SCOPING PAPER: TECHNICAL ASSISTANCE FOR AFFORDABLE HOUSING SECTOR

Outlook and opportunities under Housing for All mission focusing on resource efficiency, climate responsiveness, resilience and human comfort

Scoping Paper

on

Technical Assistance for Affordable Housing Sector

Outlook and opportunities under Housing for All mission focusing on resource efficiency, climate responsiveness, resilience and human comfort

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Why this paper?

India has a looming housing shortage, especially for urban poor, for more than a decade now. The growth of informal settlements at six per cent is outstripping the urban growth rate (compounded annually) of 2.8 per cent. Several housing policies and programmes have been launched to curb the soaring demand for home, such as the National Housing and Habitat Policy (2007), Jawaharlal Nehru National Urban Renewal Mission (Basic Services for Urban Poor and Integrated Housing and Slum Development Programme, 2005), Affordable Housing in Partnership (2009) and Rajiv Awas Yojana (2011). However, incomprehensive strategy, weak implementation and socio-economic inconsideration have resulted in housing infrastructure that has failed to attract and inhabit the weaker sections of the society.

In 2015, Pradhan Mantri Awas Yojana – Housing for All mission (Urban and *Gramin*) was announced with a deemed urgency to provide an affordable house to every household. It was followed with a recognition to affordable housing as a new sub-sector under Social and Commercial Infrastructure, by Ministry of Finance. Also, the Union Budget 2017 has increased allocation of funds for rural housing and urban housing from INR 150 billion to INR 226 billion and INR 50.75 billion to INR 60.42 billion respectively. As a result, the country is at the onset of massive development, triggered primarily by affordable housing sector.

There will be a huge requirement for resources, for instance, about 200,000 hectares of land will be needed to provide the housing deficit until 2022, which translates to addition of 244 million tonnes of carbon emissions solely from the buildings sector as a direct repercussion of the mission.[1]

Although, a guidance outlook for sustainability is brought in by the mission guidelines, Sustainable Development Goals, National Action Plan on Climate Change, Liveability Index, Environmental conditions in Model Building Bye-laws 2016, Development of Solar Cities Programme, Smart Cities Mission, Swachh Bharat Mission, draft National Energy Policy 2016, Energy Conservation Building Code, National Building Code, Waste Management Rules 2016, and several other central and state-level policies, there is a strong need for a comprehensive address to nation's affordable housing challenge.

Housing is no longer considered as simply a roof over one's head. It has evolved as a physical and social structure that plays a crucial role in sustainable development. It is imperative to ensure development of housing that is resource-efficient, climate-responsive, resilient, safe, healthy, comfortable and most importantly affordable to the rapidly growing urban masses, especially urban poor.

Centre for Science and Environment brings such insight through this document. It puts forth a guidance framework to enable sustainable practices of planning, design, construction and operation and maintenance of infrastructure, built as a repercussion of the Housing for All mission. These guidelines will not only help prevent lock-in of high resource intensity, but provide a pathway to healthy, affordable and liveable neighbourhoods that eventually shape a sustainable habitat.

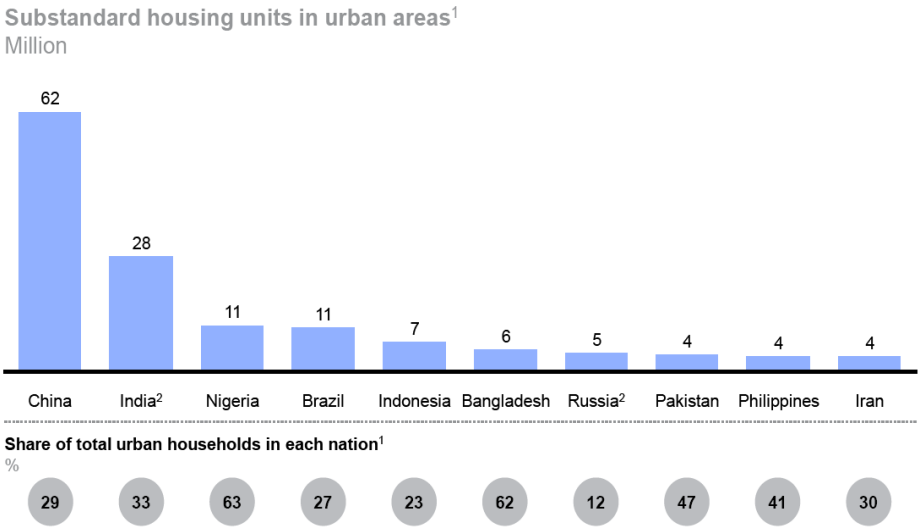
Affordable housing is a global issue

Shelter is the most fundamental unit of a person's health and well-being. The need for a decent housing would grow to an extent where a third of city dwellers would not find one by 2025, according to United Nations estimate.[2] Affordable housing has caught attention of international forums recently as the number of people deprived of a liveable and quality habitat keeps shooting higher and higher. Number of households affected by poor housing was estimated at 330 million in 2012 and projected to grow to 440 million by 2025, i.e. an increase of 1.6 billion people.[3]

Governments do provide housing for poor, but those usually compromise on the quality of materials used, are remotely located, have high operation and maintenance costs, with little or zero thought to environment and socio-cultural requirements of the people. These facets directly affect people's comfort and day to day conduct of life, but are seldom addressed in an integrated manner.

Lack of cohesion in housing provision is severe in developing nations. According to a study, about 60 per cent of substandard housing is concentrated in 10 countries, of which the major chunk lies in China and India.

Figure 1: Substandard housing units in urban areas (in millions); Source: MGI, 2014



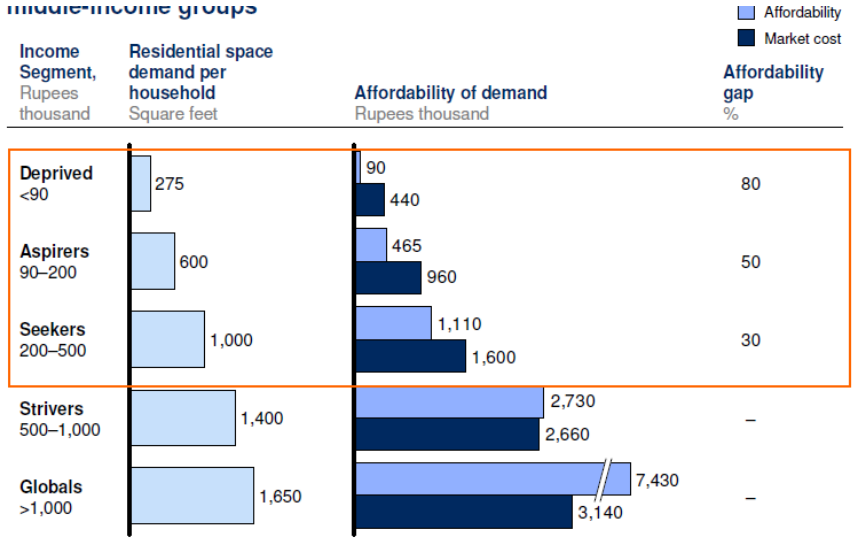
Developing economies are witnessing fastest urban population growth. With limited absorption capacity in agriculture sector, the rise in urbanisation is a direct consequence of population influx from rural areas. Majority of migrated workforce lacks skill and lands informal and marginal jobs. The phenomenon is inherent to the developing world and upsurges the number of low-income households in urban areas. Lack of formal housing, which is responsive to the needs of these households, then leads to creation of informal settlements. Existing residential built-stock also faces degradation due to congestion, obsolescence and overburdening of basic service systems, resulting in an unsustainable built environment.

