

Insight Report

Making Affordable Housing a Reality in Cities

Cities, Urban Development & Urban Services Platform
In Collaboration with PwC

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Foreword



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A world in which only a few can afford housing is not sustainable. Everyone deserves a safe place to live: it can transform the quality of life of individuals and families. Today, however, most cities around the world are facing major challenges in providing safe and adequate housing for their people, especially cities that are growing rapidly and where the affordable housing options are limited. Even those who earn steady wages are unable to buy or rent affordable housing. Rents remain alarmingly high and out of line with incomes forcing many to pay more than 50% of their income each month on housing. Key workers such as teachers, police officers, firefighters and nurses cannot afford to live near the communities they serve, instead having to bear the costs – in time and money – of commuting.

The extent of the affordable housing challenge, however, varies across geographies. The housing market is affected not only by market conditions but also by socio-political factors, environmental factors and the regulatory landscape of countries and cities. Finding solutions in a particular city requires a broader understanding of what constitutes affordability and the factors that affect it. Ensuring the healthy functioning of the housing market requires actions that address interdependencies on the supply-side while stimulating interventions on the demand-side.

This Insight Report explores both supply-side and demand-side dynamics. On the supply side, these include land acquisition and regulation, upgrading property tenures, financing models, and design and development costs. On the demand side, issues include how to determine eligibility for affordable housing, the range of tenure models for different demographics, and provisioning appropriate access to credit. The Insight Report carefully analyzes each of these challenges for different stakeholders and provides them with specific recommendations to impact the city housing market in a city. It guides decision makers towards strategic interventions and long-term reforms that can reduce dependence on government support systems and incentivize more commercially viable affordable housing through policies and practices that address systemic gaps in the housing value chain.

Reforms are required at each stage of the housing value chain, from securing land, engaging local communities, to building and improving homes that are safe, resilient and sustainable. A multi-stakeholder environment is needed to address calls for action from all entities involved – local (state and federal) government, private sector and civil society. Cities must act to address affordability if they want to avoid a mass exodus of key workers and other talented individuals. Communities develop only when the needs of all residents are met. Ensuring affordable homes is a critical step in that direction, and this Insight Report provides a holistic perspective on the ongoing discussion about how best to do so.

Foreword



Naheed Nenshi,
Mayor of Calgary

For close to a decade, Calgary has consistently been cited as one of five most livable cities in the world. Our high quality of life, abundant resources and economic opportunity have attracted migrants from all over the world, and the face of the city is now changing rapidly. At the City of Calgary we ensure access to basic urban infrastructure and services – like the 60,000 Calgarians who access our reduced fare Low Income Transit Pass – as well as safe and affordable housing, regardless of their income.

Although affordable compared to many other North American cities for those purchasing their home, Calgary still has a considerable non-market housing deficit. Only 3.6 per cent of our housing is non-market, compared to the national average of 6 per cent for other urban centers. Calgary is addressing this imbalance through the innovative initiatives in our affordable housing strategy, as we work to encourage the development of more supply across the housing spectrum. Recognizing the pent-up demand among affordable housing providers, Calgary began selling surplus City-owned land to non-profit providers at book value, imbedded a full-time affordable housing coordinator in our Planning department to facilitate applications, funded a grant program to rebate planning and development fees and expanded our advocacy efforts to other orders of government. The result? Thousands of additional affordable units are now under construction or are in our development pipeline.

Given my work on the affordable housing file in Calgary, I am heartened that the World Economic Forum has undertaken an initiative taking such a holistic approach to the affordable housing challenge, covering both the supply and demand sides.

I found this report useful and hope it proves equally helpful for other cities around the world that are facing similar challenges. I also hope cities are able to establish a much broader dialogue involving different levels of government, civil society and the private sector, focused on improving the housing supply in ways that combine affordability with commercial viability.

Executive summary

Cities are growing at an unprecedented rate, presenting an incredible opportunity for the development of local economies. However, their residents need good, affordable housing – and this remains a challenge around the world. Well-functioning property markets can act as a financial springboard for enterprises and job creation. An enabling environment for affordable housing can be developed with the right infrastructure, investment and macroeconomic policies targeted towards social and financial inclusion.

The challenge of affordability requires not just short-term fixes but also long-term strategies. Solutions will need to address both the supply side and the demand side of the housing market, and involve public-sector, private-sector and non-profit stakeholders.

Affordability: exploring the problem

Chapter 1 unpacks the notion of “affordability”: It is not only about being able to afford to buy or rent a house, but also being able to afford to live in it. This goes beyond meeting expenses related to operations and maintenance; it also involves considerations of transport, infrastructure and services. If a house is cheap enough to buy and run, but located far from livelihood opportunities or amenities such as schools, it cannot be said to be affordable.

The reasons for a lack of affordability vary from city to city, but commonly include housing costs rising faster than incomes, supply of houses not keeping up with demand, scarcity of land, and demographic changes such as population growth, ageing and changes in household composition.

Supply-side challenge 1: land acquisition and titling

Housing investments depend on land having a legal title and security through tenure and property rights. Chapter 2 explores innovative land acquisition strategies such as:

- Land-pooling, where an undeveloped piece of land is exchanged for a smaller, developed piece of land, and tradeable land quotas, in which agricultural land on the periphery of a city can be converted if other land is opened up for agriculture beyond the city’s boundaries.
- Focusing on ensuring property rights – for example, the right not to be forcibly evicted – rather than formalizing property titles.
- Partnerships between community land trusts, which own and steward land on behalf of a community, and municipal land banks, which acquire vacant land and prepare it for development.

Supply-side challenge 2: land use

City governments generally use two tools – zoning and regulation – to shape where and how new houses can be built. Chapter 3 explores the pros and cons associated with greenfield and brownfield development and discusses strategies such as:

- Transit-oriented development, in which expansion of cities is planned around new urban transport infrastructure.
- Algorithmic zoning, with incentives for developers based on assessment of what is needed to maximize the vibrancy of a community.
- Mixed-use development and inclusionary zoning, to ensure neighbourhoods have a mix of income levels and proximity to jobs and services.
- Taxation solutions, such as taxing the underlying value of land rather than the value of the property on it, and imposing a tax on vacant land or properties.

Supply-side challenge 3: securing finance

While some investors are starting to see affordable housing as a low-risk addition to their portfolio – as demand from key workers in public services is likely to remain strong through recessions – the private sector naturally focuses on market-rate housing, where returns are expected to be higher. Chapter 4 discusses options for funding the development of affordable houses, including:

- Government provision of tax incentives, grants or exemptions for private developers to develop certain types of property or develop in designated areas.
- Government-guaranteed bonds providing cheap, long-term finance to community-based organizations to develop and manage affordable housing.
- Employing investment models such as microfinance, real estate investment trusts (REITs), impact investing and Islamic finance.

Supply-side challenge 4: design and construction

While land is often the biggest cost in developing housing, construction costs are not far behind – and sometimes even greater. Chapter 5 looks into how housing can be made more affordable by bringing these costs down. Approaches include:

- Minimizing bureaucracy, as the fees and costs of complying with complicated building codes can add significantly to project cost. There is potential for technology to provide solutions here.
- Emerging construction technologies such as 3D printing, robot bricklayers, self-driving bulldozers – and solutions related to the internet of things (IoT) and artificial intelligence (AI) that could bring down operational and maintenance costs.
- Alternative construction materials such as fly ash, cement-coated expanded polystyrene panels, glass fibre-reinforced gypsum, cross-laminated timber and compressed earth blocks.
- Public-private partnerships on training to address skills shortages in the construction sector.

Demand-side challenges

Should strategies try to make housing affordable for everyone, or target assistance at certain sections of the population? And how should targeted populations be defined: by income level, age, number of children or employment as key workers? Chapter 6 delves into these and other challenges on the demand side of affordable housing, including:

- Different forms of tenure, going beyond a binary choice between rental and homeownership, can offer more options to city residents struggling to afford a house. They include build-to-rent, shared ownership and shared equity ownership.
- Rent controls offer the potential to protect tenants, but must also take care not to restrict the future supply of properties to rent by unfairly disadvantaging landlords.
- Demand-side interventions need to guard against the risk of helping in the short term but not the long term. Mechanisms to keep units affordable on resale include subsidy recapture and subsidy retention.



Recommendations

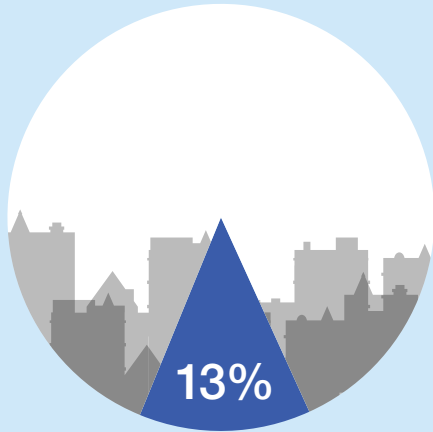
Effective strategies need to address both supply and demand side challenges. The final chapter sets out recommendations for the three main interdependent actors:

- City governments have to define their long-term plans for increasing the supply of affordable housing, balancing the need to minimize urban sprawl with the limits of the viability of building denser and taller. They need to address political considerations that could hold back the development of new affordable housing, ensure that housing developments have adequate infrastructure, explore ways to improve the situations of those living in informal housing, and create a strong regulatory enabling environment for the private and non-profit sectors.
- Private-sector players need to keep abreast of emerging solutions in construction techniques and materials, work with governments to ensure an adequate flow of skilled labour, and consider new solutions in financing and innovative tenure models.
- Non-profit organizations such as community land trusts, housing cooperatives and microfinance institutions have a critical role in bridging the gap between governments and the private sector to improve the affordability of housing, as well as working with individuals to help them understand their options and make informed decisions.

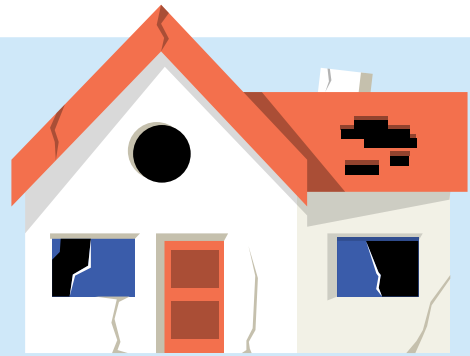


1 Introduction

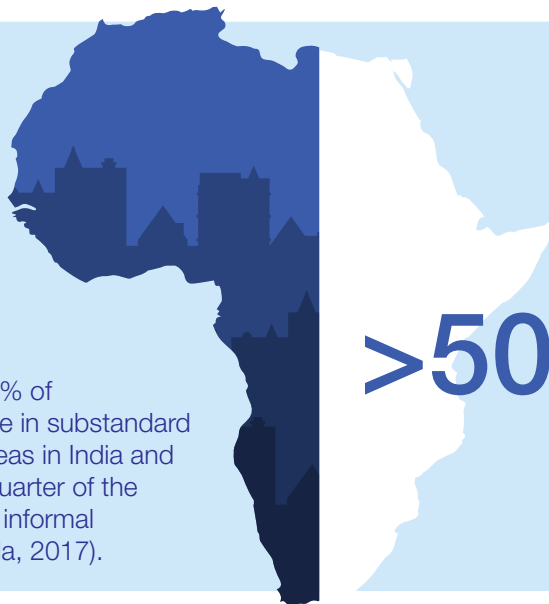
Unprecedented rates of urbanization and population growth have made housing affordability a concern around the world:



According to UN figures, only 13% of the world's cities have affordable housing (UN HABITAT, 2016).



In 2014, McKinsey estimated that 330 million urban households were living in substandard housing or were financially stretched by housing costs (McKinsey Global Institute, 2014). This is projected to rise to nearly 440 million households, or 1.6 billion people, by 2025 – and 2.5 billion people by 2050.

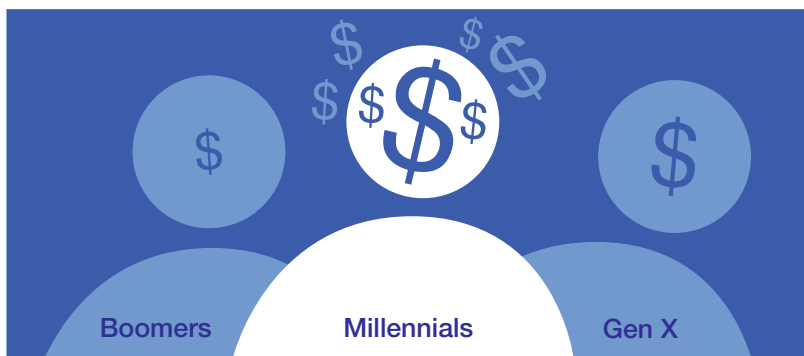


In Africa, over 50% of the population live in substandard conditions; whereas in India and China, nearly a quarter of the population live in informal settlements (Florida, 2017).



28%
less affordable

Based on median affordability (median price-to-income ratio), cities in less developed countries are found to be significantly less affordable (28% less affordable) than cities in more developed countries. (Kallergis, et al., 2018)



Millennials across the world are spending more on housing than any previous generation, with a lower quality of life (Judge & Tomlinson, 2018).

