Sustainable Social Housing Initiative
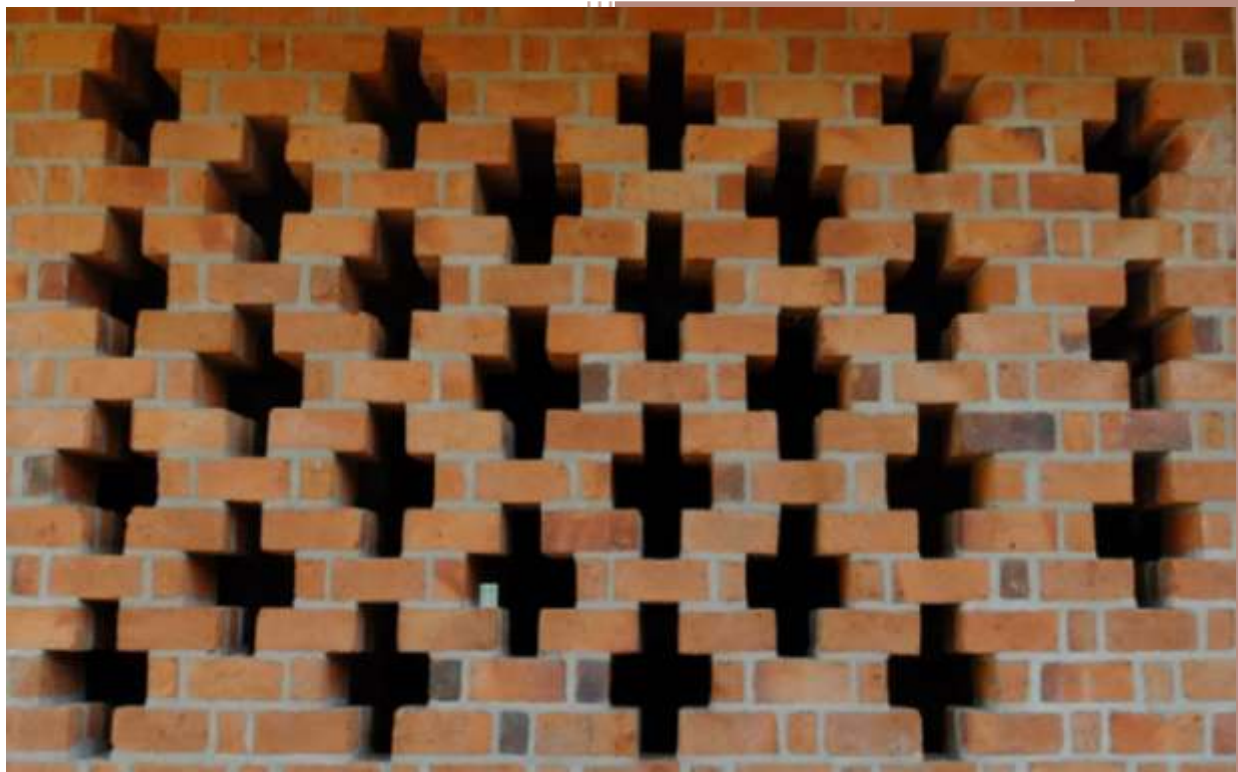
Stakeholder Assessment Report

Development Alternatives

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sustainable social
housing initiative

DA Research Team

Core

Kriti Nagrath
Amelie Gilbert

Advisors

Zeenat Niazi
Dr K Vijaya Lakshmi

Contact Details

Development Alternatives
B-32, TARA Crescent, Qutub Institutional Area
New Delhi - 110 016, India
Tel: 91 (11) 2656 4444, 2654 4100, Fax: 91 (11) 2685 1158
Email: tara@devalt.org
Website: www.devalt.org

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Acknowledgments

About Development Alternatives

Development Alternatives (DA), the world's first social enterprise dedicated to sustainable development, is a research and action organisation striving to deliver socially equitable, environmentally sound and economically scalable development outcomes. Established in 1982 and headquartered in New Delhi, the DA Group pioneered the concept of business-like approaches for eradicating poverty and conserving the natural resource base on which human development depends.

About UNEP – SUSHI

The Sustainable Social Housing Initiative (SUSHI) was initiated by the United Nations Environment Programme (UNEP) in 2009 to promote the use of resource and energy efficient building solutions in social housing programs in developing countries. Although the initial focus was to improve the environmental performance of units, the project evolved to a broader definition of sustainability, encompassing actions for social equity and economic durability. SUSHI is currently being implemented in India and Bangladesh to strengthen local capacities for the integration of sustainable solutions in social housing programs.

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Executive Summary

With rapid urbanization, Indian cities are going through an unprecedented transformation with a massive inflow of population. This has left many in search of proper living spaces within their budget. With the sky high land values and lack of existing infrastructure to accommodate the low and marginal income householders, affordable housing is one of major problems India has to address today. As per the report shared by the Technical Group on Urban Housing Shortage (2012-17), there is a shortage of 18.78 million dwelling units out of which nearly 96% are from Economically Weaker Sections (EWS) and Lower Income Group (LIG) Households.[1] The Government has launched large scale affordable housing programmes under the RAY, JnNURM and state level schemes, and have also ventured into experimenting PPP models by involving developers and facilitating agencies such as NGO and technical providers. However a lot still has to be done to meet the exponential demand.

The construction section that meets this demand is extremely resource and energy intensive. Nearly 24%[2] of the total annual national GHG emissions can be attributed to the construction sector. Alternate and green building construction materials and technologies have shown tremendous potential for delivering significant cuts in emissions at low or no-cost or net savings to economies. There is a large scope for growing the housing and construction markets in the developing world and it is the perfect time for incorporating green technologies. Addressing the demand at large scales will leverage housing cost, hence opening door for housing construction Practitioners in India such as Developers and Housing Finance Companies.

This report presents the finding of an assessment on sustainability in urban social housing in India undertaken by Development Alternatives under the UNEP -Sustainable Social Housing Initiative (SUSHI). The assessment aims at creating a better understanding of the integration of environmental sustainability in the social housing space in India. It comprises of an institutional mapping, which identifies the relevant actors in the social housing ecosystem, and an evaluation of stakeholders' awareness of environmental sustainability. Much has already been written on urbanization and access to housing for the urban poor in India, but the integration of environmental sustainability into sustainable housing is, to a large extent, a virgin field of investigation and action. The institutional mapping profusely draws on the solid body of literature addressing the economic and social sustainability of social housing programs in India. The assessment component is upheld by primary data collected by Development Alternatives to document stakeholders' awareness of green building options. The primary data emanates from three case studies of social housing projects in Madhya Pradesh, Kerala, and Maharashtra, which included consultations with developers, ULB and State Level actors. Consultations with Central Government actors were organized in New Delhi. When available, secondary data was used as a backdrop for the analysis of the primary data. This document primarily seeks to document qualitative phenomena and processes, and shed light onto the drivers of decision making in social housing when it comes to environmental issues.

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[1] Ministry of Housing and Urban Poverty Alleviation (2012), *Report of the Technical Group on Urban Housing Shortage (TG 12),* Government of India, New Delhi

[2] Parikh et al., 2009

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Green affordable housing at present is still marginal in urban India. Green building has mostly taken off in the non-residential sector. Affordable housing provision, on the other hand, is marred with a series of problems that are linked both to the quantity and to the quality of the public affordable housing stock delivery. Unavailability of land, hike in the cost of labour and materials, low capacities at the local level and bureaucratic procedures in the schemes' implementation are the major obstacles in bridging the housing gap. On top of these challenges in producing affordable housing at scale come specific challenges linked with the diffusion of green building materials and techniques in the affordable housing space. At the Central Government level, policy guidelines recommend but do not make sustainable practices mandatory under the JNNURM and the RAY. Some incentives do exist for local stakeholders to experiment with green technologies, but capacities on the ground remain insufficient to reap the benefits of such incentives. At the State level, appropriate regulations are not in place. Most States have not integrated environmental sustainability into their housing bylaws yet. Schedules of Rates (SoR), which list out materials which may be used in public construction, do not always include a wide range of green options. Implementing organizations, be they public or private, have a very limited awareness of environmental problems. Their awareness of green building solutions is also limited, as those are spontaneously dismissed as costly options, not well-accepted by the customers. Stakeholders who show some interest for alternative materials lack guidance to make choices and face considerable difficulties in sourcing these materials locally, as supply chains are very fragmented.

Awareness generation efforts are required to convince stakeholders of the benefits of using alternate materials. The economic lens is key, as cost-efficiency is the main driver in the affordable housing space. Affordable housing stakeholders need to be accompanied through their initiation with green materials to gain confidence both in the structural soundness of the materials and in their own ability to successfully use them. Similar awareness generation efforts are necessary to increase the acceptance of green buildings among low-income housing customers. Mainstreaming green solutions in other spaces, such as public buildings and higher income group construction has tremendous potential in making green building more desirable and aspirational for lower income groups. The lack of acceptance of green building solutions is a systemic problem that needs to be addressed at the level of society as a whole, so that green building solutions become desirable for all income groups, including the economically weaker sections of society. Spaces where the financial stakes are not so overwhelming for the low-income group members, such as rental housing, could also be interesting avenues to showcase the benefits of green building. Capacity building efforts need to fit within a stimulating policy framework. At the Central Government level, preferential green building material procurement and mandatory reforms in social housing schemes, coupled with stronger monitoring would strengthen and facilitate the implementation of environmentally-sound projects. Green building by-laws in all Indian States would then automatically incorporate sustainability into all housing projects, both in the public and in the private sector. The expansion of Schedules of Rates to accommodate the wide range of green building options is necessary to enable ULBs and other public implementing agencies to use environment-friendly construction techniques and materials. All points of action should ideally be simultaneously stimulated so as to create a favorable eco-system for the adoption of green building solutions.

