Building Code and Rating In India

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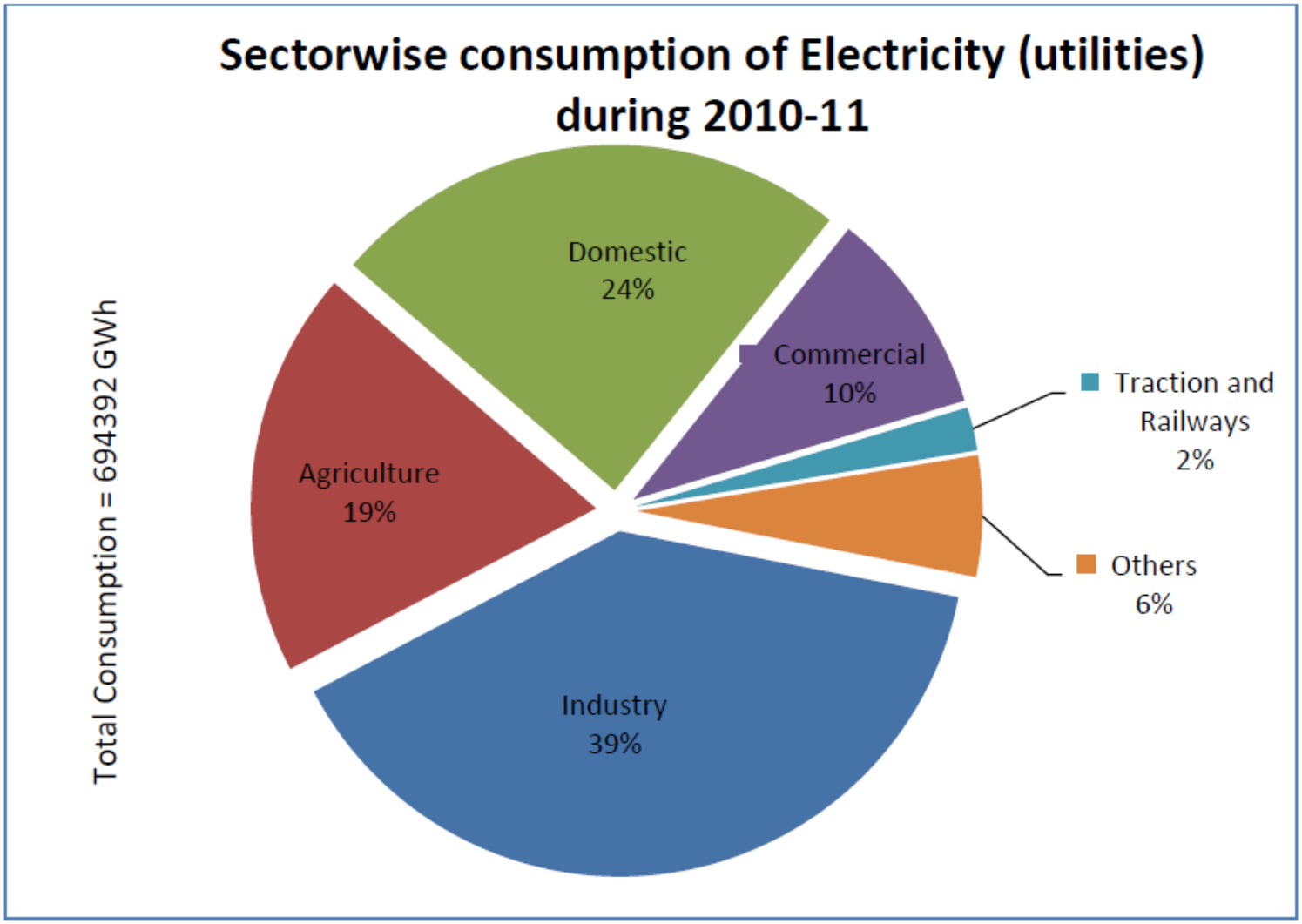
Consumption Trend in India

