

# **Sustainable and Affordable Housing: Opportunities and Challenges**

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## **Abstract**

In the context of rapidly urbanising globe, where the world urban population is projected to reach sixty-eight percent from the current fifty-five percent by 2050 and when global community is pushing for net zero carbon emission by 2050, the need for sustainable and affordable housing assumes critical importance. While housing is fundamental to the socio-economic well-being of the people, the sector is also responsible for between seventeen to twenty-one percent of global carbon emissions. Defining what constitutes sustainable and affordable housing, this paper details out India's approach on making houses sustainable and affordable. The paper also analyses key challenges and the way forward for promoting sustainable housing.

**Keywords:** Sustainable affordable Housing, Climate Change, PMAY-Urban, ULBs, Green Technology.

## **Urbanisation, Housing and Climate Change `**

More than half of the world population of 7.9 billion lives in cities which is expected to reach 6.7 billion of the projected total global population of 9.8 billion by 2050. The spike in urban population between 2011 – 2050 would be around eighty-six percent. Aligned with global trend, India is undergoing a process of rapid urbanisation, with more than 377.1 million living in urban areas in 2011 and 470 million in 2021. It is expected that this figure will reach around 600 million by 2036 (World Bank, 2022).

While urbanization is fundamental to sustained national economic growth due to demographic dividend, agglomeration economies and economies of scale effects of cities, it also brings with it complex challenges for the policy makers and city planners such as inequity, exclusivity, poverty etc along with urban basic amenities as well as increasing greenhouse gas emissions. As per UN SDG 11 Synthesis Report-2018, the total slum population in the world increased from 883 million in 2014 to around one billion in 2018,

which could double to two billion by 2030 and three billion by 2050, in the business-as-usual scenario. In addition, 1.6 billion people live in inadequate houses. By 2030, three billion people will need affordable housing units whether newly-built or renovated, which will double the global material consumption (WGBC, 2023).

Urban housing in India continues to be a challenge with about 11.2 million houses to be built by 2022 (MoHUA, 2021). Though various housing programmes have enabled the provision of affordable housing; with increasing urbanisation and rural-urban migration, the pressure on housing quantity, quality, sustainability and its affordability will increase and remain the focal point for the policy makers while designing housing and urban policies mixed with judicious programmes.

The construction sector hugely contributes to greenhouse gas emissions and climate change. The UNEP-Global Status Report for Buildings and Construction (2022) estimates that the building sector accounted for over thirty-four percent of energy demand and around thirty-seven percent of energy and process-related CO<sub>2</sub> emissions in 2021. India's building sector is the largest emitter of GHG, accounting for twenty-four percent of the total greenhouse gas emissions. In this context, the role of sustainable and affordable housing assumes critical importance for the world to meet net zero carbon emissions by 2050, so as to keep global temperature rise within 1.5°C.

In the context of the critical role of housing sector for the environmental sustainability and the well-being of the people, it is important to integrate affordability with the sustainability of housing so as to create demand for the same rather than building houses as counterproductive to the requirement. The need for developing sustainable and affordable housing has been emphasised in various international declarations. For example, Article Twenty-five of the Universal Declaration of Human Rights states that: 'Everyone has the right to a standard of living adequate for the health and wellbeing of himself and of his family' (UN, 1948). Further, the UN Special Rapporteur on the Right to Housing emphasizes that 'it is time to recognise that sustainability of housing should become an additional core element of the right to adequate housing, in order to ensure that the right to adequate housing is interpreted in full consonance with the right to a clean, healthy and sustainable environment' (UN-OHCHR, 2022). In the

spirit of 'leave no one behind', the UN 2030 development agenda, i.e., Sustainable Development Goals (SDGs), through target 11.1 of Goal no.11 prioritises housing as one of the key areas of focus by mandating the member nations to ensure access for all to affordable housing and basic services and upgrade slums by 2030 in order to make cities inclusive, safe, and sustainable (UN-SDG, 2015). The New Urban Agenda of Habitat III Conference 2016 also stresses upon the right to adequate housing as a component of the right to an adequate standard of living.

