

# ECBC Implementation Experiences: Karnataka Initiatives

***Presented by:***  
Kanagaraj Ganesan  
24 March 2017



Empowered lives.  
Resilient nations.

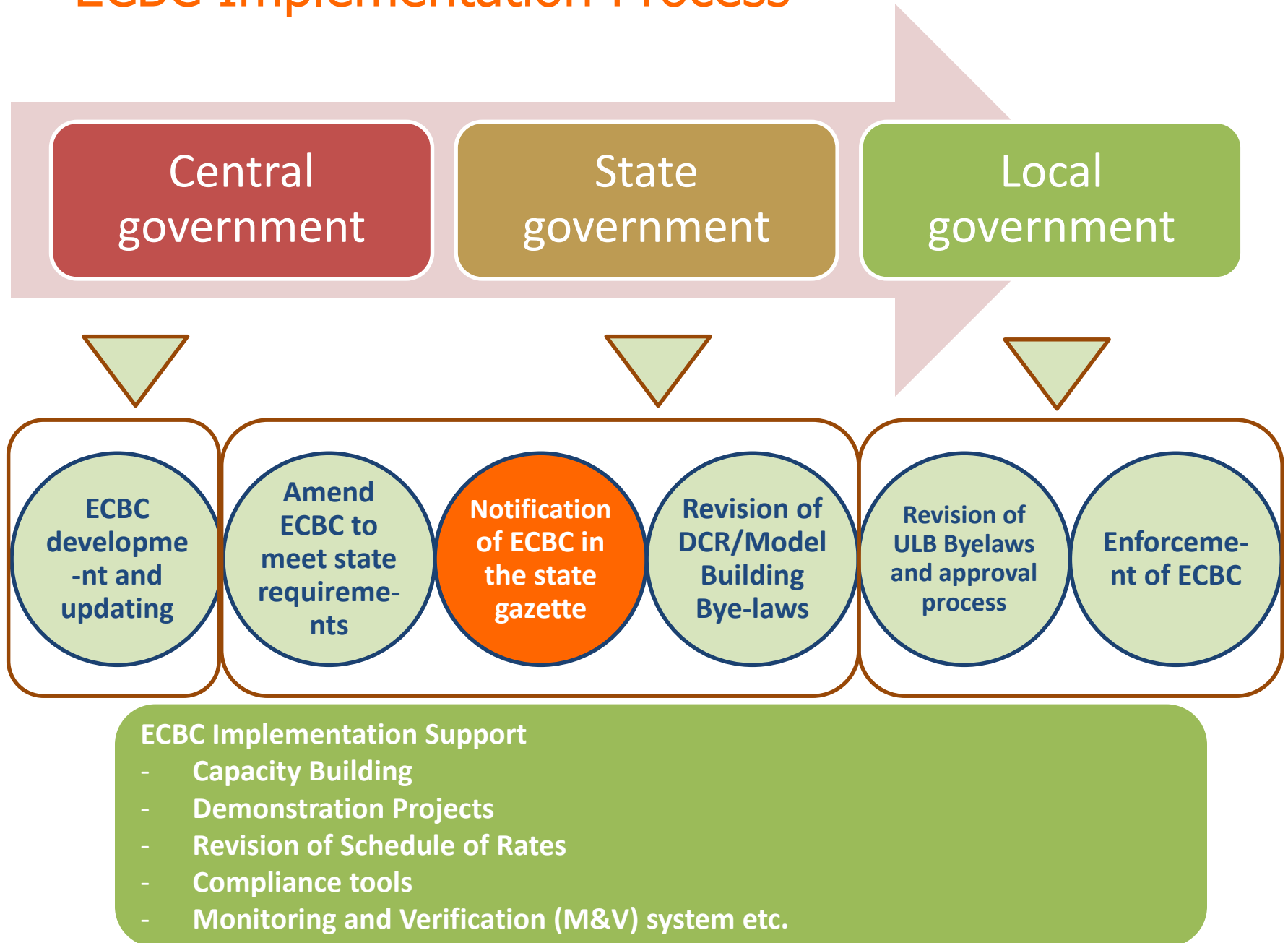


# Presentation Outline

- Content of State ECBC Notification
- Karnataka experience of implementing ECBC

# **CONTENT OF STATE ECBC NOTIFICATION**

# ECBC Implementation Process



# Notification and Gazette

- Notification of ECBC in the state gazette means that state government has adopted the Central Government code (with state specific adaptations) for its implementation and it gives legal framework as well as mandates respective state departments to implement the state ECBC.
- A Gazette is a public journal and an authorised legal document of the government. As a public journal, the Gazette prints official notices from the government. It is authentic in content, accurate and strictly in accordance with the Government policies and decisions.