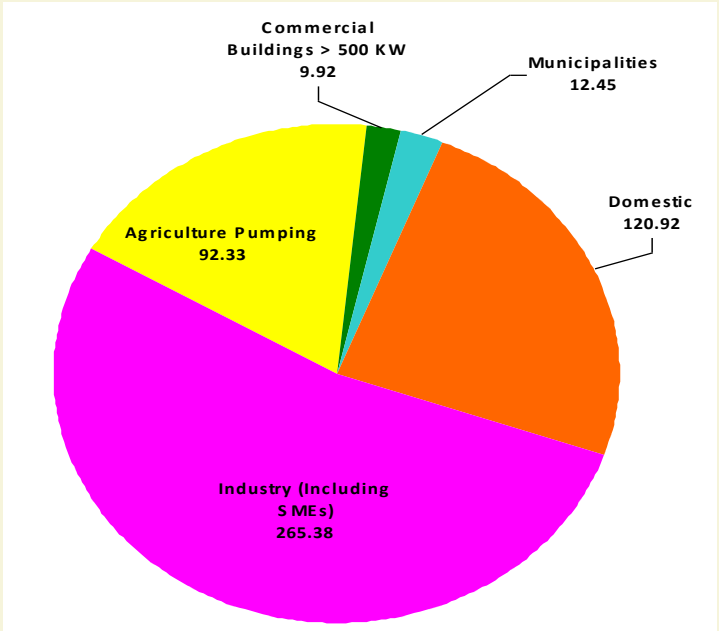


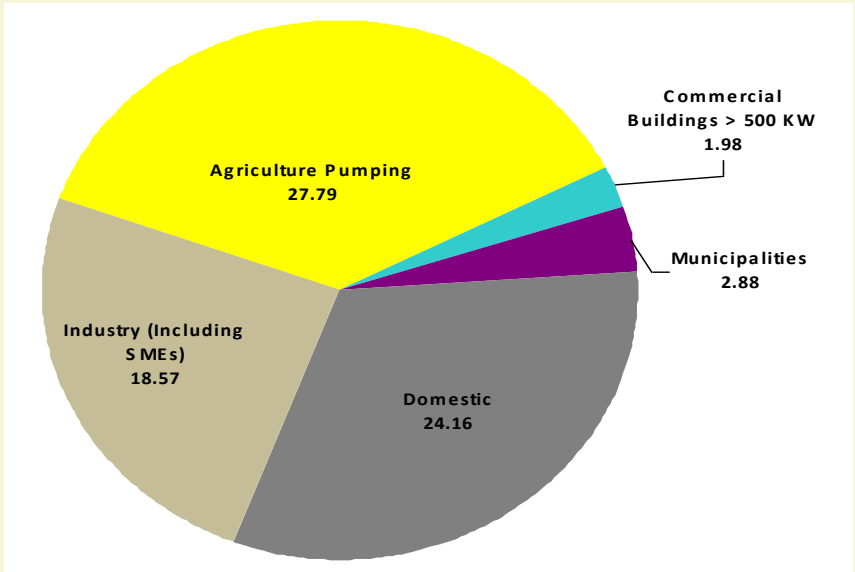
Energy statistics 2012, Central Statistics Office, GoI

Electrical Energy Consumption and Conservation Potential




S. No.	Sector	Consumption (KWh)	Saving Potential (KWh)	% Savings
1.	Agriculture Pumping	**92.33**	**27.79**	**30.09**
2.	Commercial Buildings/ Establishments with connected load > 500 KW	**9.92**	**1.98**	**19.95**
3.	Municipalities	**12.45**	**2.88**	**23.13**
4.	Domestic	**120.92**	**24.16**	**19.98**
5.	Industry (Including SMEs)	**265.38**	**18.57**	**6.99**
	Total	**501.00**	**75.36**	**15.04**





Source: BEE/ NPC Study 2009

Energy Efficiency Potential and Outcome




Energy Conservation potential assessed as at present (IEP) (15% by DSM and 25% overall)	-	**20000MW**
Verified Energy Savings :		
During X Plan period	-	**877 * MW**
During 2007-08 and 2008-09		**2127 MW**
Target for 2009-10		**2600 MW**
-Target for XI Plan period (5% reduction of energy consumption)	-	**10000 MW** **Achieved and exceeded.**

** Only as indicated by participating units in the National Energy Conservation award scheme, for the previous five years.*





