

# Resource Efficiency and Circular Economy

## - Indian Green Building Council

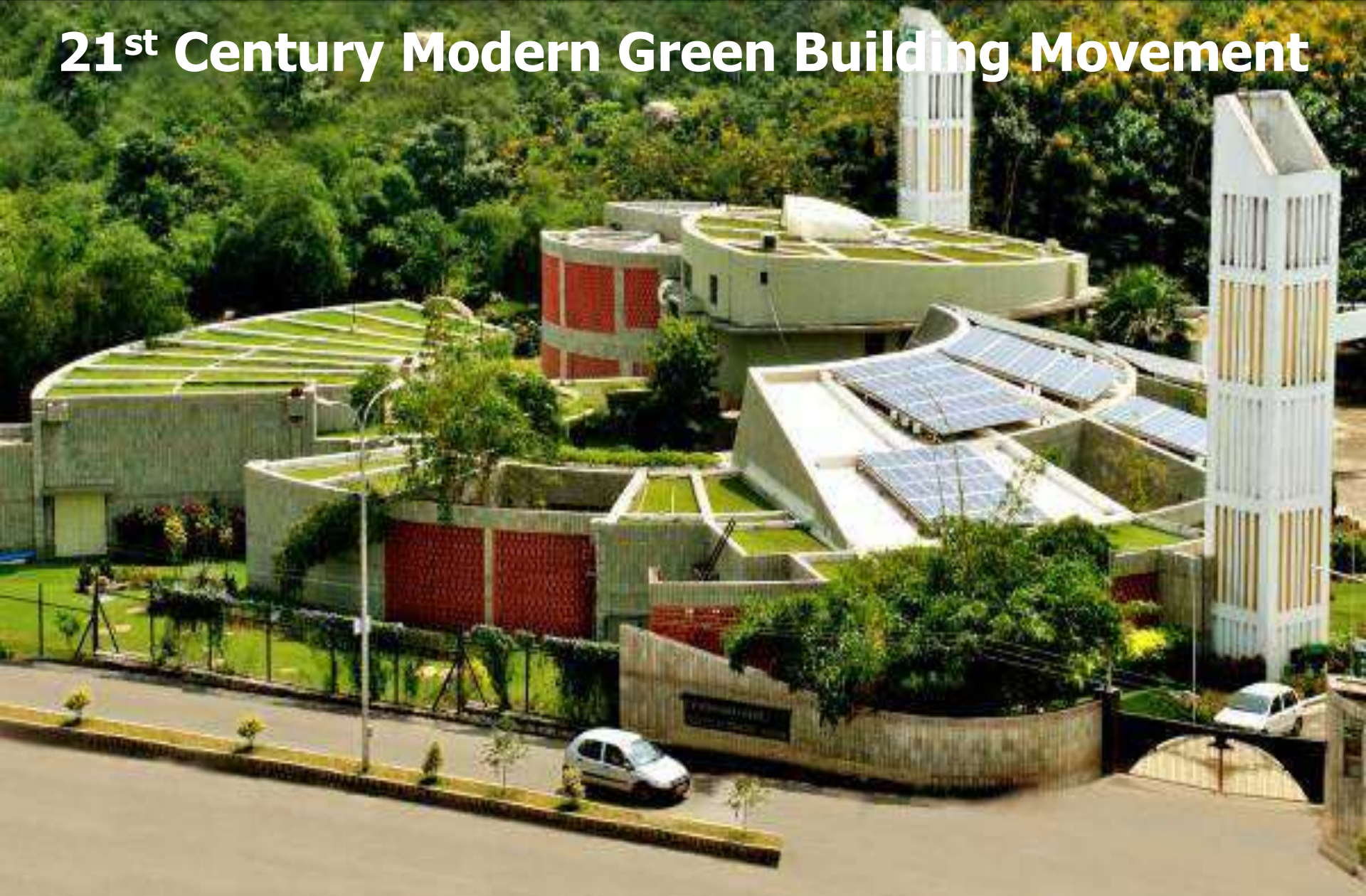


**Green Building Perspective on  
Construction, Demolition & Other Waste**

**Goa | 03 – 04 April 2018**

**Mr. Bharat Kamat, Chairman, IGBC Goa Chapter**

# 21<sup>st</sup> Century Modern Green Building Movement



**India's 1st Platinum Rated Green Building & IGBC Headquarters, Hyderabad**

# Indian Green Building Council (IGBC)

❖ **CII, formed IGBC in 2001**

❖ **Vision of IGBC**

⑩ **Enable 'sustainable built environment for all'**

⑩ **India to be one of the global leaders in sustainable built environment by 2025**

❖ **Founding Member of World GBC since 2004**



# Indian Green Building Council (IGBC)

- **Various initiatives**

- Green Building Standards
- Policy advocacy
- Capacity building of green building professionals in the country

- **Services / Involvement**

- Green Building Rating Programmes
- Certification Services
- Green Building Training Programmes





**Building Efficiency  
Accelerator**



**BETTER PLACES  
FOR PEOPLE**



❖ **Accelerating Building Efficiency Around the World**

❖ **Organised by IGBC with support of WRI & ICLEI**

Participated by 70 Govt., non-profit, and private sector stakeholders

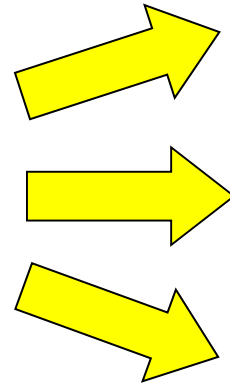
❖ **Global campaign led by WGBC that aims to accelerate the demand & the supply of buildings**

❖ **Project Objective**  
To understand the positive effects of working in green building

❖ **Participation of 25 buildings in 7 major cities (1000 Respondents)**



