



Capt. Rajesh Sharma
 Managing Director
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"Green buildings are not just the way forward but the only way forward for the future. A little education, a little awareness and a little more understanding that is all that is required to transform urban landscape and make it more sustainable, more efficient and more green. It is heartening to see the great work being done by "IREO & GACS" in this direction."



Sameer
 Senior CRE Leader
 Member GACS

"I see Green Buildings beyond the ratings and credits. In my opinion "Green & Sustainability" are the guiding principles to the Commercial Real Estate as a whole. With Commercial Buildings gobbling up most of the Global Energy production, it is our duty as CRE Leaders to spread maximum awareness amongst the stakeholders. Only then we would be able to work towards a common goal of "Sustainability". GACS as an organization is fully committed and with on-ground work done by developers like IREO we will create international benchmarks in Green Buildings."

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GREEN BUILDINGS & Sustainable Development

Presented by





Worldwide, buildings consume massive amounts of energy. The United Nations Environment Programme has reported that 30–40 percent of all primary energy produced worldwide is used in buildings. In 2008, the International Energy Agency released a publication that estimated that existing buildings are responsible for more than 40 percent of the world's total primary energy consumption and for 24 percent of global CO2 emissions.

About Green Buildings:

The definition of Green Building keeps on evolving. One useful definition is:

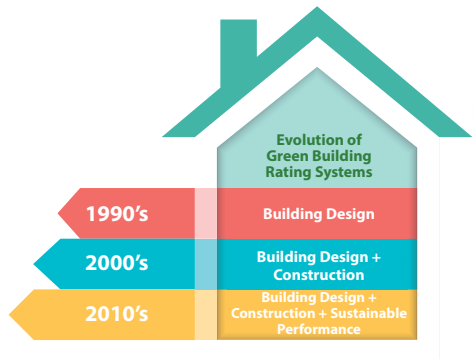
“ the practice of

(1) Increasing the efficiency with which buildings and their sites use energy, water, and materials, and

(2) Reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and removal—the complete building life cycle”

Essentially a Green Building should be using less energy than a conventional building and hence should lower the Electricity & CAM charges for the occupants.

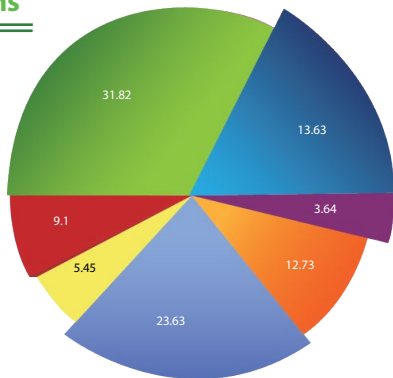




Indian Green Building Rating Systems

LEED

Indian adoption of the US Green Building Council Rating. Early mover advantage. The US Green Building Council has a rating standard specifically focused on existing buildings, referred to as LEED – EBOM

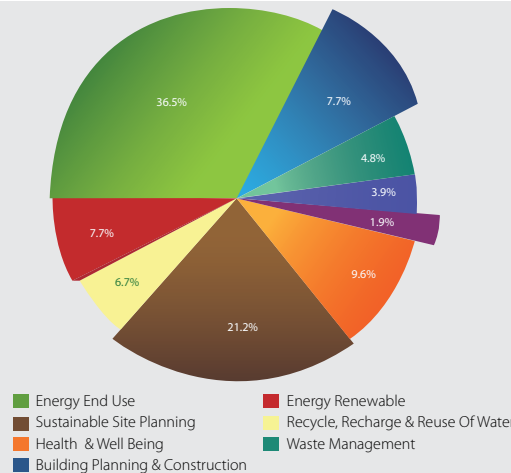


LEED INDIA

- Energy & Atmosphere
- Sustainable Sites
- Indoor Environmental Quality
- Materials & Resources
- Water Efficiency
- Regional Priority
- Innovation In Design

GRIHA - National Rating System for Green Buildings in India.

It is driven by TERI (The Energy Research Institute) with special focus on India's varied climate and building parameters. Haryana Building Code 2016 has also adopted GRIHA as the official rating system for Green Buildings.



ECBC – Developed by Bureau of Energy Efficiency in India. It prescribes standards for Building Envelope, Lighting, HVAC, Solar Water Heating, Electrical Systems. Both GRIHA & LEED have adopted ECBC as minimum compliance requirement. It also talks about EPI defined as follows: "Energy Performance Index" or "EPI" of a building means the annual energy consumption expressed in terms of electrical units, namely Kilo Watt Hours (kWh) per square meter of the area wherein energy is used and includes the location of the building and shall be expressed by the following formula: $EPI = \frac{\text{Annual energy Consumption in terms of kWh}}{\text{Total built up area excluding parking}}$





Green Building

A Facility Manager's perspective



Green Building Ratings work on a credit based system wherein various teams at Occupier level have to contribute. Of all, the Procurement and FM&RE function has significant responsibilities.

- **Low Flow Plumbing Fixtures** - For instance, a traditional urinal uses about one or more gallons per flush, and a traditional toilet uses approximately 3.5 gallons per flush. In comparison, ultralow water urinals use only 0.125 gallons of water per flush, while waterless urinals use none. Similarly, high-efficiency toilets use between 1.2 and 1.6 gallons of water or less per flush.

- **Internal Air Quality** - Indoor levels of air pollution may greatly exceed outdoor levels. Indoor air pollution is particularly important given that we spend most of our time indoors. As per estimate, indoor levels of pollution may be two to five times higher, and occasionally more than 100 times higher, than outdoor air pollution levels. Interior finish products should be chosen that emit zero or low levels of volatile organic compounds (VOCs), which are harmful to humans and can vaporize at room temperature in a process called "off-gassing." Another important step in eliminating the causes of sick building syndrome is installing MERV 13 Air filters and TFA's in the AHU

- **Lighting** - Electric lighting consumes about one-quarter to one-third of the energy in a typical commercial building. Lighting also generates heat, so reducing the amount of energy consumed for lighting through effective and efficient lighting also reduces the size of a building's air-conditioning plan. As per recommendations by ECBC, 90% of the interior lights in large buildings should be fitted with Automated Light controls.

- **Energy Performance of Equipment & Appliances** – ECBC recommends minimum efficiency requirements for Electric Equipments like UPS, Motors and use of BEE rated electric and electronic equipments.

Technical Terminology:

ACH - Air Changes per Hour

ASHRAE - American Society of Refrigerating and Air Conditioning Engineers

BEE - Bureau of Energy Efficiency

BTU - British Thermal Unit

BOMA - Building Owners & Managers Association

BREEAM - Building Research Establishment's Environmental Assessment Method

EER - energy efficiency ratio

ECBC - Energy Conservation Building Code

GRIHA - Green Rating for Integrated Habitat Assessment

HVAC - Heating Ventilation Air Conditioning

IAQ - Indoor Air Quality

LEED - Leadership in Energy & Environment Design

LEED - EBOM - Existing Buildings Operation & Maintenance

MERV - Minimum Efficiency Rating Value

SBS - Sick Building Syndrome

TFA - Treated Fresh Air

VOC - Volatile Organic Compound