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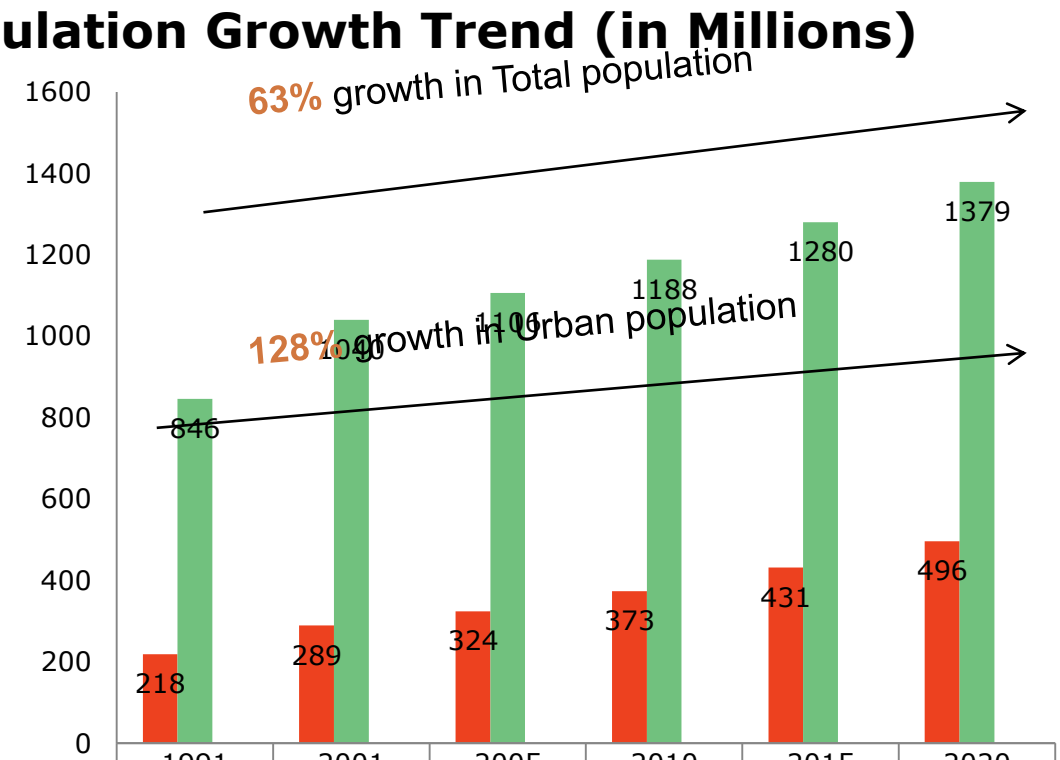
GLOBAL

Rajpal Square


Population and GDP- two fundamental activity drivers that influence energy demand from all the sectors in a country



	1991	2001	2005	2010	2015	2020
Urban population	218	289	324	373	431	496
Population	846	1040	1106	1188	1280	1379
Urbanization Rate (%)	25,70%	27,80%	29,30%	31,40%	33,60%	36,00%

In 2020 almost **500 Million** people will be living in Urban India

Present World population **7000 Million**

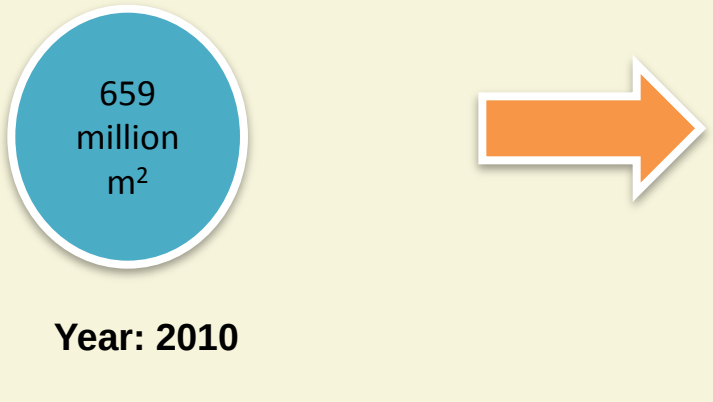
(Source: RICS Research, Real Estate and Construction Professionals in India by 2020- A demand and supply assessment of specialized skill-sets in built environment)

