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Green building; Preservation of Natural Environment

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ABSTRACT

On Earth, Buildings or Infrastructure uses 40%-50% of its energy,whereas on other side green building or sustainable building uses minimum amount of energy with the use of energy efficient construction materials. Green building creates positive impact on human health and also to the climate along with reducing negative impact. Green building established areas are much healthier than regular developed areas. These green buildings characteristics are discussed in terms of their completeness and specificity and are compared to their guidance on building construction, design, and operation for good indoor air quality. Here, a case study of indoor air quality performance in a green building is presented. This study includes a description of the indoor air quality features of the building and the results of a short -term indoor air quality evaluation of the building involving ventilation and contaminant concentration measurements.

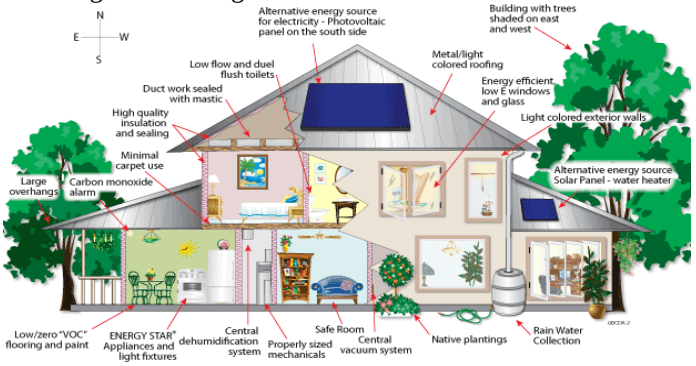
Keywords— *Green Building, energy efficient, sustainable building, air quality, eco-friendly, contaminant*

1. INTRODUCTION

Green building are those type of sustainable building which are constructed, designed and operated reduces negative impact and creates positive impact on climate and natural resources, it preserves natural resources which are precious and also improve the quality of life. Green building uses less water, optimize energy efficiency, conserve natural resources, generate less waste etc. And for these practices it requires a team work of engineers, architect and the client at all stages of project. Climate change occurs due to global warming has become critical problem worldwide. Rise in temperature, rich precipitation, increasing sea level are global warming indicators which actually is the outcome of increasing greenhouse gases. Carbon dioxide CO2 which is principal greenhouse gas is said to be foremost reason for this. With the increase in CO2 in atmosphere the ability of the earth surface to radiate back the heat to atmosphere is reducing. Thus, it acts like a warmer envelop outside its having an immense effect on the indoor temperature of building. Relating the human comfort level and building, buildings are experiencing indoor discomfort due to rise in outdoor air temperature, therefore increasing mechanical ventilation lead to high energy consumption building.

Now talking about the climate of Lucknow - the hottest months extend from April to July; the temperature remains 35° Celsius - 45° Celsius. Lucknow experiences a warm sub-tropical kind of climate. Thus, talking about the climate of Lucknow, along with the prevailing environmental conditions the population is experiencing, the following approach was made of making, building green by using certain techniques to combat the extremities of the climate in Lucknow city.

However, it is worth noting that not all green buildings are the same and need to be the same. Different countries and regions have different characteristics such as specific climatic conditions, unique cultures and traditions, diverse building types and ages or broad environmental, economic and social priorities that shape the vision of green building for all.



This is why WorldGreen Building Counsil supports its member Green Building Councils and their member companies in individual countries and across regions, to pursue green buildings that are best suited to their own markets.

2. GREEN BUILDING DESIGN

Before the advent of mechanical solar heating and cooling, passive solar building design techniques were practiced for thousands of years. It has become a traditional part of magnificent architecture in many countries. There is evidence that factors spanning solar orientation, thermal mass and construction of residential dwellings in ancient cultures.

Fully developed solar architecture and urban. There were methods of planning. The first was employed by the Greeks and Chinese who oriented their buildings southward to provide light and heat. In India, FatehpurSikri, Agra and Red Fort, Delhi are excellent examples of passive solar architectural concepts. Passive solar building design is a part of green building design, and does not include active systems.

