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GREEN BUILDINGS AND ITS EFFECTIVENESS

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ABSTRACT

Global warming is a serious problem facing the world today as well as the world in the future. In order to stop or reverse this problem, society must change, learning to alter what they use in order to be less harmful to the environment. Making buildings "green" would greatly impact this problem. There are many ways for this to be done and more ways are being developed rapidly. As these new developments arise, the cost reward for green building becomes more logical for the consumer. Green Building Challenge (GBC) was intended to advance the state-of-the-art of building performance assessment, through the development, testing, and discussion of an assessment framework, criteria and tool. Green building is a systematic effort to create, sustain, and accelerate changes in practice, technology, and behavior to reduce building-related environmental impacts while creating places that are healthier and more satisfying for people.

I. INTRODUCTION

Green building (also known as green construction or sustainable building) refers to both a structure and the using of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and demolition. In other words, green building design involves finding the balance between homebuilding and the sustainable environment. This requires close cooperation of the design team, the architects, the engineers, and the client at all project stages. The Green Building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort.

II. NEED FOR GREEN BUILDING

1.1. Sustainable Site Design

- Create minimum urban sprawl and prevent needless destruction of valuable land, habitat and open space
- Encourage higher density urban development as a means to preserve valuable green space
- Preserve key environmental assets through careful examination of each site

1.2. Water Quality & Conservation

- Preserve the existing natural water cycle and design the site so that they closely emulate the site's natural hydrological systems
- Emphasis on retention of storm water and on-site infiltration as well as ground water recharging

- Minimize the inefficient use of potable water on the site while maximizing the recycling and reuse of water, including rainwater harvesting, storm water, and gray water.

1.3 Energy & Environment

- Minimize adverse impact on the environment through optimized building siting & design, material selection, and aggressive use of energy conservation measures
- Maximize the use of renewable energy and other low impact energy sources
- Building performance should exceed minimum International Energy Code (IEC) compliance level by 30-40%.

1.4 Indoor Environmental Quality

- Provide a healthy, comfortable and productive indoor environment for building occupants
- Utilize the best possible conditions in terms of indoor air quality, ventilation, and thermal comfort, access to natural ventilation and day lighting

1.5 Materials and Resources

- Minimize the use of non-renewable construction materials through efficient engineering and construction, and effective recycling of construction debris
- Maximize the use of recycled materials, modern energy efficient engineered materials, and resource efficient composite type structural systems as well as sustainably managed, biomass materials

There is a tremendous potential in India for construction of Green Buildings. The main objective andneed for the construction of green building in India is that it saves nearly 30-40% of energy.

II. LEED

Leadership in Energy and Environmental Design (**LEED**) is one of the most popular green building certification programs used worldwide. Developed by the non-profit U.S. Green Building Council (USGBC) it includes a set of rating systems for the design, construction, operation, and maintenance of green buildings, homes, and neighborhoods that aims to help building owners and operators be environmentally responsible and use resources efficiently.

III. RATING SYSTEM

LEED has evolved since 1998 to more accurately represent and incorporate emerging green building technologies. The pilot version, LEED New Construction (NC) v1.0, led to LEED NCv2.0, LEED NCv2.2 in 2005, and LEED 2009 (previously named LEED v3) in 2009. LEED v4 was introduced in November, 2013. Until October 31, 2016, new projects may choose between LEED 2009 and LEED v4. New projects registering after October 31, 2016 must use LEED v4. LEED 2009 encompasses ten rating systems for the design, construction and operation of buildings, homes and neighborhoods. Five overarching categories correspond to the specialties available under the LEED professional program. That suite currently consists of:

IV. GREEN BUILDING DESIGN & CONSTRUCTION

- LEED for New Construction
- LEED for Core & Shell
- LEED for Schools
- LEED for Retail: New Construction and Major Renovations
- LEED for Healthcare

V. GREEN INTERIOR DESIGN & CONSTRUCTION

- LEED for Commercial Interiors
- LEED for Retail: Commercial Interiors

VI. GREEN BUILDING OPERATIONS & MAINTENANCE

- LEED for Existing Buildings: Operations & Maintenance

VII. GREEN NEIGHBORHOOD DEVELOPMENT

- LEED for Neighborhood Development

VIII. GREEN HOME DESIGN AND CONSTRUCTION

- LEED For Homes (The LEED For Homes Rating System Is Different From LEED V3, With Different Point Categories And Thresholds That Reward Efficient Residential Design.
- LEED Also Forms The Basis For Other Sustainability Rating Systems Such As The Environmental Protection Agency's Labs21

  To Make It Easier To Follow LEED Requirements, In 2009 USGBC Helped Building Greendevelop Leeduser, A Guide To The LEED Certification Process And Applying For LEED Credits Written By Professionals In The Field.

IX. FEATEURES OF GREEN BUILDINGS

1. Air tightness and vapor barrier in building walls and surfaces

Walls that are able to keep out moisture and humidity from outside will make the building naturally cooler. Because of this, air-conditioning systems will not have to work so hard to cool down the building. This lowers electricity costs.

