

Green Building concepts – Practices

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India is witnessing tremendous growth in infrastructure development. The construction industry in India is one of the largest economic activities and is growing at an annual rate of 9.5% as compared to the global average of 5%. This undoubtedly calls for increased use of natural resources such as energy, water and materials, which in turn would aggravate the global concern of carbon emissions and its impact on the quality of life. The construction sector therefore needs to play a responsible role towards preservation of the environment.

- ❖ Built environment contributes up to 40% of global CO₂ emissions, 30% of the global Solid waste generation and 20% of global wastewater generation.
- ❖ Built environment consumes 40% of the energy resources, 30 % raw materials and 20% of water resources.

Therefore, the challenge ahead of us is to grow in a sustainable manner without unduly straining our natural resources. The construction sector needs to play a responsible role towards preservation of the environment. Constructing Green buildings is a step towards this direction. The Green Building movement in India pioneered by the Indian Green Building Council (IGBC) is a step in this direction.



Indian Green Building Council

The Indian Green Building Council, a part of the CII Sohrabji Godrej Green Business Centre (CII Godrej GBC) was formed in 2001 and is represented by all stakeholders of construction industry comprising of Corporate, Government, Nodal agencies, Architects, Developers, Product manufacturers, Institutions, etc.

The vision of Indian Green Building Council is to usher in a green building movement in India and to become one of the world leaders in green buildings by 2010.

Some of its goals are:

- ❖ 1.0 billion sq.ft of registered space by 2012
- ❖ 1000 Green buildings registered by 2010
- ❖ Facilitate tapping Green building materials market of USD 40 billion by 2010
- ❖ 5000 Accredited professionals by 2010

Today the council is strong with about 400 formally registered members including 61 founding / life members. To facilitate the penetration of Green Building concepts throughout the country, Local Chapters have been launched in Ahmedabad, Bangalore, Chennai, Delhi, Hyderabad, Kolkata, Mumbai, and Pune with a mission to reach out the IGBC vision at the regional levels.

Green Building Movement in India

Globally, the construction sector is keen to adopt sustainable practices. The Indian construction sector therefore needs to play its role and contribute towards environmental responsibility. The Green Building Movement in India spearheaded by CII is a step in this direction. With a modest beginning of 20,000 sq.ft. green built-up area in the country in the year 2003, today more than 300 green buildings with a built-up area of over 230 million sq.ft. are being constructed all over India.

India is amongst the global leaders in green buildings as can be seen in Table 1.

Table 1: Green Building Movement – The growing numbers

No	Criteria	2001	Till Date
1	CEOs & senior people involved	50	H" 4000
2	No. of professionals trained on LEED rating	10	H" 5500
3	No. of registered commercial Green Buildings	1	254
	Built – in Area (sq.ft)	0	151 Million
4	No. of registered Green Homes	0	65
	Built – in Area (sq.ft)	0	88 Million
5	Green Building products & equipment	5	80



With respect to the above measurable criteria, India ranks fourth in the world after USA, Australia and Canada.

National benefits:

Every 1 million sq.ft of green building can save about 15 million kWh / year. This can reduce the carbon emissions by about 12000 tons / year.

Every million sq.ft of green building can save about 35 million litres of potable water / year

The LEED registered buildings of 151 million sq.ft can result in about **2265 million units / year of energy savings** and **5285 million litres / year of water savings**

Benefits experienced in Green Buildings

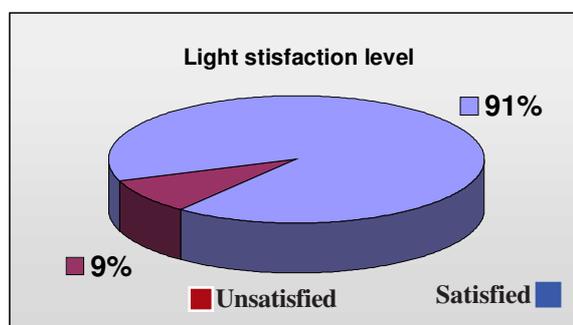
Green Buildings result in both tangible and intangible benefits.

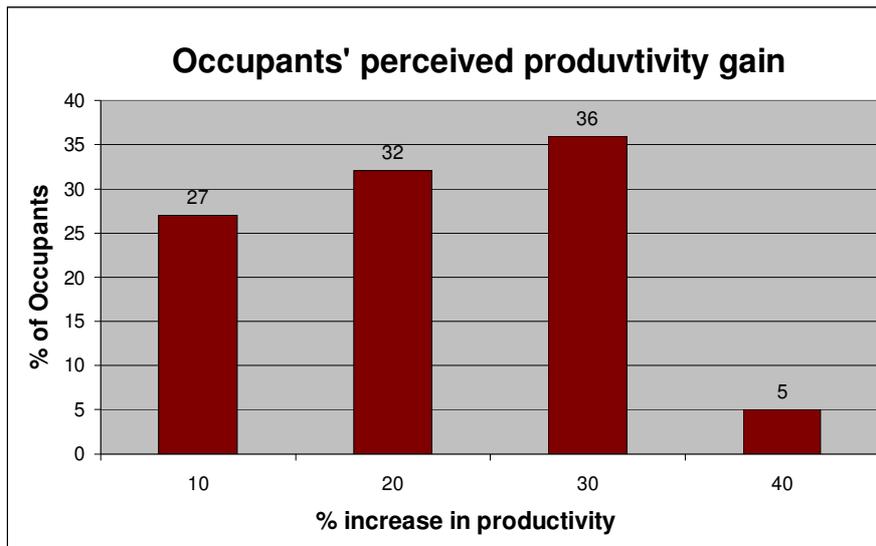
Tangible benefits: Few of the green buildings which have been in operation since 5 years have been monitored for operational savings. Table 2 presents the savings in energy.

