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Green Buildings – An Innovation Towards Sustainable living

S M Abdul Mannan Hussain[1], J KruthikaMehar[2], Asra Fatima[3]

[1]*Associate professor, civil Engineering, Malla Reddy Engineering College (India)*

[2]*B.tech Final year student, Malla Reddy Engineering College(India)*

[3]*Assistant professor, civil Engineering, Muffakham Jah College of Engineering and Technology(India)*

ABSTRACT

In the present era of growing population there is a parallel demand for the construction industry as well as fertile land which is a finite resource. To suffice this need a large number of construction companies are coming up. In this process the deterioration of land, environment, healthy life style and safety is overlooked. The use of land and resources for constructions are becoming endless and is against sustainable development. In the present period of water scarcity the wastage of water and energy which is indirectly related to water is bothersome.

Therefore in concern to the above problem, the main aim is to evaluate the impact of overlooked areas and study the incorporation of green building techniques into constructions that can help address National concerns like water efficiency, energy efficiency, reduction in fossil fuel use, handling of consumer waste and conserving natural resources. Most importantly, these concepts can enhance occupant health and well-being, which is assuming greater importance. Most of the time, people stay indoors therefore the indoor aesthetics, air quality and comfort are of paramount importance to occupants. The rating system, its importance and benefits for different criteria given by IGBC (India Green Building Council) will be studied.

Keywords: CII (confederation of Indian industry), Efficiency, Grade points, IGBC (Indian green building council), Rating system.

I. INTRODUCTION

The building sector in India is growing at a rapid pace and contributing immensely to the growth of the National economy. The sector has embraced sustainable design & construction practices in the past decade and enabled India to be in the International map of green buildings and built environment. While the concept of green was initially adopted in commercial buildings, it is now extending to varied types of buildings and communities. This augurs well for a country where the sector is expected to grow four-fold in the next two decades.

The green concepts and techniques in the building sector can help address National concerns like water efficiency, energy efficiency, reduction in fossil fuel use, handling of consumer waste and conserving natural resources. Most importantly, these concepts can enhance occupant's health and well-being, which is assuming greater importance.

Today the existing residential stock is a significant consumer of resources. It also presents tremendous opportunities to enhance efficiency of resource use. There are millions of Residential Societies which can address resource efficiency coupled with enhancing the quality of life. Against this background, the Indian

Green Building Council (IGBC) has formed a Technical committee to establish Green Residential Society rating system for existing multi dwelling residential buildings.

The committee, through various deliberations has come out with a Pilot rating to establish standards in designing sustainable Residential Society. This has been developed considering the Indian context and the National priorities. The Pilot will be operational for the next two years. Based on the learning from the Pilot, the rating system will be further streamlined.

Table 1. Various levels of rating awarded

CERTIFICATION LEVEL	INDIVIDUAL RESIDENTIAL UNIT	MULTI- DWELLING RESIDENTIAL UNIT	RECOGNITION
Certified	38-44	50-59	Best practices
Silver	45-51	60-69	Outstanding performance
Gold	52-59	70-79	National excellence
Platinum	60-75	80-100	Global leadership

II. SCOPE

The IGBC Green Residential Society Rating is designed to address the specific requirements of existing Multi Dwelling residential buildings.

III. PHYSICAL VERIFICATION AND MONITORING

Physical audit is unique to IGBC's processes. Before award of rating, the IGBC team would physically audit and verify implementation of the green measures.

Fig1: Requirements of green Building

IV. WATER EFFICIENCY

Most of the Asian countries are water stressed and in countries like India, the water table has reduced drastically over the last decade. Green Homes Rating System encourages use of water in a self-sustainable manner through

reducing, recycling and reusing strategies. By adopting this rating programme, green homes can save potable water to an extent of 30 – 50%.

4.1 Rainwater Harvesting, Roof & Non-roof

A.Intent

Enhance ground water table and reduce municipal water demand through effective rain water management.

B. Approach and Methodologies

Survey the water table in the project's location. Design appropriate harvesting system based on the subsurface characteristics. Factors to be considered include weathering, fractures & joints for rocky sites and thickness of aquifer for sedimentary sites. Capture rainwater from roof top for reuse. The design should also include flushing arrangement to let out impurities in the first few showers. Such pollutants and impurities include paper waste, leaves, bird droppings, dust, etc.

4.2 Water Efficient Plumbing Fixtures

A. Intent

Minimize the use of municipal water and reduce load on waste water systems.

B. Approach and Methodologies

While selecting water fixtures, look for their efficiencies. The product catalogue or the brochure may detail the flow rates at various pressures. Fixtures are available with ultra-high efficiency which can reduce substantial quantity of water consumption. Consider reuse of treated waste water and captured rain water for flushing. Ensure periodic testing of the treated water to meet the quality standards for flushing, as prescribed by Central / State Pollution Control Board.

4.3. Management of Irrigation Systems

A. Intent

Reduce water demand for irrigation through water efficient management systems and techniques.

4.4. Approach and Methodologies

Design irrigation management system based on the requirements of the landscape plan. Conduct a market survey on the technologies available to manage irrigation efficiently. The designer and the installer must work together and ensure the planned performance of the system. Also, identify local manufacturers supplying systems such as moisture sensors, time based controllers, etc.

