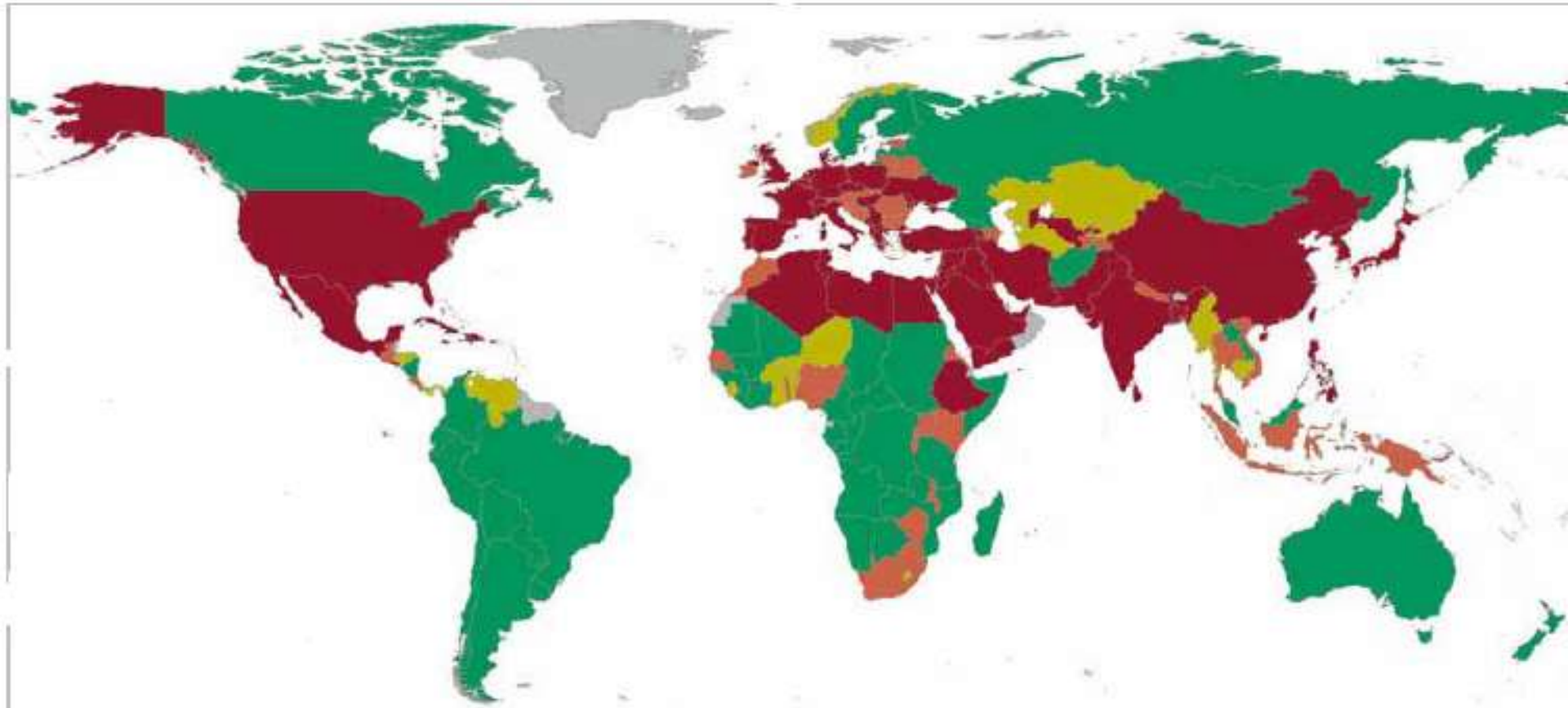


# Green building movement Challenges / opportunities



**CISCO VTV--BANGALORE  
USGBC -PLATINUM CI**

# Ecological Debtor & Creditor Countries



## Debtors

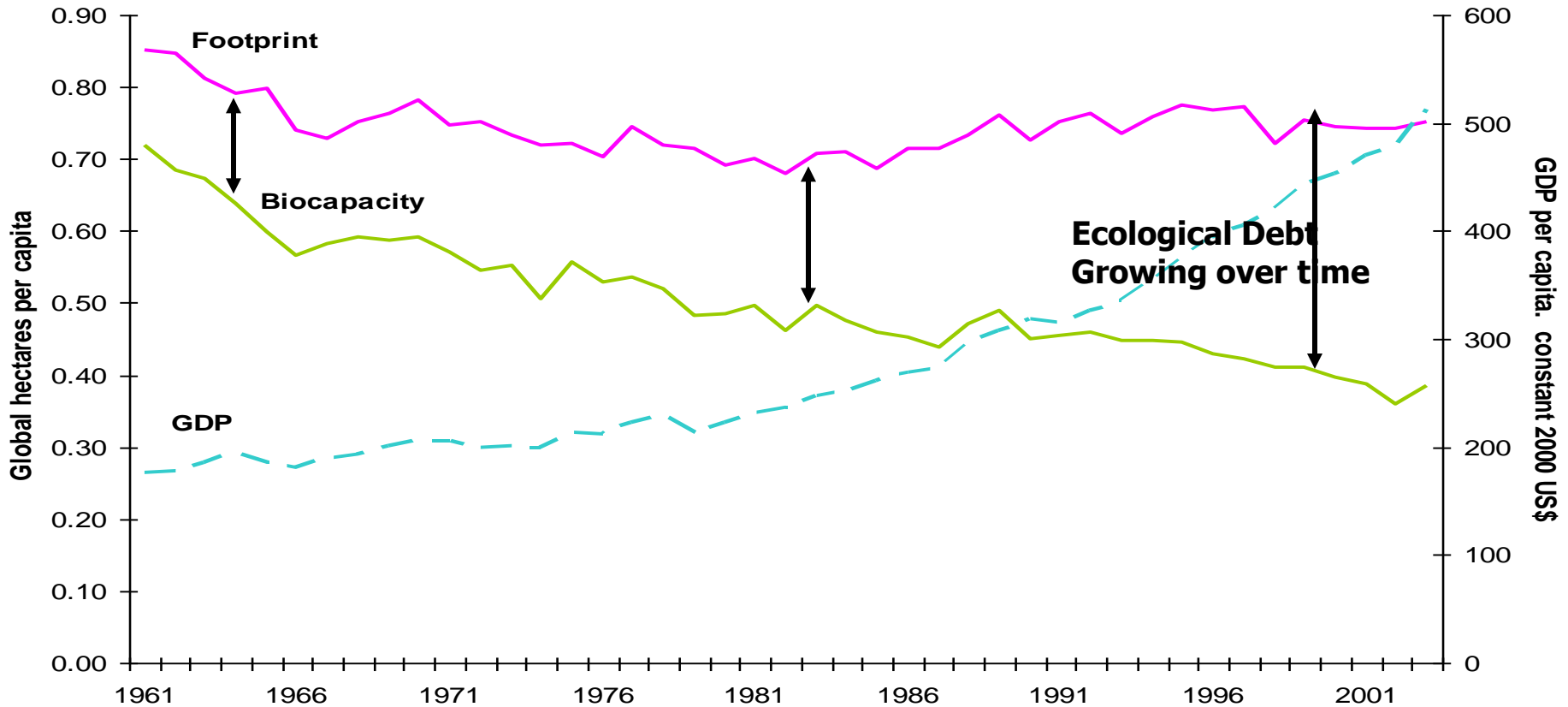
- Footprint = 1.0 - 1.5 Biocapacity
- Footprint > 1.5 Biocapacity

