TOWARDS AFFORDABLE AND SUSTAINABLE RENTAL HOUSING

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Maps used in this document are not to scale.

Contents

1. Why this study?

The ongoing COVID-19 pandemic triggered reverse migration of millions of migrant workers and poor from cities back to villages. According to the World Bank, nearly 40 million migrant workers (inter and intra-state) were affected by the lockdown in India.[1] Other estimates take this number up to 120–140 million.[2] This exodus of the poor has shown us the reality of those invisible millions who live in cities and are an integral part of the urban economy but have no place in urban planning and housing programmes. This has raised serious questions about the living conditions of a large majority in the city, including access to basic services like thermal comfort. These considerations have to inform housing programmes in states.

In response to the "migrant crisis", the Government of India came forward to acknowledge and address this problem. Affordable Rental Housing Complex (ARHC) Scheme was launched in November 2020 under the umbrella programme of Pradhan Mantri Awas Yojana (PMAY) to address the need for affordable shelter of the urban poor. This scheme has acknowledged the effects of COVID-19, which has resulted in compromised living conditions in slums and increased transport costs due to restrictions on public transport. The scheme has underscored the importance of 'dignified living'. It aims to leverage existing vacant housing as well as construct new rental building stock. This is an important step to address equity concerns in the housing sector.

Accordingly, public-private partnerships (PPP) will be needed to either adopt existing vacant housing through concessionaire agreements to retrofit, operate and maintain it, or construct rental housing on available vacant land and to maintain and operate it under the two models developed under the ARHC scheme. This PPP implementation will include strategies not only to repair, retrofit, develop, operate and maintain rental housing but also to address gaps in service infrastructure, common facilities, and adopt fiscal strategy including income tax exemption, profit and gains from operations, GST exemption, and low interest rates. Urban local bodies will provide infrastructure support. This will also be supported by technology innovation grants. The key criteria will be structural stability, basic civic infrastructure, wastewater treatment, rainwater harvesting and solar power.

So far, national level initiatives on rental housing include National Urban Housing and Habitat Policy 2007; Task Force on Rental Housing 2013; Draft National

Urban Rental Housing Policy 2015; and Model Tenancy Act 2019. These have a bearing on the way rental housing is expected to evolve in India.

The National Urban Housing and Habitat Policy 2007 aims to create rental housing stock and increase its affordability through appropriate capital or interest subsidies. It led to the 'Model Rent Act' to correct the skewed balance between owners and tenants, and proposed incentives to encourage loans by banks and housing finance institutions for rental housing.[3]

The Task Force on Rental Housing 2013 identified barriers and recommended levers for the rental housing sector. For example: deductions in taxes (service tax, property tax, stamp duty, income tax, utility and service charges); subsidies and mandates like infrastructure status for rental housing and rental housing as an option for corporate social responsibility (CSR); regulatory changes in eviction policies and procedures, and grievance redressal mechanisms; and rent pricing, creation of enabling agencies, rent-to-ownership model, rental tribunals, and financial and implementation assistance in the form of public-private partnerships, foreign direct investment (FDI), rental real estate investment trust (R-REIT) and external commercial borrowings (ECBs), securitization, priority sector lending, etc.[4]

The Draft National Urban Rental Housing Policy 2015 largely internalizes the recommendations of the Task Force on Rental Housing. It focuses on making state governments develop state rental housing policies to undertake appropriate reforms to make affordable rental housing viable. The Model Tenancy Act 2019 provides for rents and the tenure to be discussed and decided upon mutually by the tenant and the landlord, and provides for rent authority and rent courts to fix rents, lease durations and address disputes.

Against this backdrop, the ARHC Scheme was launched in 2020 to meet the need for affordable shelter. This is an important national effort to address the specific building typology of rental housing in the formal affordable housing sector. There are some state level schemes on rental housing that also provide an important learning curve. This is a critical step at the national level to move towards formal rental housing for the poor. It may be noted that within one year of the scheme's launch, nearly all states have signed the Memorandum of Agreement with the central government for its implementation. The implementation will be kickstarted soon. This makes this conversation of performance indicators for such housing very important.

Why rental housing?

Rental housing is a critical strategy to meet housing demand when self-owned housing is either not affordable or not feasible for a large population of low-income groups in cities. As per the report of the Technical Group on Urban Housing Shortage, nearly 95 per cent of the housing shortage in urban areas pertains to the poor.[5] Due to inadequate supply of affordable housing, slums and informal settlements have proliferated.

Historically, formal housing for the poor migrant has been neglected in Indian cities. Over a period of time, the government has also withdrawn to a great extent from direct provisioning of housing. As a result, the large urban labour force and service class in cities has to depend on private provisioning of rental housing, which is often not affordable. The informal rental market provides basic shelter but with compromised living conditions and access to basic services. High cost of housing does not allow for ownership. Even the housing provided for low-income groups as part of housing programmes remains largely unbuyable. This has made informal rental housing more attractive and viable for the poor.

Urban villages, informal settlements and unauthorized colonies are key providers of rental housing. Rental housing also occupies a special place for those migrants who do not need permanent residence in cities as they move back and forth between their domicile towns or villages and place of occupation. Rental housing is more appropriate for them than self-owned or self-built housing. In addition, there is a wide variability in what they can afford—from a night shelter to a room in a dormitory or hostel to a small self-contained unit often with shared facilities. It is this diversity in typology that regular housing schemes cannot cater to.

Informal rental arrangements in settlements pose several challenges. These are largely without formal tenure and registered lease agreements. This is challenging for the tenants who do not have negotiating power and safety nets. Amenities and services including sanitation, water supply, electricity and access roads are majorly overstressed in most of these settlements. These are overcrowded with tenants depending on shared amenities. Overcrowding and poorly built housing structures create uncomfortable thermal conditions with restricted daylighting and ventilation. These units can vary from small informal units made of impermanent material to very densely built multi-story buildings with shared amenities. Some of these also operate as hostels.

However, rental housing, especially informal renting, allows migrants to operate more flexibly and live closer to job centres. Otherwise, a lot of new development in

the category of low-income housing is exclusionary and is located far away from job centres.

Overall, rental typology has been largely neglected in the formal housing sector and the policy focus is primarily on home ownership. According to an estimate of the Asian Development Bank (ADB) in the early part of the last decade, formal rental housing accounted for only five per cent of the total stock while home ownership was significantly higher at 62 per cent, followed by informal rental housing at 25 per cent.[6] This ratio may have changed a little recently but not substantially.

The new rental scheme of Ministry of Housing and Urban Affairs (MoHUA) is now expected to catalyse development of rental housing in the formal housing sector. This will have to be informed well to ensure liveability and access to services while improving thermal comfort.

So far, there is some learning from the state level implementation of formal rental housing schemes. Overall, it appears that developers do not attach priority to this typology and, therefore, overall layout and building design is often neglected, leading to poorly ventilated, dark and congested multi-storied spaces with long corridors along with small patches of open or semi-open spaces. This is evident in some of the rental housing of Maharashtra for instance.

Available evidence shows that developers need to be sensitized about the special requirements of low-cost rental housing. While their focus remains on creating mass units within a restricted floor plan, it does not meet the housing needs of urban poor that varies from the specific needs of household business to shelter needs of a single person.

ADB's assessment in Mumbai found that higher floor space index (FSI) had created much higher densities—even higher than those prescribed by standards, largely because the unit sizes were kept very low. Rental housing projects could have densities of more than 10,000 population per hectare.[7] The study states that while giving environmental clearance to these projects, MoEFCC had advised either doubling the unit size or to have lower FSI for future projects. Higher FSI creates higher demand for adequate and accessible basic services including water supply and sewerage.[8]

The ADB review of such schemes, like that of Mumbai Metropolitan Region (MMR), shows these schemes collected additional external development charges from private developers to meet the additional infrastructure requirements to be

provided by the corporations or municipalities. But such high-density pockets faced limitations in being linked with the overall infrastructure. This led to resistance to rental housing schemes by urban local bodies in MMR.[9]

There is yet another typology in this segment that caters to the specific needs of the migrants. These are privately managed hostels which provide accommodation to the transit migrant population. Millions of such beds are available in cities. For instance, Aarusha Homes in Hyderabad is among the formal initiatives that do not own property but take property on lease hold to rent it out. These initiatives include dormitories for economically weaker section (EWS) and low-income group (LIG) migrants. These properties are located in close proximity to job centres. The rental allows access to services like meals, property maintenance, laundry, electricity, internet, and hot water supply.

Such formal rental initiatives in the private sector also bring out challenges like the need for capital investment to bear fixed costs like furnishings and shifting of tax burden from landowners to tenants. Since these properties are treated as commercial establishments, they attract more taxes. There is no financing strategy for operating these rental facilities.

Thus, the new rental housing programme will have to be understood from the perspective of not only the provisioning of housing but also the need for operation and maintenance, fiscal reforms and financing for the operators providing basic services. This will have a strong bearing on the quality of basic services and ability to meet thermal comfort requirements in the housing.

The formal market naturally gets undercut due to the competition from informal landlords who can escape several taxes and tariffs. The new scheme will have to address a lot of these challenges as the scheme is a step to formalize the rental housing market to set regulatory structures which are currently missing. The Model Tenancy Act 2019 introduces such regulatory structures in an attempt to address rental housing.

Effective implementation of the ARHC Scheme is going to need the harmonized effort of a number of actors. In addition to state government and urban local bodies (ULBs), intermediaries such as rental management companies will play an important role in providing quality access to basic services in a way that it does not compromise the liveability of the poor. Cities have started to integrate rental housing in their master plans. For instance, Delhi has adopted the scheme to build rental housing for migrant workers and poor in the Master Plan 2021.

Guidance is crucial to ensure liveability of the poor in such efforts. In the absence of adequate guidance, upcoming rental housing will not be able to perform due to requirements of thermal comfort, resource efficiency, affordability and liveability.

In this study, the Centre for Science and Environment (CSE) has conducted an overview of rental housing in India. While rental housing schemes for urban poor and migrants have many dimensions related to tenancy and rent, lack of regulations, poor access to basic services and exclusionary practices, this study has focussed on the policy landscape from the perspective of liveability, quality of services, and thermal comfort. The question this study asks and tries to answer is—How can public-private partnership arrangements leverage the ARHC Scheme and its two models to meet thermal comfort and resource efficiency goals? This is needed not only to improve quality of living of the masses but also to achieve sustainability goals in the housings sector.

CSE simulated rental housing sites in two different climate zones (Surat and Chandigarh) to understand their thermal performance. Their accessibility to public transport, school and health care facilities was also evaluated. Both these evaluations were necessary as these directly affect the operational cost and quality of life of beneficiaries. This shows what is needed to make future rental housing stock more liveable and affordable. An assessment of rents at ARHCs was done to see if they are affordable for targetted beneficiaries and to see what guidance is needed to fix rents as part of the ARHC Scheme. These surveys have been carried out in select neighbourhoods of Delhi and the National Capital Region.

Key takeaways and next steps: summary highlights

This assessment has revealed that several interventions are needed to strengthen the rental housing landscape in India. This is needed not only to increase provisioning of rental housing to meet housing demand but also to improve liveability, access to basic services, affordability and access to financing and financial instruments. This will require detailed guidelines, and development of indicators and rating systems to enable implementation.

Link ARHC grants and funding mechanisms with thermal performance: The ARHC Scheme comes with great opportunities to align the rental housing stock with national thermal comfort goals. The viability gap funding (VGF) provision under Model 1 and the technology innovation grant (TIG) provision under Model 2 can enable better thermal performance for beneficiaries without making the utility cost of the rental housing unit unaffordable. For this, the retrofit/repair model must not only focus on filling the infrastructure gap but also on thermal

comfort. There is a need to embed convergence with India Cooling Action Plan (ICAP) goals and create a clause for thermal comfort in the proposal format submitted by the ULBs for approval of the ARHC project. In addition to this, there is a need to establish thermal performance criteria so that it is clearly integrated in the request for proposals (RFPs) and therefore ensured in the retrofitting, design and construction of the ARHCs. Building Materials and Technology Promotion Council (BMTPC) must ask for performance based on these criteria in the scrutiny process of the proposals submitted by the developers.

Need to create an ecosystem for green financing for rental housing targeted at thermal comfort: Global experience has shown that green finance instruments have played a positive role in pushing the housing sector towards a sustainable and energy efficient trajectory. Many countries and institutions, including India, are gearing up for mainstreaming these instruments. India is coming up with multiple opportunities with the influx of funds aimed at green affordable housing such as by ADB, IIFL, IFC and HDFC, among others. Now that the government is entering the rental housing segment with both construction and management only models, green financing instruments such as green lease arrangements and green mortgages/developer finance will prove to be effective in enabling thermal comfort and ensuring better liveability. Regulatory bodies such as SEBI and RBI need to create clear guidelines and standards for evaluation and scrutiny of projects seeking green finance. Mandatory integration of ARHC Model 1 and 2 with green leasing arrangements can take upcoming rental housing stock towards better thermal performance and lower utility costs.

Cap rents to make housing affordable for the poor: The Model Tenancy Act as well as the ARHC Scheme provide for rents to be discussed mutually between the tenants and the lessee. This assessment has revealed that rents for ARHCs are being set by the ULBs. However, those are disconnected with the affordability of the beneficiary. According to the rental housing market, rents yielding a rent-to-value ratio of 2 or above are favourable for the owner for their higher returns as per the market price. Rents at a few ARHCs have a rent-to-value ratio up to 5.7 and therefore may be unfeasible for the beneficiary. ULBs and parastatals must prioritize equity and not the economics of operation and maintenance or else this will disallow the ARHC Scheme from providing affordable access to quality shelter for migrant workers and urban poor. ULBs and parastatals need to conduct market surveys and cap the rents for ARHCs based on the rent-to-value ratio such that it does not cross a ratio of 2.

Expedite development of a state regulatory framework for rental housing policy including creation of rent authority: As housing is a state subject, it is important to establish a regulatory framework at the state level for rental housing. This is one crucial feature of the model tenancy act and ARHC Scheme. Both provide for creation of rent authority and rent courts to regulate and streamline the rental housing market in India. State governments need to amend their rent control acts, formulate their own rental housing policy laying down targets and strategy for construction of rental housing stock, and create dedicated bodies that look after regulation and implementation of rental housing. Rent authorities at city level are needed to monitor and regulate rents in a bid to formalize rental housing in India.

Need better datasets at city level for calculating price-to-income ratio for housing affordability: This assessment has revealed that current housing schemes are disconnected with housing affordability of the poor in cities. Current mechanisms are also inadequate in assessing housing affordability. Price-to-income ratio is an indicator that can guide cities on affordability focusing on dynamic housing prices and different household profiles at a neighbourhood level. However, there is dearth of data on household incomes and housing prices at a city level. ULBs now need to conduct market surveys under ARHC Scheme to set rents. Therefore, this is the right time to develop city housing datasets/dashboards that comprise granular data on housing prices, household incomes, prevalent rents, predominant typologies, access to amenities, etc. This will not only enable ULBs to understand the housing affordability scenario in cities but will also inform policy discourse for future housing stock with a view to bridge the affordability gap.

Balanced scorecard approach to ensure future stock improves quality of life without increasing cost of living for the poor: This study has revealed that the operational guidelines for ARHC Scheme do not have quality control parameters in terms of ensuring access to important social and physical infrastructure such as schools, health care facilities, public transport, etc. The key driver and objective of the ARHC Scheme is to provide urban poor and migrant workers affordable shelter near their workplaces with good access to basic services and infrastructure. It is very important for these parameters to be ensured in the ARHCs being retrofitted or built for the success and effectiveness of the scheme. A balanced scorecard approach will ensure that future stock has all these parameters that support quality of life, especially for the poor. This involves metrics or performance indices for approval, designing and planning of housing projects that cater to liveability, accessibility and affordability. A balanced scorecard approach enables decision makers to take stock, plan and act in a comprehensive manner.