In line with the emerging global discourses on promoting adequate and sustainable housing, it is essential to define the levers and challenges involved in promoting the same.

### **Defining Sustainable & Affordable Housing**

Attempts to solve the shortage of housing has to deal with affordability as majority of the urban households belong to the economically weaker sections. UN-Habitat defines affordable housing as one which is adequate in quality and location and is not so expensive that it prohibits its occupants from meeting other basic living costs or threatens their enjoyments of basic human rights (UN Habitat, 2020). For housing to be adequate, it must, at least, meet other six criteria: security of tenure, availability of services, infrastructure, habitability, accessibility, location and cultural adequacy. Globally, housing is deemed affordable when a household spends less than thirty percent of their income on housing-related expenses. Affordability is also defined in terms of size and cost of the housing unit. In India, the definition of affordable housing has evolved from the first official definition based on the Report of the High-Level Task Force on 'Affordable Housing for All' under the Chairmanship of Deepak Parekh (2008) to the latest definition under PMAY (Urban)-HfA as given in Table 1.

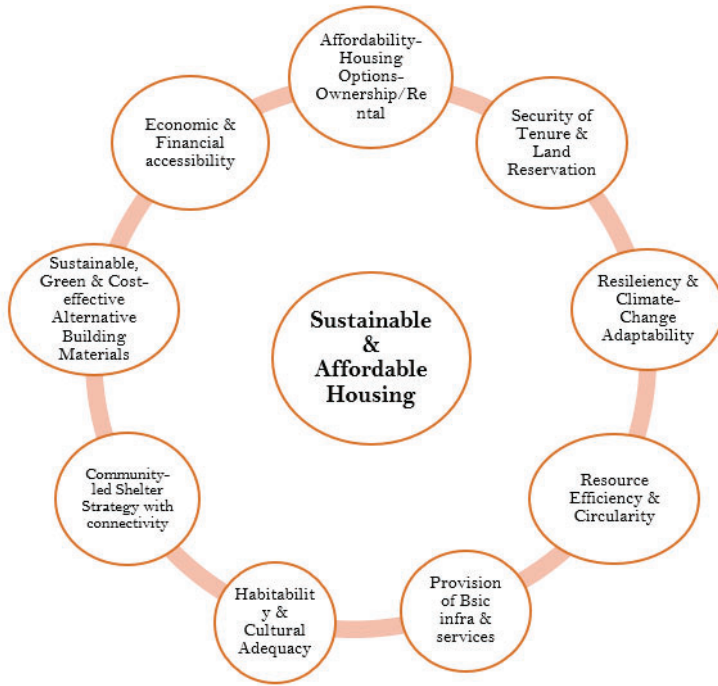
**Table 1: Defining Affordable Housing in India**

I. Deepak Parekh Committee 2008: Task Force on 'Affordable Housing for All'			II. MoHUPA Task Force on 'Affordable Housing, 2012		
Criterion	EWS/LIG	MIG	Criterion	EWS	LIG
Size	300-600 sq.ft Carpet Area	Not exceeding 1200 sq.ft carpet area	Size – Carpet Area (sq.mt)	21 - 27	28 – 60 (LIG-A: 28-40; LIG-B: 41-60)
Cost	Not exceeding 4 times Annual Gross Household Income	Not exceeding 5 times Annual Gross Household Income	Annual Income	Rs. 1 Lakh	Rs. 1 Lakh – Rs. 2 Lakh
EMI or Rent/pm	Not exceeding 30% of Gross Monthly Income	Not exceeding 40% of Gross Monthly Income	Borrowing Capacity	5 times of Annual income	5 times of Annual income
III. PMAY Definition (2015-till date)					
Criterion	EWS	LIG	MIG -I	MIG-II	
Size – Carpet Area (sq.mt)	30	60	160	200	
Annual Income	Upto Rs. 300,000	> Rs. 300,000 upto Rs. 600,000	> Rs. 600,000 upto Rs. 1,200,000	> Rs. 1,200,000 up to Rs. 1,800,000	

*Source: Compiled by Author*

The Deepak Parekh Committee not only defined the size of the housing units but also specified the standards for a decent house and gave the definition of 'adequate shelter' as 'more than a roof over one's head: It also means adequate privacy; adequate space; physical accessibility; adequate security; adequate lighting, heating and ventilation; adequate basic infrastructure; -- all of which should be available at affordable cost' (Deepak Parekh Committee 2008).