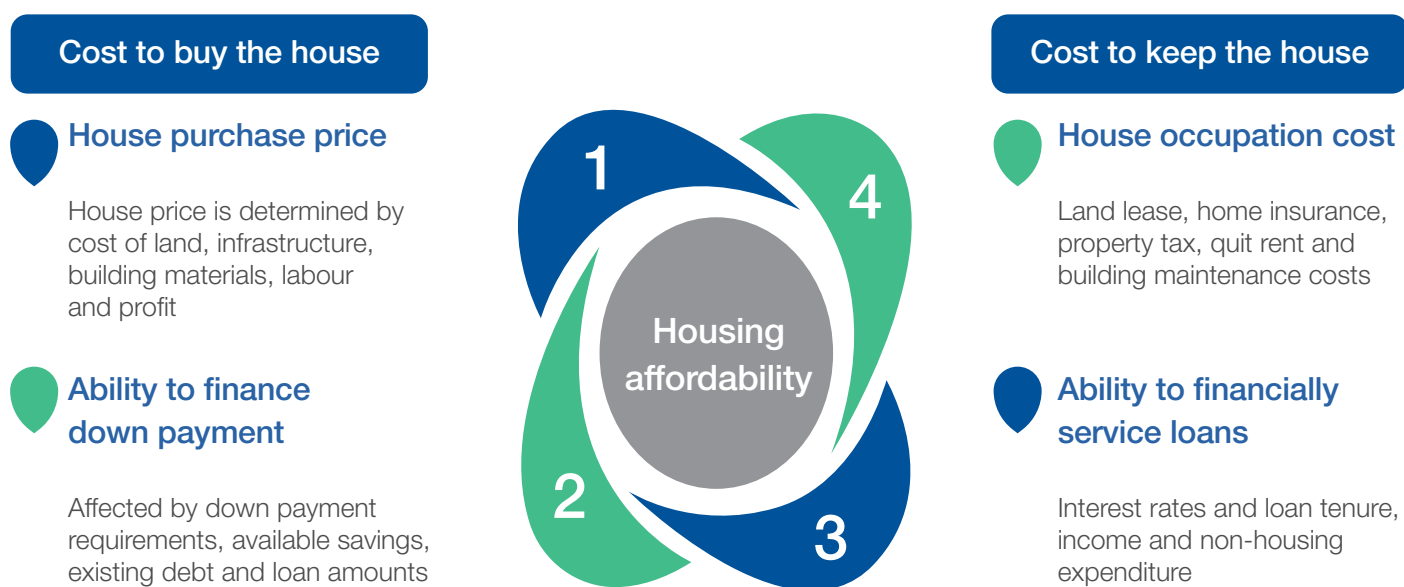
People come to cities looking for opportunity and better living conditions. Cities come under pressure to house their poorest citizens through social or public housing, but low-to-middle income households often have to depend on market-based mechanisms to access affordable homes. This requires cities to access public confidence and investor confidence through efficient regulatory and governance measures.

Cities are increasingly realizing the need for action. In 2016, for example, Habitat III in Quito adopted the New Urban Agenda, requiring states to promote “national, subnational and local housing policies that support the progressive realization of the right to adequate housing for all” by 2030. It encourages an integrated and inclusive approach to housing that interlinks education, employment, health and basic and social services through collaboration among governments, civil society organisations, major interest groups and the private sector, nationally, internationally and regionally.

Defining ‘affordable housing’

As implied by the final point in the above list, affordability is not only about the cost of buying a home – it needs to account for operation and maintenance costs. Accessibility of work and social infrastructure also matter. UN-HABITAT defines affordable housing as “housing which is adequate in quality and location and does not cost so much that it prohibits its occupants from meeting other basic living costs or threatens their enjoyment of basic human rights” (UN-HABITAT, 2011). Figure 1 below unpacks the concept of financial affordability.

Figure 1: Basic Components of Financial Affordability of Housing



Source: (Su Ling & Almeida, 2016)

Common challenges in housing affordability:

Housing costs rising disproportionately to household incomes, a particular problem for lower-income households in cities with an inadequate supply of social or public housing. In San Francisco, the poorest 5% earn approximately \$650 per month, while the bottom 5% of rental rates are around \$1,500 per month (Fidler & Sabir, 2019).

Affordable housing supply is not meeting demand, with limited incentives for the private sector to develop affordable housing.

Scarcity of land for affordable housing, often due to a lack of alignment among city, state and federal agencies on how land is to be valued and taxed.

Demographic changes

a.) Household size – a larger number of smaller-sized households can increase demand for individual housing units.
b.) Population growth – including in-migration, especially of college students and key workers such as teachers and nurses.
c.) Ageing population – rising numbers of low-income senior citizens add to demand for affordable housing, while senior citizens who still reside in large family homes contribute to the suboptimal allocation of housing units.

Energy poverty, results due to the high costs of heating or cooling relative to low household income, high energy prices and poor building energy efficiency.

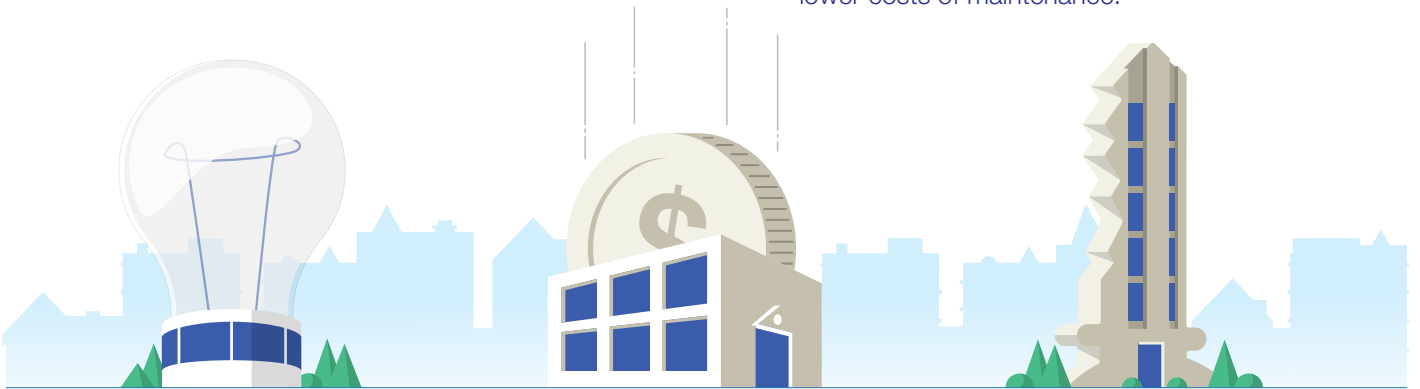


There is no universal standard of affordable housing, because ideas differ by region and culture in regards to:



Household incomes – governments typically define “affordable housing” in reference to low- and middle-income households.

Capacity – apartments, condominiums, cooperatives and terraced housing typically offer less privacy and space than single-family stand-alone units, but have lower costs of maintenance.



Energy costs – can be influenced by factors such as the building’s age, type, location and construction techniques.

Providers – subsidized private housing, public housing, non-profit housing associations and community housing providers are all ways of delivering affordable housing.

Housing tenure – affordability initiatives may focus on home ownership, rental or lease (typically leases are for longer time periods than rentals).



Occupation – key workers in particular often earn slightly above the threshold for social housing but not enough to avoid lengthy commutes. Key workers in Sydney, for example, would need to save for a minimum of 13 years for the down payment on a median-priced home in the city (Gurran, Phibbs, Gilbert, & Zhang, 2018).

Formality – dwelling units that lack security of tenure, have limited access to urban services and are not compliant with city planning and regulations are referred to as informal.

Measuring affordability

Three approaches are commonly used to measure the affordability of housing:

- The **median multiple** method considers housing affordable if the median house price is less than three times median household annual income.³
- The **housing cost burden** method considers housing to be affordable if households spend under 30% of their income on housing (mortgage payments or rent, rates, taxes, household insurance, repairs and maintenance, energy costs⁴).
- The **residual income** method subtracts the costs of meeting basic necessities from household income and uses the remaining “residual” income as the household’s

capacity to spend on housing. This approach is primarily used by commercial banks when evaluating mortgage applications.

The Australia Housing and Urban Research Institute has suggested a 30:40 indicator – “when the household has an income level in the bottom 40% of the country’s income distribution and is paying more than 30% of its income in housing costs.” It assumes that those in the top 60% of the income distribution who are paying more than 30% of their income for housing do so as a choice, with little or no impact on their ability to buy life’s necessities (AHURI, 2016).

The table below illustrates the advantages and disadvantages of each method.

Figure 2: Comparison of Affordable Housing Metrics

Macro-level method	Approach	Definition of housing affordability	Advantages	Disadvantages
↓ Micro	Median Multiple (MM)	Median house price that is three times or less than the annual income of the median household (e.g. house price-to-income ratio of 3.0 and below).	Easy to calculate. Allows comparison of housing affordability across countries and within a country over time.	Ignores the role of credit.
	Housing Cost Burden (HCB)	Housing expenditure (e.g. mortgage repayment) that is less than 30% of household income.	Considers the effect of leverage and non-housing expenditures of household. Allows comparison of housing affordability across countries and within a country over time.	Rigid threshold of 30%. Accuracy of cross-country comparison could be affected by differences in cost of living and repayment structure of mortgages across countries.
	Residual Income (RI)	Residual income (after deducting non-housing costs) that is sufficient to service monthly mortgage obligations.	Considers the effect of leverage and the household’s spending patterns. More reflective of a household’s ability to purchase a house.	Limited cross-country comparability. Requires detailed data on household income and attributes, cost of living and housing costs.

Source: (Su Ling & Almeida, 2016)

The affordable housing deficit

Housing deficits can be qualitative or quantitative.

Qualitative deficits stem from the use of substandard building materials (the Grenfell Tower fire in London in 2017, which claimed 72 lives, is an example), lack of proper urban infrastructure and services, or building in precarious locations. They may arise when informal housing intended for only temporary occupancy becomes occupied permanently, or when ageing buildings become incompatible with modern building codes.

Qualitative deficits due to ageing housing supply – The Khrushchovkas, Moscow

The Moscow’s Khrushchovkas were cutting -edge when they were constructed in the 1960s and 1970s in Moscow. However, these pre-fabricated, low-rise

blocks of flats are now riddled with leaky pipes and falling balconies. The concrete walls do not meet current insulation standards. The parallel load-bearing structure used in these buildings makes it impossible to renovate broken elements – these can only be replaced, which is more costly. The city government has controversially proposed to demolish 7,900 of these apartment blocks, relocating residents.

Source: (Luhn, 2017; Snopek, 2017)

Quantitative deficits result from demand for housing exceeding supply, which may be due to scarcity of land for development, growing urban populations, or the attractiveness as housing as an investment relative to other asset classes. Rising disposable incomes, low interest rates, and lack of financial literacy have frequently led to housing bubbles – defined as “a substantial and sustained mispricing of an asset, the existence of which cannot be proved unless it bursts” (UBS, 2017).

Costs factors affecting affordable housing development

Building costs include land acquisition (costs of purchase, titling, registration duties, obtaining planning approval, and any necessary environmental remediation or relocation);⁵ utility infrastructure (costs of developing, for example, e.g. water systems, electricity grids, heating and cooling networks, roads, security systems, sanitation systems); and construction costs (including labour and materials). Since land costs and infrastructure costs are usually a factor of location, developers may account for land acquisition and utility infrastructure costs collectively when comparing locations.

In different parts of the world, land costs account for varying proportions of overall costs, depending on factors such as land tenure, titling and allocation arrangements, and the local level of social and economic development. The cost of acquiring land tends to be higher close to urban centres, though increased density offers an opportunity to reduce land consumption per unit and the cost of connecting to existing utility infrastructure is typically lower than in more peripheral areas. The cost of land – highly influenced by planning policy, previous sale value, market dynamics and availability of basic urban infrastructure at the site – often decides whether there is commercial viability for the private sector to build affordable housing.

Infrastructure costs vary with the availability of municipal services. Municipal spending on urban services is strongly and non-linearly correlated to population density: A study of about 8,600 municipalities in Brazil, Chile, Ecuador and Mexico revealed that per capita expenditure was lowest when population density is close to 9,000 residents per square kilometre. The vast majority (85%) of the cities studied were below this density level, resulting in a “cost of non-densification” (Libertun, 2018). Utility infrastructure costs are typically lower in urban centres than on the periphery as the essential network infrastructure is already laid out for the city, and expansion may require increased investment with lower margins.

Construction costs exhibit strong economies of scale: developers typically save substantially on the costs of labour and materials for housing developments larger than 500 units (Duren N., 2017). Construction costs vary across regions depending on factors such as labour laws, building standards and choice of raw materials. A study covering 30 cities in Africa found that construction costs constitute between 35% and 72% of costs, with land and infrastructure ranging from 11% to 45% (CAHF, 2017).⁶

A study of real estate developers in Brazil and Mexico found that approximately one-third of building costs fall under “land and infrastructure” (Duren N., 2017). In the highly populated metropolises of India, land costs are typically greater – around 50–60% of the total project costs, compared to 30–40% for construction costs. (IDFC Institute, 2018)

Maintenance costs include repairs to roofing, plumbing, electrics, tiling, repainting or plastering, landscape gardening, etc., and operational costs such as heating, cooling, electricity, water consumption, property tax and insurance. Operational costs can be significantly reduced through measures such as metering in individual apartments, thermostatic valves and heat cost allocators on radiators.⁷ Apartment blocks typically require about half as much heating and cooling energy per square meter as detached housing (Litman, 2018), and also tend to have lower maintenance costs.

Developing district energy infrastructure could achieve savings from avoiding or deferring investment in individual energy infrastructure and peak power capacity, reducing fossil fuel bills while also generating local tax revenue and creating jobs in the design, construction, operation and maintenance of the shared infrastructure.⁸ Smart grids can help address the increase in demand for energy in cities, especially where population growth is particularly high.