Staggered Indian housing landscape

The nature of housing demand and supply in Indian market is a bit distorted. The country's affordable housing demand stood at 25 million in 2010, according to estimates by McKinsey Global Institute (MGI). About 90 per cent of this demand comes from households with annual income less than INR 500,000. As per the official housing shortage figures (2012), 96 per cent

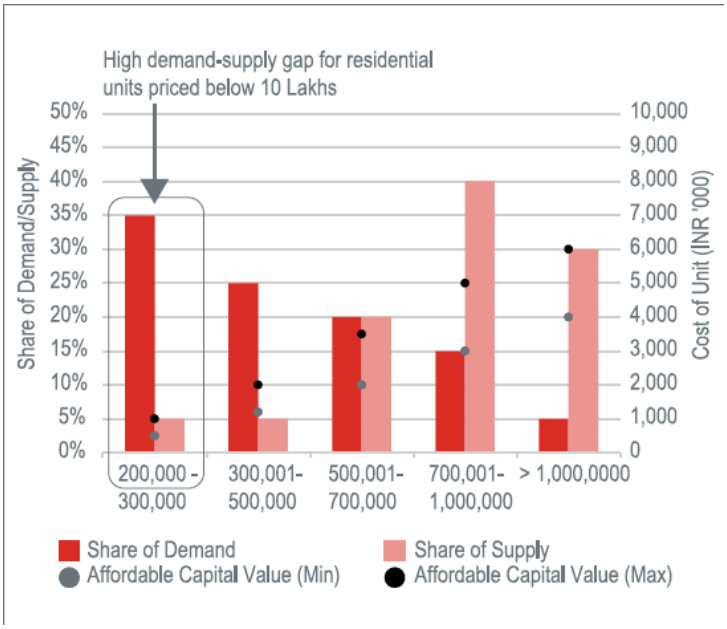
of the demand comes from households with annual income within INR 120,000.[4] The analysis also reveals that the affordability gap is massive among the segment with annual income under INR 200,000. It is 50 per cent for INR 90,000-200,000 income segment and 80 per cent for the segment with annual income under INR 90,000. The gap is showcased with a Tier 2 cities example in *Figure 2: Affordability is an acute problem among the lower income segments*; Source: McKinsey Global Institute Analysis, 2010.

Figure 2: Affordability is an acute problem among the lower income segments; Source: McKinsey Global Institute Analysis, 2010



Real estate consulting giant Jones Lang LaSalle also attributes 60 per cent of the housing demand to households with income less than INR 500,000, while the units supplied in affordable segment constitute only 10 per cent of the total supply. On the other hand, households with income more than INR 700,000 constitute just 20 per cent of the housing demand, still, 70 per cent of the housing supply caters to them.[5]

Figure 3: High demand supply gap in housing for the lower rung; Source: Jones Lang LaSalle analysis, 2010



The turning tide

Following the launch of HFA mission and various economic reforms in previous couple of years, the real estate industry has shifted its focus on affordable housing segment. According to real estate consultants Cushman & Wakefield, about 35 per cent of the total housing project launches were under affordable segment in Quarter 1 of 2016, recording an increase of 27 per cent year-on-year across top eight Indian cities.[6] Moreover, Quarter 1 and 2 together witnessed affordable housing launches doubling in comparison to previous year.[7] Absorption was mostly seen in key cities like Bangalore, Mumbai, Pune and Delhi-NCR.

In the first half of 2017 also, homes priced below INR 5,000,000 accounted for 71 per cent of total launches, forming an uplift of 52 per cent from the previous year.[8] An overall increase of 75 per cent was seen in affordable housing sales in 2017 over the previous year. This indicates affordable housing has caught the centre stage of India's real estate and is likely to remain there in the coming years, according to industry experts. The sector has gained accolades to bring a colossal investment of USD 1.3 trillion over the next seven years.[9]

How much is affordable?

Affordability is subjective. In context of housing, it is generally the proportion of money one household can spend from their income towards a dwelling out. This proportion varies from household to household. The proportion suggested by Deepak Parekh Committee is a contribution of at least 30 per cent of household monthly income towards rent and four times the household's gross annual income towards the cost of house for economically weaker system (EWS) and low-income group (LIG). While the lower income segments can afford to pay less percentage of their annual income towards rent or cost of the housing, the revised percentages as suggested in a study by National Resource Centre are shown in *Table 1: Housing affordability according to income segments*:[10]

Table 1: Housing affordability according to income segments

Income category (INR/month)	**Affordability to pay the EMI/Rent (per cent of income)**	**Affordability to pay cost of house (multiple of annual income)**
EWS (upto 5000)	20	3
LIG (5001 to 10,000)	30	4
MIG I & II (10,001 to 1,00,000)	40	5

Source: National Resource Centre and Ministry of Urban Housing & Urban Poverty Alleviation

The houses developed and allotted by the government to the lower rung of income generally range between INR 600,000 to INR 1,000,000. They are poorly designed and cheaply built, which often requires costly repairs. The living comfort is highly compromised such as poor

location leading to increase in transport demand, lack of natural lighting, poor ventilation, compromised greens and common services. These drawbacks have traditionally pushed the poor dwellers to leave the allotted housing and return to the employment hubs, where they revert to squatting.

Clamour for home

The state of housing in India is in distress in more than one ways. There is the official housing shortage on one hand and the issue of slums and degrading housing stock on the other hand. The clamour for home is equivalently high in both urban and rural areas.

Official shortage

According to a report submitted by a technical group (2012-2017) to the Ministry of Housing and Urban Poverty Alleviation (MHUPA), India's urban housing deficit is estimated at nearly 18.78 million households as of 2015. This estimate was revised from an earlier figure of 26.53 million units in 2013 by the same group, while unofficial figures are not less than 40 million. The urban housing deficit is projected to reach 48 million by 2022 – including the current demand – according to a study by KPMG and NAREDCO as shown in *Table 2: Current and projected (2022) housing demand*.[11] The demand for houses in urban areas is going to outdo the rural housing deficit by 2022.

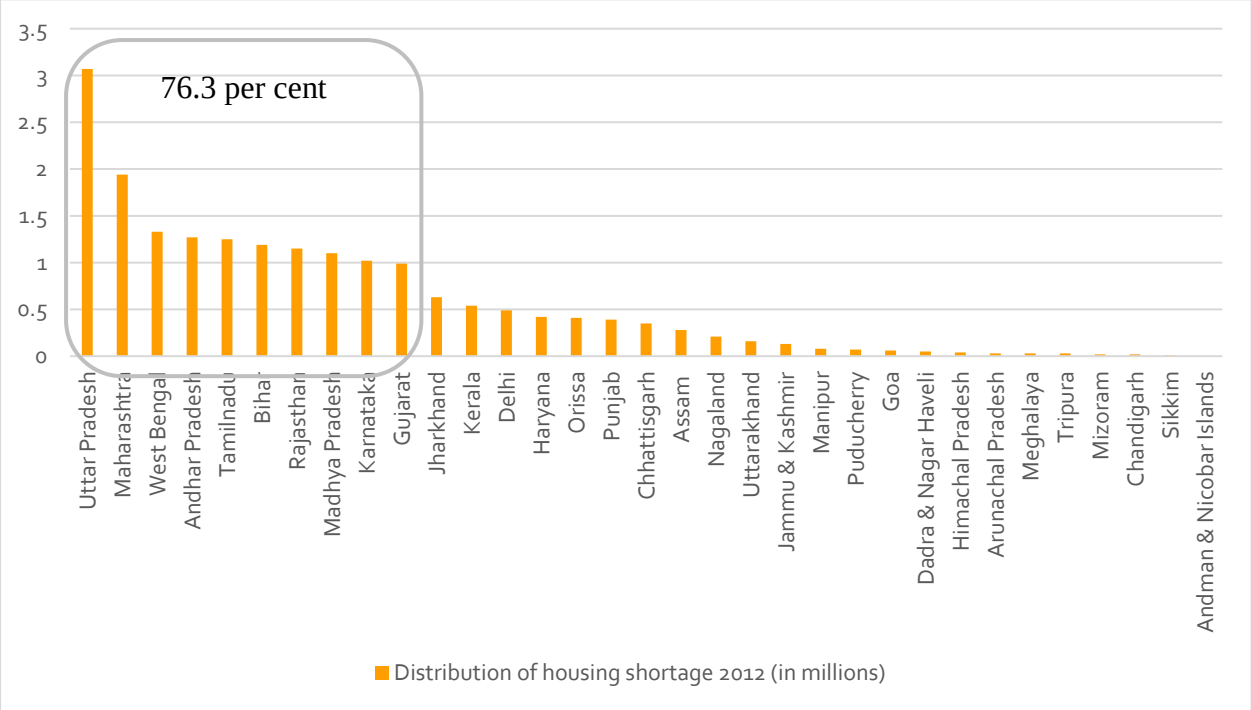
Table 2: Current and projected (2022) housing demand

Particulars	**Urban (million units)**	**Rural (million units)**	**Total (million units)**
Housing shortage as of 2012	18.78	43.67	62.45
Demand by 2022	29	25	54
Total need	**47.78**	**68.67**	**116.45**

Source: Report of the technical group on urban housing shortage, 2012; Working group on rural housing for the 12th five-year plan, 2011; Decoding housing for all by 2022, 2014

State-wise distribution of housing shortage, as shown in *Graph 1: State-wise distribution of housing shortage 2012-2017*, reveals only ten states compose about 76.3 per cent of the national shortage and of these, top five states constitute 47.2 per cent of the national shortage. The five states are Uttar Pradesh, Maharashtra, West Bengal, Andhra Pradesh and Tamil Nadu. This indicates a majority of the shelter demands arises in the states that either comprise or are located nearby urban centres. Migration can be asserted as a key process in driving the demand for shelter as a result of rapid urbanisation.

