



Bureau of Energy Efficiency



सत्यमेव जयते  
Government of India  
Ministry of Power



german  
cooperation

DEUTSCHE ZUSAMMENARBEIT

**giz** Deutsche Gesellschaft  
für Internationale  
Zusammenarbeit (GIZ) GmbH

# ANGAN

## Augmenting Nature by Green Affordable New-habitat

A Courtyard for Revolutionary Change in Building Energy Efficiency

An International Conference on Building Energy Efficiency

9<sup>th</sup>-11<sup>th</sup> September, 2019 | Hotel The LaLiT, New Delhi





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THIS PRESENTATION WAS SHARED BY

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Technical Expert, IGEN-EERB, GIZ

FOR THE SESSION:

*“ Policy Implementation and Enforcement “*

DURING ANGAN 2019

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EVENT & BRAND MANAGEMENT CO.

# Energy Efficiency improvements in Commercial Buildings

UNDP-GEF-BEE

**Augmenting Nature by Green Affordable New-habitat (ANGAN)**

9<sup>th</sup> - 11<sup>th</sup> September 2019, New Delhi

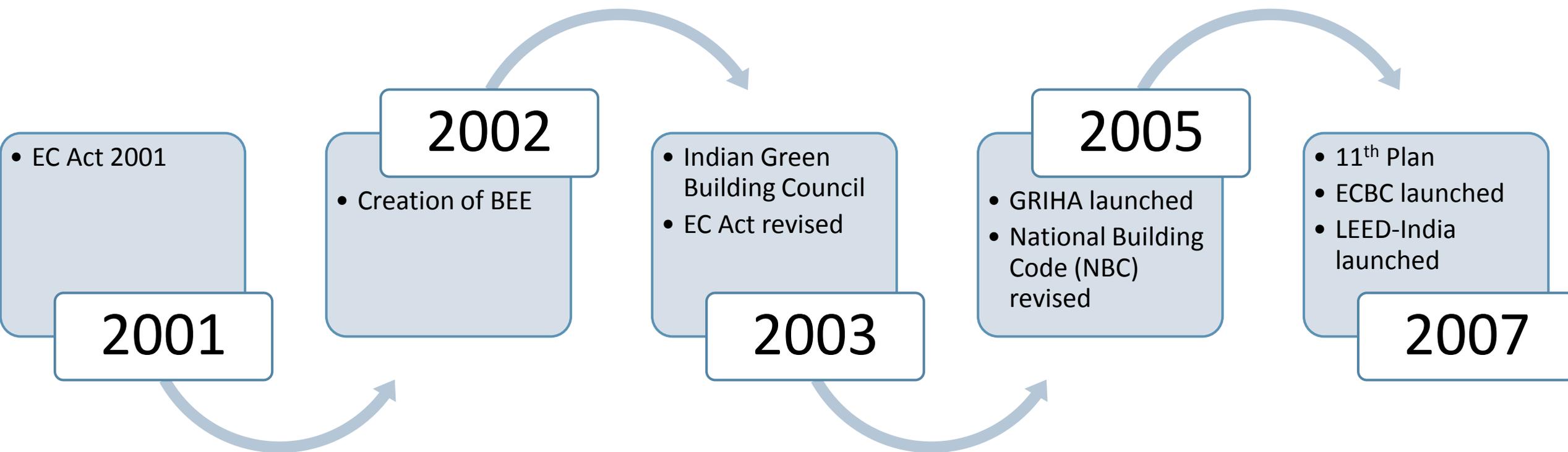
**Abdullah Nisar Siddiqui**

[ar.nisar@gmail.com](mailto:ar.nisar@gmail.com)

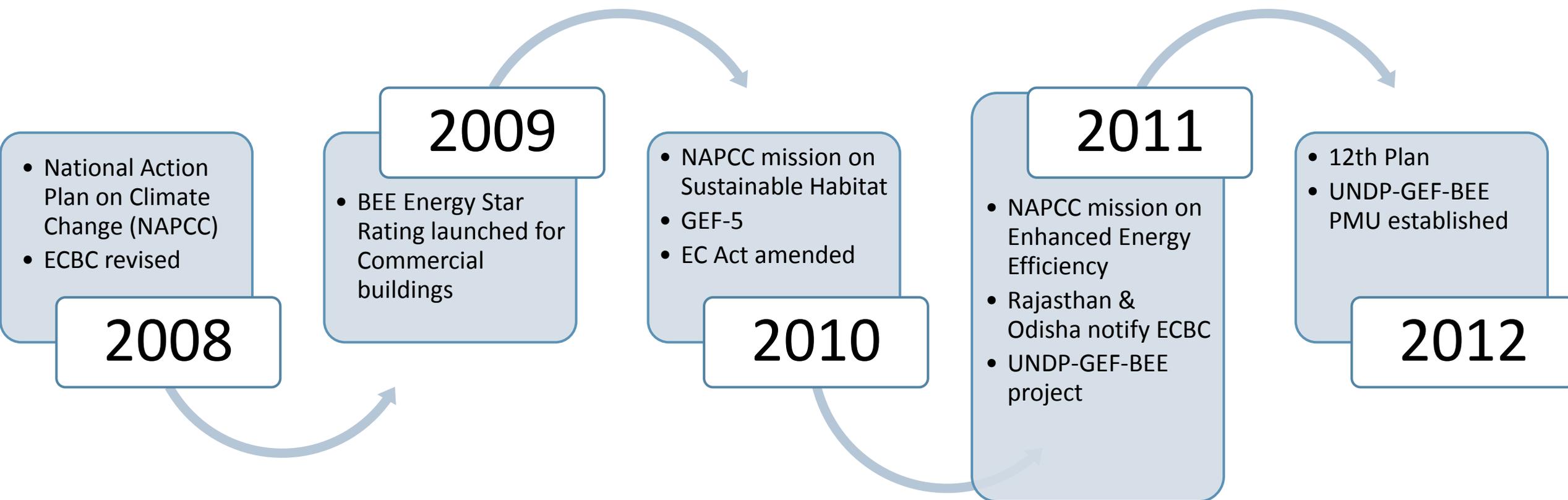


Empowered lives.  
Resilient nations.

# Overview – Timeline



# Overview – Timeline cont.



# Energy Conservation Act 2001

» Government of India - creation of Bureau of Energy Efficiency (BEE)

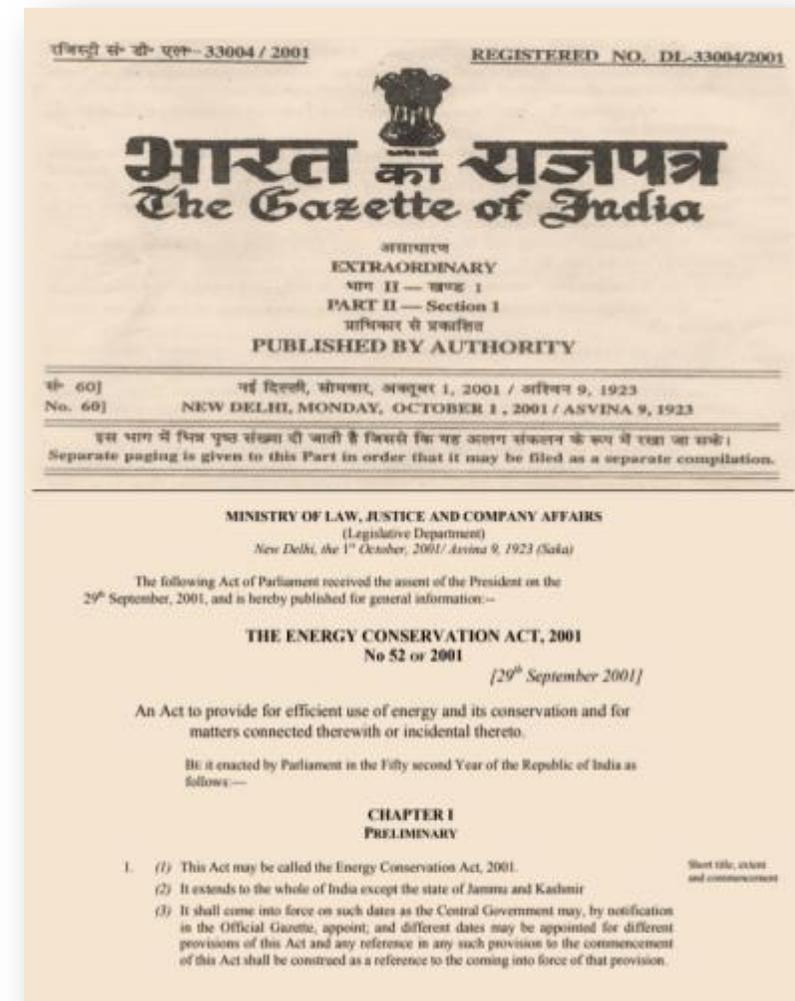
» Powers and Functions of BEE vis-à-vis ECBC

- Prescribe ECBC for efficient use of energy
- Take suitable steps to prescribe guidelines for ECBC
- Link Energy Performance Index (from the EC Act) to the ECBC Prescriptive Compliance Approach in order to facilitate the implementation of the Code

» Power of State Government:

The State Govt., in consultation with BEE, may

- amend ECBC to suit the regional and local climatic conditions with respect to use of energy in the buildings
- direct the owner or occupier of a building (if notified as a Designated Consumer) to comply with the provisions of ECBC



# EECB Project Information

## » Project Goal & Objective

- **Reduction of GHG emissions** from new commercial buildings through compliance with ECBC
- **Operationalisation of the Energy Conservation Building Code (ECBC)** for new commercial buildings

## » Project Duration: October 2010 – December 2017

**Budget: Total: US\$ 21,027,660**

- US\$ 5,200,000 (Global Environment Facility)
- US\$ 2,976,596 (Bureau of Energy Efficiency)
- US\$ 1,787,234 (SDC)
- US\$ 11,063,830 (Others)



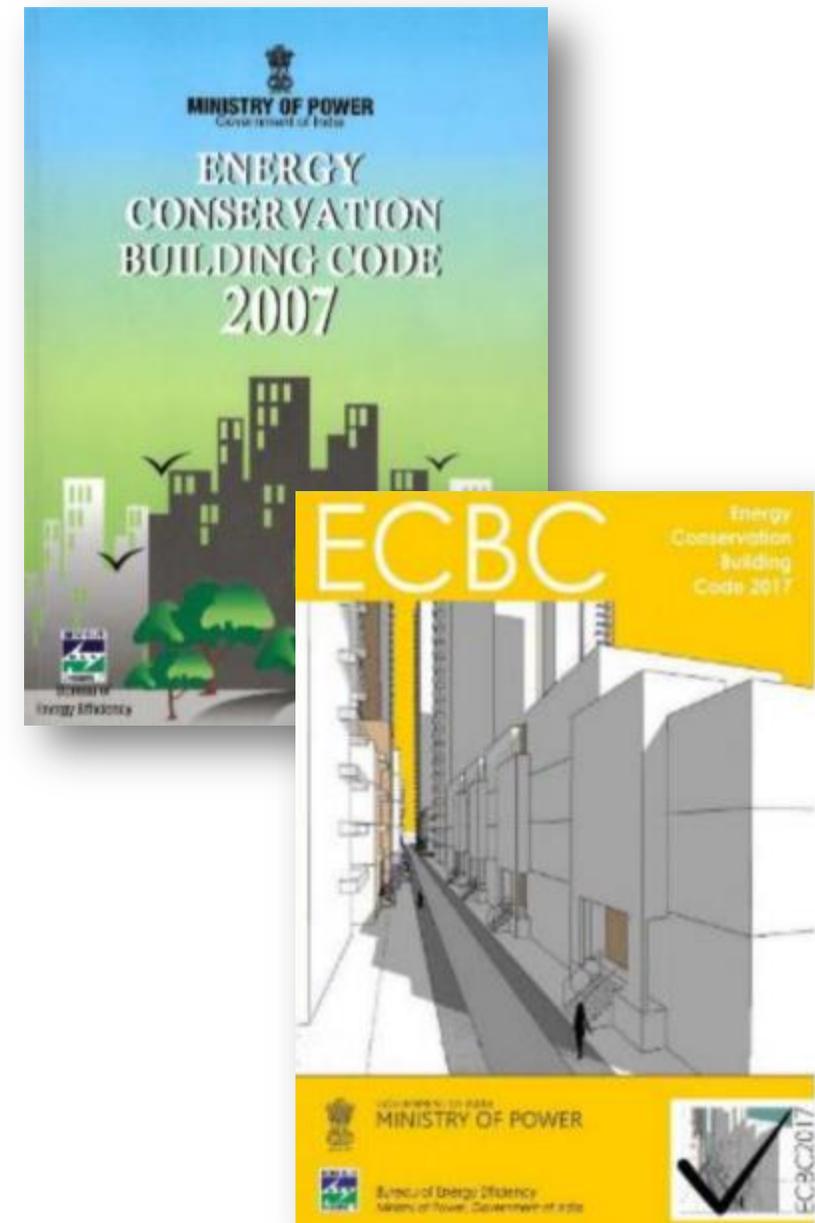
# Energy Conservation Building Code

ECBC sets **minimum** energy efficiency standards

- » Building Envelope
- » Comfort Systems and Controls
- » Lighting and Controls
- » Electrical & Renewable Energy Systems

*Voluntary introduction of ECBC in **May 2007**, revised version launched in **June 2017***

*While the ECBC has been developed by BEE, its **enforcement lies with the State governments and urban local bodies** through notification within their states / municipalities as per their regional requirements*



# Voluntary Phase: Lessons Learnt (2007)

## 1. Awareness Barrier

- General lack of awareness on the benefits of efficient buildings

## 2. Capacity and Technical Barriers

- Lack of knowledge of Designers/Architects to analyze designs based on ECBC
- Inadequate capabilities of agencies that will be implementing ECBC

## 3. Institutional Barriers

- No defined mechanism in states to make ECBC mandatory

## 4. Financial Barriers

- Asymmetry in sharing of costs and benefits between developers, owner and tenant



# EECB Project Components

- 1. Strengthen institutional capacities** at various levels on the enactment and enforcement of ECBC for commercial buildings
- 2. Enhanced technical capacity** and expertise of local building practitioners and service providers
- 3. Increased number of new commercial buildings that are ECBC compliant**
- 4. Readily available and easily accessible/shared information and knowledge products** on best practices regarding EE building technologies and measures



## Strengthening the institutional capacities of SDA/ULB

*Technical resources shall be provided to assist the State Designated Agency / ULB in performing all the tasks pertaining to energy efficiency in buildings*

