Energy Efficiency Initiatives in Commercial Buildings

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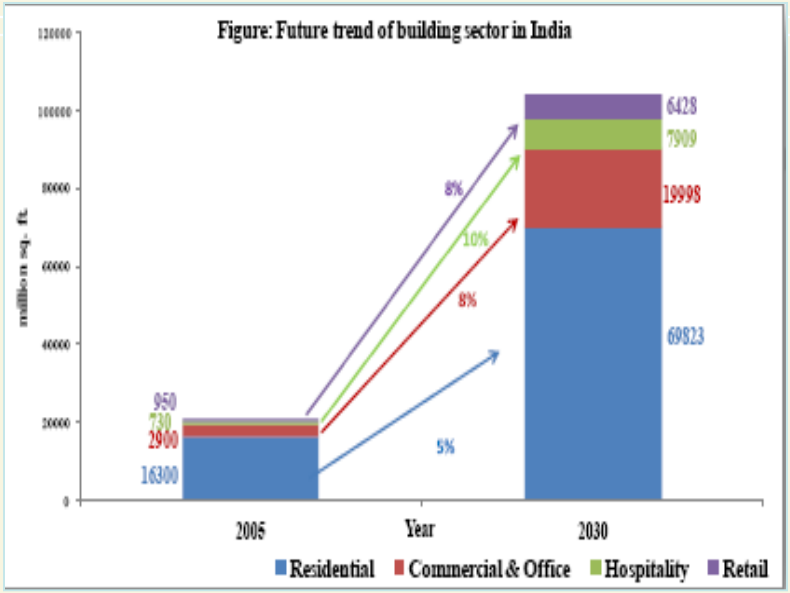
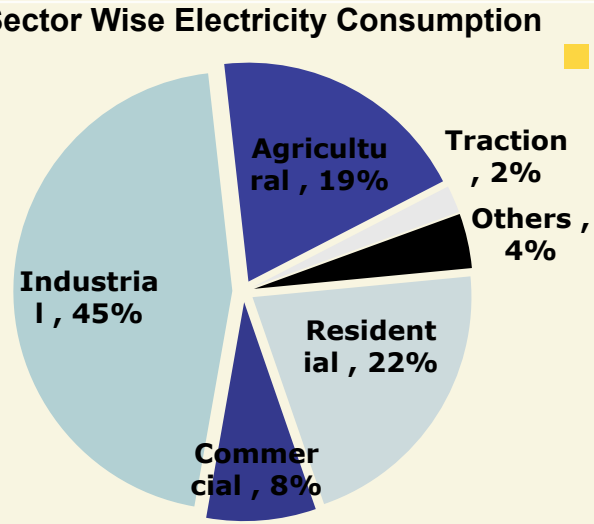
Overview of India's Commercial Building Sector





- 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 .