## Creditors

- Biocapacity = 1.0 - 1.5 Footprint
- Biocapacity > 1.5 Footprint

# INDIA'S ECOLOGICAL FOOTPRINT

India Footprint, Biocapacity and GDP



Source: Global Footprint Network, USA



# Why 'SUSTAINABLE DEVELOPMENT'.....

- ❖ For India to achieve a Developed Country status
  - Need to maintain high GDP growth rates
- ❖ Flipside of higher growth rates
  - Increased use of natural resources
    - ❑ Energy, Water, etc.
  - Increased emissions and discharges



**NEED OF THE HOUR!!!**

**IN OUR RACE TO SAVE THE PLANET.**

**Need to focus on Ecologically Sustainable growth**

*Godrej*

## Core Purpose

**“To promote and champion conservation of Natural resources in Indian Industry”**



**without compromising on high and accelerated growth**

# The Green Beginning

**A unique Public – Private Partnership  
( CII, Govt of Andhra Pradesh, USAID and Pirojsha Godrej Foundation )**

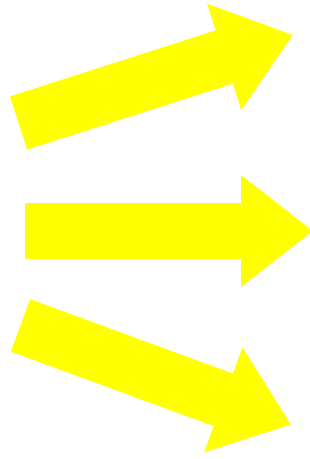


**C I I – Sohrabji Godrej Green Business Centre  
Hyderabad**

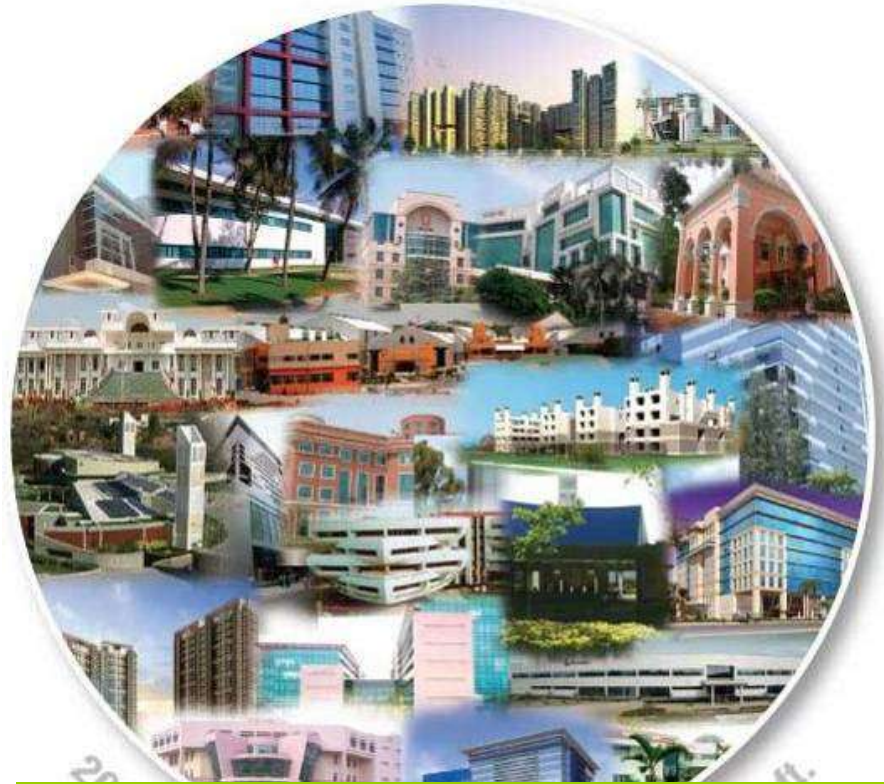


# .... the journey.

2001, 1 Green Building, 20,000 sq. ft.



**2001: 1<sup>st</sup> Green Building  
20,000 sq.ft.**



**2010: 500 Green Buildings  
352 Million sq.ft.**

# Green Building Movement in India

S No	Criteria	2001 →	Till date
1	CEOs & senior people involved	50	≈ 5,500
2	No. of professionals trained on Green Building concepts	10	≈ 7,000
3	No. of registered Green Buildings Built – in Area (sq.ft)	1 0	500 352 Million
4	Green Building products & equipment	5	90
5	IGBC Membership <i>(Founding Members)</i>	0	722 <i>(75)</i>
6	IGBC Local Chapters	0	9
7	IGBC AP	0	65
8	IGBC Assessors	0	8