# ECBC Cell



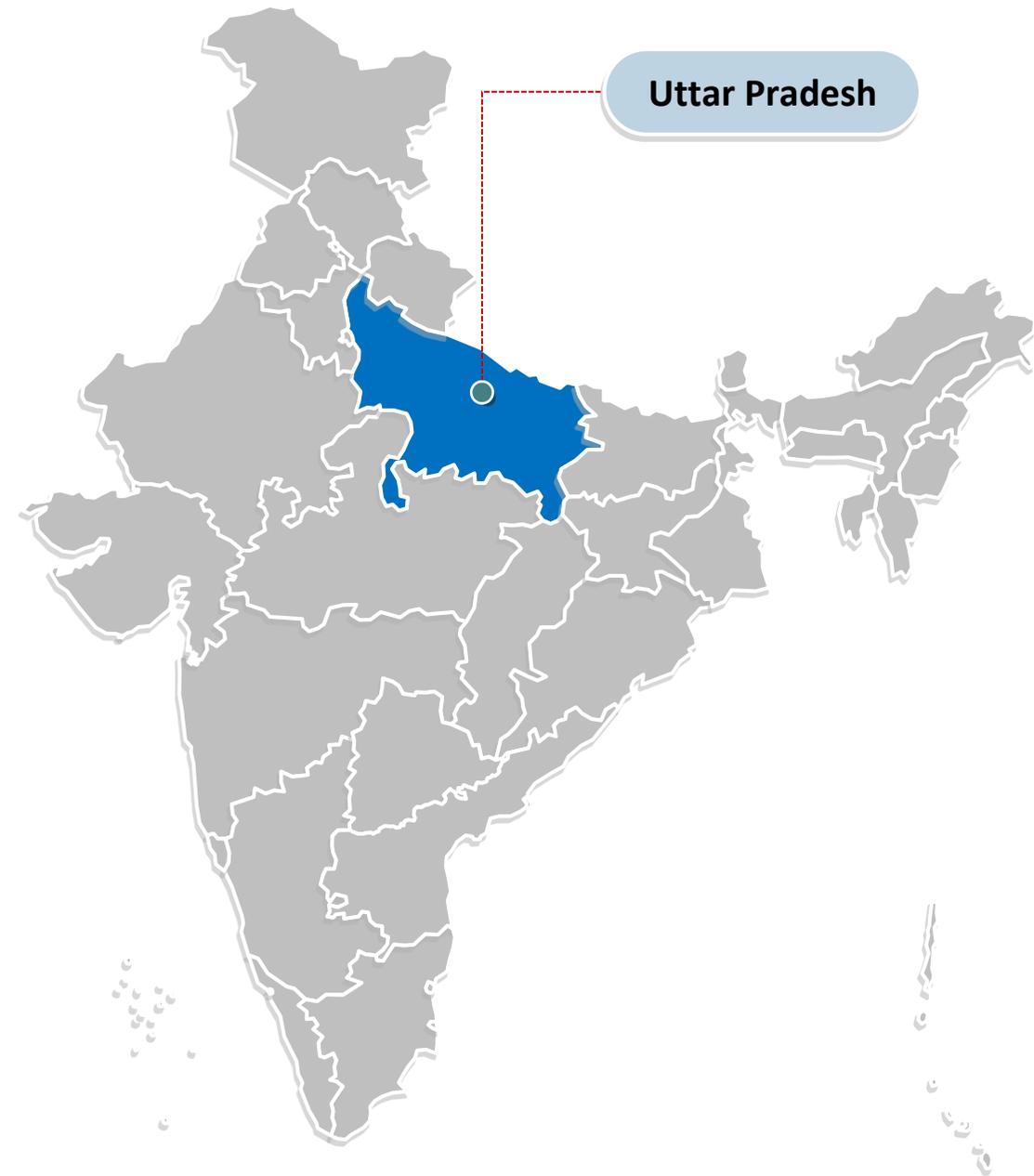
# Creation of ECBC Cells

Outcome of **State specific Roadmap** developed for ECBC implementation

- » Assist in the issuance of **ECBC regulations** and orders for ECBC Implementation in respective State/UT
- » Identify the **training** needs of government officials and other stakeholders
- » Technical Assistance to **demonstration projects** for ECBC compliance
- » Document the required revision in **Schedule of Rates (SoR)** and Plinth Area Rates (PoR) of state PWD to include specification and costing of energy efficient materials required for ECBC compliant buildings
- » Development of **Building Design templates** compliant to ECBC
- » Creation of state specific **building material directory**

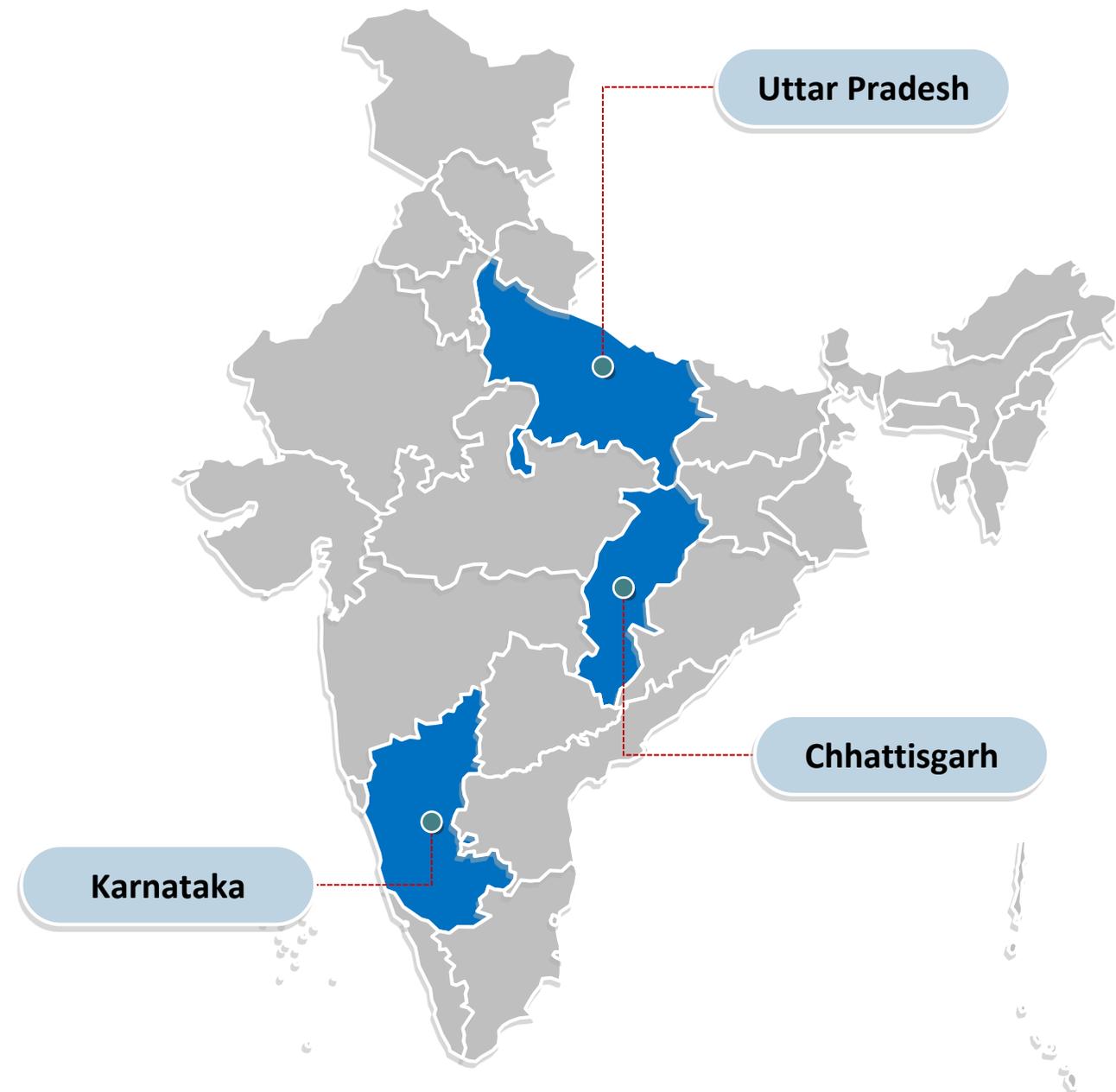
# Creation of ECBC Cells (2015)

- » First ECBC Cell Established in the state of **Uttar Pradesh**



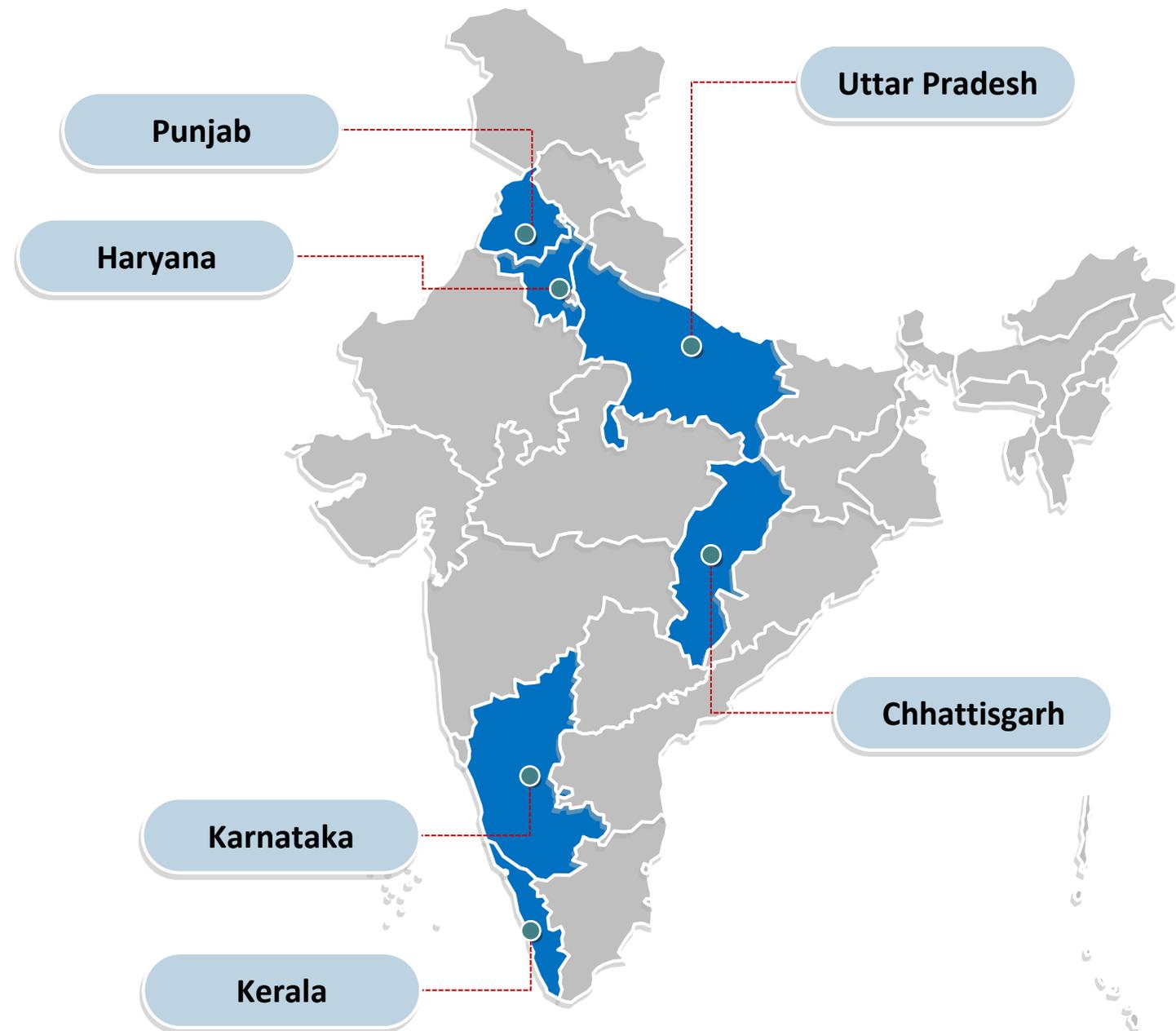
# Creation of ECBC Cells (2015)

- » Uttar Pradesh
- » Chhattisgarh
- » Karnataka



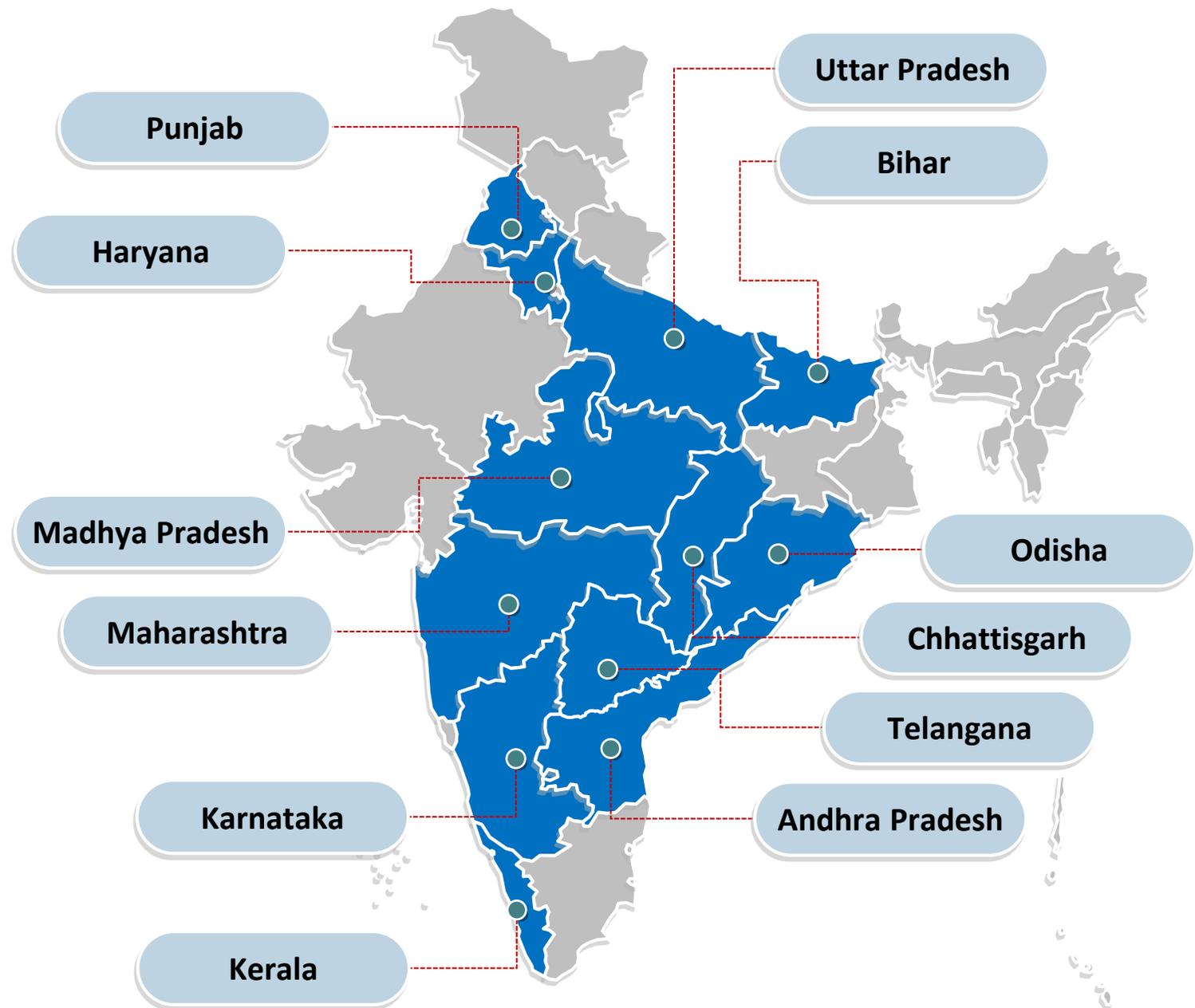
# Creation of ECBC Cells (2016)

- » Uttar Pradesh
- » Chhattisgarh
- » Haryana
- » Karnataka
- » Kerala
- » Punjab