# ECBC Notification Status

## States which have notified ECBC (10)

Rajasthan

Odisha

Andhra Pradesh

Telangana

Uttarakhand

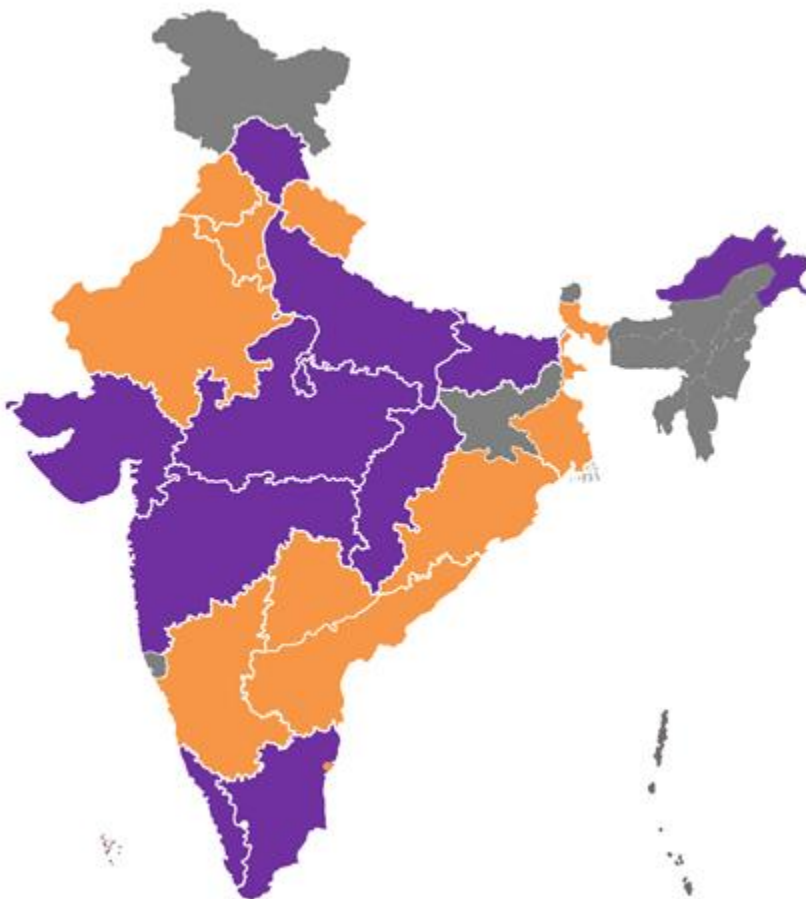
West Bengal

UT of Puducherry

Karnataka

Haryana

Punjab



## States which are in the process of notification (11)

Arunachal Pradesh

Himachal Pradesh

Uttar Pradesh

Bihar

Madhya Pradesh

Chhattisgarh

Gujarat

Maharashtra

Kerala

Tamil Nadu

Delhi

# 1. Reference to Energy Conservation Act

- Karnataka notification was done by Department of Energy, Karnataka

**GOVERNMENT OF KARNATAKA  
ENERGY SECRETARIAT  
NOTIFICATION**

**NO. EN41VSC2013, Date: 05.09.2014**

**Government of Karnataka gazette notification dated: 27<sup>th</sup> November 2014 (Part - IVA)**

In exercise of the powers conferred by section 18 of the Energy Conservation Act 2001 (52 of 2001)

**Section 18**

**THE GAZETTE OF INDIA  
MINISTRY OF LAW, JUSTICE AND COMPANY AFFAIRS  
(Legislative Department)**

New Delhi, the 1<sup>st</sup> October, 2001/ Asvina 9, 1923 (Saka)  
**THE ENERGY CONSERVATION ACT, 2001**

*(No 52 OF 2001[29- September 2001])*

*The Central Government or the State Government may, in the exercise of its powers an performance of its functions under this Act and for efficient use of energy and its conservation, issue such directions in writing as it deems fit for the purposes of this Act to any person, officer, authority or any designated consumer and such person, officer or authority or any designated consumer shall be bound to comply with such directions.*

*Explanation— For the avoidance of doubts, it is hereby declared that the power to issue directions under this section includes the power to direct —*

**(a) regulation of norms for process and energy consumption standards in any industry or building or building complex; or**  
**(b) Regulation of the energy consumption standards for equipment and appliances.**

*Power of Central Government or State Government to issue directions* 18.

- In Andhra Pradesh the notification was facilitated by Municipal Administration & Urban Development (MA&UD) Department

## 2. Scope of the ECBC Notification

- Karnataka

- The code is applicable to all buildings or building complexes in the urban area that have a connected load of 100 kW or greater **or** a contract demand of 120 kVA or greater, **or** having conditioned area of 500 m<sup>2</sup> or more **and** used for commercial purposes.

- Andhra Pradesh

- The code shall be applicable to commercial buildings and other Non Residential Buildings that have a plot area of more than 1000 Square Meters **or** built up area of 2000 Square Meters **and** certain categories of buildings such as Multiplexes, Hospitals, Hotels, and Convention Centers irrespective of their built up area shall comply with the APECB Code as given in Annexure XIII.



## 2. Scope of the ECBC Notification

- Haryana

- The provisions of Energy Conservation Building Code shall be applicable to all buildings of categories listed below having connected load of 100 KW or above or a contract demand of 120 KVA or above,-

(i) Commercial Complexes, Shopping Malls, Trade Buildings.

(ii) Hotels, Motels, Restaurants, Transit-cum-Boarding Houses, Banquet Halls, Janj Ghars, Resorts.

(iii) Cinema Halls, Auditoriums, Clubs, Convention Centers, Concert Halls.

(iv) Office Buildings, Banks, Public Assistance Institutions.

(v) Hospitals, Institutional Care Centers, Institutional Buildings, Information and Technology Parks, Cyber Parks and Business Process Outsourcing (BPO) Buildings

### 3. Responsibilities of State Departments and ULBs

- Andhra Pradesh

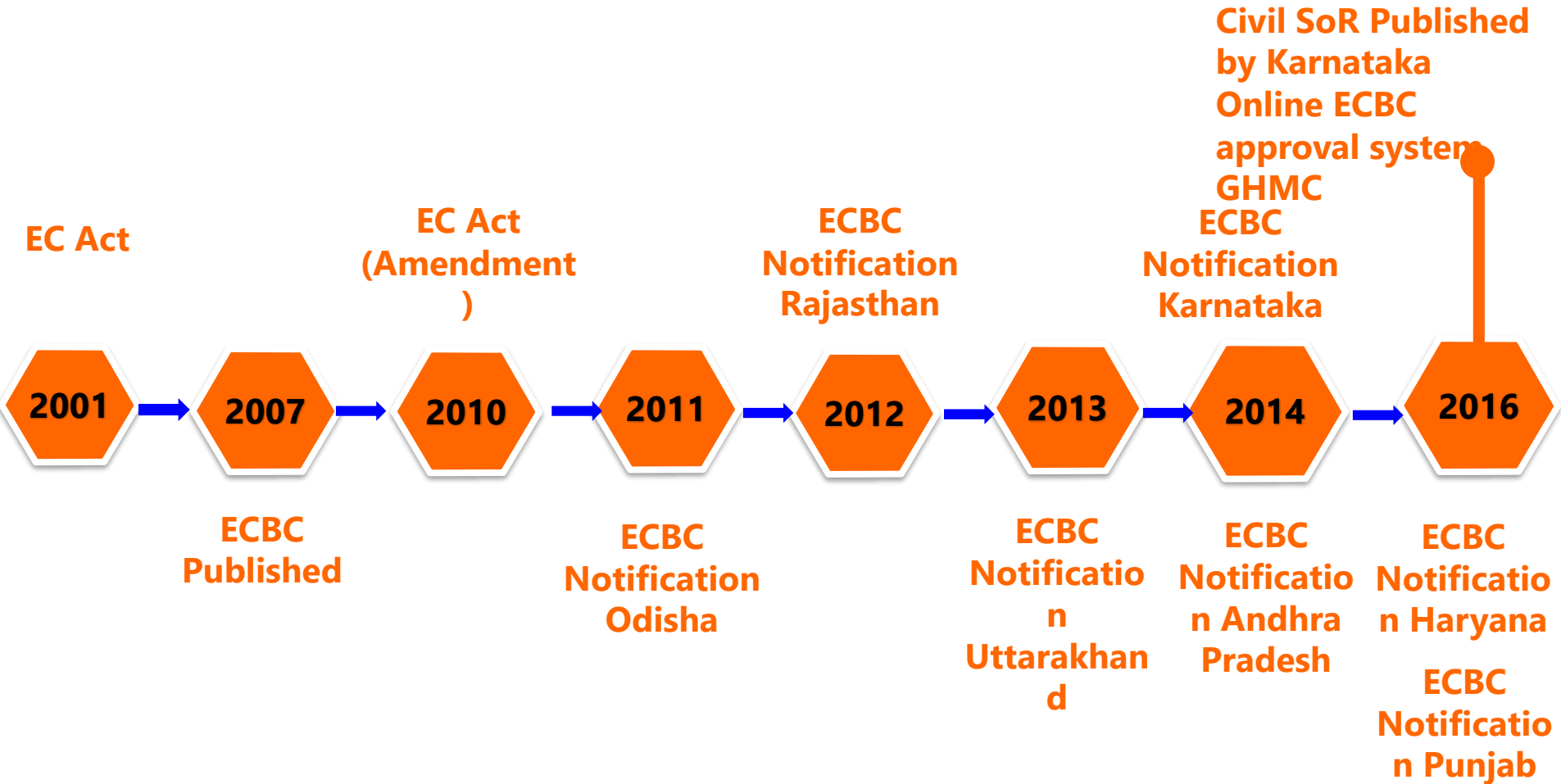
- At the time of plan approval, the Owner and Builder/developer shall submit the AP\* (AP ONE STAR) compliance, sealed and signed by AP Empanelled Architect with MAUD and NREDCAP or Bureau of Energy Efficiency Empanelled Architect against the mandatory requirement of compliance of APECBC to respective Urban Local Body.....
- At the time of issuance of occupancy certificate, the builder/owner/developer shall submit the professional statement by AP Empanelled Architect with MAUD and NREDCAP / BEE Empanelled Architect verifying that the building has been built in accordance with the approved design and plan approval.....
- In accordance with rules 25 and 26 of the AP Building rules 2012, the Urban Local Body may conduct random unscheduled progress inspections throughout the construction phase of a building for any new building, addition or alteration project, to ensure that the building complies with the APECBC. "

