
GREEN BUILDING: A SUSTAINABLE APPROACH

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ABSTRACT

The built environment has a vast impact on the natural environment, human health, and the economy. Green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction.

By adopting green building strategies, we can maximize both economic and environmental performance. However, the most significant benefits can be obtained if the design and construction team takes an integrated approach from the earliest stages of a building project. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. Green building is also known as a sustainable or high performance building.

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INTRODUCTION

The building sector accounts for at least one-third of all energy related CO₂ emissions worldwide therefore, enhancing resource (input) efficiency such as reducing water and energy usage in this sector can be an affective abatement wedge to address climate change.

At present, the building and construction industry is one of the largest economic activities in India. It is estimated that the construction industry has contributed around 8.1% to India's GDP in 2010-11 up from around 5.1% in 1999-2000. One survey reveals that built space in India will increase 5-fold from 20,000 million sq ft in 2005 to over 100,000 million sq ft in 2030. This growth will put enormous pressure on various resources such as energy, water, minerals and will have a discernible impact on the environment.

Faced with an increasingly scarcity of resources, there was an increasing focus on "green building as solution". As a result, India has emerged as one of the world's top destinations for green building and has implemented a number of home rating schemes and building codes, which open up a wide range of opportunities in construction, architecture and engineering design, building materials and equipment manufacture.

WHAT IS A GREEN BUILDING?

A high –performance green building can be thought of as a living organism, and as with all living things, it must have a nurturing environment to achieve sustained health and performance over its life. Such buildings are designed for economic and environment performance over time, with an appreciation for unique local climate and cultural needs, ultimately providing for the health, safety, and productivity of building occupants. Architectural, systems, and end-use design, coupled with continual care and monitoring, leads to lower energy use, reduce CO₂ emissions, and focused environmental stewardship while providing long term value to the community, building occupants, and building owners.

According to US green building council generally Green Homes are healthier, more comfortable, more durable and more energy efficient and have a much smaller environmental footprint then the conventional homes.

NEEDS FOR GREEN BUILDING

There is a variety of a reason to" go green" but most come back to supply and demand. We have a limited amount of resources available and more and more using them up .If we want

our future generations to enjoy the same standards of living we have experienced, we need to take action.

“Green building” is great places to start as building consume 14% of potable water, 40% of raw materials and 39% of energy in United States alone (according US green building council). that is 15 trillion gallons of water and 3 billion tons of raw material each year. If it is not enough to convince you, here are some other reasons to explain the need of green buildings



- Green buildings improve productivity
- Green building can trade energy.
- Green buildings present exciting new challenges for environmental stewardship.
- Green building awareness of what constitute a high quality environment.
- Green building can help electricity utilities by reducing peak demand.
- Green building inspire innovation.
- Green building raises the quality and standards of building generally.

BENEFITS OF GREEN BUILDING

- They use key resources like materials, energy, water and land much more efficiently than buildings simply built to code.
- They create healthier work ,learning and living environments by providing more natural light and cleaner air.
- They improve employee and student’s health, comfort and productivity.

- They save money by reducing the operation and maintenance cost, and also by lowering utility bills.
- They consume at least 40-50% less energy and 20-30% less water than conventional buildings.



FEATURES OF GREEN BUILDING

Green buildings have many advantages and features. Some important features are as follows:

- 1) Water conservation
- 2) Efficient use of landscape and minimal possible damage to earth
- 3) Use of energy efficient equipment with BEE rating
- 4) Use of solar energy street lights
- 5) Use of recycled materials in construction and operations
- 6) Use of building management system
- 7) Building design with all reduced green house effect and global warming
- 8) Preferred parking space for low carbon emission vehicles
- 9) Improved indoor air quality
- 10) Use of rapidly renewable materials

Rating systems for green buildings in India

- ❖ **GRIHA (Green rating for integrated habitat assessment)**
- ❖ **IGBC (Indian green building council)**
- ❖ **BEE (Bureau of energy efficiency)**

GRIHA in India has own rating system jointly developed by TERI and ministry of new and renewable energy, government of India. GRIHA rating system consists of 34 criteria categorized in four different sections.

Some of them are:

- 1) Site selection and site planning
- 2) Conservation and efficient utilization of resources
- 3) Building operation and maintenance
- 4) Innovation

Commonwealth games village, New Delhi, Fortis hospital New Delhi, CESE (centre for environment science and engineering), IIT Kanpur, Suzlon one earth ,Pune and many other buildings have received GRIHA RATING.