Need further research and capacity building: ULBs now play a crucial role in implementation of the ARHC Scheme. They are responsible for determining housing demand and typologies, identifying locations, and preparing implementation plans. With the new typology of rental housing taking root, it is imperative to enhance the capacity of these actors to effectively conduct analysis and capture the nature of housing demand based on the socio-economic characteristics of target groups. The interlinkages between affordable housing and mobility for affordability and liveability in the interest of beneficiaries also need to be disseminated widely. Research on more ARHCs in different cities is also needed to build a knowledge curve on rental housing and its implementation in India.

2. Understanding the need for rental housing

According to Census 2011, nearly one in three urban residents in India lives in a rented dwelling unit (see *Table 1: Rental housing in urban and rural areas as per Census 2001 and 2011*). And yet, rental housing has been largely neglected in the policy landscape. There are many factors that drive rental housing demand in cities. Urbanization and better livelihood opportunities create a 'pull' to bring people to the cities while exploitative socio-economic conditions create a 'push' out of villages and towns. These people include public and private sector employees, daily wage workers, students and young professionals. This population forms the core of the demand for rental housing in cities.

What is rental housing?

Housing is not only a shelter with four walls and a roof but is also an asset. This makes home ownership a key step in wealth accumulation. For the same reason, home ownership is being promoted by governments everywhere through incentives and financing options, leaving other options unattended or ill-explored. Rental housing is one such option which meets the dominant share of housing demand and is the first choice for shelter. But this remains unaddressed by policy.

Table 1: Rental housing in urban and rural areas as per Census 2001 and 2011

		2001		2011		2001–11 (changes)	
		Number (Millions)	As proportion of households (per cent)	Number (Millions)	As proportion of households (per cent)	Number (Millions)	As proportion of households in 2001 (per cent)
Total (rural and urban)	Owned	166.4	86.7	213.6	86.6	47.2	28.4
	Rented	20.2	10.5	27.4	11.1	7.1	35.3
	Any other	5.4	2.8	5.8	2.4	0.4	7.8
	Total	192	100	246.7	100	54.8	28.5
Rural	Owned	130.5	94.4	159	94.7	28.5	21.9
	Rented	4.9	3.6	5.6	3.4	0.7	14.9
	Any other	2.9	2.1	3.2	1.9	0.3	11.6
	Total	138.3	100	167.9	100	29.6	21.4
Urban	Owned	35.9	66.8	54.5	69.2	18.7	52.1
	Rented	15.3	28.5	21.7	27.5	6.4	41.8
	Any other	2.5	4.7	2.6	3.3	0.1	3.5
	Total	53.7	100	78.9	100	25.2	46.9

Source: Census 2011

There are several benefits attached to rental housing—

The poor can access housing without having to own it: Rental housing has the advantage of being a consumption good rather than an investment good. The high initial investment required to own a house often forces a low-income household to avail housing loans. This places the burden of paying a fixed amount every month towards repayment and interest for an illiquid asset, with low disposable incomes and no flexibility to opt out. This financial constraint often deters low-income households from seeking ownership of a house.[10,11] Home ownership is also not an option for those who lack the necessary documentation to qualify for subsidies, mortgages and loans. This makes rental housing more viable for the poor in which the focus is placed on accessing shelter without a mandate to own.

Better suited for income volatility: With the low-income segment often occupied in the informal sector, rental housing suits the associated income volatility and risk profile better. The household can choose to move to a better house where there is a higher flow of income. Or they can move to a house with lower rent when they are short on income, instead of facing debt and failure of payment of interest on housing loans obtained for buying a house.[12] Therefore, it is a more sustainable housing option for low-income groups.

Alleviates poverty conditions: The enhancement of quality of life for the low-income working population as a consequence of enhanced access to shelter could help them improve their productivity and income. In the long term, this could help them break out of the cycle of poverty. The provision of low-income rental housing has thus been found to be an essential component of poverty alleviation.[13]

Provides flexibility of location—addresses need of the user: Access to workplace is a key factor in deciding the location of housing. In case of change in job or location of workplace, an owned house does not provide the flexibility of stationing oneself near the workplace, which rental housing does. In addition to this flexibility, rental housing provides the opportunity to save commute cost and time.

Encourages influx of skilled labour: As revealed in the migration trends recorded in the Census of India 2011, most employment-related migrants move singly, without their families. These people will not prefer owning a house if they are not inclined towards settling down in the city. The presence or absence of rental housing options can be a major factor in the decision made by a potentially skilled workforce while moving to any city. This will subsequently determine the

availability of quality labour for various economic activities. A higher percentage of rental housing has been observed in urbanized states and union territories. Thus, rental housing helps to improve productivity and contribute to overall growth of the economy through availability of quality labour.

Promotes diversity: Provided necessary measures are taken towards removing discrimination in the owner-tenant relationship, enabling affordable rental housing could facilitate different sections of society to live alongside each other. This could help build a resilient community and healthy levels of tolerance in the society.

Typologies of rental housing in India

According to data compiled by the International Monetary Fund (IMF), rents have not grown as dynamically as house prices have grown.[14] This makes rental housing more accessible to different income groups and the first option for accommodation in cities with exorbitant housing prices. As low-income groups have smaller disposable incomes, rental housing is more suitable for them.[15]

Traditional rental housing

Based on the key principle of affordability, traditional rental housing system has remained active for nearly a century now in India. C*hawls* of Mumbai and Gujarat and *Mess Baris* of Kolkata are peculiar habitation systems that have provided an affordable shelter option to migrants coming in search of work to the cities.

A study on the chawls of Mumbai reveals walking distance proximity to workplace, hospitals, parks and theatres, availability of public transport nearby, and presence of stores for daily needs and meal facilities in the neighbourhood. The most important perk of this system is the cheap rent. For instance, a chawl in Naigaon area sought a mere Rs 250 for a two-room dwelling unit (200 sqft), whereas 750 sqft apartments in adjoining areas asked for Rs 25,000 (see *Figure 1: Layout of a chawl in Naigaon, Mumbai*). However, this low rent posed the problem of maintenance and suboptimal living conditions with 16 units sharing one bathroom and 4 toilets on each floor, and inadequate access to clean water, ventilation and light (see *Images 1–3: Shared toilet facilities at a chawl at Naigaon, Mumbai*). The story remains the same at other traditional rental housing systems, whether they be in Ahmedabad, Rajkot or Kolkata.

Figure 1: Layout of a chawl at Naigaon, Mumbai
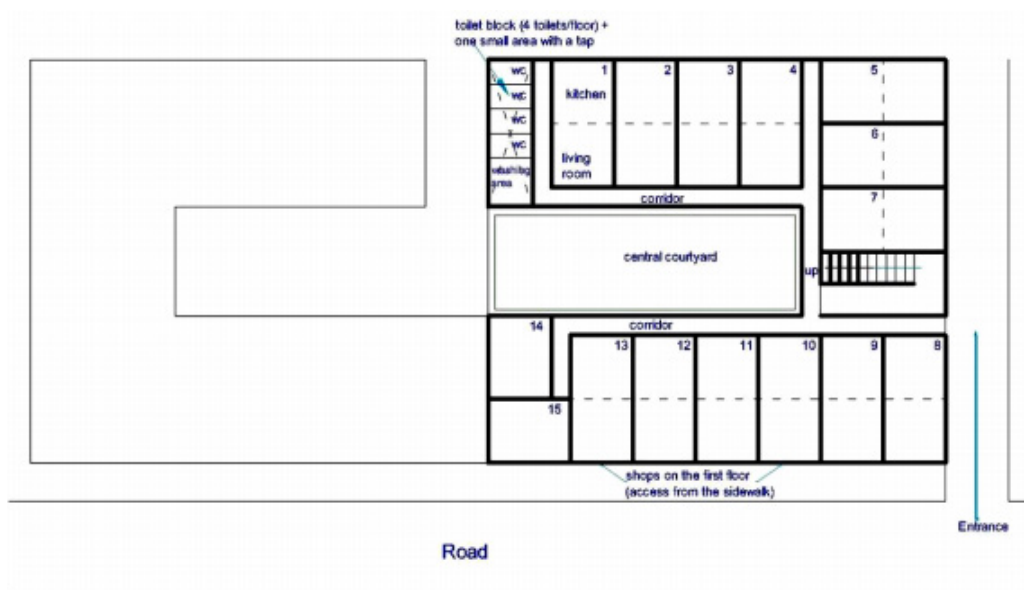
Source: CSE

Images 1–3: Shared toilet facilities at a chawl at Naigaon, Mumbai
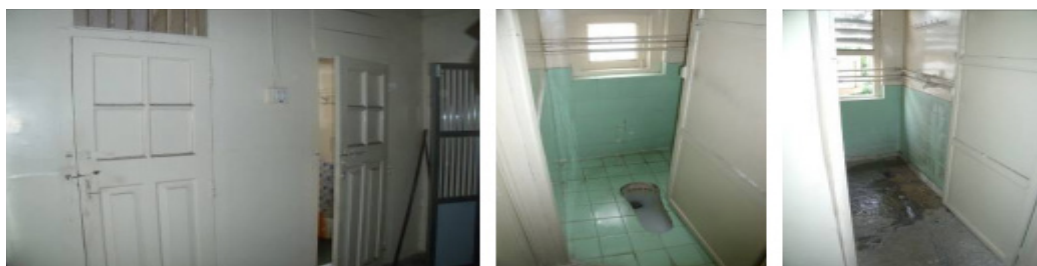
Source: CSE

Informal rental housing and settlements

As India does not have a formal rental housing framework, those in need of affordable shelter normally self-organize. Informal rental housing and settlements exist in nearly every city and are accessed by those who are part of the urban economy and seek shelter near their workplace.

Gurugram is one of the most rapidly developing cities of India. Gurugram district witnessed a steep climb in population growth rate in 2011 at 74 per cent, up from 44 per cent in 2001. This was because many migrants moved to Gurugram in this period. A survey by a Gurugram-based NGO Agrasar estimates the number of migrant workers in Gurugram to be 1 million more than the official 1.5 million as per Census 2011.[16] The survey revealed that 53 per cent of the low-income migrant

workers are unskilled and involved in domestic work, street vending and other informal jobs, while 43 per cent are semi-skilled and work as electricians, auto-rickshaw drivers, shopkeepers, etc. This population lives in unauthorized colonies, urban villages and other marginal areas in the city that are mainly in the vicinity of economic hotpots. The survey reveals that all these migrant workers lived in sub-standard conditions with poor light and ventilation, about 72 per cent also using shared toilets.

Figure 2: Spatial distribution of migrant tenants across Gurugram
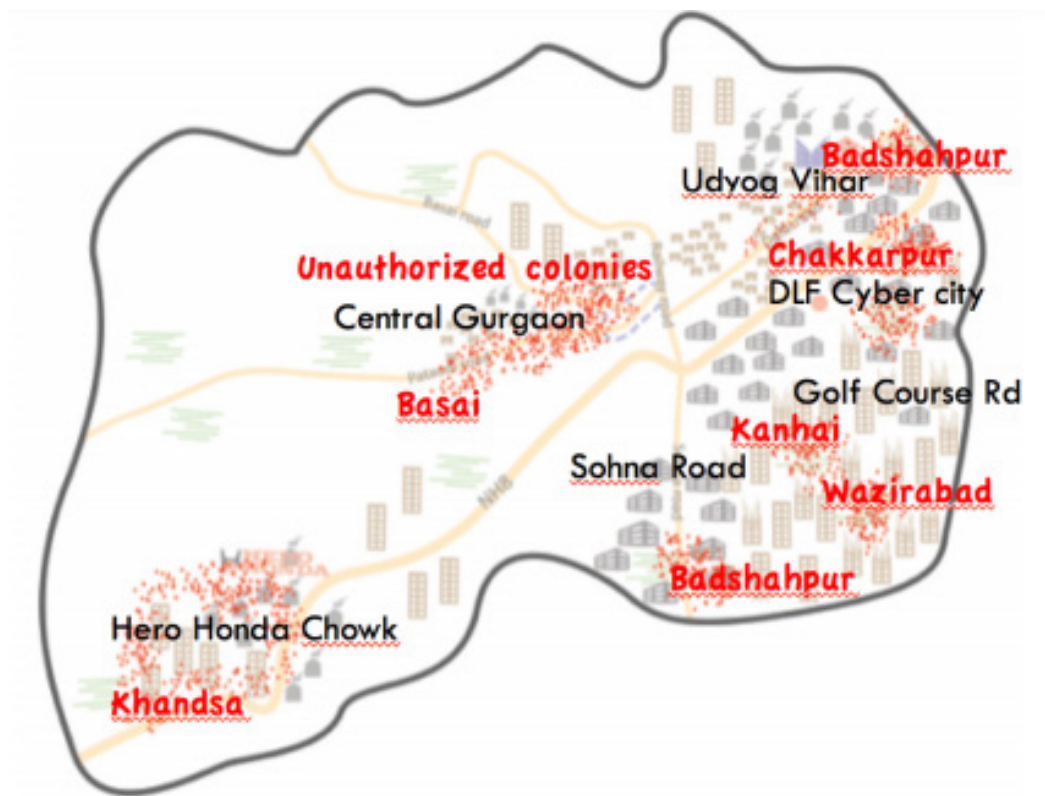
Source: Agrasar, 2013

A qualitative analysis conducted in an independent study by the National Institute of Urban Affairs (NIUA) revealed that informal rental settlements comprise mostly two-storeyed tenements that charge a rental between Rs 1,800–2,200.[17] These tenements have been developed on land owned by the local population who also live in the same unauthorized colonies and urban villages. Other models include temporary use of land owned by developers for parking or for development of temporary informal rental settlements. These settlements are also found on

Gram Sabha lands that are mostly illegally occupied and rented out by locals to migrant workers. Another model is based on occupation wherein rag pickers and *kabadiwallahs* pay rent for a piece of land where they collect and sort waste, and also live in temporary structures built adjacent to these sites.

All these informal setups are devoid of adequate water supply and sanitation. This leads to situations where a toilet is being shared by 10–20 households and some people even have to openly defecate. The structures are unsafe as they use bamboo frames with a host of temporary materials (old sarees, plastic, thermocol, thatch sheets, tarpaulin, aluminium and tin sheets) as walling and roofing material. This has led to frequent fire break-outs.

Image 4: An informal rental settlement in an urban village in Gurugram

Source: Agrasar

Co-living spaces: A reboot of traditional rental housing

Co-living spaces are a solution to need-based rental housing. According to the Census 2011 data and analysis by JLL, millennials comprise 42 per cent of India's population.[18] The study estimates that 4.7 million migrant millennials are employed in seven cities as of 2018. This population is expected to grow at a compounded annual growth rate of 8 per cent or 1.5 times by 2023 (7 million). While this population segment shows preference for rental housing, India's cities lack quality housing that suits their needs.

The JLL study based on a survey revealed migrant millennials seek services and amenities like private toilets, security, hassle free access and exit, internet, furniture and housekeeping in shared accommodations. For these services and amenities, this population segment is willing to pay an additional Rs 3,000 per bed per month. Based on these factors, the market for co-living spaces is expected to grow from 94,000 beds in 2018 to 5,41,000 beds in 2023—a fivefold increase! This will result in the co-living market becoming a Rs 100 crore opportunity industry by 2023.