### 3. Responsibilities of State Departments and ULBs

- **Karnataka**

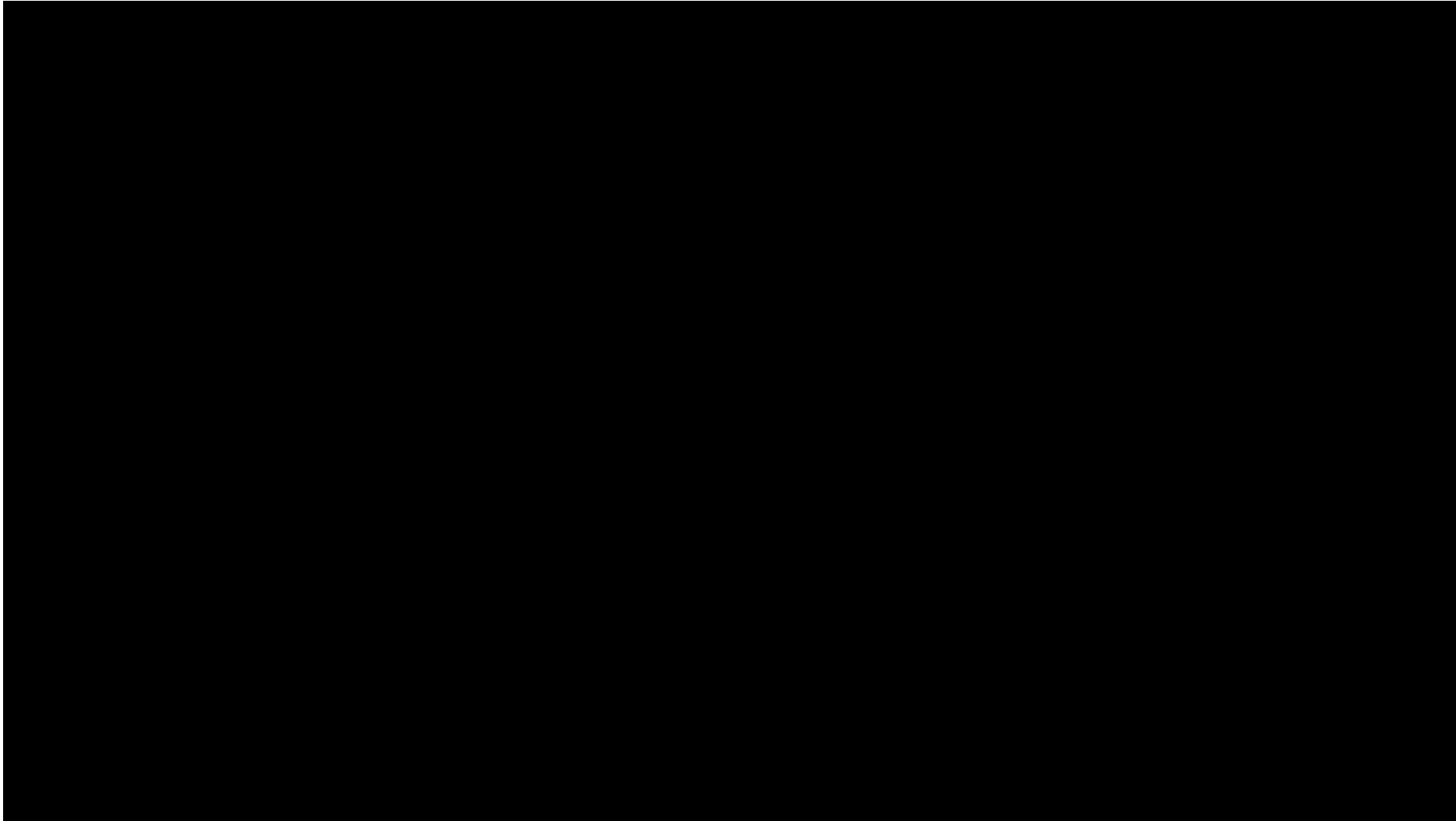
- **Urban Local Bodies** will be responsible for enforcement of ECBC in respect to private buildings and
- Public Works Department (PWD) **Architectural Department Of PWD** will be responsible in respect to state government buildings.
- **Department Of Electrical Inspectorate**, Government of Karnataka is to inspect electrical installation in the buildings, which are ECBC compliant.
- **Karnataka Renewable Energy Development Limited**, as the nodal agency to monitor the implementation of the Code at the State level and also to create the awareness of the ECBC

