

## Present Scenario of Green Buildings in India

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### ABSTRACT

Gol Konda, Hawa Mahal, Red Fort, Dhyanalinga have one thing in common- they are old Indian monuments, each architecturally or structurally eco-friendly and built keeping in mind the local environmental factors. In ancient India, buildings in hot and dry regions had corridors directing the wind to cool naturally; and in wet regions, structures or shafts captured natural light and breeze. However, with the adoption of western building and construction practices, compromises in energy efficiency have crept into architecture in India. Today, we have to be conscious of our impact on carbon footprint and adopt green technologies. US EPA (Environment Protection Agency) defines 'green buildings' as the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle – from siting to design, construction, operation, maintenance, renovation and deconstruction. In layman's terms- any building that makes optimum use of natural resources throughout its life can be called a green building.

**KEYWORDS:** *eco-friendly, green, buildings, architecture, India, natural resources, construction, environmentally*

### INTRODUCTION

The green construction sector in India currently lacks the technical expertise to execute projects and the funding to pay for construction. These remain the biggest barriers to building green, and require an entrepreneurial-regulatory state.



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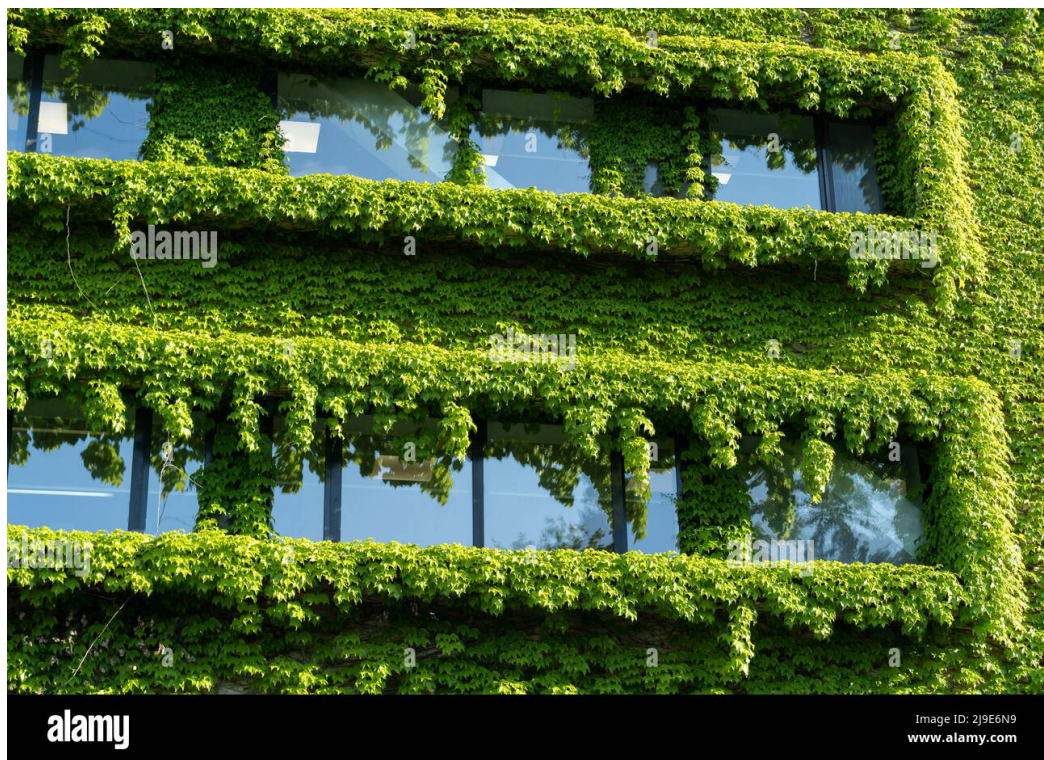


