building**



**Residential Building**

## Energy efficiency objectives

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# Where the demand comes from?

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- **Public Bodies:** interested in reducing the resource consumption and to manage a sustainable development according to more and more stringent international requirements (like Kyoto Protocol 1997/12/11 achieving the goal of "stabilization of greenhouse gas concentrations in the atmosphere to prevent dangerous anthropogenic interference with the climate system).
- **Developers:** interested to increase the value and the attractiveness of a building and to distinguish their brand against competitors
- **Investors:** Interested to address capitals where the sales price and the consequent margin and Return on Investment can be higher thanks to the attractiveness of a building
- **End Users:** Interested in addressing their saving in a building ensuring a reduced maintenance and expenses during its Life Cycle and an increased comfort level.



# The European challenge

The EU has made a commitment to integrate environmental concerns into all relevant policy areas, including energy.

- **“Energy integration strategy”** (November 1999).
- **Green Paper entitled ‘Towards a European Strategy for the security of energy supply’** in which it outlined a number of priorities for future actions, including the promotion of energy efficient technologies (November 2000)
- **energy integration strategy review** (2001)
- **European Climate Change Programme (ECCP)** also focuses on the integration of energy into climate change policies
- **Directive 2002/91 EU** on the energy performances of buildings



# The Italian adaptation: law 192/05

## Legislation

The Transposition Decree of the Directive EPBD was approved in Italy on August 19<sup>th</sup>, 2005.

The Italian Ministry of Productive Activities has developed regulations and guidelines necessary for implementing the Law.

## New building

All the new buildings must be certified in accordance with the existing rules about the energy performance.

## Existing building

All the existing buildings must be certified for all deed of sale and location.

## Timeline

1 July 2007: mandatory for entire building of 1000 m<sup>2</sup> or more

1 July 2008: mandatory for entire building of 1000 m<sup>2</sup> or less

1 July 2009: all single housing units



# The Indian reply: ECBC 2007

## Energy Conservation Building Code (ECBC)

Launched in 2007 by Bureau of Energy Efficiency, Ministry of Power

Sets of standards & guidelines for Energy efficient Building

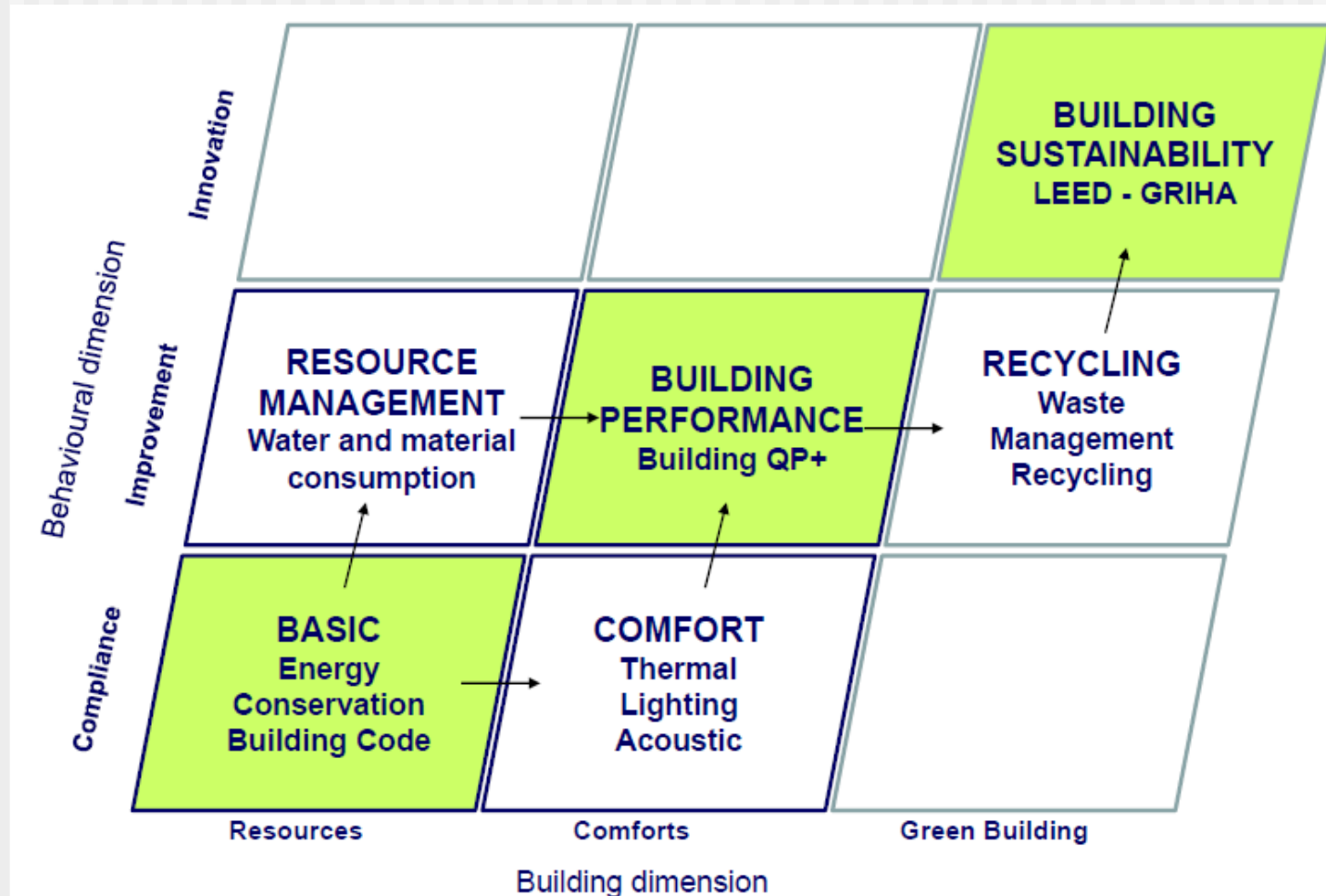
Intended for new commercial buildings – loaded more than 500 KW  
Buildings having conditioned area of 1000 sq. meter