Affordable housing has both financial and technical aspects. While the financial aspect is focused on cost reduction through subsidised land, affordable institutional finance and income upgradation so as to make the housing price below the market rate, the promotion of low-cost housing using cost-effective and sustainable building material & innovative construction technology is the focus of the later. The need for looking at alternative building materials with low carbon footprints and decarbonizing conventional materials is important so as to meet net zero carbon emissions target by 2050.



**Figure 2:** Levers of Sustainable & Affordable Housing  
*Source: Author*

Therefore, sustainable and affordable housing should include a range of key levers, as given in Figure 2, such as: (i) Affordable Housing Options, both Ownership/rental; (ii) Economic and financial accessibility including economically affordable housing price and access to long-tenor & cheaper formal finance; (iii) Security of Tenure & Land Reservation; (iv) Sustainable, Green & Cost-effective Alternative Building Materials; (v) Community-led Shelter Strategy with connectivity - community-led organizations need to be formally integrated in ULBs for planning & implementation; (vi) Slum Upgradation & Provision of Basic services; (vii) Resiliency & Climate-Change Adaptability so as to withstand extreme weather conditions, durable and easy to maintain throughout its lifecycle; (viii) Resource Efficiency & Circularity so as to maintain low carbon emission, energy efficiency and recycling; and (ix) Habitability & cultural adequacy so as to maintain social cohesion.

## Sustainable & Affordable Housing – India’s Approach

Mission-mode based programmes along with comprehensive policy framework for affordable housing and development of human settlements as sustainable entities, is the hallmark of India’s approach for sustainable and affordable housing. In fact, the provision of affordable housing has been a priority in India since independence with various housing policies and flagship programmes designed to cater different categories of socio-economic groups, especially the marginalized, economically weaker sections and lower income groups. India’s renewed approach has been to devise a package covering affordable & adequate financing, appropriate planning, efficient designs and use of green technologies, that can make housing for all a reality. appropriate options to bring down the cost of construction through adoption and promotion of modern, innovative, green and cost-effective building materials and technologies remains the focus.

Some of the key housing sector policies and programmes listed are in Figure 3.

Year	Key Housing Policies	Year	Key Housing Programmes
1988	Initiation of 1 <sup>st</sup> National Housing Policy	1988	Night Shelter Scheme
1992	The 74 <sup>th</sup> Constitutional Amendment Act	1996	National Slum Development Programme
1994	National Housing Policy	1998	Two-million Housing Programme for EWS/LIG
1998	National Housing & Habitat Policy	2001	Valmki Ambedkar Awas Yojana (VAMBAY)
2007	National Urban Housing & Habitat Policy	2005	Jawaharlal Nehru National Urban Renewal Mission (JNNURM)
2015	Template for State Housing Policies	2009	Interest Subsidy Housing for Urban Poor (ISHUP); Affordable Housing in Partnership

2016	Real Estate (Regulation & Development) Act- 2016	2011-12	Rajiv Awas Yojana (RAY)
2018	PPP Models for Affordable Housing; National Urban Policy Framework; Draft National Urban Rental Housing Policy	2015	Pradhan Mantri Awas Yojana (PMAY)
		2020	Affordable Rental Housing Complex (ARHC) Scheme
2021	Model Tenancy Act, 2021		

**Figure 3: Indian Housing Policies & Programmes**

*Source: Compiled by Author*

For seven decades, the focus has slowly shifted from providing affordable housing to development of sustainable, habitable, adequate and affordable housing in India, the latest being the Pradhan Mantri Awas Yojana -Urban (PMAY-U)-Housing for All; the largest sustainable & affordable housing programme in the world in terms of its size, scale and performance, launched in 2015 with four housing options (Figure 4). PMAY-U addresses the extent of housing shortage with different socio-economic groups including slum dwellers, housing condition and tenure status across scales of urban demography.