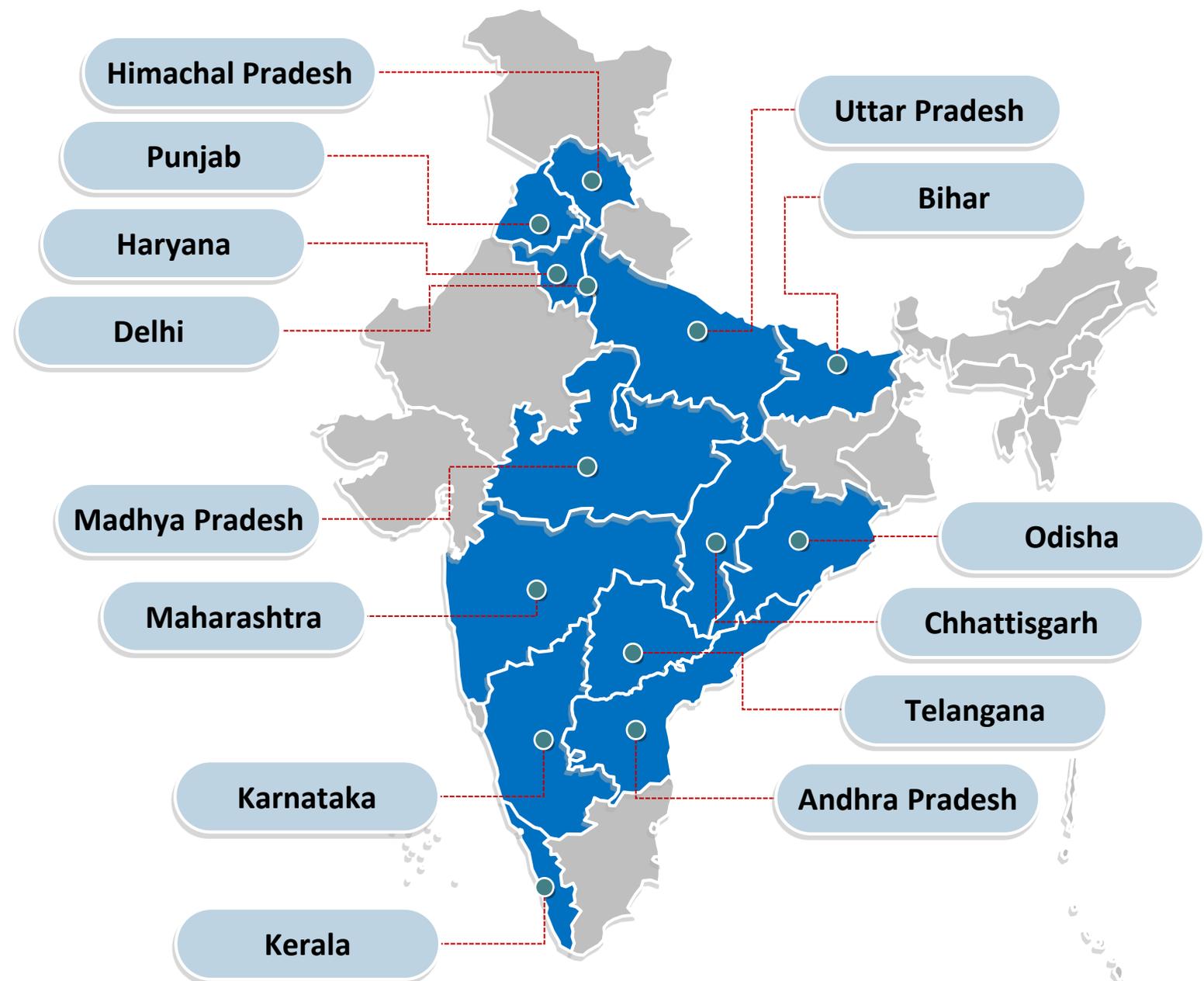
# Creation of ECBC Cells (2017-Q1)

- » Uttar Pradesh
- » Chhattisgarh
- » Haryana
- » Karnataka
- » Kerala
- » Punjab
- » Andhra Pradesh
- » Telangana
- » Bihar
- » Madhya Pradesh
- » Maharashtra
- » Odisha



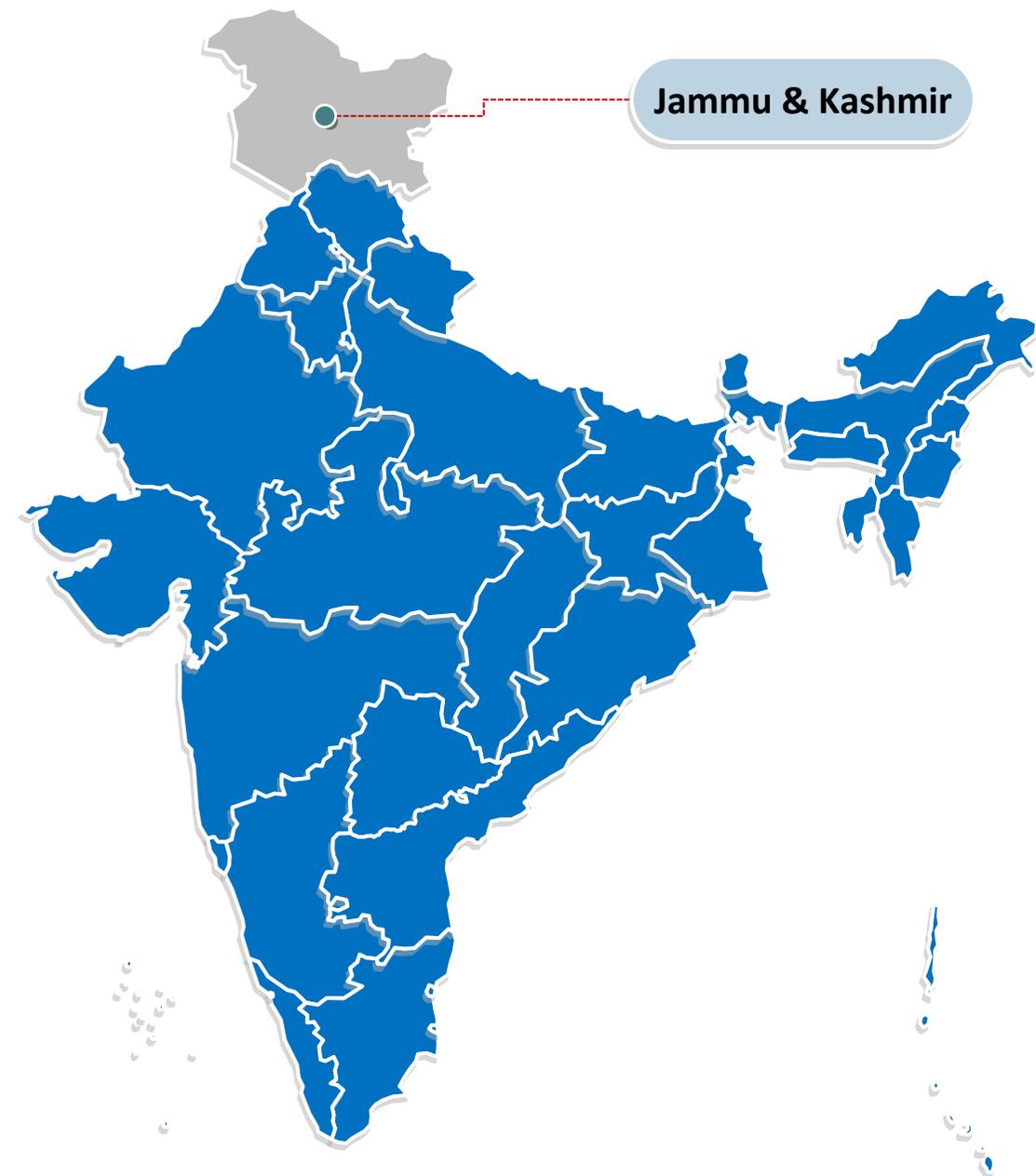
# Creation of ECBC Cells (2017-Q2)

- » Uttar Pradesh
- » Chhattisgarh
- » Haryana
- » Karnataka
- » Kerala
- » Punjab
- » Andhra Pradesh
- » Telangana
- » Delhi
- » Bihar
- » Madhya Pradesh
- » Maharashtra
- » Odisha
- » Himachal Pradesh



# Creation of ECBC Cells (2017-Q3)

» ECBC Cells established in all the States & UTs (*except Jammu & Kashmir*)



ECBC Amendment

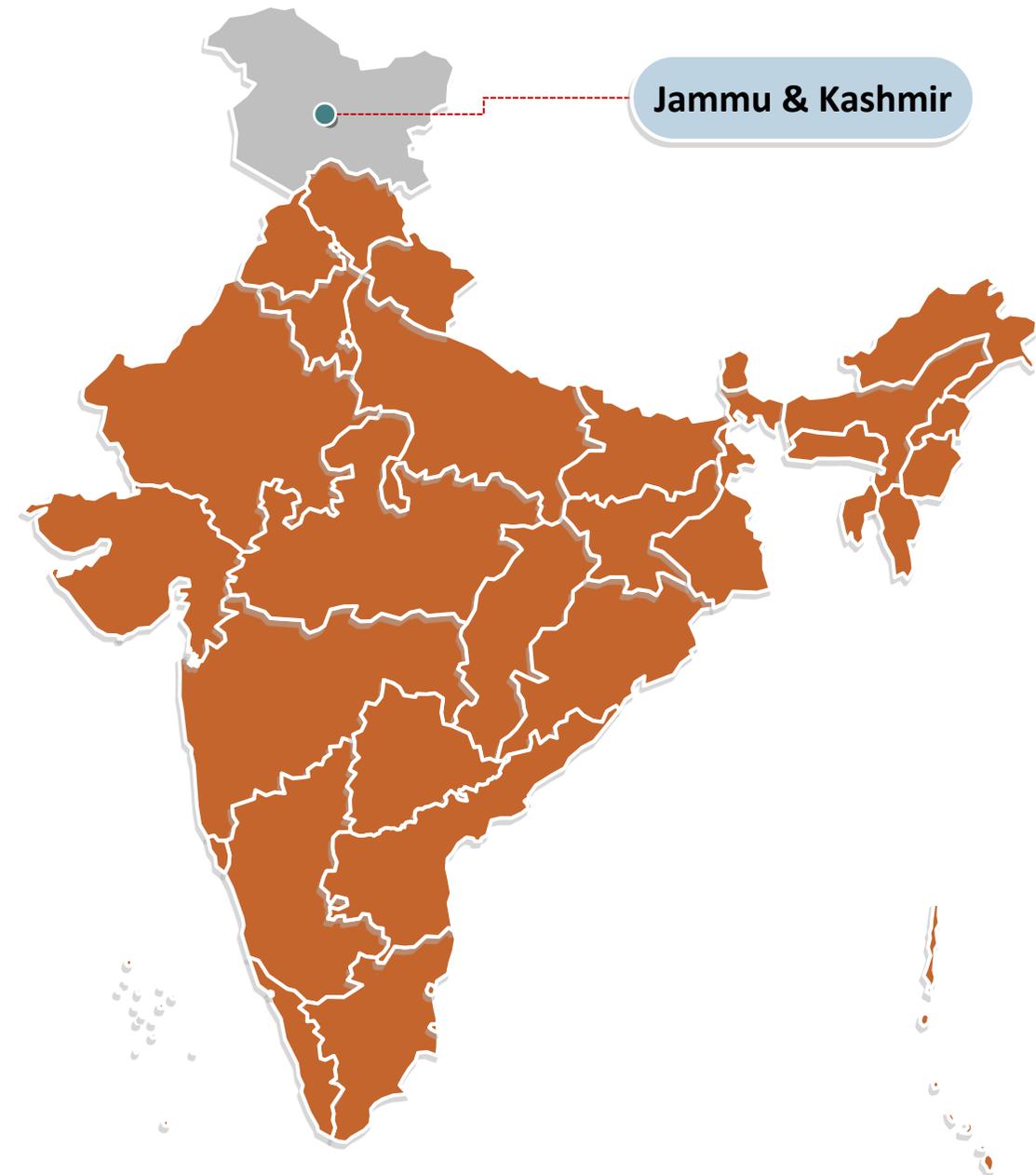
ECBC Notification

Incorporation in bye-laws

Notification at Municipal level

Enforcement

» ECBC amendment has been done in all the States & UTs to suit local conditions (*except Jammu & Kashmir*)



ECBC Amendment

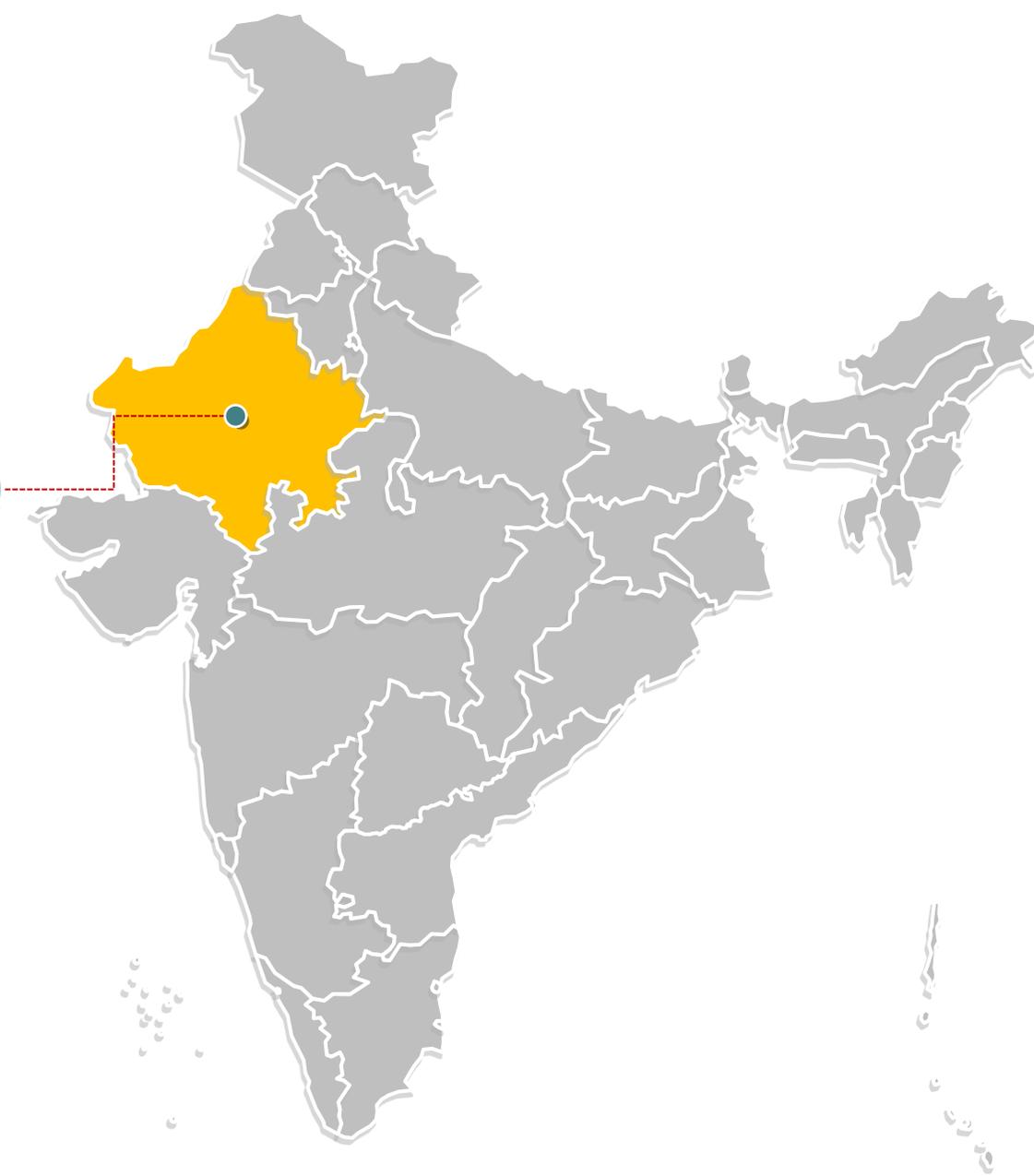
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

