

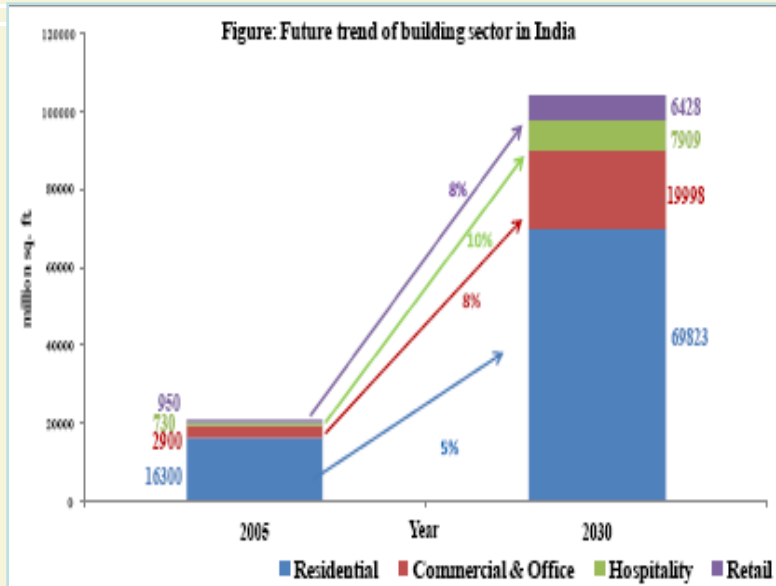


# Energy Efficiency Improvements in Commercial Buildings

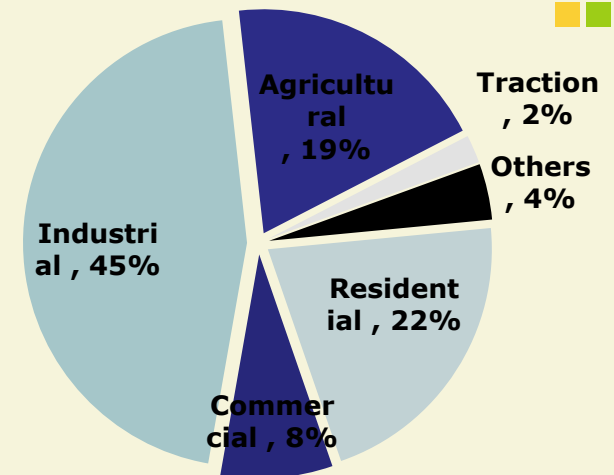
*Karan Mangotra*

Bureau of Energy Efficiency

# Overview of India's Commercial Building Sector



## Sector Wise Electricity Consumption



- The overall constructed area to increment by about 5 times from 21 billion square feet (2005) to approximately 104 billion square feet by 2030 at a CAGR between 5% to 10% .
- Building energy consumption accounts for over 30 percent of electrical energy consumption in the country, and is rising annually at 8 % .
- Lack of energy conscious designs lead to rampant inefficiencies in commercial buildings . Energy Audits show energy saving potential of up to 30-50% . Energy performance index (EPI) 200 to 300 kWh/sq m/year .

