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Green buildings- prospects and potential

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ABSTRACT

In India Green Buildings have got good results and benefits. The benefits include reduction in power consumption of 20-40% and 30-40% reduction in the consumption of portable water. The Indian Green Building Council (IGBC) has validated the benefits. IGBC has totally wiped the notion that Green Buildings are costlier. Green Buildings has got the benefits like high productivity of the occupants, safety of occupants and also best operating practices from day one. Green Buildings can be constructed with an incremental cost of 1-7%. Many Green Buildings have been monitored for the past 5 years on the view of energy savings. The new technologies, various methods and issues faced during the implementation and solving them were discussed.

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Introduction

In India construction of industry is one of the largest economic activity and it is growing at an annual rate of 9% when compared to the global average of 5%. The construction sector therefore plays a major role in preserving the environment. The Green Buildings movement in India brought by IGBC is a mile stone in this direction. IGBC has developed an indigenous green building rating by around 350 registered projects with an built up area of approximately 210 million square feet.

Concept of Green Building

Green Buildings seems to be similar in appearance to other buildings but the difference is in the approach which concerns in providing human comfort, safety, extending the lifespan of natural resources and productivity. This approach results in reduction of operating costs like energy, water. Some of the salient features of a Green Building are

- Minimal disturbance to landscapes
- Use of non-toxic and recycled materials
- Efficient use of water and water cycling
- Use of renewable energy
- Indoor air quality

Benefits In Green Buildings

Green Buildings gives us both tangible and intangible benefits. Tangible benefits: Some of the Green Buildings which are in operation for 5 years have been monitored for the operation safety. The savings in energy is presented in Table .1

Intangible benefits: A survey was carried out to identify the perceived intangible benefits at the CII Godrej GBC building in Hyderabad. The survey clearly indicated that more than 90% of the occupants are satisfied with the indoor lighting levels. 100% occupants showed productivity gains.

How do the green buildings differ?

The basic approach in a green building has been to provide indoor air comfort and at the same time to conserve the natural resources that go into the building during construction and operation. Some of the strategic approaches in these buildings are as follows:

Integrated Design

The conventional approach is to appoint consultants as the projects progressed. Historically the responsibility for energy efficiency in a building rested with the Mechanical and Plumbing consultant. Today to deliver a green building we should consider orientation, design and the selection of the material for energy efficiency.

Life cycle perspective of building cost

On the basis of research and analysis, the cost could be slightly higher than the conventional building. The incremental cost is always relative and depends on the extent of eco-friendly features considered during the design.

Over the life cycle of the building the operating cost would work out to 80 – 85 % of the capital cost while the incremental cost which is one time cost is only about 8-10%.

Green Features Adopted In Buildings

Central Court yards

Wipro Technologies Development Centre's courtyard is inspired by the traditional inward looking haveli plan that performs varied functions. Mutual shading of courtyard walls keeps them cooler than the outside walls. The water body and vegetation in the middle of the courtyard reduces the internal temperature by evaporative cooling.

At CII Godrej GBC, the courtyard is a traditional gathering place. This brings natural light and airflow. The smaller courtyards facilitate cross ventilation around all the three blocks.



Fig .1 Wipro Technologies, Gurgaon



Central Courtyard

Fig.2 CII Godrej GBC , Hyderabad

Day Lighting

The CII Godrej GBC building was designed around a courtyard which provides light to the adjoining rooms. The glazing has been split into two panels so as to avoid the effect of glare to the occupants. This results in 88% of energy saving . 90%of the building spaces are naturally lit and have access to outside views.

The ITC Green Centre in Gurgaon is designed with an L shape configuration. This reduces the width of the floor plate allowing natural light to penetrate into the interior parts. Two office wings are held together by central atrium creating an L shape which looks .



Fig.3 CII Godrej GBC Hyderabad

Efficient Envelope

The Grundfos building in Chennai has used air cavity walls to insulate the building. Air is a good insulator. The buildings have been constructed with masonry brick walls having an air gap of 20 mm which gives insulation. Some of the buildings like ITC Green Centre have used autoclaved fly ash blocks which have excellent thermal properties.



Fig.4 ITC Green Centre , Gurgaon



Fig.5 Cavity wall construction



Fig.6 Fly ash bricks used in buildings

Wind Towers

The IGP office complex in Gulbarga does not use mechanical air conditioning systems for cooling , instead they use wind towers. The complex has 10 wind towers and the temperature inside the complex reduces by 10 degrees.

In CII Godrej GBC, fresh air to the handling units is pre cooled in the two wind towers on either sides of the building. Two wind towers draw fresh air to the building. This pre cooled air decreases the ambient air temperature by 5-6 degrees.



Fig.7 IGP office Complex , Gulbarga

Root zone treatment plan

Sewage treatment in IGP office building in Gulbarga consists of sand , gravel and soil. Specific species of plants has got special bacteria reduces the complex biological waste into elemental nutrients. The length is designed to maintain the minimum retention period and the breadth is designed for optimum rate of effluent flow. This root zone treatment reduce BOD and COD of grey water below the maximum levels. The treated water is for irrigation.



Fig.8 Root Zone Treatment bed

Table .1 Energy savings in Green Buildings

Building	Sq.ft.	Normal Building (kWh)	Actual Building (kWh)	% Redn	Annual energy Saving
Wipro, Gurgaon	175000	4800000	3100000	40%	102
ITC, Gurgaon	170000	3500000	2000000	45%	90
CII, Godrej	2000	350000	130000	63%	9

Renewable Energy

The IGP Office complex , Gulbarga meets 20% of its electricity needs through solar photo voltaic panels. Solar electric power is used for lifting water for domestic use and for re-circulation of water in the wind towers.

Vestas has installed wind turbines of 950 kW off – site to meet 100% energy requirements of the building.



Fig.9 IGP Office Complex , Gulbarga

Resource Reuse

The discarded furniture are used in the new buildings of ITC Green Centre and Wipro Technologies. This has reduced tremendously the use of virgin articles.



Fig.10 Interiors in ITC Green Centre , Gurgaon

Various perceptions and realities

Green Buildings are costlier

The research analysis carried on the cost impacts shows slight increase than the conventional buildings.

The incremental cost is always relative and it depends on the extent of eco friendly features already considered during the design. This incremental cost would appear small if the base line design is already at a certain level of good eco-design.

Over the life cycle of the building the operating cost could workout to 80-85% where as the incremental cost is only 8-10%.

Green Buildings have to be air – conditioned.

Green building concepts can be applied for non-air conditioned buildings. While performing the energy analysis using software tools , such buildings will the same cooling system both in the baseline and the proposed design.

Green Buildings take more time

There is general perception that the green way may affect the project schedules. In the case of CII-Godrej GBC building it took one and half years for design whereas the construction took only 9 months.

Conclusion

In the event of growing trend of Green Buildings many problems are answered . Environmental issues are handled to a great extent in these Green Buildings. This green building concept has emerged as a very useful tool in designing sustainable buildings. Green home rating programme has been launched recently and received by the industry. IGBC is working further to launch more rating programme in the years to come.

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