Growth in the Indian Building Sector

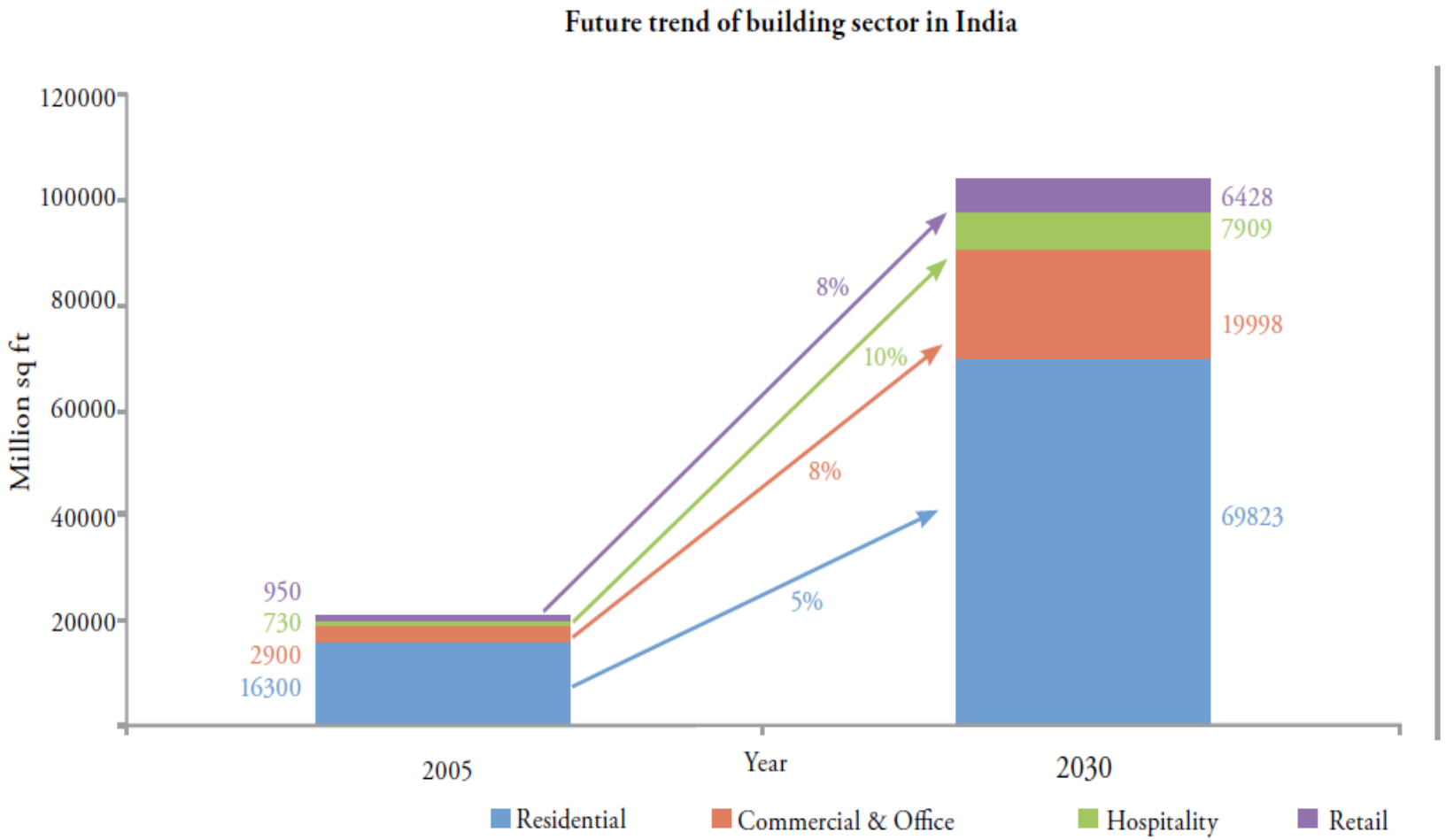



Commercial Buildings Floor Area - Growth Forecast

- 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



* Assuming 5-6% Annual Growth



Source: Growth of Indian Building Sector (CWF, 2010)

Typical Commercial Building Energy Use

Average Energy Consumption

HVAC	55%
LIGHTING	14%
Electronics	27 %
Others	4%

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

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Uniqueness of ECBC

- ECBC encourage energy efficient design of buildings
  - It does not constrain the building function, comfort, health, or the productivity of the occupants
  - Lifecycle costs (construction + energy costs) are minimized
- ECBC is technology independent
  - It defines minimum standard in terms of parameters
  - It doesn't encourage any particular technology or product
- Supported by 4 Ministries
  - MoP, MoUD, MNRE, MoEF

Enabling Measures taken up during 11th Plan Period to promote ECBC




- Technical reference materials
- Harmonisation with NBC
- Model Building Bye-laws
- Amendment in CPWD Schedule of Rates
- ECOnirman tool
- ECBC Training Module
- Empanelled a pool of 52 ECBC architects

ECBC Implementation Status

Activities	Status
Amended and notified	Rajasthan, Odisha and UT of Puducherry
Amended and process of notification	Uttar Pradesh, Karnataka and Uttrakhand
Process of amendment	Kerala, Punjab (completed), and Gujarat (completed)
Targeted states for 2012-13	Haryana, Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Maharashtra, Chhattisgarh, West Bengal (7) & other progressive states

Energy Efficiency in Existing Buildings/ facilities

- There is vast scope for energy efficiency improvement in buildings/ existing facilities.
- Energy Audit Studies have revealed a savings potential to the extent of 40% in end use such as lighting, cooling, ventilation, refrigeration etc.
- Audits identify the Energy baselines in existing facilities along with Energy Efficiency Measures.