» **Rajasthan** becomes 1<sup>st</sup> State to Notify ECBC in March 2011



Rajasthan

ECBC Amendment

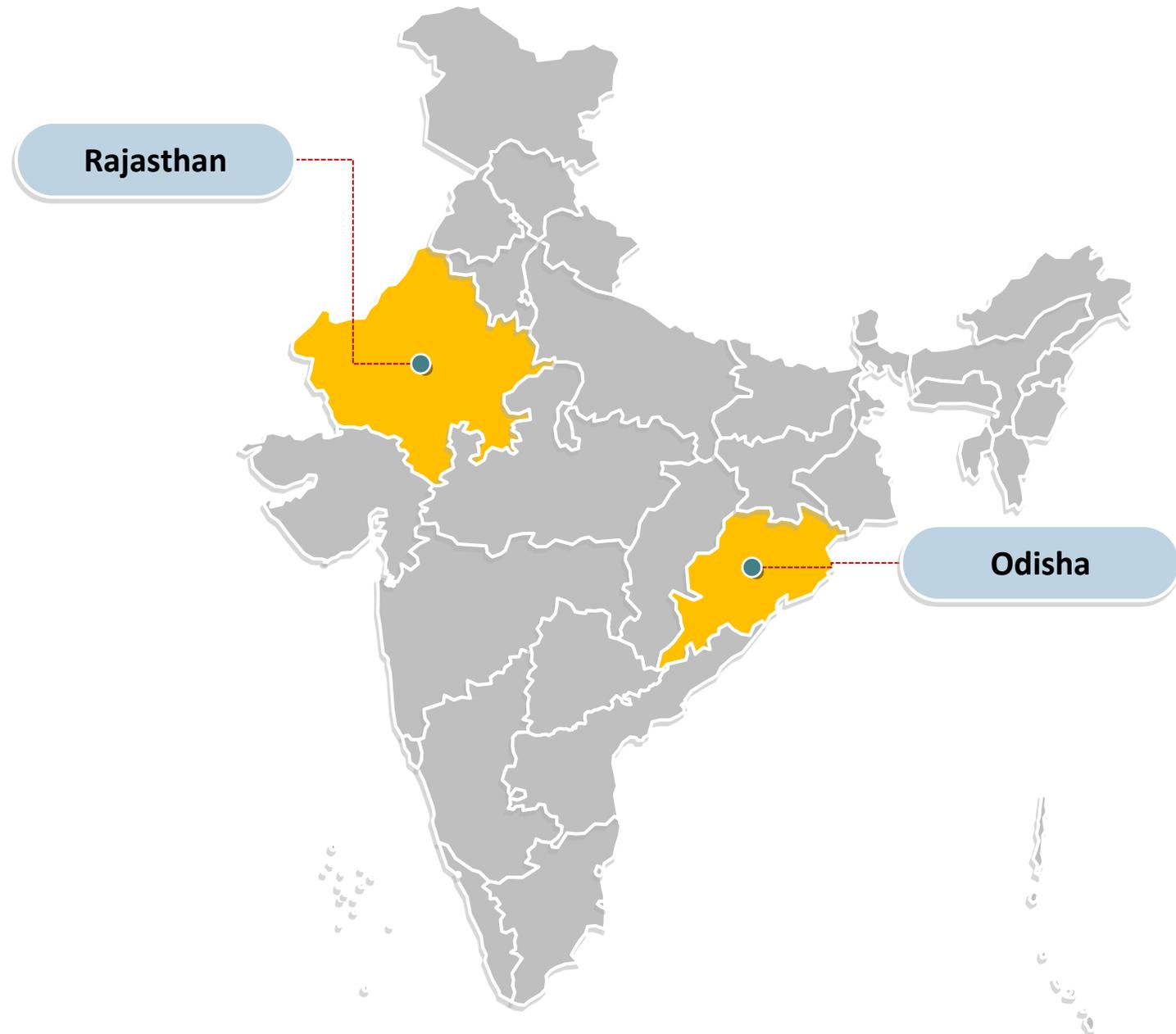
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

» Rajasthan: March 2011

» **Odisha: July 2011**

ECBC Amendment

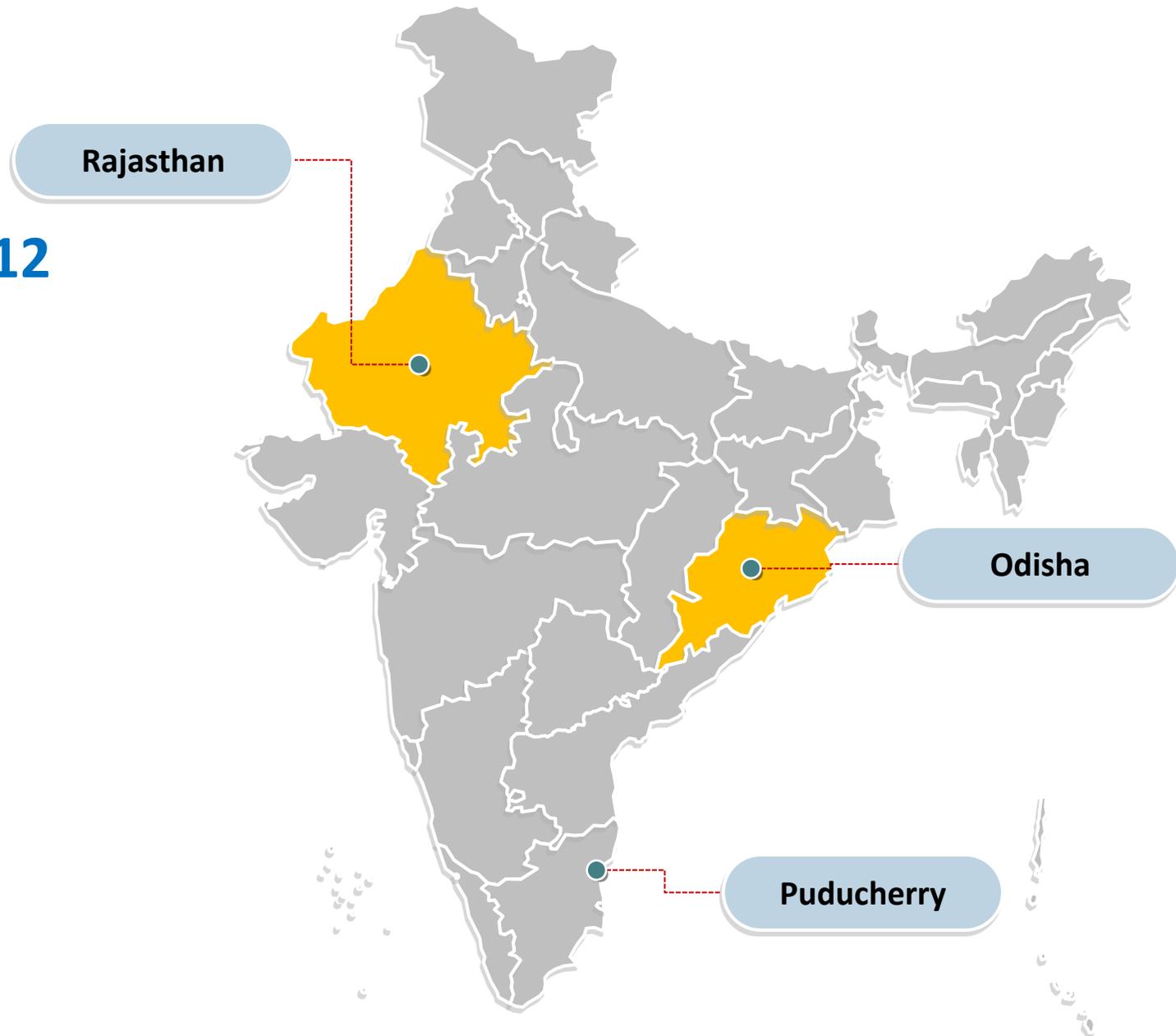
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

- » Rajasthan: March 2011
- » Odisha: July 2011
- » **Puducherry: March 2012**



ECBC Amendment

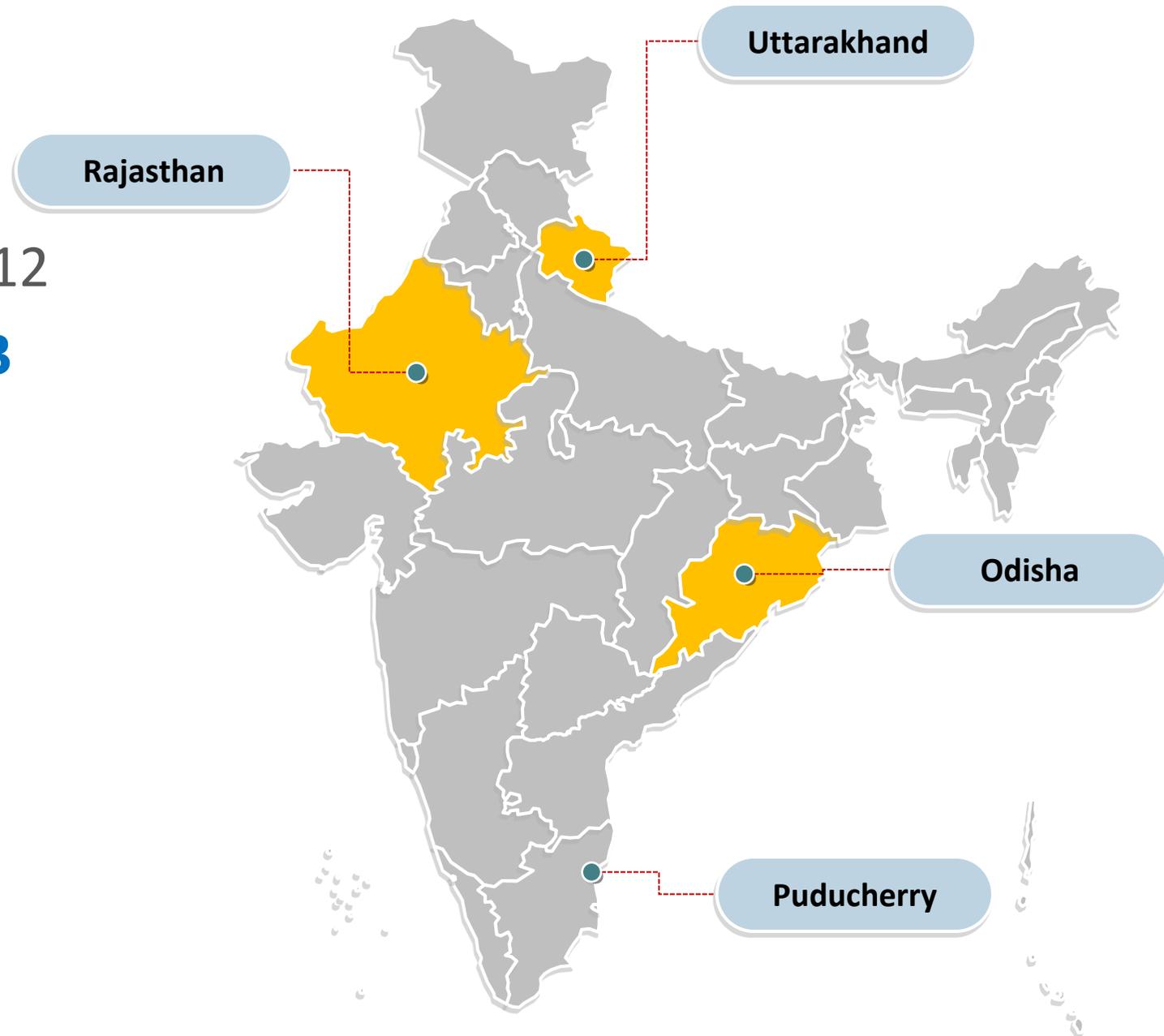
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

- » Rajasthan: March 2011
- » Odisha: July 2011
- » Puducherry: March 2012
- » **Uttarakhand: May 2013**



ECBC Amendment

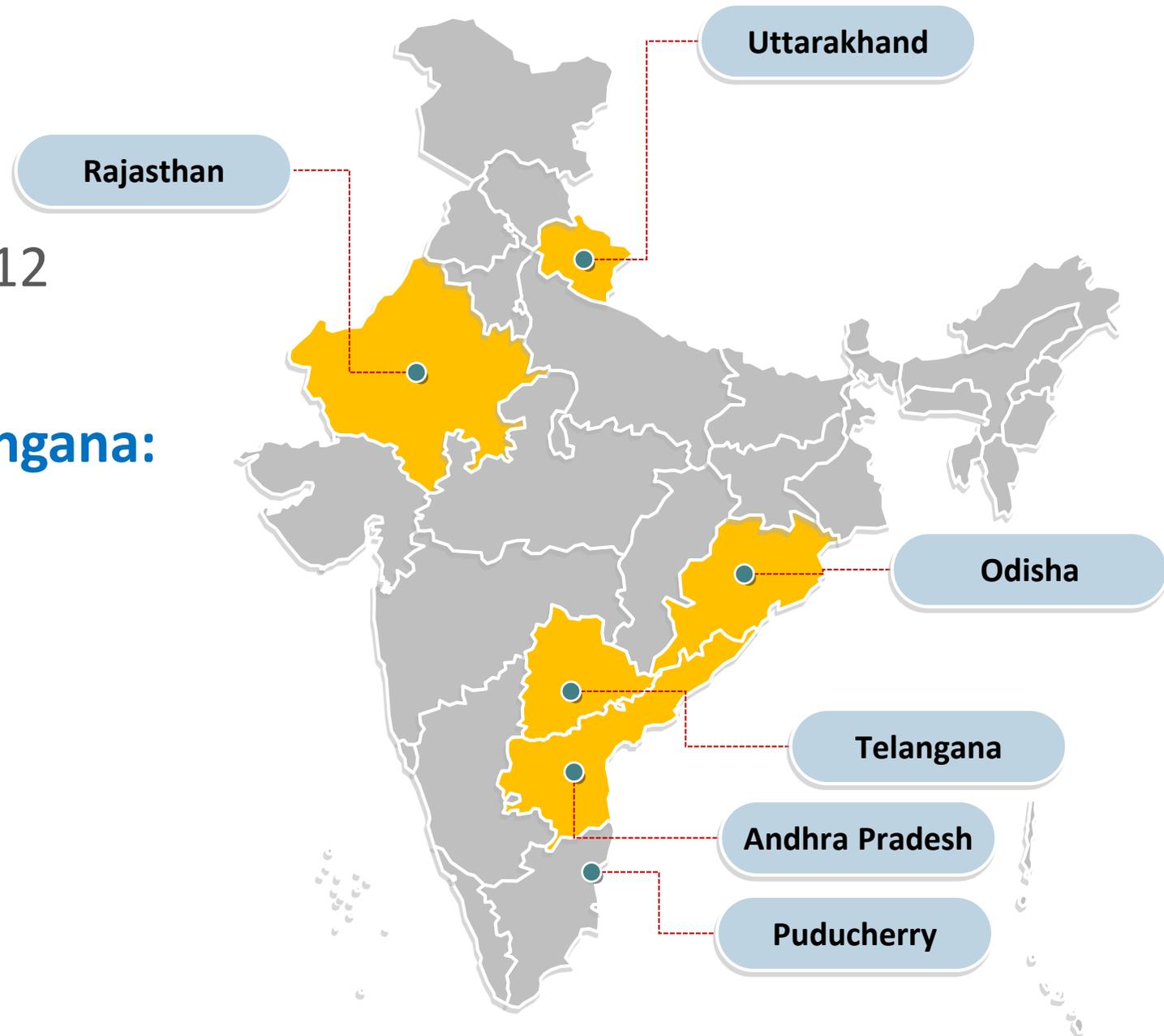
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

- » Rajasthan: March 2011
- » Odisha: July 2011
- » Puducherry: March 2012
- » Uttarakhand: May 2013
- » **Andhra Pradesh & Telangana: Jan 2014**