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India: An Urban Future

Urbanization has created Large-Scale Affordable Housing Needs

Until recently, India had been a predominantly rural society; in 1951, only 17.3 percent of India's total population lived in urban areas[3]. Since then, India has experienced a slow yet relentless territorial and demographic restructuration towards urban areas. Compared with global trends, Indian urbanization is a rather slow phenomenon.
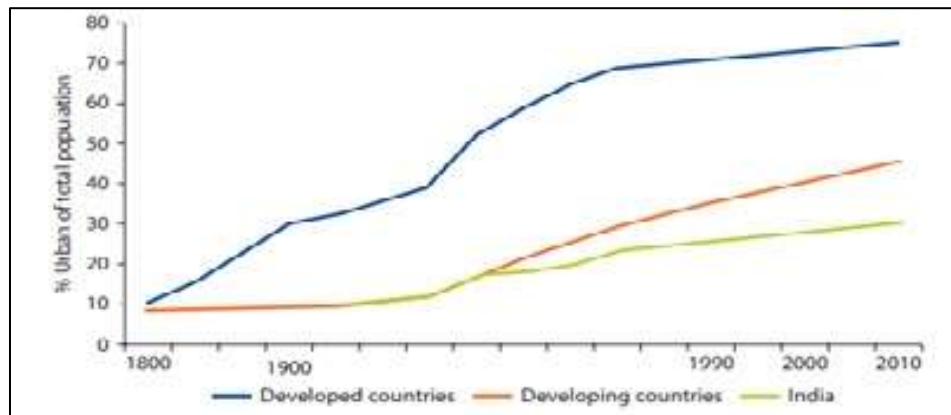
Urbanisation and Development: Developed and Developing Countries, plus India, 1800-2010
(Source: Retrieved from World Bank (2013) Urbanisation beyond Municipal Boundaries: Nurturing Metropolitan Economies and Connecting Peri-Urban Areas in India, p. 24)

 Yet, the sheer absolute population totals implied by these seemingly benign rates of urbanization result in massive urban growth and require tremendous adaption and resilience capacities from Indian cities. In 1951, the total urban population represented 54.7 million people. Today, more than 377.1 million people reside in Indian cities, and it is estimated that this number will surge beyond 650 million by 2039, crossing the 50 percent urban population threshold[4]. With the urban demographic shift, the challenge of poverty alleviation is also shifting to cities. The share of the urban poor to total poor population rose from 18.70 percent in 1973-1874 to 26.78 percent in 2004-2005[5]. In 2004-2005, 25.7% of the Indian urban population lived below the poverty line.

The experience of urban poverty substantially differs from that of rural poverty. In addition to monetary deprivation, urban poverty is characterized by asset deprivation and enormous difficulties to access basic services and facilities in the city as compared to other income groups. Informality, be it connected to habitat or livelihood, results in tremendous difficulties in accessing basic services like security of tenure, water, sanitation and finance. In 2004, it was estimated that between 72 and 82 percent of the usually employed male urban poor and about 80 percent of the usually employed female urban poor were either self-employed or casually-

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[3] Census of India, 1951
[4] Census of India 2001; JNNURM directorate, MoHUPA and NIUA, 2011
[5] Steering Committee on Urbanisation, Planning Commission, 2011

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employed[6]. As urban population grows much faster than cities' capacity both in terms of infrastructure and housing stock, the urban poor find it increasingly difficult to access decent and affordable housing and end up living in informal settlements and slums. The lack of access to housing and security of tenure is thus both a consequence and a cause of urban poverty. According to Census data (2001), 15 percent of the total urban population lives in slums, which, are characterized by high vulnerability and informality.
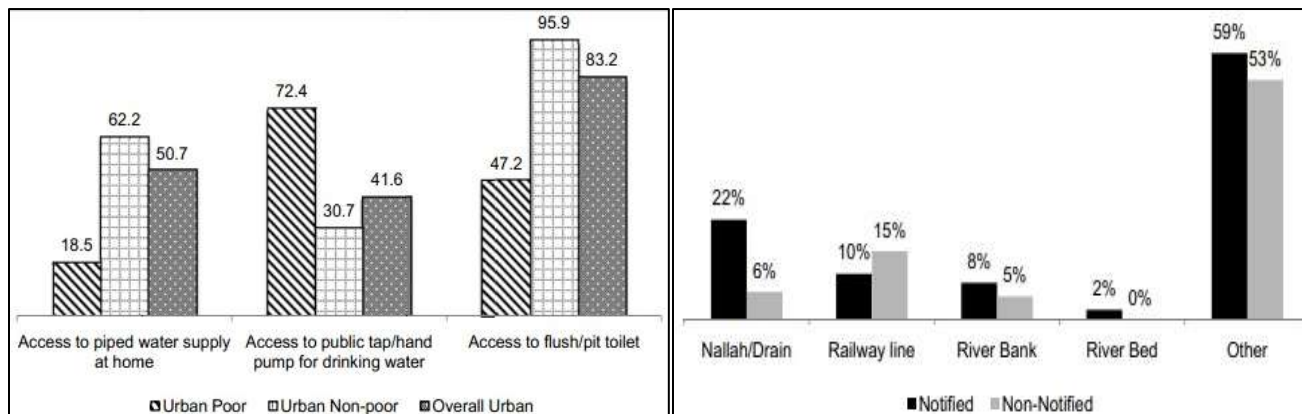
Left: Access of Urban Poor to Drinking Water and Sanitation Services (%) (2005-2006); Right: Percentage Distribution of Slums by Location (All-India) (2008-2009)
(Source: Retrieved from Planning Commission (2011), the Report of the Working Group on Urban Poverty, Slums and Service Delivery system, p.12 New Delhi)

Slums are often located in spaces that expose their residents to multiple hazards, such as riverbanks, drains or railways. Slum housing is only one side of the housing crisis in India. The urban poor live in a variety of habitats which constitute a wide spectrum in terms of legality, formality, and vulnerability. In total, the national housing shortage was estimated to be 18.78 million units in 2012, 96 percent of which affects the two weakest income groups, with respective maximum monthly incomes of INR 8333 and INR 16666[7]. Households living in congested houses account for 80 percent of the shortage, while those residing in obsolescent houses account for 12 percent. According to government data, only 3 percent of the shortage stems from households' homelessness[8].

Addressing the housing shortage is an integral part of poverty alleviation, since formal affordable housing provision comes as a package of basic services, including security of tenure, water and sanitation. It is part of an itinerary of formalization that opens access to finance and other services to low-income citizens. Bridging the supply-demand gap will require a sound identification of the bottlenecks preventing the generation of affordable housing for the poor at scale and their subsequent elimination.

> In Trivandrum, the Kannamoola Bund Colony was exposed to flooding every year during the rainy season, because of its location by a canal. Residents were relocated to houses near their former habitat, but at a distance where monsoon would not put them at risk but still be accessible to health, education, market and livelihood opportunities. In many cases however, it is not possible to avoid the trade-off between safety and conservation of socio-economic networks, due to the untenable location of slum settlements.

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[6] Planning Commission, Steering Committee on Urbanisation, (2011), Report of the Working Group on Urban Poverty, Slums and Service Delivery System, p. 5. New Delhi

[7] Ministry of Housing and Urban Poverty Alleviation (2011) Report of the Technical Group on Urban Housing Shortage (TG-12) (2012-2017)

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Bridging this Housing Gap will have Severe Consequences on the Environment

The development of adequate housing solutions and infrastructures is required to make Indian cities conducive to the development of all sections of societies. At the same time, the prospect of unabated urban development is a major concern in terms of environmental sustainability. Urban sprawl leads to soil erosion, loss of biodiversity and destruction of eco-systems. The construction sector is particularly resource intensive: it represents 30 percent of the Indian electricity consumption, absorbs 65 percent to 70 percent of total glass production, 45 percent of India's steel output and 85 percent of paint. The production of cement is expected to increase from 228.3 Mt in 2010-2011 to 600 Mt by 2020[9].

The construction sector is also a major driver of climate change, and accounts for about 24 percent of total greenhouse gas (GHG) emissions in India with 80 percent attributed to materials like steel, cement, bricks and lime[10]. These numbers are pledged to increase, at the sector is poised to grow by about 17 percent over the next decade[11].

In a business as usual scenario, catering to the huge social housing demand will dramatically accelerate climate change and the depletion of natural resources. Thus, there is an urgent need to fundamentally alter construction practices towards a more sustainable development pathway. There is considerable scope to reduce both the embodied and the operational energy consumption of affordable housing units with simple and cost-efficient building alternatives.
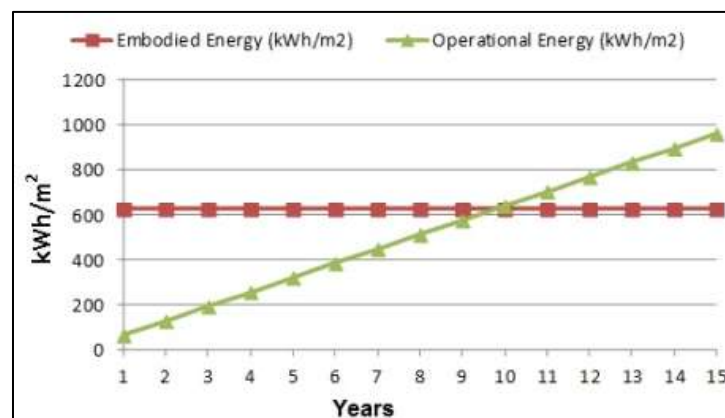
Comparison of embodied and operational energy for a typical low rise (G+3) residential building in Delhi
(Source: Studies carried out by Development Alternatives)

During the initial ten years of the life-cycle of a residential building, embodied energy concentrates the major share of total energy consumption. Alternate materials, using industrial waste or locally available resources can reduce the use of conventional materials with a high environmental footprint such as cement and steel. Roofing technologies like filler slabs and ferrocement channels can reduce the use of cement and steel by 25 percent to 30 percent[12]. Resource-efficient techniques can further reduce the amount of resources necessary to generate

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[9] Planning Commission 2013, National Skill Development Corporation, 2009
[10] Parikh et al., 2009
[11] Planning Commission,2013
[12] http://www.devalt.org/newsletter/jun96/of_5.htm

structurally-sound, high-quality buildings. Rat-trap bond masonry for red-bricks can reduce the quantity of bricks and mortar required for construction by 25 percent[13].

In terms of operational energy, heating and cooling are the two main factors of energy consumption. At the design and construction stage, simple and costless design interventions can reduce the energy consumption of the building over its life-cycle. Optimizing the use of natural daylight, ventilation, creating suitable thermal insulation can dramatically reduce the need for heating, cooling and lighting appliances, which also generates financial gains for residents.
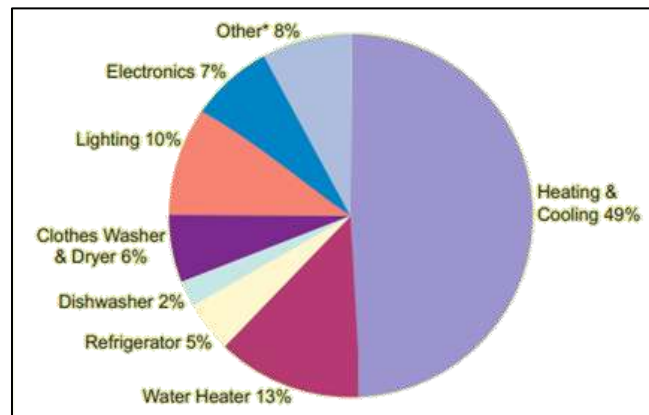
Residential Energy Consumption Breakup
(Source: Retrieved from GoI, National Mission on Sustainable Habitat, Ministry of Urban Development, New Delhi)

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[13] http://www.lauriebakerbuildingcentre.com/?page=about

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Sustainable Social Housing in the Indian context

Social versus Affordable Housing

In India, the term of "social housing" is hardly used. "Affordable housing", "low-income" or "cost-efficient" is usually preferred. This stems from the fact that unlike in European and American countries, "social housing" in India, in its major share, is not composed of rental housing units. The State is involved in the delivery of low-income housing units, through execution, regulations, and subsidies, and these units are subsequently allocated to the weaker economic sections of society.