# Growth of Green Buildings in India

**ALL TYPES OF BUILDINGS, ALL OVER THE COUNTRY :**

❖ **IT PARKS**

❖ **OFFICES**

❖ **BANKS**

❖ **AIRPORT**

❖ **CONVENTION CENTRES**

❖ **EDUCATIONAL INSTITUTIONS**

❖ **HOTELS**

❖ **RESIDENTIAL**

❖ **FACTORIES**



# Rating Programmes to Suit Different Building Types

❖ One single rating cannot be applied to suit all building types

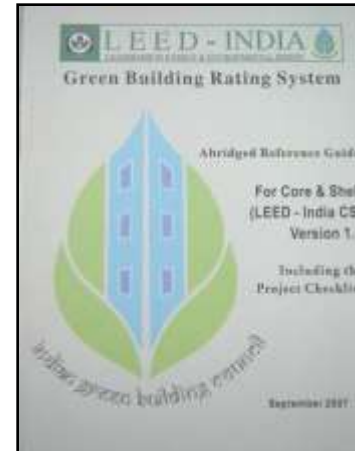
❖ Programmes launched

- LEED India NC
- LEED India CS
- IGBC Green Homes
- IGBC Green Factory Buildings



❖ Other Programmes on the anvil

- IGBC Green SEZs \*
- IGBC Green Schools\*
- IGBC Existing Buildings \*
- IGBC Green Cities \*
- IGBC Landscape \*



\* Rating under development

# Market Transformation

## ❖ New Materials & Services introduced due to the Movement

### ❖ Materials

- High performance glass
- Wall & Roof insulation
- Low VOC paints, adhesives & sealants
- CRI certified carpets
- FSC Certified wood
- High albedo roofing material
- Flyash blocks
- Eco-friendly chemicals

### ❖ Equipment / systems

- Waterless urinals
- High CoP chillers
- CO2 sensors
- Root Zone treatment plants
- Wind towers

### ❖ New Services

- LEED Facilitation services
- Energy simulation
- III Party Commissioning

**Green Materials & Equipment Business Potential: USD 40 Billion by 2012**



# Benefits of green buildings

- ❖ **Shift from Green Image to benefits**
- ❖ **Tangible benefits**
  - **Energy savings : 30-40%**
  - **Water savings : 20-30%**
- ❖ **Intangible benefits**
  - **All good aspects associated to green**
    - ❑ **Better Indoor ambience**
      - ☑ **Day lighting & views**
      - ☑ **Improved health and productivity**



# Green Building Certification Consultancy



## ❖ FACILITATION

➤ **PROVIDING COMPLETE ROAD MAP (FROM START TO FINISH) TO THE CUSTOMER FOR OBTAINING THE CERTIFICATION**

## ❖ ENERGY SIMULATION

➤ **MODELS THE BUILDING, OFFERING VARIOUS OPTIONS IN ENERGY SAVINGS**

## ❖ COMMISSIONING

❖ **VERIFIES THE DESIGN INTENT AND ENSURES THE SYSTEMS OPERATE AS INTENDED.**

❖ **TECHNICAL CONSULTANTCY IN IMPLEMENTING THE PROJECT DESIGN & CROSS VERIFICATION OF THE SAME**

# COST OF GREEN BUILDINGS - INDIAN EXPERIENCE

Building	Sqft	Rating	% Inc. in cost	Typical Payback
CII-Godrej GBC	20,000	Platinum (56 points)	20 %	7 years
ITC Green Centre, Gurgaon	1,70,000	Platinum (52 points)	15 %	6 years
Wipro, Gurgaon	1,75,000	Platinum (57 Points)	8 %	5 years
Grundfos Pumps, Chennai	40,000	Gold (42 Points)	6 %	3 years



**WIPRO TECHNOLOGIES, Gurgaon**  
LEED NC Platinum



# Energy Savings Realised

Building	Sq.ft	Normal Building (kWh)	Actual Building (kWh)	% Reduction	Annual Energy Savings (Rs in Lakhs)
Wipro	1,75,000	48,00,000	31,00,000	40%	102
ITC	1,70,000	35,00,000	20,00,000	45%	90
CII Godrej GBC	20,000	3,50,000	1,30,000	63%	9

- ❖ **Energy consumption**
- ❖ **Local climate,**
- ❖ **Density of occupancy,**
- ❖ **Occupancy schedule,**
- ❖ **Internal loads**





# **Green Perception and Ground realities.**

# Perceptions ...

- Cost Factor



- Time consuming and Efforts...



- Achievement of Credit Points ...

# Turbo Energy Limited, Chennai Platinum Rated



<b>NO. OF DISHES</b>	<b>: 60</b>
<b>EACH DISH AREA</b>	<b>: 16 SQ. MTR.</b>
<b>HOT WATER TEMP.</b>	<b>: 170 C</b>
<b>AREA COVERED ON TERRACE</b>	<b>: 1,400 SQ. MTRS</b>
<b>RATED HVAC CAPACITY</b>	<b>: 90 TR</b>
<b>AREA AIR CONDITIONED</b>	<b>: 35,000 SQ. FT.</b>

Size : 37,000 sq. ft.

### *Salient Features*

- ❖ *India's Greenest LEED Rated Building, II Greenest in the World*
- ❖ *100% Solar air – conditioned*
- ❖ *In-situ wind turbine of capacity 5kW*
- ❖ *Rs. 40 Lakhs worth of old furniture was reprocessed & reused in the building*



# Kalpataru Square, Mumbai Platinum Rated Core & Shell



Size : 3,26,937 sq. ft.

## *Salient Features*

- ❖ *First Platinum Rated Core and Shell building outside of USA*
- ❖ *Sourced green power from Biomass power plants*
- ❖ *High performance glass and water cooled chillers*
- ❖ *Annual potable water reduction by 65%*

# SUZLON 'ONE EARTH' CORPORATE CAMPUS PLATINUM – NC



# UNIQUE FEATURES

## *Campus with multiple Blocks*

- ❖ **RENEWABLE ENERGY HYBRID : PHOTO-VOLTAIC-WIND POWER INTEGRATED SYSTEM**
- ❖ **INSTALLED CAPACITY : 155 kW**
- ❖ **ESTIMATED GENERATION PER ANNUM : 2.5 LAC KWH / ANNUM**
- ❖ **> 5% OF THE TOTAL POWER REQUIREMENT**
- ❖ **WATER COOLED VARIABLE REFRIGERANT VOLUME CHILLING SYSTEM (ONE OF THE 1<sup>ST</sup> IN INDIA)**
- ❖ **DAY LIGHTING / MAX. USE OF LED LIGHTING SYSTEM**
- ❖ **LANDSCAPING : NATIVE & ADAPTIVE SPECIES**
- ❖ **ZERO WASTE POLICY**
- ❖ **RAPIDLY RENEWABLE MATERIALS**
- ❖ **WATER REDUCE – RECYCLE (100%) -- REUSE**

## Technology Block, L&T, Hazira Platinum Rated



Size : 37,000 sq. ft.