1. Building Envelope (Walls, Roofs, Windows)
2. Lighting(Indoor and Outdoor)
3. Heating Ventilation and Air Conditioning(HVAC)System
4. Service Hot Water Heating
5. Electrical Systems

National Benchmark~180kWh/m<sup>2</sup>/year

ECBC Compliant building~110kWh/m<sup>2</sup>/year

# Building certification evolution





# ECBC: basic

ENERGY EFFICIENCY

=





## Basic: energy efficiency

**Scope:** Ensuring minimum energy efficiency level for new commercial buildings – loaded more than 500 KW – and/or buildings having conditioned area of 1000 sq. meter

**Strategic target:** Improving energy efficiency for each category of building (e.g. for Commercial building moving from ~180kWh/m<sup>2</sup>/year (National Benchmark) to **ECBC Compliant building~110kWh/m<sup>2</sup>/year**)

**How:** compliance with a set of standards & guidelines for energy efficient buildings (ECBC) regarding

1. building Envelope (walls, roofs, windows)
2. lighting (indoor and outdoor)
3. heating ventilation and air conditioning (HVAC) system
4. service hot water & pumping
5. electrical systems

**Implementation:** Mandatory (from 2011)

## Basic: energy efficiency

**Existing buildings:** BEE recently launched a service aimed at calculating the Energy Performance Index (EPI) for each building and assigning a label with one or more stars according to EPI bandwidths. Such bandwidths are calculated on the basis of a data collection for each category of building in 5 climatic zones



**New buildings:** verifying the compliance of a building with ECBC requirements (at this moment is not clear what conformity assessment strategy will be achieved).

The conformity assessment approach has not been established yet (based on design? Construction? Both?)

## Open issues – Existing buildings

BPO - A

EPI = X

BPO - B

EPI = Y

We consider two buildings :

**same** climatic zone, same built up area and the connected load but they have

**Different** No. of People

2 similar buildings have a different EPI due to different consumption depending on different number of people