The latest official definitions on affordable housing are provided by the 2012 Report of the Task force on Affordable Housing set up by the erstwhile Ministry of Housing and Urban Poverty Alleviation (MoHUPA)[14]. Affordable housing targets the two weakest income groups: the Economically Weaker Section (EWS) and the Lower Income Group (LIG). The Task Force defines affordable housing in terms of affordability relatively to the occupant's income. *Is considered affordable any housing unit which price does not exceed five time the household's annual income, when government subsidies are provided, and three to four times the household's annual income in the absence of subsidies.* Besides, the dwelling units' Carpet Area is capped for each income group. In this understanding, "social/affordable housing" therefore does not exclusively refer to the dwelling units delivered by public authorities, but also encompasses those produced by the private sector within the framework of government guidelines.

Table 1: Affordable Housing Criteria by Target Group

	Maximum Annual Income in INR	Minimum Carpet Area in sq.m.	Maximum Carpet Area in sq.m.	Affordability Limit (without subsidies) in INR	Affordability limit (with subsidies) in INR
Economically Weaker Section (EWS)	100, 000	21	27	400, 000	500, 000
Lower Income Group- A (LIG-A)	140, 000	28	40	560, 000	700, 000
Lower Income Group –B (LIG-B)	200, 000	41	60	800, 000	1, 000, 000

The opening of the affordable housing space to the private sector called for clear definitions of private affordable housing projects that may be eligible to a series of state incentives or subsidies. Affordable housing projects are defined as projects which allocate at least 60 percent of the Floor/Area Ration (FAR) or the Floor/Space Index (FSI) to units of no more than 60 square meters, and where at least 15 percent of the total FAR/FSI or 35 percent of units are reserved for the E.W.S. As per the Government of India's definitions, a private development respecting these guidelines may thus be covered by the relevant government schemes, incentives and subsidies.

Sustainability in the Indian Urban Context

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[14] Task force on Promoting Affordable Housing (2012) *Task force Report*, Ministry of Housing and Urban Poverty Alleviation, Government of India, New Delhi

Effectively addressing issues of environmental sustainability in the context of urban poverty in India requires an integrated approach to sustainability. The urban poor's living conditions are characterized by a high vulnerability. While environmental sustainability is a key component of sustainability as a whole, it needs to be embedded within a wider effort to eliminate the barriers faced by the poor which make their living condition in urban areas unsustainable. Sustainable social housing, essentially, is a habitat where the poor have the possibility and the desire to reside beyond the short-term, which is conducive to their socio-economic development and respectful of the natural environment. The following aspects are crucial in assessing the sustainability of an affordable housing project in India:

Economic Sustainability

Economic sustainability is linked to housing both as a commodity and as a habitat. Housing as a commodity needs to be affordable to the urban poor. The cost of the dwelling unit, but also of utilities, operation, and maintenance, are decisive factors in determining whether the poor can sustain their occupation of the house. The modalities of allocation of social housing units to the urban poor are crucial in this regard. A fine balance between provision of free housing and overburdening the low-income citizen needs to be found to avoid leaking out of the unit or decreased sense of ownership on the one hand, and low repayment rates on the other hand. As a habitat, affordable housing should facilitate access to job and livelihood opportunities within the city for the residents. Elements such as location and land use are crucial in this regard.

FINANCIAL & ECONOMIC ELEMENTS
Economic Viability Of The Project
Use of cost-efficient materials
Affordable utility bills for residents
Affordability
Market price as per Government definitions
Affordable E.M.I
Access To Finance
Access to formal housing finance institutions
Existence of a loan product targeting the L.I.H customer
Innovative marketing techniques to reach the BoP Customer
Existence of a partnership between the developer and HFCs
Access to State subsidies
Process Of Financial Inclusion
Generation of documents for customers
Formal payments (not in cash)
Specific processes to curb speculation

Social Sustainability

Social housing needs to fulfill the requirements of residents. Security of tenure is the first and most elementary step towards sustainable social housing, as it enables the urban poor to access short and medium-run personal development perspectives, opens access to infrastructures, facilities and finance, and provides security. The majority of the urban poor stay in informal settlement with no or little security of tenure. The constant risk of eviction hampers economic development and capitalization of assets.

The dwelling unit should be a central platform from which residents can access a basket of basic goods and services, including water, sanitation, solid waste management, education and health facilities. The dwelling unit itself should have the capacity to shelter the vital activities of all members of the family. Buildings that do not fulfill basic needs of communities run the risk of being deserted by their target beneficiaries, which results in an unnecessary depletion of material resources and fosters the growth of slum settlements.

Social sustainability means that housing in a city should provide the geographic structure for a sustainable society. Questions of income-group mix within a project are crucial. European and American experiences have shown that the lack of social mix within affordable housing projects can result in an increase of social and economic exclusion.

SOCIAL ELEMENTS	
TENURE AND OWNERSHIP	**INFRASTRUCTURES**
Community leasehold	Satisfying access to water
Community ownership of the land	Satisfying access to electricity
Individual ownership of the built assets	Satisfying waste collection arrangements
Rental agreement	Satisfying access to sanitation
Cooperative societies	
Collective responsibility for operation and maintenance	
LOCATION	**QUALITY OF THE DEVELOPMENT**
Conservation of income opportunities	Satisfying size of the dwelling unit
Access to new income opportunities	Provisions for incremental development
Satisfying connectivity to the rest of the urban agglomeration	Presence of commercial spaces within the development
Satisfying access to commercial areas	Presence of open spaces
Satisfying access to health facilities	Presence of studying space for children
Satisfying access to education	Presence of a parking lot
Satisfying access to places of worship	Accessibility of all floors
Satisfying access to culture	Child-care facilities
Satisfying access to recreation spaces	Health care facilities
PROCESS	
Community engagement at a pre-implementation stage (preliminary meetings; surveys; data verification; designation of beneficiaries)	Community engagement at a planning stage (evaluation of situation and needs; participatory design)
Community engagement during construction (community monitoring of construction's progress)	Community engagement post-construction (training meetings in maintenance of the development)

Environmental sustainability

The construction of affordable housing should not, by depleting natural resources, compromise the ability of younger generations to sustain themselves in urban environments and endanger eco-systems. Urban expansion and the development of an affordable housing stock should be carried out keeping in mind the existing natural environment. Environmental sustainability comprises both a planning and a cultural dimension. On the supply side, architects and planners through material and design choices will determine the embodied energy of the building. On the demand side, the end-user through lifestyle choices will play a crucial role in reducing operational energy. Operation and maintenance of buildings, including water management, solid waste collection, will be important factors of sustainability. Achieving sustainable social housing therefore requires a close integration of the hardware and software parts of social housing programs. The infrastructural dimension needs to be accompanied with a strong social program to impact the way low-income customers interact with

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their habitat. Such programs need to account for the fact that accessing social housing represents an enormous cultural change for many of the low-income citizens: collective living within blocks of flats entail new types of collective organization, and the access to new services such as water supply, solid waste management, sanitation, brings in new maintenance responsibilities.

TECHNICAL AND ENVIRONMENTAL ELEMENTS
Structural Safety
Compliance with building codes and by-laws
Hazard resilience
Embodied Energy Efficiency
Use of energy efficient materials
Use of locally available materials
Energy-efficient use of materials
Operational Energy Efficiency
Satisfying insulation
Use of passive ventilation
Use of passive lighting
Use of renewable energy on-site
Energy efficient appliances
Landscaping
Conservation of the site's vegetation
Creation of green spaces
Water Efficiency
Rainwater harvesting
Waste water management
Energy efficient fixtures
Waste Management
Suitable sanitation arrangements
Suitable solid waste management arrangements
Community training to maintenance issues

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Policy Framework for Affordable Housing in India

Shift towards Private Sector Participation

Until the economic liberalization of the country in the 1990s, public actors were the primary stakeholders in affordable housing delivery. The provision of decent and affordable housing to the poor was widely understood as a State responsibility[15]. This understanding has now given way to a new paradigm where the State also plays the role of an enabler of affordable housing delivery through the private sector. Although relatively recent, this gradual evolution of the modalities of affordable housing delivery has far-reaching consequences. It has attracted debates questioning the possibility of achieving social inclusion in an urban development context largely driven by huge profit-making opportunities for private actors. For some, social justice, of which access to land and housing are the cornerstones in the city, remains incompatible with this new neo-liberal framework[16]. Several actors have expressed their concern that new urban renewal schemes, such as the JNNURM, might result in the creation of "apartheid cities", where the urban poor are increasingly marginalized[17].

The direct provision of affordable housing by public actors is mediated through two Centrally-sponsored schemes: the JNNURM and the RAY. The number of dwelling units sanctioned under the JNNURM culminates at 15,62,728 dwelling units, which amounts to 8.3 percent of the total urban housing shortage[18]. Acknowledging the inability of public actors to bridge the housing gap until now (National Housing Policy, 2007), Central Government actors have multiplied initiatives to rope in the private sector. Public-private partnerships are envisioned as the main vehicles through which the housing backlog is to be resorbed.

The Jawaharlal Nehru National Urban Renewal Mission, launched in 2005, is the first and biggest effort in the post-independence history to comprehensively address urban development[19]. The scheme has run from 2005 to 2015, after being extended by three years for the completion of delayed projects. The JNNURM seeks to catalyze the growth of cities by comprehensively addressing various components of urban development, with a particular emphasis on infrastructures. In addition to the hardware aspect, the JNNURM seeks to create sustainable governance mechanisms and incentivizing legal and financial frameworks. The access to central government funds is conditioned by the implementation of a set of mandatory and optional reforms, aimed at creating a favorable affordable housing eco-system and improving governance capacities at the ULB level.