Affordable Rental Housing Complex Scheme
Model-1: Converting existing vacant Govt. funded houses into ARHCs under PPP mode or by Public agencies
Model-2: Construction, Operation & Maintenance of ARHCs by Private/Public Entities on their own vacant land
V- ARHC

**Figure 4:** PMAY-Urban Housing Verticals  
*Source: PMAY-Urban Guidelines, MoHUA*

The PMAY-Urban not only ensures a pucca house having basic amenities like toilet, water supply, electricity and kitchen to all eligible urban households, but also guarantees a dignified living along with sense of security and pride of ownership to the beneficiaries as well as acts as an engine of economic growth through the provision of employment and income support.

### **Promoting Sustainable & Affordable Housing through PMAY-Technology Sub-Mission**


The Technology Sub-Mission (TSM) under the PMAY-U has been created for propagation of modern, innovative and green construction technologies, to ensure the sustainability of the houses constructed under the Programme. The aim of TSM is to provide sustainable technological solutions for faster & cost-effective construction of houses suiting to various geo-climatic conditions of the country. Further, as part of TSM, a Global Housing Technology Challenge-India (GHTC) programme has been initiated to promote the use of new construction technologies that are sustainable, disaster resilient, and save time and cost in low-cost housing projects. GHTC-India seeks to obtain the best innovative construction technologies across the globe through a competitive process. It aims to transform the eco-



system of housing construction sector through lighthouse projects (LHPs) being built using advanced technologies in six States through construction of minimum 1000 houses (Figure 5).

LHP Location	Technology Selected	No. of Houses	Unit Size (sqm)	Unit Cost (with Infra.) (Rs. Lakh)
Indore (Madhya Pradesh)	Prefabricated Sandwich Panel System	1024	29.04	12.50
Rajkot (Gujarat)	Monolithic Concrete Construction using Tunnel Formwork	1144	39.77	10.39
Chennai (Tamil Nadu)	Precast Concrete Construction System – Precast Components Assembled at Site	1152	26.58	10.09
Ranchi (Jharkhand)	Precast Concrete Construction System – 3D Volumetric	1008	29.85	13.29
Agartala (Tripura)	Light Gauge Steel Structural System & Pre-engineered Steel Structural System	1000	30.00	16.25
Lucknow (Uttar Pradesh)	PVC Stay In Place Formwork System	1040	34.50	12.58

One completed building with the technology is shown here



Indore

Chennai, India




Figure 5: Light House Projects in India

Source: Compiled by Author

These LHPs are acting as live laboratories to establish innovative and green construction practices across India. Approximately fifty-four innovative alternate construction technologies have been identified under TSM & GHTC-India. About fifteen Lakh houses are being built using innovative technologies under PMAY(U) & other state schemes.

## Challenges & Opportunities for Sustainable & Affordable Housing in India

With the trending urbanisation, the need for more housing stock has spiked up; creating various challenges. The key challenges include four broad categories, viz. land, governance, finance and construction. There are wide opportunities to address these challenges for creating sustainable and affordable housing in India, which are briefly discussed below.

### (i) Land-related

The availability of land for housing along with proper land records and laws pose problems for housing projects. Since land is a state subject, the question

of who is going to provide land at desired location for the project arises. Other challenges include land tenure security, cost of land, density norms, untenable slum land, etc. Land tenure security for slums and regularization of unauthorized colonies is very important for nudging self-housing. There are various complications associated with land use and land transfer policies which cause unnecessary waste of precious land. Further, the concept of land monetization as a useful source of financing affordable housing, though done in few cases in India, has not been scaled up adequately across states.