**How to improve the EPI in an existing building?**

**What about comfort and productivity in the work place?**

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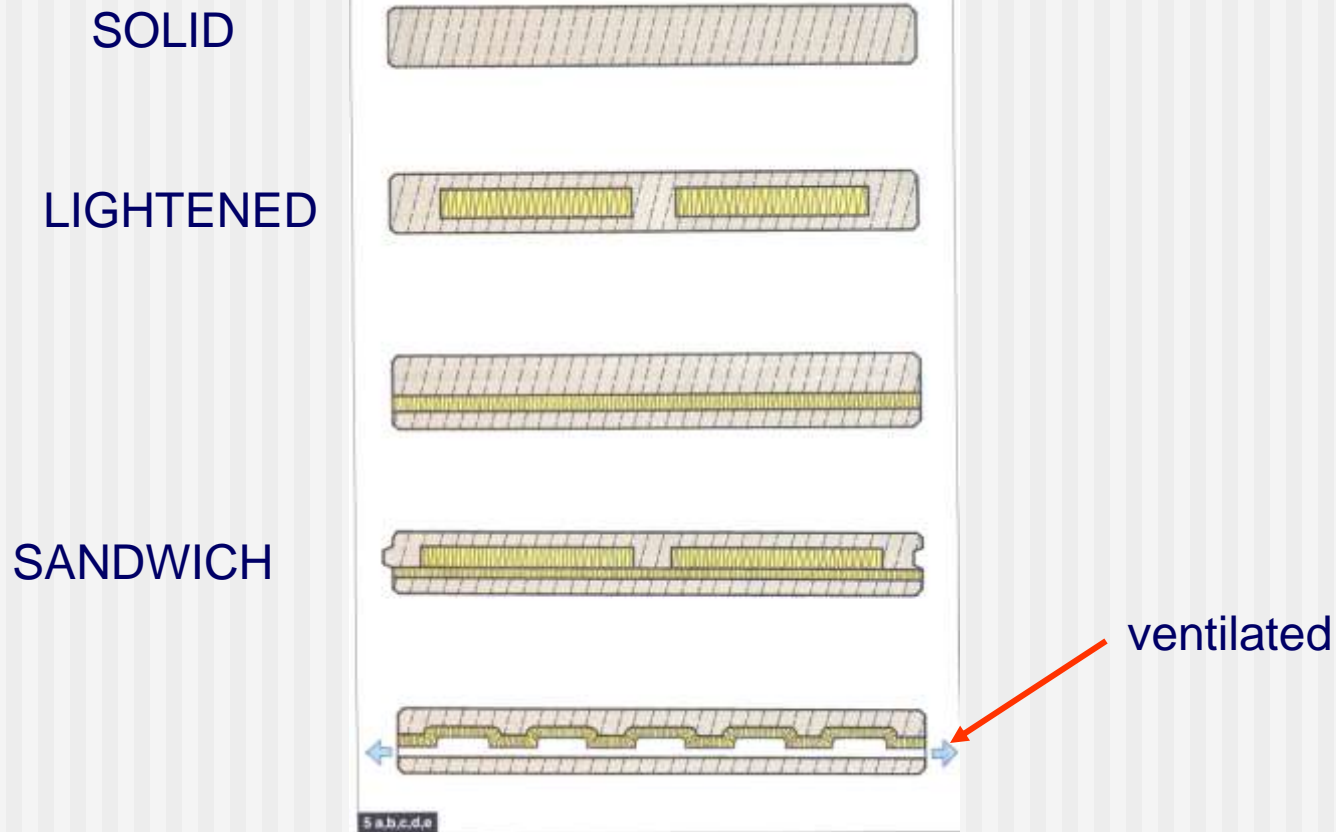
We consider two buildings :  
**same** climatic zone, built up area and No. of People

**How many star I receive if I comply with ECBC (mandatory and prescriptive)?**

**It may depend on architectural solution, building materials and mechanical/electrical equipments**

**How the compliance with ECBC is verified? (Design stage? Construction Phase? Both?)**

# Pre-cast concrete wall elements



# Building QP+ : ICMQ Proposal

**FIRE RESISTANCE**

**THERMAL COMFORT** + **LIGHTING COMFORT** + **ACOUSTIC COMFORT**

**ENERGY EFFICIENCY & WATER CONSUMPTION**





# Building QP+

**Scope:** certification scheme considering not only the energy efficiency but also comfort and other performances (water, fire resistance, etc.) **for existing and new buildings**

**Strategic target:** Increasing the value of the building through a reduction of operational and maintenance costs along the building life cycle