Such opportunities have led organized players to enter the rental housing segment. There are largely two business models for co-living. While one involves operation and maintenance of the units, the other involves an aggregator approach (see *Table 2: Prevalent models for co-living spaces*). The aggregator model has received wide popularity globally as well, so much so that it has been adopted by several municipalities across Europe. There are multiple O&M based models.

Table 2: Prevalent models for co-living spaces

NON-OPERATORS		
Model	**Key player**	**Focus/Roles/Operations**
Aggregator model	Flathood	Focus on listing shared homes or individual flats and helping customers rent them.
OPERATORS		
Model	**Key players**	**Focus/Roles/Operations**
Management contract model	Zolo Stays, Placio, Nestaway	• Operator acts as a service provider and manages the properties for a commission. • The owner is responsible for managing the returns from the property. • Operator acts as custodian and the end user enters into lease agreement with the owner.
Lease and operate model	Zolo Stays, Ziffy Homes, CoHo, Stanza Living, Oxfordcaps	• Most common model • Known as 'asset light strategy' wherein operators lease entire buildings from property owners and builders, and provide them either a fixed rental or share in revenues • Revenue share (landlord and operator) is 50:50. It is predicated on whether the property was renovated or refurbished. • Leased properties are taken either on a fixed lease rental or revenue share basis for a period of 3–9 years.
Hybrid model	Zolo Stays, ZiffyHomes, CoHo	• Few operators follow a hybrid model combining the lease and operate model and the management contract model, depending on the location and requirements of property owners. • Benefits both operators and property owners.
Franchise model	Zolo Stays, Placio	• Partner with property owners with properties near institutes, universities and large corporate parks through franchise-owned company managed (FOCM) model. • Can help developers with large number of unsold inventories, a relatively easier and alternative platform to generate higher returns on a regular basis while retaining their ownership. • Best fit for operators with expansion plans across the country.

Source: Compiled by CSE

The co-living market has spurred two crucial changes. One is the introduction of intermediaries, which was also recommended by the Task Force on Rental Housing 2013. An intermediary to operate and maintain rental housing and ensure quality services and amenities has been missing from the traditional rental housing system. The co-living market has taken the first step towards formalizing the rental housing market by way of creating intermediaries. As this market will establish experience and knowledge curve for rental housing management companies, there will be opportunity for these players to enter into the affordable rental housing segment.

Second effect of co-living spaces is that this market has reinvented the traditional rental housing system. With better quality of space, services and amenities for the occupant, co-living market has mitigated one of the key challenges of traditional rental housing that was a result of the archaic rent control laws—unmaintained dwellings with sub-optimal living conditions. This is another crucial step towards formalizing the rental housing market in India.

Evolution of address to rental housing in India: A timeline

Rent control laws: Introduced in 1948 to fix rents considering the construction cost and market value of the property. Mostly in favour of tenants and draconian in nature, the laws capped the rents and allowed only a marginal increase annually preventing any impact of inflation on the rents, maintenance costs and return on investment for the property owners. This eventually led to a collapse in India's urban rental housing sector, which declined from 54 per cent in 1961 to 31 per cent in 2011.[19]

National Urban Housing and Habitat Policy 2007: Aimed at creating rental housing stock with emphasis on improving affordability through appropriate capital or interest subsidies. Triggered development of a 'Model Rent Act' to correct the skewed balance between owner and tenant. The Act was floated based on the principle that rents would be decided mutually between the owner and the tenant for a stipulated lease period. Suggested incentives to be rolled-out to encourage loans by banks and housing finance institutions for rental housing.[20]

Task Force on Rental Housing 2013: In its report titled *Policy and Interventions to Spur Growth of Rental Housing in India*, the task force identified barriers and recommended levers for the rental housing sector. A key barrier is the missing element of residential rental management companies (RRMC). This demotivates large players from entering the sector. The task force suggested: i) incentives like

taxation and deductions (service tax, property tax, stamp duty, income tax, utility and service charges); ii) subsidies and mandates like infrastructure status for rental housing and rental housing as an option for corporate social responsibility (CSR); iii) regulatory changes in eviction policies and procedures, and grievance redressal mechanisms; and iv) market-related levers such as rent pricing, creation of enabling agencies like RRMCs, rent-to-ownership model, rental tribunals, and financial and implementation assistance in the form of public-private-partnership (PPP), foreign direct investment (FDI), rental real estate investment trust (R-REIT) and external commercial borrowings (ECBs), securitization, priority sector lending, etc.).[21]
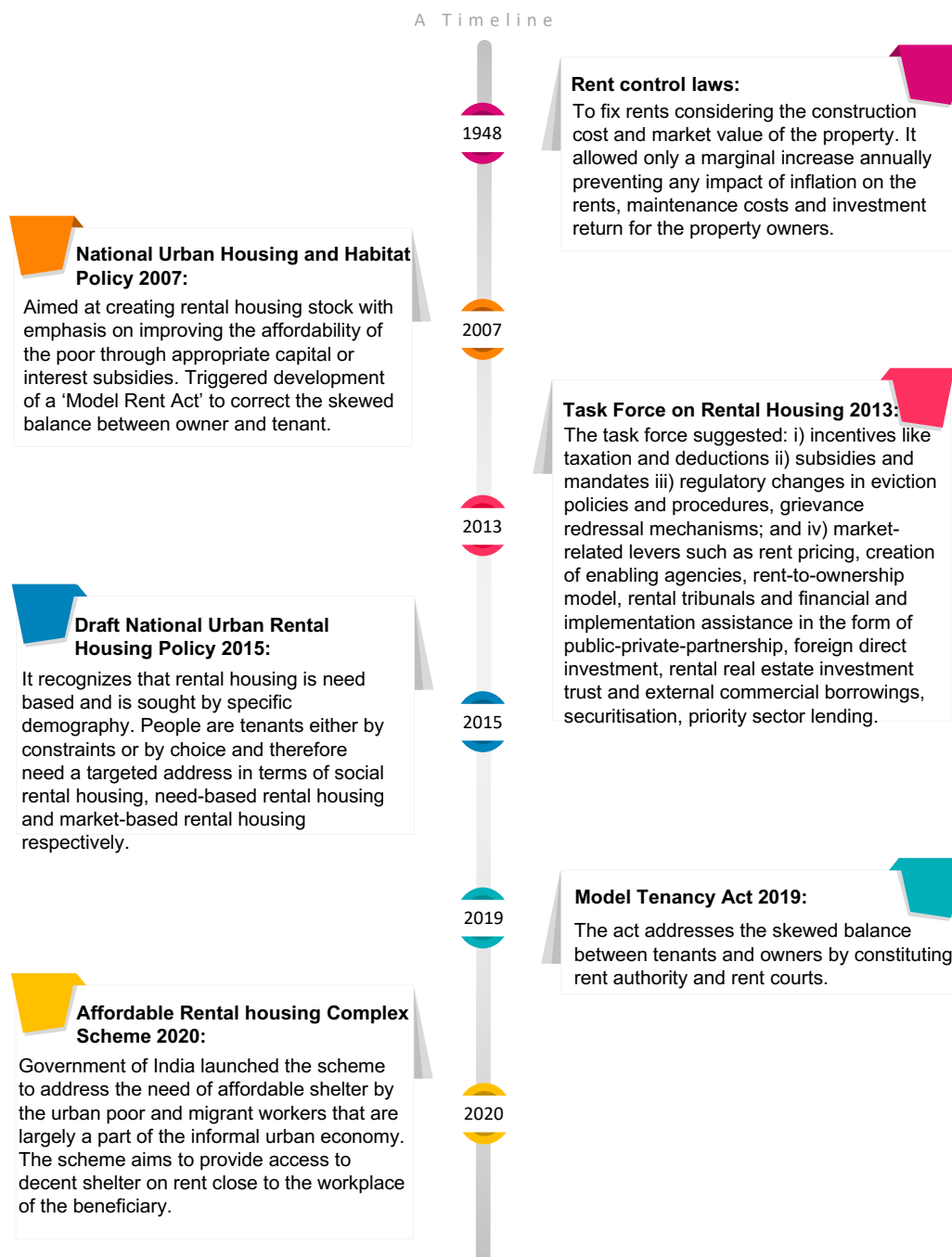
Draft National Urban Rental Housing Policy 2015: It recognizes that rental housing is need based and sought by a specific demography. People are tenants either because of constraints (urban poor, migrant workers, single women and men and students) or by choice (private rental housing) and therefore need be targetted differently in terms of social rental housing, need-based rental housing and market-based rental housing respectively. While the policy draft largely internalizes the recommendations of the Task Force on Rental Housing, it focuses on a decentralized solution to rental housing by asking state governments to 'Develop State Rental Housing Policy in consultation with the respective Urban Local Bodies (ULBs) based on local needs and demand assessment and... undertake appropriate reforms and create conducive environment to make Social Rental Housing viable.'

Model Tenancy Act 2019: The act addresses the skewed balance between tenants and owners. The act provides for rents and the tenure to be discussed and decided upon mutually by the tenant and the landlord before entering into a lease agreement. The act brings forth the constitution of rent authority and rent courts. These bodies will be instrumental in fixing rents, lease duration and expedited resolution of disputes arising between the two parties.

Affordable Rental Housing Complex Scheme 2020: Government of India launched this scheme to address the need of affordable shelter for the urban poor and migrant workers that are largely a part of the informal urban economy. The scheme aims to provide access to decent shelter on rent close to the workplace of the beneficiary through two models. Model 1 aims to utilize the houses lying vacant which were developed under previous government housing schemes, retrofit them for use and allot them to the beneficiary identified by the ULB on affordable rent. Model 2 involves development of affordable rental housing from scratch on private or government owned land. Both the models are envisaged with

PPP and involve an operation and maintenance period of 25 years. The rents will be fixed by the ULB and there are several incentives attached to the models such as tax holidays and extra FAR/FSI.

Figure 3: Evolution of policy address to rental housing in India

A Timeline

1948

Rent control laws:
To fix rents considering the construction cost and market value of the property. It allowed only a marginal increase annually preventing any impact of inflation on the rents, maintenance costs and investment return for the property owners.

National Urban Housing and Habitat Policy 2007:
Aimed at creating rental housing stock with emphasis on improving the affordability of the poor through appropriate capital or interest subsidies. Triggered development of a 'Model Rent Act' to correct the skewed balance between owner and tenant.

2007

Task Force on Rental Housing 2013:
The task force suggested: i) incentives like taxation and deductions ii) subsidies and mandates iii) regulatory changes in eviction policies and procedures, grievance redressal mechanisms; and iv) market-related levers such as rent pricing, creation of enabling agencies, rent-to-ownership model, rental tribunals and financial and implementation assistance in the form of public-private-partnership, foreign direct investment, rental real estate investment trust and external commercial borrowings, securitisation, priority sector lending.

2013

Draft National Urban Rental Housing Policy 2015:
It recognizes that rental housing is need based and is sought by specific demography. People are tenants either by constraints or by choice and therefore need a targeted address in terms of social rental housing, need-based rental housing and market-based rental housing respectively.

2015

2019

Model Tenancy Act 2019:
The act addresses the skewed balance between tenants and owners by constituting rent authority and rent courts.

Affordable Rental housing Complex Scheme 2020:
Government of India launched the scheme to address the need of affordable shelter by the urban poor and migrant workers that are largely a part of the informal urban economy. The scheme aims to provide access to decent shelter on rent close to the workplace of the beneficiary.

2020

3. Policy imperatives of rental housing

The ongoing COVID-19 pandemic has forced reverse migration with millions of migrant workers and poor going back to their hometowns amidst the lockdown. According to the World Bank, nearly 40 million migrant workers (inter and intra-state) were affected by the lockdown in India.[22] Rough estimates take this number up to 120–140 million.[23] This exodus of migrant workers and poor demonstrated how many people were part of the urban economy but did not have adequate means to sustain themselves in the city.

Government of India has launched the Affordable Rental Housing Complex (ARHC) Scheme to address the need for affordable shelter in cities. This scheme, as part of PMAY, aims to provide access to decent shelter on rent close to the workplace of the beneficiary. The scheme does not mandate ownership to the dwelling unit. This is primarily what makes this scheme different from the rest of the verticals of PMAY that involve house ownership.

The ARHC Scheme is to be implemented on PPP using two models (see *Figure 4: Model 1 proposed under the Affordable Rental Housing Complex Scheme* and *Figure 5: Model 2 proposed under the Affordable Rental Housing Complex Scheme*). Model 1 aims to utilize the houses developed under previous government housing schemes, which are lying vacant, by retrofitting or repairing or filling any infrastructure gaps and allotting to the beneficiary identified by the ULB on affordable rent. Model 2 involves development of affordable rental housing from scratch on private or government owned land. Both the models are envisaged with an operation and maintenance (O&M) period of 25 years.

The rents will be fixed by the ULB based on a local survey and will increase biennially by 8 per cent, subject to maximum gross increase of 20 per cent over a period of 5 years from the date of signing the concession agreement. There are several incentives attached to the models such as tax holidays and extra FAR/FSI among others. The typology of dwellings in this scheme involves dormitory with 4/6 beds (up to 10 sqm carpet area per capita) and common facilities in addition to 1 to 2 BHK (30–60 sqm carpet area) apartments.

In case the bidders are not able to find financial feasibility in a project, there is a provision of viability gap funding (VGF) by the state/UT governments or utilizing

the funds sanctioned to states/UTs in previous housing schemes under Model 1. Other than this, the government has not provided for any funding mechanism for the scheme and it is completely based on the PPP arrangement.

