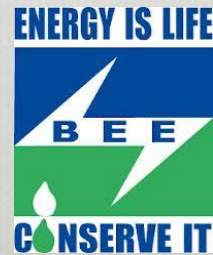


Energy Conservation Building Code



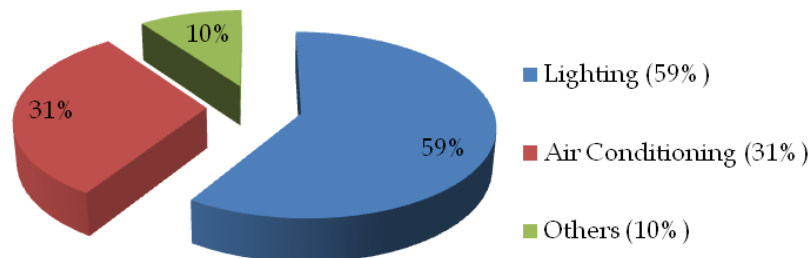
Ranchi

Saurabh Diddi
Energy Economist

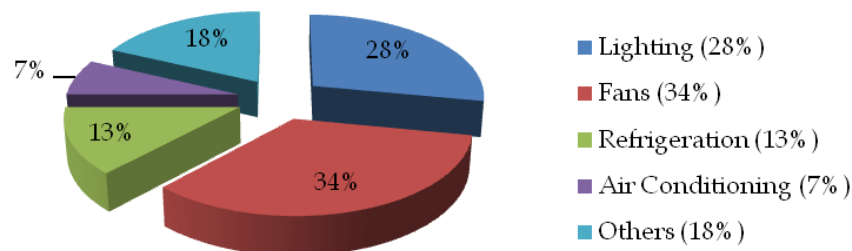
Bureau of Energy Efficiency

Typical Electricity Use in Buildings

Electricity Consumption in Commercial Sector

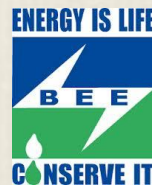


Electricity Consumption in Residential Sector



- ◆ Application of building codes reduces electricity consumption by 25% - 30%
- ◆ Urbanization and aspiration of consumers will increase air conditioning demand

Energy Conservation Act 2001



- ◆ “Building” means any structure or erection or part of structure or erection after the rules relating to energy conservation building codes have been notified under clause (p) of section 14 and clause (a) of section 15 and includes any existing structure or erection or part of structure or erection, which is having a connected load of 100 Kilowatt (kW) or contract demand of 120 Kilo-volt Ampere (kVA) and above and is used or intended to be used for commercial purposes;
- ◆ **Section 14 (p):** prescribe energy conservation building codes for efficient use of energy and its conservation in the building or building complex

ECBC – Status of adoption by States

- ◆ **Section 15** – Powers of State Government
- ◆ **Amend ECBC to suit regional and local climatic** conditions and may, by rules made by it specify and **notify ECBC** with respect to use of energy in the buildings.
- ◆ **Section 18** – Power of Central Government or State Government
- ◆ Central Government or State Government may issue directives for efficient use of energy and its conservation

States have used the powers under EC Act to notify/ issue directives for ECBC

Notification can also be done through amendments in local (municipal) building bye-laws

Energy Conservation Building Code

- ◆ ECBC
 - ◆ minimum energy efficiency standards
 - ◆ Applicable to large commercial buildings
 - ◆ (connected load of 100 kW/contract demand of 120 kVA and above)
- ◆ ECBC prescribes standards for:
 - ◆ Building Envelope (Walls, Roofs, Windows)
 - ◆ Lighting (Indoor and Outdoor)
 - ◆ Heating Ventilation and Air Conditioning (HVAC) System
 - ◆ Solar Hot Water Heating
 - ◆ Electrical Systems

While ECBC developed at Central level by BEE, its enforcement lies with the States

Ministry of Urban Development developed generic building bye-laws and advisory circulated to include in bye-laws

Support Provided to States

- ◆ Establishment of ECBC Cells (Manpower provided by BEE)
- ◆ ECBC Cells support
 - ◆ Amendment of ECBC for respective States
 - ◆ Amendments in existing bye laws
 - ◆ Preparation of notification documents
 - ◆ Energy efficient design templates for public buildings
 - ◆ PWDs in design and construction of public buildings
 - ◆ Building up technical capacities for code compliance
 - ◆ Documentation for compliance
- ◆ Create a pool of 3rd party certified verifiers
- ◆ Demonstration projects to showcase ECBC compliance

