BHARAT KA AMRUT MAHOTSAV

# Energy Conservation Building Code 2017 (Revision 2021)

# About ECBC

- The purpose of the Energy Conservation Building Code (Code) is to provide minimum requirements for the energy-efficient design and construction of buildings.

- **APPLICABLITY:** Commercial Buildings having their Connected Load of 100kW and above or Contract demand 120kVA and above

- **SALIENT FEATURES OF THE CODE**

✓**Passive design strategies**

✓**Technology neutral**

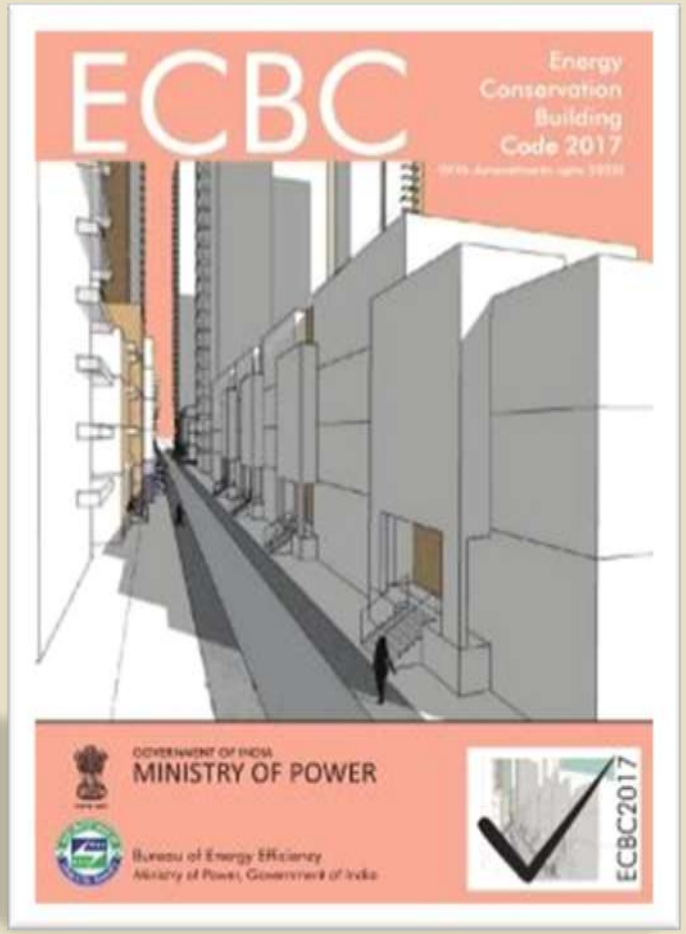
✓**Daylight integration**

✓**Renewable energy integration**

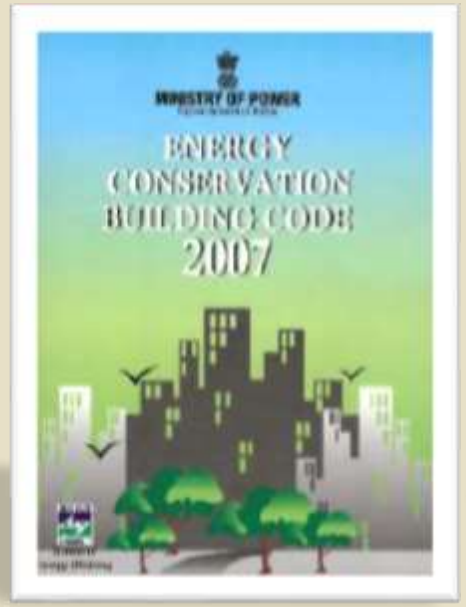
✓**Energy saving and comfort to occupants**

