



Green Building Concept

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Abstract—The green building includes a variety of procedures, facets and elements which bifurcate into many subtopics that reticulate to form the green building concept. The green building is considered to be an environmental component because the materials used for its construction are assembled from local eco-friendly sources, which are then used to make an eco-construction project subject to an eco-design that provides a healthy habitat for the occupants of the building. This paper highlights how the implementation of the green building concept helps in the reduction of the utility bills by around 50%, the various eco-friendly, reusable and recycled materials used for their construction and rating system applied to the completed green building project.

Keywords:— green building, eco-friendly resources, rating system, recycled materials.

1. INTRODUCTION

Energy from the sun drives the Earth's weather and climate. The Earth absorbs some of the energy it receives from the sun and radiates the rest back toward space. However, certain gases in the atmosphere, called greenhouse gases, absorb some of the energy radiated from the Earth and trap it in the atmosphere. These gases essentially act as a blanket, making the Earth's surface warmer than it otherwise would be. While this

“greenhouse effect” occurs naturally, making life as we know it possible, human activities in the past century have substantially increased the amount of greenhouse gases in the atmosphere, causing the atmosphere to trap more heat and leading to changes in the Earth's climate. The Intergovernmental Panel on Climate Change (IPCC) claimed that greenhouse gases generate impact large enough to change global climate. Some industries are beginning to reduce carbon emissions from their designs and manufacturing processes in order to comply with IPCC recommendations around the world. The construction industry generates the greatest environmental impacts among all the other industries. Green building designs and standards are developed to improve building operation energy and embodied energy efficiencies, and minimize energy and wastes. Therefore, over the last two decades the construction industry has made efforts to develop green building practices. Green buildings are about resource efficiency, lifecycle effects, and building performance.



Figure 1. Green House

removal, and possible reuse. Main outcomes are minimum site disruption, reduced fossil fuel use, lower water consumption, and fewer pollutants.

2. DEFINITION OF GREEN BUILDING

A green building incorporates design techniques, materials and technologies that minimize its overall impacts on the environment and human health. This is achieved by better siting, design, material selection, construction, maintenance, and released during construction, occupation and disposal of the building. The “green building practice” is a process to create buildings and infrastructure in such a way that minimizes the use of natural resources, reduce harmful effects on the ecology, and create better environment for occupants. Green buildings exhibit a high level of environmental, economic, and engineering performance. These include energy efficiency and conservation, improved indoor air quality, resource and material efficiency, and occupant's health and productivity.

Table 1 Comparison between “green buildings” and “non-green buildings”

Building Type	Green Buildings	Non-Green Buildings
Energy Consumption	Low	High
Indoor Environment Quality	Very Good	Good
Emissions	Low	High
Waste Management	Highly Efficient	Efficient
Building Materials	Environmentally Friendly	Not Environmentally Friendly
Project Practices	Sophisticated	Normal
Feasibility	>5% than Threshold	Threshold

3. ENERGY AND GREEN BUILDINGS

Green buildings are designed to save energy costs by reducing the energy consumption. Traditional buildings consume more of the energy resources than necessary and generate a variety of emissions and waste. The solution to overcome these problems will be to build them green and smart. One of the significant components in the concept of

green buildings is using renewable energy. Solar energy and wind energy are intermittent sources of energy, so these sources have to be combined with other sources of energy or storage devices. While batteries or super capacitors are an ideal choice for short-term energy storage, regenerative hydrogen-oxygen fuel cells are a promising candidate for long-term energy storage.

4. GREEN BUILDING MATERIALS

There are different criteria that are applied to select materials to be used in green buildings. These criteria include materials made of recycled and recovered agro-industrial wastes and materials that reduce the quantity used without adversely affecting the durability, it is also important that the used materials can be recycled. Life cycle assessment (LCA) and green building regulations also play a key role in evaluating building materials and maintaining sustainability in the industry. Fulfilling the requirements of ecological, recycling, healthy, and high-performance attributes, the green building material may effectively reduce environmental impacts and improve the indoor environmental quality (IEQ), so as to gradually achieve health and global sustainability. Green Building Material (GBM) evaluation system incorporates low toxicity, minimal emissions, low-VOC, recycled content, resource efficiency, recyclable and reusable materials, energy efficiency, water conservation, indoor air quality (IAQ) improvement, and use of locally products among others. The criteria are systematically comprised of four categories, including Ecology, Health, High-Performance and Recycling.

