

GREEN BUILDING

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Abstract - Since the industrial revolution, the world has witnessed incalculable technological achievements and also population growth and hence corresponding increase in resource use. For e.g.; residential, commercial, industrial buildings together consumed 31 % of global energy and which requires emission of 1900 mega tones of carbon. By 2050 this would rise to 3800. hence man devised many new techniques to save the human environment, one of which is "green architecture". Green architecture describes economical, energy-saving, environmentally-friendly, sustainable development. Green building is the practice of increasing the efficiency of buildings and their use of energy, water, and materials and reducing building impacts on human health and the environment, through better design, construction, operation, maintenance, and removal in the complete building life cycle. This work presents the detailed information about green buildings, techniques used in it and its benefits over the conventional buildings also it covers a case and concluding with the references taken.

Key Words: Green building, components of green building, Green Building Rating System etc...

1. INTRODUCTION

Green building design is a practical and climate conscious approach to building design. Various factors, like geographical location, prevailing climatic conditions, use of locally available and low embodied energy materials and design parameter relevant to the type of usage of the building are normally taken into consideration. Such an approach ensures minimum harm to the environment, while constructing and using the building.

A green building uses minimum amount of energy, consumes less water, conserves natural resources, generates less waste and creates space for healthy and comfortable living. When a number of green buildings are located in proximity, they would create a green zone, providing much healthier environment and minimize heat-island effect. The ultimate aim will then be to create many such areas, which would help the towns and cities and therefore the nation in reducing total energy requirement and also the overall global carbon footprint.

1.1 Need of Green Building

Buildings are a major energy consuming sector in the economy. About 35 to 40 % of total energy is used by building during construction; the major consumption of energy in building is during construction and later in lighting or air-conditioning systems. This consumption must be minimized.

1.2 Definition-

A green building uses less energy, water and other natural resources creates less waste and green houses gases and is healthy for people during living or working inside as compared to standard building.

Another meaning of green building is clean environment, water and healthy living. Building green is not about is a little more efficiency.

1.3 Benefits of Green Building-

- 1) Reduced maintain ace /replacement costs over the life of the building.
- 2) Energy conservation
- 3) Improved occupant health and productivity.
- 4) Life cycle cost analysis.
- 5) Lower costs associated with changing space configuration
- 6) Greater design flexibility

Following images shows concept of green building.



FIG NO:-1



FIG NO:-2



FIG NO:-3

2. ELEMENTS OF GREEN BUILDING

Four main areas need to be considered in green building: materials, energy, water and health.

1. Materials

These are obtained from natural, renewable sources that have been managed and harvested in a sustainable way; or they are obtained locally to reduce the embedded energy costs of transportation; or salvaged from reclaimed materials at nearby sites. Materials are assessed using green specifications that look at their Life Cycle Analysis (LCA) in terms of their embodied energy, durability, recycled content, waste minimization, and their ability to be reused or recycled.

2. Energy

Passive solar design will dramatically reduce the heating and cooling costs of a building, as will high levels of insulation and energy-efficient windows. Natural daylight design reduces a building's electricity needs, and improves people's health and productivity. Green buildings also incorporate energy-efficient lighting, low energy appliances, and renewable energy technologies such as wind turbines and solar panels.

3. Water

Minimizing water use is achieved by installing greywater and rainwater catchment systems that recycle water for irrigation or toilet flushing; water-efficient appliances, such as low flow showerheads, self-closing or spray taps; low-flush toilets, or waterless composting toilets. Installing point of use hot water systems and lagging pipes saves on water heating.

4. Health

Using non-toxic materials and products will improve indoor air quality, and reduce the rate of asthma, allergy and sick building syndrome. These materials are emission-free, have low or no VOC content, and are moisture resistant to deter moulds, spores and other microbes. Indoor air quality is also addressed through ventilation systems and materials that control humidity and allow a building to breathe.

In addition to addressing the above areas, a green building should provide cost savings to the builder and occupants, and meet the broader needs of the community, by using local labor, providing affordable housing, and ensuring the building is sited appropriately for community needs.

3 FINANCIAL BENEFITS OF GOING GREEN

Given the huge increases in the cost of fuel prices over recent years, it's little wonder why more and more people are choosing green homes and business premises these days. Sustainable build homes have more effective insulation, make the most of the sun with solar power, minimize the effects of the heat in the summer and favor energy efficient appliances and water conservation features. And, whilst it may take some time to recoup the costs by installing these items, there are many loans, grants and subsidies to assist you and, over time, you'll reap the benefits of the cost savings you'll make. You'll be making a firm commitment to helping the planet recover which will make the world a healthier place for future generations and, perhaps most importantly, lessen the damage you are causing to the environment which bears the greatest cost of all.

The concept of a green building was developed in the 1970s in response to the energy crisis and people's growing concerns about the environment. The need to save energy and mitigate environmental problems fostered a wave of green building innovation that has continued to this day.

4. A HOLISTIC APPROACH FOR GREEN BUILDING-

Green building requires a holistic approach that considers each component of a building, in relationship to the context of the whole building, whilst considering the impact on the wider environment and community around it. This is a highly complex approach that requires builders, architects and designers to think creatively, using

systems integration throughout their work. There are several technology tools and assessment methodologies that can help builders with this process including BREEAM (Building and Research Establishment Environmental Assessment Method) and EcoHomes.

5. GREEN BUILDING RATING SYSTEM-

There are three primary Rating systems in India.