Graph 1: State-wise distribution of housing shortage 2012-2017, including Union Territories

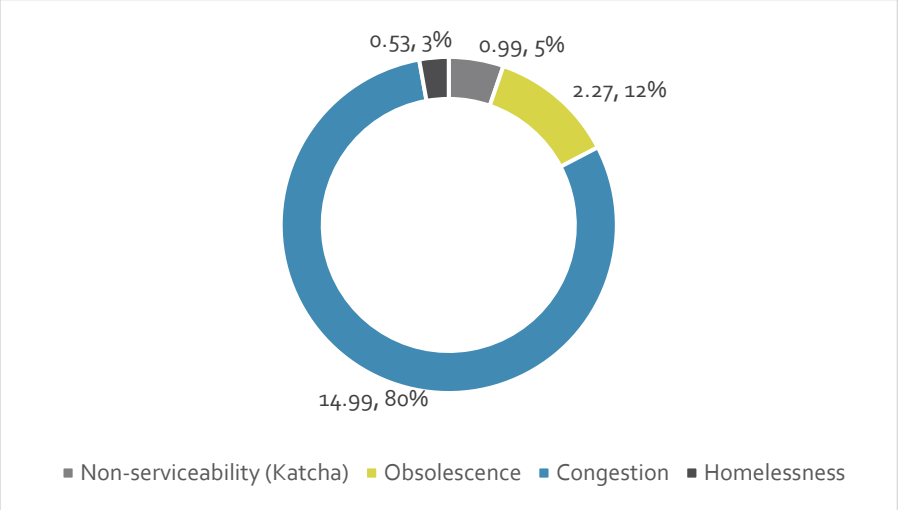


Source: Report of the technical group on urban housing shortage 2012-2017

Sub-standard urban housing stock

The problem of housing does not confine to unavailability of habitation. Poor quality and liveability of existing houses is another area of concern. According to MoHUPA, 80 per cent of urban households live in congested houses.[12] Association of Metropolitan Development Authorities (AMDA) remarks, more than 60 per cent of any Indian city's area is sub-standard and inhabits more than 75 percent of the city's population.[13] National Sample Survey Organisation (NSSO) reveals half of the urban households quoted not to be living in good conditions. About 53 percent households considered their dwelling to be with bad or poor ventilation, 45 per cent did not have an underground drainage system, 15.9 per cent disposed waste water without treatment to open lowland areas and 24 per cent did not have any kind of garbage disposal arrangement.

Graph 2: Housing shortage in urban India due to condition of houses, 2012 (in millions)



Source: Report of the technical group on urban housing shortage 2012-2017

Slums

In addition to the general housing demand, according to the Census 2011, over 65 million people live in slums in the cities of India which constitutes 17.4 per cent of the urban population. This percentage is higher—at 24 per cent (2014)—according to the UN Habitat database and India is adding 4.4 million people to slums every year.[14] On the other hand, the 69th round of NSSO revealed about 8.8 million households lived in slums, of which about two-third lived in notified slums and remaining in non-notified slums. Availability of data on informal settlements, therefore, becomes a large area of concern. Nonetheless, 202 million Indians are projected to be in informal settlements by 2020, since these settlements are growing at a rate of six per cent annually – outstripping urban growth rate of 3.4 per cent.

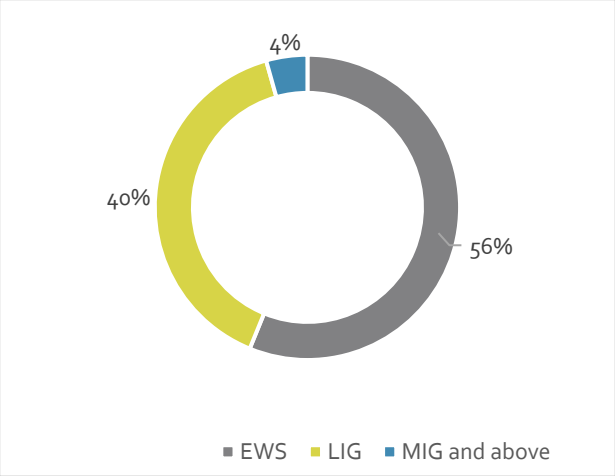
One of the reasons for such growth is the significance of the informal sector in urban economy. Informal economy contributes by 7.58 per cent to the urban Gross Domestic Product (GDP) and 4.5 per cent to country's GDP according to a study by PRIA (2013). Regardless, the poor are pushed to occupy and squat on marginal lands, the habitat for which is typified by overcrowded, insanitary, unhealthy and obsolete housing stock, in absence of quality affordable housing in urban areas. This entire population further becomes subject to insecure land tenure, lack of access to basic minimum civic services such as safe drinking water, sanitation, storm drainage, solid waste management, internal and approach roads, street lighting, education and health care, and poor liveability.

NSSO also revealed Maharashtra accounted for about 23 per cent of total slums in urban India, followed by Andhra Pradesh with 14 per cent and West Bengal with 12 per cent. These states are also among the top ones with housing shortage. Slums in India - A Statistical Compendium 2015 suggests on national level about 30 per cent of slums were located in open space or parks, 23 per cent were located along nallahs or drains, 9 per cent along railway lines and remaining 27 per cent elsewhere.

Box 1: Twisted Definitions

The classification of Economically Weaker Section (EWS) and Low-Income Group (LIG) households is based on the household income. According to the report of the technical group on urban housing shortage 2012-2017, households with income upto INR 5,000 per month (INR 60,000 annual) fall under EWS and those from INR 5,001 to 10,000 (INR 120,000 annual) fall under LIG. This yields 56 per cent housing shortage among the EWS and 40 per cent among LIG, constituting a major deficit of 96 per cent under the lower rung see **Error! Reference source not found.**.

Graph 3: Housing shortage among economic groups, 2012



Source: Report of the technical group on urban housing shortage 2012-2017

On the other hand, the HFA mission considers the allocation of central subsidies on a different definition of EWS and LIG. It considers a household with annual income INR 300,000 belonging to the EWS and a household with annual income from INR 300,001 to 600,000 as one belonging to the LIG. The difference in criteria may lead to discrepancy while disbursal of HFA mission benefits to the beneficiaries. For instance, a household reported as LIG according to the report of the task force on urban housing shortage could only qualify for HFA subsidy against a dwelling unit of 30 sqm i.e. the minimum unit size for a EWS household.

This signals a need to realign data on household income as well as housing shortage through fresh assessments at the city and state level. The State of Punjab has released state affordable housing policy, Punjab Shehri Awas Yojana 2017, which offers a range of incentives to beneficiaries and the private developers as well. The policy highlights the need to update official housing demand considering the current shortage is based on surveys done until 2012. The state will soon initiate primary surveys and other states could take note of the same.

Housing for All mission – A game changer

The Government of India launched Pradhan Mantri Awas Yojana - Housing for All (HFA) mission in 2015. It aims to provide a *pucca* house with water connection, toilet, uninterrupted electricity supply and access to every Indian household by 2022, when the country celebrates its 75th year of independence. The mission prioritizes addressing the shelter need of urban poor through demand and supply side interventions. Demand side interventions involve subsidisation of housing loan interest rates and monetary support for individual construction of houses, whereas supply side interventions include rehabilitation of slum dwellers and supply of houses factoring in strong participation by private sector.