Table 2: Energy savings achieved in Green Buildings

Building	sq.ft.	Normal Building (kWh)	Actual Building (kWh)	% Reduction	Annual Energy Savings (Rs in Lakhs)
Wipro, Gurgaon	1,75,000	48,00,000	31,00,000	40%	102
ITC, Gurgaon	1,70,000	35,00,000	20,00,000	45%	90
CII Godrej GBC	20,000	3,50,000	1,30,000	63%	9

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% of the occupants perceived productivity gains. The adjoining graphs provide the results of the survey. The overall productivity, when one calculates the weighted average of the feedback of all the respondents, works out to an overall gain of 21%.





Green Measures and Technologies:

Salient green measures adopted by the recently constructed green buildings include the following.

- ❖ Preservation and reuse of fertile top soil
- ❖ Reduced building footprints
- ❖ Central Courtyards
- ❖ Day lighting
- ❖ Ventilation
- ❖ Roof gardens to reduce heat-island impact
- ❖ Use of treated grey water for irrigation and air conditioning cooling water makeup
- ❖ Root-zone treatment for wastewater
- ❖ Efficient Envelope
- ❖ Use of energy efficient air-conditioning systems
- ❖ On-site renewable energy
- ❖ Wind Towers
- ❖ Monitoring procedures, post-occupancy
- ❖ Careful handling of construction waste
- ❖ Use of materials with recycled content
- ❖ Resource reuse
- ❖ Use of Paints, Sealants, Adhesives with low VOC
- ❖ Resource Reuse



Launch of Green Building Rating Systems

An important development in the growth of the Green Building Movement has been the indigenisation and launch of **LEED – India Green Building rating system for New Construction and Core & Shell**. LEED India rating system has been designed to suit the Indian construction industry context.

LEED Rating Programme	Type of Building
LEED for New Construction	· All new high-rise buildings · Residential buildings of 4 or more habitable stories
LEED for Core & Shell	Rented / Leased commercial buildings
LEED for Commercial Interiors	Tenant or self-occupied spaces
LEED for Existing Buildings	Existing buildings occupied for atleast 2 years

To facilitate the adoption of green building practices relevant to the local climate and regional practices, IGBC is working on the development of new rating programmes. The launch of the '**IGBC Green Homes' rating system** is an important step in this direction.

Residential sector

Green concepts and techniques in the residential sector can help address national issues like handling of consumer waste, water efficiency, reduction in fossil fuel use in commuting, energy efficiency and conserving natural resources. Most importantly, these concepts can enhance occupant health, happiness and wellbeing.

- ❖ 75-80% of the total real estate demand originates from the residential sector
- ❖ The housing requirement upto 2012 is estimated at Rs.3,61,318.10 crores (100 b US\$)
- ❖ Green building practices adopted in residential buildings can substantially reduce or eliminate negative environmental impacts.
- ❖ As an added benefit, green homes reduce operating costs, enhance marketability in case of residential apartments, and reduce health problems

Market Transformation

Stakeholders now are demanding for green buildings from consultants and architects. This has also resulted in increased demand for green building materials and products. Many new materials and services have been introduced as a result of this movement. Some of these materials and equipments include **High performance glass, Wall & Roof insulation, Low VOC paints, adhesives & sealants, CRI certified**



carpets, FSC Certified wood, high albedo roofing material, Fly ash blocks, Eco-friendly chemicals waterless urinals, high CoP chillers, CO2 sensors, root zone treatment plants, wind towers.

The market potential of green building materials and equipment is estimated to be about **Rs 15000 crores by 2010.**

Challenges and Opportunities

Having said this, there are few challenges ahead, which comes in with lots of opportunities as well:

Awareness – Awareness on Green building concept is still sporadic. The construction sector is largely unorganized. Therefore awareness poses a multitude of challenges and at the same time, glorious opportunities.

Availability of materials – The green building movement has enabled a wonderful market transformation in the country. Building owners and developers today demand green buildings from the designers.

The market potential for green building materials & equipment by the year 2012 is expected to be USD 40 billion.

Capacity building – Currently we have only a handful of trained professionals to facilitate green buildings. We need many qualified technical professionals for rendering services like Commissioning, Energy modeling and Green building advisory services. To cater to the demand of green buildings, we need trained manpower, not in tens or hundreds, but thousands of them.

Conclusion

The current growth in the green building market is the beginning of a shift towards adopting green practices in construction. India is surging well ahead of many other countries on the Green building front. India has the potential to be one of the world leaders in Green buildings.