INITIATIVES

- An exercise for expanding the number of existing ESCOs through an open invitation and evaluation process was taken up by BEE.
- In order to create a sense of credibility amongst the prospective agencies that are likely to secure the services of an ESCO as well as the financial institutions, a process of rating ESCOs was taken up through CRISIL and ICRA.
- Rating was carried out in terms of success in implementation of energy efficiency projects based on performance contracting, availability of technical manpower, financial strength, etc.
- 80 ESCOs empanelled with BEE after accreditation by CRISIL/ ICRA. 50 of the 80 accredited ESCOs are at levels 1 to 3 (Above Average)

STAR RATING FOR OFFICE BUILDINGS

- Large potential for energy savings both in government and commercial office buildings.
- The regulation, promotion and facilitation of energy efficiency in commercial buildings is one of the key thrust areas of BEE.
- Energy Conservation Building Code (ECBC)
  - specifies standards for new, large, energy -efficient commercial buildings.
- Energy Service Companies (ESCOs)
  - upgrade the energy efficiency of existing government buildings through retrofitting on performance contracting mode.

SCHEME FOR RATING OF BUILDINGS




- The Star Rating Program for buildings is based on actual performance of the building in terms of specific energy usage (kWh/sq m/year).
- This programme would rate office buildings on a 1-5 Star scale with 5 Star labeled buildings being the most efficient.
- Five categories of buildings - office buildings, hotels, hospitals, retail malls, and IT Parks in five climate zones in the country have been identified.
- Office buildings in the following 3 climatic zones for air-conditioned and non- air-conditioned:
  - Warm and Humid
  - Composite
  - Hot and Dry
  - Temperate
- It will be subsequently extended to other climatic zones and building types.

BANDWIDTHS- LESS THAN 50% AIR CONDITIONING




Composite

EPI(Kwh/sqm/year)	Star Label
80-70	1 Star
70-60	2 Star
60-50	3 Star
50-40	4 Star
Below 40	5 Star

Warm and Humid

EPI(Kwh/sqm/year)	Star Label
85-75	1 Star
75-65	2 Star
65-55	3 Star
55-45	4 Star
Below 45	5 Star

Hot and Dry

EPI(Kwh/sqm/year)	Star Label
75-65	1 Star
65-55	2 Star
55-45	3 Star
45-35	4 Star
Below 35	5 Star

BANDWIDTHS- MORE THAN 50% AIR CONDITIONING




Composite

EPI(Kwh/sqm/year)	Star Label
190-165	1 Star
165-140	2 Star
140-115	3 Star
115-90	4 Star
Below 90	5 Star

Warm and Humid

EPI(Kwh/sqm/year)	Star Label
200-175	1 Star
175-150	2 Star
150-125	3 Star
125-100	4 Star
Below 100	5 Star

Hot and Dry

EPI(Kwh/sqm/year)	Star Label
180-155	1 Star
155-130	2 Star
130-105	3 Star
105-80	4 Star
Below 80	5 Star

Bandwidths for the BPOs




- BPOs, which primarily focus on providing service to IT related activities such as application management and application development, date centre operations or testing and quality assurance.
- BPOs may have varied hours of operation e.g. 24x7/ 24x5, 18x7, 16x7 or 16x5 etc.
- Those BPOs having a connected load of 100 kW and above and a minimum built up area of 500 Sq m would be considered for BEE star rating scheme
- Average Annual Hourly Energy Performance Index (EPI) i.e. **(AAhEPI) in (Wh/hr/sqm/)** will be considered for rating the BPO.
- This programme targets BPOs located within the following 4 climatic zones ie (Warm and Humid, Composite, Hot and Dry, Temperate)

Bandwidths for the BPOs

Climate Zone	Average Annual hourly Energy EPI (AAhEPI)	Star rating
Composite	52-46	1 Star
	46-40	2 Star
	40-34	3 Star
	34-28	4 Star
	28 and below	5 Star