✓**Incremental energy performance levels**

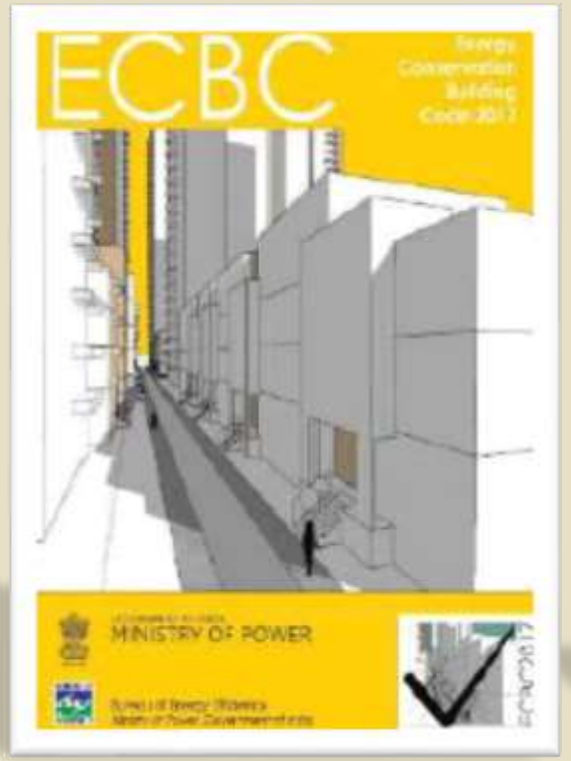
✓**Applicability to various categories of buildings**



