

Accelerating green building growth with old & new policy instruments

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ABSTRACT

India is progressively moving towards the sustainability requirements of the real estate and infrastructure sector. The remarkable benefits like resource optimization, more efficient & lower impact on environment, health and well-being of the occupants and many more, have compelled government bodies across the nation to formally and regularly pursue these outcomes through various legislative instruments. Given that building sector belongs to a complex industrial chain involving wide-ranging actors, variety of instruments imbued by the political agenda are used to achieve certain degree of sustainability. The most commonly used instruments are economic incentives, rating systems, energy audit program, technology transfer program, information and education campaign and so on. Furthermore, given that India is a country that undoubtedly thrives on its diversity. Integrating diversity of concepts and strategies and utilizing the benefits that each level of government can provide, may complicate and dilute the desired impact. This paper enlists possible tools in the Indian context and within the ambit of the existing governance framework that could be adopted and increased exponentially at both levels, national and state.

Keywords: Sustainability, Rating systems, Building byelaws, Development control rules, Green buildings, Indian context, Policy instruments.

I. INTRODUCTION

Green buildings offer immense opportunities for mitigating greenhouse gas emissions and reducing the pressure on the already crunched non-renewable resources. Additionally, the decision and policy makers can also be considered as significant contributors of this change. Similarly, understanding the logical behavior of wide ranging actors involved in the process to ensure successful development and deployment of policy instruments in India like economic incentives, rating system, energy audit and technology transfer programs and so on also holds equal importance contributing to this change. Furthermore, the green building initiatives should carry equal potential to generate the necessary motivation amongst the adopter organizations, or more precisely, they should be designed keeping in mind the various interests these organizations carry to carve out a win-win situation eventually [1].

Given that India is a country that undoubtedly thrives on its diversity, integrating diversity of concepts and strategies (100 Smart Cities Mission, AMRUT program and so on) and utilizing the benefits that each level of government can provide, may complicate and dilute the desired impact. It may also not position India well on the global map as seen in Fig. 1. Thus, what becomes quintessential is that very specific approaches may

be adopted which may be dormant in the existing policy framework but are still practically doable. This policy paper enlists similar such possible tools in the Indian context that could be adopted and increased exponentially at both levels, national and state for its wider acceptability for attaining certain grade of sustainability in the building industry.

II. OLD AND NEW POLICY INSTRUMENTS TO PROMOTE GREEN BUILDINGS

In India, there are inseparable features common to the practice and planning of architecture in both earlier and contemporary times. The traditional Indian architectural knowledge captured

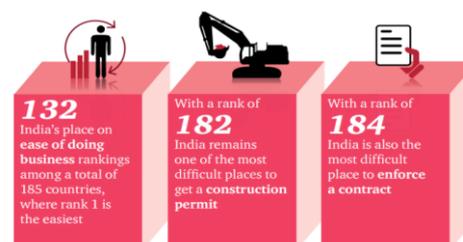


Figure 1 Raking of India on Global Map
Source: India Manufacturing Barometer Survey, July 2013 – The World Bank Group

in the form of 'Vastu Shastra' is transferred today as modern 'Sustainable Architecture' with apparent increase in choice of construction methods, materials and technologies. Traditional architecture is a result of several adaptations that the habitat goes through. It is not a single sporadic attempt, but is a tried and tested culmination of hundreds of years of understanding about the regional climate and context [2]. For instance, rammed earth is an ancient building method that has seen a revival in recent years as a sustainable alternative for constructing affordable homes in India. Similarly, the age old practices backed by robust scientific rationale are being integrated in the new building practices resulting because of social, climatic, cultural and technological change. While, several studies today discuss the need to integrate the old practices with the new, when it comes to contextualizing the abodes, recent advancements in architectural design and technology appears as an honest attempt to bridge the gap. However, a good policy framework, to accelerate the theory into practice is imperative. Given that India has significantly strengthened environmental regulations, enforcement still remains a persistent challenge, with low levels of compliance in some areas [3]. Thus, this policy paper attempts to explore realistic opportunities for integrating the old traditional practices and prevailing building codes like National Building Code (NBC) and Energy Conservation Building Code (ECBC) in the local building byelaws of the Urban Local Body (ULB).