# Green Building Movement in India



**In 2001,  
1 Green Building  
20,000 sq.ft.**

**4,509 Green Building Projects  
5.27 Billion sq. ft.**

# Green Building Statistics of India

**12,50,000+**  
Dwelling Units



**250+**  
Green Factories



**1,600+**  
Green Offices



**45+** Green  
Townships



**335+** Green  
Transit



**12** Green  
Villages



**7** Green  
City



# 21 IGBC Rating Systems

Commercial	Residential	Built Environment	Industrial
1. IGBC Green New Buildings	6. IGBC Green Homes	12. IGBC Green Cities	18. IGBC Green Factories
2. IGBC Green Existing Buildings	7. IGBC Green Residential Society	13. IGBC Green Villages	19. IGBC Green SEZ
3. IGBC Green Interiors	8. IGBC Green Affordable Housing	14. IGBC Green Township	<b>Health &amp; Well-being</b>
4. IGBC Green Campus	<b>Transit</b>	15. IGBC Green Landscape	20. IGBC Green Healthcare Facilities Rating
5. IGBC Green Data Centres	9. IGBC Green Metro Stations	<b>Education</b>	21. IGBC Health & Well-being Rating*
	10. IGBC Green Existing Metros	16. IGBC Green Schools	
	11. IGBC Green Railway Stations	17. IGBC Places of Worship	

**Places where we stay, live, learn, work, play, transit & worship should all go green**

# Benefits in IGBC Green Buildings

<b>Environmental Benefit Category</b>	<b>Average Benefits (Per Million Sq.ft per annum)</b>
<b>CO<sub>2</sub> reduction</b>	<b>12,000 – 15,000 Tons</b>
<b>Energy savings</b>	<b>13,000 - 15,000 MWh</b>
<b>Water savings</b>	<b>43,000 - 45,000 KL</b>
<b>Construction waste diverted from landfills</b>	<b>430 - 450 Tons</b>
<b>Renewable energy, (Installed capacity)</b>	<b>80+ MW</b>