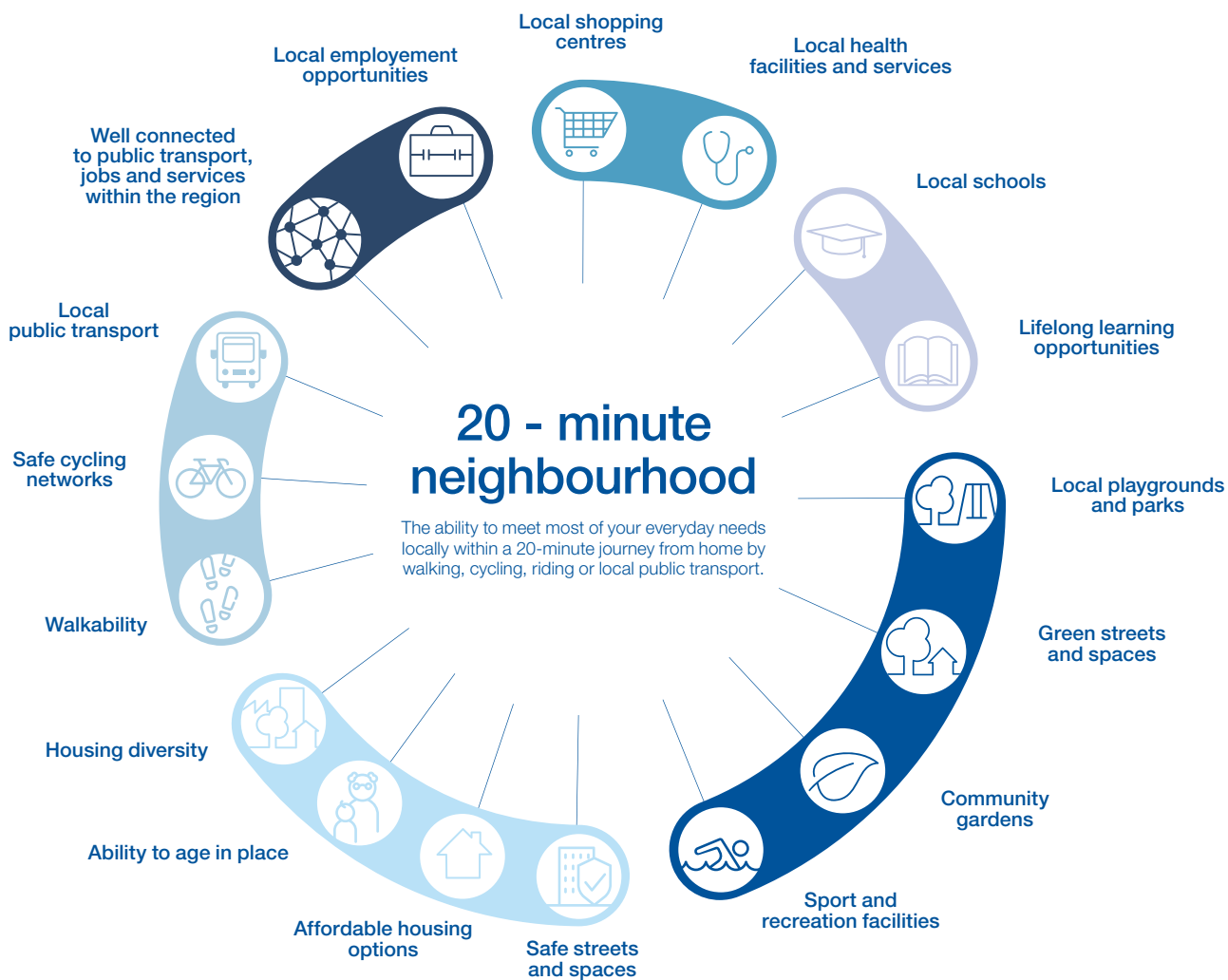
Housing costs cannot be looked at in isolation from quality of life – housing cannot be considered “affordable” if it is located far from economic opportunities. While the relationship between housing markets and labour markets needs further study, they clearly are often linked: High crime rates, for example, may both impact and affect real estate prices and make it difficult to secure a job; job insecurity makes it harder to make ends meet, resulting in less time available to improve living quarters.

In the Mexican city of Puebla, for example, households on the periphery spend twice as much cash and three times as much time commuting as those who live centrally (Duren N., 2017). When the *Iniciamos Tu Casa* programme relocated poor inhabitants into new houses outside the city centre and away from livelihood options, many of the homes were abandoned within a year (King, Orloff, Virsilas, & Pande, 2017).

The same consideration applies to amenities such as education and health services. Plans for affordable housing developments need to account for transit stations and walking/cycling infrastructure: The “20-minute neighbourhood” concept aims for everyday, non-work needs to be accessible within 20 minutes’ walk. Figure 3 illustrates the concept envisaged as part of the long-term planning strategy of the Victorian Government in Australia.

Well-designed low-income neighbourhoods can offer high quality of life. For example, a recent study shows that the Villa 31 transformation project in Buenos Aires, Argentina, outperforms wealthier neighbourhoods of the city in key indicators of urban vibrancy. Even though 37% of the neighbourhood’s 8,000 informal settlements lack a kitchen and over 25% lack proper sanitation facilities, the study found there were more people walking, cycling, socializing, and playing. Villa 31’s design of wide parallel streets and narrow alleys allow pedestrians to take short, direct walking routes, and good proximity to the city’s main transit hub makes it easier to access workplaces (Risom & Madriz, 2018).

Figure 3: 20-Minute Neighbourhood – The Concept as Envisaged by Plan Melbourne



Source: (Victoria Walks, 2018)



Analysing the affordable housing challenge

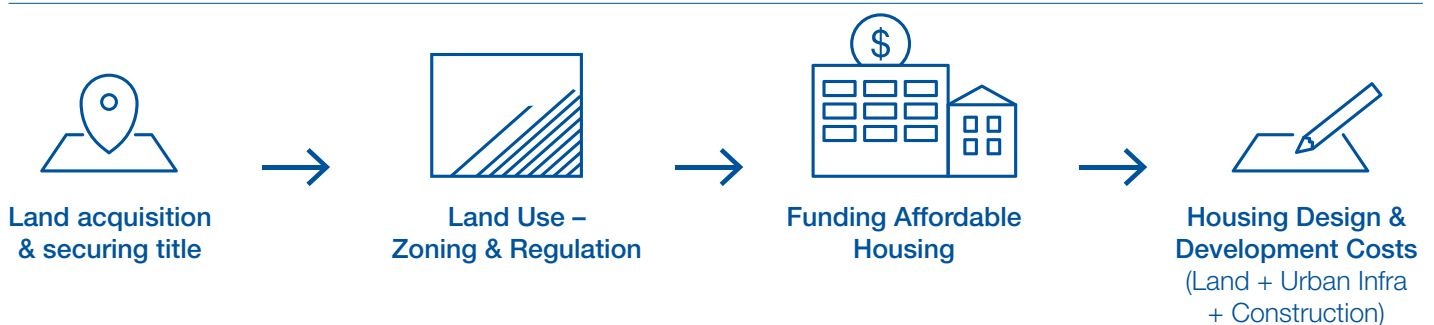
Cities have to ensure their land is utilized used optimally to the economic, social and environmental benefit of their population. This paper adopts a value-chain approach to affordable housing, looking at both the supply supply and demand sides, identifying challenges and solutions and concluding with recommendations for the main actors in bridging the gap in access to affordable housing. These value chains are not intended to be exhaustive, but to reflect the key components that impact affordable housing.

The supply-side chain (i.e. the process of creating units for occupation) starts with land acquisition and security of titling. Land use, which includes zoning and regulations, presents opportunities for cities to adopt an inclusive approach towards families, low-income households, single parents, women and immigrants, distributing density and incorporating diversity in areas accessible to public infrastructure. Concerns about commercial viability need to be addressed if finance is to be secured for meeting the costs of planning, design and construction of an affordable housing project.

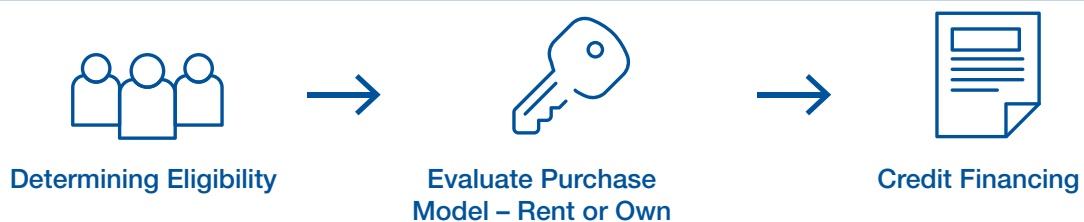
The demand-side value chain (people's ability to afford a housing unit) involves determining eligibility for designated affordable housing, choices between rental and ownership models, and credit financing for purchase. Figure 4 summarizes the value chains, which together cover a variety of activities – legal and administrative, regulatory, infrastructural, financial – involving multiple actors. The coming chapters break down these value chains to understand the challenges cities face and the solutions some have found.

Figure 4: A Value Chain Approach to Affordable Housing

Supply side value chain – Process of building homes to live



Demand side value chain – Ability to finance & afford homes to live



Evaluation of current supply and demand value chains allows us to break how the complex challenge of affordable housing and identify opportunities and solutions at each stage






Source: Analysis undertaken by the World Economic Forum Cities, Urban Development and Urban Services Platform

2 Supply-Side Challenges: Land Acquisition and Securing Title

Land acquisition is perhaps the most important and complicated piece of the affordable housing puzzle. The process entails confirmation of ownership, a survey that defines the dimensions of the land to be acquired, determination of its fair market value and procurement through a fair process (in cases of public land) or through negotiation (in cases of private land; if public land is also encroached on, the occupant does not possess full legal title and formal acquisition must be initiated through statutory powers).



Three commonly used policy instruments are land pooling, negotiated settlements and formal acquisition. The following table describes their main characteristics.

Characteristics	Land pooling/land readjustment	Negotiated settlements	Formal acquisition
Applicability 	When scattered and unsuitable allocation hinders private-sector land development; older urban structures have to be reorganized; there is a recognized need for additional provision of infrastructure and services.	When the seller wants to sell and is looking for financial compensation rather than retaining a stake in the land; when the government wants to provide an opportunity to negotiate through a market transaction rather than expropriation.	When voluntary methods and negotiated settlements are no longer an option with landowners and access to land is deemed imperative by the local authority.
Mechanism of acquisition 	Requires landowners to voluntarily sign ownership rights over to a single agency or government body, which in turn develops the land by building basic infrastructure such as roads, sewage lines, electricity and water connections.	Trading parties have to comply with a framework that details aspects of assessment, negotiation, settlement and implementation. This could also include conducting studies on land for appraisal, loss valuation and assessing impact from events such as flooding.	Entails compelling owners to sell land or involuntary eviction, thereby displacing residents through the enforcement of statutory powers.
Medium of exchange 	The agency returns a smaller portion of the developed land to the original owner, equivalent to the market value of the owner's original land before the added infrastructure investment increased its value.	The agency buying land works towards reaching an agreement: land that has to be transferred, financial compensation and the possibility of continued use of land (e.g. the use of roads) by the selling party post-transfer.	The agency sometimes compensates owners for the value of their plots. Where compensation is low or obtaining consent is difficult, land is acquired by force.
Benefits 	Less cumbersome, as the process is voluntary. Ensures planned development of the land. Provides an opportunity to recover costs incurred in building infrastructure. If administered properly, could increase equity in land distribution.	Affected parties are not forced to accept compensation at the book rate defined by the governing body and can claim higher compensation as negotiated.	Provides immediate compensation for the land at market value instead of the considerable wait times (decades or more in some cases) of recovering land through negotiation.
Limitations 	<p>The intent to pool land, if leaked, can result in cartels being created. Governments would have to regulate buyers to prevent this.</p> <p>Households may have low operating costs, leaving them with little incentive to downsize.</p> <p>Developing infrastructure does not guarantee the development of land. Speculators may choose to keep hold of land rather than develop low-income housing.</p>	Process requires skilled negotiators and valuation surveyors, skills that may be in shortage at the government level, as well as collaboration from current owners.	Costly and unpopular. Requires a social-impact assessment to be carried out, along with a resettlement plan for residents. The high cost will likely be passed on by developers to buyers.

Source: (Chari, 2015), (Ontario.ca, 2017) and (Debnath, 2018)



Land pooling has proved very successful in Amaravati, the new capital city of the state of Andhra Pradesh, India. The state government approached 24 villages to give up their land in exchange for a smaller but developed plot of land in the future. Within four months, 22 had agreed. The returned plots of land were allocated through a lottery and published online to ensure fairness and transparency. Using land as a primary mode of exchange reduced the pressure on the state's finances. The exercise is considered to be the largest of its kind in India to date, with over 33,700 acres transferred.

Tradeable land quotas – Chengdu and Chongqing, China

In China, local governments have limited authority to expropriate rural land for new housing due to the central government targeting grain self-sufficiency and imposing quotas on agricultural land that can be converted to urban use. Cities such as Chongqing and Chengdu are experimenting with tradeable land quotas; through these, peripheral land can be developed because additional land is turned over for cultivation beyond the city boundaries.

The details differ. In Chengdu, for example, by consolidating land in rural areas, developers can create a construction land quota that is valid for two years and can be sold once in this time; if not used, the city buys the land back at a specified minimum price. Some 10% of the value goes to the city to improve infrastructure in the consolidated areas. In Chongqing, the process of rural construction land conversion is carried out by the city government in collaboration with townships and village committees, and – as an anti-speculation measure – developers need to purchase a quota before bidding for a parcel of land in the urbanizing area.

Tradeable land quotas are analogous to transferable development rights (TDR), in which rights to land targeted for conservation are exchanged for rights to develop in approved areas. However, there are vital differences: TDR is not divisible, as land is consolidated from multiple parties to form the quota; and Chengdu's system of networked decision-making, in which individual and collective units negotiate with the local government and private sector, helps to safeguard the interests of individual owners.

Source: (Fuller, 2017; Lejano & Lian, 2017)

However, land acquisition does not necessarily lead to the construction of affordable housing. In areas where demand for affordable housing is high, land owners may be able to generate higher revenue from commercial or industrial use, or may choose to hoard their land in the hope that it increases further in value. Even when the land is publicly owned, it can be politically difficult to balance the objectives of improving housing supply and increasing revenues by encouraging commercial or industrial activity. Long-term planning, coordination and transparency among government agencies is necessary to optimize the use of land.

Land Development Agency – Ireland

Various national and local public bodies are together estimated to own enough land in Dublin to build about 70,000 housing units. Ireland has recently created the Land Development Agency to optimize use of publicly owned land to speed up the delivery of new homes. It is building a comprehensive database of land owned by all government departments and state bodies, and seeking opportunities to collaborate strategically with nearby private landowners to facilitate development.

Source: (Coleman, 2018) and (Melia, 2018)

Securing titles

The existence of legal titles through land tenure⁹ and property rights¹⁰ encourages investment in land, as does improving its access to infrastructure. However, well-intentioned attempts to convert informal settlements into titled land can risk widening inequality; e.g. by favouring groups with better access to information. Formal titles are less useful for groups such as those too poor to be able to service long-term loans, highly mobile youth populations or ageing populations looking for short-term security (UN-HABITAT, 2017).

Another approach could be emphasis on rights rather than title, as exemplified by measures to prevent forced evictions and relocations in countries such as Brazil, South Africa, Uganda and Cambodia. The Favela Bairro project in Rio de Janeiro, Brazil, increased residents' security of tenure by providing rights of use without full land-tenure legalization, building on the Brazilian constitution's legal instrument of usucapião (adverse possession). These rights were complemented by improvements in education, healthcare, job access and safety policies (King, Orloff, Virsilas, & Pande, 2017).