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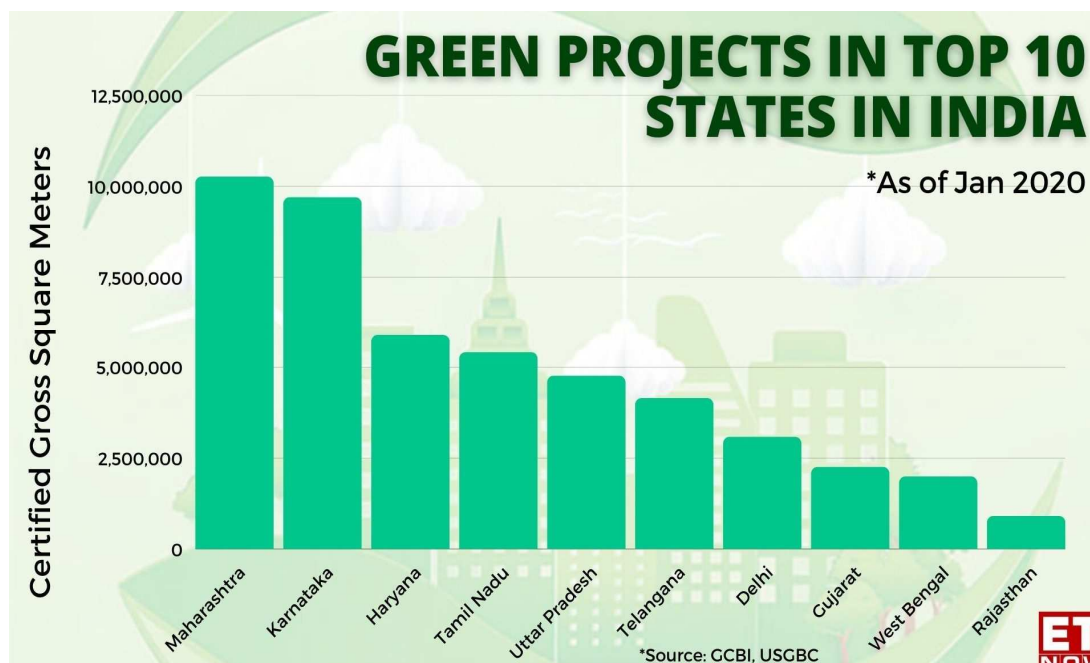
A number of government schemes have significant potential to provide an initial boost to the sector. The Pradhan Mantri Awas Yojana (PMAY) has been lauded for its potentially significant multiplier effects for the economy, including by providing an avenue for employment creation. If the scheme were to be pivoted towards building green, it would create even greater positive spillover effects for the economy. The PMAY and the Eco-Niwas Samhita, i.e., a green housing scheme, together can give a huge boost to the green residential buildings sector in the country.[1,2]

The Indian government has also provided for numerous initiatives like the Green Rating for Integrated Habitat Assessment (GRIHA) to promote green buildings. This system restricts the use of resources by 30 percent as the ultimate goal. Government has mandated for all central government and PSU buildings to get at least 3-star ratings under GRIHA.



At the state level, several state governments have promised an increased floor-to-area ratio (FAR) for GRIHA projects, incentivising the developer to earn a greater profit by building green. For instance, the Andhra Pradesh government offers a 25 percent subsidy on the total fixed capital investment of green projects obtaining a green rating from the Indian Green Building Council (IGBC). Due to these incentives, states like Tamil Nadu and Maharashtra have been able to build the highest number of green buildings in the country, according to a US Green Building Council (USGBC) report. The success of these pioneer state governments has begun incentivising green construction and encouraged other governments to emulate the same. For instance, the Karnataka government has recently proposed to provide a series of incentives like reduction in property tax and stamp duty for building projects meeting certain green standards, following similar policies by Andhra Pradesh, Haryana, Punjab, West Bengal and Sikkim.

As per the Economic Survey of 2019-20, India requires an investment of US\$ 1.4 trillion in the infrastructure space by 2024-25. In addition to government support, the banks can play a crucial role in facilitating investment for green buildings. Financing is a huge impediment in building green projects, as their initial cost of construction and design is high. Green projects require long-term investment, and banks can provide such investment by issuing green bonds to finance the construction of green buildings. In India, SBI, Yes Bank, Exim Bank, and Axis Bank are a few banks that issue green bonds.[3,4]



Banks can link home loan interest rates with the green ratings of buildings. They can also offer construction loans with lower interest rates to incentivise developers. To verify performance and ensure quality, India can come up with a subsidised insurance model (followed by some cities in China). Under this model, the developer would buy a green insurance policy before construction, promising to deliver quality and abide by the agreed performance standards. The bank could then issue green credit based on the insurance policy. The insurance company is then liable to pay or repair, if the promised standards are not met. For this model to be successful, the government needs to provide subsidies and to incentivise developers to buy these policies.

The construction industry is amongst India's fastest growing sectors, growing at a rate of 9.2 percent and contributing about 10 percent to the country's Gross Domestic Product (GDP). There is thus significant potential in residential construction, with the 'Housing for All' programme requiring 20 million urban and 10 million rural homes. Corporate sentiment is also buoyant, with many companies taking a "carbon neutral" pledge. Hence, there is a very strong business case to be made for green residential and commercial construction in India.[5,6]

Given the ongoing recession, green buildings can become a strong driver of economic growth and the prerogative to "build back better," by providing nine million skilled jobs in both the renewable and construction sector by 2030. The government, in collaboration with the banking sector, can together provide fuel to the green construction sector and help India achieve its potential in this regard.