### *Salient Features*

- ❖ *Third greenest building in India*
- ❖ *Complete reuse of old furniture and wood based materials*
- ❖ *Elimination of potable water for irrigation and reduction of 75% potable water for flushing.*
- ❖ *Construction waste management up to 96%*

## VAPOUR ABSORPTION CHILLER

❖ Make	: Thermax
❖ Rated Capacity	: 150TR
❖ Loading (100%)	: 6kW
❖ Medium (Fuel)	: Natural Gas
❖ Chilled Water Entering Temp	: 12 C
❖ Chilled Water Leaving Temp	: 7 C
❖ Cond. Water Entering Temp	: 36 C
❖ Cond. Water Leaving Temp	: 32 C

## Solar Photo Voltaic Details

❖ Panels at terrace feeding directly the nearest grid.	
❖ Photovoltaic Panels. Make-TATA BP SOLAR	
❖ Installed Capacity	: 10kW
❖ Investment	: 30 Lacs
❖ Size of panel	: 5ft x 3 ft, 30 in Nos
❖ Area consumed at terrace	: 500 sq.ft
❖ Avg. Pwr. Generation	: 24 kw/day
❖ Peak Pwr. Generation	: 35 kw/day.

# Kirloskar “YAMUNA” Corporate Building , Pune Platinum Rated




Size : 1,25,000 sq.ft built-up area

### *Salient Features*

- ❖ *Reduced overall conductance for the building envelope*
- ❖ *Building Management System*
- ❖ *Monitoring of CO2 (Demand Control Ventilation)*
- ❖ *Efficient water cooled VRF System*





# Energy Simulation



# EA CREDIT 1 : OPTIMIZE ENERGY PERFORMANCE

INTENT : TO ACHIEVE INCREASING LEVEL OF ENERGY PERFORMANCE ABOVE BASELINE IN PREREQUISITE

## NEW CONSTRUCTION

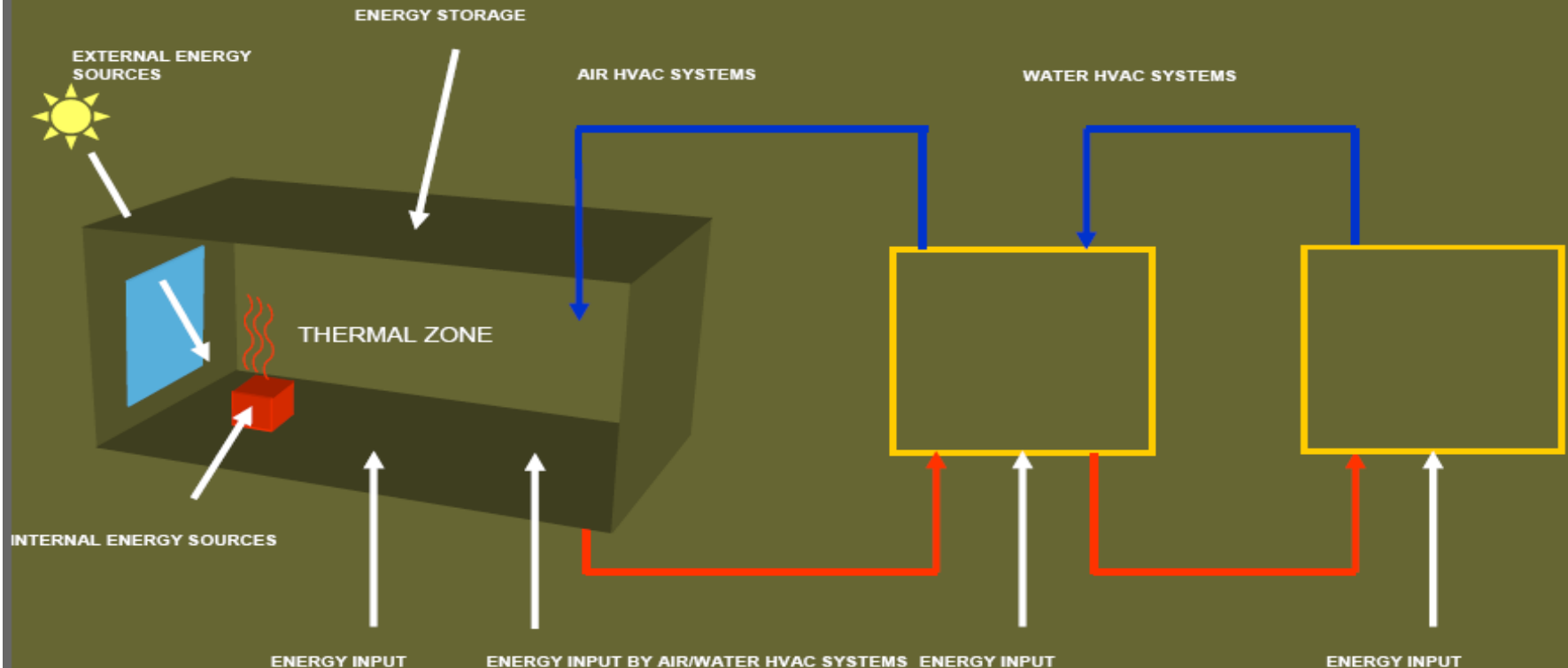
NEW BLDGS	POINTS
10.5%	1
14%	2
17.5%	3
21%	4
24.5%	5
28%	6
31.5%	7
35%	8
38.5%	9
42%	10

# Building Modeling/Simulation...?

- ❖ **Process to Analyse, Assess, Quantify Design Concepts**
- ❖ **Benefits :**
  - **Significant Energy Reduction, Occupant Comfort**
  - **Informed Multidisciplinary Decision Tool**