In a low-income settlement centrally located in Maputo, the capital of Mozambique, residents have existing land rights (DUATs) but the homes are of poor quality. The city used a "land readjustment" approach as part of its affordable housing initiative Casa Minha (My House), giving rights-holders the option of having two new two- or three-storey houses built on their plot – one of which would be for them, and the other sold at market rate, which would be affordable for key workers (Centre for Affordable Housing Finance in Africa, 2018).

Public land ownership also holds the key to affordability in cities where middle- and lower-income families are unable to compete with corporate investors, but community-housing providers and city governments could collectively purchase or repurchase large quantities of housing stock (Fidler & Sabir, 2019). Collective tenure mechanisms such as community land trusts (CLTs) and cooperatives have been highly effective in establishing tenure security with non-formal titles in many countries, including "right to the

city” (in Brazil), temporary occupation licences (in Kenya and Uganda), certificate of rights (in Botswana), anticrético (in Bolivia), and ten-year leases (In India) (UN-HABITAT, 2017). Collective land tenure refers to a community sharing land access rights to benefit from economies of scale during production, spread risk and avoid the costs of enforcing individual property rights (GRADE, 2016).

The governance structure of CLTs consists of community groups, philanthropists or government organizations; as owners, they can require that housing built on their land be affordable. Such mechanisms remove the price of land from the cost of housing, but still require an original endowment in order to buy the land; they rarely apply to core city areas given the high cost of land, but are ideal for vacant or abandoned areas (King, Orloff, Virsilas, & Pande, 2017).

Land trusts and land banks – using the untapped potential of land market partnerships

Land trusts are private, not-for-profit entities focused on the long-term stewardship of lands and buildings following redevelopment. Stewardship on behalf of a place-based community is undertaken through community land trusts, or CLTs. The land resides with the trust in perpetuity; buildings are sold privately with restrictions on use and resale to preserve affordability – e.g. home owners may be required to keep buildings in a good state of repair, and CLTs may have the option to repurchase homes at a predetermined price. Land trusts face challenges in acquiring land parcels big enough to have a transformative impact.

Land banks are quasi-governmental entities focused on short-term ownership (usually three to five years) of vacant lands, especially those blighted by contaminants, derelict structures, title defects etc. They secure land at a low price and ready it for sale for redevelopment. Unlike land trusts, they typically do not impose restrictions on affordability and are not concerned with the upkeep of buildings or land. In the US, subsidies invested in acquiring and remediating lands are claimed by the land bank at the sale of the property.

Several cities are experimenting with a partnership in which community land trusts become the favoured parties for lands released by municipal land banks. They include the city of Albany, New York, where Albany County Land Bank (ACLB) and Albany Community Land Trust (ACLT) are working together to address vacancy and abandonment and preserve affordability.

Source: (Davis, 2013) and (Graziani & Abdelazim, 2017)



3 Supply-Side Challenges: Land Use – Zoning and Regulations

Urban land cover is growing more quickly than the urban population – at estimates of twice the rate (ULI, 2018). Urban sprawl in developing nations is decreasing the density of the built environment. Factors contributing to urban sprawl include land-use patterns that prioritize personal vehicles, social norms that favour low-density housing, land-use segregation, economic incentives favouring low-density development (e.g. higher property taxes for multifamily units than single family homes in the US¹²) and mortgage financing favouring single-family dwellings (ULI, 2018).



Housing development sites can be **brownfield** or **greenfield**. Figure 5 below illustrates some of the advantages and disadvantages of each type. Houston, Texas, has some of the cheapest housing among major US cities after relaxing its zoning to enable considerable greenfield development. Acquiring greenfield land is typically easier and cheaper, though the cost advantages are somewhat offset by the need to build infrastructure – roads, water, sewers, electricity etc. In Houston, an estimated 57% of commuters drive alone to work, and only 1.5% of the population prefers walking or cycling (Novo Nordisk (Cities Changing Diabetes), 2017).

In contrast, New York City has limited capacity to expand, so housing developments are primarily on brownfield sites. This makes development – and, in turn, housing – more expensive, but brownfield sites provide easier access to urban infrastructure and services, encouraging the use of public transit systems. The Moovit Public Transit Index revealed that the average distance people walk to work or home for New York City is about 700 metres, with only 19% of commuters travelling over 1 km to reach their destination (Moovit, n.d.).

Decisions on urban expansion can affect overall affordability, as the costs of urban infrastructure are strongly related to population density: As noted in chapter 1, a study of about 8,600 municipalities in Brazil, Chile, Ecuador and Mexico revealed that per capita expenditure on urban services was lowest at a population density around 9,000 residents per square kilometre – which was a higher density than in 85% of the cities studied, highlighting the “cost of non-densification” (Libertun, 2018).

City governments typically use two simple tools – zoning and regulation – to either restrict housing supply and inflate prices, or spur growth in affordable housing units and stabilize prices.

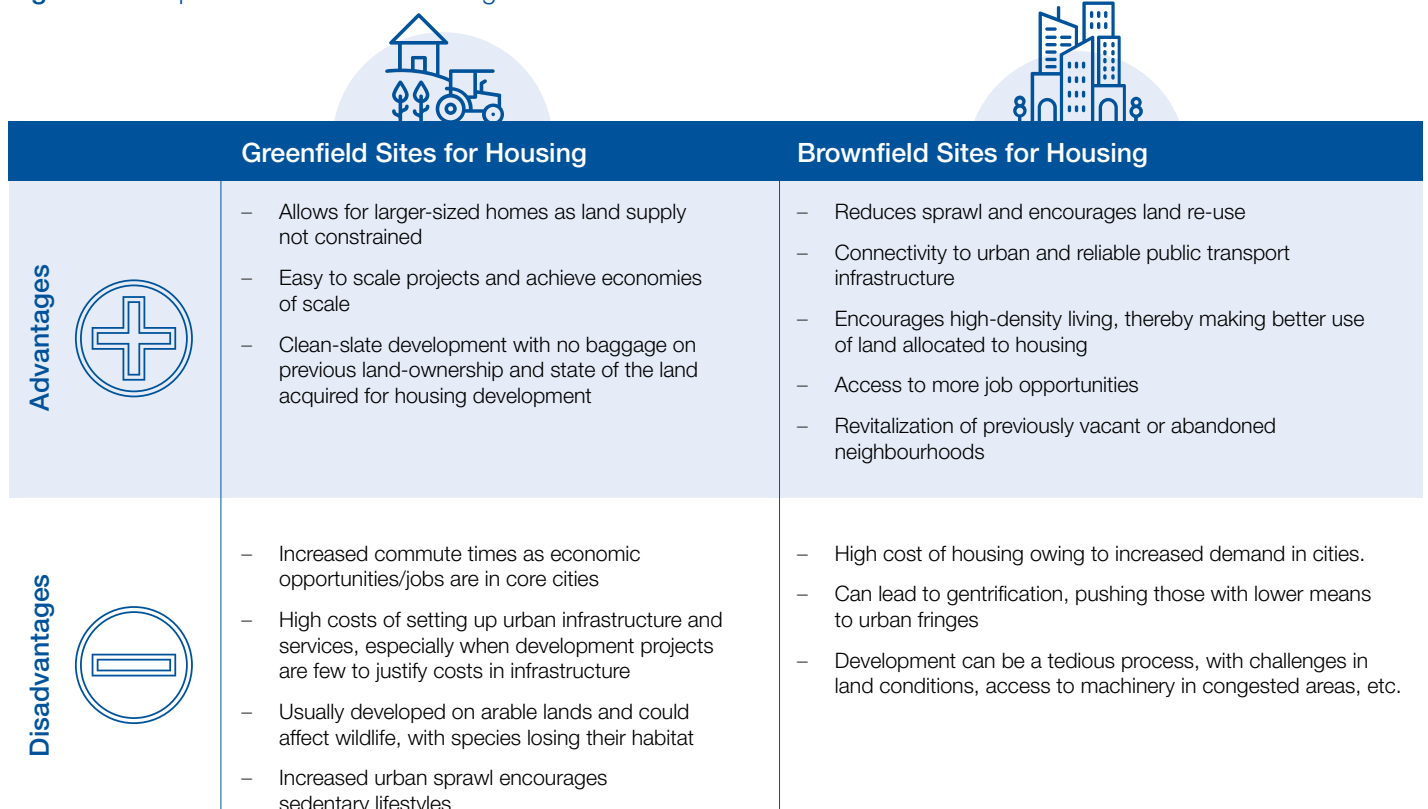
Zoning

Many cities set boundaries on their growth to minimize the impact on agriculture, forestry and outdoor leisure. Such restriction on the supply of land for development drives up the market cost of housing. Greenbelts around Seoul and London, growth boundaries in Auckland and urban land quotas in China are all examples of this (Fuller, 2017). The proximity of agricultural or business zones also has an impact on housing prices. Through zoning and urban plans, each city must try to balance its land-use objectives to achieve a healthy, economically and socially vibrant community that is also affordable for a diverse array of residents.

Intensification and densification are important concepts in residential zoning. **Intensification** implies focusing on infill development – that is, developing or redeveloping land within the city rather than developing peripheral farmland. **Densification** refers to increasing the number of households in a given area by using both the horizontal and vertical space. These strategies not only help to contain urban sprawl but also realize economies of scale in delivering city services by concentrating the population, and encouraging the use of mass transit, walking and cycling (Neptis, 2010).

Transit-oriented development (TOD) is a densification strategy that involves upgrading urban transit infrastructure and making provisions for additional development rights for affordable housing near transit areas. However, cities need to take context-specific steps to avoid an escalation of prices, leading to gentrification and the pricing out of mass transit users (Balachandran, 2018). The Los Angeles County Metropolitan Transit Authority has developed an innovative solution: The Metro Affordable Transit Connected Housing Program (MATCH) is a public-private lending partnership

Figure 5: Comparison of Different Housing Sites



	Greenfield Sites for Housing	Brownfield Sites for Housing
Advantages	<ul style="list-style-type: none"> Allows for larger-sized homes as land supply not constrained Easy to scale projects and achieve economies of scale Clean-slate development with no baggage on previous land-ownership and state of the land acquired for housing development 	<ul style="list-style-type: none"> Reduces sprawl and encourages land re-use Connectivity to urban and reliable public transport infrastructure Encourages high-density living, thereby making better use of land allocated to housing Access to more job opportunities Revitalization of previously vacant or abandoned neighbourhoods
Disadvantages	<ul style="list-style-type: none"> Increased commute times as economic opportunities/jobs are in core cities High costs of setting up urban infrastructure and services, especially when development projects are few to justify costs in infrastructure Usually developed on arable lands and could affect wildlife, with species losing their habitat Increased urban sprawl encourages sedentary lifestyles 	<ul style="list-style-type: none"> High cost of housing owing to increased demand in cities. Can lead to gentrification, pushing those with lower means to urban fringes Development can be a tedious process, with challenges in land conditions, access to machinery in congested areas, etc.

with a policy that 35% of all housing built on its land must be affordable to households earning less than 60% of the area's median income (Riggs, 2018).

Algorithmic zoning – dynamic self-regulating systems using tokens

The concept of algorithmic zoning refers to using data such as commute times, housing unit costs, amenities scores and health outcomes to measure residents' happiness. A token-based system could then be used to shape development by correcting for externalities and rewarding pro-social behaviour. For example, a housing developer might have to pay tokens when critical amenities are provided for its project, whereas a developer that converts property into communal space could receive tokens as a subsidy. For those looking to buy homes, tokens could subsidize key workers or popular figures in the community.

Source: (Crichton, 2018)

Conventional single-use zoning mechanisms emphasize separate and specific uses of land, and can become controversial if they do not fully reflect a community's needs. For example, decisions on the type of housing units (e.g. single family, multifamily) and mobility (width of roads vs. walkways) can have implications for health (higher levels of obesity in car-dependant vs. walkable neighbourhoods) and safety (large blocks of housing make natural surveillance of crime more difficult).

Form-based codes

In conventional zoning practices, individual departments such as traffic, planning, and garden and parks units work in isolation. By contrast, **form-based codes (FBCs)** use place-making principles to achieve a particular character of built environment, reflecting community input in design requirements that specify the relationship of building structures to the public realm – e.g. prescribing the height and placement of a building, the direction of windows and doors etc. Using diagrams and images, it clearly sets out standards that will lead to streamlined approval. It is assumed that the use of buildings can change over time with minimal review if the physical form is appropriate. Hundreds of cities use FBCs, including Miami, Denver, Los Angeles, Calgary, Abu Dhabi and Dammam.

Source: (Galvin, 2017; Placemakers, n.d.; City of Marshall; Madden & Russell, 2014)

Affordable housing strategies often aim to create vibrant communities through policies of inclusionary zoning – a government intervention mandating or incentivizing a portion of residential housing to include low and middle income households – and mixed land use, defined as “the co-location or immediate proximity of homes, workplaces and services in buildings, neighbourhoods and districts”. Mixed-income communities are believed to be more diverse and socially cohesive and improve social mobility (Design Buildings, 2017). In different projects, homes could be:

- Distributed among income brackets of those households involved in development.

- Provided according to a spatial strategy for mixing different income groups (e.g. “pepper-potting”).
- Proportionately distributed at different income levels in multiple tenure models (rentals, ownership etc.).
- Subsidized for low-income households through guarantees for a particular time duration (e.g. affordable housing preservation programmes).
- Provided to lower-income households compared to those living in the immediate neighbourhood (Vale, 2015).

Many cities use inclusionary zoning. Mandatory inclusionary zoning requires developers to build a specified number of homes, negotiated with the planning authorities or as a proportion of development value. An alternative is incentivized inclusionary zoning, where incentives for developers to build affordable housing could include:

- Modifying planning standards based on performance criteria (e.g. increasing site yield to encourage low-cost housing such as boarding houses, student accommodation and retirement homes in designated areas).
- Bonus systems that relax development controls such as height, density, building setback¹³ or parking controls in exchange for constructing dedicated affordable housing.
- Fast-track planning approval, or reduction, exemption or refund of planning application fees, infrastructure charges or rates (AHURI, 2017).