The four verticals of the mission and their salient features are given below:

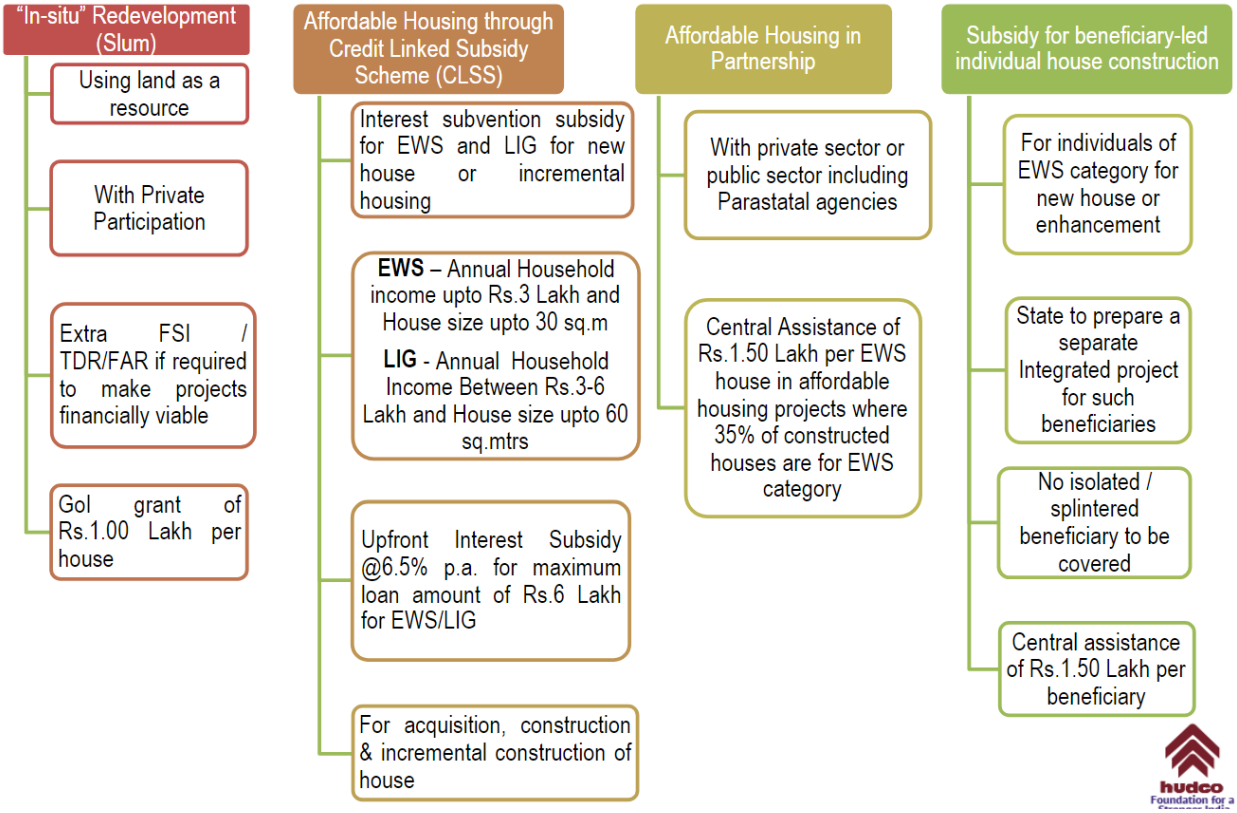
1. *In-situ slum redevelopment (ISSR):*
    a. It uses land as a resource, wherein the government facilitates development of new dwelling units with basic urban services primarily on under-utilised government lands
    b. Private developers are provided with additional floor area ratio (FAR)/ floor space index (FSI)/ transferable development rights (TDR) to make the project financially viable.
    c. After rehabilitating eligible slum dwellers, the private developer can sell remaining built-up area under the 'free sale component' of the scheme to offset project cost.
    d. The government provides a Central grant of INR 100,000 per house to eligible beneficiaries.
    e. It recommends constitution of a single authority at State/UT level to integrate prevailing rules and procedures and planning norms for faster approval of projects.
2. *Credit-linked subsidy system (CLSS):*
    a. It is a demand side support that involves interest subvention for EWS and LIG households seeking loans from banks and Housing Finance Companies (HFC) for purchase, construction of a new house or improvement of an existing one.
    b. The government facilitates ownership on houses by reducing the interest rate to 6.5 per cent for tenure of 15 years, providing a relief of about INR 250,000 to prospective house buyers.
    c. The subsidy is available for loan amounts upto INR 600,000, involving dwelling units with carpet area upto 30 Sqm for EWS and 60 Sqm for LIG.
    d. State Level Nodal Agencies (SLNAs), appointed by the State/UT government, shall identify eligible beneficiaries and facilitate them to avail the subsidy.
    e. The subsidy will be credited upfront to the beneficiaries' bank account through associated Primary Lending Institutions (PLIs) after channelization by CNAs. CNAs are to send monthly and quarterly reports to Ministry of Urban Housing and Poverty Alleviation (MoHUPA).
3. *Affordable housing in partnership (AHP):*
    a. This supply side component is designed as an extension of the policy in same name released in 2009. The aim is to foster development of dwelling units through involvement of the private sector.
    b. Financial assistance will be provided by the centre to States/UTs/Cities formulating affordable housing projects with private developers at the rate of INR 150,000 per EWS house.

c. A project shall qualify as an affordable housing project, when at least 35 per cent of the total houses are reserved for EWS and a single project has minimum 250 houses. However, state government can request the centre to reduce this minimum criterion.
d. States/UTs/Cities shall cap the sale price of EWS dwelling units to increase accessibility of the target beneficiaries.
e. The benefit shall be cross-subsidised by state grants, facilitation of land at nominal cost, waiver of taxes and duties, etc.

4. *Beneficiary-led individual house construction (BLC) or enhancement*:
   a. This vertical extends support to EWS beneficiaries seeking capital to construct their house or improve an existing dwelling unit.
   b. Beneficiaries identified in HFAPoA and not able to avail advantage of any other mission component can seek a central assistance of INR 150,000.
   c. The assistance will be disbursed in three-four instalments basing on the progress of construction of the dwelling unit. The monitoring shall be done using geo-tagged photographs of involved houses.

Salient features of the HFA mission are summarised in *Figure 4: Salient features of the HFA mission*

Figure 4: Salient features of the HFA mission

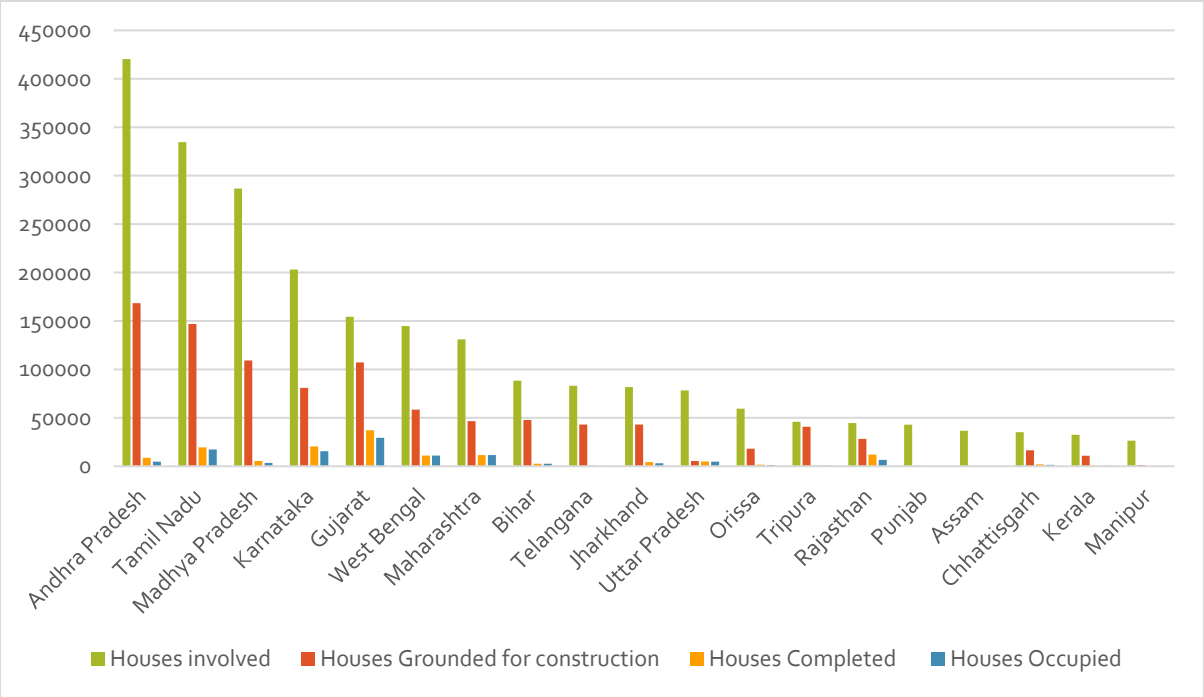


The wide demand-supply gap

The status of HFA mission is displayed in the *Graph 4: HFA mission status in States and UTs as of July 2017 (excluding the states/UTs where progress is negligible)*. States with highest housing deficit are not performing in accordance with the need, such as Uttar Pradesh, Maharashtra and West Bengal. The number of houses grounded for construction in these states