ECBC Amendment

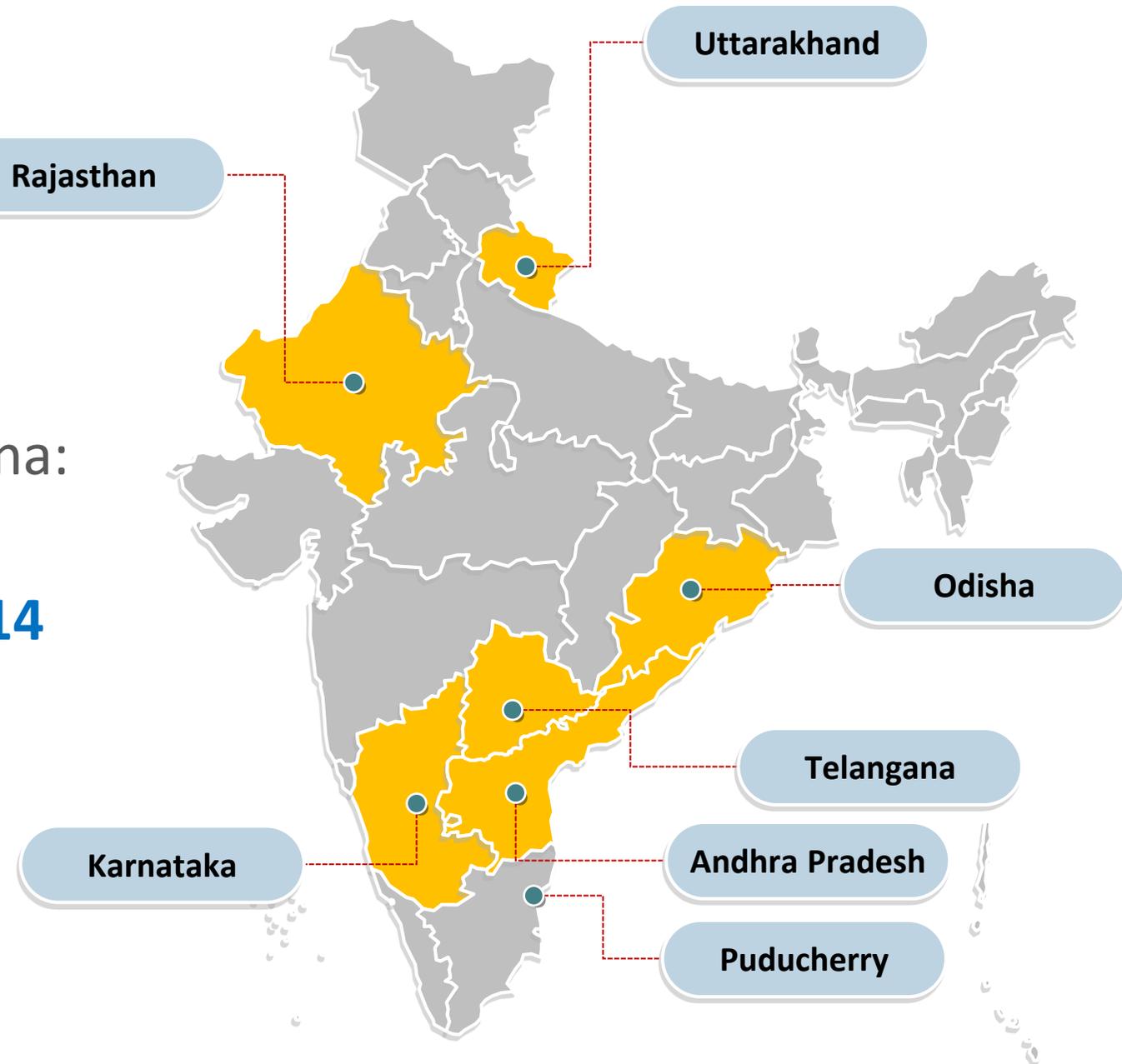
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

- » Rajasthan: March 2011
- » Odisha: July 2011
- » Puducherry: March 2012
- » Uttarakhand: May 2013
- » Andhra Pradesh & Telangana: Jan 2014
- » **Karnataka: September 2014**



ECBC Amendment

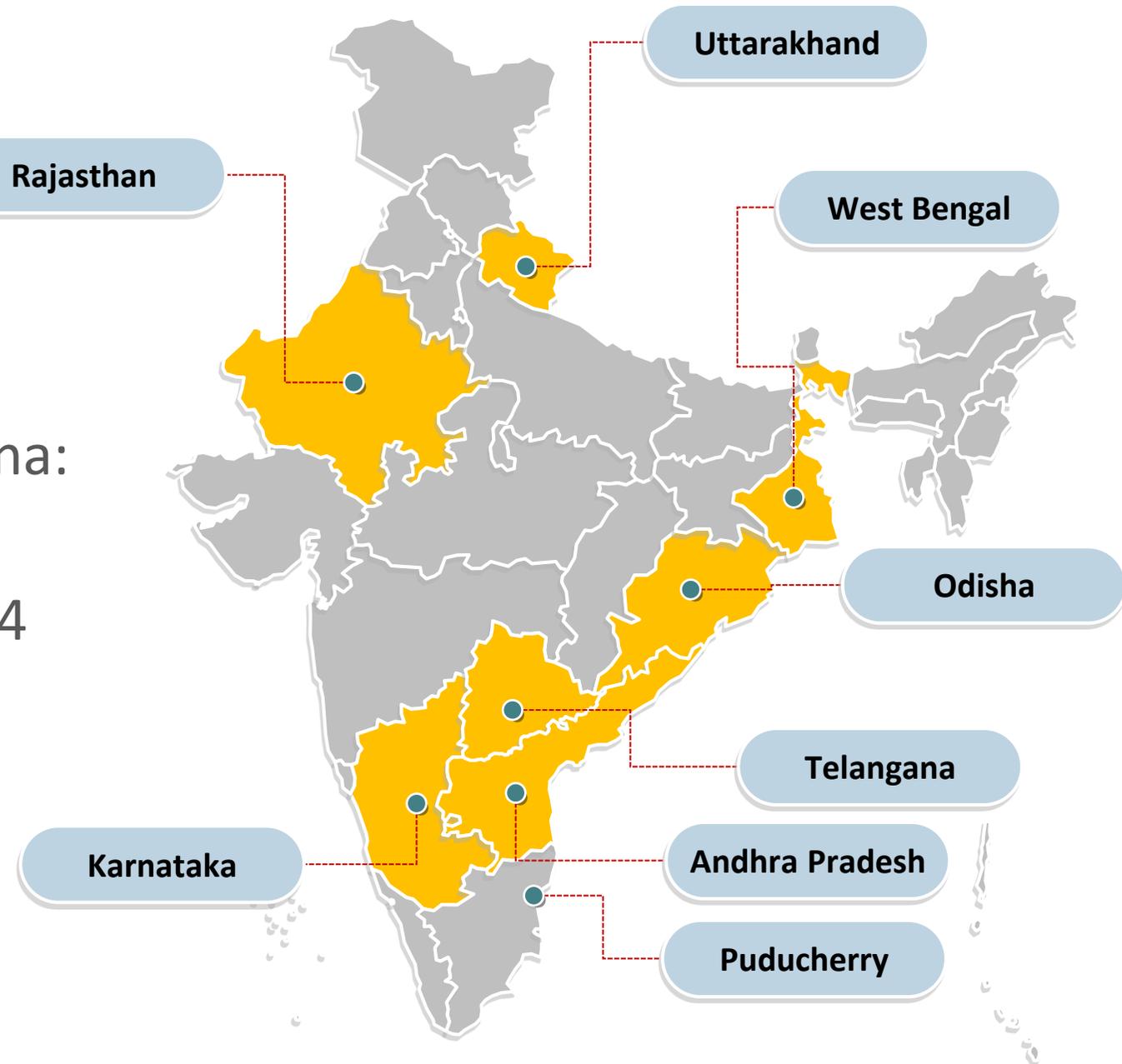
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

- » Rajasthan: March 2011
- » Odisha: July 2011
- » Puducherry: March 2012
- » Uttarakhand: May 2013
- » Andhra Pradesh & Telangana: Jan 2014
- » Karnataka: September 2014
- » **West Bengal: March 2016**



ECBC Amendment

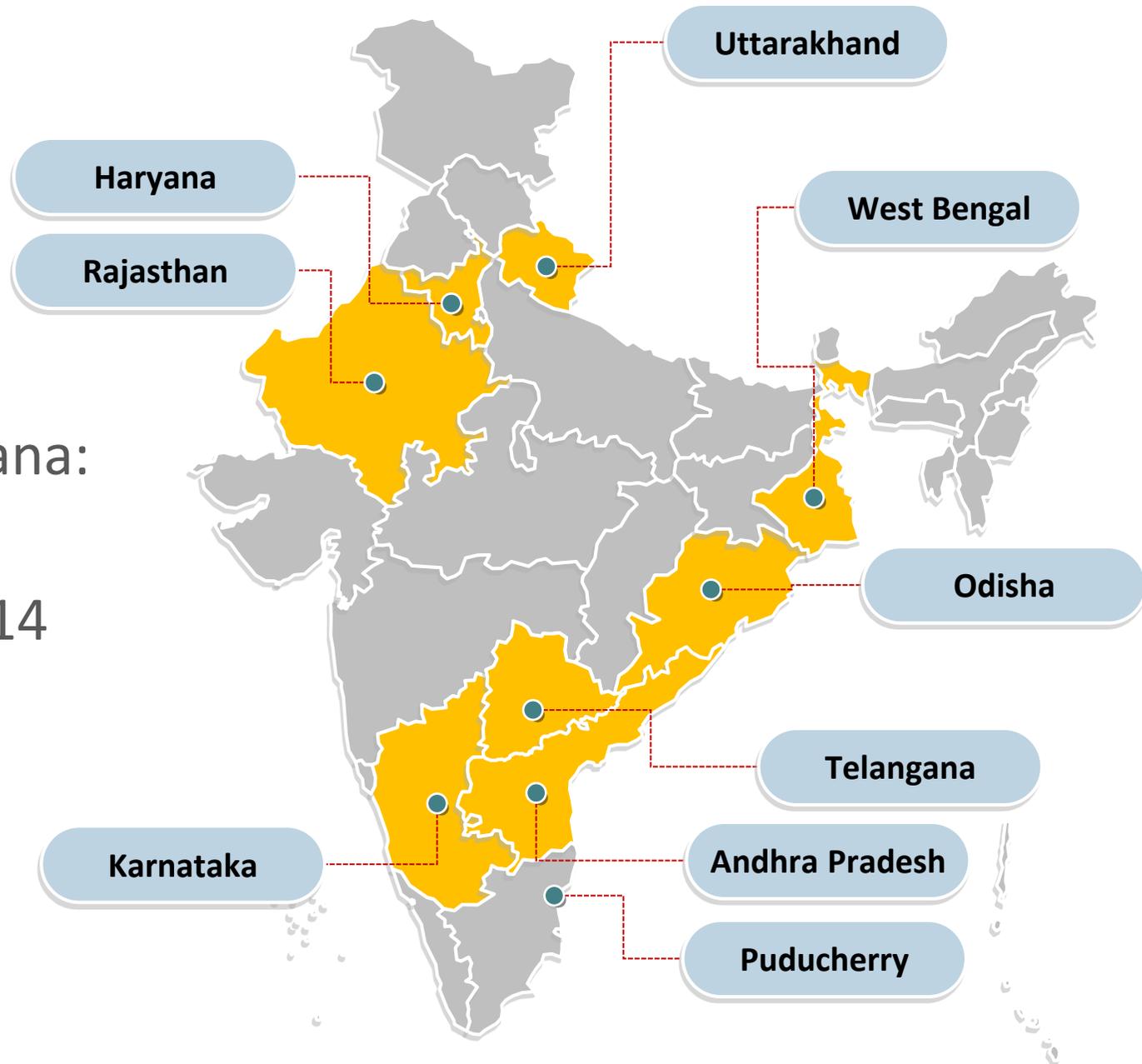
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

- » Rajasthan: March 2011
- » Odisha: July 2011
- » Puducherry: March 2012
- » Uttarakhand: May 2013
- » Andhra Pradesh & Telangana: Jan 2014
- » Karnataka: September 2014
- » West Bengal: March 2016
- » **Haryana: March 2016**



ECBC Amendment

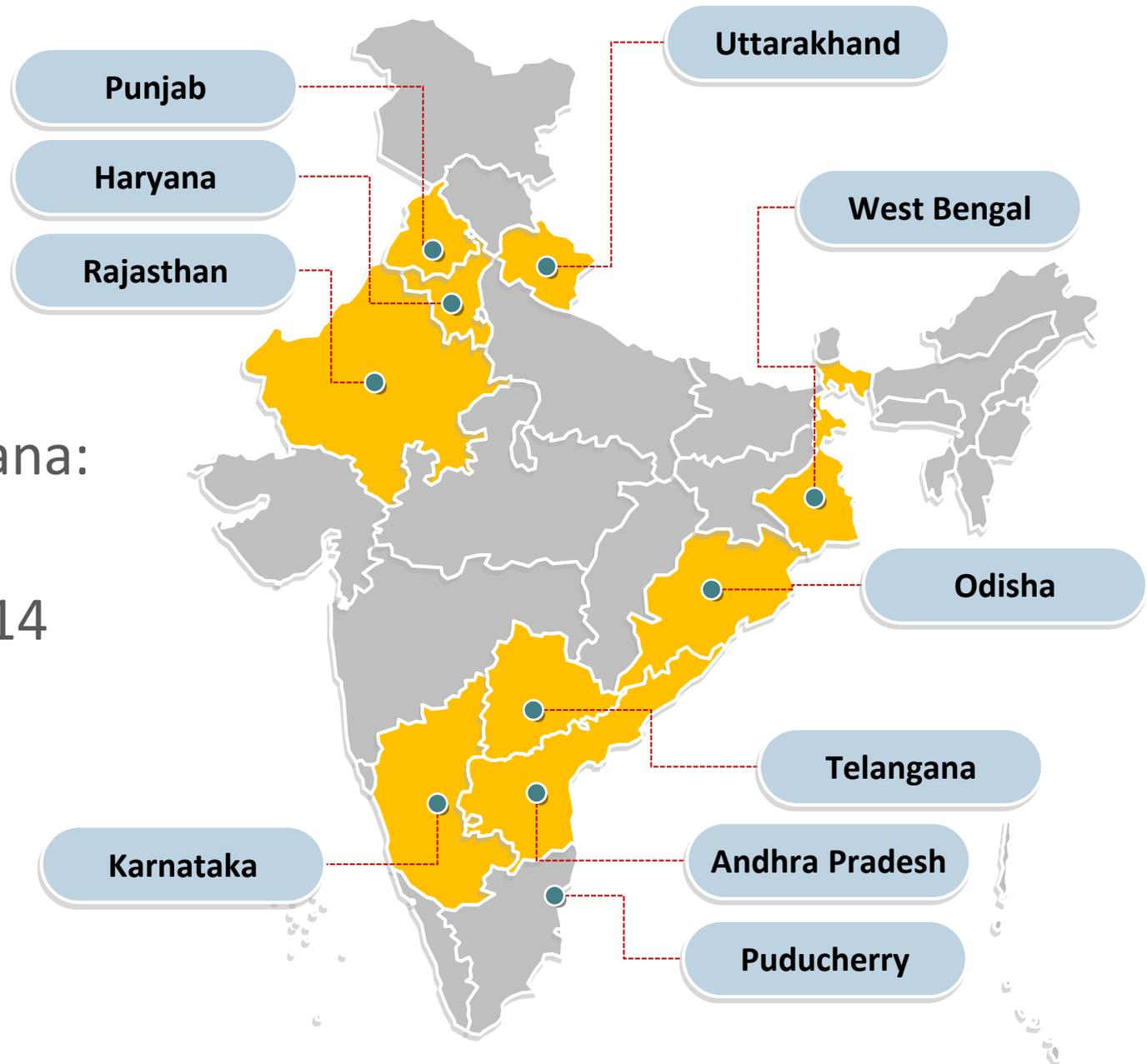
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

- » Rajasthan: March 2011
- » Odisha: July 2011
- » Puducherry: March 2012
- » Uttarakhand: May 2013
- » Andhra Pradesh & Telangana: Jan 2014
- » Karnataka: September 2014
- » West Bengal: March 2016
- » Haryana: March 2016
- » **Punjab: June 2016**