Mixed-use developments range from a single building to large-scale neighbourhoods that include residential, commercial, retail, recreational, green and other kinds of spaces. Adoption of mixed-use development has historically been slow due to anxieties about noise, smells and loss of privacy in residential areas mixed with commercial and industrial areas, but this is changing as the benefits become more apparent (Alvarez, 2017).

Mixed-use development can help to:

- reduce commute times to work and travelling time to shops
- revitalize neighbourhoods by creating a sense of community and safety
- accommodate higher housing densities, as there is likely to be less opposition to increased density in commercial spaces than in existing residential spaces
- create new housing opportunities in areas where only commercial or light industrial uses are allowed (HUD).

Communities Plus Programme – Sydney

Communities Plus is an initiative of the New South Wales Government in Australia, in partnership with the private, non-government and community housing sectors, focused on neighbourhood revitalization and integrated community development. It aims to develop 23,000 new and replacement social housing units on sites in need of renewal, integrated with 500 affordable and up to 40,000 private dwellings, with proceeds reinvested in new social housing, community facilities and high-quality open space. Assistance with housing is linked to participation in education, training and local employment opportunities.

Source: (NSW Government, 2017)

Mixed-use developments on their own cannot ensure affordability. Supplementary measures are required. A recent study in Toronto revealed that housing in mixed-use zones in core areas was actually less affordable than in the rest of the city as the ease of access to amenities and services attracted certain occupational groups. The effect was to increase housing affordability for high-income knowledge workers while reducing it for those in lower-income occupations such as social and public service, trade and manufacturing. The study concluded that cities need to implement mixed-use zones in tandem with policies supporting inclusionary zoning and affordable housing trusts (Moos, Vinodrai, Revington, & Seasons, 2018).

Land-use regulations

Land-use regulations include minimum lot sizes, minimum parking requirements, maximum floor-to-area ratios or floor space index (FSI).¹⁴ In theory, these can be relaxed or made more restrictive to address anticipated housing needs based on a city's demographic trends. However, in practice they have sometimes had unintended effects.

Land-use regulations range from being too restrictive to too relaxed, depending on the available and expected housing supply in the city and whether it is experiencing population growth, stagnation or decline. For example, Mexico City has repealed its minimum parking requirements as they were affecting residential development and increasing pressure on rents and house prices (Ikeda & Hamilton, 2015). In some cases, cities have tried to use land-use regulations to increase density but have only exacerbated a mismatch between demand and supply. For instance, in 2017, Toronto introduced regulations aimed at incentivizing multifamily housing units, but these did not spur new construction as demand remained concentrated on detached, single-family homes (Saminather & Scuffham, 2018).

Likewise, cities have often found that lowering FSI limits succeeds in reducing the “density of buildings”, but not necessarily the “density of people”, as people choose to occupy smaller spaces – sometimes illegally and informally. Lower height restrictions on central buildings can also drive up prices and lead to urban sprawl: In Beijing, this resulted in 12% expansion of its city boundaries and an increase of 20% in house prices (Ding, 2013). Another unintended side effect of lower FSI limits is that it incentivizes developers to opt for fewer and larger apartments to minimize the space that needs to be given to lobbies, stairwells, lifts etc. This limits the supply of smaller apartments, and thus reduces affordability.

One solution is the “**inverse incentive FSI**”, which rewards developers for building smaller apartments by allowing them more FSI to use on larger apartments. Cities set a benchmark apartment size, and developments below this benchmark earn the developer “incentive FSI” based on the difference: For example, if the benchmark is 75 square metres and a developer builds apartments of 50 square metres, it could buy 25 square metres of FSI from the city government at below-market price up to a stipulated limit. It can then use this FSI to construct large apartments. This mechanism ensures a balance between apartments of all sizes (Salgia, 2018).

Taking into account the population density, Indian cities have some of the most restrictive FSI in the world (1.5 in Chennai, 3.25 in Bengaluru and 3.5 in Mumbai,¹⁵ in comparison to 20 in Tokyo and 25 in Singapore). Mumbai offers developers additional FSI as an incentive to redevelop slums and construct roads and other infrastructure (IDFC Institute, 2018).

For cities that want to spur vertical construction beyond height restrictions imposed by civil aviation¹⁶ or defence requirements, there is a point past which relaxing these limits becomes less effective as demand may not justify the additional costs of construction.

The costs associated with raw materials, structural framework, plumbing, elevators, electrical work etc. vary according to the height of the structure being built. As shown in Figure 6, when urban expert Alain Bertaud graphed the relationship between cost and density, he found that an optimal value in cost savings was achieved between 20 and 25 floors, with an FSI of between 6 and 7. The cheaper land is, the lower these figures will be (Bertaud, 2010).

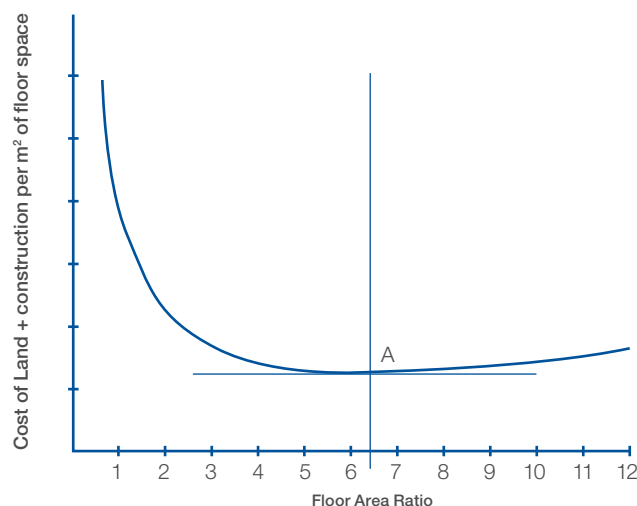
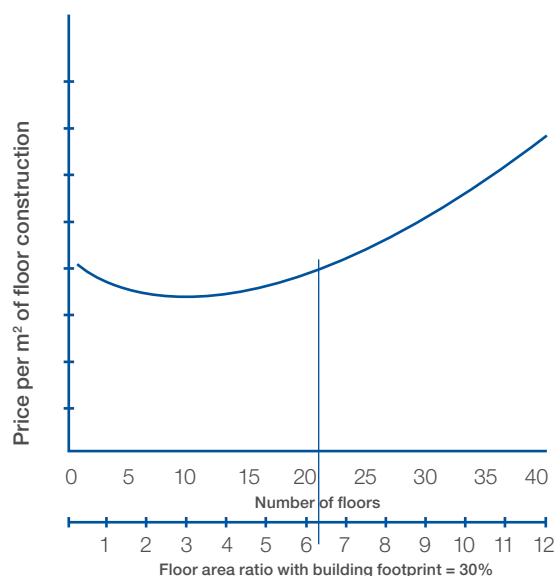
Height also has environmental considerations. In Norway, a 2015 assessment of buildings ranging from three to 70 storeys found that building height has no effect on CO2 premiums (i.e. greenhouse gas emissions per square metre of floor area) up to 12 storeys; an increase from 20 to 30 storeys brings a negligible premium per storey, and beyond this threshold the premium depends on factors such as structural solutions and material choices (Ytrehus, 2015).

Land-use regulations have political implications – most commonly nimbyism (“Not in my back yard”) – the tendency of existing residents to oppose plans for more affordable housing in their neighbourhood due to fears such as increased congestion, decrease in property value, strain on public infrastructure (such as parks and schools), services (water, power, sewers etc.) and parking availability, environmental damage and impact to the neighbourhood's historical, cultural and aesthetic character. One approach to nimbyism, proposed by Yale Law School professor David Schleicher, is “tax incremental transfers” – sharing tax revenues from new developments with existing residents through rebates in their property taxes (Florida, 2017).

Another way to encourage more intensive land use could be shifting to a recurring land-value tax model, in which the underlying value of the land is taxed, rather than the property on the land. Land-value tax can also help deter speculative land holding and bring underused land and properties into the housing market. As foreign investment commonly adds to speculation, Vancouver passed a 15% tax on sales to foreign buyers (Fidler & Sabir, 2019).

A similar challenge applies to underused land or properties. According to a McKinsey Global Institute analysis in 2016, 28% of parcels zoned for multifamily development in Los Angeles were underused and could add more than 300,000 units to the city's housing inventory. In San Francisco, the number was 31% (McKinsey Global Institute, 2016). Vacancy taxes can also encourage development of such properties. Saudi Arabia has implemented a “white land tax”

Figure 6: Variation in Construction Price with Number of Floors



Source: (Bertaud, 2010)

to encourage landowners to develop idle plots for residential use. In Vancouver, properties deemed empty are subject to a tax of 1% of assessed value (City of Vancouver, 2018). Every residential property owner is required to submit a property status declaration each year, and the city has projected that this tax will raise \$30 million (Chan, 2018).

Some cities have enforced policies on bringing vacant properties into the affordable housing market. Barcelona has identified 2,000 unoccupied homes repossessed by banks, mostly after the 2007 financial crisis, that have been unoccupied for two years. When these are in high-demand areas, expropriation orders are issued to put the property into the socially rented sector for four to seven years. Banks found to be concealing empty properties to avoid the edict are liable to pay fines (O’Sullivan, 2018).

Converting vacant and neglected rental properties into affordable rental housing – Grand City Properties

A recent study of 77 large cities in Germany revealed a shortage of 1.9 million affordable apartments. Grand City Properties, a residential real estate company, specializes in acquiring under-rented and undermanaged residential properties – mostly neglected by their previous owners – and reducing vacancies through repairs, maintenance and improved management quality. The company also invests in playgrounds and open spaces, and provides services such as assisting those with language barriers to interact with German authorities.

Source: Grand City Properties Contribution to the World Economic Forum study

While vacancy rates of a few percent are important to lubricate markets, in many middle-income countries they are concerningly high. More than 12% of homes in Indian urban areas were found to be vacant by the 2011 census (Gandhi & Munshi, 2017), and in China the figure is 22% – including second homes and temporary units – according to the 2015

China Household Finance Survey (Wong, 2017).

It is often difficult to get reliable data on vacancy rates. Research organization Prosper Australia has been using water consumption data in Melbourne to estimate when a property is vacant; complications include accounting for water leaks, single meters on entire apartment blocks, holiday homes etc. Similarly, Paris analysed electricity consumption to estimate the number of vacant homes and offices in the city. Detroit combines geospatial analysis with on-the-ground surveys and site photos cross-referenced with municipal data (Cashmore, 2015).

Where it is practical, planning should encourage the conversion of offices, underused or decommissioned land or buildings for residential use. In Massachusetts, 65,000 square feet (6,000 square metres) of unused buildings were turned into mixed-income affordable housing by Harbor Place Residences, Merrimack Street Ventures, the Planning Office for Urban Affairs and the Greater Haverhill Foundation (Riggs, 2018). Another approach is extending existing dwellings (garage apartments, basement apartments, backyard cottages etc.) or building on parking spaces. In the UK, where nearly 50% of car parks are publicly owned, the company ZEDPods provides flexible, prefabricated homes to build over surface car parks. Real estate firm JLL has identified 10,500 car parks that could accommodate 400,000 households (Dale, 2017).

Motel Conversion Ordinance – Los Angeles

The city of Los Angeles recently passed a Motel Conversion Ordinance that allows conversion of motel rooms – typically by adding small kitchens – into permanent housing for homeless people, regardless of current zoning requirements. The ordinance will also slash parking requirements and allow “permanent supportive housing” projects to be taller and denser.

Source: (L.A. Times, 2018) and (Reyes & Smith, 2018)

Jurisdiction challenges can arise over land-use regulations. Local authorities regulate land use, but affordable housing programmes are predominantly regulated by national government bodies. With limited control over land use, national governments often focus on quantitative targets (number of affordable homes built, home ownership) rather than qualitative aspects such as location and informality (Duren N. L., 2018).

Incentives to regularize informal settlements can help to increase the supply of safe, adequate and affordable housing. In Italy, residential self-renovation cooperatives (autorecupero residenziali) allow squatters to renovate previously illegally occupied vacant public housing, with local authorities allowing tenants to pay a lower rent based on their investment of time and money in the renovation (Housing Solutions Platform, 2018).

Cairo's experience shows the dangers of overly restrictive land-use regulations. Farmers began selling land informally to developers who built apartments for the city's low-income population; to discourage this, the city refused to develop roads or provide urban services. This resulted in households lacking access to jobs thus limiting their ability to become productive citizens (Fuller, 2017).



4 Supply-Side Challenges: Funding Affordable Housing

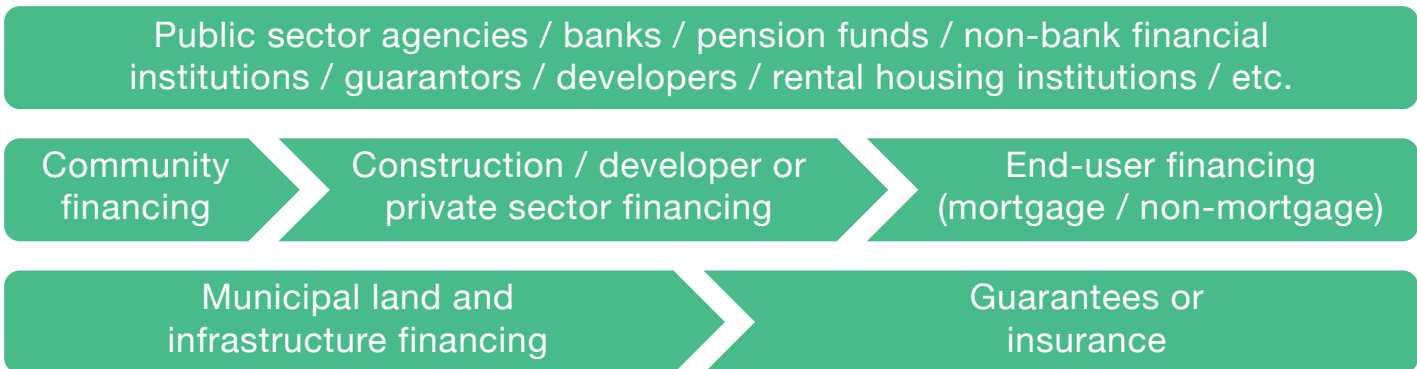
Adequate financing structures and funding are critical to addressing the affordable housing challenge. Figure 7 illustrates the funding instruments and sources of capital typically relevant in the context of low-cost housing. Finance instruments reflect how different actors – public-sector agencies, banks, pension funds, non-banking financial institutions (NBFCs), guarantors, developers, rental housing institutions, etc. – are using funding instruments at each level of the housing supply value chain.

