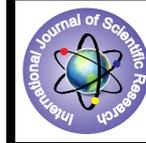


## Green Buildings in India: A Path Ahead for Sustainable Environment



### Management

KEYWORDS:

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#### Background:

The buildings sector accounts for at least one-third of all energy related CO<sub>2</sub> emissions worldwide<sup>1</sup>. Therefore, enhancing resource (input) efficiency such as reducing water and energy usage in this sector can be an effective abatement wedge to address climate change. At present, the building and construction industry is one of the largest economic activities in India. It is estimated that the construction industry has contributed around 8.1% to India's GDP in 2010-11 up from around 5.1% in 1999-2000. One survey reveals that built space in India will increase 5-fold from 20,000 million sq ft in 2005 to over 100,000 million sq ft in 2030. This growth will put enormous pressure on various resources such as energy, water, materials, and will have a discernible impact on the environment. Faced with an increasing scarcity of resources, the construction subsector which directly impinged on the viability of the sector, there was an increasing focus on 'green buildings as a solution'. As a result, India has emerged as one of the world's top destinations for green buildings and has implemented a number of home-rating schemes and building codes, which open up a wide range of opportunities in construction, architecture and engineering design, building materials and equipment manufacture. The concept of sustainable development can be traced to the energy (especially fossil oil) crisis and the environment pollution concern in the 1970s. The green building movement in the U.S. originated from the need and desire for more energy efficient and environmentally friendly construction practices. There are a number of motives to building green, including environmental, economic, and social benefits. However, modern sustainability initiatives call for an integrated and synergistic design to both new construction and in the retrofitting of an existing structure. Green building brings together a vast array of practices and techniques to reduce and ultimately eliminate the impacts of new buildings on the environment and human health. It often emphasizes taking advantage of renewable resources, e.g., using sunlight through passive solar, active solar, and photovoltaic techniques and using plants and trees through green roofs, rain gardens, and for reduction of rainwater run-off. Many other techniques, such as using packed gravel or permeable concrete instead of conventional concrete or asphalt to enhance replenishment of ground water, are used as well. Green Building requires combined efforts of the government and community dependent on the natural resources for their livelihood. This necessitates the government to promote green building construction, for that government has to make policies to give subsidies on all aspects of green building construction (design, material, solar or wind and other renewable energy sources plants, rain-water harvesting plants etc.), and minimising taxes. There is a need for facilitating institutions to create interactive forums to bridge the gap between people's needs and government policies and evolve models of participatory natural resources management. It is especially relevant in countries like India where the traditional livelihoods of people are symbiotic to the environment around them. There is need to explore various interventions at different levels to bring environment on the policy (national level) and community participation (at the grassroots) agenda.

#### Literature Review:

Many works have been done on different aspects and impacts of green Building. Brief review of literature is carried out for a better understanding of the topic. A recent survey by U.S. Green Building Council shows that many of its members believe sustainable building design will become a more common practice once the human benefits are identified, primarily the productivity gains believed to be associated with the provision of high

quality interior environments (USGBC, 1999). A number of articles and case studies show a strong positive correlation between the work performance of employees and the building in which the process takes place. For example, Romm and Browning (1998) reported eight case studies that show up to a 16% improvement in productivity between the employees in existing facilities and the employees in re modelled or new facilities designed according to green building principles. Heerwagen (2001) found significant productivity gains and reported that the workers' "overall [positive] feeling about the environment" increased by 60 per cent. Literature suggests the awareness and discussion of the environmental and economic impacts of building over design, specification and use of contingency margins is not new but has been with us for some decades (Lovins, 1992; Sorrell 2001; Romm & Browning, 1998). Bordass (2000) suggests that this "collective amnesia" is simply the property industry's mechanism to resist change. Clearly there must be some truth to the notion.

#### INDIAN SCENARIOS:

Market Assessment -According to the Indian Green Building Council (IGBC):

The market for Leadership in Energy and Environmental Design (LEED)-rated green buildings in India is projected to increase to €3.7 billion by 2012. The total market for green building materials and equipment in India is estimated to be more than 10 times the size of the LEED-rated green building market in India. India's green building footprint has grown from 20,000 sq ft in 2005, to projects covering 914.33 million sq ft by end-2011. A variety of green building projects are planned or have been completed, including exhibition centers, residential complexes, hospitals, IT parks, educational institutions, laboratories, airports, corporate offices and government buildings. The projected market potential for green building material and technologies is estimated to be €73.4 billion by the year 2012. According to statistics compiled by IGBC: India has 1297 registered buildings, 201 certified buildings and 914.33 million sq ft of green building footprint. This puts India firmly on the 2nd spot only behind the U.S in total green building footprint.

#### KEY DRIVERS FOR SECTORAL GROWTH:

The main driver for the construction sector for developing green buildings has been the growing country-wide shortages of resources such as water and power. The other drivers for the green building sector in India are coming from the private sector, spurred by the introduction of the Indian LEED2 rating system along with other rating systems by IGBC and The Energy Resources Institute of India (TERI), and investor and occupier demand for more amenable and efficient living and working space. These trends suggest significant and growing market opportunities for green buildings in India. It is apparent that the market is large (given that the share of green buildings coming up in India is still only 3%) and is (therefore) expected to grow exponentially. Hence, there is going to be a serious dearth of experienced professionals, material manufacturers and service providers in this area. This gives plenty of opportunities for budding entrepreneurs in this sector.

#### Opportunities in India for green building services include:

- Architectural and engineering services for high-rise structures, theme parks and hotel. Urban planning and design.
- Other niche architectural services like creating designs inspired from the traditional Indian architecture.
- There is also significant demand in India for green building materials and equipment including:

- High-efficiency heating, ventilation and air conditioning (HVAC) systems.
- Low-emission window and day lighting technologies.
- Water saving, water efficiency and non-mechanical treatment systems.
- Fire and safety systems and other intelligent building systems.
- Other environmentally friendly green building materials and equipment that help score points under the various IGBC and TERI's Green Rating for Integrated Habitat Assessment (GRIHA3) green building rating system.

#### Government Initiatives:

GoI has promised several incentives to the promoters and developers of green buildings; however no concrete policy for the incentives is in place. The environment ministry recently said that green buildings would be given priority in the environmental impact assessment process. However, state governments have taken the lead.

1. As part of its energy conservation measures, the Delhi Government has already decided to implement the Energy Conservation Building Code (ECBC) for government buildings in the national capital. It has initiated the process of converting 15 existing government buildings into 'green buildings' by making them energy efficient.

2. The Maharashtra government proposes to amend the Development Control Rules for the introduction of green building regulations initially in Mumbai and later in Tier-two cities of the state. Under these regulations, it will be mandatory for new buildings to use green technologies for recycling dry waste and drainage water, vermin culture for treatment of wet waste, solar energy and above all rainwater harvesting. The government proposes to provide incentives in the form of rationalization in property tax and electricity tariff, and reduction in state taxes like VAT and Octroi on green technologies.

#### Conclusion:

In India some world class Green Buildings have constructed in past few years, but still the concept of green buildings for general masses is in infancy stage. Present work is an attempt in the direction to make people, communities and general public aware about the advantages of green buildings for sustainable environmental development and management. For that four sustainability steps offer a way to achieve successful energy efficiency. To Measure energy use to identify potential savings and malfunctions. Install low consumption equipment and systems. Improve long term use by deploying automation management, consulting, training and tracking resources while maintaining high performance. Continuously analyse energy savings through maintenance, supervision and monitoring.

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