Figure 4: Model 1 proposed under the Affordable Rental Housing Complex Scheme
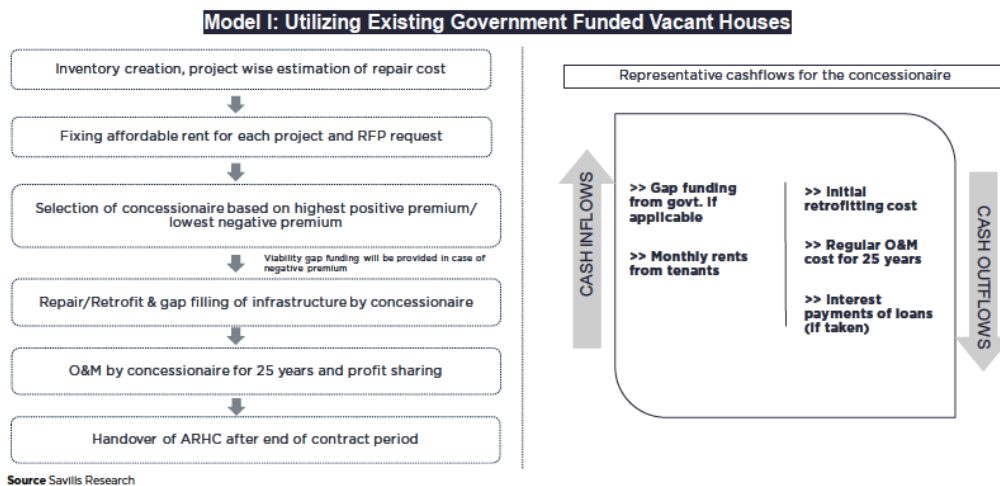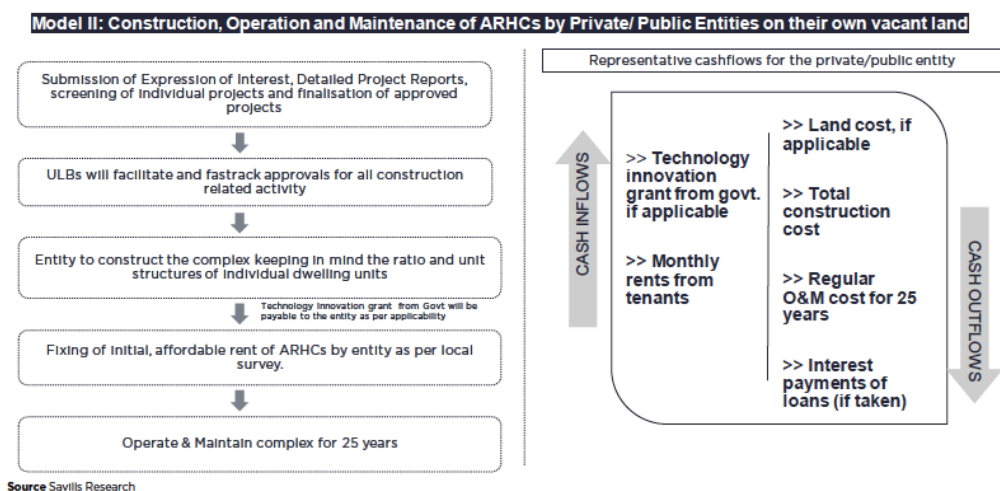

Figure 5: Model 2 proposed under the Affordable Rental Housing Complex Scheme

Within a year of launching the scheme, nearly all states have signed the Memorandum of Agreement (MoA) with the central government for its

implementation (see *Map 1: States and UTs which have signed MoA for ARHC Scheme*). According to the ARHC dashboard available on the MoHUA website, there are 87,413 dwelling units lying vacant (see *Table 3: State/UT-wise number of vacant houses reported and allotted*). More than half of these units are in Maharashtra and Delhi, which have nearly 37 per cent and 33.3 per cent of the vacant inventory respectively. With a huge housing stock lying vacant, Delhi government has recently agreed to be a part of the scheme according to the status report on the MoHUA website.

Map 1: States and UTs who have signed MoA for ARHC scheme as of 20 October 2021

Source: MoHUA

Table 3: State/UT-wise number of vacant houses reported and allotted as of 20 October 2021

State/Union Territory	Number of vacant houses reported	Number of houses allotted
Arunachal Pradesh	752	
Chandigarh	2,195	1,707
Delhi	29,112	
Gujarat	7,715	227
Haryana	2,545	
Himachal Pradesh	255	
Karnataka	1,731	
Madhya Pradesh	364	
Maharashtra	32,345	
Nagaland	664	
Rajasthan	3,790	
Uttar Pradesh	5,232	
Uttarakhand	377	
UT of Jammu & Kashmir	336	
Total	87,413	1,934

Source: MoHUA

According to the ARHC dashboard, many cities have floated tenders under the scheme. However, these tenders are mainly for Model 1. These projects are mainly implemented by the respective municipal body or parastatal organization. State urban development or housing department are the state level nodal bodies for coordination. Building material and technology promotion council (BMTPC) is entrusted with the appraisal and monitoring of the project. Overall, the process flow is the same as that of PMAY-U.

Liveability in ARHCs

ARHC Scheme was launched to improve the quality of living of migrant workers and the poor in cities. For this, affordable shelter close to the workplace and access to education, healthcare, water and sanitation, daily needs, etc. are crucial parameters. To ensure this, the scheme comes with a provision for social audits to be conducted by identified planning and architecture institutions. Further, the operational guidelines for ARHC provide for environmental services like rainwater harvesting, wastewater management, solar rooftop and recommend social and commercial services like health centres, anganwadi, creche, community centres and daily needs shops in the campus.

CSE assessed a few rental housing projects for their locational characteristics as well as thermal comfort. This was done to see whether the new scheme is able to

improve the liveability of the target group, as is its key objective. This assessment helped outline the gaps and opportunities to further strengthen the same.

Evaluating accessibility

Locational characteristics are primarily guided in India by the Urban and Regional Development Planning Framework and Implementation (URDPFI) Guidelines 2014. According to the guidelines, railway/metro stations should be located within 800m of housing projects and bus stops within 400 m. Basic amenities like ATM, shops, etc. should be within 600–800 m and amenities like school, medical clinic, etc. should be within 1.6–2 km. At the same time, 25–35 per cent of the area should be open space.[24]

Not only this, The Right of Children to Free and Compulsory Education Act 2009 asks for a minimum of one government primary school at the neighbourhood level and URDPFI guidelines suggest a primary school in 1 km radius and one government secondary school in a 3 km radius. Ayushman Bharat Guidelines 2018 provide for a non-bedded government healthcare facility at community level and URDPFI guidelines place it within 2 kms.

Based on these principles, three ARHC projects were evaluated (see *Table 2: ARHC projects evaluated for accessibility*). First project located at Maloya in Chandigarh was constructed under the JNNURM scheme and comprises 2,195 dwelling units. It is being retrofitted and operated & maintained by Chandigarh Housing Board (CHB). The second project is located at Bodakdev in Ahmedabad and is being implemented by Ahmedabad Municipal Corporation (AMC). A request for proposal has been floated twice for this project and the selection of concessionaire is awaited. The third project is located at Sachin in Surat and the concessionaire has been selected. It is being implemented by the Surat Development Agency (SUDA).

Table 4: ARHC projects evaluated for accessibility

ARHC project	Number of dwelling units	Implementing body	Status
Maloya, Chandigarh	2,195	Chandigarh Housing Board	1,707 units have been allotted
Bodakdev, Ahmedabad	1,024	Ahmedabad Municipal Corporation	RFP has been floated twice
Sachin, Surat	393	Surat Urban Development Agency	Concessionaire has been selected

Source: Compiled by CSE

Accessibility analysis revealed that the Ahmedabad project does not have access to public transport in a radius of 400 m but it has access to intermediate public transport (IPT). The nearest bus stop is in Ashok Vatika at a distance of nearly 1.7 km from the project. Chandigarh project has a bus stop right next to the project, whereas Surat project has a bus stop at 700 m proximity from the project at Shivdarshan Complex (see *Map 2: Locational characteristics at the Chandigarh ARHC project, Map 3: Locational characteristics at the Surat ARHC project* and *Map 4: Locational characteristics at the Ahmedabad ARHC project*).

Table 5: Accessibility analysis of ARHC projects

ARHC project	Number of bus stops within 400 m	Number of primary schools in 1 km	Number of healthcare facilities in 2 km
Maloya, Chandigarh	1	2	3
Bodkadev, Ahmedabad	0	1	2
Sachin, Surat	0	3	0

Source: Compiled by CSE

Image 5: Bus stop at Maloya ARHC, Chandigarh

Image 6: Government model high school at Maloya ARHC

Image 7: ARHC project at Sachin, Surat
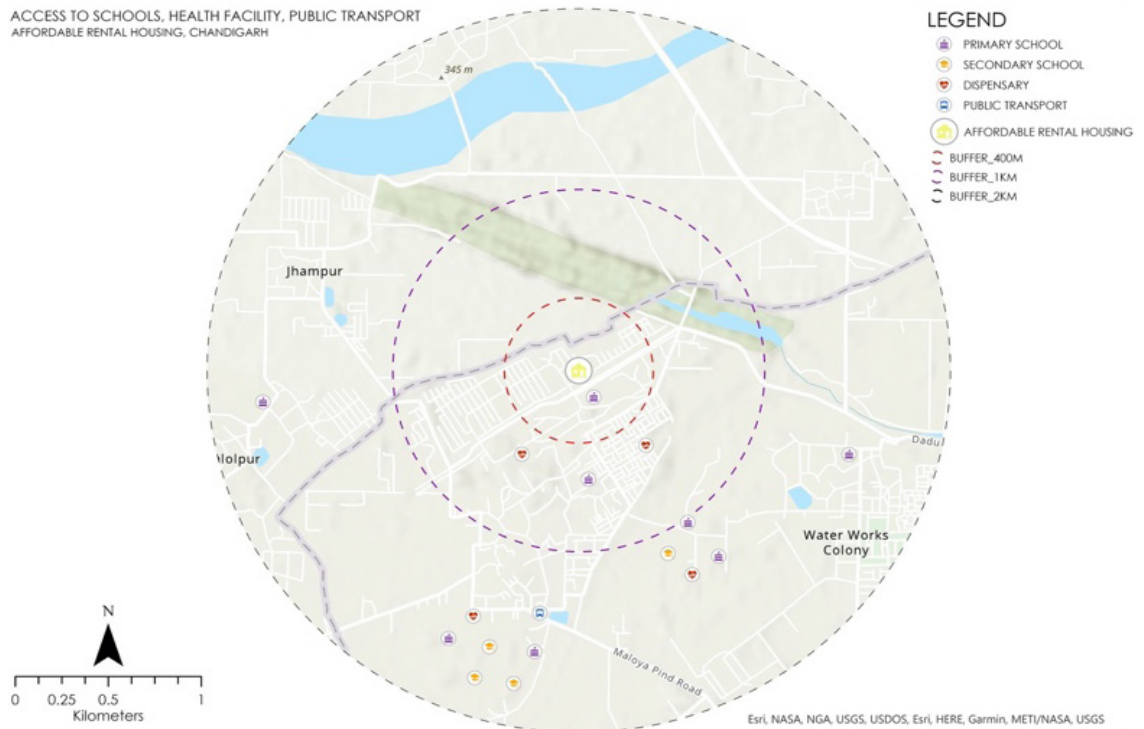

Image 8: ARHC project at Bodakdev, Ahmedabad

Source: CSE

When it comes to access to education, the Chandigarh project has 2 government schools (inclusive of primary education) as part of the project. Surat has 3 primary schools and 4 secondary schools in a 1 km radius. Ahmedabad has less options with 1 private primary school and 2 private secondary schools in 1 km radius.

For healthcare facilities, the Chandigarh project has a government dispensary at a distance of 600 m. There are 2 more healthcare facilities in a 2 km radius. Both Surat and Ahmedabad projects do not have government healthcare facilities but 2 and 3 private hospitals respectively in the 2 km radius.

Map 2: Locational characteristics at the Chandigarh ARHC project

ACCESS TO SCHOOLS, HEALTH FACILITY, PUBLIC TRANSPORT
AFFORDABLE RENTAL HOUSING, CHANDIGARH

LEGEND
- PRIMARY SCHOOL
- SECONDARY SCHOOL
- DISPENSARY
- PUBLIC TRANSPORT
- AFFORDABLE RENTAL HOUSING
- BUFFER_400M
- BUFFER_1KM
- BUFFER_2KM

Esri, NASA, NGA, USGS, USDOS, Esri, HERE, Garmin, METI/NASA, USGS

Source: CSE

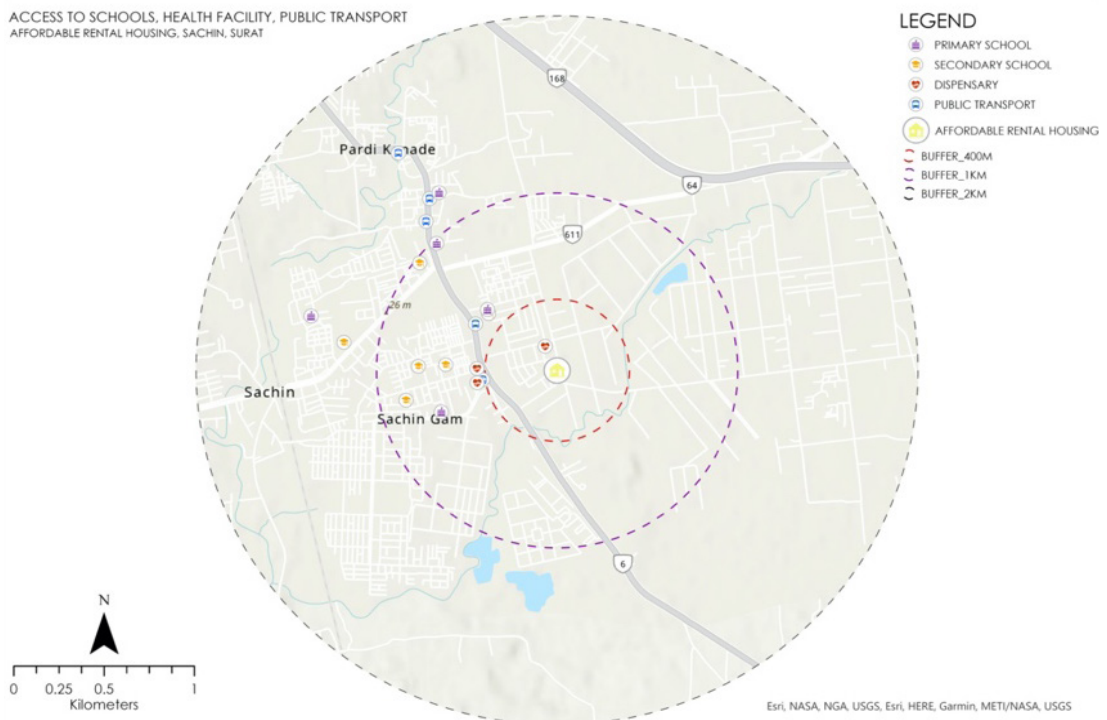**Map 3: Locational characteristics at the Ahmedabad ARHC project**

ACCESS TO SCHOOLS, HEALTH FACILITY, PUBLIC TRANSPORT
AFFORDABLE RENTAL HOUSING, BODKADEV AHEMEDABAD

Source: CSE

Map 4: Locational characteristics at the Surat ARHC project

ACCESS TO SCHOOLS, HEALTH FACILITY, PUBLIC TRANSPORT
AFFORDABLE RENTAL HOUSING, SACHIN, SURAT

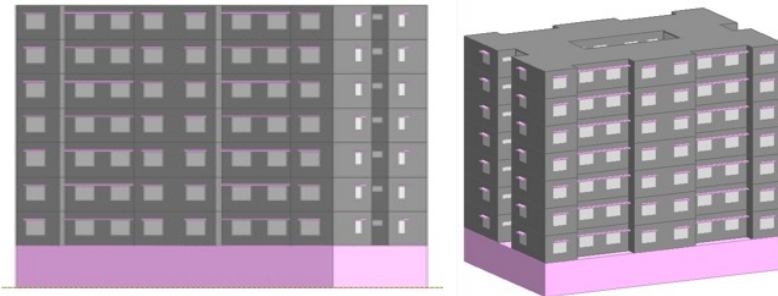Source: CSE

Evaluating thermal comfort

The operational guidelines for ARHC provide for the design of the dwelling units to conform with the National Building Code (NBC) and local bye-laws such that structural safety against earthquake, flood, cyclone, landslides, etc. is ensured. The ARHC Scheme has a provision for an additional Technology Innovation Grant under the technology sub-mission of PMAY-U. This grant is to promote use of innovative and alternate technology for sustainable, resource efficient and fast paced construction. A sum of Rs 1 lakh per dwelling unit for a 2 BHK (up to 60 sqm carpet area), Rs 60,000 per dwelling unit for a 1 BHK (up to 30 sqm carpet area) and Rs 20,000 per dormitory bed (up to 10 sqm carpet area) shall be provided through BMTPC.

As India's construction sector is transitioning towards fast-paced and automated construction technologies, it is important to guide this transition so that the country is in line with the national thermal comfort and energy goals set by the India Cooling Action Plan. Further, if this transition involving the choice of materials, layout and architectural design of the buildings is not guided, there is a threat of forcing the already economically weak households into thermally uncomfortable houses with elevated cost of energy consumption due to increased mechanical cooling load.