Two of its submissions, the Basic Services to the Urban Poor (BSUP) and the Integrated Slum Development Program (IHSDP) specifically look at issues of social inclusion within the city. BSUP covers cities with population above 1 million inhabitants, as well as all state capitals, and cities of particular interest in terms of history of tourism. IHSP is open to cities which are not covered under BSUP. The Basic Services to the Urban Poor scheme seeks to enhance the urban poor's access to a basket of basic services including security of tenure, housing,

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[15] Wadhwa, 2009

[16] Swapna Banerjee-Guha (2010), *Homeless in Neoliberal Cities: View from Mumbai,* Tata Institute of Social Sciences

[17] Lalit Batra (2009), *A Review of Urbaisation and Urban Policy in Post-Independent India,* Centre for the Study of Law and Governance, Jawaharlal Nehru University, New Delhi.

[18] GoI, "JNNURM and RAY Progress, 23rd September 2013", Ministry of Housing and Urban Poverty Alleviation, available at http://mhupa.gov.in/ray/workshop/ray_rollout/jnnurm.pdf, accessed on May 14th, 2014

[19] Om Prakash Mathur (2009) National Urban Poverty Reduction Strategy 2010-2020 -A new deal for the urban poor – slum free cities, The National Institute of public finance and policy.

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water supply, sanitation, education health and social security in 63 mission cities. Mandatory reforms under BSUP include the earmarking of funds under municipal budgets to basic services to the urban poor at the local level. Among optional reforms, the reservation of at least 20-25 percent of total developed land in all housing projects – public and private- for EWS and LIG through cross-subsidization is seen as the major way to bridge the housing gap through the market. The IHSDP seeks to comprehensively address slum development in non-BSUP cities. Under this scheme, the cost of a dwelling unit is capped at 100,000 rupees.

The lessons learnt from the implementation of JNNURM and its submissions are now being carried forward into the Rajiv Awas Yojana, which runs in mission mode from 2013 to 2022. BSUP and IHSDP suffered from a lack of community engagement and long-term, integrated planning vision. RAY hinges upon both as a curative and a preventive approach to the housing crisis: it aims to upgrade or redevelop existing slums while creating an affordable housing stock to prevent further growth of unsuitable habitat. RAY puts a stronger emphasis on the regularization of slums, security of tenure, in-situ upgradation or redevelopment and community participation. It includes a package of incentivizing schemes for the private sector and interest rate subsidies for the low-income customer.

The Affordable Housing in Partnership scheme is the part of RAY aimed at encouraging private sector participation into affordable housing provision. It was introduced in 2009, as a part of the BSUP, and further on incorporated into RAY. It aims to address the housing crisis through public-private partnership. The Central Government provides subsidies to the States' housing programs when they involve private participation, with a maximum amount of INR 75,000 per dwelling unit. The ultimate sale price is determined by the State. Until now, however, the scheme has not resulted in the creation of a massive affordable housing stock. As of June 2013, 11 projects had been approved in two States (Rajasthan and Karnataka), accounting for a total of 6768 units[20].

Besides affordable housing schemes, India has developed a policy and financial eco-system designed to let the private sector into the low income housing sector. Housing was made a priority lending sector in 1999-2000, which raised housing loans to 13.5 percent of total gross bank credit in 2012. In 2005, the real estate sector was completely opened up to Foreign Direct Investment (FDI). Tax rebates and interest subsidies have been put in place for home buyers. In the affordable sector, the Government of India recently created a Credit Risk Guarantee Scheme to foster lending to the low-income sections of society. Additional schemes integrated into the Rajiv Awas Yojana, such as the Rajiv Rinn Yojana, provide interest subsidy to help the urban poor bridge the affordability gap. External Commercial Borrowings were allowed into affordable housing. Incentives to affordable housing developers were put in place, such as service tax exemptions.

Private developers are increasingly venturing into the affordable housing sector, as they identify substantial profit opportunities. In the last five years, private developers launched at least 78,000 affordable housing units[21].

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[20] GoI, Ministry of Housing and Urban Poverty Alleviation , 2013 (a) p. 17

[21] Agarwal et al., 2013, p.14

Integration of Green Building Principles

Until recently, environmental sustainability and affordable housing for the urban poor had been two separate policy objectives. The past couple of years saw an increasing integration of these two fields in the policy sphere. Environmental sustainability as an objective is mentioned in most affordable housing policy documents.

The 2007 National Urban Housing and Habitat Policy, in its "affordable housing" section highlights the need to explore various technology options so as to achieve energy and cost efficiency. The implementation of green building solutions on the ground is encouraged. The necessity to formulate environment-friendly by-laws and regulations at the State level and incorporate new building materials into the Schedule of Rates is also highlighted. The policy framework calls for the promotion of prefabricated materials, locally available materials, as well as materials based on agriculture and industrial waste. Fly-ash, red mud and allied locally materials are specifically mentioned. Reforms aiming at mainstreaming renewable energy and rain-water harvesting in the construction sector are encouraged. The policy also advocates the substitution of wood in construction activities with bamboo.

These intentions have unfortunately not trickled down into operational policy documents such as the JNNURM and RAY guidelines. The adoption of environment friendly reforms is optional under BSUP, and limited to the adoption of bye-laws making rain water harvesting mandatory in all future buildings and providing a framework for water conversation. BSUP also mentions the adoption of bye-laws on reuse of recycled water as optional reforms. The need for greener materials and building techniques is not addressed. The Rajiv Awas Yojana guidelines, which provide the framework for affordable housing provision for the next decade, do not include green building reform objectives[22]. Though RAY has provisions for an incentivizing fund through which innovative projects, including environment-friendly developments are allocated 10 percent of the proposed RAY budget.

In addition to policy initiatives, building regulations and bye-laws are another channel through which environmental sustainability can potentially be incorporated into affordable housing projects. The National Building Code (2005) developed by the Bureau of Indian Standards (BIS) sets the standards in terms of building norms in India. It provides a model for the adoption of building by-laws by the Indian States on a voluntary basis. The past few years have seen environmental issues becoming more prominent on the political agenda. A sustainability chapter is currently being incorporated into the code and should apply to all buildings in India once it is adopted by the Indian States.

While the regulatory framework for green building is still being consolidated, some States have been proactive in drafting and implementing green building policies. In Kerala, public buildings incorporate green building techniques and materials, such as rat trap bond masonry and filler slabs for roofing. The State of Himachal Pradesh has been an active promoter of renewable energy sources. A Solar Energy Policy is being devised to meet increasing the increasing energy demand. A "passive solar housing" action plan also exist to promote passive design features and save up energy. Government buildings in Himachal Pradesh have already incorporated these passive solar features.

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[22] GoI, Ministry of Housing and Urban Poverty Alleviation, Rajiv Awas Yojana (RAY) Scheme Guidelines 2013-2022

Stakeholders in the Affordable Urban Housing Space

The Government

Central Ministries

The Government of India and its competent ministries design and monitor the implementation of affordable housing schemes for the urban poor. As per the Indian Constitution, housing is a state responsibility. The role of the Central Government is thus limited to financial assistance and provision of guidelines for implementing agencies under housing schemes. Until 2014, the Ministry of Housing and Urban Poverty Alleviation (MoHUPA), was administering the two submissions of the JNNURM and the RAY concerned with urban affordable housing. After the 2014 legislative elections, the Ministry was merged with the Ministry of Urban Development.

The Government in India defines a regulatory framework through the National Housing Policy and National Building Code so as to enable housing finance institutions and social housing stakeholders to operate. It creates a suitable eco-system for the development of the housing sector.

States

Because of the federal structure of the country, it is difficult for Central Government actors to closely monitor policy implementation and impose mandatory reforms upon stakeholders at the local level. Thus the States are the most crucial stakeholders in terms of regulations. They draft and approve building by-laws that set norms for all buildings within the State. The level of environmental sustainability of buildings within a given State thus largely depends on the by-laws' provisions. All public buildings are constructed according to the State Schedule of Rates (SOR), which lists out the materials which may be used for public buildings and within housing schemes, as well as their rates.

> **Housing Policy: The Case of Madhya Pradesh**
>
> The Madhya Pradesh State Housing and Habitat Policy (2007) provides the overall framework for affordable housing provision within the States.
>
> 30% of developed land is to be reserved for the two lower income groups in cases where the land is provided at concessional rates by the State. 15% of the developed land is reserved for the EWS and the LIG in colonies where land has been purchased by private and cooperative segment developers.
>
> The State has also adopted measures to encourage private sector participation. Additional Floor Space Index (FSI) is given for developers who provide additional developed areas for the EWS and the LIG.
>
> The Madhya Pradesh Housing Board is a major stakeholder in affordable housing provision. Created in 1972, it generates an annual average of 6000 houses, according to official Madhya Pradesh Government figures.
>
> The Madhya Pradesh S.O.R offers some green building options for public actors to consider in construction.
>
> *Source: NHB (2012) Report on Trend and Progress of Housing in India*

States also design and implement their own housing policies and affordable housing schemes. Housing Departments are usually responsible for policy-making, while housing boards act as public developers of housing for all sections of society, including the EWS and the LIG. States coordinate the implementation of JNNURM and RAY, in particular through the establishment of State Level Nodal Agencies for the two missions. They fund part of the JNNURM projects, most of the time in the form of land provision.

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Urban Local Bodies

The 74th Constitutional Amendment to the Indian Constitution (1992) enshrined the legal existence of elected Urban Local Bodies, the third tier of government of the Indian Federal system, in the Constitution. The amendment requires the State Governments to amend their municipal laws in order to devolve additional functions to ULBs so that self-governance at the local level may be achieved. Because States have implemented this reform at various paces, ULBs show great disparities across the country in terms of functions and capacities, which is an important barrier in the provision of green affordable housing. The core functions of Urban Local Bodies include water supply, drainage and sewerage, solid waste management, economic and social development plan, transport systems (roads, bridges), community health and protection of environment. Addition functions to be devolved by the States include urban poverty alleviation, under which Urban Local Bodies are now implementing agencies under BSUP, IHSDP and RAY. The implementation of the 74th amendment is a mandatory reform under the JNNURM.

Development Authorities

Development authorities share some of the responsibilities for municipal infrastructure management with the municipal corporations. Development Authorities are accountable to the Directorates of Town and Country Planning, which are State-Level agencies. Their main responsibility is to implement the master plan designed at the State level. Their mandate is primarily linked to urban development. In a few cities like Indore, Development Authorities have also been implementing agencies under the JNNURM.

Autonomous Bodies

The Building Materials and Technology Promotion Council (BMTPC) is the organization responsible for the promotion of alternate, green and cost-effective materials and technologies in India. It validates new technologies, for which the Bureau of India Standards (BIS) later on defines quality standards. The BMTPC was part of MoHUPA and is one of the appraising agencies for JNNURM and RAY.