**EFFECTIVE FOR CONVENTIONAL & GREEN BLDGS.**

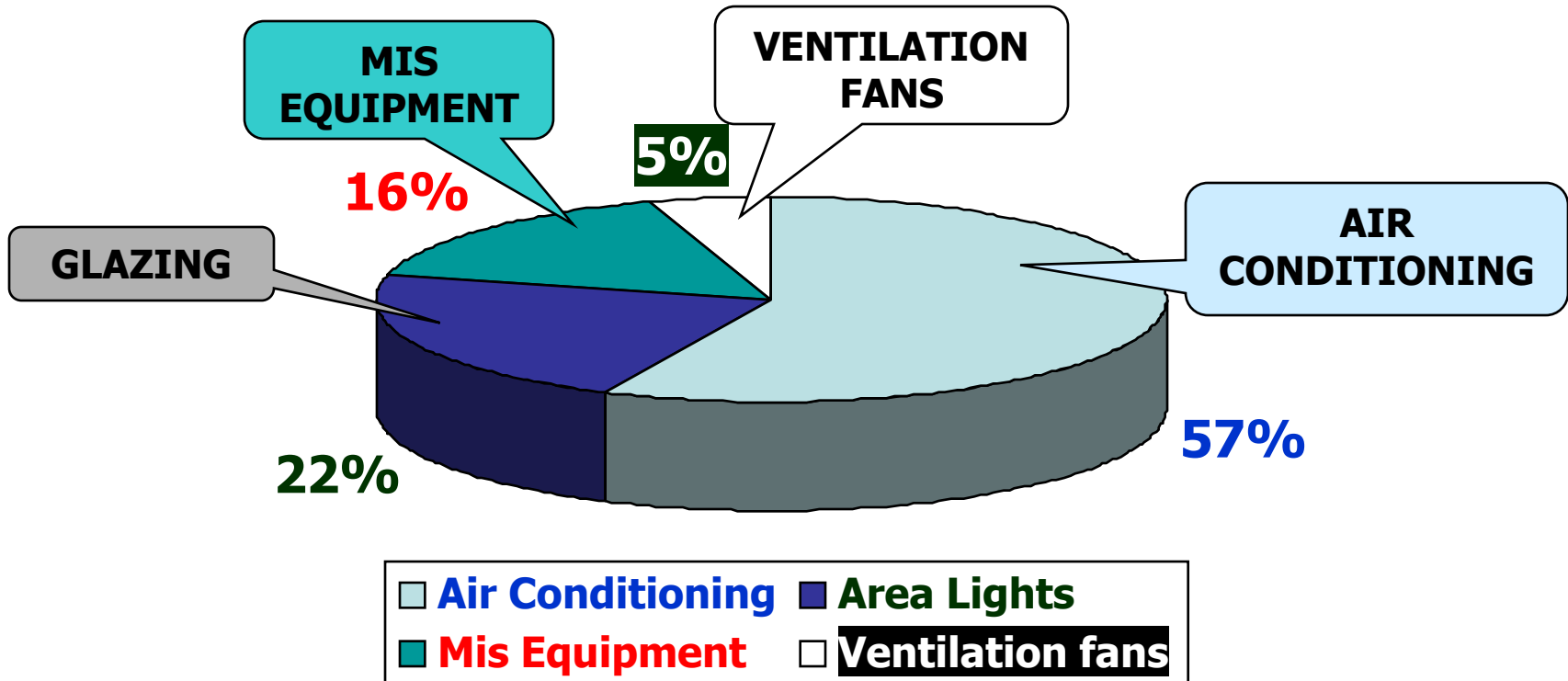
Building energy simulation > what it predicts