# Timeline of ECBC Implementation

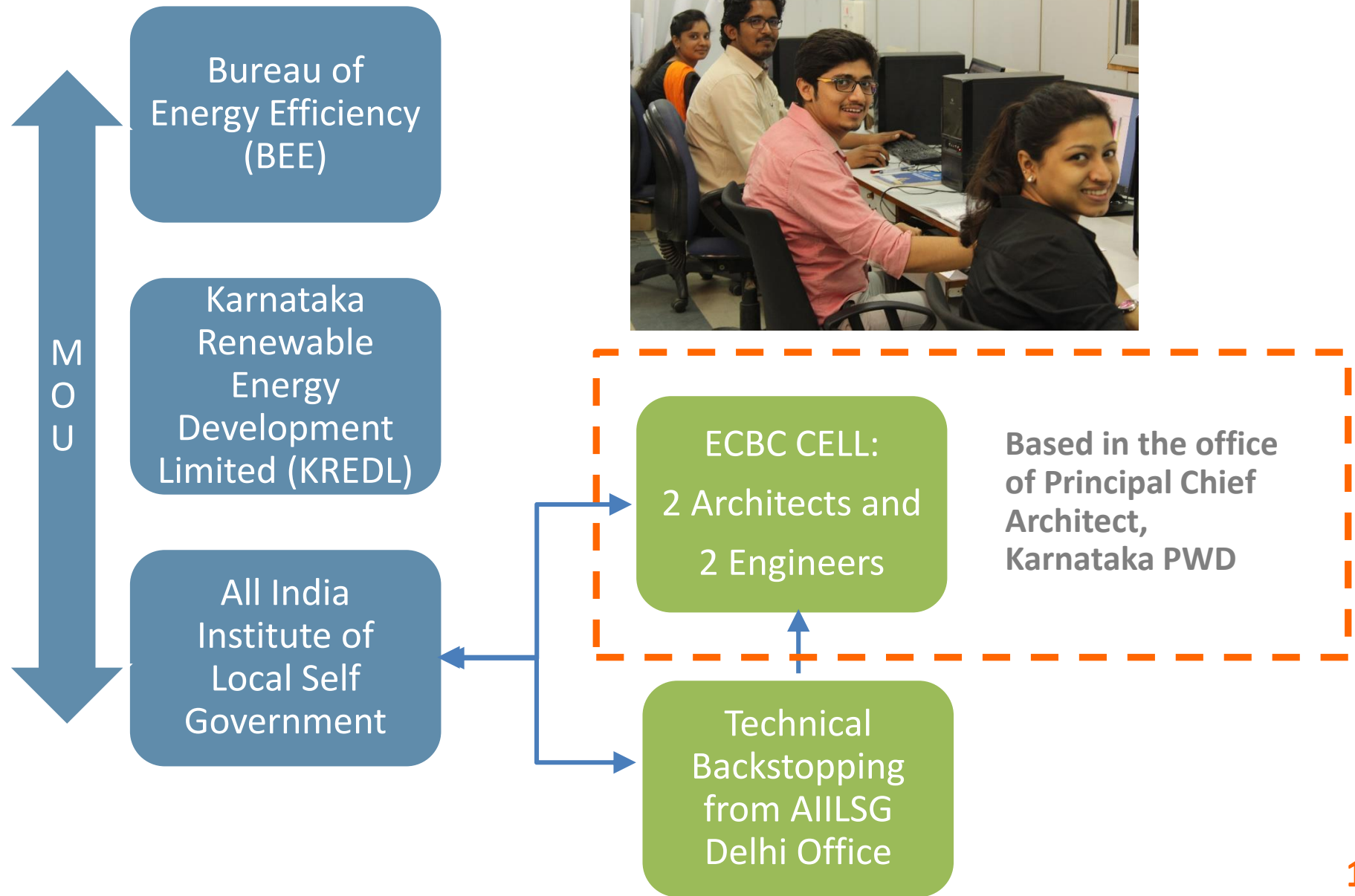


# **KARNATAKA ECBC INITIATIVES**

# Case Study: Kumar Kruppa Guest House



# Organizational Structure of ECBC Cell in Karnataka



# ECBC Cell Activities

## Revising Schedule of Rates for Karnataka

To include energy efficient materials and products in SoR

## Energy efficient building design

Use Integrated Design Process to make 10 of the PWD's buildings ECBC compliant

### ECBC CELL ACTIVITIES

## Updating Building Bye Laws

To include ECBC provisions in the State GDCR and Bye Laws

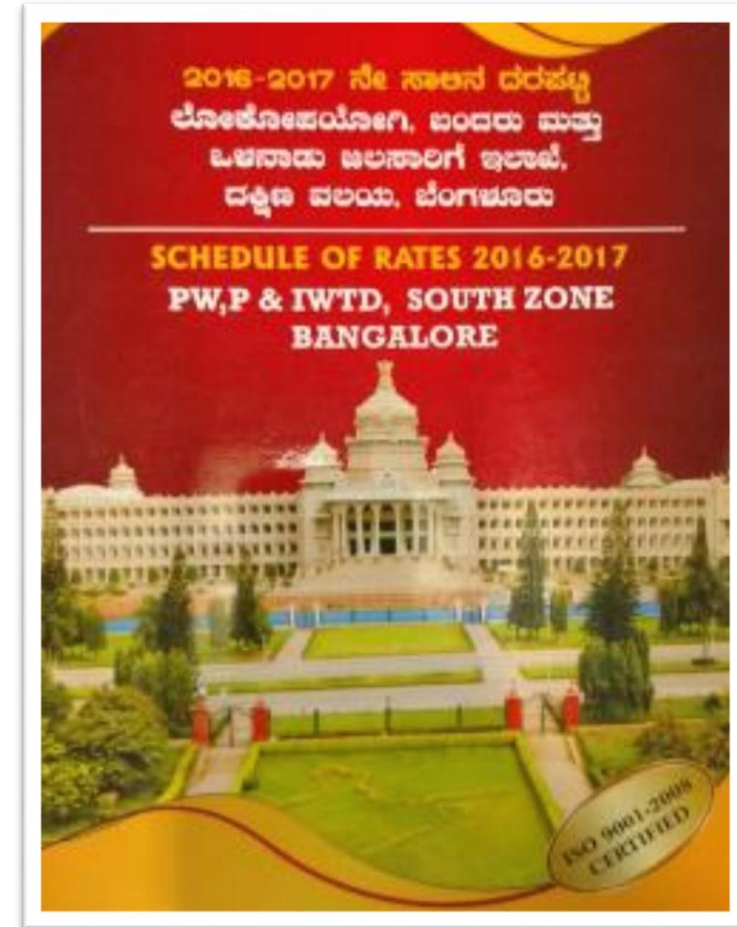
## Organizing ECBC Awareness Workshops

Capacity building of building sector stakeholders and government officials to make them aware about the ECBC provisions and compliance mechanisms.