ECBC Amendment

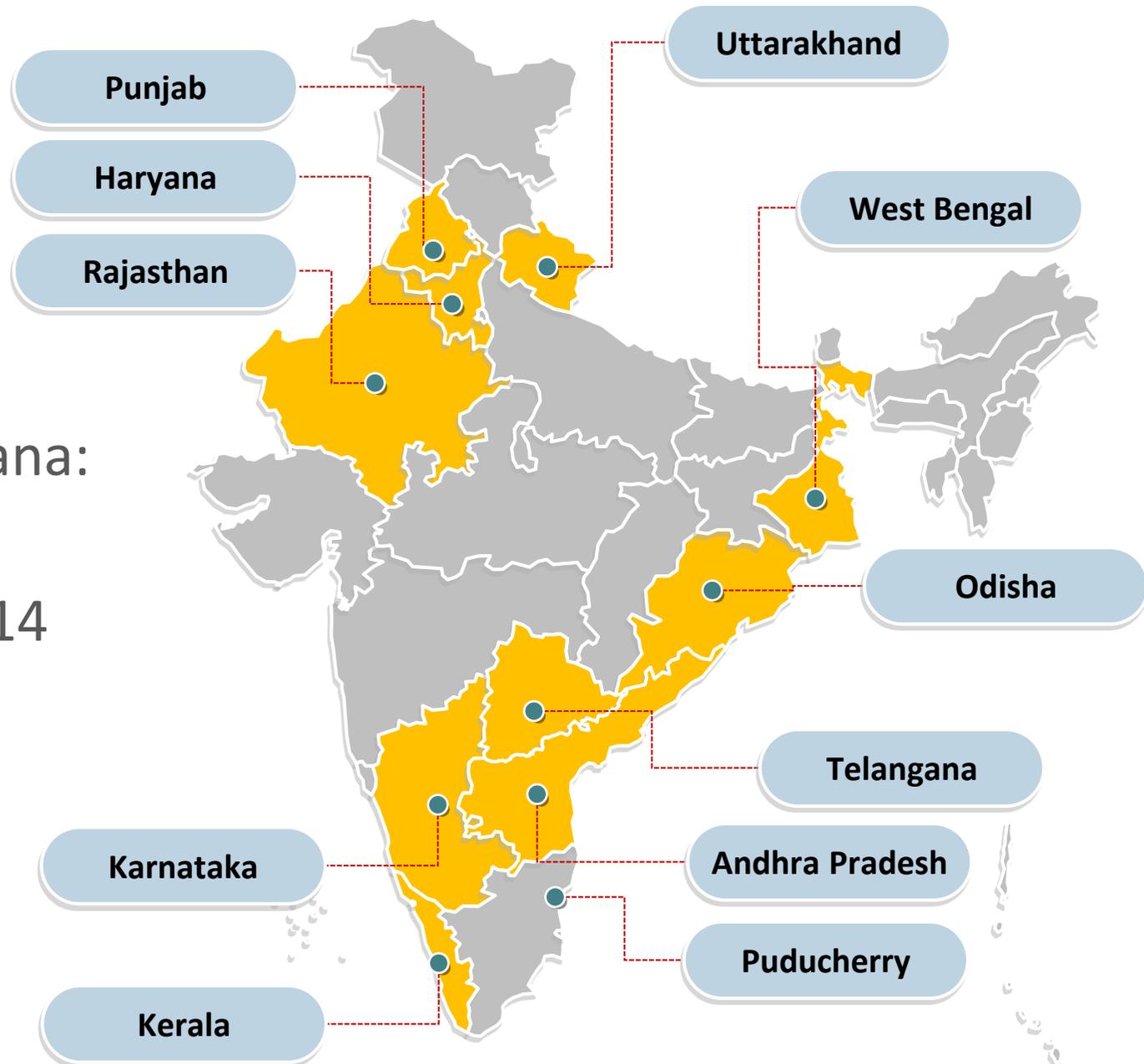
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

- » Rajasthan: March 2011
- » Odisha: July 2011
- » Puducherry: March 2012
- » Uttarakhand: May 2013
- » Andhra Pradesh & Telangana: Jan 2014
- » Karnataka: September 2014
- » West Bengal: March 2016
- » Haryana: March 2016
- » Punjab: June 2016
- » **Kerala: May 2017**



ECBC Amendment

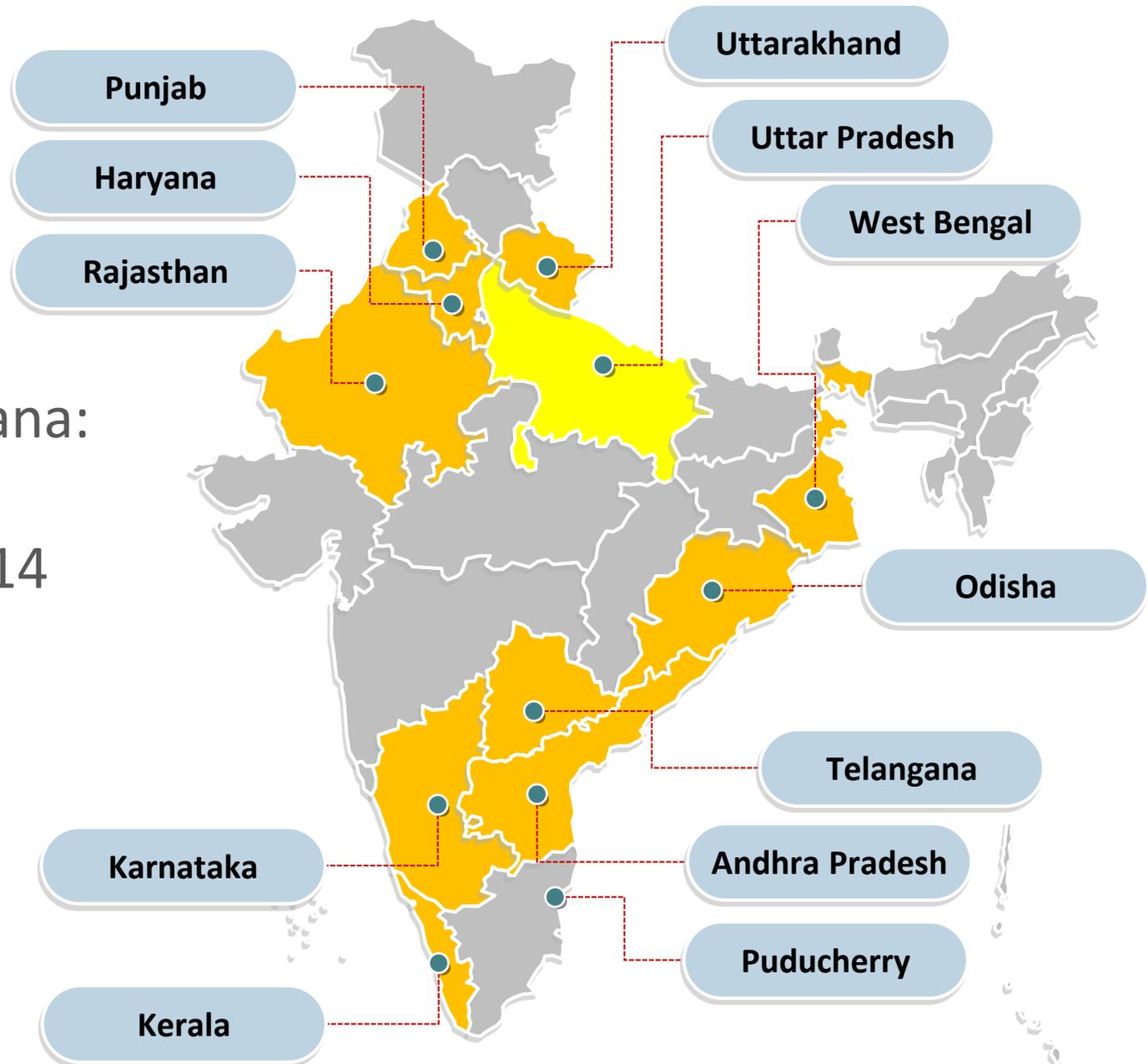
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

- » Rajasthan: March 2011
- » Odisha: July 2011
- » Puducherry: March 2012
- » Uttarakhand: May 2013
- » Andhra Pradesh & Telangana: Jan 2014
- » Karnataka: September 2014
- » West Bengal: March 2016
- » Haryana: March 2016
- » Punjab: June 2016
- » Kerala: May 2017
- » **Uttar Pradesh: July 2018**



ECBC Amendment

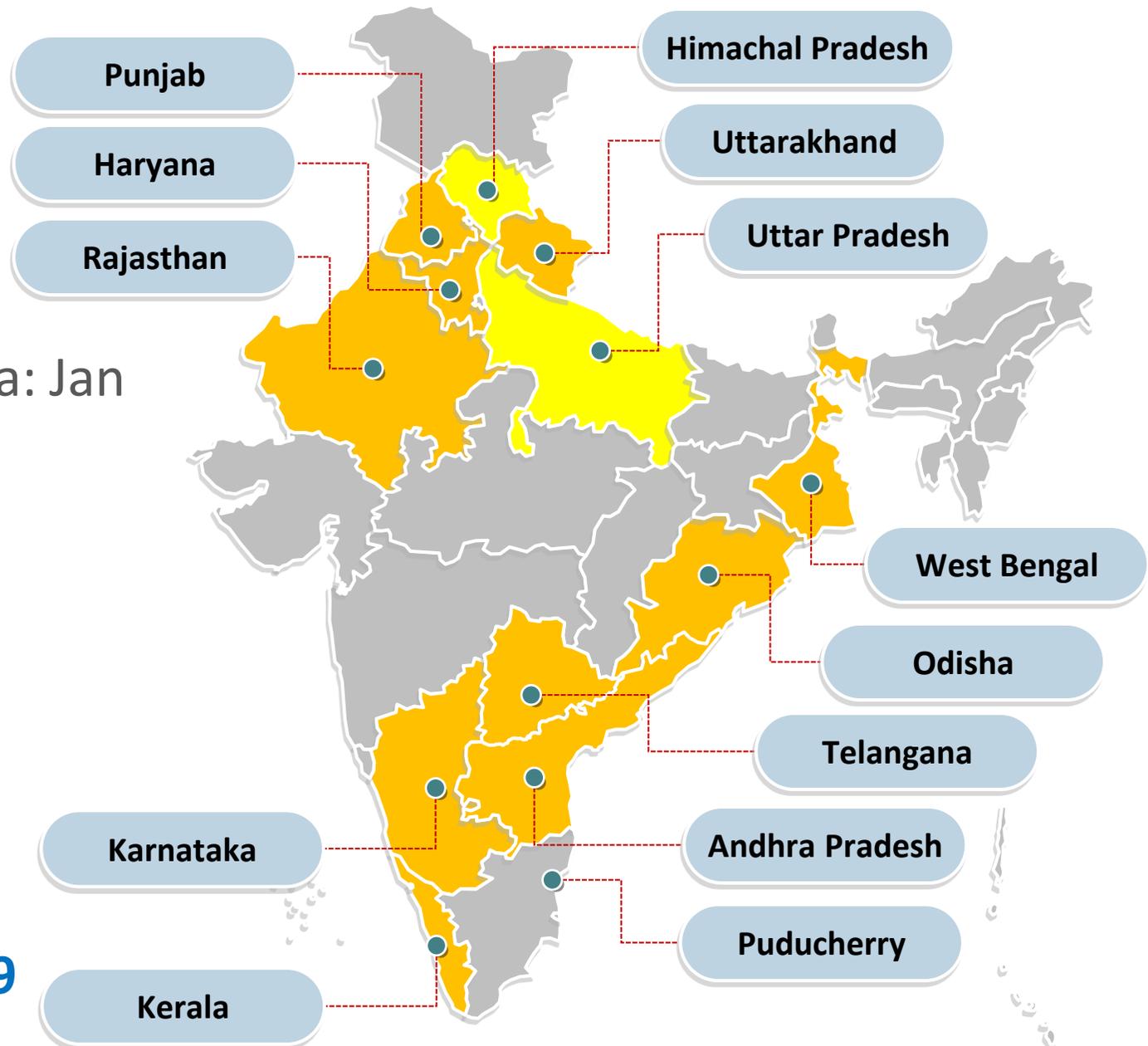
**ECBC Notification**

Incorporation in bye-laws

Notification at Municipal level

Enforcement

- » Rajasthan: March 2011
- » Odisha: July 2011
- » Puducherry: March 2012
- » Uttarakhand: May 2013
- » Andhra Pradesh & Telangana: Jan 2014
- » Karnataka: September 2014
- » West Bengal: March 2016
- » Haryana: March 2016
- » Punjab: June 2016
- » Kerala: May 2017
- » Uttar Pradesh: July 2018
- » **Himachal Pradesh: Jan 2019**



## Notification under EC Act (Karnataka)

GOVERNMENT OF KARNATAKA  
ENERGY SECRETARIAT  
NOTIFICATION  
NO. XXXXXXXX Date: DD/MM/YYYY

Government of Karnataka gazette notification dated: dd/mm/yyyy

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 1st October, 2001/ Asvina 9, 1923 (Saka)  
**THE ENERGY CONSERVATION ACT, 2001**  
(No 52 OF 2001 [29<sup>th</sup> September 2001])

Power of Central Government or State Government to issue directions

18. The Central Government or the State Government may, in the exercise of its powers and 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.

The State Government in consultation with the Bureau of Energy Efficiency do hereby adopts the following code and issues directives for efficient use of energy and its conservation in the buildings or building complexes namely:-

- This code may be called the Karnataka Energy Conservation Building Code (ECBC) 2014.
- Urban Local Bodies as the enforcing authority for implementation of the ECBC
- Public Works Department (PWD), Govt. of Karnataka as the enforcing authority for implementation of the ECBC in respect of Govt. Buildings.
- Department of Electrical Inspectorate, Govt. of Karnataka to inspect the electrical installation in the building 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 to create the awareness of the ECBC.
- It shall come into force from the date of its publication in the official Gazette.

All sections of ECBC to follow.

## Notification under Municipal Act (Andhra Pradesh)

### NOTIFICATION

In exercise of the powers conferred by section 585 read with 592 of the Greater Hyderabad Municipal Corporation Act, 1955; Proviso under sub - section (2) read with sub - section (1) of section 14 and sections 32, 46 and 58 of the Andhra Pradesh Urban Areas (Development) Act, 1975, section 56 (1) of the Hyderabad Metropolitan Development Authority Act, 2008; section 18 of the Andhra Pradesh Municipal Corporations Act, 1994; section 326 of the Andhra Pradesh Municipalities Act, 1965 and section 44 (1) of the Andhra Pradesh Town Planning Act, 1920 the Government of Andhra Pradesh hereby makes the following amendment to the Andhra Pradesh building Rules, 2012 issued in G.O.Ms.No.168 MA&UD Dept., Dated: 07.04.2012 applicable to all Urban Development Authority areas and Urban Local Bodies together with Gram Panchayat areas which are covered in Master Plans / General Town Planning Schemes / Outline Development Plans.

### AMENDMENT

(I) In the said rules, after clause (a) of rule 2 the following shall be inserted namely- "(aa) 'Energy Conservation Building Code' or ECBC is the energy code adopted by the Bureau of Energy Efficiency in 2007 and revised in 2008, that provides the minimum requirements for energy-efficient building design and construction.

The Energy Conservation Building Code (2008) when locally adapted to Andhra Pradesh's climate is termed as the "Andhra Pradesh Energy Conservation Building Code (APECBC)." All definitions included in the Energy Conservation Building Code (2008) and not otherwise defined herein are applicable to the Andhra Pradesh Energy Conservation Building Code."

(II) After Clause (b) of rule 15 the following shall be added namely: "(C) Compliance with Andhra Pradesh Energy Conservation Building Code

(i). 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 APECBC Code as given in Annexure XIII.

(ii). The code is mandatory for all new buildings, as stated above, to comply with AP\* (AP ONE STAR) with prescriptive/whole building performance method of compliance for the buildings. The prescriptive method format is given in Appendix G of APECBC, as given Annexure XIII. The whole building performance method is given in Appendix B of APECBC, as given Annexure XIII.

(iii). 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. The details of compliance documentation, administration and energy analysis is given in the APECBC in chapter 3 as given Annexure XIII.

(III) After Clause (ii) of rule 22, the following shall be added namely- "(iii). For the Buildings adopting APECBC Code, building approvals may be given on priority".