Figure 7: Finance value chain vis-a-vis the housing supply chain

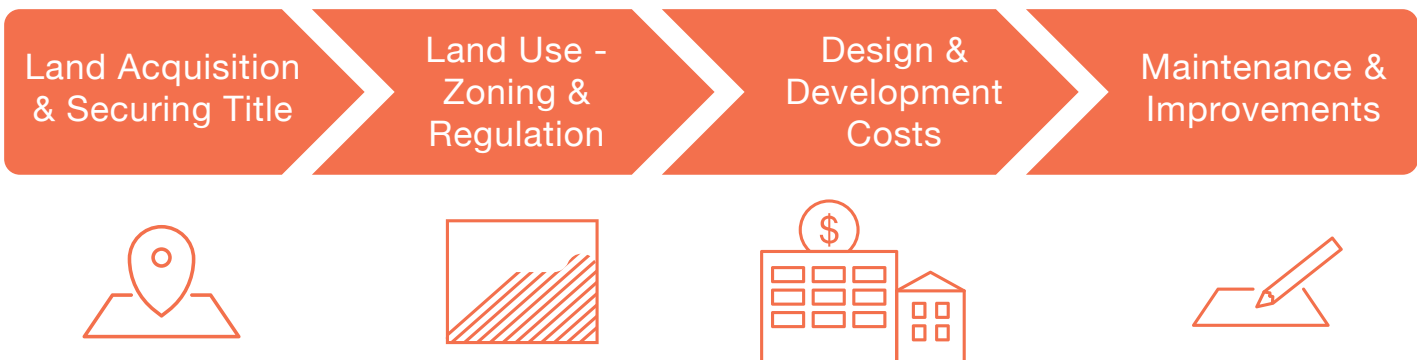
Funding Instruments



Finance Instruments



Housing supply side value chain



Source: Adapted from (Centre for Affordable Housing Finance in Africa, 2017)

Funding sources

Government funding

Government funding at national, state and local levels uses market mechanisms to influence the supply of affordable housing. These include:

- **Providing tax incentives, grants or exemptions for construction of affordable homes, or allowing a percentage of costs to be set against developers' or housing associations' tax obligations.** This includes projects that stipulate mixed use of land and inclusionary zoning on sites not previously zoned for such purposes. New York recently exempted newly constructed affordable multifamily homes in certain areas from property taxes for up to 35 years, provided certain criteria are met (New York City, n.d.).
- **Facilitating debt through low interest rates or discounts.** Vienna limits the profit developers can make from building housing units, but encourages developers by providing funding at a very low rate of 1% for 30 years (Maschaykh, 2017). Lombardy, Italy, developed an ethical real estate fund to support lease-to-rent at discounted prices, expanding the supply of affordable housing units in the private real estate market (Fondazione Housing Sociale, 2017).
- **Acting as guarantors for debt, allowing small-scale housing developers or community housing providers (CHPs) to build affordable homes.** Australia's new National Housing Finance and Investment Corporation (NHFIC) provides cheap, long-term finance for the development of affordable housing units by issuing bonds that aggregate the borrowing requirements of CHPs (Council on Federal Financial Relations, Australia, 2017). These bonds are guaranteed by the government to boost investor confidence (Sukkar, 2017).

Pooling publicly owned assets into a common investment vehicle – Urban Wealth Fund

Hamburg's HafenCity GmbH and parts of Copenhagen revitalized by the City & Port Development Company have improved housing supply by pooling publicly owned assets into a holding company – an "Urban Wealth Fund" – that enters into projects with the private sector, sharing risks and benefits. By aligning interests, this mechanism can streamline the complex execution of housing and infrastructure development projects.

Source: (Detter, 2018)

Funding from institutional investors and creditors

Private-equity funds, insurance companies, pension funds, banks, development finance institutions (DFIs, including community DFIs) and wholesale debt markets all offer instruments created specifically to address housing affordability. In the developed world, institutional investors usually see affordable housing as a niche opportunity for diversifying investment portfolios rather than a

market opportunity for high returns. However, in some circumstances affordable housing products can outperform the market. Affordable homes for key workers are almost recession-proof (Williams, 2018).

In emerging economies, low- and middle-income workers find it especially challenging to raise capital through formal instruments: Many homeowners lack full legal title but have security of tenure, making foreclosure (in case of default) a slow and expensive process. Their options include regulated and unregulated **microfinance institutions (MFIs), credit unions, cooperatives, home supply retailers** (e.g. Maestro Home Center, a home-improvement retailer in Peru issuing credit cards to informal markets) and **end-user or consumer financing companies** other than banks (e.g. specialist lenders who get funding from shareholders, banks or capital markets instead of depositors). The credit ratings of such institutions depend on where they operate.

To increase liquidity in emerging markets, long-term local currency funds need to be developed to offset the risk of investment, which is usually provided either through DFIs lending directly to local institutions or through the private sector by designing products that account for the financial risk in other ways (Magowan, 2008).

MicroBuild Fund – Habitat for Humanity, Triple Jump, Omidyar Network, MetLife Foundation

The MicroBuild Fund is a housing-specific microfinance investment vehicle, controlled by Habitat for Humanity International with Triple Jump, Omidyar Network and MetLife Foundation as partners and fund co-owners. It offers capital and technical assistance to MFIs to provide microloans to help households build or renovate houses. It also provides financial education to borrowers. Since 2012, it has lent to 42 institutions in 25 countries, and aims to serve 600,000 people by 2026. It hopes that positive returns for investors will encourage larger institutions to provide similar financing, growing the sector.

Source: (Habitat for Humanity, 2017)

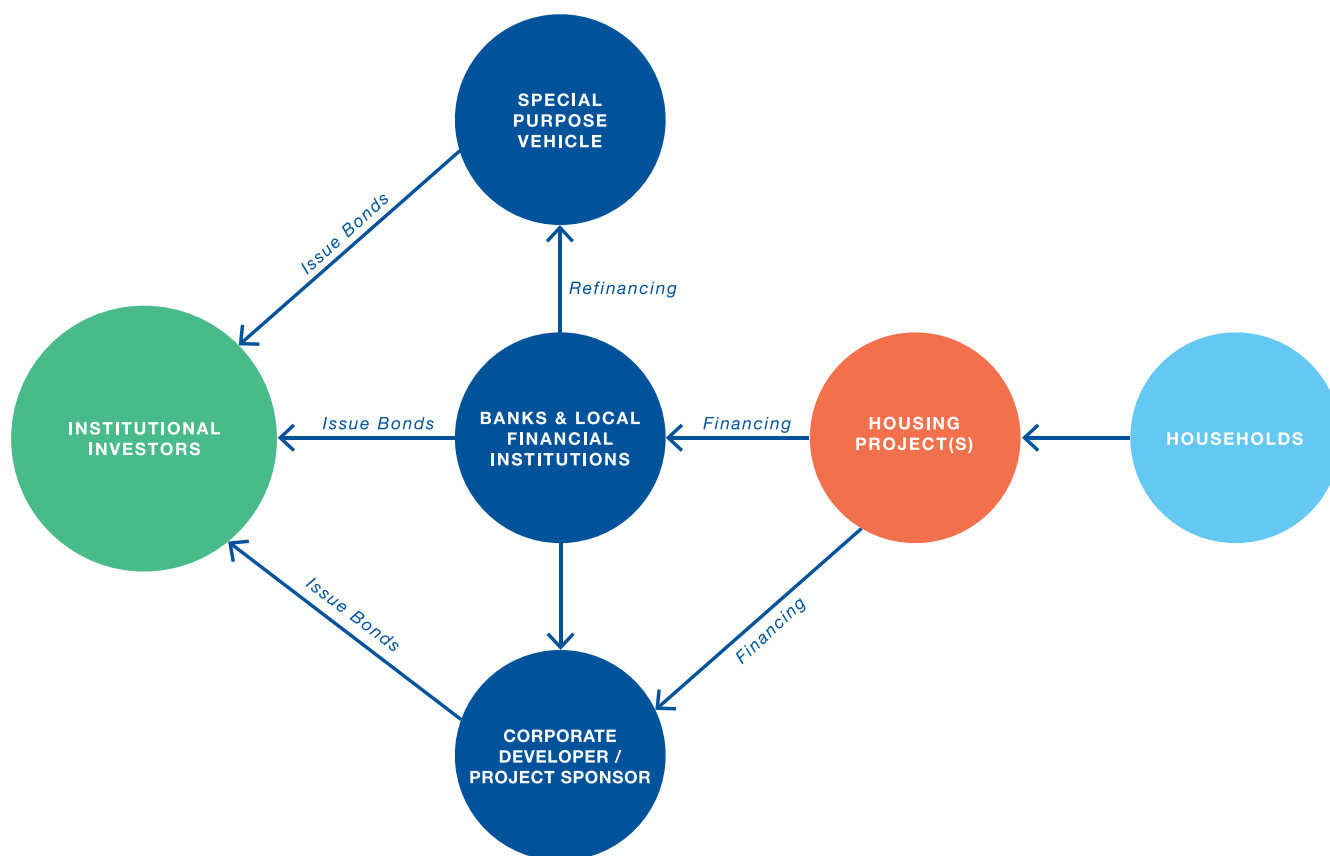
Funding from capital markets

Capital market products, bond markets, mortgages and Real Estate Investment Trusts (REITs) are particularly useful when real estate markets suffer a liquidity crunch. Mortgage markets cater to the funding needs of individual home owners.

Funding through local currency bond markets

Bond markets may not be ideal for housing finance, given operational and debt amortization risks, but they can help raise funds at the city level and provide loans to the private sector or community institutions for the development and maintenance of housing units. Depending on the enabling regulatory environment in a country, the development project sponsor may issue bonds directly or borrow from a bank or local financial institution that then issues bonds or refinances through a special purpose vehicle (or structured finance solution), which itself issues bonds (Lion's Head Global Partners & ALCB Fund, 2016).

Figure 8: Housing Finance in Local Currency Bond Markets



Source: (Lion's Head Global Partners & ALCB Fund, 2016)

Figure 8 illustrates a housing finance workflow that leverages local currency bonds for funding. Local currency bond markets (LCBMs) can help reach a broader spectrum of private and smaller institutional market investors, providing long-term access to finance. A well-developed LCBM can also contribute to a more diversified and balanced financial system that is more resilient to financial shocks (Park, Shin, & Tian, 2017).

their originators with full recourse in addition to the issuance of unsecured bearer bonds backed by pools of housing loans. The government's involvement as a shareholder was crucial in addressing the risk of default with investors and making the market ready for securitization.

Source: (Vanguard, 2010) and (Langhan, 2016)

Mortgage liquidity facilities as centralized issuers of bonds

Mortgage liquidity facilities (MLFs) are “financial institutions designed to support long-term lending activities of mortgage lenders, and act as intermediaries between primary mortgage lenders and capital markets. The facility is also a low-risk simple institution that issues bonds to raise long-term finance, purchases loans with recourse or refinances mortgage loans with recourse.” MLF shareholders comprise investors, mortgage lenders and the government. They can help develop mortgage markets – especially in developing countries – by funding mortgage lenders at better rates and longer tenures, reducing barriers for small mortgage players, and reducing maturity mismatch between housing loans and funding sources.

Unlike with securitization, which requires a portfolio of mortgages to be fully funded before bonds can be issued, MLFs can issue bonds to mobilize long-term capital at any time. However, the risk of default lies with the lender, not the facility. The National Mortgage Corporation in Malaysia, Cagamas Berhad, has used MLFs to overcome legal constraints in effecting a true transfer of property rights – it adopted a simpler form of purchasing home loans from

Funding through REITs

Mortgage and equity REITs own and manage a portfolio of mortgages or properties, respectively. Retail and institutional investors can purchase shares in them, which pay dividends on the income generated through rent collection, mortgage payments or capital appreciation. REITs are popular in developed housing markets such as Hong Kong and Singapore as they generally disburse a majority of their income back to investors (at least 90% in the US)¹⁷ rather than use it for growth. However, growing economies such as China and India are also exploring the use of REITs to ease their housing woes.

REITs do not have to be purely market driven – they can have a social purpose as well. A non-profit-owned REIT in the US, the Housing Partnership Equity Trust, acquires multifamily properties to support low- and middle-income households by preserving affordable housing while yielding good risk-adjusted returns. It comprises 14 high-performing housing providers with an investment of \$100 million from Citibank, Morgan Stanley, Prudential Financial Inc., the John D. and Catherine T. MacArthur Foundation and the Ford Foundation (Regan, 2018).

Crowdfunding homes – Fundrise

Fundrise, a low-cost crowdfunding platform, allows non-accredited investors to invest on a fractional basis in existing real estate with as little as \$500. The company's eREITs differ from publicly traded REITs in that they cannot easily be bought or sold – investments go directly into properties and can be traded only during four windows per year. The model could help to provide affordable rental housing for key workers because when an eREIT invests in a house, it will keep the existing house and rent it out, whereas other investors might instead demolish the house so they can build more expensive units on the land.

Source: (Kador, 2018; FundRise, 2019)

Financing mechanisms

Cities can generate revenue for infrastructure development through mechanisms that capture part of the increase in value of land when permission is granted to develop it. These could be developer instruments, including in-kind contributions or charges such as Brazil's CEPAC bonds, or tax-based instruments including property tax, betterment tax or tax increment financing (Ramprasad, 2015).

O-Zones – using tax breaks to encourage investment

In 2017, the US Investing in Opportunity Act created “opportunity zones” (O-Zones) – designated low-income areas in which investors can get various tax breaks from projects that meet specified criteria, which could include building affordable housing. O-Zones have poverty rates of at least 20%, or median household income less than 80% of surrounding neighbourhoods. There are about 8,700 approved O-Zones in the US, ranging from industrial towns to rural hamlets. The tax breaks encourage investment for at least a 10-year period.