# Revision of Karnataka PWD Schedule of Rates

SoR is a reference document followed by PWD and some Public Sector Undertakings (PSUs) for providing material and technology specifications and for cost estimation of buildings



# Civil Schedule of Rates

## 35 Items in Civil SoR

### **BUILDING ENVELOPE**

#### **WALL INSULATIONS & INSULATED WALLS**

- External wall insulation with Polyurethane Foam (PUF) slab
- External wall insulation with Polyurethane Foam (PUF) spray
- External wall insulation with Extruded Polystyrene (XPS)
- Cavity wall insulation with Polyurethane Foam (PUF) spray
- Cavity wall insulation with Polyurethane Foam (PUF) slab
- Cavity wall insulation with glass wool slab
- Cavity wall insulation with rock wool slab
- Cavity wall with Extruded Polystyrene (XPS)
- Autoclaved Aerated Concrete Block
- Hollow Burnt Clay Block
- Insulated Burnt Clay Block
- Hollow Concrete Block
- Hollow Concrete Block
- Truss Reinforced Insulated Concrete (TRIC) Wall

### **ROOF INSULATIONS**

- Over deck insulation with Polyurethane Foam (PUF) spray
- Under deck insulation with Expanded Polystyrene (EPS)
- Over deck insulation with Extruded Polystyrene (XPS)
- Over deck insulation with vermiculite
- Over deck insulation with glass wool
- Over deck insulation with rock wool
- Under Deck Insulation with glass wool
- Under Deck Insulation with rock wool

# Civil Schedule of Rates

## **COOL ROOFS**

Heat Reflective Paint on roof

Heat Resistant Tile on Roof

Green Roof

## **GLAZINGS**

Single Glazing with High Performance Coating

Double Clear Glazing

Double High Performance Glazing

## **FRAMES**

UPVC Frame

Aluminium Frame with Thermal Break

## **SOLAR WATER HEATERS**

Flat Plate Collector

Evacuated Tube Collector

# Electrical Schedule of Rates

## **HEATING VENTILATION AIR CONDITIONING**

Fans

Air Conditioners:

- Fixed Speed Direct Expansion Unitary Systems
- Variable Speed Direct Expansion Unitary Systems
- Variable Refrigerant Flow (VRF) System
- Central Chilled Water System: Air-cooled, water cooled, evaporative cooled

Cooling Towers

Plumbing

Condenser Water Pipe

Valves Without Insulation

Ducting, Grills, Diffuser And Insulation

Air Handling Units

Fan Coil Units

Treated Fresh Air Unit

Heat Recovery Wheel

Direct, Indirect and Indirect-Direct

Evaporative Cooling

Indirect Direct Hybrid Cooling Unit

Chilled Beams

Radiant Cooling

Variable Frequency Drives

## **ELECTRICAL WORK**

### **LIGHTING**

LED Lamp/Luminaire: Indoor & Outdoor

Lighting Control: Occupancy Sensor &

Daylight sensor

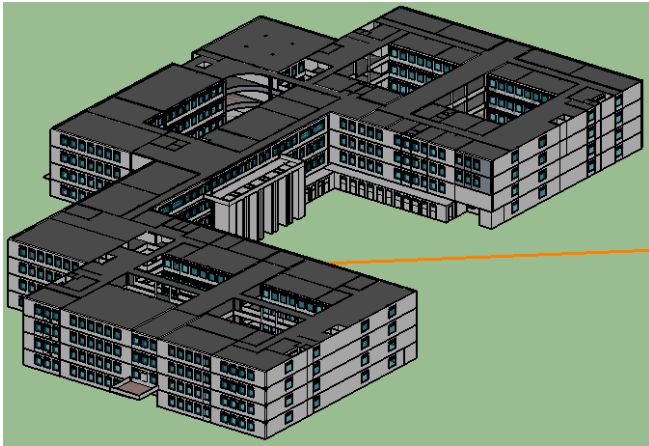
### **SOLAR PHOTO VOLTAIC**

Solar PV: Grid Connected

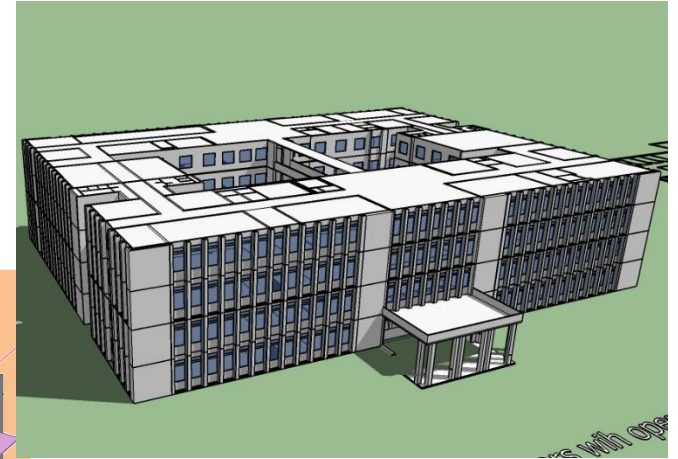
Solar PV: Off Grid

111 Items in Civil SoR

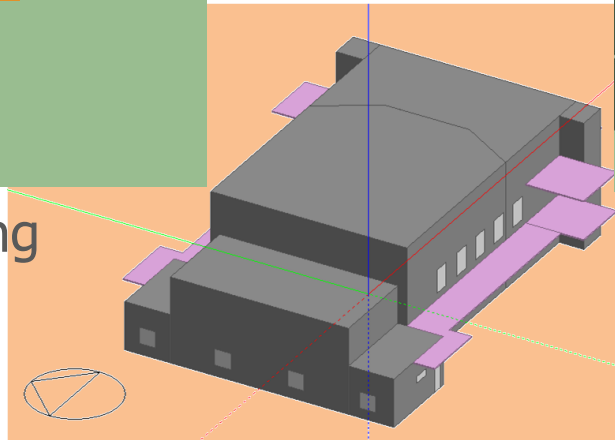
# Use of Integrated Design Process for Evaluating Energy Efficient Strategies