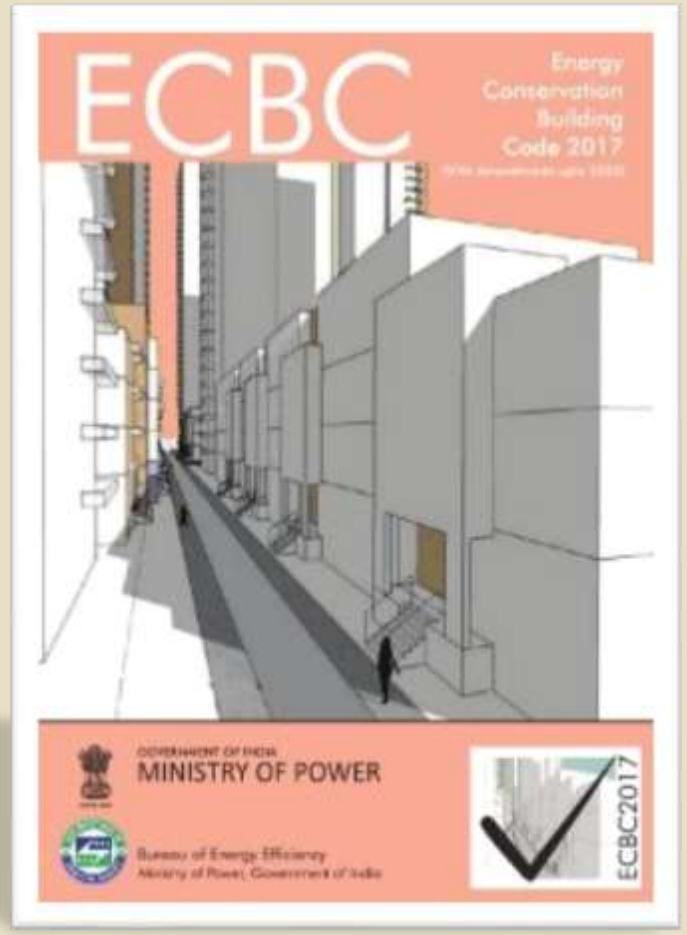
# About ECBC




ECBC 2007




ECBC 2017

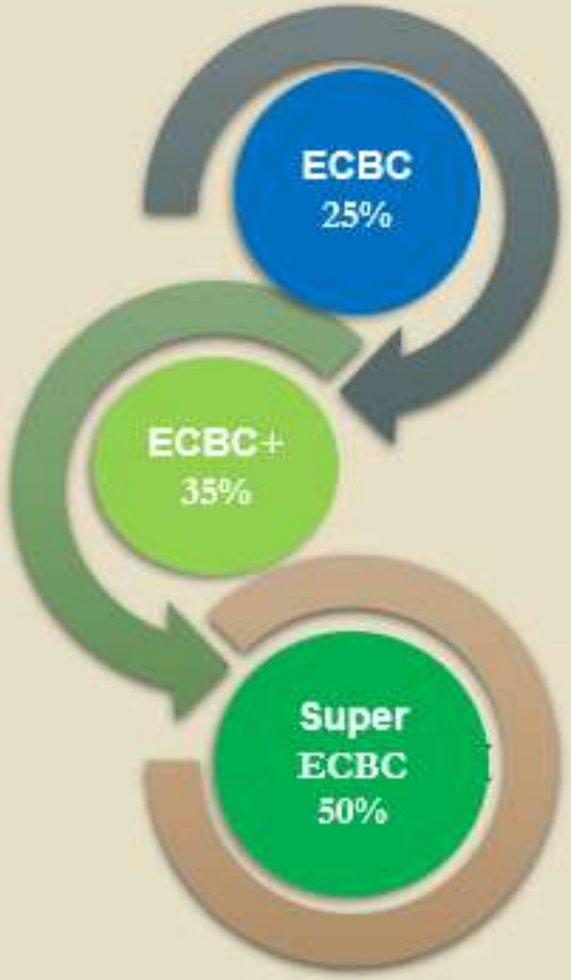



ECBC Amended Upto 2020

# ENERGY SAVING POTENTIAL

**INCREMENTAL COMPLIANCE LEVELS**

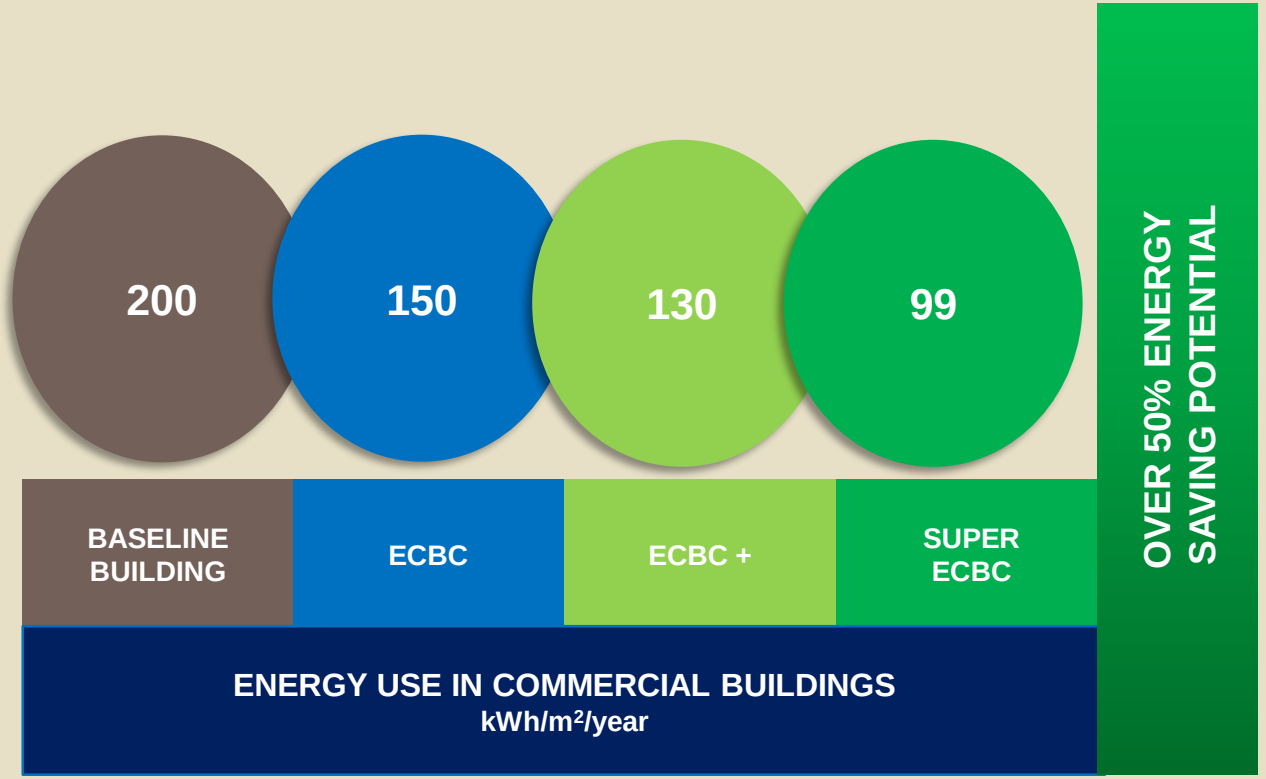
- ✓ **ECBC Compliant Building – MANDATORY**
- ✓ **ECBC+ Building – VOLUNTARY**
- ✓ **Super ECBC Building - VOLUNTARY**