Source: (Bertoni, 2018)

Private-sector developers finance construction projects with a view to recovering costs by selling or renting out the developed housing units. Small developers typically finance projects through informal sources (e.g. private money lenders) or partnership or revenue-sharing agreements with landowners (Das, Karamchandani, & Thuard, 2018) Mid-sized and large developers generally work on large-scale projects where numerous units offer economies of scale, though these projects usually get built away from the city centre where additional investment is required to extend infrastructure. Private-sector financing can help in creating the city's social infrastructure (e.g. healthcare centres, schools, colleges, parks) and economic infrastructure (e.g. business centres, economic zones).

Employers supporting city housing

Employers are experiencing challenges in recruiting top talent to offices in cities where housing is expensive. In London, a recent survey by CBI/CBRE revealed that 66% of companies face issues with entry-level recruitment due to housing costs and availability. Employers such as Facebook and Google (in the US), IKEA (in Reykjavik,

Iceland), Lego (in Billund, Denmark), Samsung (in Seoul and Suwon) and Alibaba (in Hangzhou) have started investing in the development of housing for employees. Other employers are offering help to meet housing costs, either in the form of loans, subsidies or mortgage deals. In China, Shenzhen-based Tencent offers interest-free loans to help employees buy property, while Starbucks subsidizes the rent of full-time workers.

Source: (Forrest, 2018)

Community financing models for investment in housing include community land trusts, non-profit REITs, the local government acting as a guarantor for loans, city-level funds that issues bonds and in turn receive government contributions for supporting infrastructure, and tenancy management programmes where community housing providers use funding to support social housing tenants – e.g. the Department of Family and Community Services in New South Wales, Australia, is transferring the management of around 14,000 social housing properties to community housing providers on a 20-year lease.

Islamic finance applies to raising capital for housing in Islamic countries. It prohibits *iktinaz* (hoarding) and *riba* (interest), and requires *al-ta'awun* (support of community and economic equity). Islamic banking is consistent with microfinance in advocating entrepreneurship, risk-sharing and inclusion of the poor, and being willing to lend based on intangibles such as character. This can mean Islamic banks invest in affordable housing schemes that are rejected by conventional lending institutions due to insufficient collateral (Dhumale & Sapcanin, 1998). Novel methods are being developed to raise capital for affordable housing construction compliant with the tenets of Islamic banking.

The ‘sukuk’¹⁸ way of affordable housing construction finance – Kuala Lumpur

In Sentul, Kuala Lumpur, NewParadigm Capital Markets and SkyWorld Development have devised a world-first Islamic bond issue for residential development, with a credit structure designed to mitigate revenue, construction and liquidity risks. Conventionally, the credit investor would take on these risks directly. The objective is to monetize unbilled sales upfront for a more efficient cashflow, allowing the developer to lower the weighted average cost of capital without straining shareholders to inject more equity. The model rewards residential developers who are able to successfully lock in sales for their development projects.

Source: (Say, 2017)

Impact investing is gaining prominence as a way of raising capital for sustainable forms of development of affordable homes that employ energy-efficient solutions (Williams, 2018). For example, the Build Opportunity Fund is an impact investing vehicle created by the Housing Partnership Network, a US business collaborative of 100 affordable housing and community development non-profits, to provide capital for high-performing non-profit developers (Regan, 2018).

5 Supply-Side Challenges: Design Considerations and Construction Costs of Affordable Housing

Affordable houses may be built by private developers, institutions or governments – or by the landowners themselves. Self-building is especially common for small-scale projects on the outskirts of large cities or in smaller towns. In India, 62% of new housing being financed is self-constructed: It has become a popular option among households above median income (Das, Karamchandani, & Thuard, 2018). Some cities in the developed world are also encouraging self-building. In Almere, the Netherlands, citizens can buy or rent “serviced plots” that come with planning permission pre-applied. London has developed a “small sites portal”, where individuals, groups or social enterprise buyers can find sites and connect with lenders and companies that can help to customize homes (Parvin, 2018).

Whether self-built or developer-built, design and construction costs can significantly affect affordability. Alongside land acquisition, titling and infrastructure development, hard costs include landscaping, raw materials and labour; soft costs include project financing services, professional services (consultants, designers etc.), taxes, licences and fees, and sales and marketing costs for developer-built housing. Innovations in design, construction and productivity can play a significant role in alleviating some of these costs, with positive social, economic and environmental impacts.¹⁹



Improving construction productivity

Red tape, corruption, complicated building codes and permitting processes can significantly raise construction costs. The City of Portland, Oregon, recently estimated that “government fees” added an average of 13% to total housing development costs. In 2010, the city waived development charges on construction of accessory dwelling units (ADUs) – which has ranged from \$8,000 to \$11,000– and applications increased fourfold (Bertolet, 2017).

A recent study of 600 cities in 180 countries of the developing world found it takes an average of 16 procedures and five months to obtain a construction permit, costing about 450% of per capita income, and seven steps and two months to register a property, costing 7% of the property value (Monkkonen & Ronconi, 2015). Below, Figure 9 provides a summary of steps, days and costs involved in construction permits (costs as a percentage of gross national income) and property registration (costs as a percentage of estimated value of the property) in the 87 Latin American and 118 Asian cities studied.

In India, residential housing projects can require up to 150 approvals from different city, state and national agencies (Abraham, Batra, & Gandhi, 2017). Even a single approval can delay or block a project, and public officials may demand unofficial as well as official payments for these approvals. In 2017, India introduced the Real Estate Regulatory Authority (RERA) Act in an attempt to increase transparency and efficiency in the construction sector. However, these provisions have the effect of making it easier for large developers with significant credit reserves to fund housing projects compared to small developers, and the act does not have contingencies for delays caused by slow approvals from regulatory bodies (Sinha, 2018).

Inefficient project management practices and lack of investment in technology, research and development can contribute to low productivity in small and large developers alike. One emerging solution comes from Barcelona, where Barcelona Housing Systems has designed a modular and standardized manufacturing system in which prefabricated components manufactured off-site are assembled by non-skilled workers on-site in half the time of traditional construction processes (Barcelona Housing Systems, n.d.). In California, start-up TraceAir has developed software that analyses photos from a construction site and compares them with blueprints to determine work progress. In India, Brick Eagle is an incubator for small-scale real estate entrepreneurs, providing venture capital and knowhow to local builders with land in 20 cities (Surendar, 2018; Mitter, 2018).

Shortages in skills are driving up costs in many countries. In a survey by PwC and the Society of Chartered Surveyors Ireland (SCSI), surveyors said skill shortage was the single biggest obstacle to construction. Contractors cited lack of skilled labour and the rising cost of staff as a major concern, with bricklaying costs increasing by 25% in six months (PwC, 2018).

Mayor's Construction Academy – London

London has tried to address the issue of insufficient investment in training and innovation through the Mayor's Construction Academy. It is establishing a “quality mark” to accredit training providers, creating hubs to strengthen coordination between training providers and construction employers, and providing capital funding for upgrading training equipment and premises. The aim is to harmonize the various sources of construction-skills training in the city to benefit the industry while making it more attractive for young people. The city is also developing a broader programme – the London Skills Strategy – to improve education and technical skills for those aged over 16.

Source: (Design Buildings, 2018) and (Greater London Authority, 2018)

Figure 9: Summary of Costs of Construction Permits and Property Registration in Asian and Latin American Cities

	Latin America			Asia		
	No. of Cities	Mean	SD	No. of Cities	Mean	SD
Construction Permits						
Steps	87	13.55	3.92	118	19.29	8.18
Days	87	145.03	142.63	118	146.1	84.19
Cost (%)	87	138.98	134.19	118	486.46	777.25
Registering Property						
Steps	99	8.52	3.05	153	6.78	2.06
Days	99	50.88	52.83	153	55.46	63.36
Cost (%)	99	4.21	2.72	153	6.69	4.06

Source: (Monkkonen & Ronconi, 2016)

Promising tools include building information modelling (BIM), which can help identify issues in a structure before it is physically constructed, and Buildings as Material Banks (BAMB), a way of tagging and monitoring building materials so data analytics can improve the accuracy of cost and time estimates.²⁰ Automated equipment such as self-driving bulldozers and bricklaying robots can also improve productivity: Built Robotics, a company launched in 2016, has used an autonomous tracked loader to excavate a site for 700 homes in Lathrop, California (Kendall, 2018).

Bricklayer robots – Semi-Automated Mason (SAM) and Hadrian X

New York-based Construction Robotics has developed a bricklayer robot, SAM (Semi-Automated Mason). Running along a track and building a straight wall, SAM can lay five to ten times more bricks than a human bricklayer – more than 3,000 in an eight-hour shift, with a margin of error that can be measured in millimetres. It is currently being operated on a few sites across the US. Perth-based Fastbrick Robotics has developed Hadrian X, a truck-mounted robotic arm that can “print” a house using blocks 15 times larger than a regular brick, placing them more than 30 metres away with sub-millimetre accuracy. The firm is piloting its technology in Mexico in partnership with GP Vivienda, one of the country’s largest construction companies.

Source: (Wilkinson, 2018; Tchertvertakov, 2018)

Innovations in space optimization

Smaller spaces should be cheaper to build and use less energy for heating and cooling, though they still need to be comfortable and functional and comply with local regulations. MIT’s Media Lab has developed an 18.5-square-metre prototype apartment with the functionality of one that is three times its size: It uses transformable furniture that can be flipped, moved and stowed by hand gestures and voice commands (Rhodes, 2015). In San Francisco, oWow believes it can bring down apartment costs by 30–50% by using space more efficiently (Littman, 2018).

In India, Carlo Ratti Associati and non-profit organization WeRise have developed Livingboard, a flat-pack housing solution for self-builders, currently being piloted near Bangalore (Dexigner, 2018). In New York, creative agency FramLab has proposed temporary shelters for homeless people in the form of 3D-printed hexagonal pods that can be attached to windowless facades (FramLab, 2018). Another potential space-saving solution is for low-rise multifamily units (three to four storeys) to be connected through bridges, enabling them to share stairwells and lifts (Gopalan & Venkataraman, 2015).

Shared living or **co-living** has gained traction, particularly in US metropolises where most residents cannot afford to rent a studio apartment. Start-ups such as Common and WeLive are connecting people to share living spaces (Sisson, 2016). Other US co-living models include multigenerational, multifamily and community-based housing for homeless, low-income and middle-income households or individuals.

Homes with multiple master rooms, independent bathrooms, larger shared kitchens, multiple entrances, rentals within a single-family home and accessory dwelling units are increasingly popular (Littman, 2018).

Micro-housing or “**tiny homes**”, not larger than 500 square feet (46.5 square metres), are emerging in neighbourhoods zoned for single-family residences. Boston is encouraging homeowners to build “plugin houses” in their backyards for rent to low-income tenants – a variant on the idea of the accessory dwelling unit, in which attics and garages are converted into self-contained “secondary suites” or “granny flats”. Los Angeles is offering loans of \$75,000 to homeowners to build backyard houses and rent them to homeless city residents for at least ten years (Howard, 2018). However, some have criticized tiny homes as creating lifestyle challenges and further incentivizing speculation in supply-constrained markets (Howard, 2018).

Innovations in sustainable design

A “fabric-first” approach to construction involves maximizing the performance of the materials that make up the building fabric, to minimize operational and maintenance costs (Designing Buildings, 2018). It includes the “passive house” concept, where buildings require little energy for space heating or cooling (Wikipedia, n.d.). One emerging concept in sustainable design is the green roof: covering a building with vegetation, soil, drainage layers, barriers and irrigation systems. Green roofs can lower costs from heating and cooling requirements, and reduce the number of drainage outlets that would otherwise be required to guard against flooding; they also last two or three times longer than traditional roofs.

The Nightingale Housing model in Australia is an example of delivering high-quality, environmentally sustainable, affordable homes. It addresses three types of sustainability concern: financial sustainability, such as reducing living costs by negotiating wholesale energy (heating and cooling) and internet contracts; social sustainability, being designed around a manageable size of 40 housing units sharing semi-private spaces such as rooftop gardens; and ecological sustainability, such as providing no parking spaces and contractually obliging buyers not to own a car (Sorthe, 2018).

Green Roof Initiative – Denver

In November 2017, Denver passed the Green Roof Initiative, requiring buildings of more than 25,000 square feet (2,300 square metres) to have green roofs or solar panels. This includes upcoming affordable housing projects. The city claims lower-income communities will benefit in the long term from lower air and water pollution and energy bills. However, the initiative will also increase upfront costs, and developers are wary.

Source: (CREJ, 2018)

Energy-efficient housing

There is scope to link energy efficiency of residential buildings with social programmes (UNECE, 2013). San Francisco and Toronto have programmes that support lower-income communities to retrofit homes, tackling health hazards such as condensation and mould (McKinsey Center for Business and Environment and C40 Cities, 2017). Rooftop solar panels can also improve energy efficiency by generating power. In New York City, property owners StuyTown are expected to become Manhattan's largest solar power producer by investing over \$10 million for the installation of 10,000 solar panels on 56 buildings (Cohen, 2017).

Innovations in construction techniques

While their adoption in affordable housing projects has so far been slow, innovations with potential include:

3D-printed homes can save on labour costs and materials (Debczak, 2018). In Austin, 3D-printing company ICON and housing non-profit New Story have constructed code-compliant tiny homes in 24 hours for \$10,000; in developing markets, the costs could reduce to \$4,000 per structure. A firm in Beijing has built a 3D-printed house that can withstand an 8.0 magnitude earthquake; a Shanghai firm, WinSun, can print 10 detached single-storey homes in one day. Eindhoven plans to host the world's first 3D concrete printed commercial housing project, including four multi-storey units (Walsh, 2018). In many cities, regulatory reforms are needed to permit multi-storey 3D-printed homes.

Prefabricated (prefab) housing is partly or wholly built off-site and assembled on-site. In a panelized system, structural components such as walls, floor systems and roofs are constructed in a factory. In a modular system, homes are built in separate modules, including structural components, ceiling, wiring, plumbing and other fixtures. Modular construction helps reduce material waste, labour time and delays (Nacamulli, 2017). Prefab housing can offer economies of scale. Dweller, a start-up in Portland, is prefabricating tiny homes that homeowners can put in their yards and rent out, paying no upfront costs and keeping 30% of the rental income (Howard, 2018).

Design for manufacture and assembly (DfMA) is a design approach that emerged in automotive and consumer products and is now being used for prefabricating construction components such as concrete floor slabs, structural columns and beams with rigorous quality control and consistency. In London, a 38-storey mixed-use development including affordable homes has used this technique (RICS, 2018).