BMTPC's technical mission is also shared with Housing and Urban Development Cooperation (HUDCO), a government techno-financing company which also comes under MoHUPA. HUDCO heads the network of State Building Centres promoting alternate technologies at the district level in India. It finances or undertakes the setting up of industrial enterprises of building materials. Beside its technical function, HUDCO also provides finance to State Housing Board and Development Authorities for housing development. It undertakes housing and urban development programs, including the financing or setting up of new satellite towns.

TATA HOUSING'S SHUBH GRIHA IN BOISAR

TATA Shubh GRIHA Boisar is a 67 acres development located near the Tarapur Industrial area in Thane District, Maharashtra. The first phase of the development, which will enclose 3000 units when completed, includes 1300 dwelling units priced between INR 390,000 and INR 670,000. The available housing options include 1 small Room-Kitchen Units (1RK), 1 large Room-Kitchen Unit, and one Bed-Hall Kitchen Unit, of respective selling areas of 26.29 square meters, 33.44 square meters and 43 square meters. All buildings are G+2 structures, in accordance with the local building by-laws.

The township is equipped with a community hall, a school, community hall, playground, a green landscaped seating area, shopping markets, jogging tracks, parking spaces. The design attempts to maximize space within dwelling units for low-income families. Flats offer big halls that can be used for multiple purposes and converted into a bedroom for the night. Methods of passive design maximize natural lighting and ventilation.

The project was developed under the guidance of the Indian Green Building Council (IGBC) and obtained the LEED silver rating. It features rainwater harvesting systems, medicinal plantations, vermiculture, solar lighting for public spaces. According to Tata Housing, the scheme was oversubscribed seven times a few days after its opening.

Tata saw the profit potential in the base of the pyramid sector. Offering affordable houses in a viable manner required a tailor-made business model. Tata developed the land on a joint-ownership basis with the land-owner to keep a check on costs. New low-cost construction technologies were explored, such as prefabrication. Materials suppliers were locked-in on long-term contracts to achieve economies of scale and save on materials cost. Marketing and distribution expenses were massively reduced, and Tata housing relied instead of word of mouth, publishing advertisements in local newspapers and in public spaces such as railways stations and bus depots. To reach the low-income customer, Tata Housing tied up with Micro Housing Finance Corporation to offer micro-housing finance to customers in the informal sector. The 65 acres is also set to be developed with flats for middle and higher income groups that will come in two more phases, which will reduce the financial risk of the venture for Tata.

Source: http://www.tatavaluehomes.com/shubh-griha-boisar/construction/may14/large/60.jpg

Private Actors

Developers

As a result of incentivizing measures taken by the Government of India, private participation into the affordable housing sector has been steadily increasing. The 2013 Monitor report[23] highlighted the high productivity of private stakeholders, with some 30,500 units priced below INR 1,000,000 put on the market between June 2011 and January 2013. The vast majority of private affordable housing units originate from small and medium developers, who operate only in one city. Nevertheless, 71 percent of the affordable housing output is accessible only to the LIG segment. The EWS remain unreached by the market as all housing units were launched starting from INR 400,000 per dwelling unit, which represents their upper affordability limit.

Green Building in the private affordable housing space is still a very marginal phenomenon. The necessary legal framework for private green affordable housing is not in place, since most States are still to adopt green building construction by-laws. In this context, green building remains a niche market, which developers are mostly exploring for higher income groups. The incentives for green buildings are linked to reputation building, and so far, the gains are not perceived as substantial enough to reach a critical mass and set a market trend.

Tata Housing, with their affordable housing branch, is one of the first movers into the green affordable housing market in Boisar (Mumbai), with LEED certified floated into the market for up to INR 600,000. Such houses are however not marketed as green but as affordable, and the name of Tata acts as a guarantee of quality for the customer. After its success in Maharashtra, Shubh Griha is now being developed in Gujarat.

Housing finance companies

Housing Finance Companies (HFCs) are institutions specialized in lending for housing. In 2012, there were 54 HFCs registered with the National Housing Bank[24], but many of them are yet to enter the affordable housing space. The number and portfolio size of Housing Finance Companies operating in the low-income sector is undergoing a steady growth. Housing Finance Companies operate in different sectors of the affordable housing space (incremental housing, resale or new housing) and offer services to different types of stakeholders (individuals, small or large developers). These elements give rise to a wide diversity of business models and cost-structures[25].

As more and more HFCs enter the affordable housing space, they are still confronted with challenges inherent to introducing formal finance products to informal sector customers, which require them to operate in a highly innovative manner. The lack of documents of customers engaged in the informal sector compels HFCs to devise new ways to assess the creditworthiness of their clients. Innovative loan products are also needed to take into account irregular income flows and securitize the loans.

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[23] In 2013, Monitor Deloitte released a report presenting the findings of a six-month study of the private affordable housing sector, carried out in 22 Indian cities. 27 developers selling dwelling units priced up to 1 000 000 were interviewed, as well as 9 housing finance companies.
[24] National Housing Bank, 2012 p. 167.
[25] Agarwal et al., 2013

Table 2 : Characteristics of HFCs Loan Portfolio

HFC	NPAs	Average Ticket Size (INR Lakh)	LTVs	Loan Tenor (years)
HFC -1	0.73%	10.4	66%	9
HFC -2	0%	6	70%	16
HFC – 3	0%	6.2	67%	14
HFC – 4	0%	5.6	60%	15
HFC - 5	0%	4.5	65%	na
HFC – 6	<0.01%	3.5	<25%	12
HFC - 7	0%	9	60%	16
HFC - 8	0%	4.5	55%	11

(Source: Agarwal et. Al (2013), p. 28)

Non-Governmental Organizations (NGOs)

NGOs hold several functions in the affordable housing space, with varying degrees of formality. They can be contracted as consultants or implementing agencies by ULBs for program implementation. Because of their involvement in low-income communities, they often take part in the drafting of DPRs and tend to be involved at the planning stage. In Sangli-Miraj-Kupwad Municipal Corporation, Shelter Associates, an organization with a long-standing presence in the city's slum settlements devised a city-wide slum redevelopment plan within IHSDP. NGOs with required capacities sometimes implement projects. In Trivandrum, Habitat Technology Group and COSTFORD (The Centre of Science and Technology for Rural Advancement), two NGOs committed to mainstreaming social sustainable housing, have been executing agency for BSUP. NGOs can also play a more informal role of community mobilization and participation.

The assessment has shown that NGOs had a strong and positive impact on the quality of affordable housing projects. In all projects studied, NGOs' involvement was synonymous with better community participation and enhanced sustainability. In Trivandrum, the COSTFORD and Habitat Technology Group are the main players responsible for the introduction of green components into affordable housing projects where they were involved. In Sangli, the involvement of Shelter Associates enabled a fully participatory process which would not have occurred otherwise. Civic Society organizations are thus part of the eco-system that can be successfully leveraged to deliver quality affordable housing to the urban poor.

End-users

Citizens belonging to the EWS and the LIG are perhaps the most crucial stakeholders in affordable housing projects. Too often, however, they tend to be left out of planning processes. The successful involvement of scheme beneficiaries into planning and design, and the level of consideration given to their needs greatly affect the level of social sustainability of affordable housing units, that is the ability of citizens to occupy these units in the long run. End-users detain crucial information for the success of social housing units, and this knowledge capital needs to be tapped.

In terms of environmental sustainability, the living habits of low-income citizens, along with the initial design of the units, will be crucial elements in determining the operational energy consumption of social housing projects. Many of EWS and LIG members who benefit from affordable housing schemes are moving to formal housing for the first time. As many affordable dwelling units are part of flat complexes, EWS and LIG families often experience a considerable change of lifestyle when moving to social housing units. Assets and responsibilities

need to be collectively managed, which entail the formation of cooperative housing societies. Strong social components need to be integrated into social housing programs to ease the transition to this new lifestyle.

Aspirations determine the aesthetics and thus the material choices for the housing. The aspiration is to move towards *pakka* RCC structures and an effort to introduce alternate materials often is rejected by users due to perception of poor quality. Large scale awareness needs to undertaken to bring about a change in this mindset.

Challenges to Green Affordable Housing

There are multiple gaps in the translation of policies into implementation that reduce the impact of the policies. In September 2013, only 47 percent of the total number of dwelling units sanctioned under JNNURM had been completed. In Punjab, in September 2013, 87 percent of the total dwelling units sanctioned under BSUP and IHSDP were either not started (48 percent) or not completed (39 percent). The discrepancy between the disbursement of Central Assistance one the one hand and the completion of dwelling units on the other is particularly striking in some States and highlights implementation difficulties: in Sikkim, 94 percent of Additional Central Assistance (ACA) had been released as of September 2013, but only 17.7 percent of the total number of sanctioned dwelling units had been built. In Rajasthan, 73.3 percent of Central Assistance had been disbursed, but 19.3 percent of total sanctioned units had been completed.
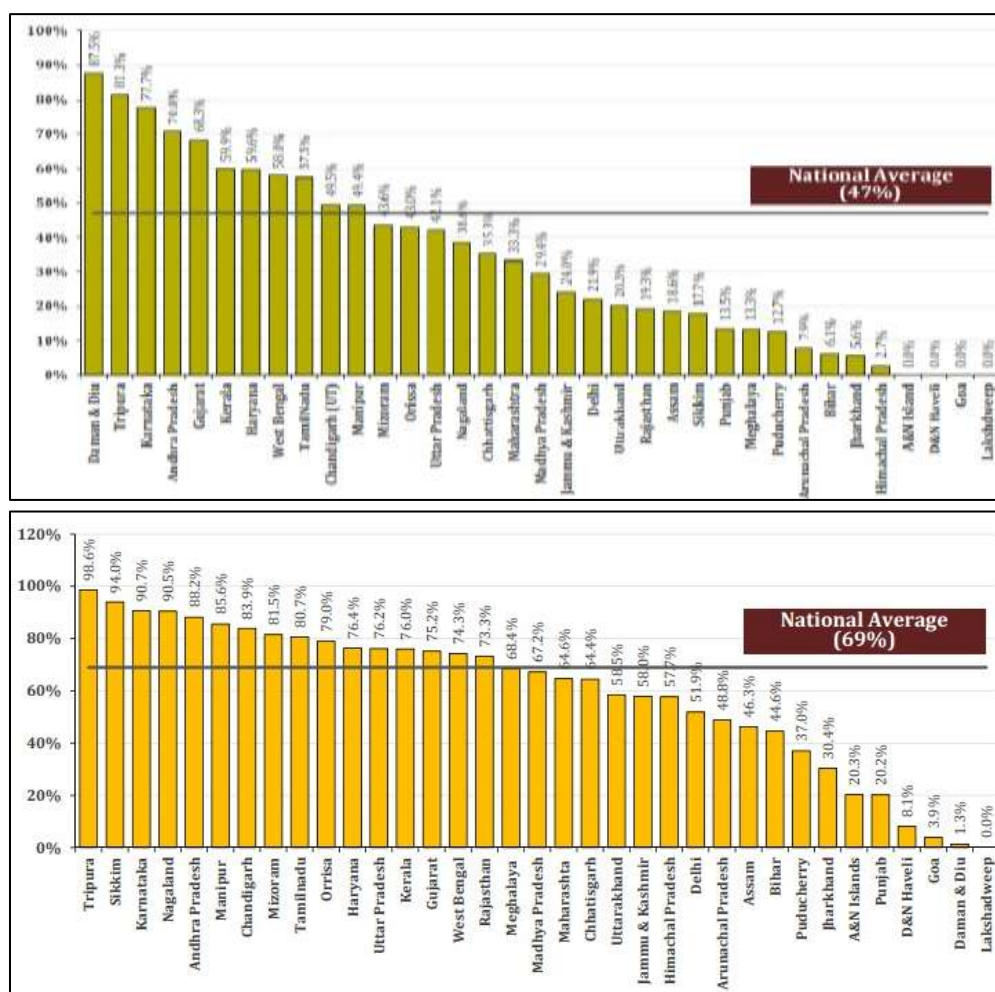
Top: Percentage of Total Dwelling Units completed against Sanctioned under the JNNURM; Bottom: Percentage of ACA released against allocation under the JNNURM