5. RATING GREEN BUILDINGS

Building assessment systems allow planners to examine whether buildings and developments meet sustainability goals. National initiatives have been taken to create public or private voluntary green

building rating systems that serve the purpose of assessing buildings against a set of performance criteria and recognizing their superior environmental performance. Such rating programmes provide guidance for design, construction, and operational practices in order to significantly reduce the environmental impact of buildings. Three major certification systems for buildings were established in the 1990s, starting with the British Building Research Establishment Environmental Assessment Method, or BREEAM in 1990. This was followed by the French certification system, HQE (High Environmental Quality) in 1996. Perhaps the most widely recognized certification system around the world today is the LEED (Leadership in Energy and Environmental Design), developed by the United States Green Building Council (USGBC) in 1998. The USGBC was founded in 1993 to drive the building and construction sector towards high performance green buildings. LEED is adopted voluntarily in the U.S. and a large number of countries around the world.

6. ECONOMICS OF GREEN BUILDINGS

Buildings account for 40% of the greenhouse gas emissions, 70% of electric consumption, and 12% of water consumed; there is a need to change these trends, and in fact, the green building technology has proven that this is possible. Studies have shown that green buildings save approximately 30% reduction in utility bills over conventional buildings. Besides direct savings in energy costs, green buildings have the potential of lower insurance premiums, lower waste disposal charges, reduced water and sewer fees, and increased rental rates. Green buildings are designed to be environmentally healthy and energy efficient. However, their initial costs can be 1 to 5% higher than the conventional buildings. These additional initial costs are recouped in energy savings

over a few years, and as the number of green buildings increases, the cost of green materials and green design will decrease, thus the initial cost of green buildings will decrease. Implementing the green building concept can result in reduction of carbon emissions by 35%, water usage by 40%, energy usage by 50% and solid waste by 70%.

7. BARRIERS TO THE PROPAGATION OF

Green Buildings

Despite the fact that there is a strong business case for building green, the shift towards more green construction practices is slow because of a number of roadblocks. Preference is still given to “build fast and cheap” and there is a lack of value attached to the life cycle benefits of green buildings. Moreover, there is an overall resistance to change at all levels: government, industry and individuals. The challenges confronting the greening of buildings are different for industrialized and developing countries.

Industrialized countries have a head-start in addressing challenges and overcoming barriers but they are over-burdened by the predominance of existing building stock that are to be retrofitted and converted into green assets. On the other hand, developing countries have a huge need to construct new buildings but are lagging behind in adopting suitable policies to tackle various barriers to green building. In addition to the typical economic and financial challenges, there is also a huge vacuum in terms of awareness and capacity to deliver.

Understanding the different barriers that hinder the growth of green buildings and community is extremely important before any action or measure can be taken to bring in appropriate changes. While many believe that a major barrier to green buildings is the cost, this is not true in most cases. In the urban context, it is the

land price that makes the difference. Barriers are more linked to lack of policies, understanding of the crucial issues, business models, markets, know-how and technologies, commitment, etc. The barriers can be classified into four categories, as shown below.

8. BENEFITS OF GREEN BUILDING

Green building design is rooted in an understanding of natural systems and the behaviour of eco-systems, facilitating and preserving the interrelationship between nature and buildings. It encompasses the whole process of planning and design (pre-building phase), construction, use and maintenance (building phase), and demolition/disposal (post-building phase), spanning over the whole life cycle of the building. It strives to make judicious use of the surrounding resources in order to create a harmonious environment and excellent living space for the dwellers, while minimizing the environmental impacts and ecological footprints.

- 30%-40% reduction in operating cost.
- Health and safety of building occupants.
- Incorporates latest techniques and technologies.
- Minimal disturbance to landscape and site condition.
- Use of recycled and environment friendly building materials.
- Use of renewable energy.
- Indoor air quality for human comfort.
- Efficient use of water and water recycling.
- Use of non-toxic materials.

9. CONCLUSION

Green building is considered as a way for the building industry to move towards protecting the environment. The promotion of green building practices is to pursue a balance among economic, social, and environment in the construction projects. With the growing awareness on

environmental protection, this issue has gained wider attention from construction practitioners worldwide. Implementing green building construction practices has been advocated as a way forward in fostering economic advancement in the building industry while minimizing impact on the environment. In order to reduce these detrimental impacts of construction on the environment and to achieve sustainability in the industry, three principles emerge: resource efficiency, cost efficiency and design for human adaptation. The sustainability requirements are to a greater or lesser extent interrelated. The challenge for designers is to bring together these different sustainability requirements in innovative ways. The new design approach must recognize the impacts of every design choice on the natural and cultural resources of the local, regional and global environments.

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