# ENERGY SAVING POTENTIAL

**IN 10 YEARS OF IMPLEMENTATION:**

- ✓Over 300BU Energy Saving
- ✓Over 15 GW Peak Demand Reduction
- ✓Over 250 mtCO2e GHG Abatement
- ✓Over 35,000 Crore Rupees saving



# IMPLEMENTATION & ENFOCEMENT IN STATES/UTs

**ENERGY CONSERVATION ACT, 2001**

- **Provide legal framework and institutional arrangement to embark energy efficiency drive.**
- **ECBC was developed under this Act.**

**BUREAU OF ENERGY EFFICIENCY (BEE)**

- **Exert leadership, develop policies and provide direction to National Energy Conservation and Efficiency efforts and Programs**
- **ECBC was developed by BEE.**
- **Power of Central Government**
  - 14 (p): prescribe ECBC for efficient use
  - 14 (q): amend ECBC to suit climatic conditions
  - 14 (r): direct owner to comply provisions of ECBC
  - 14 (s): direct to get energy audit conducted

**STATE DESIGNATED AGENCY (SDA)**

- **Section 15 of the EC Act empowers Govt. of India and State Governments to modify ECBC as per climatic conditions of states.**
- **Enforcement of ECBC lies with the State Governments and Urban Local Bodies through notification within their states as per their regional requirements**

- *ECBC is a mandatory compliance requirement in green building rating systems in India (GRIHA, IGBC).*

# NOTIFICATION STATUS

States notified: **18 States and 2 UT**

- Andaman & Nicobar
- Andhra Pradesh
- Assam
- Himachal Pradesh
- Kerala
- Punjab
- Puducherry
- Haryana
- Karnataka
- Madhya Pradesh
- Mizoram
- Odisha
- Rajasthan
- Telangana
- Uttarakhand
- Uttar Pradesh
- West Bengal
- Tripura
- Arunachal Pradesh
- Sikkim

**Till Date (Since 2017)**

No of Trainings: 1201
No of Persons Trained: 40,161

NOTIFIED

FOR CABINET APPROVAL

AMENDMENT READY

# ECBC Chapters

1. **PURPOSE**
2. **SCOPE**
3. **COMPLIANCE AND APPROACH**
4. **BUILDING ENVELOPE**
5. **COMFORT SYSTEMS AND CONTROLS**
6. **LIGHTING AND CONTROLS**
7. **ELECTRICAL AND RENEWABLE SYSTEMS**
8. **DEFINATIONS, ABBREVIATIONS AND ACRONMYS**
9. **WHOLE BIUILDING PERFORMANCE METHOD**
10. **APPENDIX**

# AMENDMENT IN CHAPTER 2: SCOPE

| S. No | Section/Table # | Para/Row # | ECBC 2017 | Amendment upto 2020 |
|---|---|---|---|---|
| 1 | Note 2-1 | Business | 1. Large Office (>30,000 m2)<br>2. Medium Office (10,000m2-30,000 m2)<br>3. Small Office (<10,000 m2) | 1. Daytime use<br>2. 24-hours use |
| 2 | 2.4 Reference Standards | | - | **Added:** Standards and labelling (S&L) Program of BEE will be applicable for minimum equipment efficiency standards, wherever specified. In case the schedule of S&L is revised for any equipment, the design approval year of building will be considered as base year for ECBC compliance. |