(Source: Ministry of Housing and Urban Poverty Alleviation (2013), JNNURM and RAY Progress – 23rd September 2013-[26])

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[26] Available at *http://mhupa.gov.in/ray/workshop/ray_rollout/jnnurm.pdf* p. 6

Regulatory Framework does Not Fully Integrate Sustainability and Affordability Agendas for Housing

The policy approach to green building in India shows little integration. Policy documents do not successfully incorporate the environmental goals set by the National Urban Housing and Habitat Policy into operational policy guidelines. Efforts have been made at the Central Government level to promote cost and resource effective materials within RAY and JNNURM. The Ministry of Housing and Urban Poverty Alleviation had taken steps to facilitate the inclusion of green materials into Schedules of Rates. Nevertheless, these measures might not bear significant results as long as environmental sustainability targets and reforms are not fully incorporated into JNNURM and RAY guidelines and sets of mandatory reforms.

This lack of integration is rooted in a reluctance to impose prescriptive environmental requirements upon local stakeholders (at the State and ULB level). Prescriptive environmental guidelines are considered counterproductive, as they are thought to conflict with the need for flexibility in a country as diverse as India. The limited availability of alternative materials at a local level, the diversity of local natural conditions, the variety of rules and regulations at a State level, or of financial capacities at the ULB level are perceived as barriers to the mandatory implementation of green building measures by the Central Government. Central Government stakeholders tend to identify the local level as the primary locus of change, and fail to acknowledge the potent role they could play in the adoption and diffusion of greener building practices in India. This results in a loose monitoring of the environmental sustainability of Detailed Project Reports (DPRs) submitted by ground level stakeholders and a piecemeal approach to environmental sustainability.

The lack of an appropriate regulatory framework for green affordable housing is most striking at the State level, which is a key component of the regulatory framework. The biggest obstacle to green affordable housing in public housing schemes is the absence of many green materials and from most Schedules of Rates (SOR). Implementing agencies at the ULB level therefore lack the necessary guidance and information to use environment-friendly materials, even if they might be interested in doing so.

A chapter on environmental sustainability is still to be added to the National Building Code, which should provide a model for the States. As a result, few States have incorporated green building provisions into their building by-laws. In the absence of common standards applying to all buildings within a State, green building remains a marginal practice. The integration of environmental sustainability into by-laws involves a variety of stakeholders at the State level who do not always work in a very integrated manner. This lack of coordination increases the time-lag in adopting and mainstreaming green practices. This lack of green building regulatory provisions at the State level bears negative consequences for the mainstreaming of green building through the private sector.

Low Capacities at the Implementation Level Result in Poor Project Quality

The successful implementation of housing policies is hindered by the lack of capacities at the State and U.L.B levels. Many of the State Level Nodal Agencies have headed the JNNURM without any dedicated staff. In some States, Project Management Unit (PMU) or project Implementation Unit (PIU) had not even been created.

One of the major aims of the mission was to complete the devolution of powers to Urban Local Bodies as mandated by the 73th and 74th amendment. These functions were transferred regardless of the actual capacities of the Urban Local Bodies. Crucial infrastructural mandates, related in particular to road construction and

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maintenance, water supply, sewerage and drainage were transferred to ULBs while the required capacities were not in place, which was reflected in the quality of the projects.

In addition to project management and capacity problems, the CAG report has also pointed out to various irregularities. In Jharkhand, Jammu and Kashmir and Haryana, funds have been diverted away from housing projects. There is therefore a pressing need for stronger planning and monitoring of policy implementation by the Central Government.

Project Design and Planning Stage

The lack of capacities is particularly true at the pre-implementation stage, when detailed project reports (DPR) and City Development Plans (CDP)s are to be drafted. At this stage, ULBs have massively resorted to external consultants to prepare these plans, as internal capacities did not exist[27]. This has heightened coordination problems, as the number of stakeholders increased. Urban Local Bodies also missed on a valuable opportunity to enhance their capacities, as intended by the JNNURM. JNNURM had no budget allocation for reform implementation designed to improve governance at the municipal level, which made the adoption of reforms linked to accounting and GIS mapping difficult. As a result, evaluations report that most JNNURM projects were sanctioned only in 2007, while the scheme was floated in 2005.

These elements were confirmed by the documentation of a BSUP project (scheme 134) in Indore, Madhya Pradesh. At the municipal level, several organisations (the Municipal Corporation and the Development Authority) were in charge of the implementation of BSUP, and worked with no cooperation. Projects failed to understand the requirements of beneficiaries, as they were mostly relocation projects, with no preliminary survey.

In the private sector, the analysis of Shri Ram Kamal residency in Indore stressed that because of the small-scale of operation and lack of qualified human resources, project planning can be carried out with a lot of amateurism, neglecting crucial aspect of the development such as sanitation and solid waste management. Further documentation is nevertheless necessary to determine whether these findings are significant at the level of total privately-built affordable housing stock.

Participatory Mechanism Design

The inability to generate suitable habitat options for the urban poor partly stems from the exclusionary planning processes which have been a characteristic of BSUP and IHSDP's implementation[28]. ULBs have been unable to tap local knowledge and involve communities at crucial stages of the projects, including data collection and planning. BSUP's guidelines made it a point that target communities should be involved in the upgrading, redevelopment or resettlement processes. In practice, this community engagement has not happened. In Indore, low-income people were evicted out of their former habitat and forced to buy housing units that they strongly disliked, and in the design of which they had not been involved. The lack of community engagement has had deleterious effects and far-reaching consequences. Poor citizens have been forced to live in conditions that

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[27] Grant Thornton, 2011
[28] Steering Committee on Urbanisation, Planning Commission, 2011

no planner or architect of such units would accept for themselves, in undersized dwelling units, with no access to infrastructure, basic services and market opportunities. Simple and cost-free design solution that could improve the life of beneficiaries, such as passive ventilation and lighting, satisfying insulation, rationalization of space within dwelling units have not systematically been implemented. These traumatic experiences strongly damage the links between low-income communities and local governments. They have also resulted in low occupancy and repayment rates (Indore), hike in litigations linked to communities unwilling to relocate, etc.

More fundamental social aspects of affordable housing programs have also been a problem. The successful identification of beneficiaries and allocation of houses is often a problem at the ULB level for lack of linkages with the communities. During JNNURM, this caused many completed projects to remain unoccupied in States like Bihar, Gujarat, Haryana, Himachal Pradesh and Karnataka.

Project Implementation and Monitoring

At the implementation stage, several elements also constitute a bottleneck. They are linked both to the lack of capacities and to the fragmented governance structure. Land assembly emerged as a major reason for delays in the timeline of projects. The lack of litigation free land was reported in eighteen cities, including Hamirpur (Himachal Pradesh, IHSDP), Shimla (Himachal Pradesh), Patna (Bihar), Chandigarh (Chandigarh), Dimapur (Nagaland), Vijayawada (Andhra Pradesh), Puducherry, Delhi, Ranchi (Jharkhand), Bangalore (Karnataka), Thiruvananthapuram (Kerala), Gwalior (Madhya Pradesh), Kohima (Nagaland), Ajmer-Pushkar (Rajasthan), Kanpur (Uttar Pradesh), Mussuorie (Uttrakhand), Tura (Meghalaya) and Ludhiana (Punjab)[29]. In Sangli-Miraj-Kupwad Municipal Corporation, construction work could not start either in several sites for the same reason.

The documentation of scheme 134 in Indore (annexure 1) has highlighted that even in cases when the housing scheme is built and occupied, the living quality of the development is hardly acceptable. Tight budget constraints as well as an overriding concern for cost-efficiency have an adverse impact on the quality of the development. Scheme 134 is characterized by the lack of community spaces, open and recreational spaces, and the poor quality of infrastructures (no connection to water even though the scheme is occupied). The design of the scheme and of dwelling units is not conducive to a healthy lifestyle and to the socio-economic development of beneficiaries. Spaces to carry out professional activities or store capital and belongings are absent. The CAG report highlights similar problems in other housing schemes: in Raipur (Chhattisgarh), the size of dwelling units in a BSUP project was reduced by 6.13 square meters to accommodate cost escalation.

The lack of capacities bore a negative impact not only on the delivery capacity of public housing schemes but also on the quality of the houses built for low-income citizens. Many housing complexes built under JNNRUM are not suitable for their beneficiaries. In Patna, projects were sanctioned on low-lying areas that are not suitable for development. In Hyderabad, about two thirds of a 4550 houses development remained unoccupied because of the presence of a garbage dump yard in the proximity of the colony. In Tirupati (Andhra Pradesh), dwelling units were built with a carpet area of 14.74 square meters, while the approved carpet area was 25.39 square meters[30]. Further

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[29] Controller and Auditor General of India, report 15 of 2012-2013, Performance audit on Jawaharlal Nehru National Urban Renewal Mission, chapter 6 Implementation of Housing Projects
[30] ibid

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problems including water seepages in newly built units, use of sub-standard steel, deviation in pile foundation were reported in projects in Andhra Pradesh, Chhattisgarh and Tamil Nadu.