There are opportunities for addressing the land-related challenges for increasing land supply for sustainable and affordable housing by removing various procedural bottlenecks through appropriate Land Policy at the national and state level. There is a need for clear demarcation of land use pattern and proper inventory of assets and its regular updating through computerised database of properties and use of GIS. Land can be given as grant, long-term lease or grant-cum-lease basis for housing. Tenure security may be granted on de-facto basis without right to property to all households in slum and unauthorized areas on lands that are not required for public purpose or unlikely to be developed by the land owing agency in the next ten years and are not ecologically fragile. States may work with land-owning agencies such as railways, etc. on grant of land tenure to settlements on their land. The programme like JAGA Mission (under Odisha Land Rights to Slum Dwellers Act, 2017), which is designed for assigning land rights to the identified slum dwellers for redevelopment, rehabilitation and upgradation of slums needs to be suitably replicated in other States as well.

### **(ii) Governance:**

The pace of urbanization in India poses enormous challenges to urban governance. The major governance-related challenges for the housing development include: too many approvals for housing projects as well as cumbersome approval process leading to cost escalation and project delay; no single window procedure followed; cases of litigation & corruption; and inadequate regulatory framework for integrating housing and sustainability, etc.

Reform in the institutions of urban governance is crucial to combat these challenges. Strong urban governance is the foundation of urban strategy. There is a need for formulating a sustainable housing policy for making houses resilient as well as affordable.

Improving urban governance through several reform measures such as e-governance, single-window clearance system, double-entry accounting system and energy & water audit along with making municipalities fiscally robust, bringing in optimality in land use, ensuring tenurial security, earmarking of the municipal budget for urban poor settlements, reserving lands for economically weaker households, enactment of a Community Participation Law, enactment of a Public Disclosure Law, the Real Estate (Regulation & Development) Act-2016, Model Tenancy Act 2021, and building capacities are some of the key directions being undertaken in India for providing sustainable and affordable housing as well as making urbanization efficient and inclusive.

### **(iii) Finance-related**

Finance will play a catalytic role for mainstreaming green mass housing. Availability of long-tenor and cheaper formal sector finance for the informal sector & poor households as well as Private Sector developers is a key challenge. As per an estimate (NHB, 2022), out of the total flow of funds to housing sector by public sector banks and HFCs, less than ten percent pertains to individual housing loans, i.e., EWS & LIG households, whereas the housing shortage for these two categories is above ninety-six percent, it depicts skewed flow of funds in favour of big-ticket individual housing loans. There is no Micro Housing Finance Institution for providing housing loans at affordable terms of finance to the informal sector households.

To address such challenges, there is a need for innovative financing mechanisms and re-engineering the existing financing sources for enhancing the flow of funds to the sustainable and affordable housing market. It is argued that since sustainable building materials and technologies involve more cost than the conventional material, there is a case for providing additional grants for ensuring use of sustainable practices.

Various green financing options like Mutual Funds, Exchange Traded Fund and Index Funds are on a gradual rise. The opportunities for developing green financing instruments include: soft Green Mortgage Loans with favourable financing conditions, like lower interest rates, longer amortization times, or higher loan to-value ceilings from Banks and HFCs/NBFCs; Priority Sector Lending (PSL) for Green Housing; Tax-free Green Bonds/ 'Green Housing Bond'; Green Real Estate Investment Trust (REIT); Green Housing Insurance Scheme based on building's green performance after construction; and tapping, incentivising Private Sector

participation in sustainable housing projects through PPP, tax incentives and interest subvention.

**(v) Construction-related:**

Housing developed by public and private agencies should be liveable and not made cheaper by lowering standards. Standardization of building components is a critical challenge to the sustainable housing sector. Other major challenges include: technology suitability: innovative construction technology at affordable cost, etc, poor supply chain of sustainable building materials, archaic building bye-laws, improper construction practices without credibility of builders, lack of transparency in beneficiary selection, lack of skilled manpower, construction delays leading to time & cost overruns and no designated agency for construction & maintenance of houses.