is far less than the housing shortage, for instance, Uttar Pradesh had a requirement of about 3 million houses until 2012 but has been able to ground only 5,474 units – about 0.2 per cent – wherein, 4,903 have been completed and 4,733 have been occupied as of July 2017.

Graph 4: HFA mission status in States and UTs as of July 2017 (excluding the states/UTs where progress is negligible)

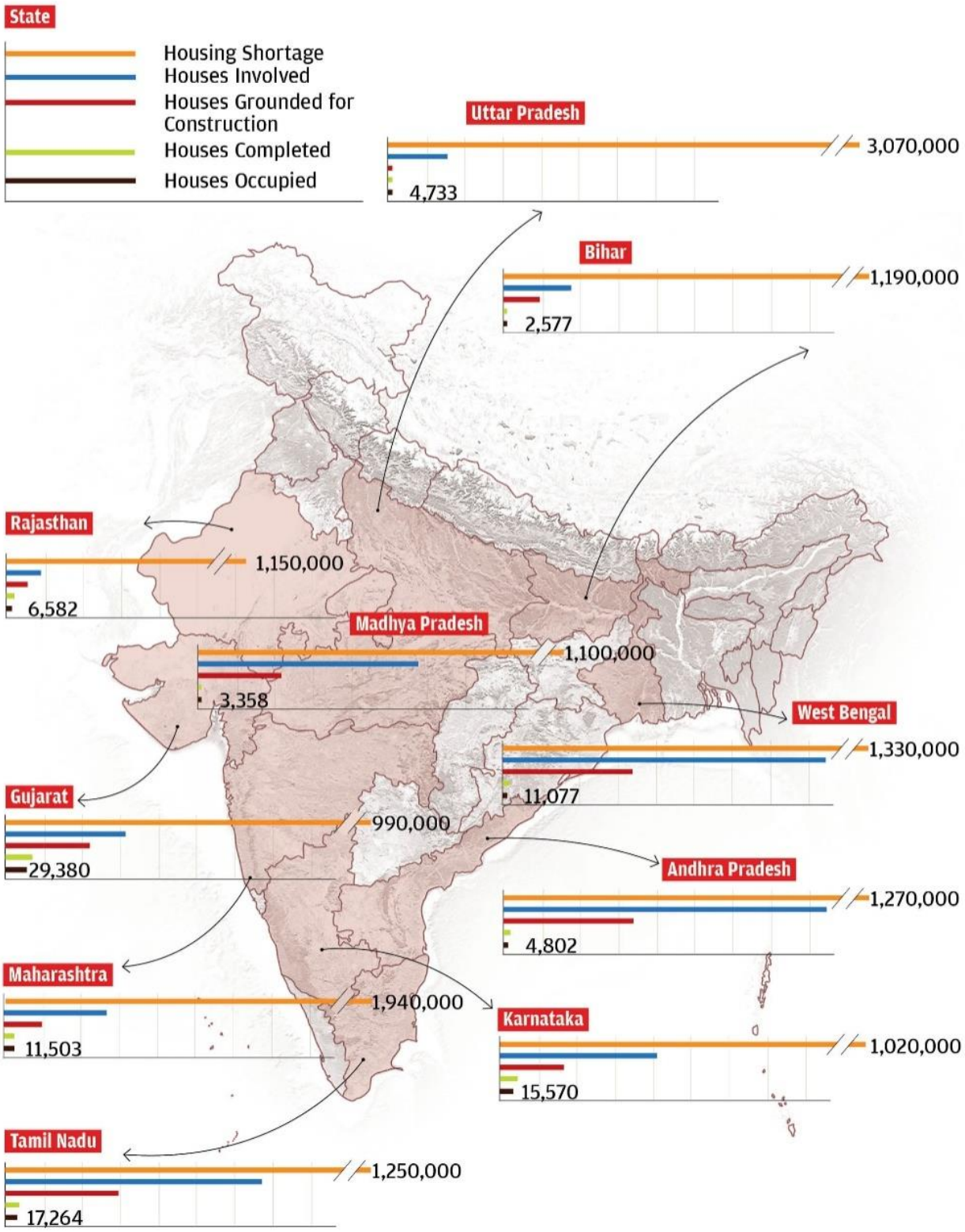


Source: Ministry of Housing & Urban Poverty Alleviation, 2017

Similarly, Maharashtra has been able to construct 46,561 dwelling units, wherein only 11,503 houses – a fourth of constructed – have been completed and occupied, against a demand of about two million units. High housing shortage indicates migration to economic hubs in these states, whereas their focus on urbanisation has been poor. An in-depth analysis would reveal the states either lack or have a weak policy landscape to address their shelter needs.

Other states such as Andhra Pradesh, Tamil Nadu, Madhya Pradesh, Karnataka and Gujarat have been able to initiate the process fairly well, where about 1 million to 1.5 million houses have been already grounded for construction. However, the number of completed and occupied units is still far less at about 5,000 to 40,000, i.e. only 0.5 per cent to 2.6 per cent. Where occupancy is concerned, the states such as Gujarat, Tamil Nadu, Karnataka, West Bengal, Maharashtra and Rajasthan have been able to house a miniscule of their house-deprived population.

Figure 5: Housing for All mission progress as of July 2017 in ten states with maximum housing shortage