Climate Zone	Average Annual hourly Energy EPI (AAhEPI)	Star rating
Warm and Humid	54-48	1 Star
	48-42	2 Star
	42-36	3 Star
	36-30	4 Star
	30 and below	5 Star

Climate Zone	Average Annual hourly Energy EPI (AAhEPI)	Star rating
Hot and Dry	37 - 31	1 Star
	31-25	2 Star
	25-19	3 Star
	19-13	4 Star
	13 and below	5 Star

Climate Zone	Average Annual hourly Energy EPI (AAhEPI)	Star rating
Temperate	47 - 41	1 Star
	41-35	2 Star
	35-29	3 Star
	29-23	4 Star
	23 and below	5 Star

Present status of the Scheme & Future Initiatives




- **170** applications have been received under day use office building category.
- **104 Buildings** have been found eligible for issue of a star Label under this scheme till date . (RBI, SBI, ADB ,CPWD, Railways, kalpataru)
- 17 BPO buildings found eligible.

Star Rating in Shopping Malls

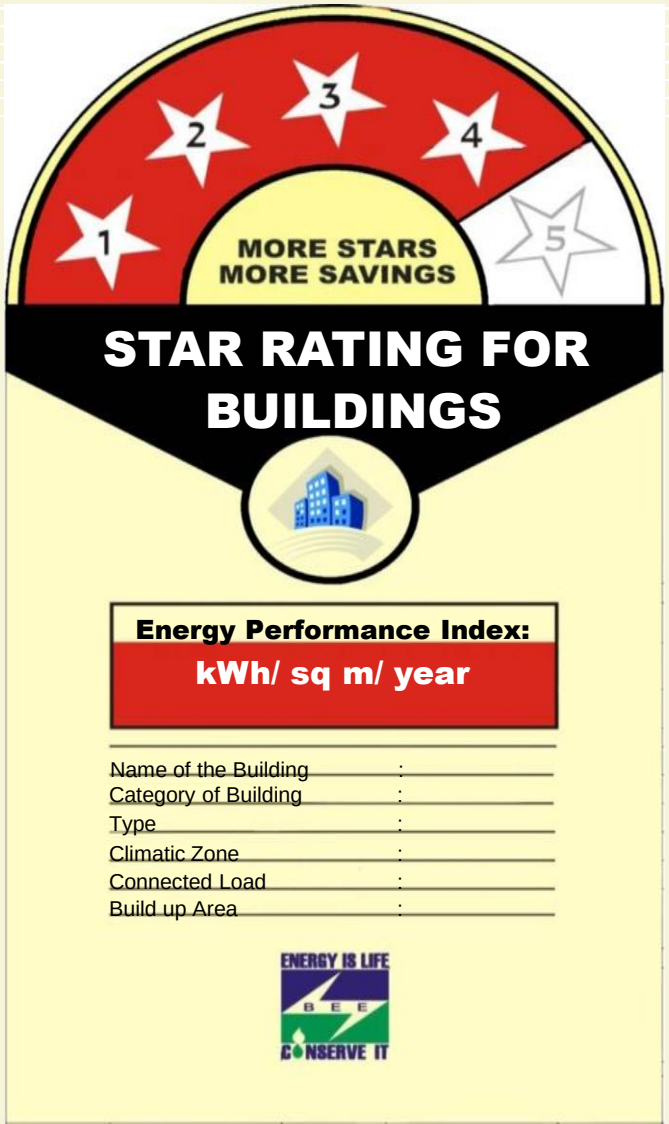
Composite Climate	
EPI (kWh/Sqmtr/Year)	Star Label
350-300	1star
300-250	2star
250-200	3star
200-150	4star
below 150	5 star

Hot and Dry	
EPI (kWh/Sqmtr/Year)	Star Label
300-250	1 star
250-200	2 Star
200-150	3 Star
150-100	4 Star
below 100	5 Star

Temperate	
EPI (kWh/Sqmtr/Year)	Star Label
275-250	1 star
250-225	2 star
225-200	3 star
200-175	4star
Below 175	5 star

Warm and Humid	
EPI (kWh/Sqmtr/Year)	Star Label
450-400	1 star
400-350	2 star
350-300	3 star
300-250	4 star
below 250	5 star

Label


1
2
3
4
5
MORE STARS
MORE SAVINGS
STAR RATING FOR BUILDINGS
Energy Performance Index:
kWh/ sq m/ year
Name of the Building :
Category of Building :
Type :
Climatic Zone :
Connected Load :
Build up Area :
ENERGY IS LIFE
BEE
CONSERVE IT


Thank You!