**4,509 projects (5.27 Billion sq.ft) Going Green with IGBC**

# Intangible Benefits in Green Buildings

- ❖ **Environmental benefits**
  - Reduce impact on the environment
- ❖ **Health and Safety benefits**
  - Enhance occupant comfort
- ❖ **Improve Productivity of occupants**



<b>Occupants</b>	<ul style="list-style-type: none"><li>• Green cover</li><li>• Day lighting</li><li>• Ventilation</li><li>• 5-6% higher rental value</li></ul>
<b>Senior Citizen</b>	<ul style="list-style-type: none"><li>• Walking areas</li><li>• Green Outdoors</li></ul>
<b>Children</b>	<ul style="list-style-type: none"><li>• Play/Tot lot areas</li><li>• Recreational areas</li></ul>



# Green Buildings – intangible benefits

## ⑩ Productivity

- Reduction in absenteeism : **32%**
- Increase in Retention of employees : **11%**



## ⑩ Enhances Indoor Environmental Quality

- Reduction in communicable respiratory diseases : **9-20%**
- Decrease in Allergies and Asthma : **18-25%**
- Reduction in non-specific health & discomfort effects: **20-50%**

*Reference - World Green Building Council report*

# Tangible Benefits in Green Buildings

Water Savings	Energy Savings	Carbon Emission reduction
50,000 - 60,000 litres/ year/ household	1,500 - 2,250 kWh/year/ household	1.2 - 1.9 tons/year/ household

\* *Baseline: Energy: 300 to 600 Kwh / month / household*

\* *Baseline: Water: 135 litres /person / day*



**Typical Payback < 1 year**



# Construction & Demolition Waste - India

## ❖ Annual C & D waste in India

- **165-175 Million Tonnes**
  - Delhi, Mumbai, Kolkata
- **New Construction**
  - ❑ **40-60 Kg/ Sq.m**
    - Brick masonry, Concrete sand & soil
- **Building Demolition**
  - ❑ **300-500 Kg/Sq.m**

Asian Age/Delhi/December 24, 2013

Page No. 05

## Demolition waste 52 times more than MoEF estimate

RASHME SEHGAL  
NEW DELHI, DEC. 23

India belched over 626 million tones of construction and demolition (C&D) waste in 2013, which is 52 times more than the ministry of environment and forests' estimate of construction and demolition waste.

The MoEF continues to quote the grossly underestimated figure of 10-12 million tones of waste being generated annually. This is a decade-old estimate given to the ministry in 2000 by the ministry of urban development.

The result of this gross underestimation of

waste has been that most of the water bodies, including lakes and ponds across our cities, have been destroyed because of this indiscriminate dumping.

The NCR alone has lost 1,464 water bodies because of the dumping of this solid waste. Mumbai's 103 water bodies are under threat because of C&D dumping. Once the lakes are destroyed, the land is reclaimed for "development" purposes.

Why has the MoEF failed to revise its figure, asked sustainable building (SB) experts, given that from 2005 India has added 5.75 billion square

metres of additional floor space.

Avikal Somvanshi, a senior researcher with the SB team at the Centre of Science and Environment (CSE), pointed out, "Most of this waste is being used by land sharks to illegally fill up water bodies and wetlands around urban centres for real estate development or it is simply being dumped in rivers and open spaces."

Huge quantities of waste are also being generated by large infrastructure projects across the country with serious environmental consequences.