CSE's previous research has produced evidence that current housing schemes are devoid of a mechanism to ensure thermally efficient houses that consume less energy and are easy on the beneficiary's pocket. It is important that the choice of materials and design of the upcoming ARHC projects under Model 2 respond to the native climatic conditions and ensure that the future rental housing stock contributes to the ICAP goals. CSE assessed two rental housing projects for their thermal performance to build a knowledge curve and inform what factors play a role (and by how much) in providing thermal comfort.

CSE simulated an ARHC project at Sachin (sector-2), Surat to understand its thermal performance based on its orientation, choice of walling materials, shading devices, glazing and roofing material, and the native climatic conditions. The project comprises two mixed use building blocks (block C & D) with 140 dwelling units with stilt parking and seven floors. The intermediate and top floors were simulated using the thermal comfort parameters suggested in the National Building Code (NBC) 2016.

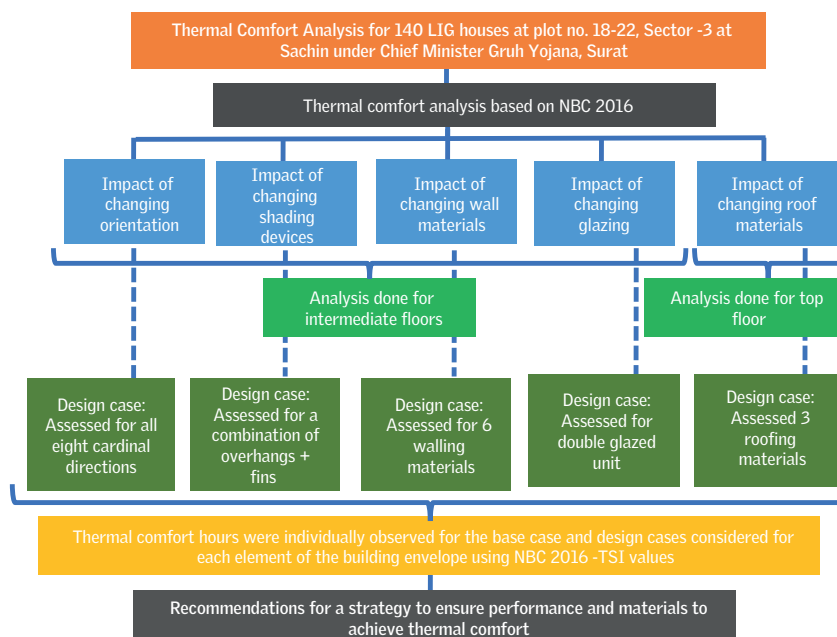**Figure 6: 3D model of Block C at Surat ARHC**

Source: CSE

Figure 7: 3D model of Block D at Surat ARHC
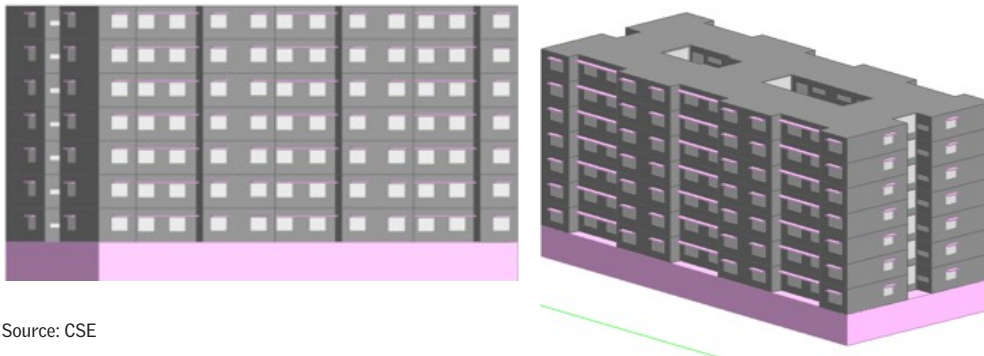
Source: CSE

Figure 8: Methodology adopted for thermal comfort assessment of Surat ARHC

Source: CSE

The base case was a combination of external walls made of AAC blocks 225 mm, roof with RCC slab (125 mm), brick batt coba (40 mm) and cement mortar (40 mm), and a clear glass glazing (6 mm) (see *Table 6: Thermal transmittance value of the building elements for thermal comfort simulation*).

Table 6: Thermal transmittance value of the building elements for thermal comfort simulation

Building elements	Base case	U-value (W/m²K)
External walls	AAC Block 225 mm	0.68
Roof	RCC slab 125 mm + brick batt coba 40 mm + cement mortar 40 mm	2.46
Glazing	Clear glass 6 mm	5.778 SHGC – 0.819

Source: CSE

Six design cases were considered with different combinations of walling materials such as red bricks, cast concrete, fly ash bricks, AAC blocks, hollow concrete blocks and resource efficient hollow blocks. The thermal transmittance value of the combinations was calculated as well.

Table 7: Walling materials considered for thermal comfort simulation of Surat ARHC

Design case – walls	Construction material	U-value (W/m²K)
Design case 1	Red brick 230 mm	0.69
Design case 2	Cast concrete 150 mm	2.90
Design case 3	Fly ash brick 150 mm	2.31
Design case 4	Red brick 115 mm + AAC block 75 mm	1.28
Design case 5	Hollow concrete block 200 mm	2.60
Design case 6	Resource efficient hollow blocks 200 mm	1.74

Source: CSE

Three cases with different combinations of roof materials were considered, ranging from PUF, China mosaic tiles, foam concrete, plain cement concrete (PCC), extruded polystyrene (XPS) and cement screed. A double-glazed unit with air gap was considered for the glazing (see *Table 9: Glazing material considered for thermal comfort simulation of Surat ARHC*).

Table 8: Roofing materials considered for thermal comfort simulation of Surat ARHC

Design case – roof	Construction material	U-value (W/m^{2}K)
Design case 1	PUF 40 mm + China mosaic tiles 20 mm	0.71
Design case 2	Foam concrete 100 mm + PCC 25 mm	1.21
Design case 3	XPS 50 mm + cement screed 20 mm	0.52

Source: CSE

Table 9: Glazing material considered for thermal comfort simulation of Surat ARHC

Design case – glazing	Construction material	U value (W/m^{2}K)
Design case 1	Double glazed unit (6 mm clear glass + 6 mm air gap+ 6 mm clear glass)	3.09 SHGC – 0.49

Source: CSE

Orientation: The longer axis of blocks C and D is parallel to N-S direction. The simulation revealed that if both the blocks were oriented 90° to the East (as compared to the existing orientation), thermally comfortable hours would increase by 159 and 219 hours in case of Block C and D respectively.

Walling: The simulation revealed that the project is using walling material— AAC blocks (200 mm)—that is providing good thermal comfort in the buildings. AAC blocks have better resistive properties as compared to other commonly used materials such as concrete, red bricks and hollow concrete blocks. Should the walling material be concrete, the thermal comfort hours would reduce by 153 and 144 hours for block C and D respectively. In case of hollow concrete blocks, the thermal comfort hours would reduce by 248 and 182 hours for block C and D respectively.

Shading: On changing the shading device from overhangs to a combination of overhang and vertical fins, thermally comfortable hours would increase by 266 hours and 83 hours for Block C and D respectively.

Roofing: The roofs of both blocks are composed of conventional mix of RCC slab topped with brick batts and four-cement mortar. On changing the materials to XPS insulation and screed, a gain of thermally comfortable hours of up to 178 hours and 154 hours was observed for block C and D. Nearly the same gain was observed for PUF insulation topped with china mosaic tiles for both the blocks (172 hours and 142 hours respectively).

Glazing: Changing to a double-glazed unit from a single-glazed one resulted in a gain of 132 hours and 87 hours in Block C and block D respectively.

Table 10: Summary of simulation results for Surat ARHC

Building elements	Changed from (base case)	Assessment done for	Changed to (best case)	Gain in thermally comfortable hours	
				Block C	Block D
Orientation	Longer axis parallel to N-S	Intermediate floor	Longer axis perpendicular to N-S	159 hours	219 hours
Shading devices	Overhangs	Intermediate floor	Overhangs + vertical fins	266 hours	83 hours
Wall	AAC blocks 225 mm	Intermediate floor	NA	NA	NA
Glazing	Single glazed unit	Intermediate floor	Double glazed unit	132 hours	87 hours
Roof	Brick batt 40 mm + cement mortar 40 mm	Top floor	PUF 40 mm + China mosaic tiles 20 mm	172 hours	142 hours
			XPS 50 mm + cement screed 20 mm	178 hours	154 hours

Source: CSE

Similarly, a rental housing project in Chandigarh was simulated. This project is being planned and awaiting construction by Chandigarh Housing Board. It comprises 9 blocks with 2 BHK units, 16 blocks with 3 BHK units and 1 block with 4 BHK units. There are G+6 floors and 4 flats on each floor with total 28 dwelling units. The project is in composite climate zone.

Figure 9: 3D models of the rental housing project at Chandigarh
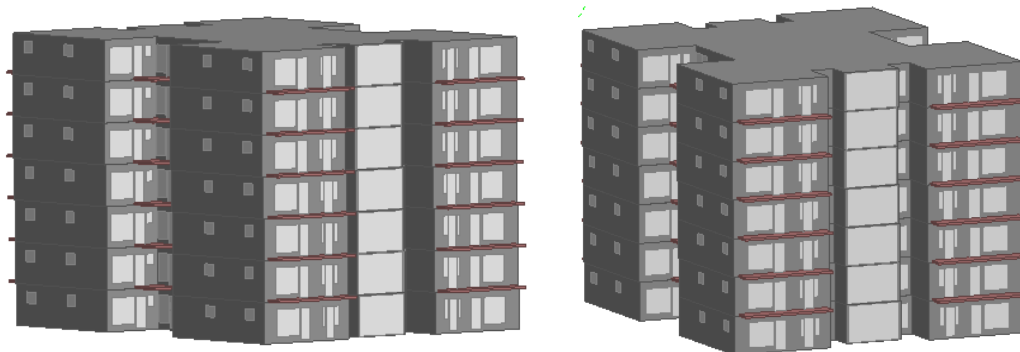
Source: CSE

Figure 10: Methodology adopted for thermal comfort assessment of Chandigarh RGCTP project

CHB's -IT Habitat Project at RGCTP Chandigarh - Thermal Comfort Analysis

Thermal comfort analysis using NBC 2016

Impact of changing wall material on thermal comfort

Design cases –
- AAC block 200mm
- Cast concrete 150mm
- Flyash brick 150mm
- AAC block 75mm + air gap 20mm + red brick 115mm
- Hollow concrete block 200mm

Impact of changing glass type on thermal comfort

Design case –
- Single glazed unit –tinted glass 6mm

Impact of changing roof material on thermal comfort by the roof

Design cases –
- RCC 125mm + PUF 40mm + China mosaic tile 20mm OR PCC 25mm
- RCC 125mm + mud fuska 50mm + brick tile 50mm
- RCC 125mm + mud fuska 115mm + PCC 25mm
- RCC 125mm + AAC block 100mm + PCC 25mm
- RCC 125mm + XPS 50mm + cement screed 20mm
- RCC 125mm + brick batt coba 115mm + cement mortar 20mm

Analysis done for intermediate floor

Analysis done for top floor

Thermal comfort hours were individually observed for the base case and design cases considered for each element of the building envelope using NBC 2016 -TSI values

Gain in thermally comfortable hours for various walling options.

Gain in thermally comfortable hours for various glass options.

Gain in thermally comfortable hours for various roof options.

Best performing materials to achieve thermal comfort

Source: CSE

The project involves red brick walls, a combination of RCC slab, bitumen and tiles in roof and clear glass for glazing (see *Table 11: Base case for thermal comfort simulation of the Chandigarh rental housing project*).

Table 11: Base case for thermal comfort simulation of the Chandigarh rental housing project

Building elements	Base case	U-value (W/m^{2}K)
External walls	Red brick 230 mm	2.1
Roof	RCC slab 125 mm + 2 coats of bitumen + tiles 20 mm	2.78
Glazing	Clear glass 6 mm	5.778 SHGC – 0.819 VLT – 88%

Source: CSE

Six walling as well as six roofing materials were simulated along with one glazing case (see *Table 12: Walling, roofing and glazing cases for thermal comfort simulation of the Chandigarh rental housing project*).

Table 12: Walling, roofing and glazing cases for thermal comfort simulation of the Chandigarh rental housing project

Building elements	Design case	Construction material	U-value (W/m^{2}K)
External walls	Design case 1	AAC block 200 mm	0.69
	Design case 2	Cast concrete 150 mm	3.4
	Design case 3	Flyash brick 150 mm	1.5
	Design case 4	Red brick 115 mm + Air gap 20 mm + AAC block 75 mm	1.135
	Design case 5	Hollow concrete block 200 mm	2.25
	Design case 6	Resource efficient hollow brick 200 mm	1.75
Roof	Design case 1	PUF 40 mm + China mosaic tiles 20 mm OR PUF 40 mm + PCC 25 mm	0.5
	Design case 2	Mud fuska 50 mm + brick tile 50 mm	2.15
	Design case 3	Mud fuska 115 mm + PCC 25 mm	1.64
	Design case 4	Foam concrete 100 mm + PCC 25 mm	1.16
	Design case 5	XPS 50 mm + cement screed 20 mm	0.5
	Design case 6	Brick batt coba 115 mm + cement mortar 20 mm	2.22
Glazing	Design case 1	Tinted glass 6 mm	5.778 VLT – 44.3% SHGC – 0.602

Source: CSE

The simulation results produced evidence that materials play a significant role in thermal comfort in buildings. The design case with AAC block resulted in a gain of 70–130 thermally comfortable hours (see *Table 13: Summary of simulation results for the Chandigarh rental housing project*). By switching to tinted glass, up to 26 thermally comfortable hours were gained. When both the wall and glass material are changed, the cumulative impact on thermal comfort is in the range of 131 to 183 hours. On changing the roofing material, a maximum of 371 thermally comfortable hours for the top floor were gained with the use of XPS and PUF. The best wall, glass and roof combination resulted in a gain of 528 hours for the top floor.

Table 13: Summary of simulation results for the Chandigarh rental housing project

Building element	Changed from (base case)	Assessment done for	Changed to (best case)	Gain in thermally comfortable hours
Wall	Red brick 230 mm	Intermediate floor	AAC block 200 mm	129 hours
			Red brick 115 mm + air gap 20 mm + AAC block 75 mm	68 hours
Glass	Clear glass	Intermediate floor	Tinted glass	26 hours
Roof	2 coats of bitumen + tiles 20 mm	Top floor	XPS 50 mm + cement screed 20 mm or PUF 40 mm + China mosaic tiles 20 mm or PUF 40 mm + PCC 25 mm	371 hours
Wall + Glass	Red brick 230 mm + clear glass	Intermediate floor	AAC block 200 mm + tinted glass	183 hours
			Red brick 115 mm + air gap 20mm + AAC block 75 mm + tinted glass	131 hours
Wall + Glass + Roof	Red brick 230 mm + clear glass + 2 coats of bitumen + tiles 20 mm	Top floor	AAC block 200 mm + Tinted glass + XPS 50 mm + cement screed 20 mm or PUF 40 mm + China mosaic tiles 20 mm or PUF 40 mm + PCC 25 mm	528 hours
			Red brick 115 mm + air gap 20 mm + AAC block 75 mm + tinted glass + XPS 50 mm + cement screed 20 mm or PUF 40 mm + China mosaic tiles 20 mm or PUF 40 mm + PCC 25mm	484 hours

Source: CSE

Low thermal comfort and elevated energy bills

In a scenario where there is low thermal comfort in the dwelling units, the beneficiary is forced to switch to mechanical means of cooling. This not only increases energy consumption and hamper the thermal comfort and energy goals of the country, but also increases the utility bills for the beneficiary. A CSE analysis has revealed that energy performance index (EPI) could witness a six-times jump due to use of mechanical means of cooling to make up for the missing thermal comfort in buildings. This definitely has an enormous impact on energy bills. However, this impact is completely avoidable with better layout, architectural design and choice of materials.