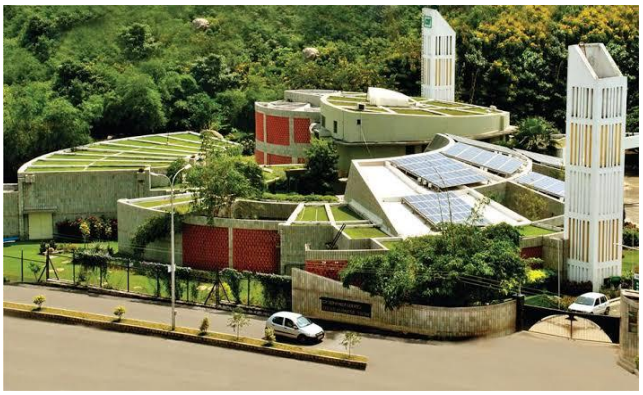
Green buildings have both tangible and intangible benefits. The most important benefit is the reduction in energy and water consumption from the first day of occupancy. Green buildings address the most important national priorities conservation of resources such as water conservation, consumer waste handling, energy conservation, timber and include less dependence on the use of energy intensive building materials. Green building in itself encourages water use Permanent methods through reduction, recycling and reuse strategies. Through this, 30 - 50% potable water can be rescued. Green practice encourages the separation of waste generated domestically. Green building at least energy consumption through energy efficient artificial lighting, air conditioning systems, motors, pumps etc. and using daylight. The use of energy efficient devices saves 20 - 30% overall energy. Use options and green fuel is an integral part of green buildings for transportation and captive power generation. Green building projects thus encourages the use of recycled and reused materials to minimize the impact on the environment. Health, welfare and comfort is the most important aspect of green building. Therefore green buildings ensure maximum daylight use and natural Aeration.

3. GREEN BUILDING DESIGN EXAMPLES

3.1. CII- Soharabji Godrej Green Business Centre, Hyderabad

The CII-Sohrabji Godrej Green Business Center (also known as CII or CIIGBC) earned a LEED rating of 56 credits and was certified LEED Platinum for New Construction (NC) v 2.0 in 2003 - the first in India and the US. Vegetated roofs cover 55–60% of the building's roofs, and the remaining part of the roof is covered by solar photo voltaic with a capacity of 24 kW. 100 to 120 units generated per day are fed to the grid meeting 20% of the total energy cost of the building.

“The green roofs on the curved building are divided into parcels which are separated by parapets. Above the concrete roof, the green roof system begins its construction with three layers of waterproofing. The green roof system consists of 2” sandy soil, topped with deformable paver blocks similar to those used in grades, and overlayed with uniform hay sod. In their appearance and structure, green roofs resemble grassy pedestrian and parking areas at grade."All wastewater and runoff generated by the building is recycled by" root zone treatment ", where specially selected plants purify and filter the water that irrigates them. The water leaving the root zone treatment is used in three ponds. One of them is directed, then used for domestic purposes. The building achieves a 35 % reduction of water supplied partially through the use of low-flush toilets and waterless urinals. As part of the zero-discharge design, the recycled water from the building is used for irrigation and is directed to destroy any runoff in grade. During the dry season, green roofs are irrigated daily.” (Christine Thuring, 2009).



3.2 Infosys Limited, Mysore

Infosys Limited has been awarded LEED (Leadership in Energy and Environmental Design) India. Platinum Indian rating by Indian Green Building Council (IGBC) for its Software Development Block 5 (SDB 5) in Mysore, India. This is the third Infosys Building which has achieved Platinum rating, taking the total platinum.780,000 sq ft of construction area in Infosys. LEED-India is the green building rating system nationally and internationally accepted benchmarks for design, construction and operation high performance green buildings.

Completed in March 2011, this building is located in Infosys Limited Special Economic Zone, Mysore. SDB 5 is designed keeping in mind the overall approach to sustainability. Five major areas, including- sustainable site development, water savings, energy efficiency, Material selection and indoor environmental quality.