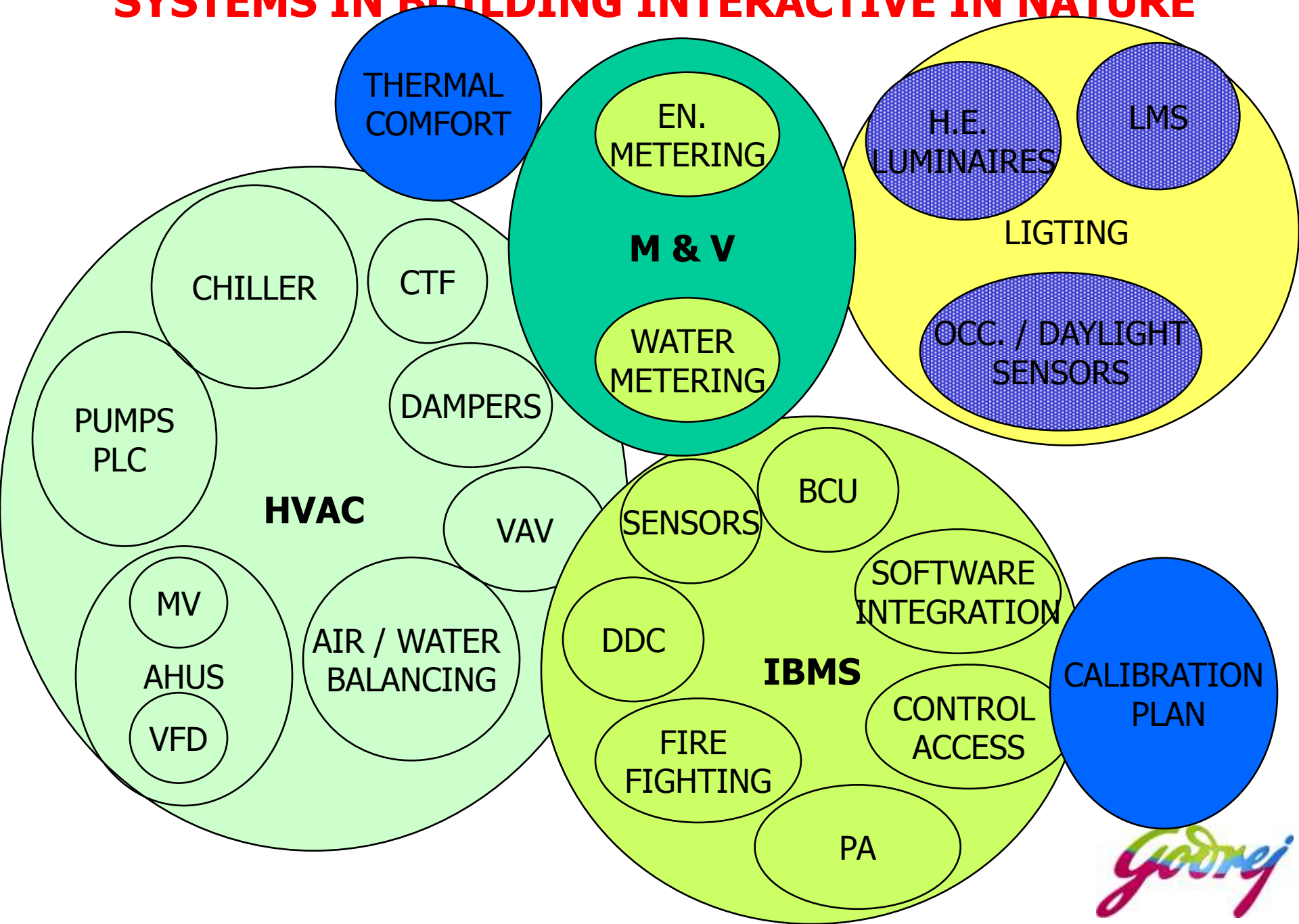
# Commissioning

# Building Energy Consumption



**Break-up of energy consumption in a building**

# SYSTEMS IN BUILDING INTERACTIVE IN NATURE



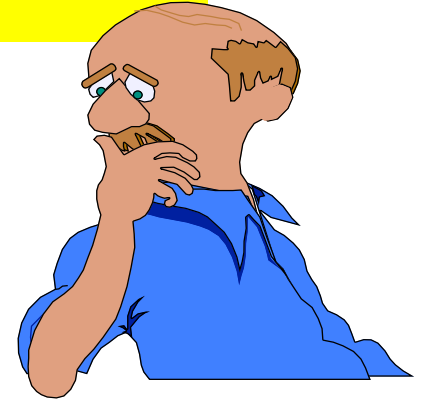
# ***WHY COMMISSIONING??***

## ❖ **Building has World Class Professionals on Board**

- ❖ World Class Standards considered in Design
- ❖ Selected most efficient Equipment / Technology available
- ❖ Allocated work to contractors of repute



# ***SAVINGS IN BUILDING.....?***



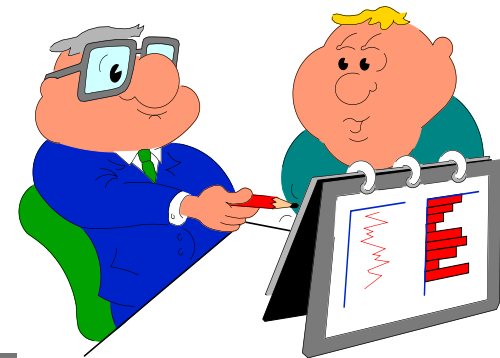
❖ **Will building perform as designed.....??**

❖ **Will owner/project team achieve energy and water savings as per design.....??**