A CSE study reveals that enhanced composition of walling materials (massing and insulation) with right proposition of shading may work at an additional cost of Rs 500–600 per square foot over conventional construction. Government grants and financing instruments can cover this additional cost and ensure thermally comfortable rental housing. But to enable this, there is a need of thermal performance standards for rental housing.

4. Economics of rental housing

The ongoing COVID-19 pandemic and the mass exodus of migrant workers reminded us how a huge chunk of population does not have access to affordable shelter in our cities. This exodus demonstrated the fact that housing shortage is highest in the lower income groups. According to the report of the technical group on urban housing shortage, about 95 per cent of the national housing shortage is constituted by EWS and LIG households.

Housing affordability is globally recognized as one of the key issues facing households today and demands policy attention. It forms the core for the demand-supply gap that exists in the housing sector in our cities. It is important to be clear on how affordability should be measured. This section brings an insight on what constitutes housing affordability, the ability of current instruments to measure it and new metrics to inform policies on housing affordability. Rental housing emerges as a typology that can increase access to quality housing and bridge the affordability gap in our cities.

Understanding housing affordability and demand assessment

A house in India is considered affordable for an LIG household when the monthly instalment or rent does not exceed 30 per cent of the household's gross monthly income. This benchmark was established by the Deepak Parekh committee set up in 2008. This benchmark measures affordability using the Expenditure method or Housing Cost Burden Method. Under this, the expenditure towards housing is classified as affordable if it does not go above a certain percentage of the household income. This percentage cut-off is set by the respective government. Globally, this cut-off is about a third of the household income.

Table 14: Housing affordability as per income groups

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

Source: Ministry of Housing and Urban Poverty Alleviation

Based on the affordability benchmark set by the Deepak Parekh Committee, the technical group on urban housing shortage estimated that 18.78 million households were in need of housing, following which PMAY was launched. While PMAY was being implemented, independent research published by Indian Council for Research on International Economic Relations (ICRIER) estimated housing demand of at least 29 million houses and at maximum 50 million as of 2018. This puts the validated housing demand of 11.2 million as a gross under-representation of housing shortage in India. The massive reverse migration during the COVID-19 lockdown further confirms this.

The use of expenditure method by the government for defining housing affordability has several inadequacies. For instance, it overlooks housing price dynamics across the city and disposability of income that is very less in the bottom income-strata. As a result, the growing unaffordability for housing is not addressed by policies and the housing demand-supply gap keeps widening. This calls for indicators that capture housing affordability on-ground with respect to the housing prices prevalent in the city.

Price-to-income ratio as an indicator for housing affordability

According to a study conducted by Asian Development Bank in 2018 on 211 cities of 27 Asian member countries, 92.9 per cent of the cities had severely unaffordable housing and 98.6 per cent had unaffordable housing (see *Graph 1: PIR study in 211 cities of 27 developing nations*). The metric used for this analysis was the price-to-income ratio (PIR). The cities where housing was affordable had a price-to-income ratio (PIR) less than or equal to 3, whereas cities with severely unaffordable housing had a price-to-income ratio of more than or equal to 5.1. The higher the PIR goes, the more unaffordable housing becomes.

A high PIR is an indicator that something is wrong in the housing demand-supply chain. With this understanding, PIR has emerged as a commonly agreed measure of affordability. PIR is a median-multiple indicator and is the ratio of median house prices to median annual household disposable income in a city. With these data inputs, PIR is able to give a ground picture of the available housing and people's ability to afford that.

Acknowledging this, countries such as UK, New Zealand, Croatia, Latvia, Serbia, China and Turkey have started adopting PIR as their indicator for

Graph 1: Price-to-income study in 211 cities of 27 developing nations
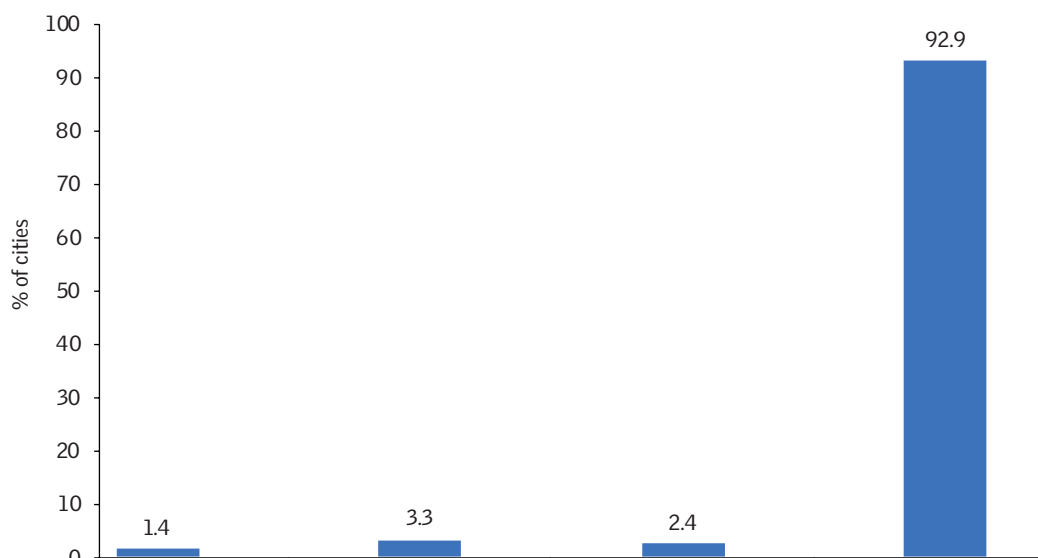
Source: Asian Development Outlook, 2019

housing affordability. Not only this, PIR is recommended by international organizations such as the World Bank, International Monetary Fund (IMF) and also the United Nations Department for Policy Coordination and Sustainable Development. It is one of the ten key housing indicators approved by the Commission for Human Settlements (Resolution 14/13) to be collected by all countries.

India has been using median-multiple measures such as PIR and EMI-to-income ratio to monitor housing economics behaviour. For instance, Reserve Bank of India has been conducting a Residential Asset Price Monitoring Survey since 2010 across 13 cities based on the housing loans disbursed by banks and housing finances companies. In 2019, this analysis revealed that housing affordability has worsened over the past four years as the housing price-to-income ratio increased from 56.1 in March 2015 to 61.5 in March 2019. While Mumbai was the least affordable city, Bhubaneswar was the most affordable (see *Table 15: House price-to-income ratio in 13 cities from March 2015 to March 2019*). However, such analyses have remained disconnected from policy discourse.

Table 15: House price-to-income ratio in 13 cities from March 2015 to March 2019

| Quarter	Mumbai	Chennai	Delhi	Bengaluru	Hyderabad	Kolkata	Pune	Jaipur	Chandigarh	Ahmedabad	Lucknow	Bhopal	Bhubaneswar	All
Mar-15	64.1	51.9	54.0	52.2	47.9	48.8	60.9	53.4	52.2	59.5	52.5	49.1	47.2	**56.1**
Jun-15	66.5	51.9	54.4	58.2	52.7	54.2	66.4	60.3	53.2	62.9	54.5	55.6	51.3	**59.3**
Sep-15	64.0	52.8	57.5	51.8	47.2	49.2	62.4	56.3	48.9	56.5	55.0	51.4	43.0	**56.4**
Dec-15	66.2	52.4	58.5	51.8	46.3	46.8	61.9	57.2	57.4	57.4	53.5	53.2	47.9	**57.1**
Mar-16	70.1	59.2	59.6	59.0	51.7	57.2	67.7	63.5	64.7	64.4	61.2	58.2	53.1	**61.3**
Jun-16	71.0	59.6	59.5	58.4	53.1	57.5	67.6	65.3	58.9	66.6	58.5	55.9	55.5	**61.5**
Sep-16	69.9	58.5	58.5	57.3	51.6	56.6	67.0	62.2	62.4	66.7	56.2	53.4	53.3	**60.5**
Dec-16	69.3	59.1	59.0	57.4	51.9	55.2	67.1	60.0	60.5	64.9	58.4	55.6	51.3	**60.2**
Mar-17	70.1	59.6	58.6	57.9	53.6	56.6	67.2	62.9	61.7	64.7	57.9	57.6	48.2	**60.6**
Jun-17	73.4	62.2	58.7	58.0	53.6	57.8	69.2	62.5	64.0	66.9	59.4	56.7	54.0	**61.9**
Sep-17	75.4	61.9	60.3	58.7	54.9	57.4	69.3	62.6	63.3	67.1	57.9	62.2	53.9	**62.4**
Dec-17	76.4	60.7	60.1	59.3	56.1	59.5	69.9	60.5	61.4	65.4	57.2	58.3	55.1	**62.6**
Mar-18	76.8	59.7	59.6	59.2	57.8	59.0	69.3	59.7	63.0	67.6	58.2	60.0	52.6	**62.7**
Jun-18	75.1	58.0	57.7	56.1	56.3	58.4	67.5	55.6	64.8	68.4	56.5	56.6	52.9	**61.1**
Sep-18	75.5	58.7	58.6	57.0	57.7	58.9	67.8	56.0	64.7	69.2	60.0	56.1	56.0	**61.8**
Dec-18	76.9	58.2	59.5	56.9	59.2	57.5	68.0	56.0	63.5	69.7	56.6	56.3	54.4	**62.0**
Mar-19	74.4	58.6	58.5	56.1	60.3	56.5	66.6	55.9	63.4	70.4	58.6	56.2	54.3	**61.5**

Source: Reserve Bank of India, 2019

Evaluation of PIR in Delhi

CSE has studied PIR in Delhi to understand the ground reality when it comes to formal affordable housing and housing for the poor. This study was also done to comprehend what kind of data exists in our cities for capturing housing affordability, whether that is adequate and what more would be needed to fully understand housing affordability. For this, 20 neighbourhoods across five major zones of Delhi were considered. The housing prices in these neighbourhoods were gathered using third party real estate data sources and the median housing price was calculated. As the household income data is not available in the public domain, income bands as per PMAY-U and literature on the slums in Delhi were used. This gave five income groups: EWS (slums), EWS, LIG, MIG I and MIG II.

PIR calculated for these five income groups in each neighbourhood suggested that there is much variation in housing affordability in the city itself. As real estate is dynamic and subject to location, PIR in different neighbourhoods varies from 9 to 99 for EWS (slums) households, 3 to 28 for EWS and LIG households, 4 to 37 for MIG I and 3 to 31 for MIG II households (see *Map 5: PIR in Delhi for EWS households*, *Map 6: PIR in Delhi for LIG households*, *Map 7: PIR in Delhi for MIG 1 households* and *Map 8: PIR in Delhi for MIG II households*). Among these income groups, PIR in EWS (slums) is enormous in four neighbourhoods with values above 60 and PIR reaching 99 in the Defence Colony neighbourhood (see *Graph 2: Variation in PIR across Delhi for EWS (slums) households*). Not only this, PIR in NCR is also high for EWS (slum) households—Noida Sector 74–78 (21), Gurugram DLF City Phase 3 (43) and Gurugram Palam Vihar (23).

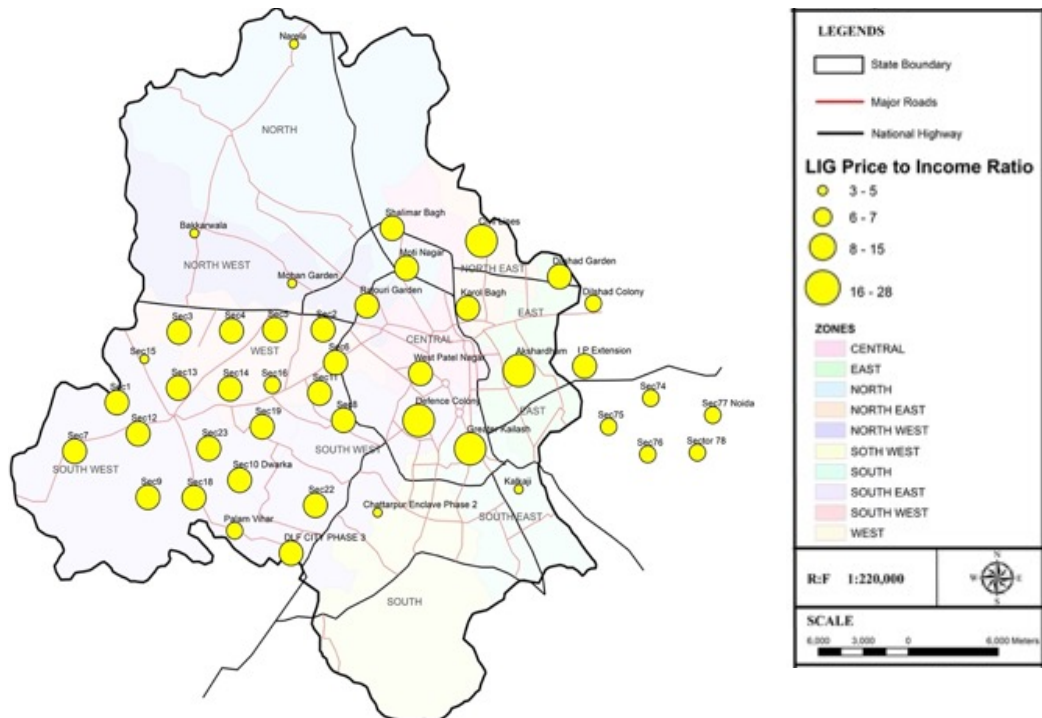**Graph 2: Variation in PIR across Delhi for EWS (slums) households**
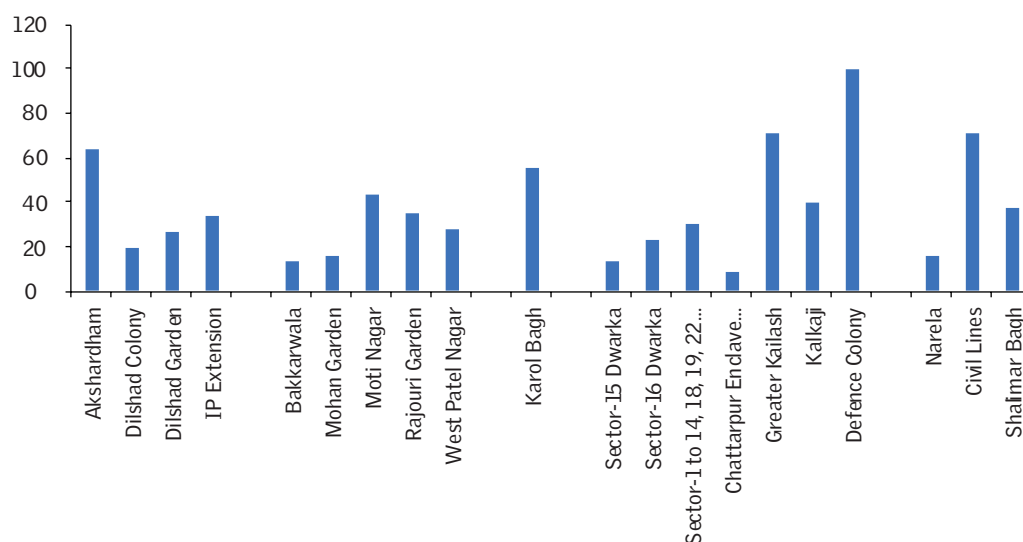
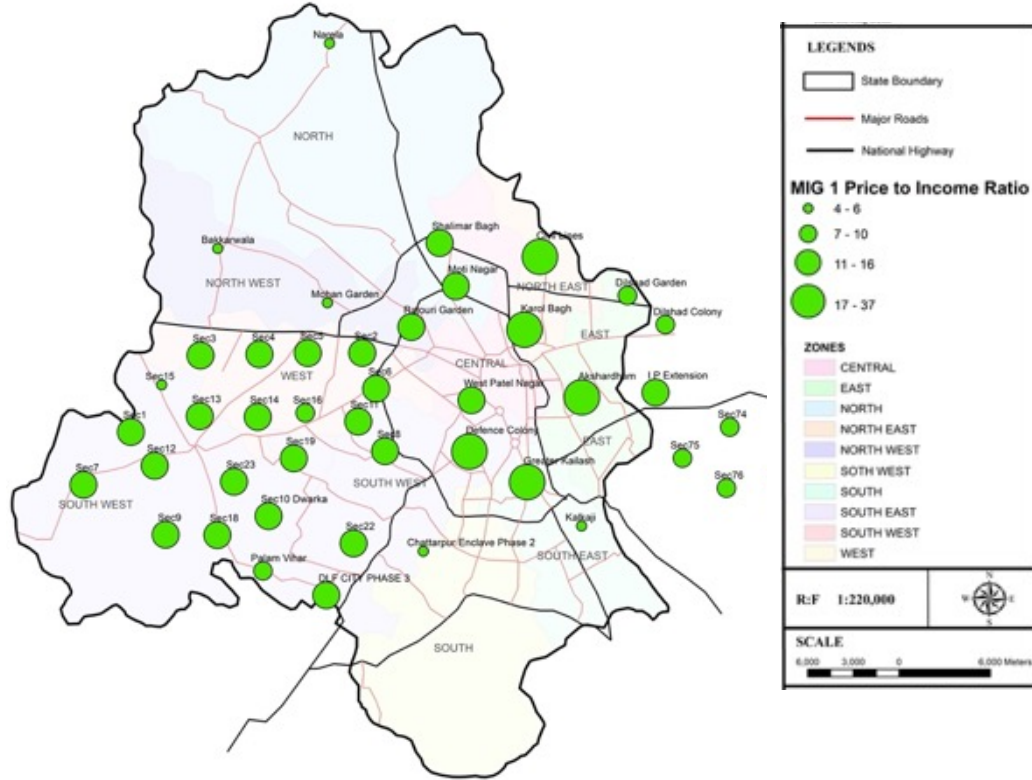Source: CSE