# AMENDMENT IN CHAPTER 3: COMPLIANCE & APPROACH

| S. No | Section/ Table # | ECBC 2017 | Amendment upto 2020 |
|---|---|---|---|
| 1 | 3.4 | A building following the whole building performance approach shall show compliance through a whole building energy simulation software that has been approved by BEE.<br><br>Compliance to the daylight requirements of §4.2.3, if calculated through software tools, shall be shown through a daylighting software endorsed/approved by BEE. The list of BEE approved software for whole building energy simulation and daylighting analysis is given in Appendix E. | A building following the whole building performance approach method of §9 or Total System Efficiency – Alternate compliance approach of §5.4 shall show compliance through online BEP-EMIS or whole building energy simulation software that has been approved endorsed by BEE.<br><br>Compliance to the daylight requirements of §4.2.3, if calculated through software tools, shall be shown through online BEP-EMIS or daylighting software approved by BEE. The list of BEE approved software for whole building energy simulation and daylighting analysis is given in §14 Appendix E. |
| 2 | 3.3.2 | Where the new connected load demand of the addition plus the existing building exceeds 100 kW or 120 kVA, the additions shall comply with the provisions of §4 through §7. Compliance may be demonstrated in either of the following ways: | If any existing building after additions or alterations changes its connected load to 100 kilo- shall comply with the provisions of §4 through §7. Compliance may be demonstrated in either of the following ways: |
| 3 | 3.1.1 | New Insertion | To comply with the Code, EPI value shall be rounded off to two decimal places in accordance with IS 2 : 1960 'Rules for rounding off numerical values |

# AMENDMENT IN CHAPTER 4: BUILDING ENVELOPE

| S. No | Section/ Table # | ECBC 2017 | Amendment upto 2020 |
|---|---|---|---|
| 1 | 4.2.3.1 New Insertion | | Required Documentation:<br><br>1. Output file from simulation tool outlining point wise compliance for the analysis grid.<br>2. Summary describing the results of the analysis, including annual use for the proposed design and the standard design, and software used.<br>3. Brief description of the project with location, number of stories, space types, conditioned and unconditioned areas, hours of operation.<br>4. List showing compliance with the mandatory requirements of this code.<br>5. Explanation of any significant modelling assumptions made.<br>6. Explanation of any error messages noted in the simulation program output.<br>7. Building floor plans, building elevations, and site plan.<br>8. Material reflectance, analysis grid size, total number of grid size/resolution, total number of grid points, number of grid points meeting compliance and compliance in percentage. Draft PPT for State Index Parameters |
| 2 | 4.3.3 | (c) Assembly U-factor includes both frame and glass area weighted U-factors | Assembly U-factor shall be determined for the overall fenestration product (including the sash and frame) |
| Note4-1, Table 4-12 & Table 4-13; Note 4-2, Table 4-16, 17, 18, 19; Note 4-3 revised | | | |

# AMENDMENT IN CHAPTER 5: COMFORT SYSTEMS & CONTROLS

| S. No | Section/ Table # | ECBC 2017 | Amendment upto 2020 |
|---|---|---|---|
| 1 | 5.2.2.1 | The application of air-cooled chiller is allowed in all buildings with cooling load less than 530 kW. For buildings with cooling load equal to or greater than 530 kW, the number of air-cooled chiller shall be restricted to 33% of the total installed chilled water capacity unless the authority having jurisdiction mandates the application of air cooled chillers. | The application of air-cooled chiller is allowed in all buildings with cooling load less than 530 kW. For buildings with cooling load equal to or greater than 530 kW, the capacity of air-cooled chiller shall be restricted to 33% of the total installed chilled water capacity unless the authority having jurisdiction mandates the application of air cooled chillers. |
| 2 | 5.2.2.2 | | Minimum efficiency requirements under BEE Standards and Labeling Program for chillers shall take precedence over the minimum requirements presented in Table 5.1 through Table 5. 2 |
| 3. | 5.3.1 New Insertion | | 5.3.1 Chillers shall meet or exceed the minimum efficiency requirements as per standards and labelling program of BEE for ECBC+ and Super ECBC Buildings<br>i. Minimum 3 star rated chillers is required foe ECBC+ compliance<br>ii. 5 Star chiller to meet Super ECBX compliance |
| 4 | 5.3.1 Chillers | To show compliance to ECBC, minimum requirement of both COP and IPLV requirement shall be met. Table 5 .14 and Table 5.15 | **Removed** |