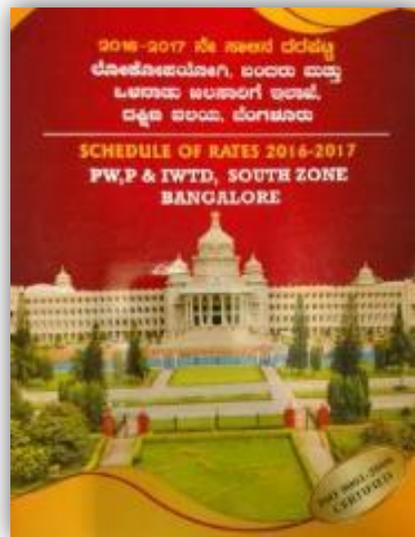
(IV) After Annexure – XII the Andhra Pradesh Energy Conservation Building Code Annexure XIII shall be added.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

# ECBC code progress – two examples

## Karnataka

- » 2014: Issued ECBC notification
- » 2014: Developed of state roadmap/action plan for ECBC implementation
- » 2015: ECBC compliance in all New government projects
- » 2016: Revision of Schedule of Rates (SoR) to include energy efficient materials and technologies
- » 2016: Revision of ULB's building bye laws to include ECBC provisions
- » 2017: Awareness and training programmes in the state



## Telangana

- » 2011: Chief Secretary set up Technical committee on ECBC lead by Principal Secretary, Municipal Admin with members from SDA, DISCOM
- » 2012: Tech committee revised by-laws to include ECBC
- » 2013: Awareness and training programs in the state
- » 2014: Notification issued strengthening ECBC in by-laws, TPA empaneled by SDA and GHMC
- » 2015: Tech committee at GHMC set up including Chief City Planner
- » 2016: ECBC included for compliance check along side fire safety, etc. included in Online approval process
- » Ongoing: Approval by Building Construction committee [includes Mayor]
- » Ongoing: ECBC as part in occupancy certificate

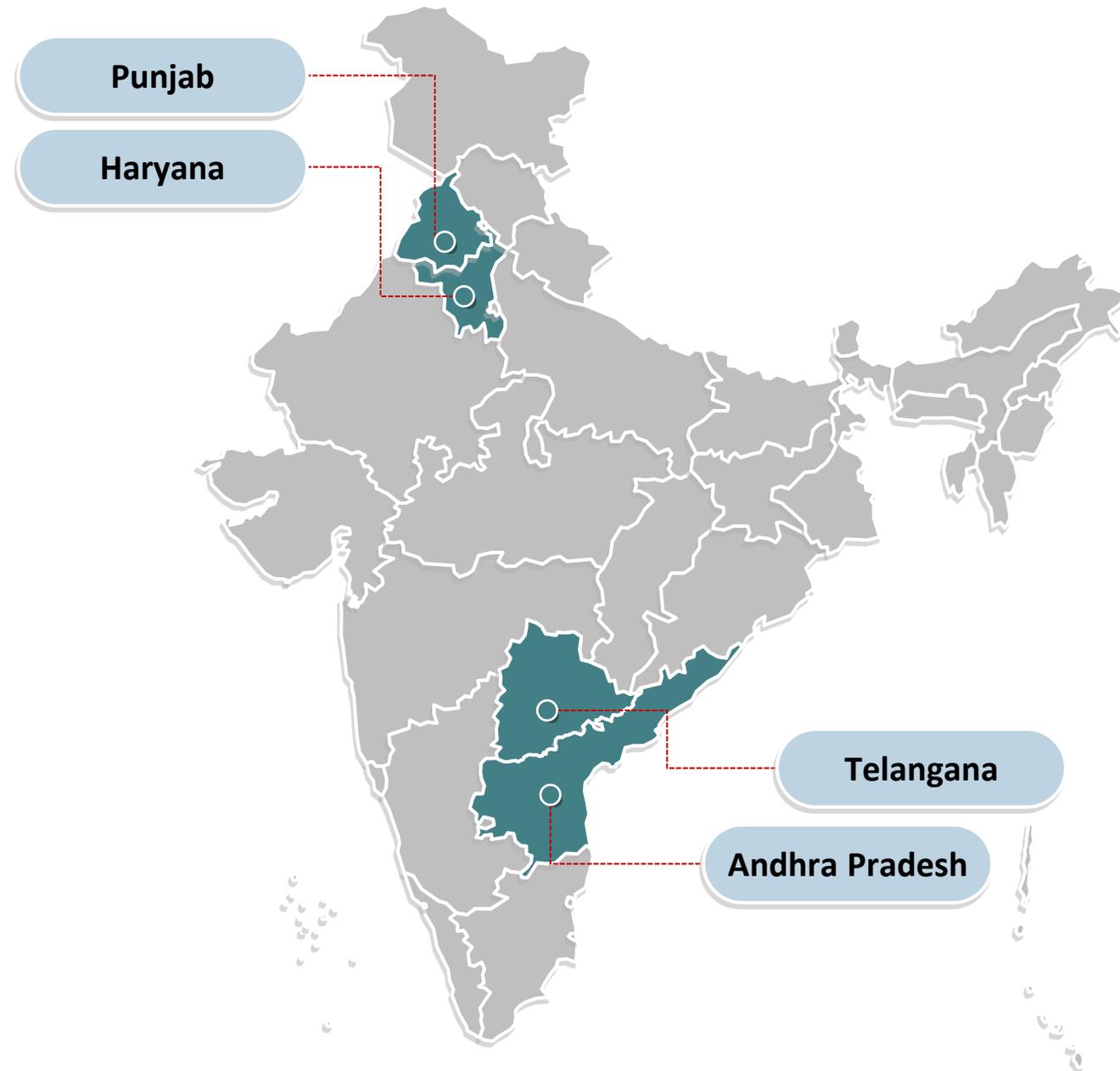
ECBC Amendment

ECBC Notification

**Incorporation in  
bye-laws**Notification at  
Municipal level

Enforcement

- » Andhra Pradesh
- » Telangana
- » Haryana
- » Punjab



ECBC Amendment

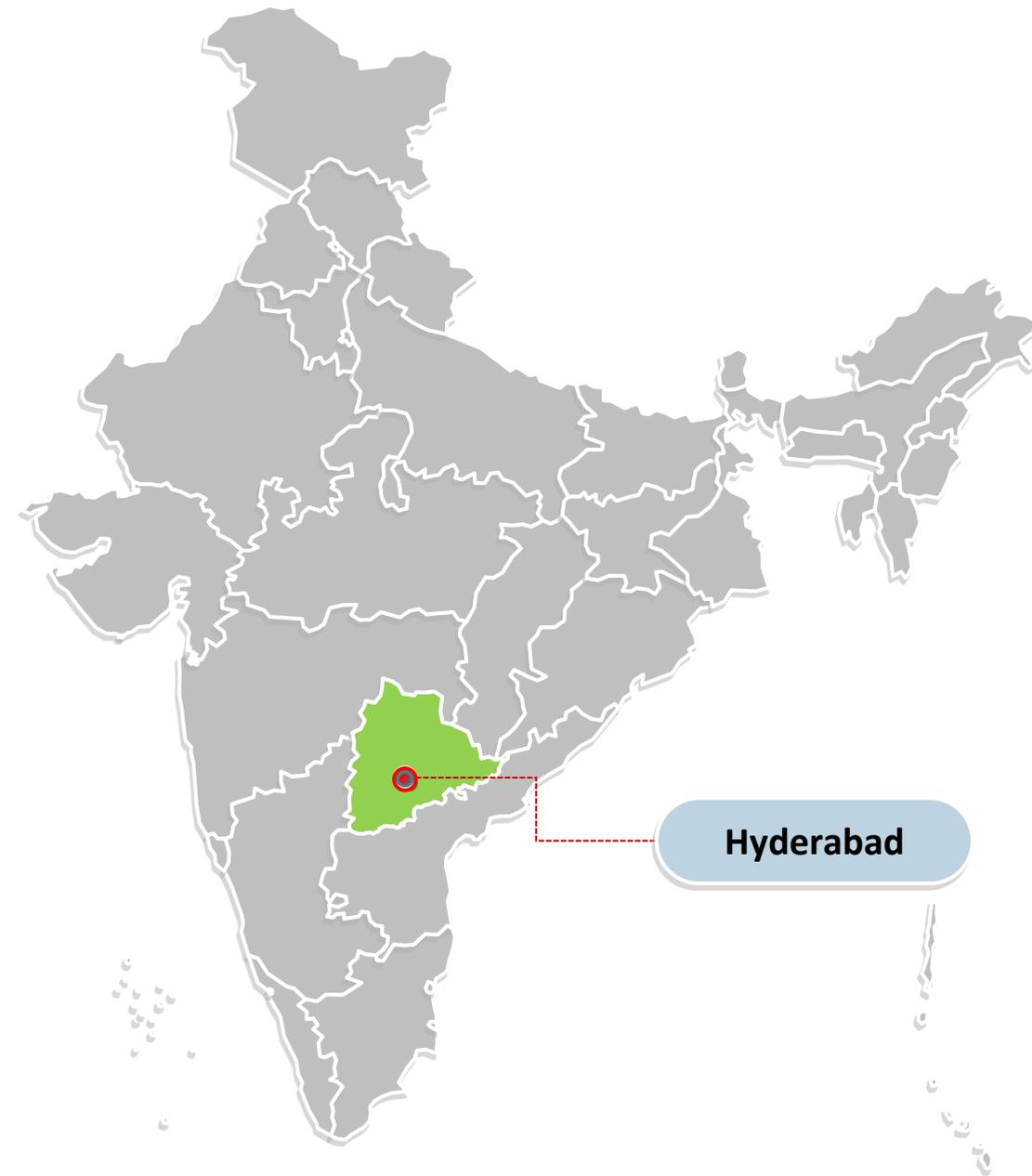
ECBC Notification

Incorporation in bye-laws

**Notification at  
Municipal level**

Enforcement

» **Greater Hyderabad Municipal Corporation (GHMC)** in  
Telangana



ECBC Amendment

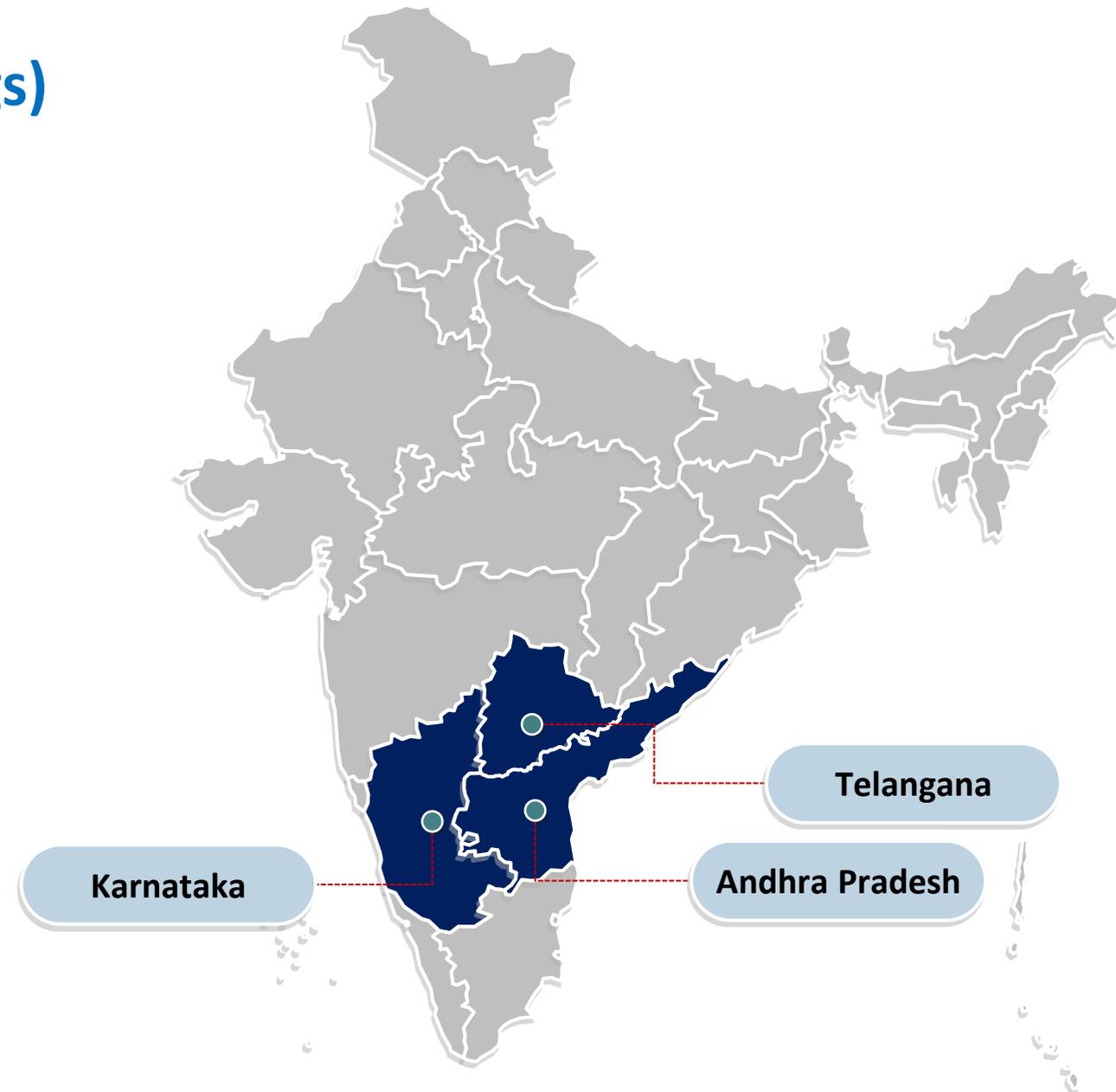
ECBC Notification

Incorporation in bye-laws

Notification at Municipal level

**Enforcement**

- » **Karnataka (Public buildings)**
- » **Telangana**
- » **Andhra Pradesh**



## Enhanced number of ECBC compliant commercial buildings

*Technical support shall be provided to assist the Building Owners / Developers in achieving ECBC compliance*

# Demonstration projects



# Demonstration Projects

- » **Facilitate implementation** of pilot ECBC demonstration projects in the 5 climatic zones
- » Objective is to highlight **enhanced efficient designs** in the construction of buildings and the use of energy efficient materials and products
- » Support the **design and construction** of commercial buildings in all climatic zones
- » Provide **technical assistance** in the selection, planning, design, modeling, formulation of construction documents and commissioning as well as **construction, monitoring and performance evaluation** of the model buildings.



# Demonstration Projects

# 1

**PILOT DEMONSTRATION**

**15 BUILDINGS**

**CONSULTANTS :**

**HOTELS:** VK:e environmental

**INSTITUTES AND IT:** Kalpakrit

**HOSPITALS:** Prem Choudhary Associates

**OFFICES:** Yetinder Mathur Associates



# Demonstration Projects

# 1

PILOT DEMONSTRATION

**15 BUILDINGS**

CONSULTANTS :

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**INSTITUTES AND IT:** Kalpakrit

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# 2

ENERGY EFFICIENT MODEL  
BUILDINGS (EEMB)

**25 BUILDINGS**

Environmental Design Solution  
(EDS) is the consultant  
PAN India

# Demonstration Projects

# 1

PILOT DEMONSTRATION

**15 BUILDINGS**

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**OFFICES:** Yetinder Mathur Associates

# 2

ENERGY EFFICIENT MODEL BUILDINGS (EEMB)

**25 BUILDINGS**

Environmental Design Solution  
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PAN India