Map 5: PIR in Delhi for EWS households
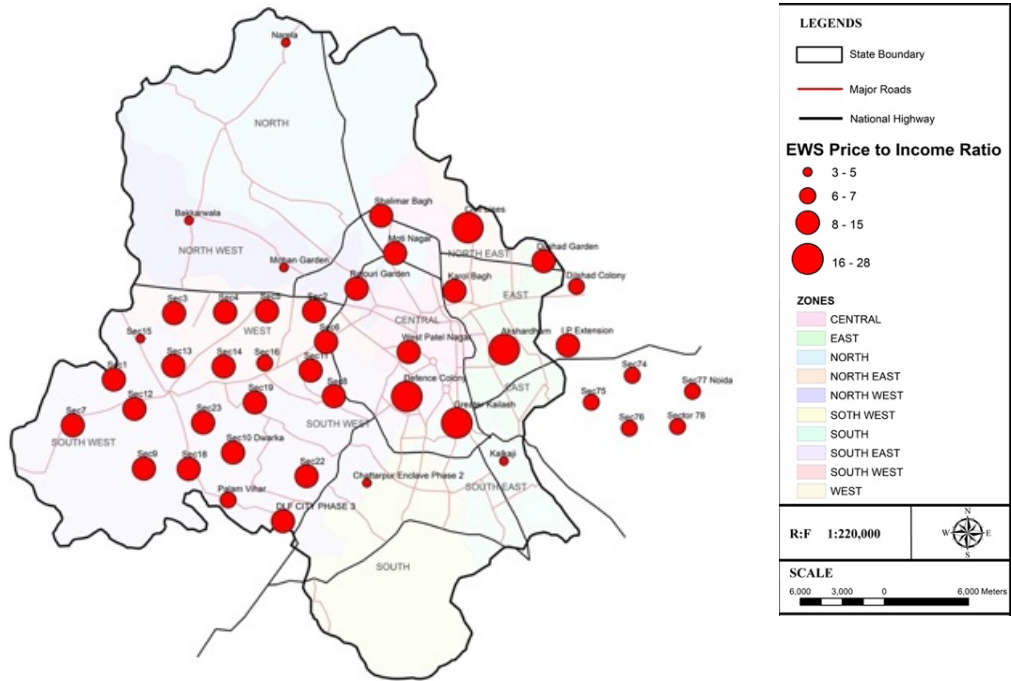
Source: CSE

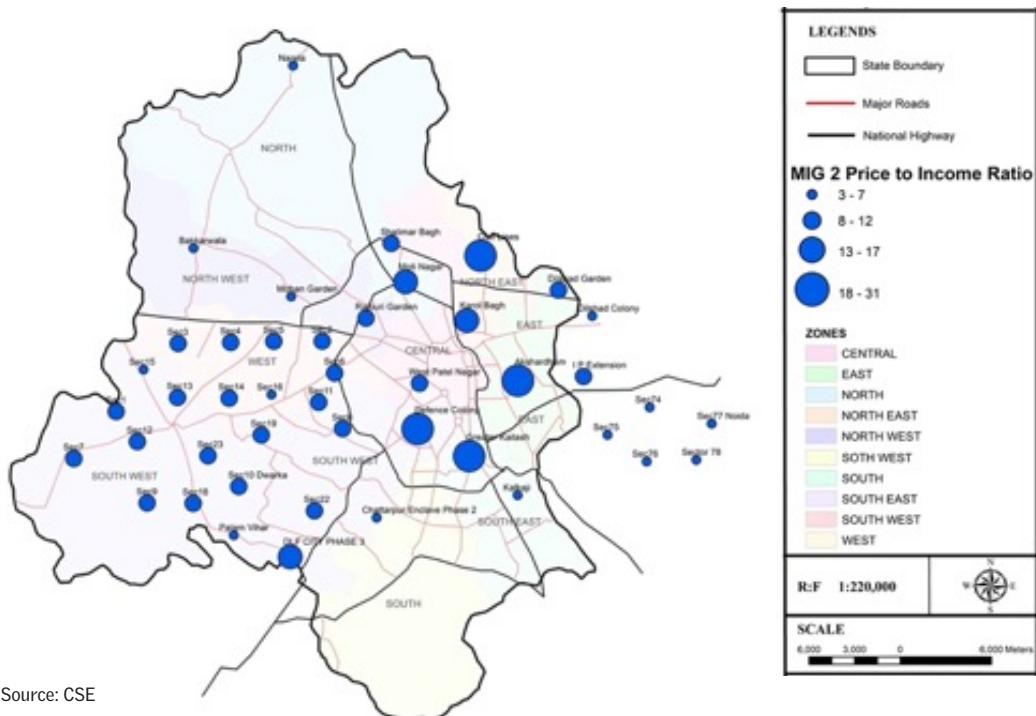## Map 6: PIR in Delhi for LIG households

Source: CSE

Map 7: PIR in Delhi for MIG 1 households

Source: CSE

Map 8: PIR in Delhi for MIG II households

Source: CSE

This evaluation has shown that there is dearth of data on household income at city level as well as neighbourhood level. Globally, data sources such as average apartment size, average price per sqm in and out of the city and yearly average net salary of households in Croatia, Latvia and Serbia; housing price index data, GDP shares of cities, GDP per capita and total disposable income of the country in case of Turkey; and bank loan interest rates, annual loan repayment data and down payment ratio in China have helped these countries calculate respective PIR and inform policies. Similarly, India needs to identify datasets and indices that could help in understanding housing affordability in cities better.

A quick investigation on potential data sources for household income showed that the government has income data at state level which dates back to 2011–12 or 2014–15. Further independent research organizations have the household income data at district and town level but that is chargeable and may be dated. A data portal 'Numbeo' has the latest data at city/town level, however it may not capture the information on lower income groups as the data is crowdsourced. India needs household income and expenditure data at city level to effectively capture housing affordability in cities.

Table 16: Data sources for household income in India

Sr. no.	Source	Responsible organization	Nature	Year	Granularity level
1	NSHIE (National Survey of Household Income and Expenditure) – Round 1	NCAER	Non-profit economic think tank	2004–05	State and town level
2	Indian Household Development Survey (IHDS) –Round 2	NCAER	Non-profit economic think tank—open access	2011–2012	District level
3	Per Capita Income (Current Prices)	IndiaStat	Private-paid access	(2012–2013 to 2014–2015)	State level
4	State-wise data on Gross State Domestic Product, Per Capita Income and Growth Rate	Central Statistical Organisation and Economic & Statistical Organisation, Punjab	Government—open access	Up to 2018–19	State level
5	ICE 360° Survey 2016	People Research on India's Consumer Economy	NGO—Paid access	2016	District and town level
6	Household Income and Expenses database	Centre for Monitoring Indian Economy	Private—Paid access	2014–19	District and town level
7	Average Monthly Net Salary	Numbeo	Private crowdsourced data—open access	2020	City and town level

Source: Compiled by CSE

Rents at the affordable rental housing complexes

ARHC Scheme was launched with a provision for rents to be set initially by the ULB or parastatal based on a survey. After handing over the project to the concessionaire for O&M, the rents could be increased by 8 per cent in two years, subject to a maximum aggregate increase of 20 per cent in 5 years.

Cities that have floated tenders for retrofitting of vacant government housing projects have disclosed rents (see *Table 17: Monthly rents set by ULBs in ARHC projects*). These rents range from Rs 800 to 4,500 in different cities. In order to see how feasible or unfeasible these rents are for the poor in the context of that particular city, CSE evaluated the rent-to-value ratio for a few of the ARHC projects. This is the ratio of annual rent divided by the market price of that unit. The higher the ratio, the more exorbitant is the rent with respect to the market value of the dwelling unit.

Neighbourhoods in Mumbai and Delhi-NCR demonstrate a rent-to-value ratio of 2.63. Mumbai and Delhi are the two cities that reported the majority of vacant housing stock, which house a majority of migrant workers and are known for exorbitant rentals. Rent-to-value ratio for most of the cities came out to be ranging from 1.24 to 5.73. This shows that rents which are supposed to be affordable for the poor may not actually be affordable. This needs to be addressed by the ULBs. Rent authorities will be instrumental for this.

Not only this, high rents combined with high utility costs (energy bills in absence of thermal comfort) can affect the beneficiary's affordability to a great extent. Cities must keep rents of the ARHCs within the affordability bracket of the beneficiary, unaffected by the incremental cost of providing thermally comfortable dwellings (see *Figure 10: Decision on rents must not be linked with the construction cost and instead should align with the utility cost*). This incremental cost can be covered through financial support mechanisms such as viability gap funding and tax increment grants under the ARHC Scheme. The rents must be de-linked from the construction costs of the ARHC projects. Cities must strive to improve the quality of rental housing and keep access to the same affordable. For this, cities must expedite the setup of a rent authority. Rental housing database comprising inventory of rental housing, market price of the properties and prevailing rentals also need to be developed.

Figure 10: Decision on rents must not be linked with the construction cost and

Table 17: Monthly rents set by ULBs in ARHC projects

City	Address	No. of houses	Monthly rent	Rent-to-value ratio
Surat	Plot Nos. 12–26 of Sector No. 2 at Sachin (Resi. – CUM – COMM. Highrise Building, P + 10 & P + 11) Under Chief Minister Gruh Yojana	393	3,500	5.73
Rajkot	BSUP-3 Quarters, TPS-24 Rajkot, FP 17/A (part) and 17/B, Popatpara	698	3,000	2.91
Vadodara	Harni TP 1 FP 88–52 DUs; Chhani TP 13 FP 209–136 DUs and Sayajipura FP 127–560 DUs as Affordable Rental Housing Complexes	748	3,500	
Shimla	Nalagarh	72	2,500	
Udaipur	Biliya, Revenue Village Titardi	88	1,500	1.33
Chittorgarh	Mid-Day mill k pass, Gandhinagar	480	1,000 (ground floor) 900 (First floor) 800 (second floor)	
Kutiyana, Gujarat	Amarmanagar manja 208 and chunarivas 48 unit under IHSDP Kutiyana	256	0	
Indore	RAY Budhania Village	168	2,000	
Gwalior	Mahel Gaon ki Pahadi, Khasra No. 42, Gram Ohadpur, Tehsil and Distt. Indore	100	2,000	
Dehradun	Ramnagar, BSUP Affordable rental housing	70	4,000	
Pali	Shaheed Bhagat Singh Residential Scheme, Mandia Road	304	1,500	
Surat	Plot Nos. 11/2–17 of Sector No. 3 at Sachin (Resi. – CUM – COMM. Highrise Building, P + 10) Under Chief Minister GruhYojana	126	4,500	5.69
Surat	Plot Nos. 18–22 of Sector No. 3 at Sachin (Resi. – CUM – COMM. Highrise Building, P + 7) Under Chief Minister GruhYojana	79	3,500	5.67
Faridabad	1766 at Dabua colony, NIT, Faridabad and 779 at Bapu nagar colony, Ballabgarh as Affordable Rental Housing Complexes	120	0	
Surat	Moje Bhestan R.S. No. 245 (T.P.S. No. 62 (Bhestan-Bhedwad-Dindoli), F.P. No. 157(R-27)).	270	2,500	5.01
Jammu	Sunjawan Jammu	336	3,200	
Pratapgarh	Near to housing board, Dariyawad Road	120	800	
Jaipur	Sanjay Nagar Bhatta Basti	1228 (Duplex)	2,000	1.24
		120	1,000	

Source: MoHUA

instead should align with the utility cost
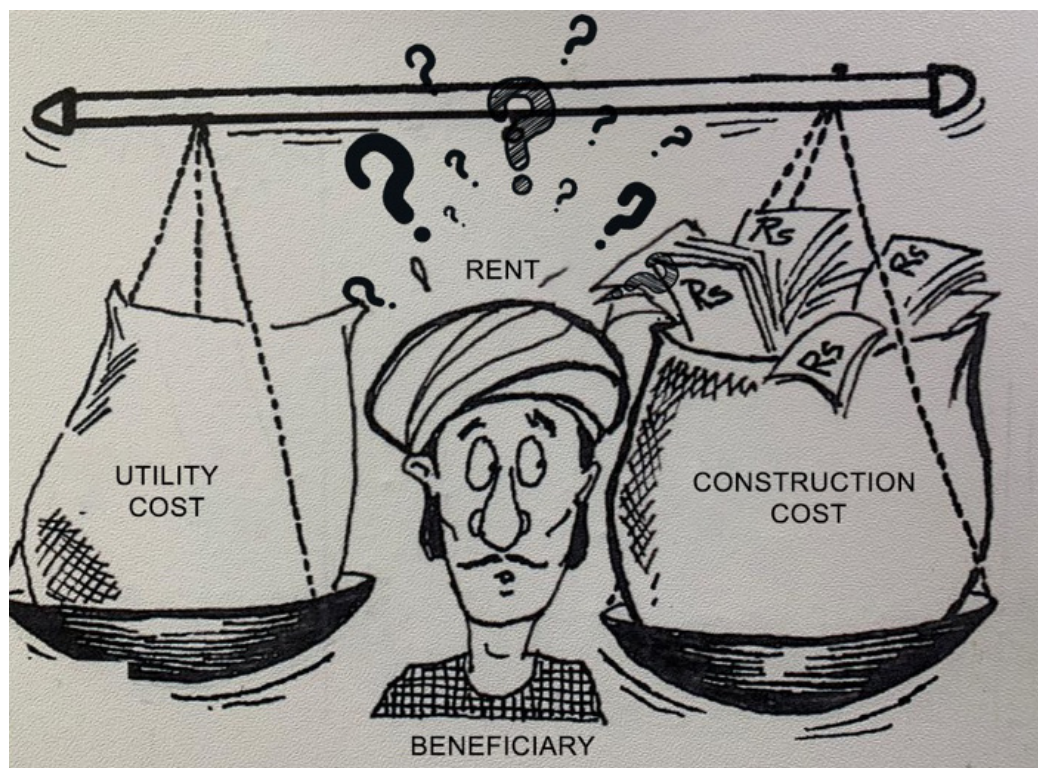
Source: CSE

Instruments to finance green and thermally comfortable rental housing

Provision of thermal comfort in rental housing is going to incur additional costs. CSE study titled *Fiscal Strategy for Affordable Housing* had established that the incremental cost of using better materials that increase annual thermally comfortable hours in buildings can range from Rs 500–600 per sqft over conventional construction. As this incremental cost disrupts the economics of construction, developers don't invest in design and choice of materials that will enable thermal comfort in the buildings. But now the provision of thermal comfort and better quality of living in rental housing units is linked with post-COVID green recovery in the housing sector. Currently, there is great opportunity to address India's thermal comfort and energy goals and the issue of operational costs for the beneficiary while constructing resilient housing stock. For this, it is crucial to get the private sector on board through innovative finance strategies.