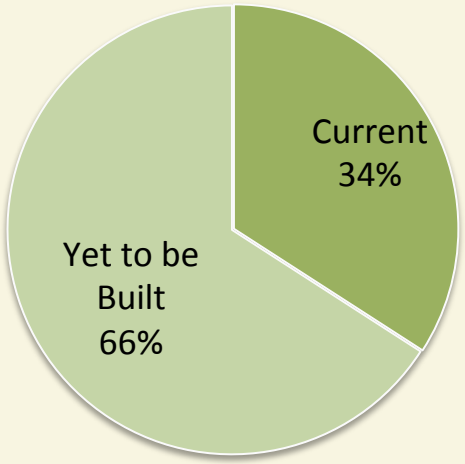
Growth in the Indian Building Sector




Commercial Buildings Floor Area - Growth Forecast

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

Year: 2010

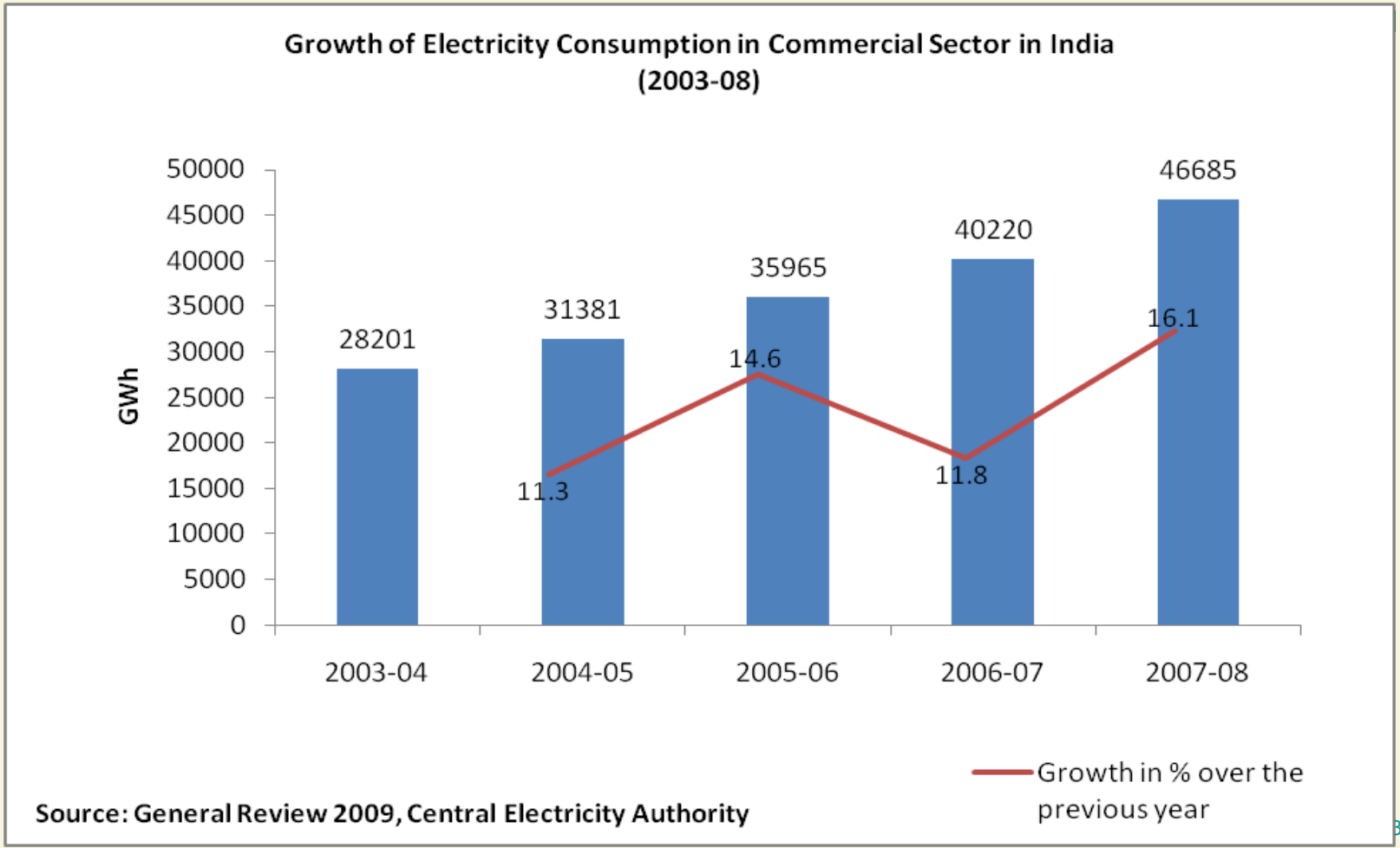


1,900 million m^2

Year :2030

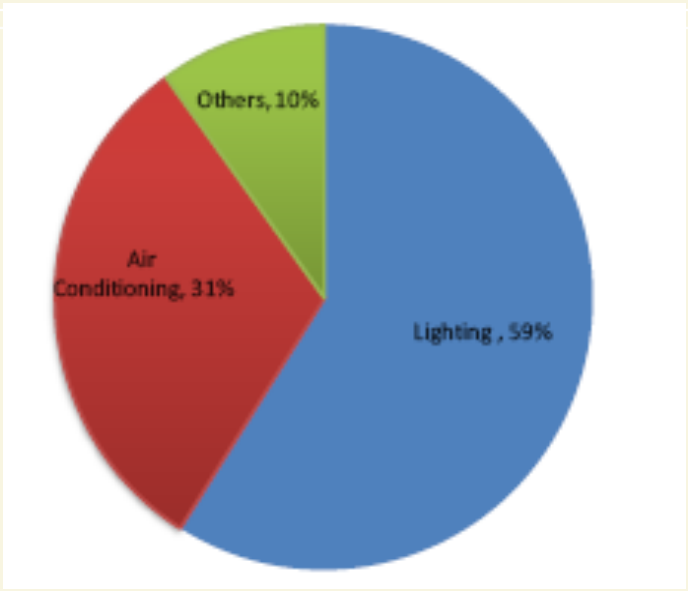
* Assuming 5-6% Annual Growth

Electricity Growth in Commercial Sector



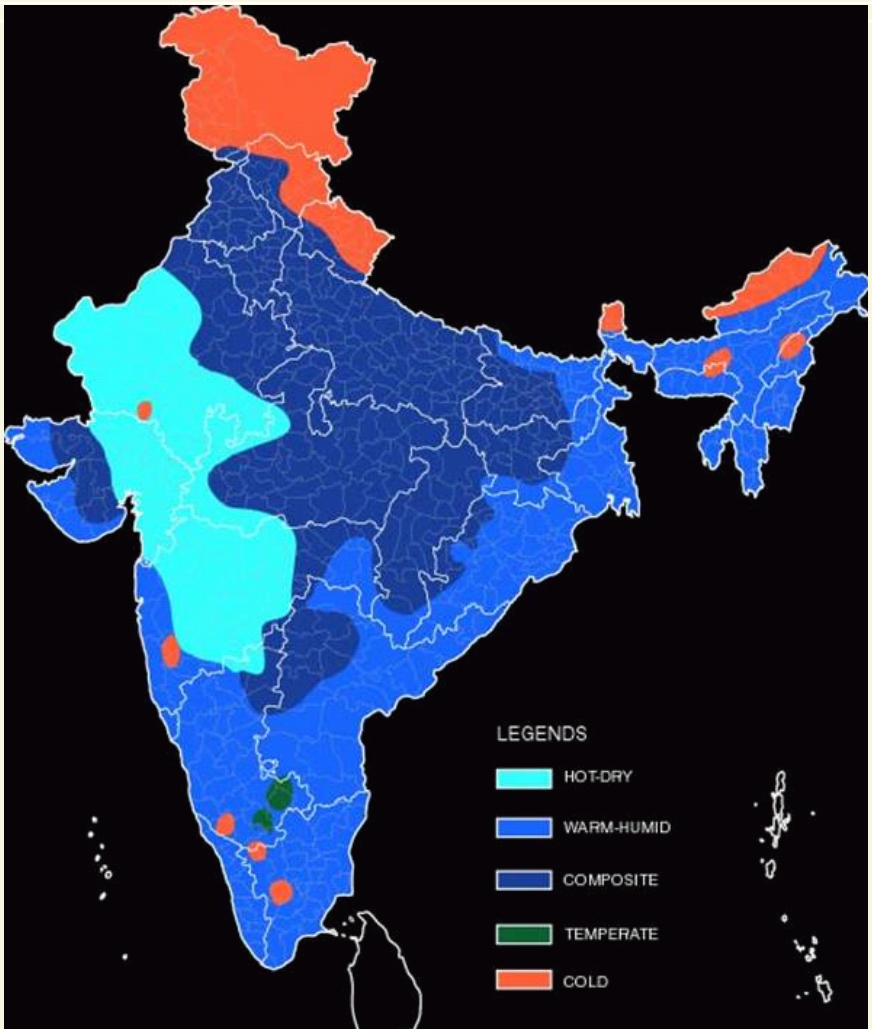
Source: General Review 2009, Central Electricity Authority

Typical Building Energy Use



- Lighting and Air Conditioning account for over 80% of energy end use in a typical commercial building in India while in residential building fan and lighting load are predominant .
- Most of the existing lighting and air conditioning systems are not very efficient, leaving a wide scope for improvement in energy performance .
- Overall the energy savings estimates for the commercial and residential buildings vary between 30-70%.
- Challenge before India is to plan and implement energy efficiency measures during the early stages of growth in the building sector .

CLIMATIC ZONES OF INDIA



Five climate zones:-

1. **Composite (Delhi)**
2. **Hot Dry (Ahmedabad)**
3. **Hot Humid (Kolkata)**
4. **Moderate (Bangalore)**
5. **Cold (Shillong)**

ENERGY IS LIFE

BEE

CONSERVE IT

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 ~ 180 kWh/m^2/year
  - ECBC Compliant building ~ 110 kWh/m^2/year

Roadmap towards implementation




- Development of ECBC training package covering the various aspects of the code
- Development of ECBC User Guide
- Conformance Check Tool developed
- Implementation of ECBC
- Amendment of ECBC to suit local & regional climatic condition
- Notification of ECBC in progress
- Integration of ECBC in building bye-laws
- Modification in schedule of rates
- Harmonization with NBC (National Building Code)

