

Green Buildings for Better Future-A Case Study

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Abstract—Globally the construction sector is one of the largest end users of environmental resources and one of the largest polluters of natural environment. The building industry is responsible for approximately 44% of society's use of materials. Buildings account for 39% of India's energy consumption and this figure is increasing at 8% per annum. The prediction is that energy demand in the Indian building sector will increase more than five times by 2100.

Due to the higher level of Pollution, and Energy usage, which is causing degradation to the environment the Importance for the Green building is increasing. The Construction of Green building has immense benefits to environment and society in compare to Conventional Building. In this paper different Green Buildings of India has been compared at different levels and their capacity has been measured to implement the future construction of Green Building

Keywords: Conventional Building, Green Building, Sustainable Development

Introduction

When a Conventional Building is Constructed it Requires large amount of energy for construction and Operation, according a study by the Commonwealth Scientific and Industrial Research Organization, during the construction process of an average residential home, the materials used have embodied emissions equal to 15 years of operational emissions includes emissions from extraction, manufacturing, and transportation, and while operation of Building it requires-39% of total energy use, 68% of total electricity consumption, 30% of landfill waste, 38% of carbon dioxide emissions, 12% of total water consumption.

A green building has been defined as 'a building that can coexist with nature, maximize resource conservation (energy, land, water and materials), reduce pollution in its whole life cycle and deploy the efficient use of space'. Green buildings come under the umbrella of sustainable development and rating systems have been developed to measure the sustainability of green building

Green buildings often include measures to reduce energy consumption – both the embodied energy required to extract, process, transport and install building materials and operating energy to provide services such as heating and power for equipment. As high-performance buildings use less operating energy, embodied energy has assumed much greater importance – and may make up as much as 30% of the overall life cycle energy consumption. The Energy Produced by the Green Building is Clean Energy as the carbon Emission by the Building is very less. The various components of Green Building are shown in Fig.1.

There are Various Guidelines for the Construction of green building in India which includes LEED-India (Leadership in Energy and Environmental Design), GRIHA (Green Rating for Integrated Habitat Assessment) and IGBC (Indian Green Building Council).



Figure 1 Components of Green Building

Objectives

The main objective of this study is to Compare existing Green Buildings, Identify Various Parameters used to Design these Green Buildings and Check the Drivers for the Green Building Development.

Case Studies

Suzlon One Earth, Pune:

- Suzlon One Earth is a Commercial Building, Designed by the Pune-based Christopher Charles Benninger Architects and executed by Synefra.
- It has total Plot area of 45, 392 Sq.mt. (Approx.) and Total Built Up Area of 70, 865.58 Sq.mt. (Approx.).
- It has total Capacity of 25, 000 Employees.
- It is LEED Platinum Rated by 57 points and GRIHA Rated 97 points.
- Features of Suzlon One Earth as shown in Fig.2

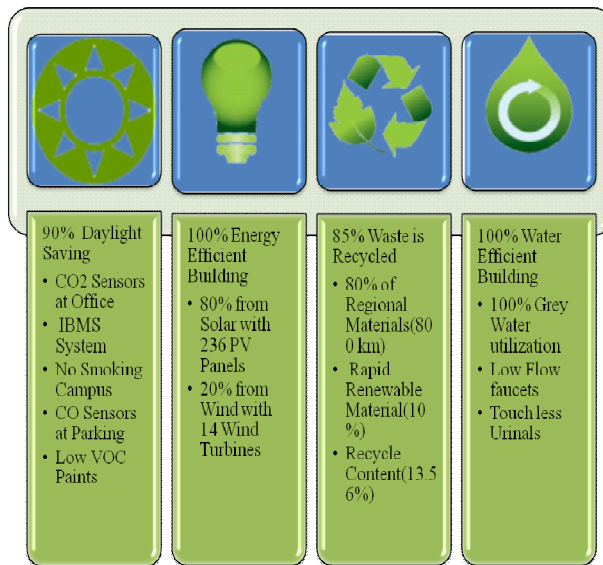


Figure 2 Features of Suzlon One Earth

1. CII Sohrabhji Green Business Centre, Hyderabad

- Sohrabhji Godrej Green Business Centre, Hyderabad is a commercial building which consists of office buildings, research labs and Conference rooms.
- The project is a public-private partnership between the Government of Andhra Pradesh, Pirojsha Godrej Foundation, and the Confederation of Indian Industry (CII), with the technical support of USAID.
- It has Total Site Area of 4.5 acres and Total Built up of 1, 858 sq.mt. in which 1, 115 sq.mt. is total Air-conditioned area.
- It has LEED Platinum Rated with 56 points
- Features of CII Sohrabhji Green Business Centre as shown in Fig.3.