There is room for improving construction standards to make it liveable as well as disaster resilient. Efforts should be made to make supply-chain of sustainable materials accessible to housing developers at lower costs. Housing development should follow sizing and density norms prescribed in the Master Plans/ Urban & Regional Development Plans Formulation and Implementation (URDPFI) guidelines to prevent overcrowding and resource stress (water, sewerage, solid waste etc.). There is a case for providing green and innovative technological support for house construction by the poor households. In the emerging climate change environment, housing projects should be designed so as to protect the area's natural ecology and ensure resilience by protecting, harvesting and sustaining resources. There are also opportunities for developing housing projects with zero ecological footprint in construction as well as having resilience features such as household/community rainwater harvesting, water recharge systems, wastewater treatment and recycling using dual piping, waste recycling areas, solar energy, green walls etc.

**Mainstreaming Sustainable & affordable housing; The way forward:**

There is a critical need to mainstream sustainability into the mass affordable housing programmes to reduce the carbon footprints and keep the cost within the affordable limits of different socio-economic groups. The way forward for designing sustainable housing programmes requires addressing the following issues:

- a. **Delivery Model:** The appropriate design of delivery model for mainstreaming sustainable and affordable housing would determine how effectively the programme can be promoted in the country. Appropriate technology and cost-effective building materials are an integral part of cost-effective, affordable and acceptable shelter delivery system including incremental construction and housing upgradation programme for the poor sections of population. An improved policy environment based on inter-sectoral approach is required to strengthen the construction industry.
- b. **Land Tenure Rights:** The issues of land tenability and ownership are key for sustainable housing programmes, especially for slum upgrading programmes. There is a case for formulating a National or Local level Policy on Land Tenure, which should clearly define the appropriate forms of land tenure security - de facto/ de jure - full property rights to occupancy rights.
- c. **Reorienting Role of Urban local bodies and state agencies:** While the efforts of central and state governments in making houses sustainable and affordable have been encouraging, the ULBs hold the key for promoting sustainable and affordable housing in India. The urban local bodies and state agencies such as Housing Boards, Development Authorities ought to cover technology in addition to the financial aspect of affordability. All housing and construction agencies in the public, cooperative and private sectors may be mandated to take up at least thirty to thirty-five percent of housing units or public buildings like schools, health centres, etc. by incorporating new technologies for effective savings in the construction cost. This will not only popularize the cost-effective technologies but would foster confidence in such technologies and ensure widespread application.
- d. **Training at Grassroots Level:** Skill development training for all stakeholders is essential for implementing sustainable housing programmes efficiently. A variety of workers such as workmen, artisans, contractors, supervisors, middle level construction managers etc. constitute the working force. Though there are several formal courses and training schemes but most of them are not structured to meet the needs of cost-effective housing

construction programmes particularly that of innovative alternate building materials and construction technologies.

- e. **Reviving Building Centre Movement:** In view of the important role played by the Building Centres (BC), BC schemes should be revived and further strengthened to become self-sustaining vehicles for technology dissemination, skill upgradation and capacity building with the involvement of NGOs, CBOs, Professionals and Entrepreneurs. This will complement the efforts of Technology Sub-Mission (TSM) of PMAY-Urban.
- f. **New Approach to Construction Management:** The real solution to the problem of housing would be to adopt new approach to construction management where emphasis is led on quality material & construction, use of sustainable materials, timely completion, more focus on accountability and customer satisfaction. Implementation of the various building codes for earthquakes, cyclones and flood resistant buildings may be ensured through appropriate legislation. A system of reward and penalty can ensure timely and quality construction, saving on costs considerably.

## Conclusion

India is at a crucial stage in its urban transition and demand for sustainable, adequate and affordable housing is going to be the priority for habitat development for the years to come. Therefore, these enablers for making housing sustainable and affordable call for a paradigm shift in urban policy making, urban planning, green financing and sustainable human settlement management. The emerging policy interventions of the Government have generated a host of opportunities and challenges for all the key stakeholders in transferring skills, technology and affordable building materials, finance and basic amenities particularly to the uncovered segments of the society, in order to provide sustainable and affordable housing for all.

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