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POLICY BRIEF - 72

Green Buildings for Climate Resilience: A Policy Roadmap for Bengaluru

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1. Introduction

Buildings consume nearly 40% of total energy in numerous nations which makes buildings a significant source of greenhouse gas emissions. The Intergovernmental Panel on Climate Change (IPCC) projects that when it comes to energy consumption in buildings, it can contribute as much as 3800 megatonnes of carbon emissions (Nautiyal et al, 2023), with the real estate sector as a whole expected to account for nearly 38 percent of global energy use. In India, commercial and residential buildings together consume more than 30 percent of total electricity use. This shows their significant share in the nation's overall energy consumption (Manasi et al, 2023).

Green buildings are constructed for the purpose of reducing the dependence on non-renewable resources, at the same time enhancing efficiency through recycling, reusing materials and making use of renewable sources of energy such as solar, wind and water. Green buildings are designed to minimize environmental impact. They promote human health and well-being through utilization of clean energy and conserving water and other resources efficiently. Their construction also focuses on the use of recycled, eco-friendly, and reusable materials (Nautiyal et al, 2023).

Since the last decade, the "Green Building Movement" has gained momentum, though its origin goes back to the nineteenth century. Buildings and utility systems that are energy efficient can bring down the demand for energy up till 40 percent (Manasi et al, 2023). Since the approach regarding green buildings is comprehensive, it covers not just the reduction of energy use but also aspects such as material sourcing, reuse of resources, public amenities and waste management.

This policy brief attempts to bring out the significance of encouraging green buildings in Bengaluru against the backdrop of climate change. It builds upon the study's objectives of documentation of green building typologies in the city, analysis of their economic and ecological efficiency, recording perception and experience of people, and identification of implementation challenges.

2. Data and Methodology

The research used both qualitative and quantitative approaches for gathering the required data. Secondary data were gathered from sources such as Town Planning Department, BBMP, LEED and GRIHA. For the collection of primary data, structured and semi-structured surveys were made use of as well as interviews, case studies and focus group discussions were done. Random sampling was employed for capturing perceptions from various categories including age groups, women and the elderly. Indicators were used to measure ecological and economic efficiency.

3. Key Findings

3.1 Certification and Standards

By 2021, it had become essential for office buidlings to have certification as a key measure of quality. According to LEED statistics 55060 projects worldwide had gained certification. These consist 8627 Gold, 24334 Platinum, 22068 Silvder and 20742 Certified buildings (U.S. Green Building Council, 2020). Additionally, 76042 projects had been registered and awaiting certification and the number of projects that held pre-certification status is 2366. In case of India the data from LEED, GRIHA and IGBC point to a steady increase in the number of certified buildings. The Town Planning Department further reports that there are about 2400 high-rise buildings with green features in Bengaluru alone, developed as per government mandate (Manasi et al, 2023).

3.2 Policy Interventions in India

Central as well as state government bodies in India acknowledge the green rating systems of IGBC. Buildings that got pre-certified or provisionally certified under IGBC are provided with quicker environmental clearance by the Ministry of Environment, Forest and

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Table 1: State-Level Count of LEED, GRIHA, and IGBC Certified Projects across India

States	Certified by LEED	Certified by GRIHA	Certified by IGBC	Total across States
Andhra Pradesh	10	72	77	159
Assam	2	14		16
Bihar	2	27	8	37
Chandigarh		3		3
Chennai		1		1
Chhattisgarh		11	15	26
Delhi	127	157	223	507
Goa	4	17	28	49
Gujarat	35	47	280	362
Haryana	54	209	280	543
Himachal Pradesh		7	15	22
Jammu	2	10	3	13
Jharkhand	1	15	14	30
Karnataka	412	63	407	882
Kerala	16	18	117	151
Madhya Pradesh	10	44	36	90
Maharashtra	362	727	1,333	2,422
Meghalaya		4		4
Odisha	4	34	31	69
Puducherry		13		13
Punjab	8	26	60	94
Rajasthan	17	35	92	144
Tamil Nadu	205	34	402	641
Telangana	99	13	304	416
Uttar Pradesh	238	14	441	693
Uttarakhand	2		21	23
West Bengal	36	36	305	377
Tripura		1		1
North Eastern States			22	22
Not given/Others	5	2		7
Total	**1,651**	**1,765**	**4,514**	**7,930**

Source:Office documents of LEED and GRIHA, 2021

Climate Change (MoEFCC), Government of India. States such as Punjab, Rajasthan, Haryana, Uttar Pradesh, West Bengal, Sikkim, Maharashtra and Andhra Pradesh offer additional Floor to Area Ratio (FAR) benefits when it comes to green buildings. These benefits can be applied to projects with Silver, Gold, and Platinum ratings under IGBC, along with some states offering further incentives through multiple departments (IGBC, 2020). The Government of Maharashtra brought in a Green Building Policy for encouraging such projects. The policy covers both commercial and residential buildings. Owners of certified green buildings get tax concessions for a period of five years. The extent of this benefit is based on the certification level awarded by the respective agency.