Capacity problems also affect the private affordable housing space. The documentation of Shri Ram Kamal Residency in Indore raised a series of concerns regarding the quality of the development. The developer lacked the qualified human resources that are usually required to successfully develop a housing project, including architects. The project consequently showed considerable weaknesses in terms of infrastructure, in particular regarding waste management and sanitation. Fly-ash bricks of mediocre quality are being used for their cost-efficiency. The market survey carried out by Monitor highlighted that this type of development might well be the norm rather than the exception: 60 percent of the supply mapped in the survey comes from projects with less than 500 units. About 75 percent of the developers surveyed operate in only one city. Over 30 small developers, building between 10 and 50 units, are active in Indore. The entrance of small and medium enterprises into the affordable housing sector is one area of concern, to the extent that these small developers might lack the sufficient financial, technical and human resources to deliver sound and high-quality affordable units. The quality of private affordable housing projects thus needs to be more closely monitored.

Affordable Housing Stakeholders are Not Familiar with Concepts of Environmental Sustainability

As environmental sustainability does not affect the synergy between supply and demand, most developers in the public and private sector have a limited understanding of environmental problems and how these connect to their activities. Interviews with private developers and Development Authority Officers in Indore highlighted that affordable housing practitioners tend to understand alternative materials as cost-efficient options exclusively, and this understanding includes green materials only to the extent that they are also cost-effective. Discussions further showed that "green building" is mostly associated with landscaping elements or the proximity of the natural environment – it is not unusual to see private affordable housing projects built in not yet developed peripheries being marketed as "green townships" for their proximity with nature.

Affordable housing stakeholders are not aware of the whole range of green/alternative building materials and doubt their capacities to use them. Stakeholders show little understanding of green building, but most of them are rather keen to explore cost-effective solutions. Many of the green building solutions, including fly-ash bricks, rat-trap bond or filler slabs for roofing are cost-effective, and could therefore be interesting options for public and private actors alike. Yet both public and private actors engaged in the affordable housing space lack guidance in selecting and using alternative building solutions.

Private Developers' interest in cost-efficient and alternative building solutions does not translate into action, mainly because they doubt their own capacity to successfully use alternative technologies[31]. The market is currently dominated by small and medium developers, who lack both financial and technical capacities to experiment with green building. The study of Shri Ram Kamal Residency revealed that in spite of their interest to use cost-effective technologies, small developers are not always aware of the full range of options, especially those that may also yield environmental benefits, and lack guidance in choosing new materials. Big players, with

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[31] Agarwal et al., 2013

capacities to dilute the risks of such experimentations within a larger portfolio, enjoying a reputation that would attract the trust of the customer are still few in the affordable housing market.

In the public sphere, the level of environmental awareness decreases as one gets closer to the implementation level of projects. Interviews with Municipal Corporation officers in Indore revealed that the level of awareness of green building materials and environmental issues is very low. As one gets closer to the ground level, stakeholders' priorities shift away from wider policy issues to more fundamental implementation concerns. How to deliver affordable housing units as per Central Government targets, within tight budget constraints, in a context of limited capacities, administrative complexity, difficult land assembly, reluctant beneficiaries is a question that already fully occupies stakeholders at the Municipal level and leaves little room for green building experimentation. In Indore, interviewees at the Municipal Corporation showed interest for cost-effective materials and requested guidance in selecting and using them.

Most Stakeholders Do Not See a Confluence of Affordable Housing with Sustainability Concerns

Cost-efficiency is a key word for implementing agencies. Green building is not perceived as an opportunity to streamline implementation processes at the ULB level, but as an additional cost and extra-complication. Implementing agencies such as Development Authorities and Municipal Corporations often build EWS and LIG houses over their initial budget. The perspective of cost-savings is a powerful incentive to explore cost-effective options.

The link between resource-efficiency and cost-saving is not made in most places. Interviews with experts promoting resource-efficient buildings highlighted that resource-efficiency technology suffer from mistrust from implementing stakeholders. Using fewer resources is clearly understood as compromising on the quality and safety of the development. It also triggers the fears that customers and beneficiaries might not accept the final output. In Kerala however, resource-efficient building techniques are widely used, showing that such obstacles can be overcome. Usage of such techniques by all sections of society is crucial to make a clear segment that resource-efficient techniques are not ways to build substandard habitats intended only for the poor.

State-level institutions such as housing boards show an increasing level of environmental awareness. Even in States like Madhya Pradesh, where green building has not taken off at the State level, the housing board is now launching "green" apartments. Nevertheless, these are intended mostly for higher income groups. Even among housing board officers, the perception that "green building" and "costly" are synonymous is widespread.

Interviews with the BMTPC, NGOs implementing the IHSDP in Sangli, Municipal Corporations and private developers unanimously highlighted that the lack of acceptance of green buildings from end-users was one of the major challenges in mainstreaming environmental-sustainability. In Madhya Pradesh and Maharashtra, stakeholders highlighted that mainstreaming green building through the affordable housing space leaves the urban poor with the impression that they are being used for dubious building experiments because of their socio-economic status, something they strongly resent. In Kerala, however, green buildings techniques and materials were not rejected by residents of affordable housing projects, since such materials and techniques are also widely used for higher income group construction. Locally-available materials are reportedly perceived as low-cost, low-quality options by end-users in places where green solutions are not widely used. Whenever customers have the financial capacities to do so, they prefer to opt for materials which are perceived as "higher-end". This points out that green building is a systemic problem, which needs to be addressed at the level of

society as a whole, so as to make green solutions desirable for all income groups, including the economically weaker sections of society.

The assessment showed that successful projects are overwhelmingly dependent upon the presence of strong civic society organizations that promote sustainable practices and community engagement. The green initiative seldom comes from Municipal Corporations. NGOs, hired as consultants to draft Detailed Project Reports (DPRs), or as executing agencies can and have incorporated the green building dimension into the project, and very actively promote sustainable practices. While this has yielded positive results –but to different extents- in Sangli and Trivandrum, the absence of such organisations to make up for public sector apathy in cities like Indore leave a complete vacuum in terms of green building. The existence of a stimulating eco-system, that includes Municipal Corporations but other organizations as well, emerged as a crucial factor. The level of engagement of the local population in civic life, literacy rates, socio-economic indicators are elements that favor better governance and accountability, which in turns favors dynamic implementation of Central Government Schemes.

Supply Chain for Green Affordable Materials Is Not Yet Consolidated

At a local level, State and other actors are confronted with the lack of consolidation of the supply chain for green materials. In Madhya Pradesh, the housing board tries to use locally-available materials, such as stone slabs for roofing, when available. The Housing Board would also like to mainstream the use of Autoclaved Aerated Concrete Blocks. Nevertheless, these are not evenly available across the State. In demand hotspots, such as Bhopal and Indore for instance, these are not available. The unavailability of green building materials at a local level makes them expensive as building options. For the Madhya Pradesh Housing Board, sourcing autoclaved aerated concrete blocks from distant places, such as Nagpur or Surat would drive up the cost of projects. Further up the supply-change, there is a lack of financial incentives to launch green material supply ventures. Loan products are not readily available for small-scale and medium scale enterprises. Risks are also high as the market for green materials is underdeveloped.

Affordable Housing Projects Do Not Always Remain Affordable Till Completion

Governance structures and bureaucratic procedures represent a major economic challenge for private developers. Project approval often takes from 18 to 36 months for developers[32]. Delays are particularly crucial in the low-income sector, as the price hike can be passed on to the low-income customer only to a certain extent, beyond which demand for the project would decrease.

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[32] Agarwal et al., 2013

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Delays in Approvals
(Source: Retrieved from KPMG (2012), Bridging the Urban Housing Shortage in India. P. 9)

In the public sector, delay in the approval and disbursement of funds under BSUP and IHSDP heighten vulnerability to labour and material cost fluctuation. Delays and cost-escalation then become a vicious circle: budgets need to be revised and approved, which brings in further delay and cost-escalation. Cost-escalations also mean that some of the partners under BSUP and IHSDP will have to bear the extra-costs of the project. Thus, cost-escalation enhance government problems.

In Trivandrum, like in many other places, the Municipal corporation bore the extra-cost of BSUP project. This is a problem for municipalities with low revenues. In other cases like Indore, cost-escalations are passed on to the beneficiaries, which make it difficult for households to repay housing loans. Construction costs represent a major share of the total cost of the project, as opposed to higher income housing projects, where land concentrates the cost of the project. The fluctuation of the cost of both labour and materials greatly affects both public and private implementing agencies, resulting in substantial cost-hikes. Cement saw an escalation of 35% and labour of 30% from 2010 to 2011[33]. For 60 percent of the developers surveyed by Monitor, cost escalation is one of the top two challenges of the sector. This was confirmed by the study of Shri Ram Kamal Residency in Indore, where the developer highlighted the cost of materials as a major problem. For private actors, the shortage of affordable land is also reported as one of the major challenges[34].

In Trivandrum, construction materials intended for BSUP projects and stored near construction sites were stolen. Risks and additional costs are borne by the organisations contracted for construction, which acts as a deterrent for private actors to participate in affordable housing programs. Such risks are unaccounted for in policy provisions, and remain difficult to address because of their social aspects.

Debt Remains Costly and Not Very Accessible For Low-Income Customers

The cost of debt is on average higher for Housing Finance Institutions than it is for mainstream financial institutions. 50 percent of the H.F.Cs surveyed by Monitor ranked "cost of debt" as one of their top two

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[33] KPMG (2012), Bridging the Urban Housing Shortage in India
[34] Agarwal et al., 2013, KPMG 2012

challenges[35]. These difficulties to avail of financial services are reflected in high interest rates for the low income customer, who is in turn unable to access housing via the market. The difficult access to finance for the LIG customer is one of the major causes of booking cancellations, a substantial difficulty faced by the developers.

More financial instruments and models need to be developed by housing finance companies to provide financial services to customers engaged in the informal sector. Innovative models that bypass problems including customers' lack of documents, irregular income flows and little scope for loan securitization need to be developed. The number of HFCs engaged in informal sector lending for housing needs to reach a critical mass to widen the range of financial products available to customers and lower the cost of these products.

The existence of a substantial cash component in some housing markets is a problem for the LIG customer, as loans are available only on non-cash components[36]. Project delays equally impact the customer's financial capacities and prevent socio-economic planning for low-income families. The EWS still cannot afford privately-built units, which hints at the need for demand-side financial subsidies to bridge the affordability gap.

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[35] Agarwal et al., p. 29
[36] Ibid.

Triggers for Change

There is a need to develop an integrated understanding of sustainability such that green buildings are part of the affordable housing solution. The difficulty of the Indian eco-system to deliver affordable housing in significant quantities means that there is still time to incorporate a green dimension into affordable housing before delivering mechanisms are enabled and supply unleashed. Green building practices can be a part of the solution to smooth the delivery chain in the affordable housing sector, and they need to be promoted as such to make green solutions attractive to affordable housing stakeholders. There are several entry points which need to be simultaneously activated to mainstream green building in the affordable housing space in India. The ground level remains the space where most problems concentrate, and thus requires special attention.