# Growth in the Indian Building Sector

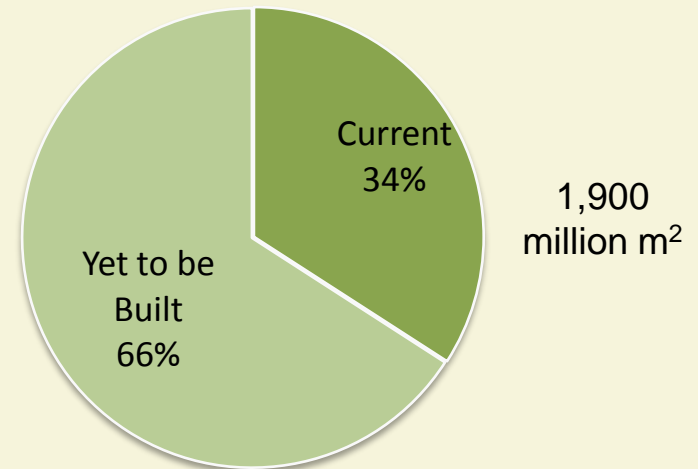


## Commercial Buildings Floor Area - Growth Forecast

- Currently, ~ 659 million m<sup>2</sup> (USAID ECO-III Internal Estimate Using MOSPI, CEA and Benchmarked Energy Use data)
- In 2030, ~ 1,900 million m<sup>2</sup> (estimated)\*
  - 66% building stock is yet to be constructed



Year: 2010



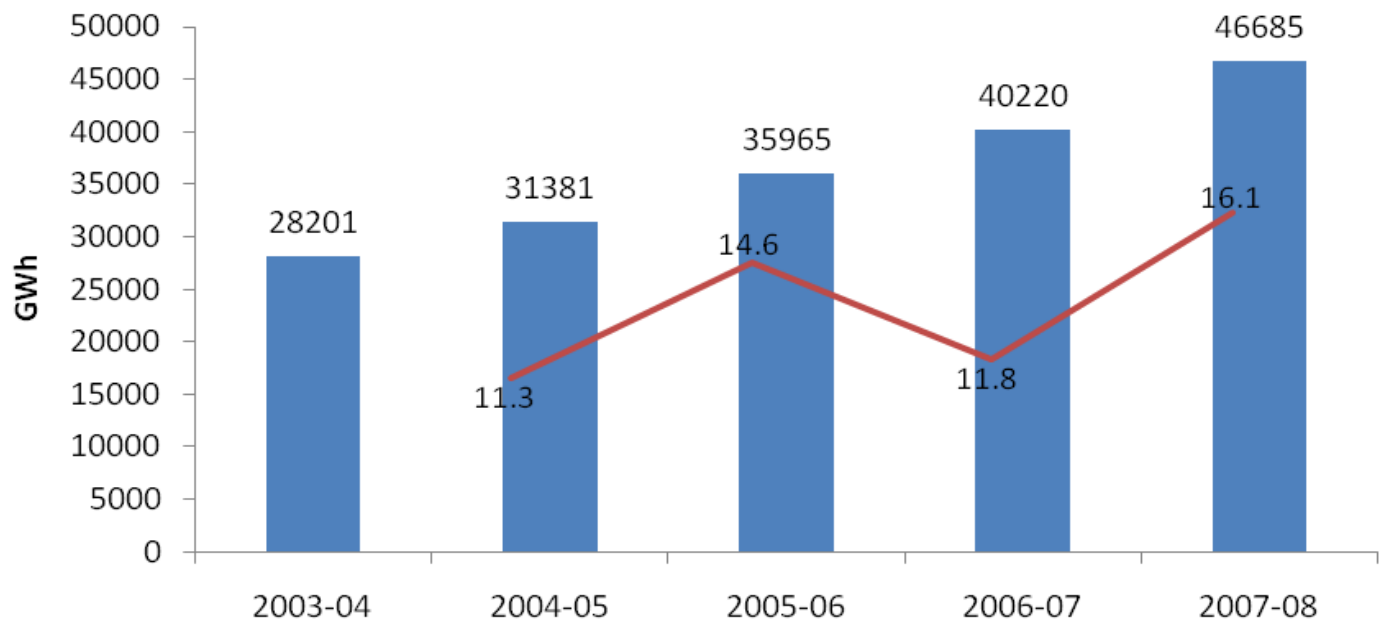
Year :2030

\* Assuming 5-6% Annual Growth

# Electricity Growth in Commercial Sector



Growth of Electricity Consumption in Commercial Sector in India  
(2003-08)



Source: General Review 2009, Central Electricity Authority

— Growth in % over the previous year

# Projected growth in Floor Space & Energy Consumption- 'Business as Usual' scenario



Year	Floor space ( sq.m)	Energy consumption (BU)
2005	425	36
2012	745	166
2017	1114	240