S.no	State/UT	ECBC Amendm ent	ECBC Notificat ion	Notification in state bye- laws	Notificati on at Municipal ities	Enforce ment	Sched ule of Rates - PWD	ECBC Cell	Training & Capacity Development	Energy Simulation Software
1	Andhra Pradesh	✓	✓					*	✓	*
2	Arunachal Pradesh	✓							✓	
3	Assam	✓								
4	Bihar	✓						EU		*
5	Chandigarh UT									
6	Chhattisgarh	✓						✓	✓	✓
7	NCT of Delhi	✓						*		*
8	Goa									
9	Gujarat	✓								
10	Haryana	✓	✓					✓		✓
11	Himachal Pradesh	✓								
12	Jammu and Kashmir									
13	Jharkhand									
14	Karnataka	✓	✓					✓	✓	✓
15	Kerala	✓						*	✓	*
16	Madhya Pradesh	✓						EU		*
17	Maharashtra	✓						EU	✓	*

S.no	State/UT	ECBC Amendm ent	ECBC Notificatio n	Notification in bye-laws	Notificatio n at Municipalities	Enforc ement	Schedul e or Rates-PWD	ECBC Cell	Training & Capacity Developemet	Energy Simulation Software
18	Manipur									
19	Meghalaya									
20	Mizoram									
21	Nagaland									
22	Odisha	✓	✓					EU		*
23	Puducherry UT	✓	✓							
24	Punjab	✓	✓					✓	✓	✓
25	Rajasthan	✓	✓							
26	Sikkim									
27	Tamil Nadu	✓								
28	Telangana	✓	✓					*	✓	*
29	Tripura									
30	Uttar Pradesh	✓						✓		✓
31	Uttarakhand	✓	✓							
32	West Bengal	✓	✓							

Energy Conservation Building Code

User Guide



ECBC - Code

Key objectives of ECBC 2017 development



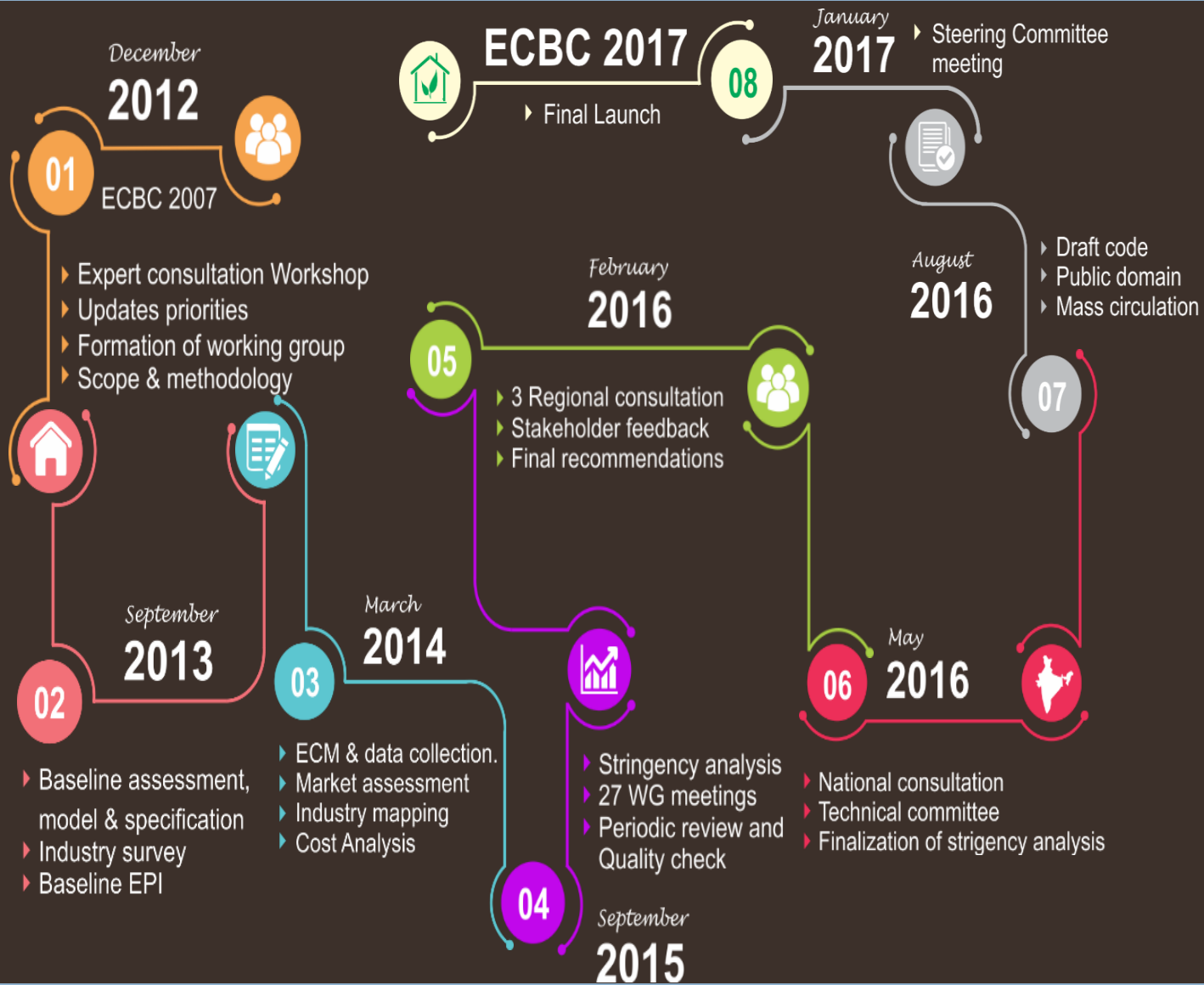
1. Set a long term vision for building energy efficiency
2. Include new types of buildings
3. Focus on design strategies for reducing energy use
4. Establish a baseline of energy performance and promote buildings that go beyond the code
5. Ease of compliance and enforcement