**How:** measuring the building performances in terms of:

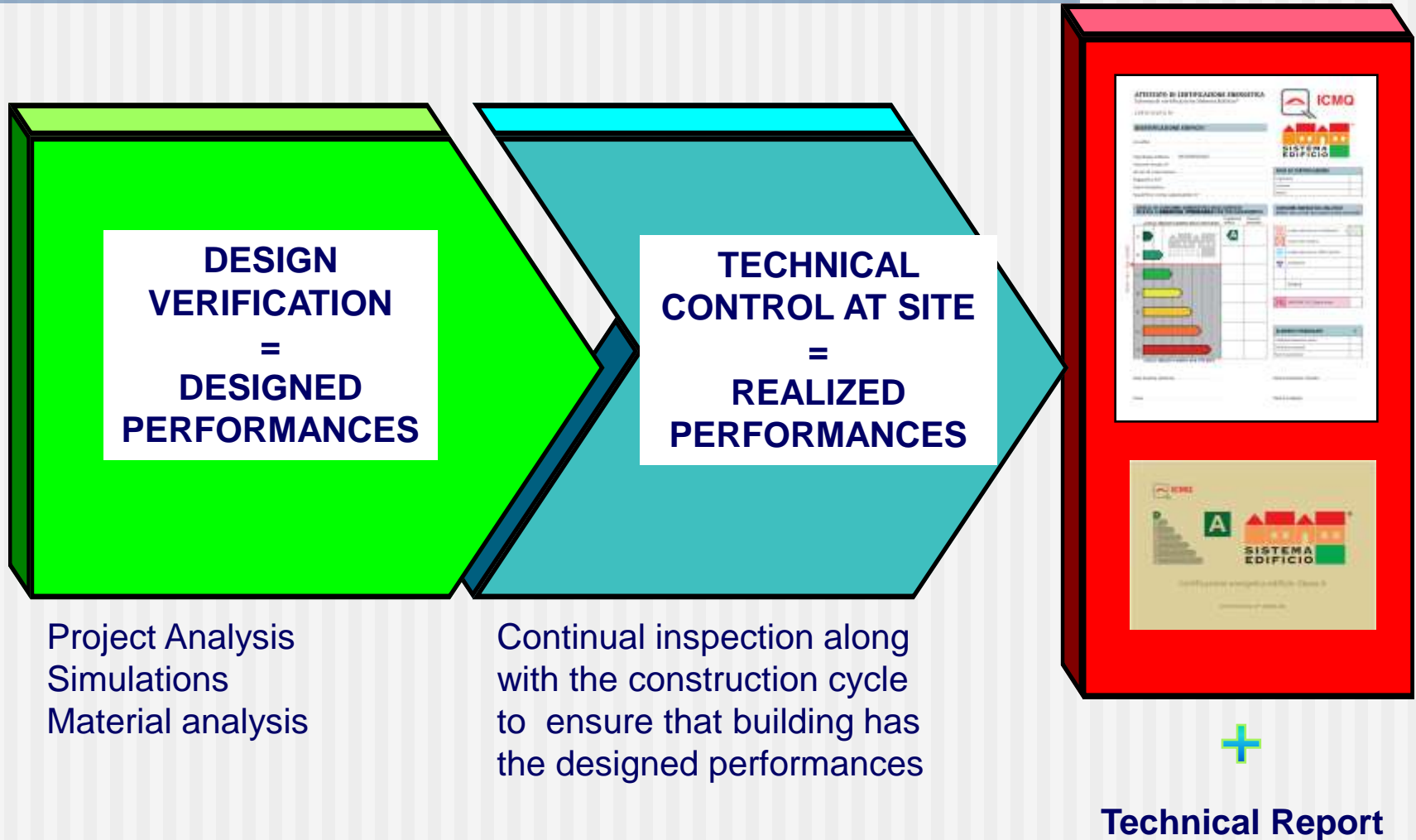
1. Energy efficiency (compliance with ECBC code)
2. Water consumption
3. Thermal comfort
4. Lighting comfort (beyond energy consumption)
5. Acoustic comfort
6. Fire resistance

**Reference Standard:** International standard and methodologies for measuring building performances

**Implementation:** Voluntary



# New Building approach





# Projects

- Current projects - energy efficiency is incorporated with construction quality.
- Tata Housing, Boisar, India - 2 Lakh Sq. Meter / 144 Buildings