Additionally, in the background of the recently submitted Intended Nationally Determined Contribution (INDC) to United Nations Framework Convention on Climate Change (UNFCCC), India committed to reduce the emissions intensity of its GDP by 33 to 35% by 2030 from 2005 level. But having a voluntary approach to meet these targets may not alone suffice the purpose. Thus, mandating the 'doability' aspects of green buildings within the framework of building bylaws will facilitate mitigating the impacts of human interventions and in the process also achieve the national targets. Moreover, given that in any administrative structure, local governments and municipalities, have different formal responsibilities and accountability for outcomes [4], they can play a significant role in mainstreaming certain policies. Thus, this paper discusses various policy recommendations which have been articulated for ULBs for consideration in their building bylaws. This can further help achieving certain degree of sustainability, along with a cohesive long term objective that is SMART: Specific- targeting a specific area for improvement, Measurable-Quantifying or suggesting an indicator of progress, Assignable- specifying who will do it, Realistic- stating results that be realistically

achieved in the given resources, Time bound-specifying when the results can be achieved [5].

III. MANDATING SOLAR PASSIVE ARCHITECTURE IN BUILDING BYELAWS/DEVELOPMENT CONTROL RULES

Vernacular/ traditional architecture broadcast the deepest beliefs of our ancestors about tradition, culture, climate and most importantly the simplest way of addressing human needs, which is seen to be diminishing, in today's modern architecture. The recent ecological studies of cities have also shown that they sometimes exceed their environmental footprint by a factor 10–150 [6]. It is in this background that the building byelaws/development control rules become important, wherein certain solar passive design could easily be mandated. When the municipality is evaluating such building proposals, the intention and the practicality of integrating the site features to its maximum should be considered and given due credits. Having known the increasing need of the hour along with multiplying benefits of making buildings greener, making construction sustainable and contextualized no more remains a choice. The same also needs to be appropriately rewarded. Thus, mandating few most doable steps is much required, which would definitely impact the footprint. A few preferences which can be mandated by the municipality have been elaborated below:

Building orientation: Optimal building orientation offers natural ventilation, high quality day light, avoidance of solar heat, downscaling of lighting fixture requirement, reduced conventional energy requirement, integration of site features like topography, mature trees on site and so on. The ideal orientation of the building's larger façade should be in North-South direction to maximize the aforementioned benefits of optimal building orientation. Thus, it should be made mandatory to develop and deploy at least two passive design strategies for building design optimization in the design and planning process.

Window to Wall ratio: Limiting the gross window area with respect to the gross wall area will also encourage use of natural day light and ventilation in the habitable space, thus reducing the dependency on artificial systems. The scale of the benefits will vary depending on the location & utility of the building. Thus the window to wall ratio should not exceed more than 60% [7] so as to invite only diffused light and not glare/heat gain.

Hard and softcape percentage: Generally, 'minimum' offsets are suggested from the existing/proposed road in the Development Control

Rules (DCR). However, the finishes for the road/surfaces is not specified. Mandating the use of relevant hard & soft scape materials, designs & percentages for open areas suited to the context, will offer benefits like allowing easy water percolation, increased ground water table, resilience from urban flooding, cooler micro climate and reduced urban heat island effect. Mandating the declaration of the same, can ensure its implementation. Simply, the DCR can mandate that the net imperviousness of site should not exceed the imperviousness factor as prescribed by NBC 2005, Part 9 [8], to ensure a balanced ratio of hard and softcape. Depending upon the type of area and the usage, the imperviousness factors have been mentioned in NBC. For instance, residential area with high density shall have imperviousness factor ranging between 60 to 75%, residential area with low density between 35 to 60%, commercial and industrial area between 70 to 90% so on and so forth.