ECBC 2017 Update Process



ECBC Journey



Long term vision – going beyond the code

Increasing levels of stringency set in ECBC:

Mandatory

1. Energy Conservation Building Code Compliant (ECBC) Building (MEP)

Voluntary

2. Energy Conservation Building Code plus (ECBC+) Building
3. Super Energy Conservation Building Code (SuperECBC) Building

Cost-Benefit Approach for Setting the Stringency Level

1. Component Approach
2. Life Cycle Cost Approach
3. Energy Performance Index (EPI) Approach
4. Linked to Bench Marking and Star Rating

Highlights of ECBC 2017

Integration of current provisions and relevant standards

New sections in ECBC 2017-

ECBC 2017 to have an International benchmark
Code specific to Indian conditions – Climatic and Construction
Pave the way for future net zero energy buildings

3 different sets of requirement – ECBC 2017, ECBC+ buildings, SuperECBC buildings

Wider scope in Comfort systems and controls, Integration of low energy comfort systems, natural ventilation, set points, Controls

Daylighting, Shading requirement with relaxed U value

Revised document structure for ease of use

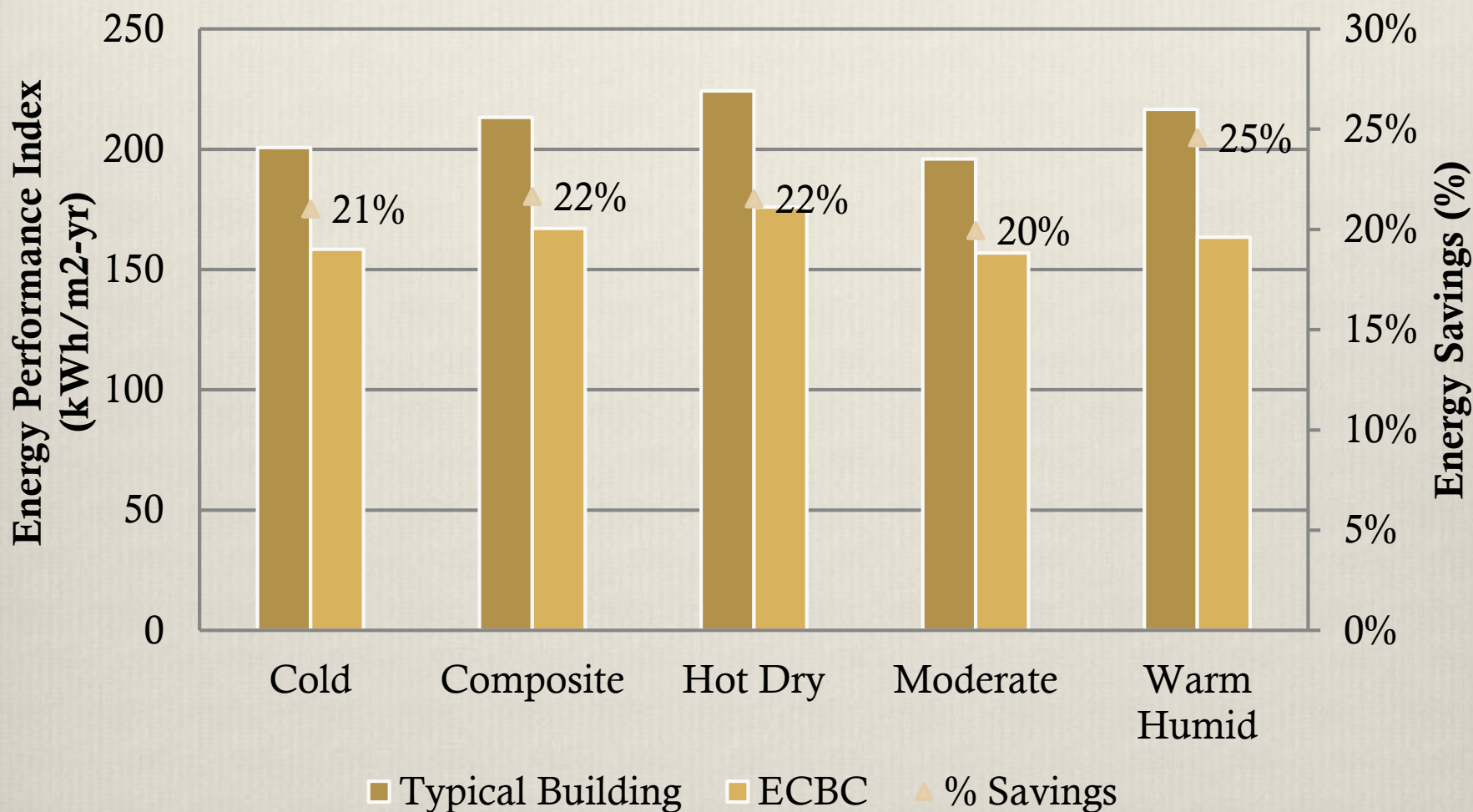
Provision for inclusion of Renewable Energy