❖ *DESIGNING (ALONE) A BUILDING GREEN..... DOES NOT ALWAYS RESULT IN ENERGY SAVINGS.....*

❖ **What is the solution.....??**

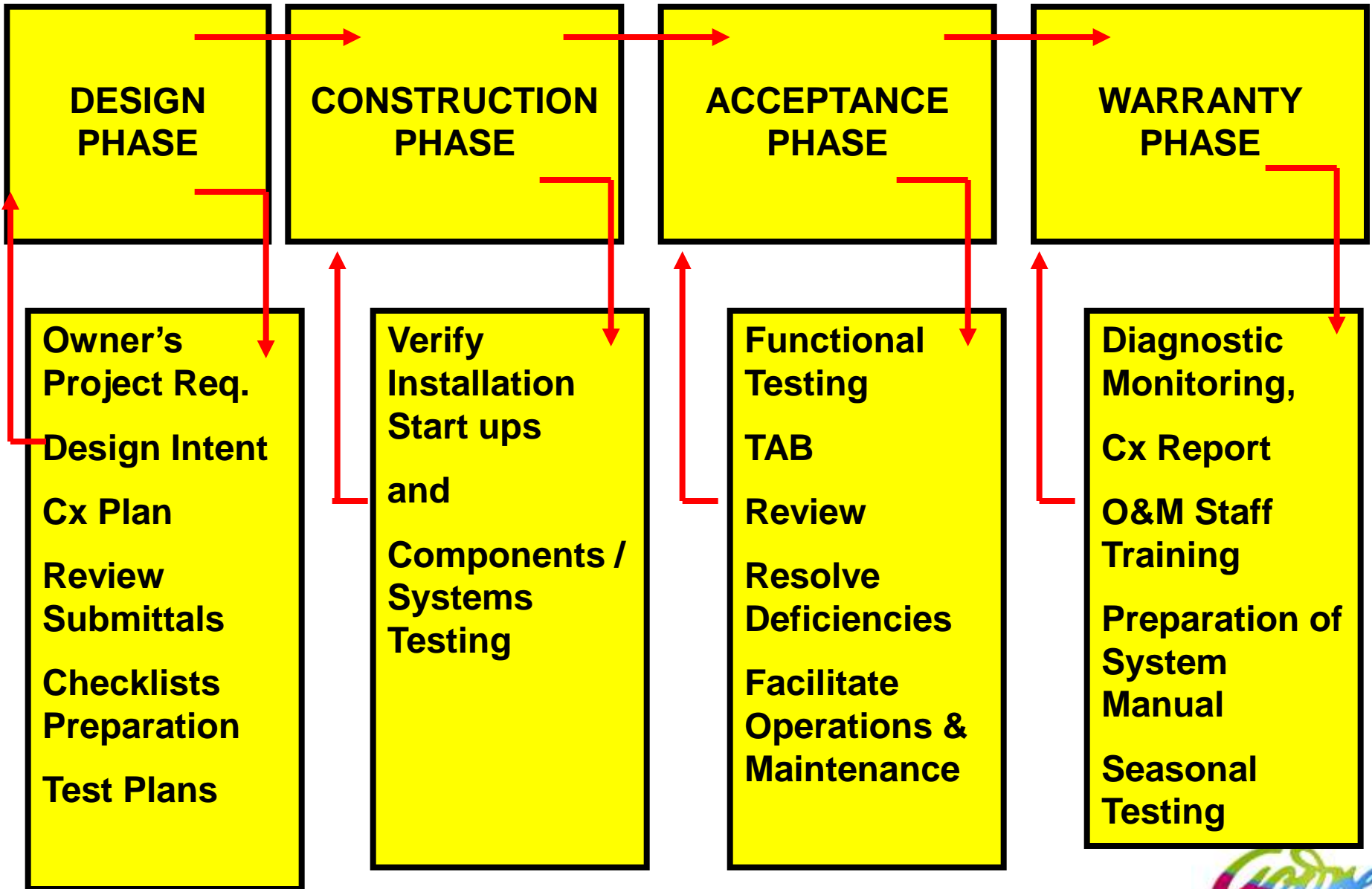
➤ **ANSWER IS ..... ????????**

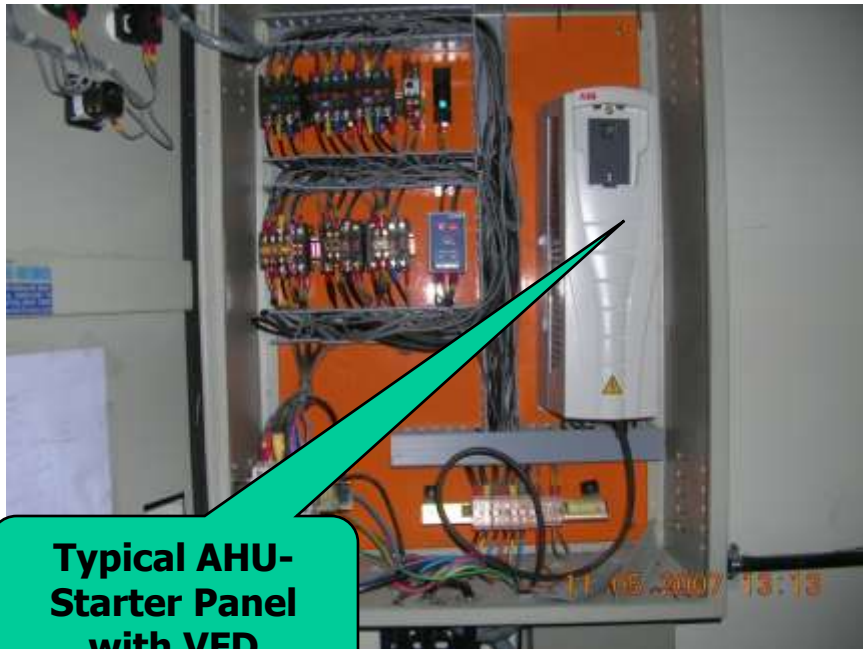
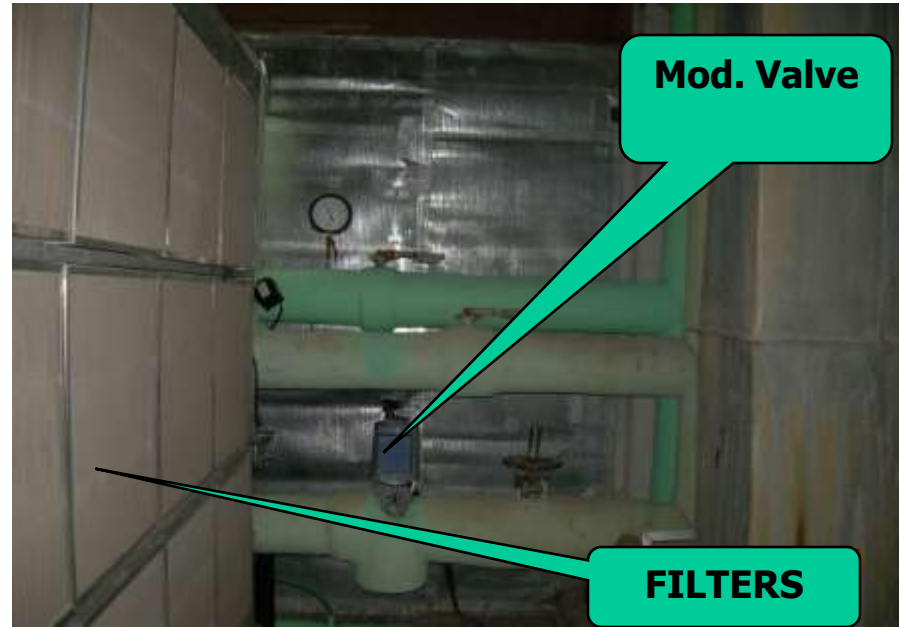
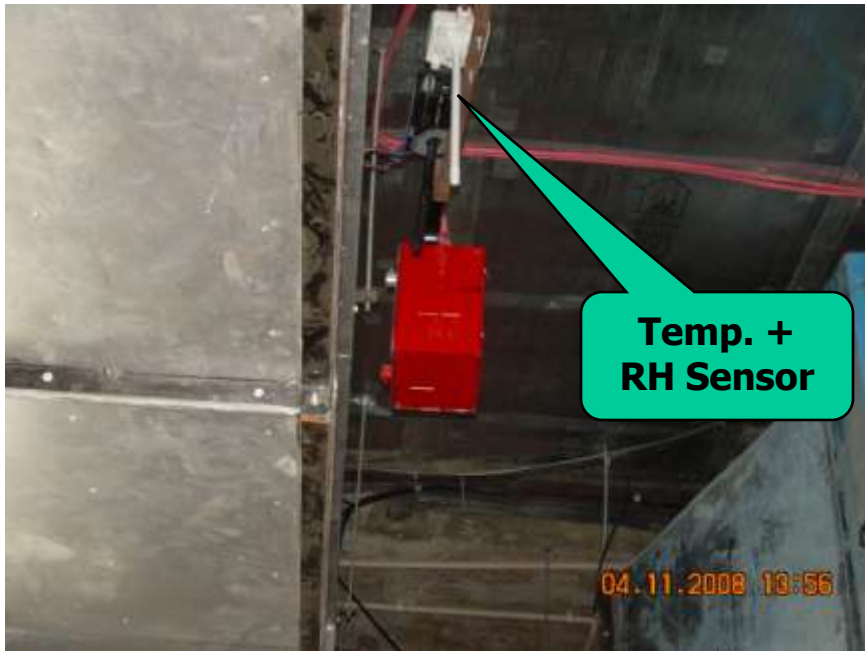