# Measurable Benefits in 1,320 IGBC Certified Buildings, India

<b>Environmental Benefit Category</b>	<b>Average Benefits / Million Sq.ft</b>	<b>Actual Benefits from 1,320 IGBC certified projects</b>
<b>Construction &amp; Demolition Waste diverted from landfills</b>	<b>450 Tons</b>	<b>585 Kilo Tons</b>
<b>Co2 reduction</b>	<b>12,000 Tons</b>	<b>15,600 Kilo Tons</b>

India is expected to double its existing building footprint by 2030

# Approach to C&D Waste & Other Waste in Green Buildings

## 1. Building Reuse

- Shell & Non-Shell

## 2. Construction & Demolition Waste

- Divert from Landfills

## 3. Resource Reuse

## 4. Use of Materials with Recycled Content

## 5. Segregation of Waste

## 6. International Practises

- Use of Green Certified Products

# #1. Building Reuse



EXISTING SITE CONDITIONS

EXECUTION PHASE

AFTER COMPLETION

***Ambuja Cement Corporate Office,  
Gurgaon***

© Confederation of Indian Industry

# Building Reuse...

## Extend the life of building

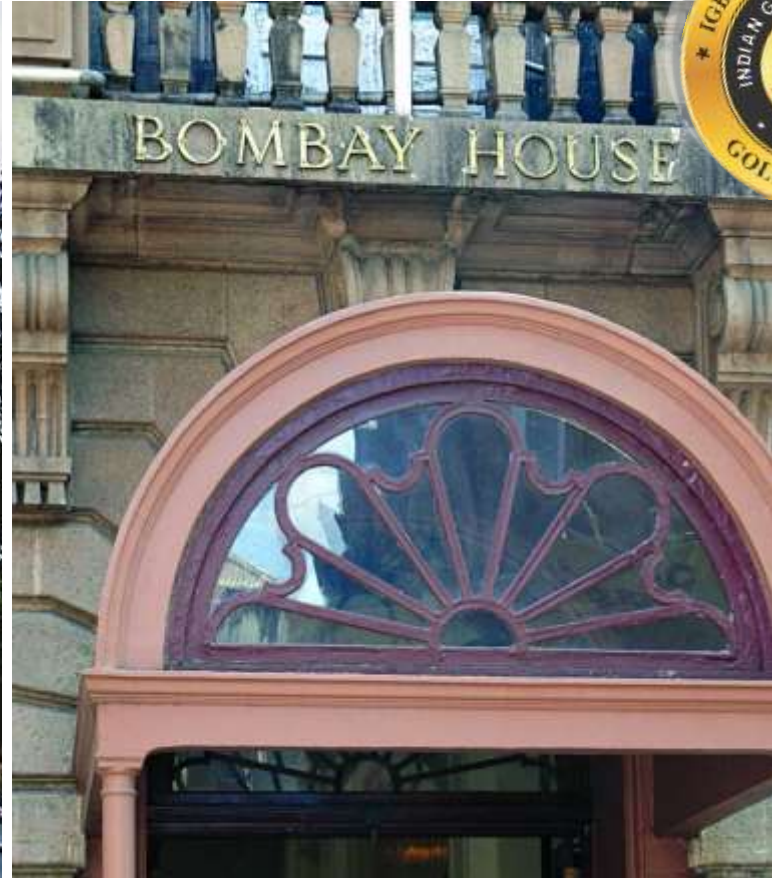


**ACC Cement House, Mumbai**  
**Gold Rated**



**Godrej Bhavan, Mumbai**  
**Gold Rated**

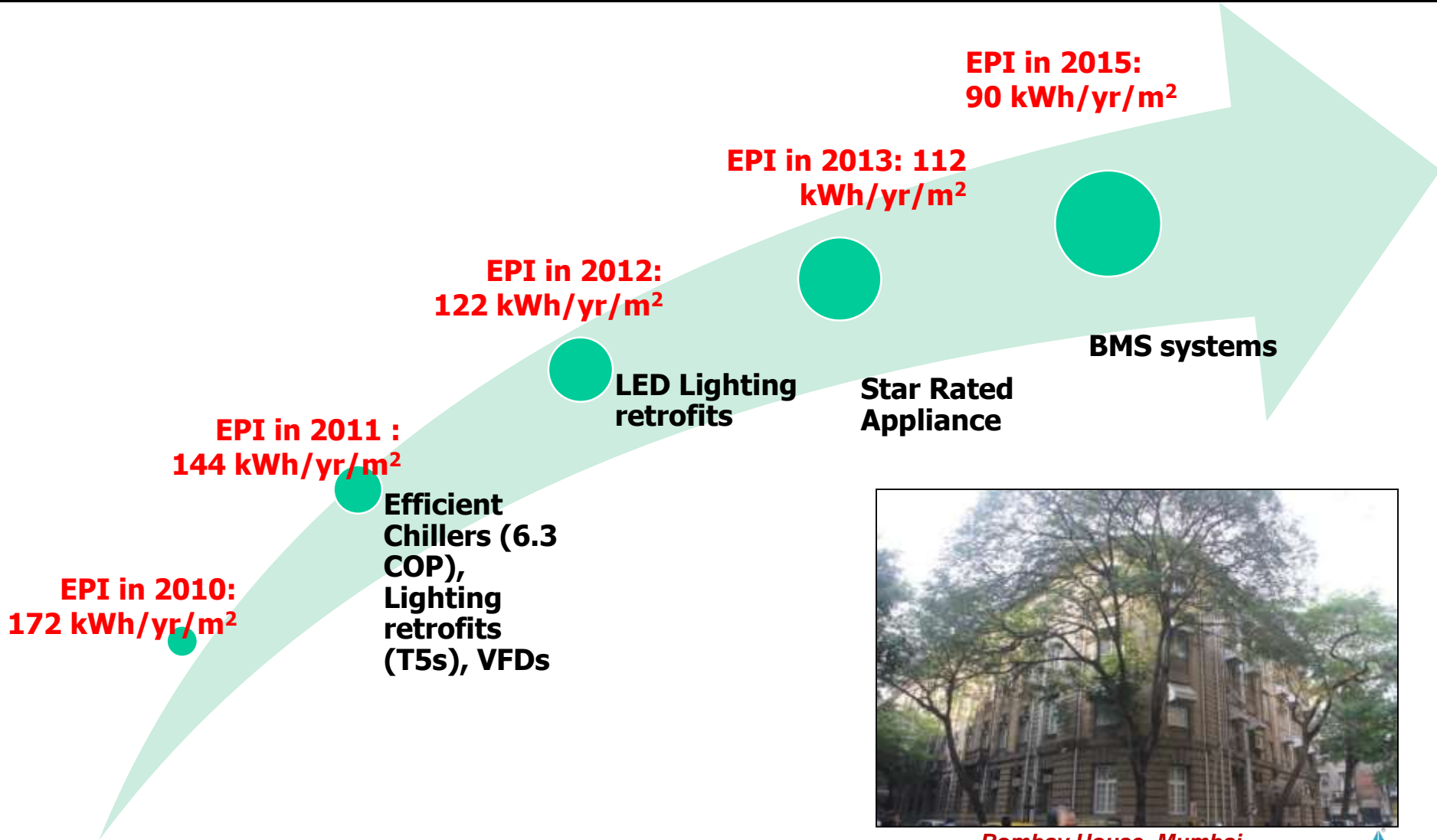
# Bombay House, TATA Head Quarters, Mumbai



- ❖ 4 storied with a roof penthouse office building.
- ❖ Heritage Grade IIA rated structure by the