Stringent Lighting Requirements with focus on better controls

Stringent requirements for air conditioning systems and controls

Compliance for New Construction, Core & Shell, Tenant lease type etc

ECBC Impact



Potential Impact

Year	Commercial Construction (million m ²)	Current Energy Use (BU)	Reduced Energy Use (BU)	Annual Savings (BU)
2017-2018	95 million m ²	19.95 BU	15.58 BU	4.3 BU

For year 2017-18, mandatory enforcement of ECBC has a technical potential of yielding a savings of

- 4.3 billion kWh and
- 3 million metric ton of CO₂

Energy Conservation Building Code

User Guide



ECBC - Rules

Definitions

- ◆ **“Building or building complex”** mean commercial buildings with connected load of 100 Kilowatt (kW) or contract demand of 120 Kilo-volt Ampere (kVA) and above.
- ◆ **“Built up area”** means the summation of all the total covered areas on all floors of a building from the basement to all story’s including walls etc excluding storage and parking.
- ◆ **“Connected load”** means the sum of the maximum amount of wattage that is allocated for building or part of a building, who have sought electricity connection for the completed buildings
- ◆ **“Compliance Documents”** mean the Forms specified in these rules

Definitions

- ◆ **“Certified Energy Auditor for Building”** means an energy conservation building energy Auditor given certification in these rules.
- ◆ **“Energy Performance Index” or “EPI”** of a building means the annual energy consumption expressed in terms of electrical units, namely Kilo Watt Hours (kWh) per square meter of the area wherein energy is used and includes the location of the building and shall be expressed by the following formula: Basement

$$\text{E.P.I.} = \frac{\text{Annual energy Consumption in terms of kWh}}{\text{Total built up area excluding parking}}$$

- ◆ **“E.P.I Ratio”** of a building means the ratio of the Energy Performance Index of the proposed design to the Energy Performance Index of the Standard Design of a Building

Compliance Mechanism

Prescriptive Method

- ❖ Shall comply with all mandatory measures (Sections 4.2, 5.2, 6.2, 7.2 and 8.2 of the ECBC)
- ❖ shall comply with all the prescriptive requirement (Section 4.3 or 4.4, 5.3 & 7.3)
- ❖ EPI Ratio = $\frac{\text{EPI (Proposed)}}{\text{EPI (Standard)}} = 1$

Whole Building Performance Method

- ❖ Shall comply with all mandatory measures (Sections 4.2, 5.2, 6.2, 7.2 and 8.2 of the ECBC)
- ❖ Shall comply with the requirements specified in section 10
- ❖ EPI Ratio = $\frac{\text{EPI (Proposed)}}{\text{EPI (Standard)}} \leq 1$

Way Forward

- ◆ Mapping of All States with respect to notification, implementation and enforcement of ECBC Code
- ◆ Operations Manual to standardize notification & implementation of ECBC in states
- ◆ Notification in each state and subsequently integration with bye laws of ULBs
- ◆ Launch of ECBC 2017
- ◆ Notification of ECBC Rules
- ◆ Capacity Building of States
- ◆ Inclusion of Residential Buildings in EC Act
- ◆ Hotel sector to be included in PAT Scheme

Thank You for Your Kind Attention