Source : "Interim Report of the Expert Group on Low Carbon Strategies for inclusive Growth

# Energy Conservation Building Code



- ECBC covering the following components prepared:
  - Building Envelope (Walls, Roofs, Windows)
  - Lighting (Indoor and Outdoor)
  - Heating Ventilation and Air Conditioning (HVAC) System
  - Solar Hot Water Heating
  - Electrical Systems
- ECBC finalized after extensive consultation
- Voluntary introduction of ECBC in May 2007; mandatory after capacity building and implementation experience
- Impact of ECBC - Reduced Energy Use for buildings
  - National Benchmark  $\sim 180 \text{ kWh/m}^2/\text{year}$
  - ECBC Compliant building  $\sim 110 \text{ kWh/m}^2/\text{year}$



# Status of Activities



## ➤ Technical Resources Development and Capacity Building

- Pool of 54 ECBC expert architects/consultants empanelled by BEE to provide assistance to government agencies and departments
- ECBC User Guide-aims to guide and assist building design professionals to implement ECBC in real situations and comply with the requirements of ECBC
- ECBC Tip Sheets-on Envelope, HVAC, Lighting, Energy Simulation
- Establishment of technical committees involving various stakeholders
- Academic Curriculum enhancement-to build capacity in the country to prepare the next generation of architects, engineers, and building energy professionals to help with sustainable building design. 30 architecture and engineering colleges have been provided with Building Technology Atlas as resources .
- EConirman-developed for assessing the conformance of ECBC at the design stage, keeping in view five climatic zones.



# Status of Activities



## ➤ Technical Resources Development and Capacity Building

- ECBC Standard Training module for Professionals has been developed with an aim to enhance awareness, provide administrative and technical guidance for its conformance and assist in understanding the technical requirements.

- The duration of the training program is for two days followed by an ECBC Proficiency Test.

- ECONirman User Manual has been developed that provides assistance for on-line submission of data and generation of building conformance report.

## ➤ Awareness Workshops and Seminars

- Disseminating information on ECBC to sensitize builders, developers, architects, engineers, design professionals with the support of SDAs, TERI, USAID, CPWD, MoUD, etc.

- More than 50 such workshops have so far been conducted involving about 5000 such professionals covering all climatic zones.





# Status of Activities



## ➤ Model Energy Efficiency building bye-laws

- Climate specific guidelines for integration of energy efficiency into building bye-laws of municipalities has been initiated.
- A sub-committee has been constituted by the MoUD under the Chairmanship of DG, BEE along-with other stakeholders for its effective integration into building bye-laws.

## ➤ Standard Designs for Prototype Buildings

- Assistance provided to Architectural department/PWD, Government of Haryana, through empanelled expert architects in developing energy efficient building plans for ease of replication across the state.

## ➤ Performance rating of building components

- Energy Rating programme for windows based on energy performance parameters has been initiated. Technical committee comprising of various stakeholders has been setup.

# Vision for 12<sup>th</sup> Plan



Name of the Scheme	Objective	Instrument
Energy Conservation Building Code (ECBC)	75 % of all new commercial buildings coming up till 2017 are ECBC compliant	<ul style="list-style-type: none"> <li>• Notification of ECBC for mandatory adoption by states</li> <li>• Integration of ECBC with building bye-laws</li> <li>• Harmonization of ECBC with NBC code</li> </ul>
	20% of the existing commercial building stock becomes energy efficient through retrofits	<ul style="list-style-type: none"> <li>• Notification by states for mandatory energy audit &amp; its implementation</li> <li>• Inclusion of various category of building under Star Rating Scheme for Buildings</li> <li>• Notification for declaration of buildings as designated consumers under ECA</li> </ul>