**TATA HOUSING**



## International Projects

- Hotel – Rosa Degli Angeli



- New Head Quarter Campari – Milan ( Area = 1.1 million m<sup>2</sup> )



## International Projects

- Residential area- campari Towers



- Residential Housing Complex –Borgoverde in Vimodrone  
21 Bldgs & 981 Apartments





# Comfort

## **Thermal Comfort:** (ISO 7730)

determining the thermal balance sensation for the body as a whole by measuring environmental parameters (air temperature, mean radiant, temperature, air velocity (chill factor) or air humidity) to calculate two fundamental indexes:

- a) the predicted mean vote (PMV)
- b) The predicted percentage of dissatisfied (PPD)

## **Acoustic Comfort** (ISO 354; ISO 9613-1):

Measure of acoustic comfort model with predictions for rooms, such as rooms in dwellings and offices, and common spaces in buildings, such as stairwells, corridors and rooms containing machinery and technical equipment to estimate the total equivalent sound absorption area or reverberation time of enclosed spaces in buildings.

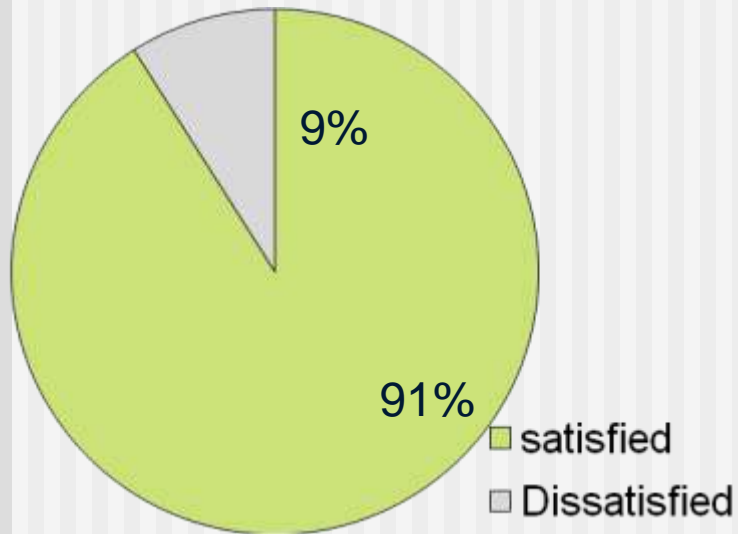
## **Lighting Comfort** (e.g. IS 4347 for Hospitals lighting)

Determining how well a source provides visible light from a given amount of electricity. A good balance between lighting, energy saving and comfort may increase the workspace usability and attractiveness (particularly relevant for buildings like hospitals, hotels, shopping malls, offices, etc.)