3.3 Policy Developments in Karnataka

Karnataka is currently drafting a policy to support green buildings, with the Urban Development Department preparing the by-law for its implementation. Although the draft has been completed, it has not been implemented yet, since government approval is needed for it to take effect. In Karnataka, this policy would be the first of its kind. The draft includes measures like solar power systems, rainwater harvesting, and plantation of saplings, along with specific guidelines. It also gives definitions for green buildings and provisions related to sustainability. Other features include sustainable practices in solid waste handling, building materials that are eco-friendly, fire safety measure, and other requirements.

3.4 Green Building Code Revision

The Draft Building Code, which is not approved yet, highlights the significance of green buildings. It includes a dedicated section on green construction. The code mandates plots of different sizes to follow green norms and meet mandatory conditions before the sanction is granted. These provisions are applicable to newly constructed as well as already established buildings. They are mandatory especially when applying for licenses, permits, or official clearances. Green norms have to be complied by buildings on different plot sizes and also all buildings have to meet the requirements that are mandatory for getting sanctioned.

3.5 Awareness and Adoption

Our study has found that more than half of the respondents (56 percent) had knowledge of what green buildings are and its features. In terms of motivation to construct or purchase green homes, 29 percent of residents mentioned improved quality of life as the key factor. Another 19 percent emphasized on the environmental benefits associated with these buildings. Respondents also expressed familiarity with various aspects of green buildings. They also demonstrated knowledge and compliance with practices like water conservation, waste management, energy efficiency, and adaptation measures. For example, 97 percent of the respondents demonstrated knowledge of practices in management of solid waste and many of them reported separating waste at source to support recycling. As segregation is mandatory, respondents revealed that they kept separate dustbins for dry, wet and electronic waste. When it comes to sewage treatment plant (STP) water use, 64 percent of respondents reported the presence of STPs in their apartment complexes. Also, 40 percent of them noted that the water that was treated was reused for flushing, while 36 percent expressed that it was utilized in gardening (Manasi et al, 2023).

3.6 Benefits for Residents

Among residents of green buildings, 80 percent reported experiencing positive outcomes. Their responses highlight the perceived advantages of living in such structures. Along with green buildings being aesthetically appealing, one thing that was common across all the respondents was mental relaxation. They also revealed having physical relaxation (32 percent), lowered indoor air pollution (34 percent) as well as good quality of life (20 percent). From various channels, the residents also have sourced information and hence have the awareness regarding health benefits as well as reduction in electricity and water bills in the long run from green buildings. Moreover, the employees too showed happiness regarding working in green buildings and have revealed to have experienced benefits directly with respect to improved levels of

energy and overall health. Respondents also anticipated included tax concessions and additional recognition for green or eco-friendly buildings as well as implementation friendly policies (Manasi et al, 2023).

4. Key Challenges

Lack of Mandatory Regulations

Construction of green buildings is not obligatory which makes their implementation difficult. Government enforcement is lacking. Although, certain aspects have been made mandatory by some states, Maharashtra for example. Though Maharashtra has updated its Draft Building Code through the addition of Green Buildings as a separate section, approval is yet to be done.

Weak Adoption of Energy Efficiency Codes

The Government of India has laid down codes on efficient energy use in buildings. These regulations are thorough and organized in a systematic manner. Although, adoption of these codes remains limited. Local bodies often face capacity challenges that need to be addressed. To encourage the implementation of the energy efficiency codes effectively, training and motivation are crucial.

Limited Incentives and Finance

Another challenge is the absence of proper incentives to encourage people to go for green buildings. Since these buildings help in lowering carbon emissions, the government bring in a provision of support through incentives. Green buildings can be promoted by provisions such as tax benefits, green labelling for recognition and motivation and also easier access to finance.