Strengthening the Regulatory Framework

Central Government Actors Need to take a Leading Role in Mainstreaming Green Solutions through Policy Channels, while reinforcing Monitoring Mechanisms

In the policy chain, the Central Government stills plays a crucial role as a funder of affordable housing programs conditioned by the adoption of reforms, as a provider of incentives and guidelines and as the creator of a favorable eco-system for affordable housing provision. These three functions have proven to be crucial driver of change in terms of planning and regulation at the State and ULB level. A case in point is that under optional JNNURM reforms, 17 Indian States had earmarked 20 to 25 percent of all developed land in all housing projects for the EWS and LIG (RICS, 2010)[37].

The inclusion of mandatory or optional reforms related to environmental sustainability under RAY could mainstream environmental sustainability into affordable housing projects. At the DPR stage, standards in terms of sanitation arrangements, solid waste management could be set and condition the project's approval. Procurements guideline could recommend using green building materials.

Non-binding documents, such as guidelines, could also be circulated to implementing agency to provide adequate design typologies, featuring passive design techniques and showcasing the use of green materials and techniques. There has been some movement in this direction, but there needs to be customization at the sub-regional level to suit local climatic conditions.

Affordable housing stakeholders at the Central Government Level need to be convinced of the necessity to mainstream green affordable housing on the one hand, and of the role they can play in doing so on the other hand. Monitoring capacities and mechanisms need to be strengthened to ensure that the guidelines and reforms are being appropriately undertaken.

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[37] RICS Research, 2010, p.20

Adoption of Suitable Green Building Codes and Regulations at the State Level would make Environmental Standards Applicable to All Buildings

The adopting of a set of compelling green building by-laws and regulations at the State level would directly make green building standards applicable to all buildings within a State. Even though such regulations may be difficult to enforce at first, they would be instrumental in nurturing a demand for alternate materials and fostering a market for green solutions. Green building by-laws are the first and most fundamental step in bringing about a paradigmatic shift in the construction sector. The release of the new chapter on Approach to Sustainability in the National Building Code should provide State stakeholders with a model to incorporate environmental concerns into building bylaws. Technical support and capacity building could fast-track the adoption of such measures.

Addressing the lack of integration of green materials in Schedules of Rates (SOR), tenders and Bill of Quantities (BoQ) for preferential procurements would also unleash a demand for these materials in public housing schemes. Demonstration in large public construction projects will help in building confidence in these materials and technologies that will trickle down to the affordable housing sector as well.

On the demand side, communication campaigns to raise awareness about habitat and green buildings could also be best organized at the State level. Such campaigns should insist on the economic gains and increased levels of comfort generated by green buildings for all sections of society.

Developing design typologies and material guides for different regions

The assessment has shown that stakeholders willing to implement green solutions lack information regarding the local availability of materials. In Sangli, the NGO that drafted the DPR for the IHSDP would have liked to use greener materials and techniques, but lacked strong support from the State. The States are in a good position to document the local availability of alternative materials and circulate this information. Design typologies that are adapted to the local climate conditions also need to be developed at a decentralized level, and the State level seems to be an appropriate scale for this. Support agencies such as HUDCO and BMTPC could support this process of documentation.

Bridging the Affordability Gap with Suitable Demand-Sides Measures

Increasingly, it is becoming mandatory for housing boards and private developers to reserve a share of total FAR in all project for affordable housing. As green building projects are slowly developing in higher income groups implemented by State and Private actors, a share of total FAR and FSI is also reserved for the EWS and LIG in an increasing number of States. Mixed-income green projects can be a suitable way of promoting green buildings to all sections of society at once, and particularly to the economically weaker section, to whom they become aspirational. They have positive social outcomes as they prevent social segregation and enhance economic efficiency at the city level. On top of this, mixed-income projects can cross subsidize the use of green building techniques and materials in the affordable housing space. Interviews with the Madhya Pradesh Housing Board have shown that many affordable units built under mixed-income projects are out of reach of the urban poor. This is due to the absence of specific allocation mechanisms – the area of units is capped, but the income group of the buyer is not checked-, and to the absence of supply-side subsidies to bridge the affordability gap. Interest rate subsidies for the poor buying units in such housing projects could mainstream green building in the affordable housing space. Within the Rajiv Rinn Yojana, such measures already exist, but the urban poor need to

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be guided towards such schemes. More efforts are required to promote such measures to low-income customers. Building up awareness

Building Awareness and Developing Capacities

Making Green Building Aspirational by Mainstreaming them in the Public Sector and Higher Income Group Housing

Green public buildings increase the visibility of environment-friendly solutions and enhance their acceptance. In Kerala, most public buildings use unplastered red brick walls with rat trap bond masonry, making them part of cityscapes. Interviews with Municipal Corporation officers have shown that this fosters a sense of equal treatment and acceptance of such materials for the low-income citizen.

The promotion of green building options among all sections of societies, particularly higher income groups, can also facilitate the acceptance of green building materials in affordable housing. Green homes should be looked up at as positive indicators of social status by low-income citizens and assets they can take pride in.

The construction sector is one of the largest employers after agriculture. The acceptance of green building materials will increase as these are being used by construction workers.

Rental housing could be a preferred avenue to develop green building technologies. Most of the urban poor's reluctance towards green building comes from the fact that they need to invest their hard-earned savings to purchase a house under affordable housing schemes. Thinner steel columns, lesser quantities of bricks, and other cost savings methods appear as a compromise on the quality of the poor's assets. Rental housing could be used to mainstream the concept of green building, because the poor are relieved of the financial pressure linked to such a big investment. Rental housing could serve as a proof of concept, and an introduction towards sustainable self-owned housing. It could increase the perceived benefits of green buildings by the poor, particularly in terms of lower utility bills, better thermal comfort. Given the higher turnover in rental units, such houses could be used as a platform to promote green housing to a wider audience through direct experience, and word-of-mouth. Because of high migration rates, Indian cities have a huge demand for rental housing. Social rental housing is still in its infant stage in India, and represents a minor share of the total housing stock, but its development is one of the major targets under RAY.

Providing Training and Technical Assistance to Stakeholders Operating at the Local Level

The most important bottleneck in the policy chain is located at the implementation level. In the absence of massive and sustained capacity building efforts, policy and regulatory amendments to mainstream green building will not reach the ground level. The vicious and self-sustaining circle of low social acceptance of green materials and reluctance to use such materials needs to be addressed at three different levels.

Training and capacity building at the ULB level could yield tremendous benefits. Training needs to be of a very practical kind, so that local implementing actors can once and for all fully trust green building and cost-efficient technologies, and then gain confidence in their ability to implement such solutions. Such success stories could be highlighted both to inspire fellow practitioners and to act as a "reputation" incentive to develop such projects. Exercises of learning-by-doing, accompanied by strong monitoring could be one way of building up capacities.

At an earlier stage, awareness of environmental issues and green solutions need to be created in architecture and engineering colleges and universities. The lack of emphasis on environmental sustainability within curricula needs to be corrected. These efforts have to be made in parallel with the creation of a sizeable market for sustainable architecture, so as to encourage students to pursue this career path. Capacity building activities are also required for already practicing architects.

Lastly, masons, carpenters, electricians and other professions involved in the practical construction activities need to be trained accordingly, so that there exists a skilled labour force to implement the solutions chosen by architects and engineers within implementing agencies. The fear that masons might not be able to implement green solutions is one of the main barriers for public actors in using alternative materials and techniques. All three points of action should therefore be simultaneously activated.

Highlighting Benefits for Developers and End-Users

In a context of financial constraints for social housing stakeholders, green building solutions can and need to increase the efficiency of affordable housing schemes. Green solutions can be looked at from an economic, social or environmental perspective, and different discourses need to be activated depending on the drivers of each stakeholder.

There is a need to create an understanding that green solutions can bring-in economic value-added for public and private developers. Efforts are required to disseminate the message that green building solutions can result in cost-savings for developers. Very importantly, it needs to be highlighted that cost-savings realized thanks to green solutions do not entail a quality trade-off. The developers need to be made aware of the benefits of green building solutions for residents to successfully market them to the low-income customer. Successful marketing is a key aspect in making green solutions aspirational. What is currently perceived as a market risk can be turned into a niche market if a synergy is created between supply and demand. To that aim, the increased comfort resulting from the usage of green building solutions need to be highlighted: better insulation, lower utility bills, enhanced ventilation and natural lighting need not be promoted as sustainable solutions, but as characteristics of a comfortable living.

By providing more comfortable residential units, green solutions can therefore address the problem of the lack of acceptance of public social housing units by target communities by increasing the quality of the house for the end-user.

Stimulating Supply Chain through Public Demand

States are in the best position to take a leading role in mainstreaming green building technologies and materials, because the geographical scale at which they operate puts them in a favorable position to act upon supply and demand at a local level. Green building in India is to a large extent a "chicken and egg" dilemma, where lack of supply and lack of demand mutually reinforce each other. Like in Kerala, States can take the lead in creating a demand for green technologies through public buildings. State demand encourages the consolidation of local supply chains. In Kerala, building centres at the district level also act on the supply-side by producing green materials. The network of building centres that was established in the 1980s in India could provide the spine bone for the stimulation of local supply chains.

Further Areas of Research

The assessment phase has highlighted the need for further research in a few areas of crucial importance within the green affordable housing space. The conditions required to activate each of the triggers for change identified in this report need further investigation, keeping in mind the different roles and incentives of each stakeholder.

- The balance between scale and adaption to local conditions needs further attention. Particularly, it needs to be determined at what scale social and environmental aspects of projects can be incorporated in an economically viable manner. As supply chains are not fully consolidated yet, transport cost for green materials tend to be high. A critical threshold in terms of development size might need to be reached for developers to reap benefits from using green materials.
- In the same way, a balance needs to be found between standardization and community design, in a context where the housing needs remain pressing. Determining at which scale community participation can be a factor of both successful and efficient is an important aspect to consider. Ways to institutionalize such processes also need to be studied.
- Rental housing needs be investigated as an alternative to sellable affordable residential units for the mainstreaming of green solutions. The modalities according to which this could be achieved need to be studied. In-depth surveys are also necessary to test the readiness of the population to accept green social rental housing.
- The quality of private affordable housing development requires further documentation, so as to build up a fair representation of the quality of the private affordable housing stock in India. New models need to be devised to monitor the quality of such project, as it is becoming increasingly evident that they are becoming the preferred tool of affordable housing delivery in India.

List of Annexures

Indore

Sangli

Trivandrum

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