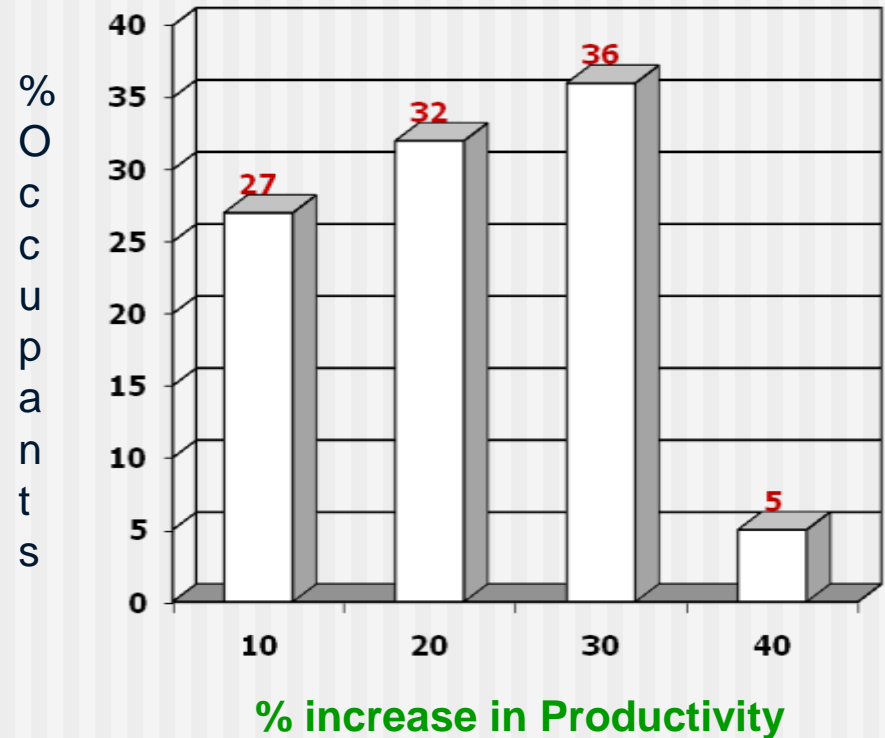


# Comfort = well being / productivity

**Light Satisfaction Level**



**Productivity Gain**





## Benefits

Increasing the value of a property by:

- achieving a voluntary certificate attesting compliance with ECBC (**pioneer instead follower**)
- Achieving superior performances in comfort (to increase productivity)
- Improving the attractiveness of building towards Customers
- Increasing the brand image of a builder/developer
- Improving the quality of a building due to a continual control either in design and construction stage and a systematic reporting system
- Minimizing the retrofit costs
- Reducing maintenance costs of a building along the life cycle

INNOVATION + SUSTAINABILITY

+

LIGHTING  
COMFORT

+

THERMAL  
COMFORT

+

ACOUSTIC  
COMFORT

=

+

ENERGY EFFICIENCY & WATER CONSUMPTION





# Building Star Rating Project

# BEE- Star Rating Project



**Overall Objectives:** establishing a “data based EPI bandwidths system” tailored for categories of buildings (*BPO, Hotels, Hospital, Shopping Mall, Data Center, IT Centre & Residential Building*) and climatic zones (*warm & humid, hot & dry, temperate, composite, cold*) to refer the Star Rating system.

In particular this project aims to:

- ❑ collect the energy consumption DATA on **800 buildings** in different categories and climatic zones
- ❑ calculate the EPI for each building
- ❑ arrive at the EPI bandwidths for Star Rating

# Climatic zone – INDIA



# Use of EPI

- ❑ Energy Performance Index (EPI ) is calculated as a ration between the Total Annual Energy consumption KWH and the Built Up Area in m<sup>2</sup>
- ❑ The EPI allows the Benchmarking among different buildings in the same category and climatic zone for comparing the energy consumption and to boost a continual energy consumption reduction.
- ❑ Most commercial buildings have energy performance index (EPI) of 200 to 400 kWh/sq m/year.
- ❑ Energy-conscious building design has been shown to reduce EPI to 100 to 150 kWh/sq m/year in India – development of such buildings is restricted to environmentally-sensitive corporate.

# Example of use of the EPI bandwidth

## Commercial Building EPI – Band width more than 50% air Conditioning

### Composite

EPI(Kwh/sqm/year)	Star Label
190-165	1 Star
165-140	2 Star
140-115	3 Star
115-90	4 Star
Below 90	5 Star

### Warm and Humid

EPI(Kwh/sqm/year)	Star Label
200-175	1 Star
175-150	2 Star
150-125	3 Star
125-100	4 Star
Below 100	5 Star

### Hot and Dry

EPI(Kwh/sqm/year)	Star Label
180-155	1 Star
155-130	2 Star
130-105	3 Star
105-80	4 Star
Below 80	5 Star

## Findings in commercial buildings

- Most of the commercial buildings are cautious of the energy consumption
- Almost 70 % of commercial buildings are below 3 star ratings.
- Buildings are not designed or constructed considering the energy efficiency
- Two similar building with same utility & consumption pattern having large EPI variation (one of the major reason of building envelope)
- Commercial buildings owners want to improve EPI but the retrofit cost is very high with large pay back period.

# Conclusion

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- Measuring the EPI of an existing building is important but not enough
- **The energy efficiency improvement at reasonable cost depend on project development phase**
- **Effective building performance assessment must include:**
  - a) design verification and validation: design modification costs are acceptable & feasible
  - b) Technical control at site: to verify if “designed performances” are also “realized”. Modifications are possible at acceptable costs depending on the construction phase a problem is identified)
- **The challenge is “how to identify the weakness point of a building in a stage that allows a modification of the architectural, mechanical and electrical solution to improve the energy efficiency at acceptable costs”**

# Thank You !

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Thank you for your attention