**India's first IGBC 'Gold' Rated Existing Building & First Platinum Recertified Existing Building**

# Bombay House - Energy Performance Over Years



Bombay House, Mumbai

IGBC Green Existing Building GOLD



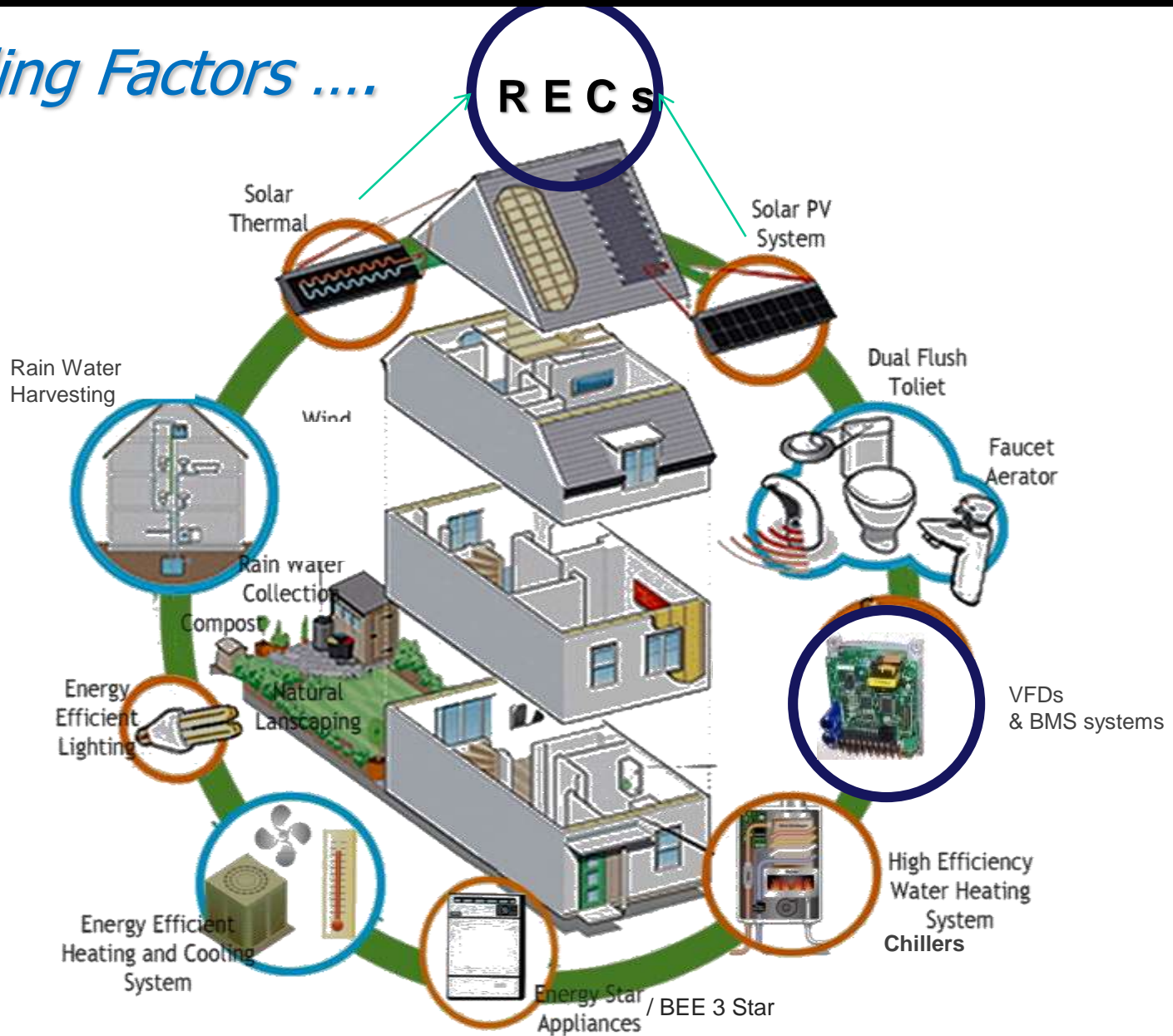
ustry

**Current EPI – 90 kWh/yr/m<sup>2</sup>**

By installing DGUs glass & BMS

# What Bombay House did Differently

*Leading Factors ....*



# #2. Construction & Demolition Waste Divert from landfills

Type of waste	Percentage (%)
New Construction	10
Renovation	40
Demolition	50



**Waste generated is concrete, sand & aggregate, brick, ceramics, glass, steel, timber, aluminum, gypsum**

# Waste Management (During Installation)



Collection of construction waste , GNRC



# #3. Resource Reuse



**Use of Railway sleepers bought from railway auction**

**Eicher-Volvo Corporate Office, Gurgaon  
Platinum Rated**

© Confederation of Indian Industry

# Resource Reuse



**IGBC certified projects have diverted  
500 Tons of construction waste from landfill every year**

# #4. Use of Materials with Recycled Content

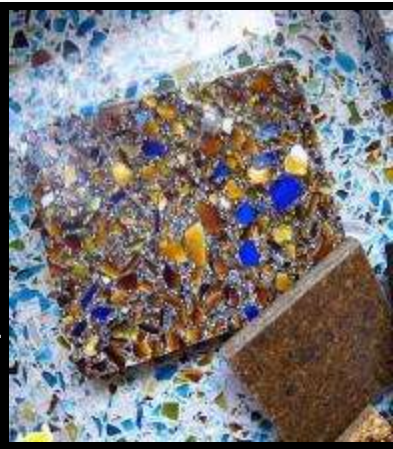
## Post Consumer Waste

Waste material available after consumer use

Tetra pack, Used bulbs, Plastic covers, Pet bottles



*Post consumer Corrugated tiles*



*Post consumer glass tiles*

## Post Industrial Waste

Waste material generated during manufacturing

Fly ash, Particle board, Bagasse board



*Post Industrial Bagasse board*



*Post Industrial Fly ash Brick*



# #5. Waste Segregation – post occupancy

## Solid Waste Management

No System in Place, Not functional



Conventional Buildings

Organised segregation



Green Buildings

# #6. Use of Certified Green Products

## Challenges Faced by Green Building Proponents

### Typical Questions

- How do I know the product is green ?
- If green, to what extent ?
- Is it green in performance (or) materials used ?
- What if the product is green in performance but not during manufacture?