Key features of this platinum rated building include:

- Total water consumption has decreased by 58% the building, through the use of efficient plumbing fixtures, is only recycled water used for irrigation.
- This building is 40% more efficient than globally accepted ASHRAE standard and has a carbon saving capacity of about

800,000 kg emission. This is achieved through an efficient building envelope, which includes insulated walls and ceilings, as well as selective double-glazed windows that are properly shaded. Adding it is efficient use equipment and smart automation leading to a 40% reduction in energy costs.

- 90% of the space in this office harvests natural light, reducing its need artificial light during the day. Design includes light shelves with all windows to ensure that natural light travels into the building as deep as possible. This lighting design is 35% more efficient than ASHRAE standards.
- 100% energy consumption of this building is met by green power.
- For this project, Infosys has removed construction waste from landfill. 10% of the total construction material used there were recycled materials including aluminum, glass and steel. 41% of the total project the material was manufactured regionally at a cost that reduced pollution transportation

4. CLIMATE RESPONSIVE FOR NORTH EAST ZONE

The North East region is classified into three major climatic zones: hot and humid, cold and humid and cold and cloud. This classification is based on ambient temperature, humidity, rainfall, wind speed, altitude and solar radiation. and also takes into account the physical topography of the area. It also takes care of wind direction, sky conditions, and Varsha (Rain). A detailed study has been done on the architecture of North East India. Identify passive design features, orientation and materials used, etc. It has been found that locally available materials such as, processed clay, stone, cane, cane leaves arranged in a special fashion, bamboo, straw, jute, lime, jaggery, cow-dung and wood etc. is used effectively in construction. It has also been found that people are aware of passive the air gap between the walls and the ceiling, many layered false ceilings, varying the thickness of the soil wall and material processing techniques, orientation, structure of houses (surface to volume ratio), size and location of window in hot and humid and cold and humid area; Mother toungue architecture refers to the height from floor to ceiling at a height of 15 to 18 feet and the sum of the window and door areas is about 50% of the floor. Area. Elevation helps in the creation of natural drafts and windows help ventilation. More stressed ventilation as relative humidity remains above 80% throughout the year. Cold and cloud area buildings are relatively high compact and south slopes are constructed in comparison to the buildings of the other two climatic zones to achieve more solar radiation.

5. GREEN BUILDING RATING

Several green building rating systems have been developed to evaluate energy and environmental performance Spans a broad spectrum of building stability. Typically, buildings are designed to meet the building code requirements, while green building design challenges designers to go beyond code to improve the overall building performance, life-cycle environmental impact and reduce costs. Green Building Rating Systems Are Changing construction industry by focusing on energy efficient, high performance, environmentally friendly and economical buildings. All green building is voluntary in nature for rating system. Although energy efficiency is a major component of designing a green building, many other basic stability requirements must also be met before the building can be claimed to be green.

Recognizing that energy efficiency and waste management are important issues in the construction sector, national housing and the Housing Policy was formulated by the Government of India in 1998 [5]. In 2001, the Government of India enacted energy protection Act (EC 2001) to promote energy efficiency and conservation. This act leads to the formation of a bureau energy Efficiency (BEE) under the Ministry of Energy in 2002. The Act also authorizes the BEE to establish an Energy Protection Building Code (ECBC). The Bureau of Indian Standards (BIS) published the National Building Code in 2005

Mainly focuses on structural safety and other design issues of buildings. However, it did not cover energy issues of efficiency of buildings. In 2007, BEE comes with the Energy Conservation Building Code (ECBC) in India. It is currently mandatory for private players to have voluntary but government-owned buildings.

5.1. LEED (Leadership in Energy and Environment Design)

LEED (Leadership in Energy and Environmental Design) is the most commonly used green building rating system in the world. Available for virtually all building types, LEED provides a framework for highly efficient, healthy, and cost-saving green buildings. LEED certification is a symbol of globally recognized achievement and leadership.

LEED is for all construction types and all construction stages including new construction, internal fit out, operation and maintenance and core and shell. Unsure of which rating system to use? To get started check out our interactive Discover LEED tool; Then, use the rating system selection guidance to make the final decision. Millions of people are living, working, and learning in LEED-certified buildings worldwide. Learn more about the value of LEED certification.