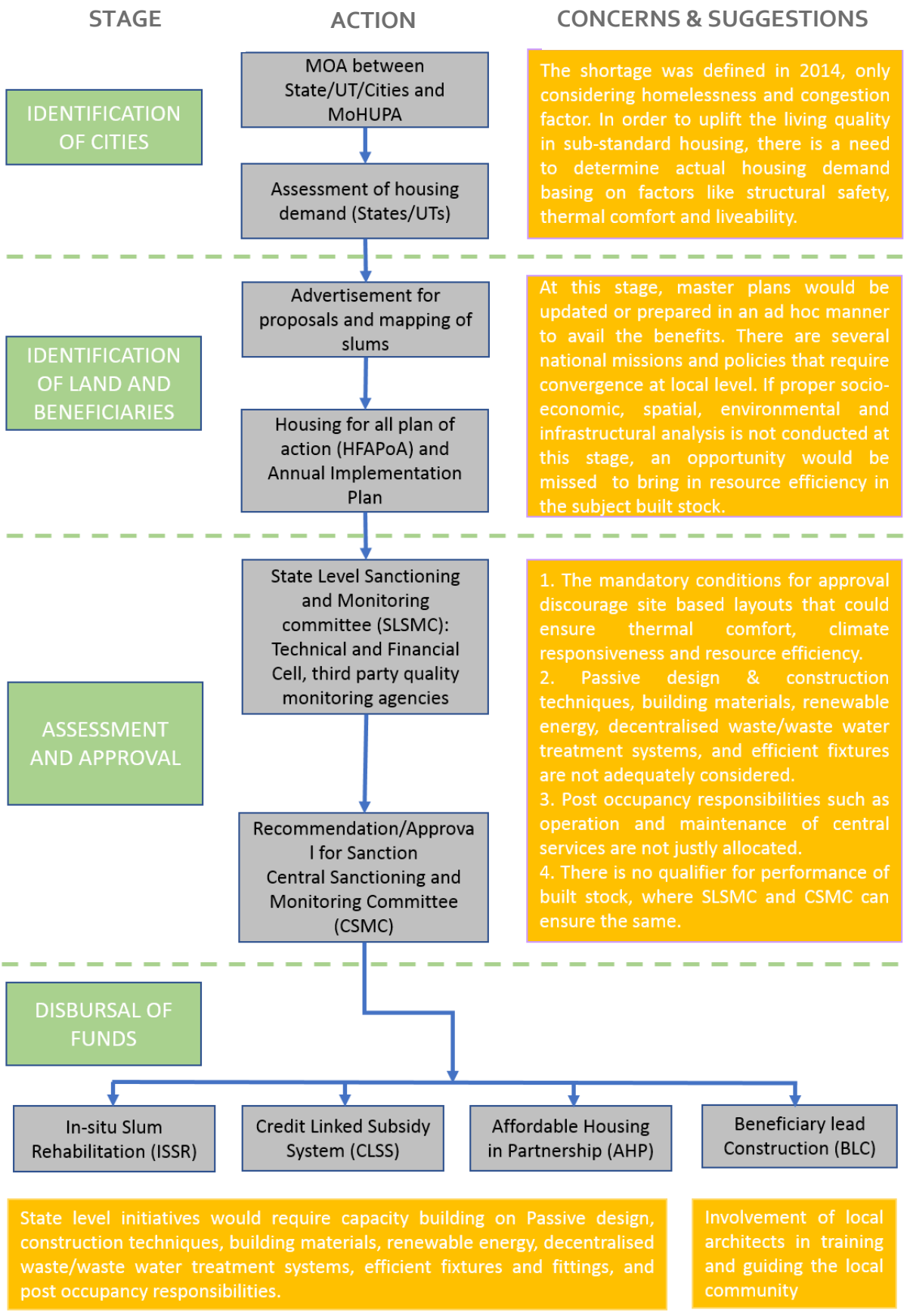
Implementation loopholes and suggestions

The discourse of HFA mission comprises of several stages at different administrative level. It also requires mobilisation of various actors and institutions. The discourse has been divided into four stages, namely, identification of participating cities, identification of beneficiaries and housing locations, assessment and approval, and disbursal of funds.

First stage requires inputs from data collection agencies such as Socio-economic and Caste Census, National Sample Survey Organisation, National Building Organisation, Department of Industrial Policy and Promotion, etc. Second stage involves land owning agencies such as development authorities, urban local bodies, Ministry of Rail, state housing boards. Further it anticipates active participation from citizens and elected representatives to validate the information collected.

Third stage is pursued by state level and central level nodal authorities, wherein, state and central level committees scrutinise and process the sanctions. These committees are comprehensively constituted, comprising of experts from technical, financial, quality monitoring and academic backgrounds. The final stage involves nodal authorities, urban local bodies (ULB), developers, primary lending institutions (PLI) and beneficiaries to take the mission on-ground.

Figure 6: Mission methodology and concerns with every action



Two Central Nodal Agencies (CNAs), namely, National Housing Board (NHB) and Housing and Urban Development Corporation (HUDCO) have been designated to monitor, implement and disburse these subsidies. Interested States/Union Territories (UTs) will have to assess their respective housing demand, prepare a Housing for All Plan of Action (HFAPoA) and Annual Implementation Plan (AIP), and get requisite approval first from the State Level Sanctioning and Monitoring Committee (SLSMC) and eventually the Central Sanctioning and Monitoring Committee (CSMC).

SWOT Analysis of the mandatory conditions

The criticalities of the mission lie in several mandatory actions to be taken to access the mission incentives. Local bodies and state governments have to statute these conditions before taking housing projects for sanction to SLSMC and CSMC. No such mandatory action was taken in the previous housing programmes. These conditions are intended to remove regulatory bottlenecks in the implementation of the mission and are somewhat able provide an opportunity to tap the existing loopholes in urban planning and the entire institutional process related to development. Although it is too early to comment if the conditions may lead to desired outcomes, a few concerns have been identified by CSE as consequences of respective conditions. The consequences have been evaluated as strength, weakness, opportunity or threat to the mission in *Table 3: SWOT analysis of the mandatory conditions of HFA mission*.

Table 3: SWOT analysis of the mandatory conditions of HFA mission

Condition	Concern	SWOT
No separate Non-Agricultural (NA) permission required in case land falls in the residential zone earmarked in the Master Plan of city/town Earmarking land for affordable housing in Master Plans	• Due to these conditions, Master Plans are under amendment/preparation in an ad hoc manner. • A need for fresh spatial analyses arises in order to earmark appropriate land for affordable housing in Master Plans. • Majority Census Towns do not have a Master Plan (76.2 per cent of the total 7953 towns). There are few towns that do have a master plan but cannot implement it due to a variety of reasons.[15] There is a need for technically sound and holistic amendment/preparation/legalisation of statutory Master Plans.	**Weakness** as identification of land without spatial, socio-economic and environmental analysis would not be feasible in longer term. However, this condition also provides an opportunity to make intervention in the same regard
Single-window-time-bound clearance for layout approvals and building permissions	• Online environmental clearance for fast approval under the 'Ease of Doing Responsible Business' has brought down approval time from 600 days in 2004-09 to 190 days in 2016.[16] It will further reduce to 100 days starting with the 53 cities with million plus population.[17] • Reduced time increases chances of compromise with some of the regulations.	**Opportunity** as per the recent pro-development scenario. It shall become a **weakness** if post construction compliance is not adequately addressed as the local government may be lacking capacity.
Pre-approved building permission and layouts	• A perspective of health, structural safety, resource conservation and efficiency may be	**Threatens** the scope of prospective

for EWS/LIG or exempt approval below certain built up area/plot area	missed out while permitting building layouts. For instance, Odisha has exempted buildings with built-up area under 100 Sqm from layout approval.[18] • State-wide layout template results in a cookie-cutter approach, which will create infrastructure that is not conducive to local climate, topography and environs, interventions like passive architecture, thermal efficiency measures, etc. will have limited application. • Limits the scope of projects to adopt decentralised service systems and shed some of the load from already choked central municipal service networks. • Limits construction under the HFA mission to contribute to national emission reduction targets and be in line with the goal of sustainable development. • Potential for training and capacity building of individuals, architects and construction workers for sustainable building practices with a strong bearing for local action.	development to incorporate passive design techniques. On the other hand, a **great opportunity** to integrate energy and sustainability performance parameters to contribute towards national emission reduction and sustainability targets
Additional Floor Area Ratio (FAR)/Floor Space Index (FSI)/Transferable Development Rights (TDR) and relaxed density for slum redevelopment and low-cost housing	• Results in dense and high-rise development typology which does not connect with the requirements of EWS/LIG households. • With more focus on environmentally sound decentralised services as per the environmental conditions in the model building bye laws and considering the operational affordability, open area provisioning requires a rational check.	**Weakness**, as dense and high-rise development and increased operation and maintenance responsibilities and costs shall reduce uptake by the target group. This makes functional performance of the built stock highly important.

PPP models: burdening responsibilities on beneficiaries

HFA mission has been envisaged with a strong private sector role. However, the response from private sector had somewhat been bleak. As of March 2017, INR 900 billion of investments had zero representation from the private sector. Until June 2017, only eight affordable housing projects on Public Private Partnership (PPP) have been initiated where all projects involve government land.[19] Sensing this issue and in an attempt to bring momentum to the mission, Union Minister M. Venkaiah Naidu announced the scheme to be extended on private lands, especially for the AHP component.

A draft PPP Policy was introduced to demystify the implementation process for projects involving a private partner. The policy identifies land availability, high land cost, and construction and operation inefficiency as the major challenges related to affordable housing

projects. Land has been recognized central among all the challenges considering its scarcity as a resource and the fact that it ranges between 20 to 60 per cent of the total project cost. Interventions therefore broadly involve financial subsidies around land and built area, subsidies in-kind (government land) and cross-subsidies to facilitate affordable housing.