- Is it toxic?
- What happens at the end of life?

### Thus far...

- Extent of Green based on declarations
  - ❑ **Examinee & Examiners are same**
- Dependence on Certifications from other countries
- Non authentic sources



# GreenPro – The definition

## ❖ Green Product Certification:

- Is an ecolabel by CII in India.
- It is recognised by *Global Ecolabelling Network, GEN*, <https://globalecolabelling.net/gen-members/india/> as a Type 1 ecolabeling program.

- ❖ GreenPro assesses 'How Green is a product' based on a holistic product life cycle framework and highlights the way forward to achieve excellence in environmental performance.

## ❖ Benefits to Users

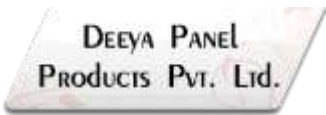
- Eliminates time and effort in carrying due diligence for selecting green products
- Assures environmental performance of the products and equipment
- Ensures toxic and carcinogenic free products
- Enhances market reach with credible and precise information on Green features



# GreenPro – Evaluation framework



# GreenPro Certified & Under Certification



# How IGBC promotes the Circular Economy

**For product manufacturers:**

- 1. Developing resource efficient products**
- 2. Responsible sourcing of raw materials**
- 3. Using delivery and return logistics to recover materials**
- 4. Designing to minimise waste in product refurbishment and maximise re-use**
- 5. Moving to alternative business models e.g. product service systems**

**"Green makes Business Sense"**



# How IGBC promotes the Circular Economy

**For design and construction:**

- 1. Designing out waste**
- 2. Designing for resource efficiency**
- 3. Designing for deconstruction and disassembly**
- 4. Using more renewable energy**
- 5. Reducing embodied carbon over a whole building lifecycle**

**"Green makes Business Sense"**





**Go Green with IGBC**

**Thank You!**



Confederation of Indian Industry

© Confederation of Indian Industry