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

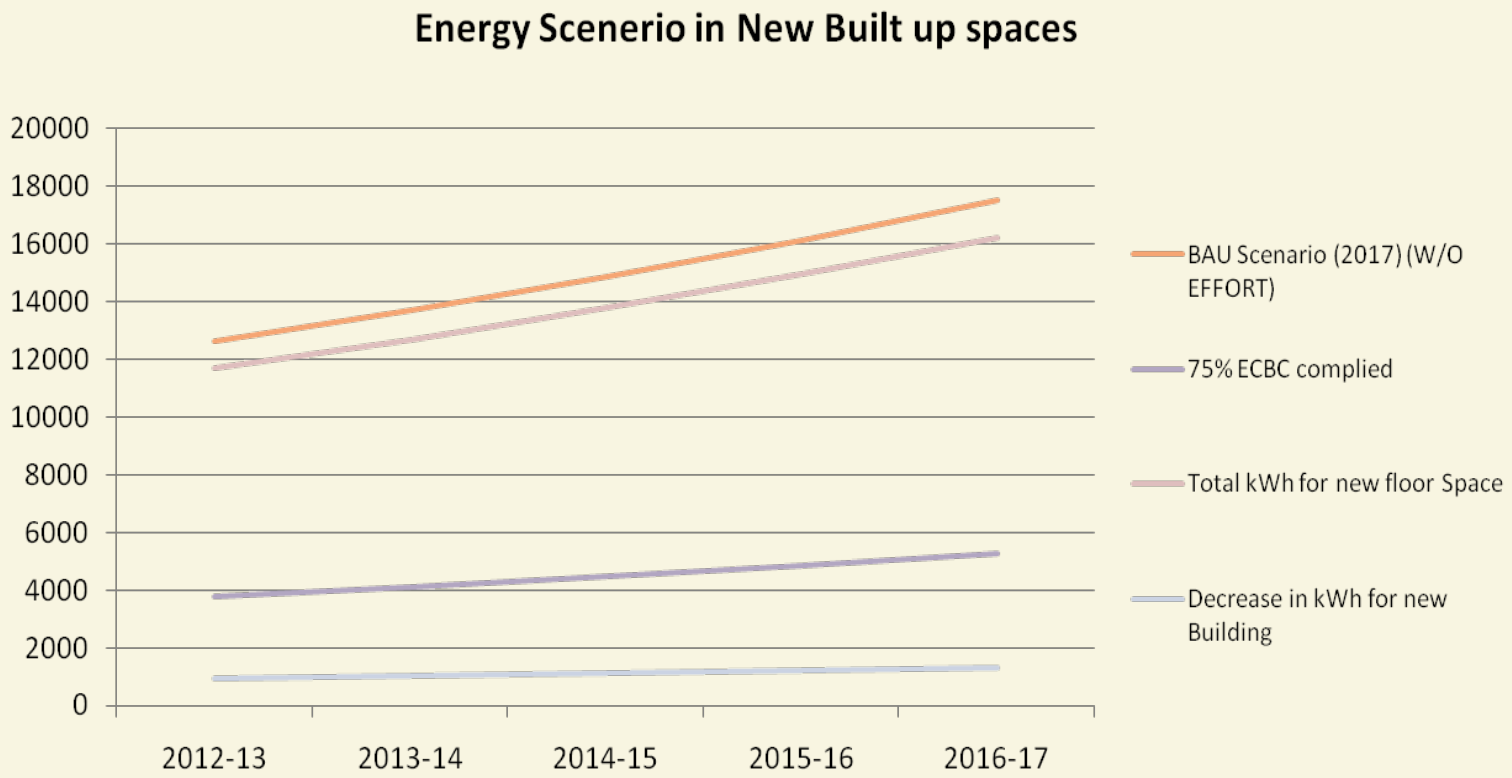
Projected growth in Floor Space & Energy Consumption- 'Business as Usual' scenario




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

Projected savings in new built up spaces



Cool Roofs – roadmap ahead




- The Energy Conservation Building Code (ECBC) defines prescriptive requirements for cool roofs.
- Promotion of Cool Roofs would include:
  - Building parameters
  - Application options- materials and their energy performance
  - Implementation options- policy, promotional
  - Various technical and design considerations applicable.
  - Cool roofing, application, and maintenance issues.
- Providing details of cool roof technology and application, and access to the research carried out.
- Analysis of the energy savings on account of application of cool roofs

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