There are six PPP models for projects involving government land and two involving private land (only for CLSS and AHP programme). The subsidy is extended through central assistance of about INR 2.5 lakh per house under the CLSS programme. The second model involves support of INR 1.5 lakh per house in case the beneficiary does not want to take bank loans. The models involving government land are:

Figure 7: Scope of work and actors under the eight PPP models

Parameters	Government-land Based Subsidized Housing	Mixed Development Cross Subsidized Housing	Annuity Based Subsidized Housing	Annuity cum Capital Based Subsidized Housing	Direct Relationship Ownership Housing	Direct Relationship Rental Housing	Private-land based Subsidized Housing (CLSS Scheme for EWS/LIG/MIG)	Private-land Based Subsidized Housing (AHP Scheme for EWS)
Designing and Building of units	Private partner	Private partner	Private partner	Private partner	Private partner	Private partner	Private partner	Private partner
Maintenance of units	Beneficiaries	Beneficiaries	Private partner	Private partner	Private partner	Private partner	Beneficiaries	Beneficiaries
Distribution of units	Private partner to Public authority	Private partner to Public authority	Private partner to Public authority	Private partner to Public authority	Private partner to beneficiaries	Private partner to beneficiaries	Private partner to beneficiaries	Private partner to beneficiaries
Development mix	Affordable housing	Affordable housing & high-end housing/ commercial development	Affordable housing	Affordable housing	Affordable housing	Affordable housing	Affordable housing	At least 35% of the houses in the project are for EWS category as per PMAY guidelines
Responsibility of trunk infrastructure	Public authority	Public authority	Public authority	Public authority	Public authority	Public authority	Public authority	Public authority
Implementation of Trunk infrastructure	Separate EPC or PPP arrangement	Separate EPC or PPP arrangement	Separate EPC or PPP arrangement	Separate EPC or PPP arrangement	Separate EPC or PPP arrangement	Separate EPC or PPP arrangement	Separate EPC or PPP arrangement	Separate EPC or PPP arrangement

Source: Ministry of Housing and Urban Poverty Alleviation

Four out of the eight PPP models place the responsibility of maintenance with the beneficiaries or Residents' Welfare Association (RWA) post the transfer, as shown in *Figure 7: Scope of work and actors under the eight PPP models*. An issue will arise when the developer would transfer the built stock to beneficiaries for upkeep. The transfer of housing stock and central utilities to untrained beneficiaries poses a threat to the performance of central infrastructure.

The beneficiaries of affordable housing are chiefly from the EWS and LIG segment and already not equipped with financial resources to buy a liveable habitation. The responsibility of operation and maintenance of the built stock and time to time recapitalization of the central utilities add to their financial and cognitive burden post the purchase of house. In worst case, the target group of the HFA mission would not find it feasible to inhabit the affordable housing and revert to squatting.

Affordability – sustainability interplay

Housing is no longer considered as simply a roof over one's head. It is an indicator of the quality of life, well-being of people and social conditions of places. It is an integral part of urban habitat as a physical and social structure and plays a critical role in achieving sustainable development. Sustainable development for the country is governed or guided by several targets, as the number of urban dwellers grows by the day and develops elevated demand for shelter

and other urban services. Construction of new housing and allied infrastructure under HFA mission will only exacerbate the need for water, energy, land and materials. These international and national goals then provide a case to counter the adverse resource impacts of the development by pursuing various sustainable practices.

Coupling of affordability and sustainability is essential for effective materialization of quality shelter for the urban poor. It is often a misconception that sustainable building practices require extensive financial resources, first at the time of installation/construction and later due to operation and maintenance. However, several experiences and research from across the globe have revealed multiple benefits associated with sustainable housing, most notable of which is affordability. Sustainable practices are affordable. Benefits of sustainable housing according to the UN-Habitat are:

1. Improved quality of life and dignity of residence
2. Affordable access to housing
3. Better hygiene and sanitary conditions
4. Improved health and lower incidents of illness, fatalities, material losses and better labour productivity
5. Better conditions for human development, employment and economic growth
6. Durability and low maintenance cost of the built stock
7. Reduced vulnerability against disasters and natural hazards
8. Improved environmental efficiency and savings on the use of energy, water and other physical resources
9. More cohesive and socially inclusive urban growth
10. Contribution towards climate response and mitigation

Box 2: Recent sustainability initiatives

The **National Action Plan on Climate Change** (NAPCC) addresses the urgent concerns in the wake of climate change and guides through a directional shift in the development pathway, including enhancement of the current and planned programmes. India has committed to reduce energy emissions by 33-35 per cent by 2030 over 2005 as Nationally Determined Contributions (NDC). These emission cuts are to be achieved through eight missions such as National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission for Sustainable Habitat, National Water Mission, etc. the intervention range from research and development, enabling policy landscape, innovative business models and targets such as installation of 100 GW renewable energy capacity by 2022 (National Solar Mission). The conduct has been decentralized by mandating states to prepare their own State Action Plan on Climate Change, where a strategic stance has at least paved way for actions. The states now need to converge the standards set by six sub-committees, namely, energy efficiency in the residential and commercial building sectors, urban transport, water supply and sewerage, urban planning, urban storm-water drainage and municipal waste and execute accordingly.

The **India Habitat III – National Report** further demonstrates government's commitment to sustainability. Key actions include reducing water and electricity use by 50 per cent; enabling over 60 per cent of urban travel by public transport; generating half the power demand from renewable sources; promoting walking and cycling for last mile connectivity; compact and cluster urban development; promoting natural drainage patterns; reducing waste generation of all kinds; promoting greenery and public places; and construction of houses for the urban poor. The UN Habitat III talks about the "Right to City"- indicative of a collective right of all inhabitants, irrespective of their legal status, over the city's resources and space. This is an integral part of sustainability.

Since sustainability is closely linked with energy security, the draft **National Energy Policy** stresses on cutting fossil fuel consumption with heavy emphasis on de-carbonisation through energy efficiency and renewable energy interventions. According to energy modeling exercise undertaken by the NITI Aayog, the energy demand of India is likely to increase by 2.7-3.2 times between 2012 and 2040, where electricity rise would be 4.5 times. On the other hand, the prices (in kWh terms) of wind and solar technologies between 2010 and 2015 have declined by 60 per cent and 52 per cent. The policy suggests to harvest these abundant energy sources in the country in an innovative manner to meet energy requirement at decentralized locations.

The second aspect of the National Energy Policy is to achieve energy efficiency through demand reduction. It also recognizes buildings as one of the sectors to reduce energy consumption. In order to cut the consumption levels, it suggests improving energy efficiency of all appliances and investing in energy efficient buildings. Improved energy efficiency is anticipated to reduce energy demand over BAU scenario by 17 per cent in 2040. It recommends undertaking retrofits in buildings as per Energy Conservation Building Code (ECBC) and plans to bring residential buildings under the purview of ECBC. It provides to raise thermal efficiency of buildings by enhancing availability of better insulation and construction materials. The policy however does not recommend incorporation of design techniques for energy efficiency.

Dimensions of sustainable housing

The union between affordability and sustainability in context of housing under this paper is illustrated through four dimensions, namely environmental efficiency, social inclusivity, cultural integrity and economic stability. Nuances within these dimensions can help development and provision of sustainable and affordable housing in any given context.

Table 4: The dimension and corresponding goals for sustainable affordable housing

Dimensions	Guiding principles
Environmental efficiency	• Ensure energy, water and resource efficiency • Reduce, reuse and recycle waste • Mainstream green building practice and technologies • Mandate low-impact planning and design including efficient space management and climate responsive building geometry • Achieve sustainability through green building materials • Focus on decentralized service systems • Facilitate low-carbon transport • Protect ecosystems and bio-diversity and provide serviced land with least hinderance to surrounding environs

	• Monitor environmental performance of the built stock, benchmark and set reduction targets
Social inclusivity and cultural integrity	• Culturally responsive urban design, such as common spaces with a 'sense of community', and identity • Infrastructure for non-motorized mobility • Universal infrastructure design to increase accessibility of differently abled, women children and the elderly
Economic feasibility	• Appropriate location (near economic hubs) • Affordable use of resources • Access to public transport • Trained operation and maintenance of built stock • Available housing choices, such as rental housing, and security of tenure

Recommendations:

A summary of preliminary observations and a suggestive way forward for the affordable housing sector in the country is given below:

Data Collection

1. There is a need for fresh collection of socio-economic data, considering the current official housing shortage is until 2012 and the growth rate of informal settlements is much higher than the rate of provision of houses under the HFA mission.