Green housing finance is garnering attention globally. Not only because of the

impetus given by global initiatives such as the Millennium Development Goals or Sustainable Development Goals but also the fact that housing sector lies at the centre of economic growth. Therefore, green housing finance has now taken shape of a crucial lever to effectively realize these global goals. For over a decade, several instruments (mostly debt-related) such as green bonds, green mortgages and green developer finance have been launched in an attempt to bring the housing sector towards construction of resource efficient and sustainable stock. Such instruments are now needed to mainstream thermal comfort.

India has been working on green finance since 2007 when the Reserve Bank of India issued a notification titled "Corporate Social Responsibility, Sustainable Development and Nonfinancial Reporting – Role of Banks".[25] Further action involves establishing a Climate Change Finance Unit in 2011 as the nodal agency for several green finance institutions in India and sustainability disclosures that started to be sought from top 100 companies at Bombay Stock Exchange and National Stock Exchange in 2012.

A major move was the issuance of the guidelines for green bonds in 2017.[26] Sectors for which green bonds can be issued include renewable and sustainable energy, clean transportation, sustainable water management, climate change adaptation and energy efficiency (efficient and green buildings). The criteria for demonstrating fitness was submission of environmental impact reports with largely qualitative performance indicators, according to the *Concept Paper for Issuance of Green Bonds*.[27] This is an area where clear benchmarks and more stringency is needed as RBI later noted a challenge in green financing in terms of 'green washing' referring to false environmental performance claims and unclear definitions, among other issues.[28]

According to an evaluation of green finance in India, Rs 71 thousand crore were spent during 2017 and 2018 by the government and its agencies as domestic public green finance.[29] Only 20 per cent of this was spent on energy efficiency and power transmission improvement. The foreign investment was mainly focused on renewable energy. The study adds that the information on health of the finance sector with respect to India's green economic development goals is non-existent to scarce.

The good news is that a number of financial institutions are committing to invest in green housing finance. For instance, World Bank's International Finance Corporation and Housing Development Finance Corporation Ltd (HDFC) have joined hands to promote green affordable housing. IFC has extended USD 250

million loan to HDFC to invest in affordable housing and an emerging green affordable housing sector. At least 25 per cent of this investment is earmarked for green affordable housing. According to IFC, there is a USD 1.25 trillion investment opportunity in green affordable housing in India by 2030. Not only this, ADB and IIFL Home Finance Limited have tied up for a USD 1 million technical assistance project to promote green and affordable housing in India.[30] The project involves research and awareness building initiatives on climate risk mitigation and adaptation and green-certified housing standards. An ecosystem that combines green lending and climate adaptation strategies for affordable housing will also be created. India needs to leverage such programmes towards achievement of thermal comfort goals.

However, for implementation of any green finance instruments, standards are important. Residential rating programmes can facilitate such standards. For instance, minimum seven stars under Australia's Nationwide House Energy Rating Scheme (NatHERS) will fetch home buyers an interest rate as low as 2.44 per cent.[31] A seven-star rating is better than the minimum standards of Australia's National Construction Code and uses less energy.

India has launched its own residential rating system titled Energy Efficiency Label for Residential Buildings in 2019 anchored by Bureau of Energy Efficiency (BEE). The programme is estimated to lead to up to 40 per cent energy savings over conventional houses while annual savings would be to the tune of 90 billion units by 2030.[32] This system involves climate zone-wise EPI ranges where a 5-star rated house is 40 per cent more energy efficient than a 1-star rated house.[33] A cumulative saving of 388 billion electricity units is anticipated from the system by 2030. Such standards are going to play a crucial role not only in energy efficient housing and enabling thermal comfort to take India towards its ICAP goals but also in green housing finance.

GLOBAL GREEN FINANCING INSTRUMENTS

Green bonds: A green bond is a fixed-income instrument that is issued in the trading/investment market to raise money. The net proceeds from the purchase of bonds are used to finance sustainable development projects. In addition, investors get tax benefits by purchasing these bonds. The first green bond was launched in 2008 by the World Bank following the evidence produced on climate change and its political and economic impacts by the Intergovernmental Panel for Climate Change in 2007. This bond was released as an instrument to bridge the gap between finance, development and environment.

To decide which projects qualify for investment from these bond sales, an eligibility criteria and green bond guidelines were developed by the World Bank. Further, to keep the process unbiased and technically oriented with environmental sustainability, green bond eligibility of World Bank approved projects is reviewed by the Center for International Climate and Environmental Research at the University of Oslo (CICERO).

Since 2008, the World Bank has raised USD 13 billion through nearly 150 green bonds.[34] According to the World Bank's Green Bond Impact Report 2018, the eligible sectors include renewable energy and energy efficiency; clean transportation; water and wastewater; solid waste management; agriculture, land use, forests and ecological sources; and resilient infrastructure.[35] Green bonds have supported projects in India like grid connected solar rooftop programme which has helped India avoid 1.2 million tonnes of eCO_2 annually and sustainable urban transport project which led to emissions reduction of 128,000 tonne of CO_2 in 10 years.

Green mortgages/loans: A green mortgage is when a bank or a finance institution extends a housing loan with a condition that the house for which the loan is being extended performs at par with a sustainability standard. Such mortgages are being extended either to buy a green home or to renovate/repair an existing well performing house into a greener one. As an incentive, the buyer gets a lower interest rate or an increased loan amount. On the other hand, the bank receives a lower default rate as a green home leads to lower utility bills which result in better net incomes for the home buyers and an improved capacity to pay. The banks also get business opportunities and a higher resale value should the house go into sale.

Green homes have better value in the market known as 'green value' which is higher than a conventional house. Due to this, lenders find it lucrative to invest in green homes and reduce risks associated with the loans. Better green values lead to higher market values and that results in a higher loan-to-value ratio that eventually benefits the buyers with larger loan amounts as compared to the conventional buildings. Loan-to-value ratio is an indicator used by banks to examine lending risk associated with a loan.

But for green mortgages to work, the homebuyers have to demonstrate and prove the performance levels of the house as predicted and committed at the time of loan sanction. The challenge that the banks face in green mortgages is the verification of a project's committed performance. For this verification, standards are often given by or adopted from the green building certification systems. For instance, in Europe, World Green Building Council (WBGC) is working on a roadmap under their EeMAP initiative to establish European green mortgages.[36] Around 10 countries are part of this initiative. Similarly, Bank Australia along with Clean Energy Finance Corporation launched Australia's first green mortgage in 2020 through an AUD 60 million investment.[37] This investment was later increased to AUD 90 million due to good traction. Under this programme, a green home loan is extended at an interest rate of as low as 2.44 per cent.[38] In return, the borrower has to meet a seven-star energy rating under Australia's Nationwide House Energy Rating Scheme (NatHERS).

Green lease: A lease in which sustainability or environmental performance is part of the landlord-tenant agreement is called a green lease. Such lease arrangements are popular in United States in commercial buildings. A study on several green lease resources available in the US suggests that there are largely four types of green lease clauses:[39]

i) Passthrough clauses: Such clauses allow the landlord to pass capital cost related to investment in efficiency measures to the tenant by adjusting it in the rent.

ii) Operational clauses: Under such clauses, operational parameters are set for the buildings. For instance, set operating hours for set point temperatures for air conditioning.

iii) Sustainable purchasing requirements: To guide procurement of efficient fixtures and equipment, materials and other appliances, purchase requirement can be set at the time of signing the lease. For instance, energy efficient or low-mercury lamps, star-rated appliances, low or no-VOC furnishings among others.

iv) Reporting and data sharing: Such clauses involve reporting or benchmarking requirements to enable performance monitoring and tracking of progress towards efficiency goals (if any set in the agreement).

Largely, there is lack of awareness of such leasing arrangements. However, cities such as Boston are now moving ahead and including such models in their climate action plans.

5. Key takeaways and next steps

Rental housing is an important area of intervention and requires a lot of attention to improve liveability, thermal comfort, access to basic services, affordability and financing strategy. The new rental scheme is an opportunity to create the right template to achieve these objectives and also inform state level initiatives.

Link ARHC grants and funding mechanisms with thermal performance: The ARHC Scheme comes with great opportunities to align the rental housing stock with national thermal comfort goals. The VGF provision under Model 1 and the TIG provision under Model 2 can enable better thermal performance for the beneficiary such that the utility cost of the rental housing unit does not become unaffordable. For this, the retrofit/repair model must not only focus on filling the infrastructure gap but also on thermal comfort. There is a need to embed convergence with ICAP goals and create a clause for thermal comfort in the proposal format submitted by the ULBs for approval of the ARHC project. In addition to this, there is a need to establish thermal performance criteria so that it is clearly integrated in the RFPs and therefore ensured in the retrofitting, design and construction of the ARHCs. BMTPC must ask for performance based on these criteria in the scrutiny process of the proposals submitted by the developers.

Need to create an ecosystem for green financing of rental housing targeted at thermal comfort: Global experience has shown that green finance instruments have played a positive role in pushing the housing sector towards a sustainable and energy efficient trajectory. Many countries and institutions, including India, are gearing up for mainstreaming these instruments. India is coming up with multiple opportunities with the influx of funds aimed at green affordable housing such as by ADB, IIFL, IFC and HDFC. Now that the government is entering the rental housing segment with both construction and management only models, green financing instruments such as green lease arrangements and green mortgages/ developer finance will prove to be effective in enabling thermal comfort and ensuring better liveability. Regulatory bodies such as SEBI and RBI need to create clear guidelines and standards for evaluation and scrutiny of projects seeking green finance. Mandatory integration of ARHC Model 1 and 2 with green leasing arrangements can take upcoming rental housing stock towards better thermal performance and lower utility costs.

Cap rents to suit the affordability of the poor: The Model Tenancy Act as well as the ARHC Scheme provide for rents to be discussed mutually between the tenants and the lessee. However, this assessment has revealed that rents for ARHCs are being set by the ULBs and those are disconnected with the affordability of the beneficiary. According to the rental housing market, rents yielding a rent-to-value ratio of 2 or above are favourable for the owner for their higher return as per the market price. Rents at a few ARHCs are up to 5.7 and therefore may be unfeasible for the beneficiary. ULBs and parastatals must prioritize equity and not the economics of O&M or else this will disable the ARHC Scheme from providing affordable access to quality shelter to the migrant workers and urban poor. ULBs and parastatals need to conduct market surveys and cap the rents for ARHCs based on the rent-to-value ratio such that it does not cross a ratio of 2.

Expedite development of a state regulatory framework for rental housing policy, including creation of rent authority: As housing is a state subject, it is important to establish a regulatory framework at the state level for rental housing. Both the model tenancy act and ARHC Scheme provide for creation of rent authority and rent courts to regulate and streamline the rental housing market in India. State governments need to amend their rent control acts, formulate their own rental housing policy with targets and strategy for construction of rental housing stock, and create dedicated bodies that look after regulation and implementation of rental housing. Rent authorities at city level are needed to monitor and regulate rents in a bid to formalize rental housing in India.

Need better datasets at city level for calculating PIR for housing affordability: This assessment has revealed that current housing schemes are disconnected with housing affordability of the poor in cities. Current mechanisms are also inadequate in assessing housing affordability. Price-to-income ratio is an indicator that can guide cities on affordability, focusing on dynamic housing prices and different household profiles at a neighbourhood level. However, there is a dearth of data on household incomes and housing prices at a city level. ULBs now need to conduct market surveys under ARHC Scheme to set rents. Therefore, this is the right time to develop city housing datasets/dashboards that comprise granular data on housing prices, household incomes, prevalent rents, predominant typology and access to amenities. This will not only enable ULBs to understand the housing affordability scenario in cities but will also inform policy discourse for future housing stock with a view to bridge the affordability gap.

Balanced scorecard approach to ensure future stock improves quality of life without increasing cost of living for the poor: This study has revealed that the

operational guidelines for ARHC Scheme do not have quality control parameters in terms of ensuring access to important social and physical infrastructure such as schools, healthcare facilities and public transport. The key driver and objective of the ARHC Scheme is to provide affordable shelter near the workplace with good access to basic services and infrastructure to the urban poor and migrant workers. It is very important for these parameters to be ensured in the ARHCs being retrofitted or built for the success and effectiveness of the scheme. A balanced scorecard approach will ensure that the future stock has all these parameters that support quality of life, especially for the poor. This involves metrics or performance indices for approval, designing and planning of housing projects that cater to liveability, and accessibility and affordability for the poor. A balanced scorecard approach enables decision makers to take stock, plan and act in a comprehensive manner.

Need further research and capacity building: ULBs now play a crucial role in implementation of the ARHC Scheme. They are responsible for determining housing demand, typologies, identification of location and preparing implementation plans. With the new typology of rental housing taking root, it is imperative to enhance the capacity of these actors to effectively conduct analysis and capture the nature of housing demand based on the socio-economic characteristics of the target groups. The interlinkages between affordable housing and mobility for affordability and liveability in the interest of beneficiaries also need to be disseminated widely. Research on more ARHCs in different cities is also needed to build a knowledge curve on rental housing and its implementation in India.

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Rental housing is a critical strategy to meet housing demand when self-owned housing is either not affordable or not feasible for large populations of low-income groups in cities. In this study, the Centre for Science and Environment (CSE) has conducted an overview of rental housing in India keeping in mind rents, affordability, regulations, access to basic services among others. This study has focussed on the policy landscape from the perspective of liveability, quality of services and thermal comfort.