4.5 Waste Water Treatment and Reuse

A. Intent

Reduce consumption of potable water and waste water generation to minimize the burden on municipal streams.

B. Approach and methodologies

Calculate the waste water volumes generated in the building. Design appropriately the capacity of the on-site waste water treatment system. While designing the treatment system, ensure that the treated waste water meets the required quality standards based on its purpose of application. Ensure that the quality of the treated waste water is fit and safe for reuse.

Prioritize the use of treated waste water such that irrigation, flushing, etc., Excess treated waste water can also be used for make-up water for air-conditioning systems and other purposes. Ensure periodic testing of the

treated water to meet the quality standards as prescribed by Central / State Pollution Control Board. Have adequate signages all around the building to caution residents and housekeeping staff that this water is not potable.

V. ENERGY EFFICIENCY

The residential sector is a large consumer of electrical energy. Through IGBC Green Homes rating system, homes can reduce energy consumption through energy efficient-lighting, air conditioning systems, motors, pumps etc., The rating system encourages green homes which select and use BEE (Bureau of Energy Efficiency) labeled equipment and appliances. The energy savings that can be realized by adopting this rating programme can be to the tune of 20 – 30%.

5.1 Solar Water Heating System

A. Intent

Encourage use of solar energy for water heating applications in the building.

B. Approach and Methodologies:

Calculate hot water requirement for the entire project. Install solar water heating system, thereby catering to hot water requirement in the project. The design should also consider the availability of space to install the solar panels.

VI. MATERIALS AND RESOURCES

The rating system encourages projects to use recycled & reused material, and discourages the use of virgin wood, thereby, addressing environmental impacts associated with extraction and processing of virgin materials. Reduced usage of virgin wood is also encouraged

The materials used are

1. AshCreteIt is a concrete alternative that uses fly ash instead of traditional cement. By using fly ash, a by-product of burning coal, 97 percent of traditional components in concrete can be replaced with recycled material.
2. Timbercrete is an interesting building material made of sawdust and concrete mixed together. Since it is lighter than concrete, it reduces transportation emissions, and the sawdust both reuses a waste product and replaces some of the energy-intensive components of traditional concrete. Timbercrete can be formed into traditional shapes such as blocks, bricks, and pavers.
3. Ferrock is a new material being researched that uses recycled materials including steel dust from the steel industry to create a concrete-like building material that is even stronger than concrete. What's more, this unique material actually absorbs and traps carbon dioxide as part of its drying and hardening process – making it not only less CO2 intensive than traditional concrete, but actually carbon neutral.
4. Recycled Plastic :Instead of mining, extracting, and milling new components, researchers are creating concrete that includes ground up recycled plastics and trash, which not only reduces greenhouse gas emissions, but reduces weight and provides a new use for landfill-clogging plastic waste.
5. Papercrete: It is a construction material which consists of re-pulped paper fiber with Portland cement or clay and/or other soil added.

VII. INDOOR AND OUTDOOR ENVIRONMENT QUALITY

7.1 Maximum Day lighting

Ensure that daylighting is considered at the design stage by appropriate orientation. The orientation of the building(s) can be such that maximum daylighting to all the spaces is achieved during most part of the day. While designing for daylight, care should be taken to control glare which causes discomfort. Strategies include building orientation towards the north, appropriately designed windows to ensure adequate daylighting, double height roof, etc.

Fig2: Light absorbers to allow sun light but not heat

VIII. SITE SELECTION AND PLANNING

8.1 Soil erosion control

Control soil erosion and sedimentation, thereby, reducing negative impacts to the site and surroundings.

8.2 Approach and Methodologies

Evolve strategies to stockpile fertile top soil and reuse later for landscaping purpose or stockpiled soil can be donated to other sites for landscaping purpose.

Consider adopting measures such as temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps, and sediment basins, as appropriate. Open areas can be landscaped (eg. native grass, trees, shrubs). Paved areas can be installed with permeable paving. For impermeable surfaces, direct all run-offs towards rain water collection pits, sediment traps, etc.

Fig3: Retaining sediments

8.3 Heat Island Effect, Non-roof

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate.

8.5 Approach and Methodologies

Shade constructed surfaces on the site with landscape features and use open-grid pavers in impervious areas. Consider replacing constructed surfaces (i.e. roof, roads, side walks, pathways, etc.,) with vegetation and/ or open grid paving or high-albedo materials to reduce heat absorption.

Fig4: Roof garden to reduce heat

IX. BENEFITS

1.20-30% reduction in Energy cost

2. 30-50% reduction in Water requirement

3. Improved health & wellbeing of occupants

Other National Benefits

1. Water Conservation

2 .Proper handling of household waste

3. Energy conservation

4. Reduced dependence on Virgin materials

5. Reduced use of fossil fuels

X. CONCLUSION

Green Building concepts is gaining importance throughout the world. Building green infrastructure also creates jobs and boosts economy. It is also useful for building strong global partnerships. Therefore incorporating green structures not only is beneficial to the environment, occupants but also to the country's prosperity.

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