Figure 3 Features of CII Sohrabhji Green Business Centre

2. ITC Green Centre, Gurgaon

- ITC Green Centre, Gurgaon is a commercial building, houses the headquarters of ITC’s hotel business.
- It has Total Floor Area of 1, 70, 000 Sq. Ft. and Designed by Rajender Kumar & Associates.
- It has LEED Platinum Rated with 56 points.
- Features of ITC Green Centre as Shown in Fig.4.

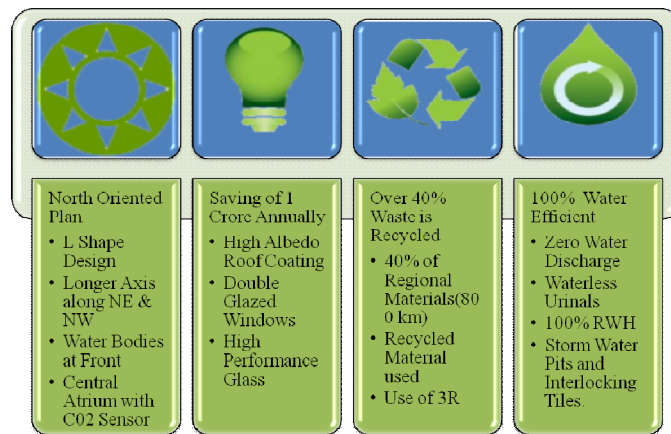


Figure 4 Features of ITC Green Centre

Table 1 Comparison of Different Green Buildings

Parameters	Suzlon One Earth	CII Green Sohrabhji Business Centre	ITC Green Centre
Water Efficiency	100% Water Efficient	100 % Water Efficient	100 % Water Efficient
Energy Efficiency	100% Energy Efficient	85% Water Efficient	51% Energy Efficient
Waste Management	85% Waste Managed	95% Waste Managed	40% Waste Managed
Indoor Lighting	90% Daylight Saving	75% Daylight Saving	L-Shaped Design maximizing Daylight Saving
Materials	80% Regional Material	66% Regional Materials	40% Regional Materials
LEED Rating	57	56	56
GRIHA Rating	97	N/A	N/A

Major Findings

- The Suzlon One Earth is More Sustainable and Prone to Environment as It is more Efficient in all Criteria and helpful for reducing the Carbon Footprints in Environment.
- The Suzlon One Earth has more rating compared to other Green Buildings and it has low maintenance with great future life
- GRIHA is been largely used by the public sector for the development of institutional projects and LEED projects are more prevalent for the Corporate Sectors.
- Certain methods for increasing the energy efficiency built on the building energy performance are as follows:
 - Building Design and Construction Building form, orientation, location, characteristics of buildings etc.
 - Service Design Natural Ventilation, Heating System, heating system and artificial lighting.
 - Occupant Behavior this included the occupancy and vacation patterns of individuals, employee awareness and training.
 - Cogeneration and Trigeneration

Recommendation and Suggestions

- The usage of Local material should be more which inhabits the local economy and Cost Saving.
- The Usage of Rain Water Harvesting System is More Efficient in Context with Green Building.
- The Extra Subsidies Should be Given to Promote the Solar and Wind Power for Clean Energy.
- The Provision Should be made for the utilization of the Grey Water in the Households
- There is need of Awareness for the Green building Construction for the Sustainable future.
- There is a Need of Green Building Assessment tool for the Post Built Assessment, as there are tools available for the Assessment Building before the Occupants live.
- The Provision should be made for Roof top Gardening, Terrace Farming, and Vertical Gardening.

Conclusion

It visible that the Green Building is far more Better than the Conventional Building, As the green buildings are highly efficient for the Water conservation, Energy Conservation, and Environmental Sustainability and their Life is Also longer than the Conventional Building, The Carbon emission and Footprints Released by the Green Building are far more less than the Conventional Building.

The Green Building Should be Adopted by the Government Authorities to Promote the Green Building and It should be Recommended for the Private Sectors and Companies for Better Values.

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