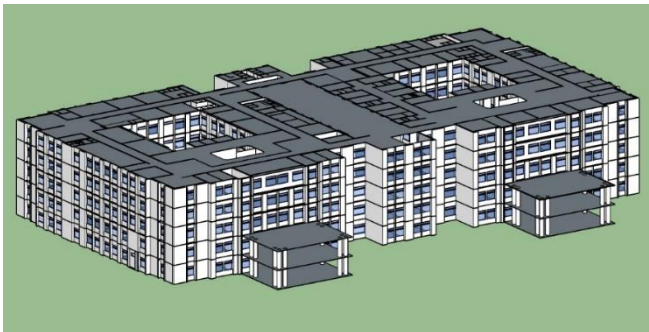
Yelburga Engineering College



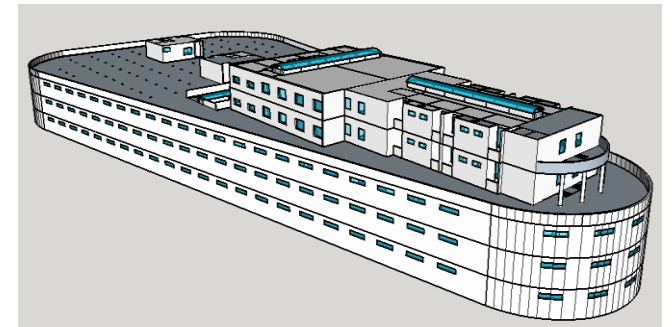
Kalburgi Lokopoyogi Bhavana, Gulbarga



Template Auditorium Building



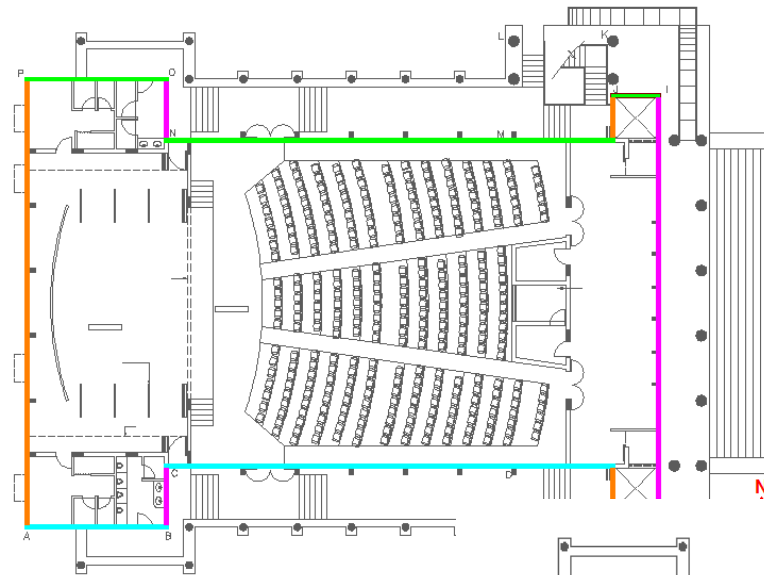
500 Beds Hospital, Mysore



Parking Lot, Chamundi Hills

# Auditorium Building Analysis

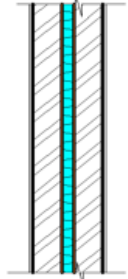
Energy Sufficiency > Energy Efficiency > Onsite Renewable



- North Facade
- East Facade
- South Facade
- West Facade

COMPLY WITH ECBC  
PRESCRIPTIVE REQUIREMENTS

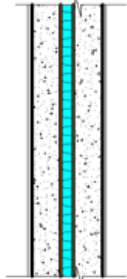
115 mm brick wall  
+ 65 mm XPS + 115  
mm brick wall



0.42

~1096

50 mm concrete  
+ 100 mm EPS + 50  
mm concrete

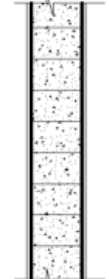


0.41

~2500

DOES NOT COMPLY WITH ECBC  
PRESCRIPTIVE REQUIREMENTS  
CAN BE COMPLIED USING  
ENVELOPE TRADE-OFF METHOD  
OR ECB METHOD

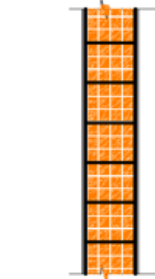
200 mm  
AAC Wall



0.54

~745

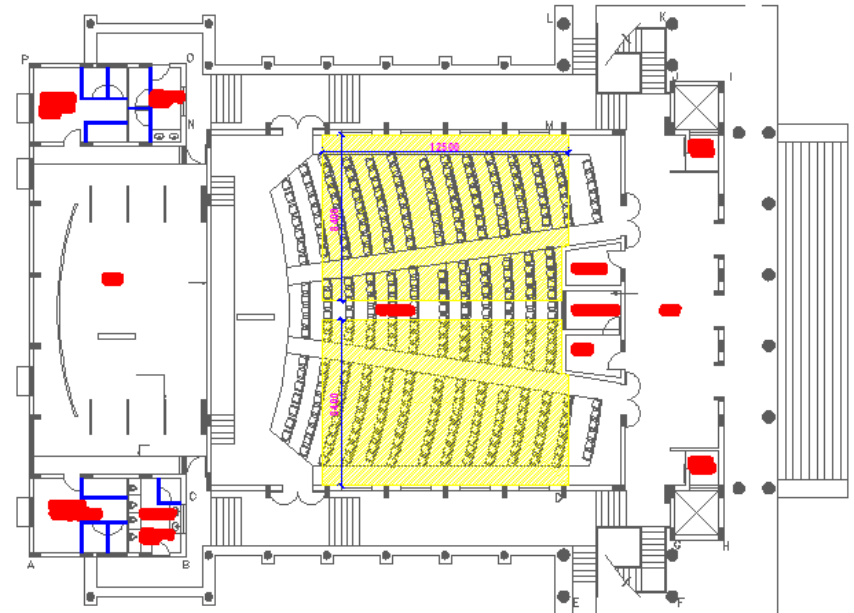
200 mm Porotherm  
Thermo Brick  
Rockwool Insulation