## Discussion

India has emerged as one of the leading countries to adopt green and sustainable buildings and developments as the country ranked third in the world on the U.S. Green Building Council (USGBC) annual list of the top 10 countries and regions outside of the US for Leadership in Energy and Environmental Design (LEED) in 2021. India has a total of 146 LEED certified buildings and spaces, representing nearly 2.8 million gross area square meters (GSM) of space. This marks a nearly 10% increase in LEED certified space in India from 2020. "India's continued presence among the top three countries for LEED outside of the U.S. in 2021 is a testament to its focus on sustainable development and achieving its Paris agreement targets. India's continued momentum in adopting LEED across sectors will play a large role in ensuring the overall wellbeing of its citizens and communities in the coming years. The pandemic has highlighted the fact that green buildings are not the

solution of tomorrow, they are a solution for now," said Peter Templeton, President and CEO, USGBC and Green Business Certification Inc. (GBCI). About four per cent of buildings in India are "green" but a lack of technical expertise to execute projects and funding to pay for improvements remain the biggest barriers to investment, according to a new study. Green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle.[7,8]

The Ireland-based Johnson Controls Building Technologies and Solutions conducted its second annual smart city indicator survey to track key drivers, organisational barriers, technology trends, and the status of smart city solution implementations around the world. The survey queried over 330 city leaders. It also enumerated some of the key drivers in energy investments like greenhouse gas footprint reduction, increasing energy security and increasing building resilience. The survey noted that India has about four per cent green buildings but a lack of technical expertise to execute projects and funding to pay for improvements remain the biggest barriers to investments.

Clay Nesler, the Vice President of the Johnson Controls, said even though India had a slow start it is on track -- with the global average of 14 per cent. "India is getting bit of a slow start but it would be catching up. The most exciting data that we have is that 46 per cent of the organisations in India are willing to pay a premium to lease space in a green building," he told PTI. India is definitely on track to be consistent with the global average, he said. The survey was conducted in 20 countries, including Argentina, Brazil, Canada, Chile, China, Colombia, France and the United States, besides India. The survey findings show that cities are increasingly looking to implement applications that will improve sustainability and the environment while creating jobs, improving public safety and reducing costs.[9,10]

The Indian Green Building Council (IGBC) was formed by the Confederation of Indian Industry (CII) in 2001 [1] The council is based out of the CII-Sohrabji Green Business Centre, Hyderabad which is India's 1st Platinum rated green building and a Net Zero Energy Building. The vision of the council is to enable a 'Sustainable built environment for all.

IGBC is India's premier body for green building certification and related services. Today, with strong support from various stakeholders, they have achieved the following significant milestones:[2]

- 7,128 projects registered with IGBC from various parts of India and abroad, amounting to a total footprint of 8.00 billion square feet (743,000,000 m<sup>2</sup>)
- 30 IGBC green building ratings that cover all typologies of projects - residential, commercial, industrial, healthcare, etc.
- 1,600+ IGBC Member Organizations comprising developers, corporates, architects, consultants, institutes, government, etc.
- 5,661+ qualified IGBC Accredited Green Building Professionals; more than 30,000 stakeholders have been trained by IGBC till date.[11,12]

IGBC certifies the green projects which are conceptualized, designed, constructed and operated as per IGBC Ratings. Till date, more than 2,383 projects (approx 1,212 million square feet (112.6×10<sup>6</sup> m<sup>2</sup>)) have been rated by IGBC. These IGBC-rated projects, as compared to conventional structures, have demonstrated tremendous savings to the extent of up to:

- 15,000 MWh of Energy per million sq ft. per annum
- 45,000 KL of Water per million sq ft. per annum
- Installation of 100 MW of renewable energy in IGBC certified projects
- Reduced CO<sub>2</sub> emissions by 12,000 tons per million sq ft. per annum
- Diverted 500 tons of construction waste from landfill per million sq ft.

Green projects rated by IGBC fall under one of the following levels (in ascending order): Certified, Silver, Gold and Platinum. [3]

Residential buildings in India: The residential building sector is one of the largest consumers of electricity in India. Continuous urbanisation and the growth of population result in increasing power consumption in buildings.[13] Thus, while experts express the huge potential for energy conservations in this sector, the belief still predominates among stakeholders that energy-efficient buildings are more expensive than conventional buildings, which adversely affects the “greening” of the building sector. This belief is contested by studies finding evidence for the opposite being the case.[4]