IV. MANDATING GREEN BUILDING MATERIALS, PRODUCTS AND TECHNOLOGIES (MPT)

Buildings are extensively resource intensive if designed haphazardly making the sector responsible for consumption of more than a third of global resource annually [9]. Hence developing market for newer authentic green building materials, products and technologies becomes crucial in the present scenario. Moreover, once the target stakeholders are convinced about the environmental and financial benefits of constructing a green building and using resources efficiently, the next important question would be how and what makes a green building- with respect to building MPT. At this very stage, unavailability and inaccessibility of green MPT and lack of information from reliable sources may become a mounting barrier in the green building process and the anticipated impact in the region. Given that private sector is most active in the market and the government involvement is relatively less, in this circumstances the not so efficient MPT that are 'affordable' may take over the market. The resultant may be that the MPT that are genuinely green may seem to be expensive due to weak value proposition and lack of authentic information, thus aggravating the concern. Therefore, government interventions are necessary to trigger market transformation and make green MPT more affordable & accessible. Here, it is important to favor public private cooperation so that the private sector takes the active role in manufacturing and promoting green MPT, while leveraging the limited public funding. This may be relatively a less expensive mechanism to stimulate innovation and competition among potential manufacturers by guaranteeing higher market share for their products.

For instance, in the building bye laws the following could be mandated [10]:

- Replacing minimum 15% of Ordinary Portland Cement (OPC) by weight with fly- ash or equivalent industrial/agricultural waste as recommended in Bureau of Indian Standards (BIS) in structural concrete.
- 100% of the building blocks shall have at least 40% fly ash or equivalent industrial/agricultural waste as recommended by BIS (by volume).
- Mandatory to have renewable energy based hot water systems if the hot water requirement is more than 500 litres per day.
- Minimum 70% of the total quantity of materials used in interiors which may include sub-assembly, internal partitions, paneling, false-ceiling, in-built furniture, flooring and door & window frames shall be low-energy materials.

By mandating renewable energy based hot water system or similar aspects of MTP as aforementioned, will apparently give rise to local network of manufactures/distributors to meet the new market demand that has been created by the municipality in that region. Through this, it is very much evident that by both means, direct and indirect the government can drive the market towards sustainable production and consumption. This dual benefit strategy may also encourage the manufactures to be on the competitive edge and consider concepts like low embodied energy, life cycle analysis and so on in their business practices.

V. MANDATING ENERGY PERFORMANCE LABELLING AND ENERGY CONSERVATION BUILDING CODE COMPLIANCE FOR MAJOR ELECTRICAL APPLIANCES AND EQUIPMENT'S

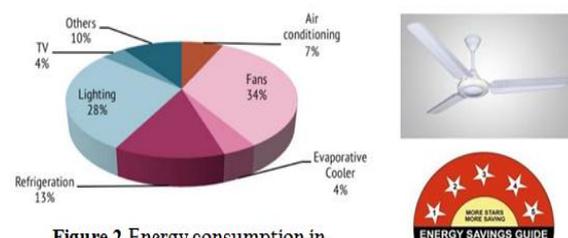


Figure 2 Energy consumption in residential sector (Planning)

The building sector in India represents about 33% of electricity consumption, where 25% is from residential sector and 8% from commercial sector [7]. As seen in Fig. 2, the energy consumption in the residential sector at a unit/building level is the maximum by the ceiling fans, accounting to almost 34% of the total energy consumption, followed by lighting (28%) [11]. The intention here is that, by setting minimum energy performance standards in

the building byelaws will help save energy at unit level and compounding the benefits for the state government in terms of lesser energy production, expenditures and associated greenhouse emissions levels. The Standards and Labelling (S&L) scheme of Ministry of Power, Government of India was launched as a voluntary scheme in the year 2006, with an objective to provide the consumers an informed choice about the energy saving and thereby the cost saving potential of the marketed household and other equipment. Since then, the promotion and facilitation of the scheme is being done by Bureau of Energy Efficiency [12]. However, if we look at the uptake of this scheme over a period of one decade, it has been exponential but completely at the discretion of the individuals' interest in the subject of energy efficiency. In order to have harmonious development and standardization of activities, it is advisable to consider mandating the minimum requirements of energy efficiency in the building byelaws. This domineering approach is required here, so that the inefficient products are eliminated from the market and guaranteed energy saving potential is offered through a legal framework and regulatory mechanism. Thus, for instance the following could be mandated in the building byelaws.