# AMENDMENT IN CHAPTER 7: ELECTRICAL & RENEWBALE

| S. No | Section/ Table # | ECBC 2017 | Amendment upto 2020 |
|---|---|---|---|
| 1 | 7.2.4 | Services exceeding 1000 kVA shall have permanently installed electrical metering to record demand (kVA), energy (kWh), and total power factor. | Services exceeding 1000 kVA shall have permanently installed electrical metering to record demand (kVA), energy (kWh), and total power factor on hourly basis. |
| 2 | 7.2 | Power transformers of the proper ratings and design must be selected to satisfy the minimum acceptable efficiency at 50% and full load rating. The permissible loss shall not exceed to values listed in Table 7 1 for dry type transformers and Table 7 2 for oil type transformers. | **Revised:**<br>Power transformers of the proper ratings and design must be selected to satisfy the minimum acceptable efficiency at 50% and full load rating. The permissible loss shall not exceed to values listed in Table 7-1 for dry type transformers. BEE star rating for dry type transformer shall take precedence over this table once notified by BEE under BEE Standards and Labelling Program. For oil type transformer BEE star rated transformer (BEE Standards and Labelling Program) shall be used in all compliant buildings. Power transformers to meet compliance shall have:<br>(a) minimum 3 stars rating in ECBC Buildings<br>(b) minimum 4 stars rating in ECBC+ Buildings<br>(c) 5 stars rating in Super ECBC Buildings |
| 3 | | Table 7. 2 Permissible Losses for Oil Type Transformers. | **Removed:** Table 7..2 |

# AMENDMENT IN CHAPTER 7: ELECTRICAL & RENEWBALE

| S.No | Section/ Table # | ECBC 2017 | Amendment upto 2020 |
|---|---|---|---|
| 4 | Table 7.1 (Footnotes) | Total loss values given in above table are applicable for thermal classes E, B and F and have component of load loss at reference temperature according to Clause 17 of IS 1180 i.e., average winding temperature rise as given in Column 2 of Table 8.2 plus 300C. An increase of 7% on total for thermal class H is allowed. | **Revised:** The total loss values given in above table are applicable for thermal classes E, B and F and have component of load loss at reference temperature according to Clause 12.7 of IS 11171 i.e. average winding temperature rise as given in Column 4 of Table 4 of IS 11171 plus $30^0$C. i.e. for F thermal class the total loss values shall be calculated at $120^0$C and for H thermal class the total loss values shall be calculated at $145^0$C. An increase of 7% on total loss value for thermal class H is allowed. |
| 5 | 7.2.3 | | **Additional Clause:** Provided the building does not use DG sets for captive power generation ( no more than 15% of power requirement is being met by the use of DG sets), 3 star rated DG sets may be used for ECBC + and Super ECBC Buildings. |

# AMENDMENT IN CHAPTER 9: ELECTRICAL & RENEWBALE

| S.No | Section/ Table # | ECBC 2017 | Amendment upto 2020 |
|---|---|---|---|
| 1 | Table 10.2 | Typical thermal properties of common building and insulating materials | From ASHRAE |
| 2 | Table 10.1 | Frame Type Glazing Type U-Factor (W/m2.K) SHGC VLT<br>All frame types Single Glazing 7.1<br>Wood, vinyl, or fiberglass frame or metal frame with thermal break Double Glazing 3.4<br>Metal and other frame type Double Glazing 5.1 | Please also note that where certified glazing assembly is not available, the glass VLT reported by manufacturer must meet or exceed 0.37 (as it accounts for framing). The SHGC values reported by glass manufacturer can be used as they are and must meet or exceed the prescriptive requirements in Table 4-10 for compliance.<br><br>Table 10 1 Defaults for Unrated Vertical Fenestration (Overall Assembly including the Sash and Frame): **Revised**<br>*Note: COG refers to Centre of Glass U value reported by the glass manufacturer in the glass specification sheet. |

# Thank You!