Low Awareness and Misconceptions

The understanding of the benefits of green buildings among people is limited. Many people have the perception that these buildings are costly. While the initial investment may be higher, few realize the long-term return on investment. There is also doubt about the sustainability of these buildings over time. Overall, public knowledge about green buildings is quite low.

Capacity, Skills and Material Constraints

Large-scale capacity building efforts are not adequate anymore to drive the development of green buildings. A significant obstacles is the lack of adequate knowledge about the materials or energy-saving devices that are available. Lack of locally accessible materials could deter builders as well. In the construction business, there is a shortage of skills and inadequate training.

Cost and Certification Barriers

The initial investment towards green buildings is over 30 percent more than that of conventional buildings. Again, the material needed for construction are more costly. Maintenance also comes at a high cost as it requires specialized professionals. Moreover, the certification process regarding green buildings is costly as well and developers pointed out towards the insufficient availability of support and consultancy services to complete this process.

Perceptions and Marketing Gaps

Green architects noted that perceptions are important. What is often not valued is the simplicity and design of green buildings. Marketing teams also do not highlight enough green buildings as a key feature. Bringing about a unique and visible green code to label buildings could help increase their recognition as well as visibility.

5. Policy Suggestions

Mandatory Implementation and Enforcement

Construction of green buildings should be made compulsory. Several features have been brought in by the new building code and its implementation can lead to further promotion. Karnataka has also revised its Draft Building Code by introducing Green Building as a separate section, which is assumed to give more support to their promotion.

Strengthening Energy Efficiency Codes

The Government of India has laid down energy efficiency codes that are clear and well structured. Training and motivation are essential for encouraging their promotion. Awareness can be bettered by having demonstration projects that showcase the effectiveness of the code. Easy and inexpensive performance oriented systems such as Excellence in Design for Greater Efficiencies (EDGE) help developers follow standards for resource efficiency and make it easier for certifying agencies to verify compliance.

Incentives and Financial Support

The government should introduce incentives for green buildings. Such measures can help reduce emission of carbon and lower overall carbon footprint. Promotion of green buildings can be encouraged with measures such as tax benefits, green labelling for recognition and motivation and better financial access for their purchase. For instance, in Andhra Pradesh, Haryana and Punjab their respective governments have already recognised LEED and other such programs for green buildings and are also offering incentives according to their policies.

Awareness and Information Campaigns

Marketing professionals, real estate developers, and architects are needed to be well-informed about green buildings. They also need to be encouraged to pass on this knowledge to buyers and construction firms. Clear information regarding costs and long term benefits of green buildings should be made easily available. Moreover, more awareness campaigns and promotional activities should be organised and streamlined within the construction industry.

Addressing Misconceptions on Costs and Returns

Though initial investment is high, a lot of people are unaware of the savings in the long term that can be obtained through operations and maintenance. It is important to improve awareness about certification. Marketing teams of high-rise buildings has an important role in this, as they can document and present the long-term benefits and measurable returns to enhance awareness.

Photo 1: Green Campus of Hasiru Bhavan, EMPRI Office, JP Nagar, Bangalore

Photo 2: Soar Panels installed at The Organic State – The Green Path

Capacity Building and Skill Development

At present, large-scale capacity building programs aimed at promoting green building construction are not adequate to address the growing needs of the construction industry. Moreover, there is shortage of skills that exist within the sector and lack of proper training.

Sustainable and Affordable Materials

Limited knowledge regarding available material and energy-saving appliances is a significant challenge. The absence of locally sourced material can also discourage builders from choosing green buildings. Regarding this, steps are needed to be taken in order to manage the costs of materials and operations and maintenance in green buildings.

Improving Certification and Support Services

Raising awareness among public about certification is of significant importance. Developers pointed out the absence of adequate guidance and advisory assistance for the certification process. This gap may have been an obstacle in the path of wider adoption of green buildings. Overall, the familiarity among people about these processes is very less and hence there is a need for proper systems in place in order to make them more user-friendly.

Green Codes and Recognition

At present, green buildings appear to be modern, unique and attractive, although they lack a distinct visible code. Introduction of a special green label would make them more recognizable and increase public awareness.

Marketing and Promotion of Resource Efficiency

High-rise buildings, specifically gated communities are required to integrate features such as solid waste management plants, rainwater harvesting, systems for sewage treatment, and solar installations. Though, these features are mostly not highlighted by the marketing teams. They should be equipped to enhance the resource performance of building.

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