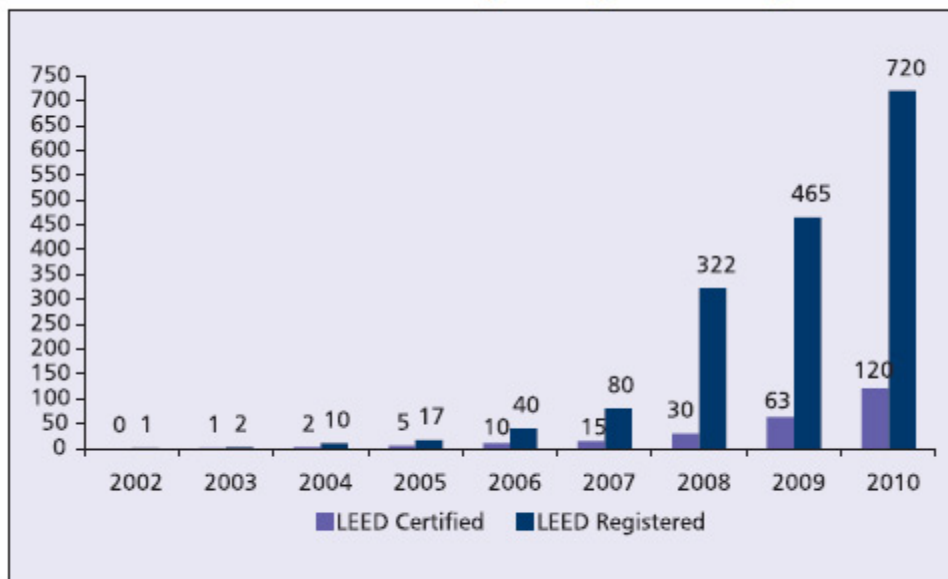
LEED(Leadership in Energy & Environment design) is the rating system developed for certifying green buildings .LEED is developed by USGBC. It is a frame work for assessing building performance against set criteria and standard point of references. The benchmark for the LEED green building rating system were developed in year 2000 and currently available for new and existing construction.

Confederation of Indian industry (CII) formed IGBC in year 2001.IGBC has licensed the LEED green building standard from USGBC. Till date the following green building rating systems are available under IGBC:

- LEED India for new construction (LEED India NC)
- LEED India for core and shell(LEED India CS)
- IGBC green homes
- IGBC Green Factory building
- IGBC Green SEZ

- IGBC Green Townships

Growth in LEED Certified and Registered green buildings in India



Source: Indian Green Business Council

BEE developed its own rating systems for the buildings based on 1 to 5 star scales. More stars mean more energy efficiency. BEE has developed energy performance index (EPI).

IGBC green home rating system evaluate certain mandatory requirements and credit points using a prescriptive approach and others on performance based record. It is a measurement system designed for new and major renovated residential buildings which are broadly classified in two construction type:

1) Individual residential unit (IRU)

2) Multi dwelling residential unit (MRU)

- Gated communities
- High rise residential apartments
- Hostels, service apartments ,resorts, motels and guest houses

IGBC green home rating system addresses green features under the following categories:

- 1) Site selection and planning (SSP)
- 2) Water efficiency (WE)
- 3) Energy efficiency (EE)

- 4) Materials and resources (MR)
- 5) Indoor environmental quality (IEQ)
- 6) Innovation and design process (ID)

IGBC GREEN HOMES CHECK LIST

Sr. No	PARTICULARS	MANDATORY REQUIREMENTS	CREDIT POINTS	
			IRU	MRU
1.	SSP	1. Local building regulations 2. Soil erosion control	9	19
2.	WE	1. Rain water harvesting 2. Water efficient plumbing fixtures.	11	18
3.	EE	1. CFC free equipment. 2. Minimum Energy performance	22	25
4.	MR	1. Separation Of Household Waste	13	18
5.	IEQ	1. Tobacco smoke control 2. Minimum day light-50% 3. Fresh air ventilation.	15	15
6.	ID	---	5	5
		TOTAL	75	100

(SOURCE: IGBC)

IGBC GREEN HOMES CERTIFICATION LEVELS

RATING	POINTS	
	INDIVIDUAL RESIDENTIAL UNIT (IRU)	MULTI-DWELLING RESIDENTIAL UNIT (MRU)

CERTIFIED	38-44	50-59
SILVER	45-51	60-69
GOLD	52-59	70-79
PLATINUM	60-75	80-100

The rating levels “Platinum”, “Gold”, “Silver”, and “Certified” indicate the extent to which a building excels the requirements of the national codes.

ENERGY EFFICIENCY IN GREEN BUILDINGS

Energy efficiency is the first step to green. A building can't be green if it isn't energy efficient. Building energy efficiency is the first step toward achieving sustainability in buildings and organizations. Energy efficiency helps control rising energy costs, reduce environmental footprints, and increase the value and competitiveness of buildings. To cope up with present environmental problems and for sustainability, the best option is renewable energy. Green buildings encourage the use of renewable energy sources like

- a) Cool day lighting
- b) Passive solar heating and cooling
- c) Geothermal heating and cooling
- d) Recycled and sustainable materials

Green design and renewable energy can provide us a healthy and efficient house that is also environment friendly and save money in long term.

BARRIERS FOR GREEN BUILDINGS

- Lack of awareness about green buildings.
- Limited availability of local materials and equipments.
- Combating the cost of higher cost of green buildings which new cost is Only around 2% higher of conventional buildings.
- Performance evaluation tools to measure and verify the needs of green buildings under occupation.

CONCLUSION

To achieve green low carbon and sustainable built environment, green buildings are best options. Green building has a potential to save 30-40% of energy consumption with reduction of operating cost and enhance good health.

The green building technology is for the benefit of mankind, society, country and global environmental concerns on large scale.

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