Design & Development of Green Buildings in India

LEADERSHIP WORKSHOP ON
SMART CITIES SUSTAINABLE CONSTRUCTION

By: ASHISH JAIN, Director, AEON Integrated Building Design Consultants
What is a Green Building?
A green Building is not just green in colour!
A green building is good for your health, your wallet and our planet!!!
GREEN BUILDING RATING SYSTEMS AROUND THE WORLD
COMPARISON of GREEN BUILDING RATING SYSTEMS AROUND THE WORLD

Bar chart comparing the percentage of different rating systems in various categories:
- Sustainable Sites
- Water Efficiency
- Energy Efficiency
- Materials and Resources
- Indoor Environmental Quality
- Waste and Pollution
- Others

Systmes compared:
- BREEAM
- CASBEE
- LEED
- SBTool
- SBC-ITACA
- Green Globes
Green Building Rating Systems providing A Framework
GREEN BUILDING RATING SYSTEMS

- Part of CII which got formed in 2001.
- Developed by the US Green Building Council and LEED New Construction was first launched in 2000.
- Green Rating for Integrated Habitat Assessment Conceived by TERI & developed jointly with the MNRE.
In India, Green Building Movement had been started in 2001.
LEED-India New Construction Rating System

- Owner Occupied Buildings

LEED-India Core & Shell Rating System

- Tenant Occupied Buildings
Growth of Green Buildings in India

In 2001, 1 Green Building 20,000 Sq.ft.

2016 Green Building Projects, 3+ Billion Sq.ft.
Green Building Movement in India

IT PARKS, OFFICES, BANKS, AIRPORTS, CONVENTION CENTRE, EDUCATIONAL INSTITUTIONS, HOTELS, RESIDENTIAL COMPLEXES, SCHOOLS, HOSPITALS, FACTORIES, TEMPLES, UNIVERSITIES, INSTITUTES, GOVERNMENT BUILDINGS
Green Building Rating Systems Available Today
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGBC Green New Buildings</td>
<td>Owner Occupied &amp; Leased Out</td>
</tr>
<tr>
<td>IGBC Green Homes</td>
<td>Residential Buildings</td>
</tr>
<tr>
<td>IGBC Green Factories</td>
<td>Industrial Buildings</td>
</tr>
<tr>
<td>IGBC Green Existing Buildings</td>
<td>Existing Buildings</td>
</tr>
<tr>
<td>IGBC Green SEZ</td>
<td>Special Economic Zones</td>
</tr>
<tr>
<td>IGBC Green Townships</td>
<td>Townships and Large developments</td>
</tr>
<tr>
<td>IGBC Green Landscapes</td>
<td>Landscapes, Amusement Parks, Heritage Bldgs</td>
</tr>
<tr>
<td>IGBC Green Mass Transit</td>
<td>Metro, Railways etc.</td>
</tr>
<tr>
<td>IGBC Green Societies</td>
<td>Residential Societies</td>
</tr>
<tr>
<td>IGBC Green Interior</td>
<td>Building interiors</td>
</tr>
<tr>
<td>IGBC Green Cities</td>
<td>Cities</td>
</tr>
</tbody>
</table>
LEED Rating System

- LEED for New Construction
- LEED for Core & Shell
- LEED for Schools
- LEED for Healthcare*
- LEED for Retail*
- LEED for Commercial Interiors
- LEED for Retail Interiors*
- LEED for Existing Buildings
- LEED for Existing Schools*
- LEED for Homes
- LEED Neighborhood Development*
SVAGRIHA
- LESS than 2500 sq. mtr. built up area
- Any building, except for a factory building

GRIHA
- MORE than 2500 sq. mtr. Built-up area
- Any building, except for a factory building

GRIHA For Large Developments
- MINIMUM built-up area 150000 sq. mtr. OR
- Minimum Site Area of 50 hectares

GRIHA PRAKRITI
- EXISTING School Buildings in India
While Green Building Rating Systems provide Guidelines, those DO NOT LIMIT TO GO BEYOND for achieving higher levels of Sustainability.
• Net Zero Energy Buildings
• Occupant Comfort
• Occupant Health
• Enhanced Microclimate
• Outdoor Comfort
• Building Commissioning
• Building Operation And Maintenance
• Building Integrated Modeling
Combining Nature (Passive) with Systems (Active)
RENEWABLES

ACTIVE MEASURES
Efficient HVAC Components, Interior Lighting, High Performance Glazing etc.

PASSIVE MEASURES
Building Form, Orientation, WWR, Solar Shading, Thermal Mass, Insulated Envelope, Micro-Climate etc.
For Smart & Sustainable Buildings

INTEGRATED DESIGN APPROACH....

need of the hour
SHUNYA – NET ZERO ENERGY HOME

- India’s **FIRST NET ZERO HOME**
- A house with **Minimal Carbon Footprint**
- **ZERO** Electricity Bills
**Solar Photovoltaic**
3kW solar array on the roof to meet energy requirements of the home.

**Insulated Roof**
Helps reduce solar heat gain and provide more thermal comfort by reducing radiant temperature in natural ventilated space.

**Solar Shading**
Louvers at optimized angle filters in daylight with the glare inside the house.

**Wooden Deck**
Made out of reclaimed wood cuts the demand for virgin wood thus saving forests.

**Double/Triple Glazed Windows Panels**
For optimized daylight factor and cut down on heat gain.

**Fencing**
Made out of reclaimed wood cuts the demand for virgin wood thus saving forests.

**Green Wall**
Promoting vertical gardening to offset horizontal green.

**Water Harvesting**
Optimized water management including recycling of waste water and rain water harvesting.

**Landscape Green**
Horizontal coverage to reduce heat island effect around building.

**Floor Tiles**
Made of recycled contents including glass in the range of 20-80%.

**Insulated Wall Panels**
Cuts on heat gain to provide optimized indoor temperatures.
Integration of Passive & Active Strategies in the building design promises a Green and Sustainable Future...