1. GRIHA
2. IGBC
3. BEE

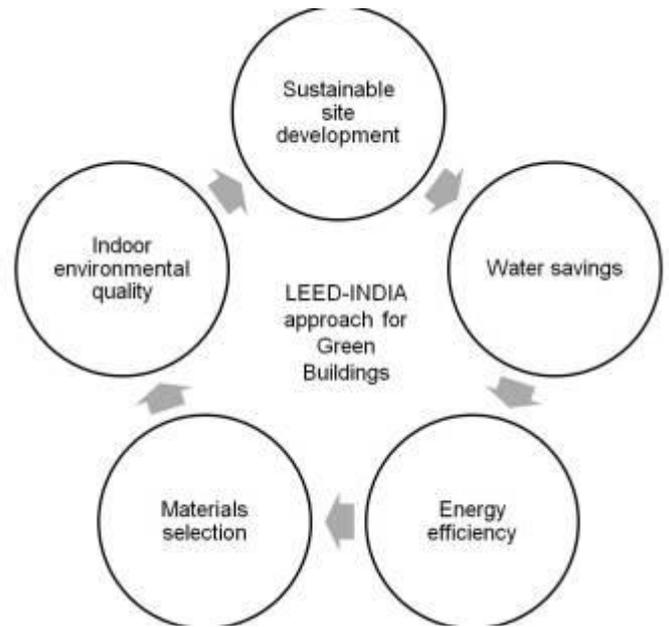
1. Green Rating for Integrated Habitat Assessment (GRIHA)

Green Rating for Integrated Habitat Assessment (GRIHA) is India’s own rating system jointly developed by TERI and the Ministry of New and Renewable Energy, Government of India. It is a green building design evaluation system where buildings are rated in a three-tier process. The process initiates with the online submission of documents as per the prescribed criteria followed by on site visit and evaluation of the building by a team of professionals and experts from GRIHA Secretariat. 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, and (4) Innovation.

Commonwealth Games Village, New Delhi, Fortis Hospital, New Delhi, CESE (Centre for Environmental Sciences & Engineering) Bldg, IIT Kanpur, Suzlon One Earth, Pune and many other buildings has received GRIHA rating.

2. Indian Green Building Council (IGBC)

The Leadership in Energy & Environmental Design (LEED) is the rating system developed for certifying Green Buildings. LEED is developed by the U.S. Green Building Council (USGBC), the organization promoting sustainability through Green Buildings. LEED is a framework for assessing building performance against set criteria and standard points of references. The benchmarks for the LEED Green Building Rating System were developed in year 2000 and are currently available for new and existing constructions.



Confederation of Indian Industry (CII) formed the Indian Green Building Council (IGBC) in year 2001. IGBC is the nonprofit research institution having its offices in CII-Sohrabji Godrej Green Business Centre, which is itself a LEED, certified Green building. Indian Green Building Council (IGBC) has licensed the LEED Green Building Standard from the USGBC. IGBC facilitates Indian green structures to become one of the green buildings.

IGBC has developed the following green building rating systems for different types of building in line and conformity with US Green Building Council. Till date, following Green Building rating systems are available under IGBC;

- 1) LEED India for New Construction
- 2) LEED India for Core and Shell
- 3) IGBC Green Homes
- 4) IGBC Green Factory Building
- 5) IGBC Green SEZ
- 6) IGBC Green Townships

3. Bureau of Energy Efficiency (BEE)

BEE developed its own rating system for the buildings based on a 1 to 5 star scale. More stars mean more energy efficiency. BEE has developed the Energy Performance Index (EPI). The unit of Kilo watt hours per square meter per year is considered for rating the building and especially targets air conditioned and non-air conditioned office buildings. The Reserve Bank of India’s buildings in Delhi and Bhubaneswar, the CII Sohrabji Godrej Green

Business Centre and many other buildings have received BEE 5 star ratings.

Indians were aware of Green Building concepts from the beginning. Conventional homes with baked red color roof tiles and clay made walls is a really good example of energy efficient structures that are used to keep cool during summers and warm during the winters. Most of rural India is still attached to this building technology with naturally available materials like clay, wood, jute ropes, etc. Today we have advanced technologies that create smarter systems to control inside temperature, lighting systems, power and water supply and waste generation. Green buildings might be a bit heavy on the purse but are good for the environment. In this rapidly changing world, we should adopt the technology that helps us to save precious natural resources. This would lead us to true sustainable development.

6. GREEN PROJECTS IN INDIA-

GREEN BUILDINGS PROJECT IN INDIA

- Suzlon Energy Limited-Pune
- Biodiversity Conservation India-Bangalore
- Olympia Technology Park-Chennai
- ITC Green Centre-Gurgaon
- The Druk White Lotus School-Ladakh
- Doon School-Dehradun
- Raintree Hotels-Chennai
- Nokia-Gurgaon
- Rajiv Gandhi International Airport-Hyderabad
- Hiranandini-BG House, Powai
- ABN Amro Bank, Chennai
- Palais Royale at Worli, Mumbai
- Punjab Forest Complex, Mohali



7. CONCLUSIONS

Building and urban development should promote and maximize energy saving and minimize carbon emission. Recycling and waste minimization are crucial to reducing CO₂ emission. Residential development should inculcate measures that address fuel security. All building development should confirm to the relevant health and safety standards.

Building developments should be encouraged to procure materials locally in order to boost local economics.