# 3

TECHNICAL ASSISTANCE THROUGH **ECBC CELLS**

**~90 BUILDINGS**

ECBC Cell in different states  
and Union Territories

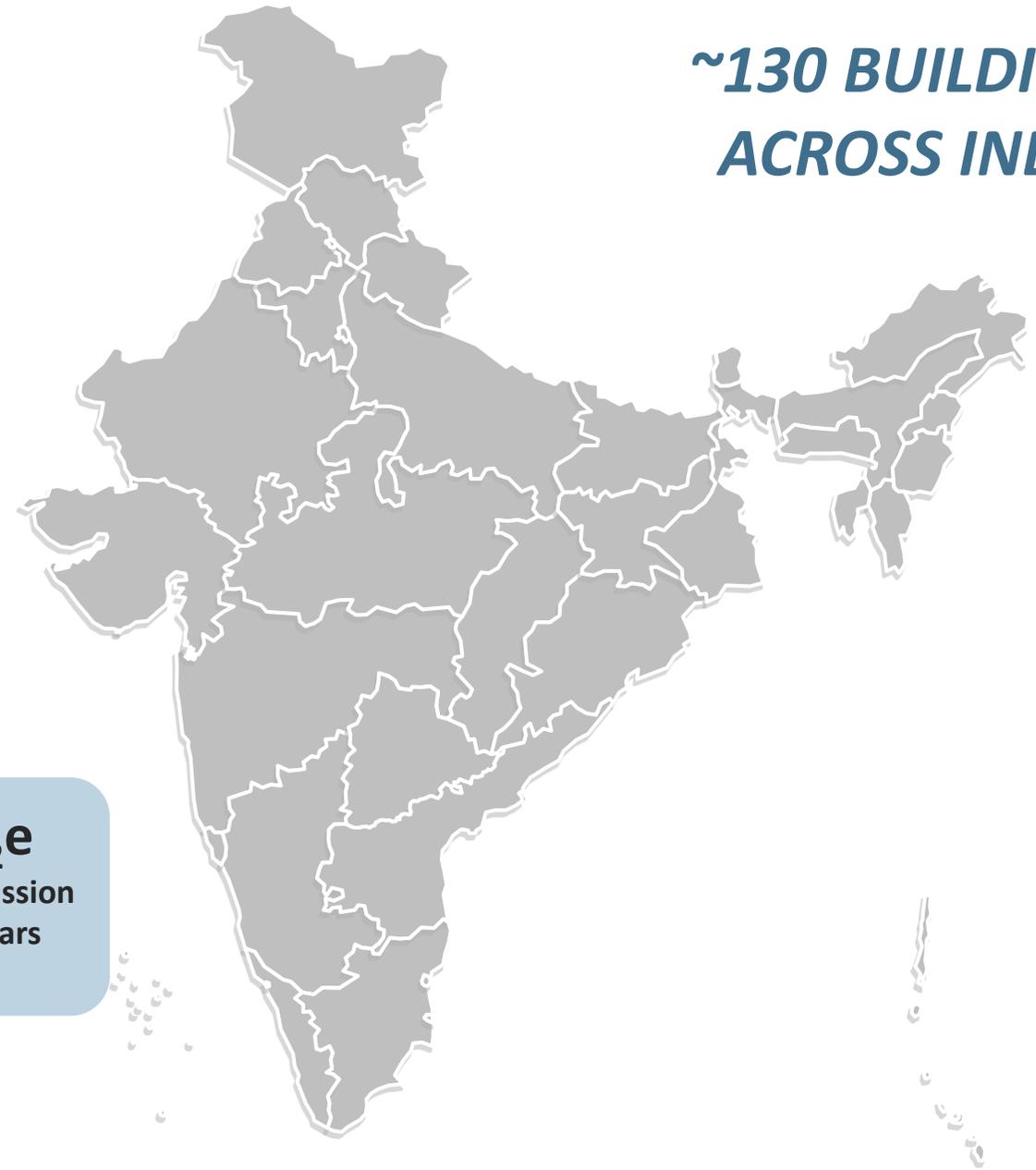
# Demonstration Projects

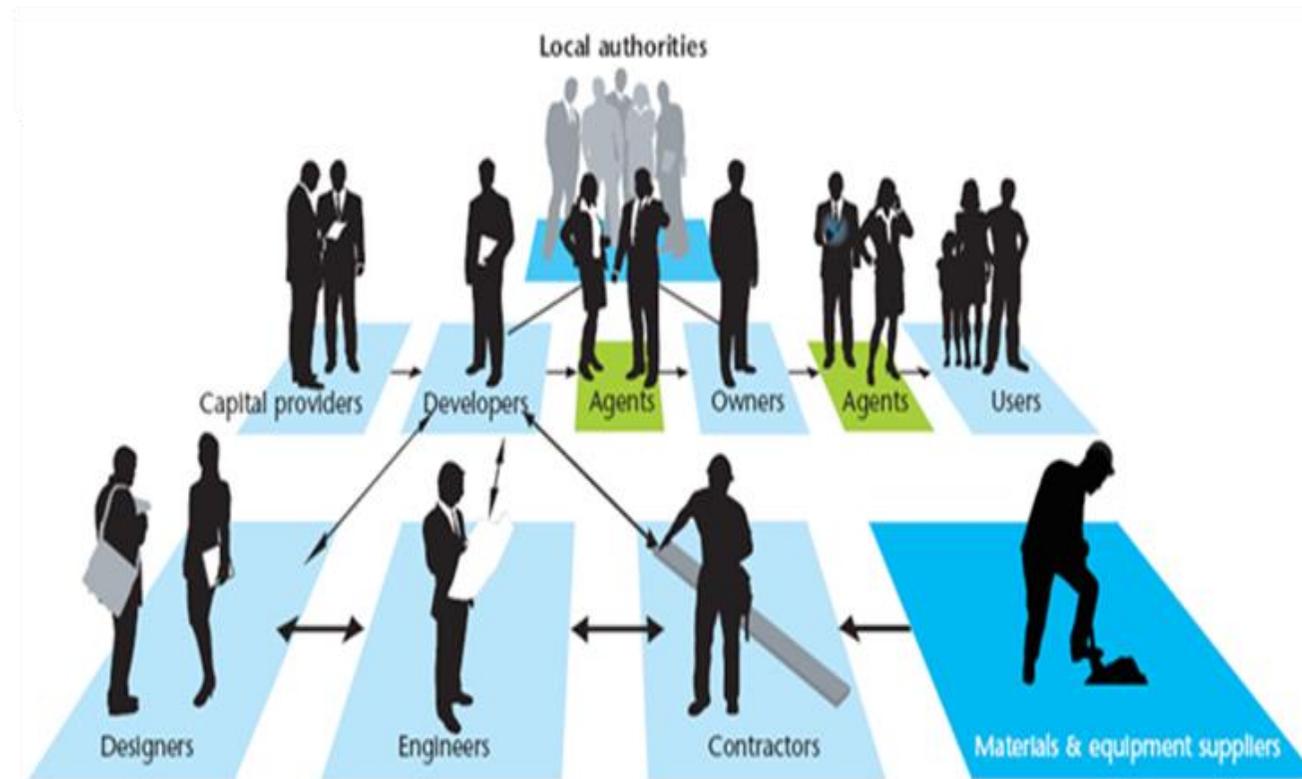
**~6 million m<sup>2</sup>** of  
built up area covered

**~420 GWh** of Annual  
electrical energy savings

**~9 million tCO<sub>2</sub>e**  
Green House Gas (GHG) emission  
reduction over next 25 years  
compared to BAU case

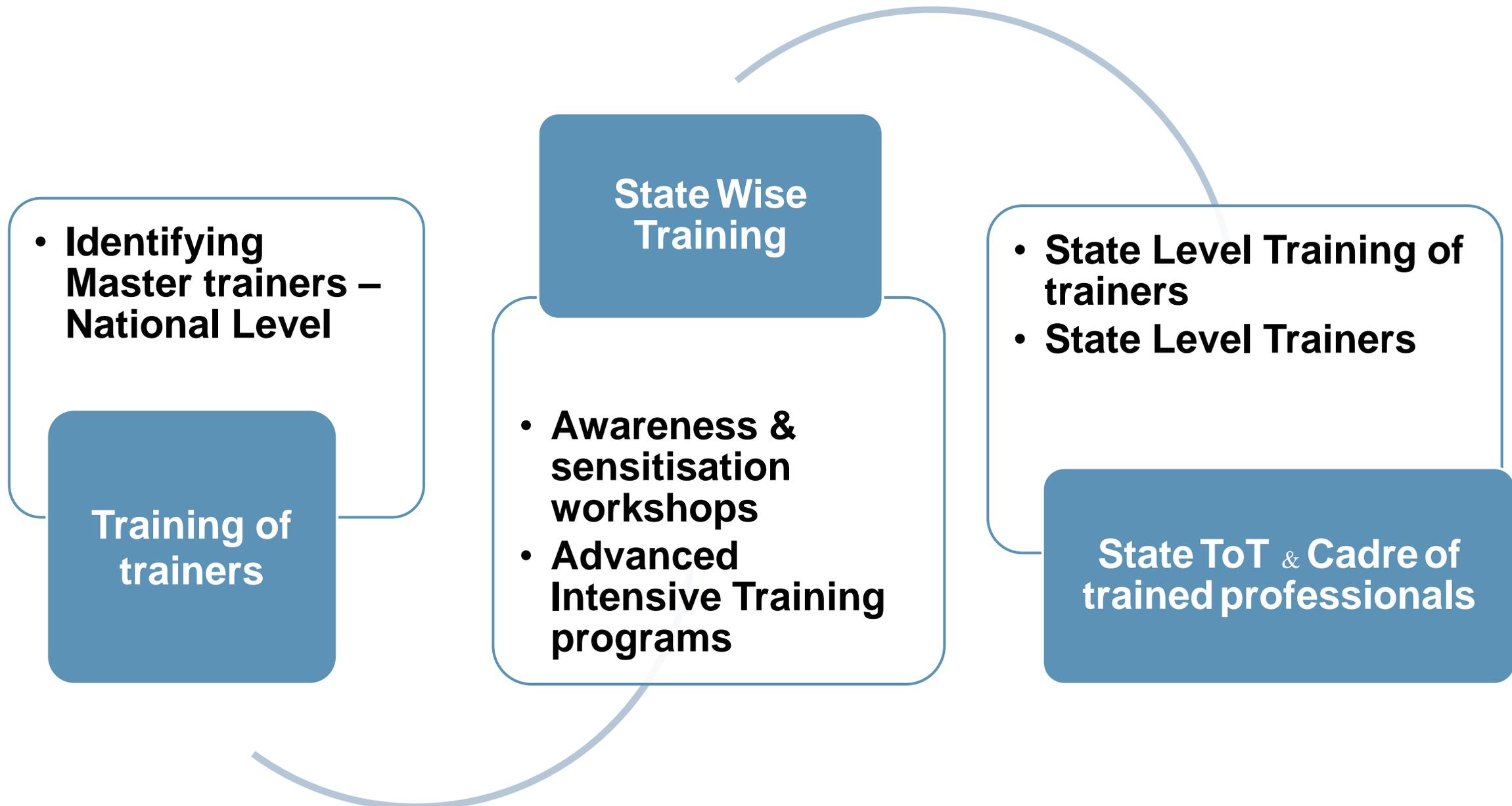
**~130 BUILDINGS  
ACROSS INDIA**





# Training and Capacity Building

# Training and Capacity Building – Scheme



# Training and Capacity Building

**122 ECBC  
Master Trainers**  
identified

**~ 200 training  
programs** organized  
across the country

**~ 5000 Building  
Design Professionals**  
trained on ECBC



*Key Outcomes under the project*

# UNDP-GEF-BEE Project Deliveries



ENERGY EFFICIENCY IMPROVEMENTS  
IN COMMERCIAL BUILDING



# Key Outcomes

- » **Draft ECBC rules** to support enforcement of ECBC in states including building up their institutional capacities
- » Established an **institutional framework for training** & capacity building of key stakeholders
- » Developed **state specific roadmaps** for enhanced regulatory framework and identify new fiscal incentives
- » **122 ECBC Master Trainers** identified through the Training Scheme
- » Established **ECBC cells** in all the States & UTs
- » Established **National Energy Benchmarks** for different categories of commercial buildings in the various climatic zones
- » Supported ~**130 demonstration projects** for ECBC compliance in various climatic zones



# Key Outcomes cont.

- » **Market assessment** of energy efficient **building materials**
- » Organized **International Conference** on Energy Efficiency in Buildings – **ICEEB (2015)**
- » Co-organized **International Conference** on Energy Efficient Building Design with SDC **(2016)**
- » **Delegation visit** from UNDP-GEF Project ‘Building energy efficiency in the **North-West Russia**’
- » Organized **Knowledge Exchange Visit to Russia**
- » **Translation of Building Energy Efficiency Publications** from Russian to English
- » Mobilized construction of **6 million sqm. ECBC compliant** commercial building floor space

# Key Outcomes cont.

- » Developed mobile based **ECBC APP**
- » Enhanced the technical capacity of SDA through procurement of Building Energy **Simulation Software**
- » Developed **User Manual & Design Guide** for ECBC 2017
- » Developed **BEP-EMIS online tool** to streamline ECBC compliance and strengthen M&V
- » Created ECBC related **Project videos**
- » Quarterly **Newsletters** – EECB Update

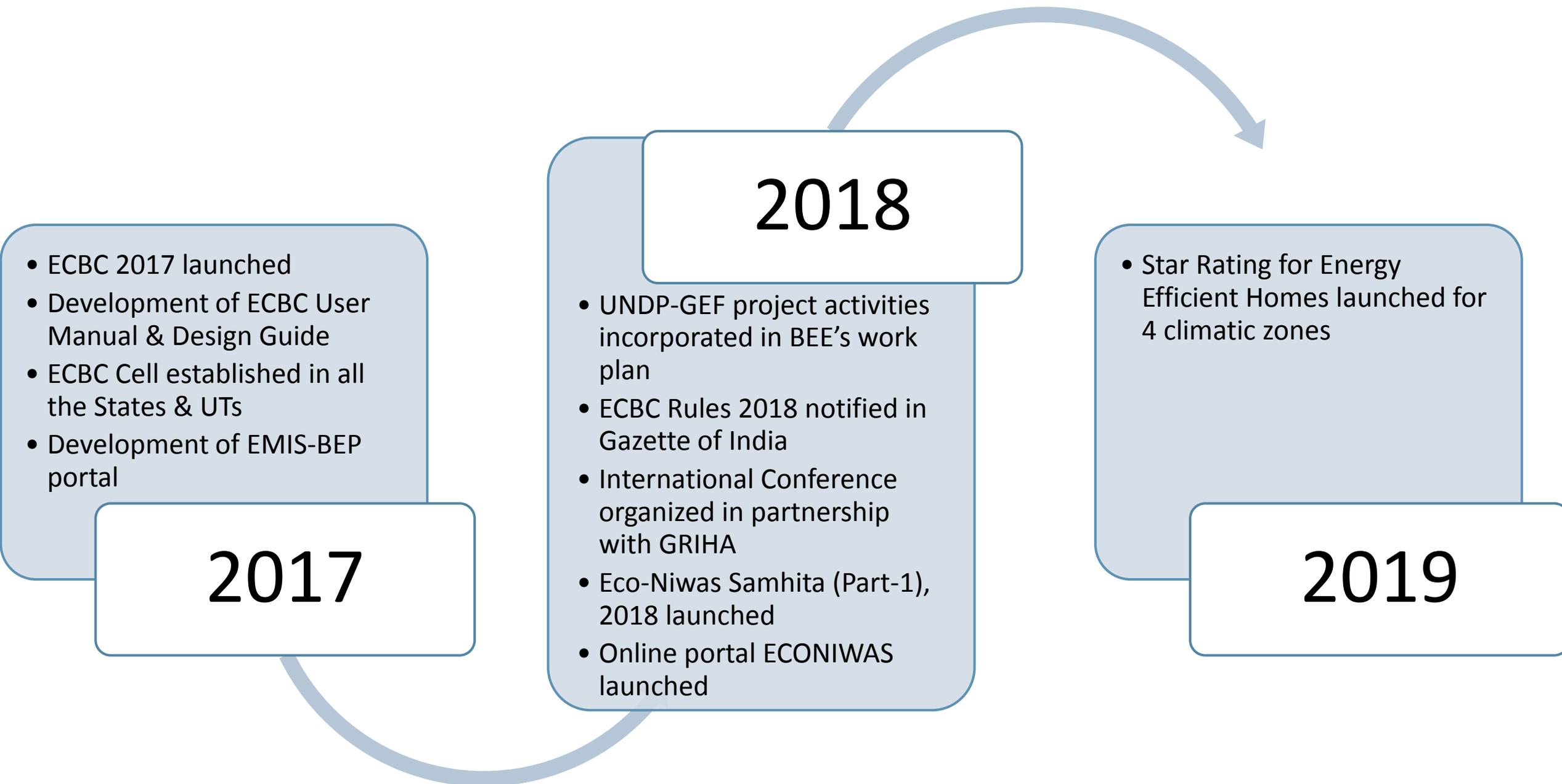


# Project's activities continued after Termination

1. **ECBC Cells** established in the states
2. Further development and implementation of **BEP EMIS**
3. Continued support to **demonstration projects**
4. **Revision of ECBC**
5. Capacity Building & **Training Programs**



# Overview – Timeline cont.



# Thank You

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Resilient nations.*



ENERGY EFFICIENCY IMPROVEMENTS  
IN COMMERCIAL BUILDING



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