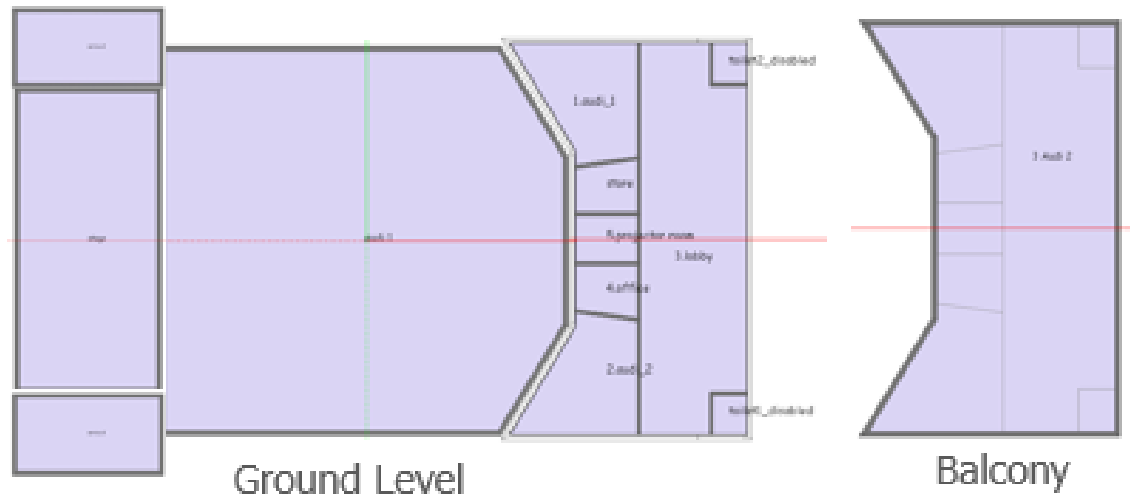
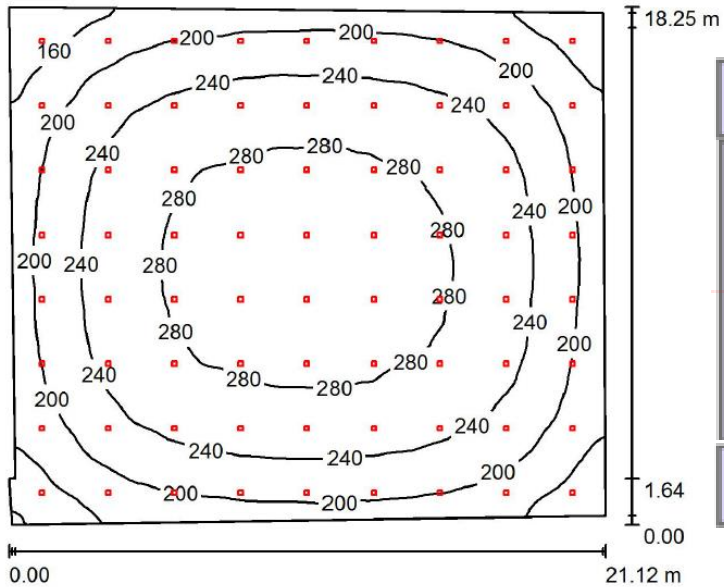
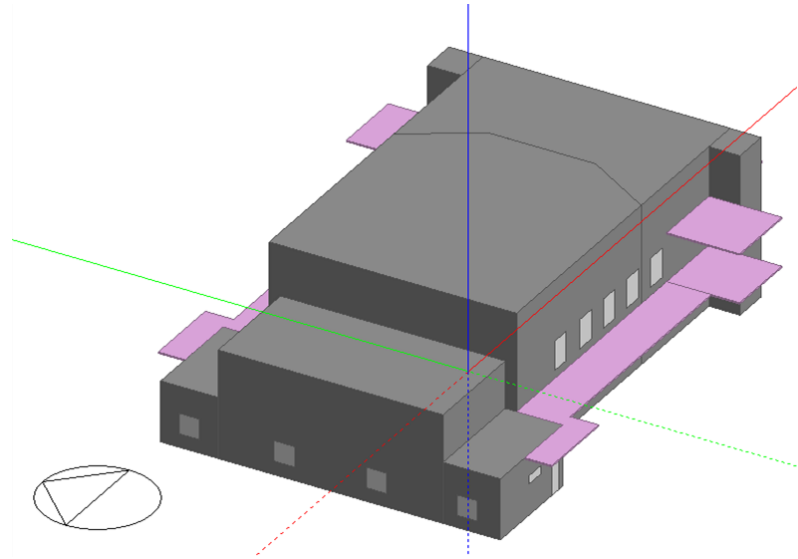
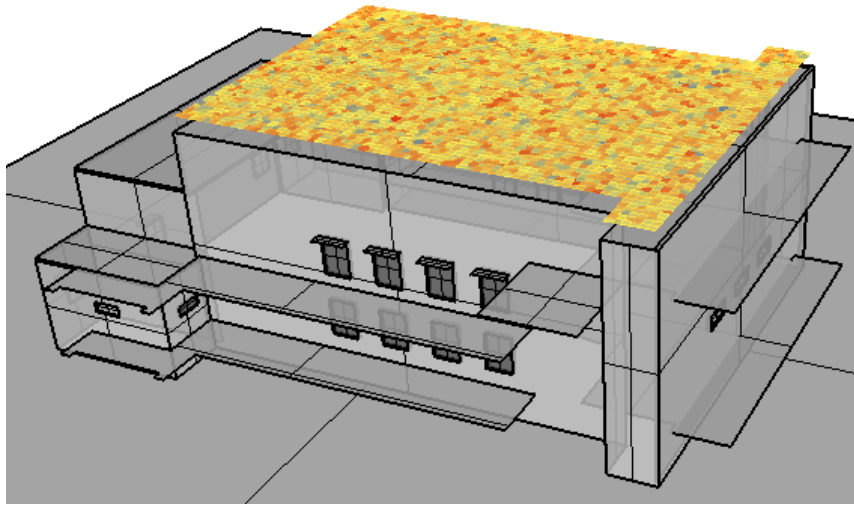
0.6