- Minimum 2-star BEE labeled fans and lights.
- ECBC compliant pumps, transformers and so on.

VI. OTHER SPECIFIC POLICY RECOMMENDATIONS

Financial incentives/Additional floor space index/tax credits/fast track clearance: The policy makers in the rapidly developing economies of Brazil, Russia, China and India as well are actively considering alternative mixes of environmental instruments whilst choosing different development paths. The government of China has shown increasing interest in the use of alternatives to direct environmental regulation in policy documents 1999–2008, particularly economic instruments, and makes use of various voluntary and information based approaches [13]. Similarly, in India at present the most lucrative incentives given are

- Rebates that are offered by the municipalities on the premium amount that is paid by the developers.
- Free of cost additional floor space index (FSI)/ floor area ratio (FAR) for pledging and building a green structure.

Further, mandates such as environmental clearance from Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India (GoI), required for projects having more than 20,000 square meters, is in itself a cumbersome task. Thus the fast track environment clearance also tops the list of preferred incentives, in certain parts of the country.

The financial incentives can help overcome the liquidity barrier and encourage the potential actors in making their buildings greener in all respect. However, the stage at which these incentives should be released must be strategic so as to avoid non-compliance or misuse of the incentive model during the course. The same would hold true in case of release of FSI/FAR incentive as well. The penalty clause for non-compliance would be critical in this case, given that the extra FSI would have been already constructed on site. Also as an innovative strategy, the government can announce tax credits on percentage savings on energy & water achieved through green buildings. The owner of the flat may get a rebate on the property tax whereas the developer can get a financial incentive/rebate for constructing a green building, thus gaining the momentum from the both the sides, customers as well as developers.

Innovative financing: Despite the life cycle cost advantages, the initial capital investment for green buildings may be slightly higher than the conventional ones. However, this is still a persistent debate as, cost of building could be managed depending on the stage at which the builder decides to make it green. The cost of any given building could be well managed and budgeted with proper financial and project planning. However, still, the prevailing financial solutions in the market are inadequate to overcome the financial barrier for the green building development. Hence, there is a need to look for innovative financing options like Small Industries Development Bank of India (SIDBI) has been providing financial assistance to green buildings certified by accredited rating agencies. A collaborative effort in this direction will be advantageous in accelerating the green building movement in the country.

Awareness and sensitization: Across the globe, the most frequently cited barrier for green building growth is low awareness level and lack of authentic information about the potential benefits of a green building over the entire life cycle. This holds true for all the stakeholders involved in the green building process. Therefore, mapping the stakeholders and having constant deliberations on the benefits & evolving challenges will help address this identified gap. The stakeholders should not only involve builders, developers, architects but also politicians, policy makers, planners and economic players. In order to make the awareness efforts effective, the gains that each stakeholder can reap, should be very well highlighted.

VII. CONCLUSION

The process of mainstreaming green

buildings into the overall developmental agenda could be a cumbersome task given that there are multiple actors involved with a lack of clarity of roles. However, it may be noted that, this process could be accelerated with an effective implementation plan and development of suitable policy instruments. Articulation of an appropriate and implementable policy framework would require, rigorous dovetailing of the current governing actors like ULBs, state urban development departments and may more along with key market players like financial institutions, research bodies and so on. Building up on existing codes (ECBC, NBC) and corporation specific development control rules may contribute significantly in strengthening the green building policy framework at a regional scale. However, in this process, developing resonance in the perspectives & functioning of the state and the central government could be an impending challenge. To be able to holistically achieve this, parallel efforts to mobilize awareness generation initiatives amongst all the levels of varied stakeholder groups can leave a long lasting impact while also augmenting the top down mainstreaming of green building fundamentals into the developmental process.

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