# ECBC Implementation Status



S.No.	Period	Name of states which had moved ahead for ECBC adoption process
1	<b>During 11<sup>th</sup> Plan Period</b>	
	Adopted & Notified	Rajasthan, Odisha, UT of Puducherry
	Amended & are in process of notification	Uttarakhand, Uttar Pradesh, Karnataka, Punjab, Kerala and Gujarat
	<b>12<sup>th</sup> Plan Period</b>	
2	2012-13	Chhattisgarh, Andhra Pradesh, Tamil Nadu, Haryana, Maharashtra and West Bengal (6 States)
3	2013-14 (Targeted states)	Himachal Pradesh, Bihar, Assam, Tripura, Jharkhand, Goa and Madhya Pradesh

## Snapshot: Partnership to Advance Clean Energy – Deployment (PACE-D) Technical Assistance Program

**OBJECTIVE: To accelerate India's transition to a high performing, low emission and energy secure economy**

- Project formally launched: July 31, 2012



### PACE-D TA Team

- Chief of Party (TBD)
- Deputy COP – Energy Efficiency
- Deputy COP – Renewable Energy
- Communications Specialist
- M & E Specialist
- Program Associate
- Support Team

# Indo-Swiss Building Energy Efficiency Project (BEEP)



**Goal: Contribute to reduction of energy consumption in new buildings and to promote best practices in designing and applying energy-efficient measures.**

**Overarching strategy: Capacity building of India's building professionals and knowledge transfer from Switzerland.**

**Duration: 5 years duration (Nov. 2011 - Nov. 2016)**

**Budget: ~5 million CHF**

# UNDP-GEF-BEE Project on Energy Efficiency Improvements in Commercial Buildings



## Project Aim

- ❑ To address informational, capacity, institutional and financial barriers to help bring ECBC under mandatory regime
- ❑ Indicators/targets: new building space ECBC compliant is increased from 5 to 117 million m<sup>2</sup> by 2014
- ❑ Average energy consumption in new buildings is reduced from 210 to 180 kWh/m<sup>2</sup>/y,
- ❑ Direct energy saving of 90.7 GWh/y, i.e. 1.27 million tCO<sub>2</sub> and indirect emissions reductions of 2.7 to 49 million tCO<sub>2</sub> by 2020

Project schedule	Indicative dates
Work Programme (for FSP)	Nov 2008
CEO endorsement	Feb 2011
GEF agency approval	Mar 2011
Implementation start	April 2011
Mid-term review	March 2013
Implementation completion	April 2015

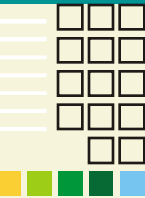
# UNDP-GEF-BEE Project Outcomes

<b>Demonstration Projects/Design Assistance for commercial buildings</b>	<b>Assisting states in ECBC implementation</b>	<b>Knowledge dissemination and sharing</b>	<b>Technical capacity building</b>	<b>Building materials/components testing and certification</b>	<b>Fiscal &amp; Regulatory Incentives</b>
<p>Technical assistance to demonstration projects in 5 climatic zones</p>	<p>Developing framework for enforcement, Augmenting capacities of key stakeholders</p>	<p>Case studies on demonstration projects Development of web portals for creating a building database, newsletters</p>	<p>Training of trainers, Training of various stakeholders, training curricula and modules, Certification of professionals, EE software, guidelines/templates.</p>	<p>Study on building materials, Test standards, Protocols, Accreditation of labs, capacity development of labs</p>	<p>Financing schemes designed with banks for investors, award scheme for efficient investments in commercial buildings</p>

# Challenges to ECBC implementation



- Adoption
  - State by state adoption after mandatory requirement
- Implementation
  - Lack of expertise amongst architects, engineers and contractors
  - Lack of availability of equipment with prescribed efficiency levels
  - Lack of third party objective testing facilities that measure product efficiency with standard test procedures.
- Enforcement
  - Enforcement at urban local bodies
  - Lack of expertise and human resources
  - Occupancy approval does not include all building systems





# Contact us



Thank You!