2. Low solar heat gain coefficient of glass (SHGC)

Solar heat gain coefficient is the amount of solar radiation that enters through glass and is released as heat inside a building. The lower the SHGC, the less solar heat it transmits, the cooler the building. This also lowers electricity cost because air-conditioning systems don't have to do all the work.

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3. Enthalpy recovery of exhaust air

A device called an enthalpy wheel recovers cooled air from the inside and uses the coolness of this "spent" air to cool fresh air from outside. The process also dehumidifies the air from outside. This is a cost-efficient way to improve indoor air quality and lessen energy consumed by air conditioning systems.

4. Daylight-controlled lighting systems

This type of lighting system has sensors that can detect daylight. During the day, the sensor switches off the lights since there is enough light from the sun. When the sun sets, the system will switch the lights on.

This way, the use of artificial lighting during the daytime is reduced. It prevents cases when occupants are too lazy or forget to turn off the lights when they aren't needed.

5. Occupancy sensors

This lighting system only turns on when it senses people in the room. This technology can also be found in escalators that activate only when there are people to ride on them.

6. Water-efficient fittings

The latest faucets and flush mechanisms use less water to do the same thing.

7. Rain-water harvesting

A structure catches rainwater and then stores it in big containers. The water can then be used to water plants, flush toilets, or

supply cooling towers.

8. Materials recovery facility (MRF)

An MRF is where the building's garbage is segregated into biodegradable, recyclable, non-recyclable, and special or hazardous waste.

Biodegradable waste can be composted and used as fertilizer for the building's plants. Here is an example of a successful MRF in San Fernando, Pampanga.

9. Vegetation

A significant portion of the building's unpaved area should be devoted to vegetation. This helps reduce the heat urban island effect – when concrete surfaces so common in urban areas absorbs heat from the sun and radiates it to the surroundings.Plants also help absorb some rainwater which would otherwise go to sewers and drainage, later on contributing to flooding.Mandaluyong's ordinance requires that at least 50% of a building's unpaved area be planted with indigenous flora.

X. GREEN BUILDINGS IN INDIA

A green building is one which uses less water, optimizes energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building. IGBC is leading green building movement in the country.

XI. THE INDIAN GREEN BUILDING COUNCIL

The Indian Green Building Council, part of the Confederation of Indian Industry (CII) was formed in the year 2001. The vision of the council is, "To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025". The council offers a wide array of services which include developing new green building rating programs, certification services and green building training programs. The council also organizes Green Building Congress its annual flagship event on green buildings. The council is committee-based, member-driven and consensus-focused. All the stakeholders of the construction industry including architects, developers, product manufacturers, corporate, Government academia and nodal agencies participate in the council activities through local chapters. The council also closely works with several State Governments, Central Government, World Green Building Council, bilateral multi-lateral agencies in promoting green building concepts in the country.

XII. GREEN HOUSES

In Tamil Nadu, the government is planning to build solar-powered green houses for rural poor. It has allotted Rs.1058 crore for construction of 60,000 houses. In Maharashtra, near Mumbai in the Thane District, Govardhan Eco Village, a community in India, has built buildings with compressed stabilized Earth blocks, Rammed Earth Technique, Cob Houses (ADOBE Bricks) with traditional thatched roofs. These buildings have received a five-star rating from GRIHA, an Indian Nationwide Green Standards for Buildings, a wing of the famous TERI.

XIII. TRADITIONAL BUILDINGS

Traditional buildings were energy efficient because architecture depended on the places. Buildings in the hot and dry regions, had corridors directing the wind to cool naturally. In wet regions, structures using natural light and breeze, were used. Some examples are

- Hawa Mahal - Articulated windows provides cool breeze in a desert area·
- Golkonda - Ventilation is designed to let in fresh cool breeze, in spite of summer.

The traditional building practices were utilized in constructing the Dhyanalinga. Mud mortar stabilized with lime, sand, alum and some herbal additives was used

XIV. EXISTING GREEN BUILDINGS IN INDIA

- Earth Air Tunnels & Passive Cooling **I** Aquamall Water Solutions**,** Dehradun
- Thermal Storage **I** TCS Techno Park **& G**rumdfos Pumps **in** Chennai
- District Cooling System **I** RMZ Ecospace**,** Kolkata
- Radiant Cooling Technology I Infosys
- Green and Solar Reflectance Indexroof in Hotel Leela Palace, New Delhi
- Hybrid HVAC System **I** Olympia Tech Park, Chennai