~1000

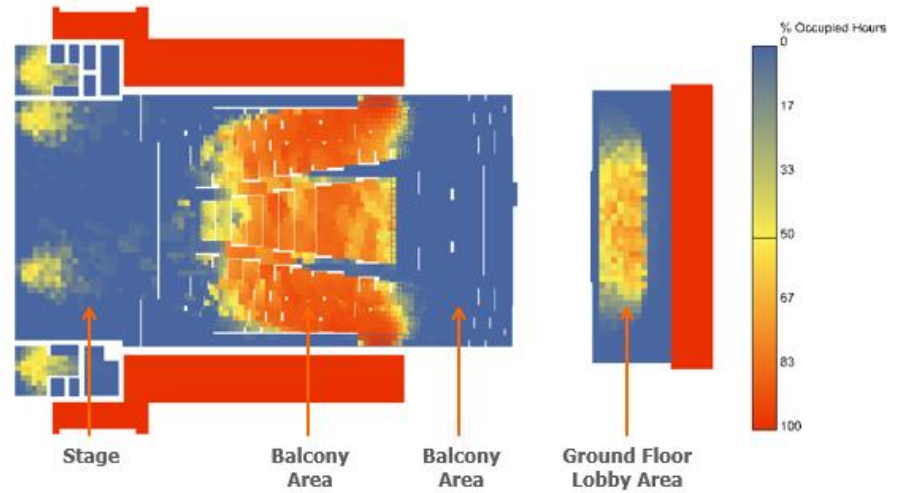
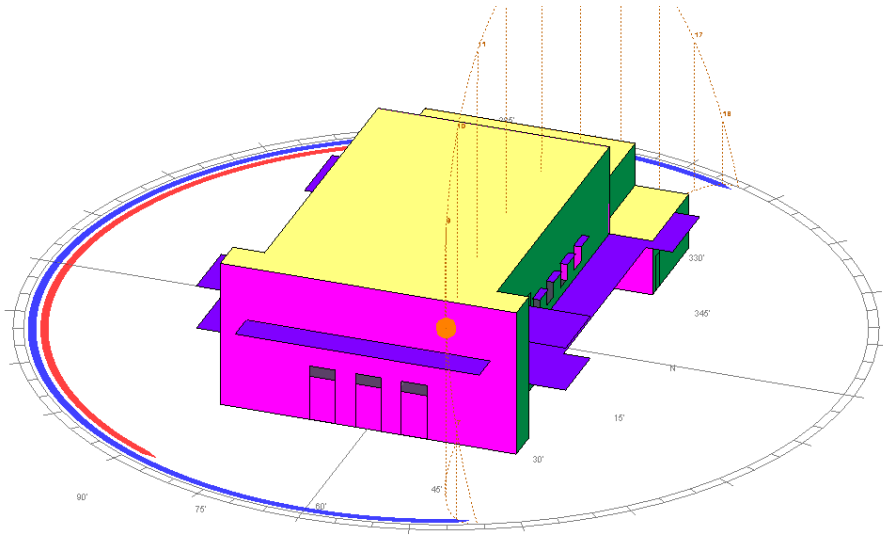
10



# Auditorium Building Analysis

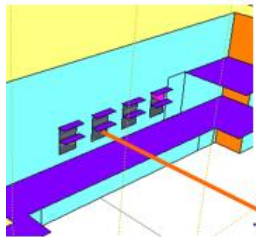


# Auditorium Building Analysis

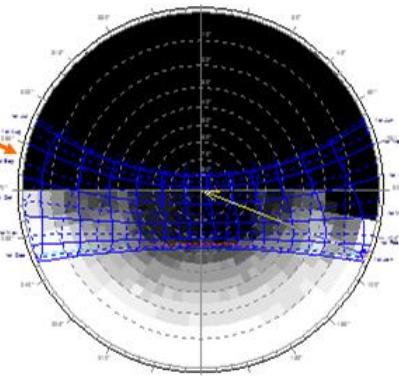


VLT: 0.80 with effective shading

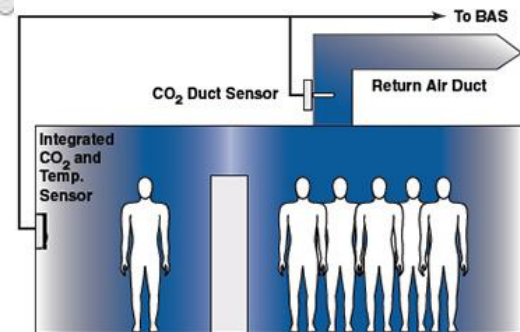
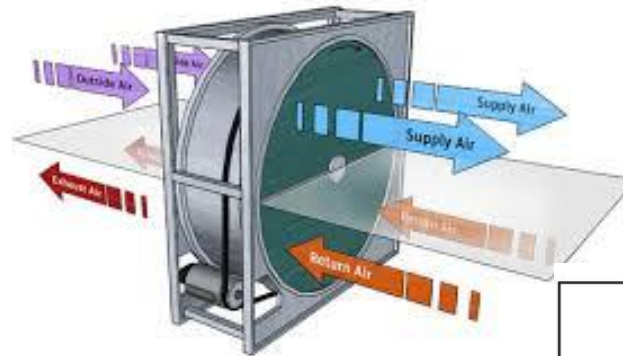
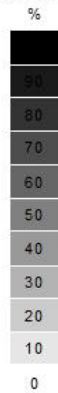
64



Solution: Balcony level windows with two equidistant overhangs of 600 mm



Overshadowin %



24



# Summary of Karnataka PWD Demonstration Projects

S.no	Building	Location	Climatic Zone	Category	Area (m <sup>2</sup> )	EPI Existing Design to EPI ECBC Case in kWh/m <sup>2</sup> .year (savings %)
1	Government Engineering College	Yelburga	Warm and Humid	Institute	34,220	107 to 63 [42%]
2	500 Bed Mysore Hospital	Mysuru	Warm and Humid	Hospital	39,715	227 to 110 [52%]
3	Multi-Purpose Parking Lot	Mysuru	Warm and Humid	Parking	27,390	29 to 22 [26%]
4	Lokopayogi Bhavana	Kalaburagi	Hot and Dry	Office	14,770	141 to 80 [44%]
5	Teacher's Academy	Dharwad	Warm and Humid	Institute	18,650	96 to 75 [22%]
6	DC Office	Mysuru	Warm and Humid	Office	29,010	123 to 89 [32%]
7	Mini-Vidhan Soudha	Shimoga	Warm and Humid	Office	2,925	60 to 34 [43%]
8	Yadgir Insitute of Medical Sciences	Yadgir	Hot and Dry	Institute	31,300	93 to 75 [20%]
9	Auditorium Template	Bengaluru	Moderate	Recreational	10,150	154 to 91 [41%]
10	Multi-Purpose Hall	Chitradurga	Warm and Humid	Assembly	1,736	120 to 104 [14%]
11	Multi-Purpose Hall	Bidar	Hot and Dry	Assembly	1,736	124 to 107 [14%]

**Calculated Incremental Cost:**

**0.8 – 4.0% of construction cost**

**Simple Payback Period:**

**1 - 4 years**

**Cumulative Expected Annual Energy Saving:**

**7,117 MWh**

**Cumulative Annual CO<sub>2</sub> emission reduction:**

**5,840 T CO<sub>2</sub>**

# Way Forward for Karnataka State

- Notification of ECBC Rules
- Updating Building Bye-Laws
- Inclusion of ECBC compliance checks in building approval system
- Implementation of compliance tools for ECBC enforcement
- Implementation monitoring and verification tools for ECBC compliance
- Training and awareness campaign of building sector stakeholders

***Contact Details:***  
*kanagaraj.ganesan@undp.org*

**THANK YOU!**