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GREEN BUILDINGS OPPORTUNITIES & BENEFITS



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The building sector is growing at a rapid pace and is the third largest consumer of energy, after industry and agriculture. Environmentally benign technologies and practices in this sector can address sustainability issues and contribute to conservation of national resources, besides saving on the operating costs.

The world over, today, the focus is on constructing green buildings, which addresses environmentally sustainable issues in a holistic manner. A green building could be defined as one, which encompasses the use of clean energy, renewable energy, efficient use of water, use of recycled or recyclable materials and provide healthy indoor air quality for building occupants.

Opportunities

In the developed countries the energy consumption growth rate is only marginally higher compared to the population growth rate. For example, in USA, energy consumption is projected to grow at 1.3% while the population growth rate is projected at 0.8%.

In contrast, in developing countries like India, population growth rate is expected at 1.3% while the energy consumption rate is expected to grow at 4.3%.

This trend would strain the energy sector to a large extent. The building sector being a major energy consumer can contribute to a large extent to address this issue. Green buildings have the potential to save 30-40% energy.

There is a tremendous potential for construction of green buildings in India. The overall investment towards urban building construction in India is estimated at Rs.5000 crores annually (as per NICMAR data). Even if 5% of this could be diverted for construction of green buildings, the potential is huge. This could open up a plethora of opportunities for several stakeholders like construction industry, architects, material and equipment manufacturers etc.

The projected growth potential for green buildings in India is shown in **Table 1**:

	2004	2005	2006	2007
Estimated annual potential for Urban Buildings @ 4 % growth rate (Rs Crores)*	5400	5625	5850	6084
Annual potential for Green Buildings (Rs Crores)	380	510	585	730
% share of Green Buildings	7%	9%	10%	12%

*As per NICMAR (National Institute of Construction Management and Research)

Benefits of Green Buildings

Going for green buildings has tremendous benefits, both tangible and intangible. The most tangible benefit is in the reduction of operating energy and water costs right from day one during the entire life cycle of the building. A summary of the benefit is given below :

- 30% to 40% reduction in energy cost
- 20% to 30% reduction in water consumption
- Improve productivity of occupants
- Enhance occupant comfort
- Imbibe best operational practices from day one
- Green corporate image

Green Building Rating

There have been buildings, which adopt one or more green features. To recognize the extent of green features that a building adopts, rating systems have been evolved and have come of age in the US and Europe. These rating systems are playing a pivotal role in market transformation of the green building industry. The prime objective of these rating systems is to bring in a change in the market wherein the user demands green products. One of the popular rating systems being adopted in the US is the LEED (Leadership in Energy and Environmental Design) System of the US Green Building Council based in Washington.

Sri Lanka, Canada, China, India and Spain already have building projects, which have registered for the LEED rating.

Australia, France, Hong Kong and Japan have been evincing keen interest in adopting the LEED rating system.

Green Building Features

The approach to a green building is holistic in nature in the sense that it addresses varied issues right from construction to occupancy. Some of the typical green building features are shown in the sidebar.

Some Features of the CII-Godrej GBC

The CII-Sohrabji Godrej Green Business Centre is the center of excellence on clean energy, green buildings, environment and recycling, water management, renewable energy and climate change activities in India. In line with the philosophy of the services being offered from the center, it is being housed in a state-of-the-art green building located at Hyderabad.

The building has been awarded the coveted “Platinum Rating” of USGBC, the first building in India and third building in the world to get this rating.

The building has incorporated many green features and some of the major ones are listed below:

Sustainable site features

- Facility for charging electric automobiles and electric pool car facility for building occupants
- Open space at the site exceeds the local requirements by more than 25 %
- All paved parking and pathways constructed with pervious materials

Water efficiency

- Rain water harvesting
- Recycling of 100 % grey water and treatment
- Roof garden covering over 60 % of roof area
- High efficiency drip irrigation

Optimum energy efficiency

- Design of air conditioning systems in accordance with ASHRAE 90.1-2001
- Solar path analysis and solar orientation to maximize north and south exposure and minimizing east and west exposure
- U-value of roof 0.052 Btu/hr ft² °F, with R-15 insulation vis-à-vis 0.63 Btu/hr ft² °F, with R-15 insulation as per ASHRAE 90.1-2001
- U-value of wall 0.1 Btu/hr ft² °F vis-à-vis 0.58 Btu/hr ft² °F recommended by ASHRAE 90.1-2001
- Fenestration maximised on the north orientation to minimise heat gains from windows and also to maximize day lighting
- North-oriented glazing maximized
- Low U-value of glazing
- Designed LPD (lighting power densities in w /sq.ft) reduced by 40% with efficient lighting systems such as T-5 lamps, CFL, high efficiency ballasts
- Daylight dimmer controls
- Water-cooled Scroll Chiller with COP of 4.23
- Efficient cooling tower
- VFD for all AHUs
- Energy-efficient motors
- Use of autoclave aerated concrete blocks

- State-of-the-art building management systems
- Measurement and verification plans to monitor energy and water savings

Materials and Resources:

- Collection, storage and disposal of building waste like paper and plastics
- Recycling of construction waste material like shuttering timber, paint cans, cement bags, etc.,
- Use of resources from other sites like structural steel (angle, plate and hollow sections), doors, broken China mosaic pieces for flooring, GI pipe sleeves
- Use of fly-ash based cement
- Use of fly-ash based Aerocon blocks
- Use of certified wood Indoor Environmental Quality
- Declaration of the entire building as "non-smoking" area
- Installation of carbon dioxide sensors to monitor indoor air quality
- 2-week building flush out before occupancy and replacement of AHU filters
- Use of composite wood
- Operable windows and lighting controls in perimeter occupied areas
- Daylight and views for 90% of regularly occupied areas

Some Green Building Features

- Adopting erosion control techniques like temporary seeding, permanent seeding, etc.,
- Encouraging occupants to use mass transportation like bus or rail, use of bicycles and use of cleaner fuels for automobiles
- Minimize building footprints to minimize the impact on environment
- Reduction of impervious areas to prevent storm water run-off
- Installation of high efficiency irrigation technologies and selection of vegetation, which have low water consumption
- Use of low/no water consuming plumbing installations
- Harvesting of site energy
- CFC-free HVAC equipment
- Energy-efficient equipment for air conditioning and lighting systems

- Use of on-site renewable energy
- Measurement and verification plan to ensure energy and water savings
- Controls and building management systems
- Segregation, collection and disposal of waste streams at source
- Use of salvaged or refurbished materials from other sites
- Recycling of construction debris to other sites
- Use of building materials having a high recycled content
- Use of rapidly renewable materials (material which could be replenished within a life cycle of 10 years)
- Declaration of the site as "non-smoking" area or have designated areas for smoking
- Maintaining indoor environmental quality to avoid sick building syndrome
- Use of low VOC (volatile organic compound) paints, sealants and adhesives
- Providing daylight and views for the occupied areas.

Conclusion

The awareness of green buildings in India has begun and caught the attention of many major corporates. Capacity building in terms of knowledge and innovative ideas can make a difference in approach to the construction of such buildings.

With the building industry in India poised for a major growth, green buildings will be the mantra of the building industry in the near future. The government and the entire building industry including corporates, architects, contractors, consultants, equipment and material manufacturers have a major role in creating a market transformation.

Green buildings address ecological and environmental impacts in a holistic manner and at the same time offer tremendous economic benefits.