5.2. IGBC (Indian Green Building Council)

The Indian Green Building Council (IGBC), part of the Confederation of Indian Industry (CII), was formed in the year 2001. The Council's vision is to "enable a sustainable built environment for all and facilitate India to become one." Global leader in sustainable built environment by 2025."

The council provides a wide array of services including developing new green building rating programs, certification services and green building training programs. The council also organizes the Green Building Congress, its annual major event on green buildings.

The council is committee-based, member-driven and consensus-focused. All stakeholders in the construction industry, including architects, developers, product manufacturers, corporate, government, academics and nodal agencies, participate in the council's activities through local chapters. The council works closely with several state governments, the central government, the World Green Building Council, bilateral multi-lateral agencies to promote the concept of green building in the country.

5.3 GRIHA (Green Ratings for Integrated Housing Appraisal)

GRIHA is an acronym for Green Ratings for Integrated Housing Appraisal. GRIHA is a Sanskrit word meaning 'abode'. Environment is interacted with the Human Habitats (buildings) in various ways. Throughout their life cycle, from construction to operation and then demolition, they consume resources in the form of energy, water, materials, etc., and waste as emissions directly from municipal waste or indirectly from power generation. Emit in GRIHA strives to reduce the resource consumption, waste generation and overall ecological impact of a building within a nationally acceptable range / criterion.

According to the old saying that what is measured is managed ', GRIHA tries to determine aspects such as energy consumption,

waste generation, adoption of renewable energy, etc., to manage, control and reduce to the best possible extent.

GRIHA is a rating tool that helps people assess the performance of their construction against some nationally acceptable benchmarks. It assesses the overall environmental performance of a building over its entire life cycle, providing a definite standard for constructing a 'green building'. The rating system is based on accepted energy and environmental principles, which will try to strike a balance between established practices and emerging concepts, both national and international.

6. METHODOLOGY

(a) Understanding Green Building
(b) Green building design
(c) Structural design
(d) Certification and Guidelines

The project used a mixed method to synthesize knowledge on alternative solutions in green buildings. This mixed-methods approach includes primary research including interviews with green building practitioners and secondary research using document analysis. Studies are the primary source of data for studies to identify and collect transformative solutions and discuss the regulatory experience of green buildings. The target set for the number of interviews was about 15 practitioners, planners or green building project managers. Key informants include project managers or planners of green buildings who are familiar with the description of building code variants for building codes, fire codes, or plumbing code requirements and were identified using the following criteria:

- Projects located within Canada
- New build projects, Inspiration build retrofits
- Projects with certification such as Living Building Challenge, LEED Platinum, Passive House V
- Preference for large, complex buildings

7. CONCLUSION

The building sector has emerged as the largest primary energy consumer worldwide. Population growth and housing demand has forced policy makers to compromise on environmentally friendly aspects of buildings over the past two decades. Issues of global warming and climate change have now forced policy makers to think a fresh energy and resource consumption of modern buildings. The building has become greener all over the world synonymous with environmental and sustainable building. Some countries have developed their own methods on their geographical location and resources; To define and certify buildings. However, most of these are green buildings the rating system lacks to address issues related to their respective socio-cultural and socio-economic. As well as most rating systems are available for commercial buildings. The rating system also fails to define proper monitoring and verification, after certification of a particular building and validity of certification (in years) after which re-certification standards and certification process needs to be done as per the enhancement.

In India, there are two certification procedures. GRIHA and IGBC construction evaluation methods are available assessing the greenery of commercial and residential buildings. A total of 59 buildings are certified and 17 buildings so far are under certification process by IGBC across the country. Currently 2 buildings and 19 buildings are certified GRIHA under the certification process. These rating systems are designed to be integrated standards for all climatic zones of the country. Since the residential sector is the major end user of total energy consumption in the building sector, a more detailed study is necessary for the whole country to have any standard before it is set. These rating systems should also have scope to address with different climatic socio-cultural and socio-economic norms of the country.

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