2. The new assessment for housing should consider factors beyond congestion, such as construction quality, comfort level, health implications and thermal efficacy of structures.

3. Definition of EWS and LIG households needs to be realigned as per the qualification criteria of the HFA mission to avoid confusion during disbursal of subsidies.

Sectoral Integration

1. Prepare/amend state affordable housing policies while integrating the provisions of national missions and policies such as Sustainable Development Goals, National Action Plan for Climate Change, Swachh Bharat Abhiyan, Smart Cities Mission, AMRUT, National Energy Policy, Energy Conservation Building Code (Residential), etc.

2. Encourage or mandate sustainable development features in city/town/zonal plans and building bye-laws for new and existing built stock.

3. Actively engage all financial institutions, banks and housing finance and micro-finance companies in greening of the built sector through incentives.

Site Selection

1. Conduct comprehensive feasibility study, including socio-economic, spatial, environmental and infrastructural extension analyses, for earmarking affordable housing land in the master plans.

Climate Adaptation

1. *Layout planning and design*

    - Site considerations: Optimize the use of resources and energy savings by reducing the site disturbance during construction and occupancy phases of the project.

    - Cluster planning: Cluster based planning of the building blocks within campuses results in more compact utilities network, reduces damage to existing environment and promotes walkability. Sharing spaces, services and creating a medium-rise, high density development complements this.

    - Contextual layouts: The layout plan should evolve from site to best utilize the native potential. HFA mission mandates states to prepare pre-approved layout and building permission or exemption from approvals below a certain plot or built-up

area. Local environs vary widely within Indian states, a pre-approved layout template would curtail the potential for passive design, resource efficiency and low-impact construction.

- Passive design: Passive design techniques as stipulated in the Model Building Bye Laws 2016 should be implemented to promote low-impact development. It should be done on a priority basis in areas more prone to urban flooding/flash floods. The Energy Conservation Building Code 2017 at present only caters to commercial buildings. CSE encourages that a code for residential buildings, for which a draft has recently been rolled out, should be expedited.

2. *Materials*

- Encourage alternate building materials, as suggested by Central Public Works Department's [CPWD] guidelines for sustainable habitat, which perform better than the conventional ones. Usually, locally available materials perform well on the sustainability parameters and in addition stimulate local economy. Further the materials can be identified based on properties such as thermal transmittance (U value), reflectivity, spectrum selectivity, visible transmittance etc.

- Adopt materials and construction technologies as guided by the Building Materials & Technology Promotion Council (BMTPC) under the HFA mission's Technology Sub-mission.

- Collaborate with technical research institutions like IITs and NITs for innovation in and identification of advanced materials and technologies with due preference to local availability.

- Create a region-wise database of sustainable materials for the entire supply chain to refer to and promote the same nation-wide.

- Encourage use of recycled building materials, which are tested efficient on above mentioned properties and also verified for zero toxicity, lower emissions and less embodied energy.

- Build capacity on thermal efficacy, durability and recyclability of materials at state and local level to avoid usage of inferior materials**.** According to the 2011 census, 12.6% of housing stock in the country is 'katcha' houses while 21.3% are 'semi pucca'. The materials used in these typologies usually comprises of straw, tin sheet, asbestos, etc., which have poor thermal efficacy, durability and recyclability. The capacity is necessary so as to prevent usage of same material under the BLC vertical of the HFA mission. CSE recommends involvement of local architects in training and guiding the local community on efficient materials with a focus on incremental and self-constructed housing.

3. *Building geometry*

- Building Form: Compact building forms have a relatively small exposed surface area for a given floor area, thus reducing the influence of the external environment.

- Building orientation: It should be planned according to the native sun path. Ideally, long axis should run east-west, so that sunlight can be harvested and controlled for daylight and passive solar gain from northern and southern façade. Eastern and western facades should be protected by using shading devices, vegetation or buffer spaces.

- Building envelope**:** It should be designed in a shape that encourages natural ventilation, acoustic comfort, and insulation that enhances thermal efficacy**.**

- Higher FAR should not lead to high-rise buildings: As a result of extra FAR/FSI awarded to developers under the HFA mission, there is a possibility of creation of high-rise buildings as permitted by few state building bye-laws. CSE recommends a low to mid-rise development with high density. Studies have revealed a low to mid-rise development performs better on the aspects such as carbon emissions per Sqm (eCO_2/Sqm), maintenance costs, common services energy demand, rooftop to energy demand ratio, usability of spaces, etc.

- Building typology/layout: CSE recommends building typology should be conducive to site, local climate and environs, which could be decided on three basic criteria: 1. Carpet area efficiency, 2. Natural lighting, and 3. Cross-ventilation.

4. *Energy efficiency*

- Reduce dependence on grid power and promote shift towards decentralized (renewable) power generation.

- Promote rooftop solar power in all new and existing housing projects. Many state building bye laws stipulate meeting at least one per cent of total electricity demand in a project from solar energy. States like Haryana and Punjab have more potential to harness solar power as per the current building bye-law provisioning, following which Haryana has increased their mandate to meet five per cent of demand load from solar power. Other states can also go for more stringent requisites on power generation from renewables based on solar incidence.

- Refer the Residential ECBC for design stage interventions to bring in energy efficiency.

- Discourage use of diesel generator sets and offset with renewable where possible.

- Install energy saving appliances and fixtures, such as five star rated appliances for indoor use and LED bulbs for lighting streets and common areas.

5. *Water efficiency*

- Conserve rainwater by rainwater harvesting and increase groundwater recharge by maximizing percolable surface area in housing projects, reference could be drawn from the model building bye-laws and CPWD's guidelines on sustainable habitat standards 2014.

- Deploy sustainable urban drainage systems including berms, filter strips swales, rain gardens, retention basins, etc.

- Install decentralized waste water treatment systems, as suggested by the CPWD's guidelines for sustainable habitat 2014 and Model Building Bye-laws 2016, and reduce dependence on groundwater and municipal supply by reuse and recycling.

- Install water efficient fixtures, as suggested by the Uniform Plumbing Code – India 2016, and enable non-potable use of treated waste water.

6. *Efficient waste management*

    - Mandate three-way segregation of solid waste as required in the Solid Waste Management Rules 2016, i.e. biodegradable, non-biodegradable and hazardous.

    - Enable treatment of bio-degradable waste through composting as stipulated in the model building bye-laws 2016, CPWD's guidelines on sustainable habitat standards 2014 and Solid Waste Management Rules 2016. Considering affordability parameters use of non-mechanized composting methods should be promoted to reduce installation and maintenance costs.

    - Explore possibilities of waste management at neighbourhood level, with due consideration to health, hygiene and safety parameters.

    - Encourage recycling and reuse of non-biodegradable waste and ensure proper collection, treatment and disposal of hazardous waste.

Operations and maintenance

1. Adopt an appropriate and realistic green mandate to commit to resource efficiency, improve resource management, and ascertain compliance to various pro-sustainability guidelines such as ECBC, benchmarking techniques, etc.

2. Prepare a construction management plan to regulate resource consumption and waste generation to optimum levels across project planning, design, construction and post construction stages, compliance under Construction & Demolition Waste Management Rules 2016 and guidelines issued under National Building Code should be considered.

3. Use third party assessments to ensure well environmental performance of the site and installed service systems.

4. Develop Operation & Management manuals and train residents for upkeep and monitoring of built stock.

Capacity building

1. Attune surveyors/assessors to consider more relevant factors as recommended for fresh assessment of housing demand.

2. Train professionals of the built environment and ULBs with latest policy interventions for an efficient and effective sectoral integration.

3. Update planners, regulators, ULBs and other government personnel with the nuances generated by new policies so that they can conduct the several feasibility analyses as needed by the master plan preparation/amendment exercise.

4. Build capacity for enabling climate adaptation and/or green construction among regulators, developers, urban professionals, and skilled and un-skilled workforce. Calibrate those capacity building programmes to evolve in line with the codes/standards requirements at state and local level.

5. Build capacity among beneficiaries of affordable housing projects on various resource conservation and efficiency strategies that help save financial resources as well.

6. Mobilise capacity building programmes at local level involving architects, especially targeting the beneficiaries of BLC vertical and incremental housing.

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