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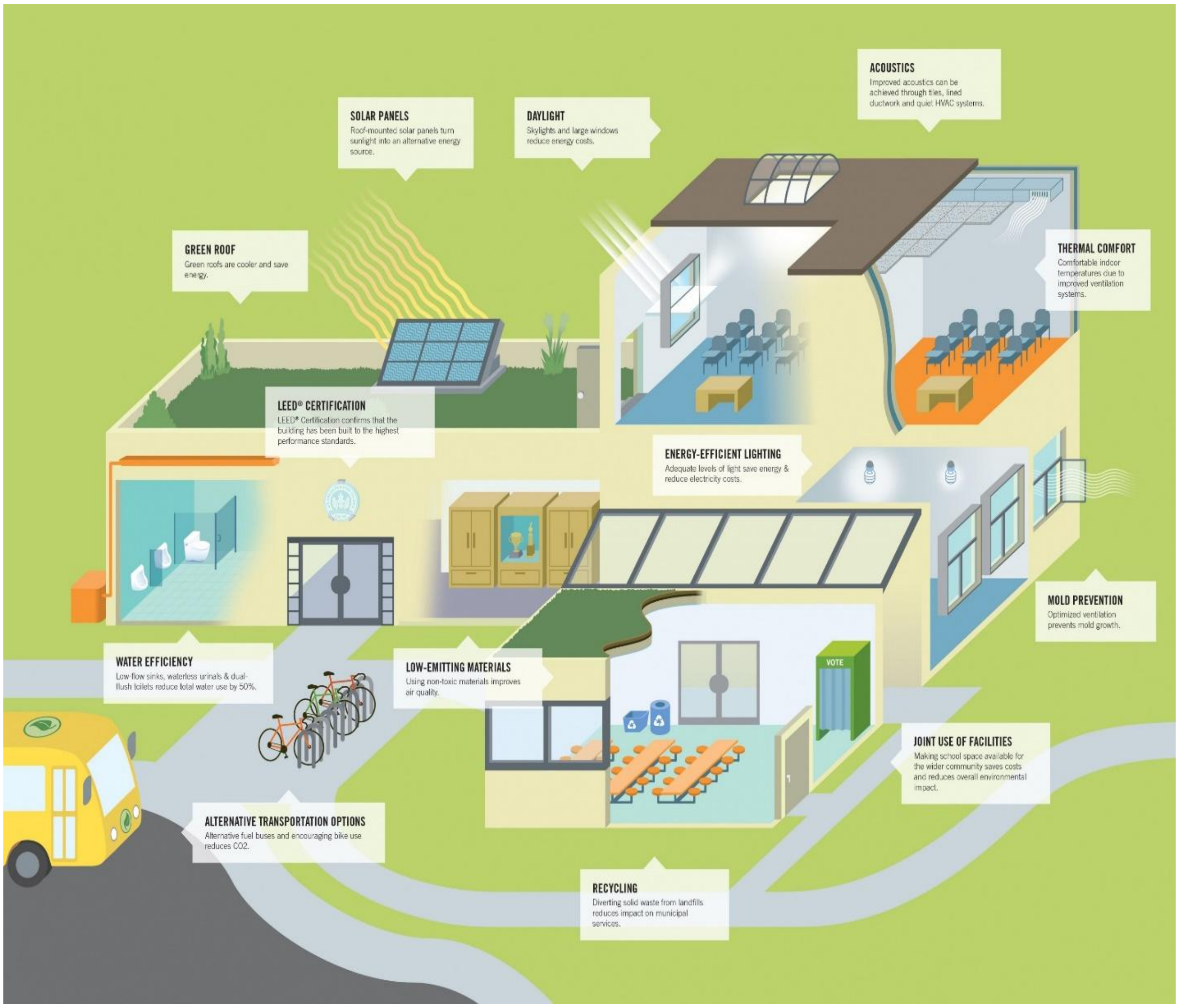
- High Performance Envelop ITC Gardenia, Bangalor.



XV. REALITIES

Perception #: green buildings are costlier. The cost could be slightly

Higher than a conventional building, but, this needs to be seen with a different view.

An ideal building has life cycle of average 40 years and all the cost are to be considered which are initial, construction, operating, maintenance etc. A sample calculating for normal building has been evaluated as below:

S.No.	Particulars	Green buildings		Normal buildings	
1	first cost	340	14-20%	280	12-16%
2	Operating cost	900	40-50%	1900	75-80%
3	Maintenance cost	240	5-20%	180	4-13%
	Total	1480		2360	

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life cycle cost comprises for 40 yrs. life span, 20,000sqft area building @1400 Rs./sqft construction
Total expected benefits over life cycle of the building Rs. 880 lacs.
Yearly benefits Rs.22 lacs (37.3%)

XVI. CONCLUSION

As account for 40% of global carbon emission, The Green Building Movement has an unprecedented opportunity to make a major contribution to new global carbon reduction target. The common carbon metric will be piloted by the leading green building rating tool and made available to all those who are dedicated to promoting the understanding and development of Green Low Carbon and Sustainable built environment. The Green Building Movement and Technology is for the benefits of individuals, society, country and global environmental concert at large the built environment

REFRENCES

[1.] http://www.igbc.in
[2.] http://www.greenbuilding.in
[3.] http://www.bp.in
[4.] http://www.geoexchange.org
[5.] http://www.usgbc.org
[6.] http://www.googlescholars.com