➤ **Commission the building by Third Party Agency**



# PHASES IN COMMISSIONING.....







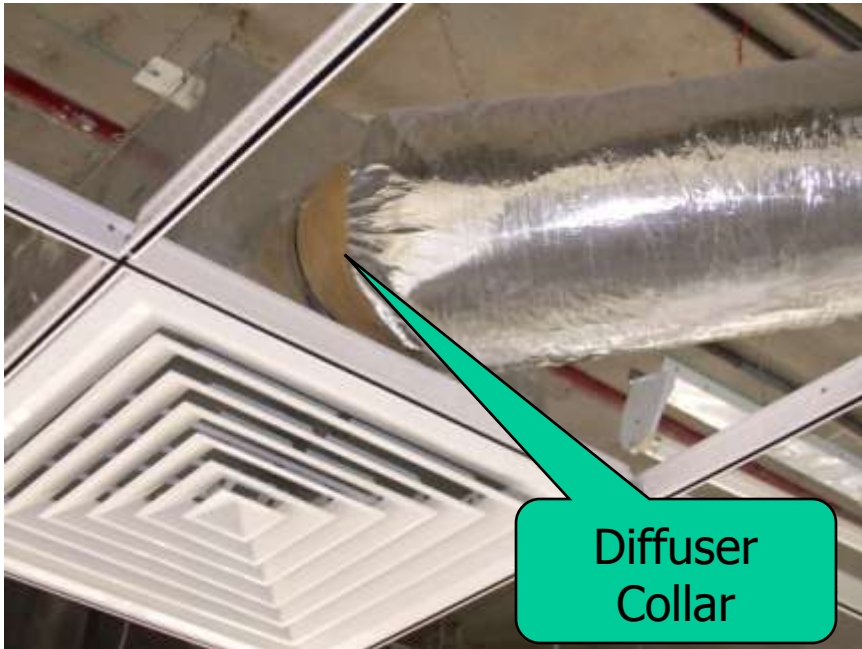


**HVAC/ELECT EQUIP. COVERED**



**Duct End Sealed**

**CONST.  
IAQ.  
MGMT.**



**Diffuser  
Collar**



**Smoke  
Detection**

# EA- CR. -5 'MEASUREMENT & VERIFICATION'



LUX LEVEL MEASUREMENT



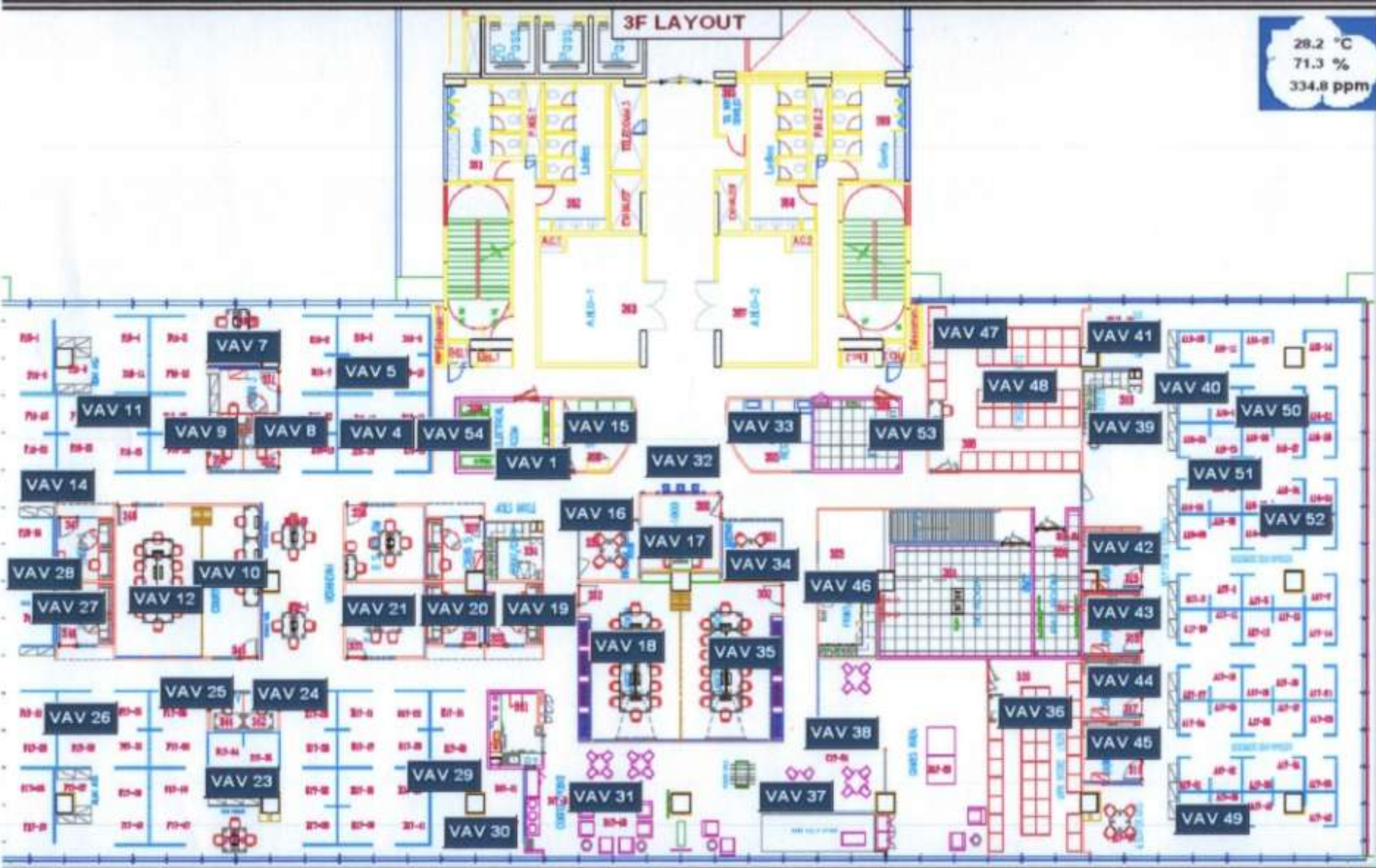
BTU METER



Air Flow Measurement across the Filters

3F LAYOUT

28.2 °C  
71.3 %  
334.8 ppm



SVS OVERVIEW



SELECTION



HEAT MAP



SUMMARY

04/11/09  
11:18:47

## COMMISSIONING .... COST ?

**IT IS AN INVESTMENT..... PAYS FOR ITSELF**



**ENERGY SAVING POTENTIAL ... 30-40%**

**WATER SAVING POTENTIAL ... 20-30%**

**0.5-3% OF THE SYSTEM CONST. COST.**

# ON-GOING JOURNEY



**TOWARDS SUSTAIN-ABLE  
DEVELOPMENT**