## Results

The IFC, a member of the World Bank Group, and the Confederation of Real Estate Developers' Associations of India (CREDAI), apex body of

private real estate developers, have partnered to promote green buildings in the country through IFC's EDGE certification. An MoU was signed in the presence of former Minister for Environment and Forests Prakash Javadekar on[5] November 25, 2014. The Indian Bureau of Energy Efficiency (BEE) launched the Energy Conservation Building Code (ECBC). The code is set for energy efficiency standards for design and construction with any building of minimum conditioned area of 1,000 m<sup>2</sup> and a connected demand of power of 500 KW or 600 KVA. The energy performance index of the code is set from 90 kW·h/sqm/year to 200 kW·h/sqm/year where any buildings that fall under the index can be termed as "**ECBC Compliant Building**"[6]

Moreover, the BEE launched a five-star rating scheme for office buildings operated only in the day time in three climatic zones, composite, hot&dry, warm&humid on 25 February 2009. IGBC rated green buildings are also able to meet or exceed the ECBC compliance. The CII Sohrabji Godrej Green Business Centre is a BEE 5 star-rated building.

The Reserve Bank of India's buildings in Delhi, Bhubaneshwar in Orissa and in Kerala have been star rated.[7]

In Tamil Nadu 11 buildings were star rated by BEE, in the year 2010, including RBI buildings.[8]

In Tamil Nadu, the government is planning to build solar-powered green houses for rural poor. It has allotted Rs.1058 crore for construction of 60,000 houses.[9]

In Maharashtra, near Mumbai in the Thane District, Govardhan Eco Village, a community in India, has built buildings with compressed stabilized Earth blocks, Rammed Earth Technique, Cob Houses (ADOBE Bricks) with traditional thatched roofs. These buildings have received a five-star rating from GRIHA, an Indian Nationwide Green Standards for Buildings, a wing of the famous TERI.[10]

Traditional buildings were energy efficient because architecture depended on the places. Buildings in the hot and dry regions, had corridors directing the wind to cool naturally. In wet regions, structures using natural light and breeze, were used.[11] Some examples are

- Hawa Mahal - Articulated windows provides cool breeze in a desert area[12]
- Golkonda - Ventilation is designed to let in fresh cool breeze, in spite of summer.[13]

The traditional building practices were utilized in constructing the Dhyanalinga. Mud mortar stabilized

with lime, sand, alum and some herbal additives was used.[14][15]

## Conclusions

The **Bureau of Energy Efficiency** is an agency of the Government of India, under the Ministry of Power created in March 2002 under the provisions of the nation's 2001 Energy Conservation Act.[1] The agency's function is to develop programs which will increase the conservation and efficient use of energy in India.[2] The government has proposed to make it mandatory for certain appliances in India to have ratings by the BEE starting in January 2010.[3] The mission of Bureau of Energy Efficiency is to "institutionalise" energy efficiency services, enable delivery mechanisms in the country and provide leadership to energy efficiency in all sectors of the country. The primary objective would be to reduce energy intensity in the economy.[13]

The broad objectives of BEE are as follows:

- To exert leadership and provide policy recommendation and direction to national energy conservation and efficiency efforts and programs.
- To coordinate energy efficiency and conservation policies and programs and take it to the stakeholders
- To establish systems and procedures to measure, monitor and verify energy efficiency results in individual sectors as well as at a macro level.
- To leverage multi-lateral, bi-lateral, and private sector support in implementation of Energy Conservation Act and efficient use of energy and its conservation programs.
- To demonstrate delivery of energy efficiency services as mandated in the EC bill through private-public partnerships.
- To interpret, plan and manage energy conservation programs as envisaged in the Energy Conservation Act.
- To promote research and development in energy efficiency and energy conservation.
- To develop testing and certification procedures for energy consumption of equipment and appliances and promote the testing facilities.[14]
- To strengthen consultancy services in the field of energy conservation.[1]

**Energy Audit** : The Government of India has identified certain energy intensive industries labelled as 'designated consumers',[4][5] and made it compulsory for them to conduct Energy Audits following the 'Bureau of Energy Efficiency (Manner

and Intervals of Time for Conduct of Energy Audit) Regulations, 2010'[6] It has declared new energy standards for ACs which will be applicable from 1 January 2021.[7]

**Energy Efficient Lamps:** Bachat Lamp Yojana is a voluntary participation program that provides Energy Efficient Compact Fluorescent Lamps (CFLs) at the same cost as regular incandescent bulbs. Participant investors in the sales earn internationally tradeable carbon credits under the Clean Development Mechanism of the Kyoto Protocol. [8]

**Standards and Labeling:** The BEE has made it mandatory for certain high energy use consumer equipment and appliances to be tested and labeled with their energy performance in order for consumers to be able to make an informed choice about their purchases. The program also allows for some classes of products to volunteer for testing and labeling. The program includes outreach and workshops for sellers to understand the labeling and the cost and energy saving potential of rated equipment and appliances in order for them to inform customers.[9] [10] The program includes a searchable database for consumers to compare products.[15]

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