Alternative construction materials

Cement and concrete remain the most commonly used materials for structural components, but cheaper alternatives may be feasible in some contexts. Researchers estimated that nearly 35% of cement can be replaced with fly ash or pozzolana material (Shinde & Karankal, 2013). In Nigeria, a cement plant that sources pozzolana locally has

been piloted and could save developers as much as 30% compared to imported materials (Ayeyemi, 2018). In Kenya, experiments are underway with cement-coated expanded polystyrene (EPS) panels for the construction of houses. This has been found to reduce construction costs by 25% and halve construction times (Kagai, 2017).

Glass fibre-reinforced gypsum (GFRG) – a green building material in India

GFRG panels are made of high-quality gypsum plaster reinforced with special glass roving, prefabricated at low cost and with low energy requirements, and erected on-site with cranes. GFRG panels were first introduced in Australia in 1990 (also known as RapidWall), as either load-bearing or partition walls. After a decade of research, the Indian Institute of Technology (IIT) Madras has now proposed a complete building system using GFRG panels, with minimal use of concrete and steel and no use of bricks. The government of India has approved standards for the structural design of GFRG buildings. The resulting houses will be fire and earthquake resistant, and can be up to 10 storeys in low seismic zones. The thermal resistance of GFRG also reduces the need for air conditioning. GFRG panels can be made using gypsum waste generated by India's fertilizer plants, and have been confirmed as a green material by the United Nations Framework on Climate Change.

Source: (Diwaker, 2018) and (Anam, 2018)

The US, Canada, Sweden, the UK and Australia are among countries to have changed their building codes to allow construction with **cross-laminated timber (CLT)**, which is suited to prefabrication. Portland, Oregon, recently built the US's first high-rise from wood – an affordable housing project of 60 units (Bell, 2018). CLT is a multilayer panel with timber boards placed crosswise to increase rigidity and stability. A life cycle assessment found that CLT buildings could save 9.9% on energy and 13.2% on carbon compared to reinforced concrete (Guo, et al., 2017).

Uniform, rectangular **compressed earth blocks (CBB)** and **interlocking stabilized soil blocks (ISSB)**, using materials such as clay, loam and sand, cost less and have a lower environmental impact than conventional fired bricks but provide comparable or better quality (Brendenoord, 2017). **Interlocking bricks** use the principle of Lego blocks: They can be clicked onto each other, minimizing the need for cement or mortar, without the need for skilled workers. They can also be made of recycled materials: In Vietnam, recycled polypropylene and rice husks – collected as waste from rice cultivation – are used to form rice husk polypropylene (RHPP) to be used as low-cost construction materials (Brendenoord, Van Phan, & Le Nguyen The, 2015).

Other trends on the horizon

Emerging technologies of the Fourth Industrial Revolution create opportunities and challenges for affordable housing. The **internet of things (IoT)** offers the potential to reduce maintenance costs through sensors monitoring factors such as air quality, temperature, carbon monoxide, humidity and

energy efficiency. Combined with **artificial intelligence (AI)**, the data gathered can provide insights into how properties can be better managed and monitored, informing future purchase decisions and providing landlords with early warnings of repairs and maintenance issues, minimizing financial losses or the potential for litigation (Housing Technology, 2017).

Remote monitoring can alert providers of urban services to anomalies, such as water flow being outside the normal range (McQuillan, 2014). Better monitoring can help tenants manage energy consumption in their homes (Housing Technology, 2017). Artificial intelligence could also help in other ways: supporting tenants with housing applications or logging service requests; ensuring all legal protocols have been followed; offering predictions on whether a tenant will be able to pay their rent on time and providing debt counselling services when needed (Davison, 2018)

Blockchain could improve planning and scheduling mechanisms in the construction industry, and offer new solutions for land registry issues. In 2017, Sweden began using blockchain to register property; Brazil has developed a pilot for its national land records; India is working on a pilot that tracks property ownership; and the UK's Land Registry is investigating registration and conveyance improvements through blockchain (The National Law Review, 2018).

EHAB – blockchain-based platform for affordable construction projects

EHAB is a blockchain-based platform that aims to cut down inefficiencies throughout a project's life cycle, saving time and money. It codifies agreements into smart contracts, with automated payments when project milestones are met – for example, GPS-enabled IoT devices would help determine when materials have reached a site. The platform would expedite due diligence by enabling investors to see how contractors have performed in the past. Pilot versions of this platform have been tested in Senegal and the UK.

Source: (ehab, 2018)



6 Demand-Side Challenges: An Overview

Demand-side challenges predominantly concern the ability of city residents to rent a home or access credit and purchase a home. They include determining eligibility for affordable housing subsidies, grants or exemptions; securing funds to provide credit access to those in need and mitigate risks of default; and – most importantly – assessing the importance of rental and ownership markets for long-term affordability.



Determining eligibility

Affordable housing initiatives generally follow either a targeted or universal approach. In countries such as the US, Canada, Malaysia and India, vulnerable and low-income households are targeted for provision of affordable housing (Figure 10 shows the different types of housing). In countries such as Singapore, the Netherlands, Sweden and Denmark, the entire population is considered to be eligible for affordable housing. The Netherlands, for instance, has the highest share of social housing in the European Union, representing about 32% of its total housing supply and 75% of its rental market, which helps to keep homes affordable (Fidler & Sabir, 2019).

While household income is the primary determinant for eligibility in most countries using a targeted approach, other social and demographic factors may also be considered, such as household size, number of children, citizenship status and prior asset ownership. Countries that use a universal approach may also consider these factors: For instance, Singapore caters primarily to “family units”, preferably married couples;²¹ single people need to be 35 years old to purchase flats; unmarried people, even with children, are treated as singles; and older residents without families are encouraged to move to smaller flats.


Defining eligibility for social housing in Dupnitsa, Bulgaria, and Poznan, Poland

When the city of Dupnitsa, Bulgaria, constructed 150 social housing units in 2017, eligibility was restricted to “Bulgarian citizens living at least five years in the city; having no properties suitable for permanent dwelling; having no ownership of non-built-up landed property, not owning factories, workshops, shops, commercial and business warehouses; having no ownership of property, including motor vehicles, of a total value greater than the market value of a dwelling in the city”. Also, household income needed to be no more than four times the cost of a suitable rental at market price. Applicants were then ranked based on employment status, education level, age (neither too young nor too old) and number of children.

The city of Poznan in Poland developed another approach. This focused on retaining recent university graduates by offering them affordable rentals for up to 10 years, provided they did not own any other apartments in the city, worked and paid taxes in the city, and their earnings fell within an upper and lower income limit.

Source: (Tosics, 2017)

Figure 10: The Housing Ladder

Target Income	Housing Type	Government Support for home seekers/renters
Median Income  Very low Income	Affordable Homeownership (Social and Private)	<ul style="list-style-type: none"> – Grants - home start initiatives for first homes – Exemptions - stamp duty waivers / concessions – Credit - mortgages, shared equity
	Market Rental Housing	<ul style="list-style-type: none"> – Rental Support - housing vouchers, rent assistance programs
	Affordable Rental Housing	<ul style="list-style-type: none"> – Grants - housing preservation grants – Exemptions - tax reliefs
	Social Rental Housing	<ul style="list-style-type: none"> – Grants - operating subsidies, capital grants, etc. – Support Services - income support, allowances

Based on analysis of Cities, Urban Development and Urban Services Platform



Monitoring mechanisms are required to ensure that schemes actually benefit the intended beneficiaries: In their absence, governments may end up subsidizing beneficiaries who are not those most in need. Conversely, there have also been situations where affordable homes targeted for a certain income bracket are occupied by those below it. In a recent survey of affordable housing units in Austin, Texas, targeted at those earning under 50% of median family income, it was found that the intended occupants had left the area because it lacked decent access to urban transit and public education; instead, the units were serving some of the poorest households in Austin, earning as low as 17% of median family income (Masino & Vanstone, 2018).

Evaluating purchase models – to rent or to own

Homebuyers are looking for a safe, affordable place to live that can be expected to appreciate in value and be used as collateral for debt financing. Renters are looking for secure tenure for as long as needed, guarantees of privacy for their personal space, permission to carry out home improvements, and controls on rent increases. While homeownership comes with more rights and privileges, rental housing also often has advantages: lower capital requirements, as residents typically only need the first month's rent and a security deposit; greater ability to work informally and pay rents in cash; fewer citizenship or domicile requirements; lower cost of maintenance and operations; and flexibility to invest any money saved by renting rather than owning.

For cities, there is a case for nurturing strong rental markets. Renting makes it easier for young people to move around inside the city as their needs change in terms of proximity to educational institutions, workplaces, public transit, and social and cultural amenities. High homeownership is correlated with restricted labour mobility, with impacts on business creation and economic development (Florida, 2013).

Build-to-rent – an emerging affordable housing solution for middle-income households

Build-to-rent (BTR) properties are purpose-built to be rented out rather than sold. They comprise blocks or clusters of housing units owned and operated by a single institution. In the US, the BTR sector is the largest real estate class, bigger than commercial and retail property: Typically, BTR offers lower returns, but also lower risk. In 2017, over 11,000 BTR homes were under construction in London, representing 17% of the private rental market in the city. The concept has also been picked up in many cities in Europe and Japan, but not yet in developing economies or in Australia, where investors are put off by high land taxes and lack of government incentives.

Source: (PwC, 2017; Future of London and LSE London, 2017; Greater London Authority, 2018; Davies, 2017) with inputs from PwC Australia

For many residents in a variety of locations, homeownership is not an option because they cannot afford down payments or mortgages. For example, a decade after the financial crisis, would-be buyers of starter homes in the US remain constrained by strict conditions on mortgage lending and a

low inventory of homes for sale. Over a million starter homes (with a footprint of less than 2,000 square feet [185 square metres]) that were owner-occupied before a wave of crisis-led foreclosures are now rented out, and new starter homes have been constructed at a much slower rate since the crisis (Fannie Mae, 2016).

For the housing market to be affordable, it requires a mix of tenures – rental, homeownership and a combination of the two. In the UK, Bristol constructed 161 homes on a former primary school site with the involvement of a housing association, community investment company and a private investor, involving six different types of tenures – from conventional sale-and-rental to shared ownership, “ethically rented” for key workers and a rent-to-buy model (Cork, 2018).

Financing for rental and homeownership

For **private rentals**, the social characteristics of tenants is of no consideration. After World War Two, many cities in Western Europe and North America instituted rent-control mechanisms with the intent of protecting tenants from steep rises in their leases. In these “first-generation” controls, rents were fixed well below market rates and tenants could not be forcibly evicted. As landowners effectively ended up subsidizing rents, this discouraged the formation of new rental markets.

In the 1970s and 1980s, Western Europe adopted a milder form of “second-generation” rent controls, permitting annual percentage increments and further increments in specified circumstances; in some cities, units were decontrolled after the existing tenant vacated (Tandel, Patel, Gandhi, Pethe, & Agarwal, 2015). In Scotland, the Private Housing Act of 2016 gave authorities in cities such as Aberdeen, Edinburgh and Glasgow the right to cap rent rises of certain properties at 1% above inflation.

Second-generation rent controls benefit tenants by keeping rent below market rates, but can also discourage the supply of new rental housing – however, increased supply also keeps prices down. Ideally, a **rental regulatory framework** minimizes vacancy, mandates that a share of units be affordable units (e.g. through inclusionary zoning), prevents segregation and protects both landlords and tenants without distorting supply. Such frameworks could limit the sharing of rent-regulated apartments or public housing, as in San Francisco (Riggs, 2018).

In the case of **social rental**, tenants may be supported by government-granted loans, operational subsidies, interest subsidies, guarantees, supplemental income support or tax reductions. Institutional investors (mostly microfinance institutions) may provide market loans to tenants that are guaranteed by the government. Similarly, interest subsidies can lower interest payments on such loans. It may include some **cost-price rental housing**, in which rents are based on the cost of making and maintaining the home, not its market value – together with income-based subsidies, this can prioritize help to those with the lowest disposable incomes (Lyons, 2018).

For low- to median-income households and first-time buyers in many cities, **home ownership** has become a

Homebuyers purchase homes also as an investment. Intended beneficiaries of government-provided subsidies or grants may not benefit in practice because they lack access to necessary information or resources.

Homebuyers depend on market instruments to afford down payments. In US, UK, Australia and Canada, it is possible to borrow the necessary money and pay an extra amount to compensate the lender for the higher risk.

distant dream. Home purchases require a down payment or deposit, and a mortgage that funds the remainder of the cost while the property is occupied by the owner. Down payments can be as high as 35% (as in the case of Beijing) or 40% (Addis Ababa).²² In the US, the UK, Australia and Canada, those who cannot afford down payments can borrow the necessary money and pay private mortgage insurance or a mortgage indemnity guarantee to compensate the lender for the higher risk.

and lenders to place bids, resulting in a better deal than consumers could otherwise have secured (Mendis, 2016).

Affordable homeownership programmes typically provide assistance with both the down payment and mortgage. However, when access to credit is easy, there is a risk of inflating a bubble in property prices – as happened when Mongolia introduced a homeownership programme that subsidized mortgages (Hornby, 2016). Similarly, grants or subsidies often do not reach the intended beneficiaries and are acquired by others who have greater information or access to resources, worsening rather than easing affordability concerns.

Crowdfunding credit to buy homes

US mortgage banking firm CMG Financial has launched an app, HomeFundMe, to help homebuyers crowdsource down payments by seeking gifts from friends, family members and employers. If users take a homebuyer counselling session, HomeFundMe matches the donations up to a certain limit.

Source: (Lerner, 2017; Olick, 2017)

Loftium – funding down payments through Airbnb revenues

Loftium, a Seattle-based start-up, finances down payments for homes by taking a share of the revenues earned from renting the property on Airbnb for up to three years. It is aimed at helping young people who are burdened by student debt to buy a home. However, research finds that Airbnb pushes up rents: In 100 US metro areas, every 10% growth of Airbnb listings in a ZIP code raised the average rent by 0.4%. This suggests cities should consider regulating short-term rentals to help keep rents affordable.

Source: (Bernard, 2017; Fidler & Sabir, 2019)

Government-supported and not-for-profit assistance programmes

provide grants, subsidies or interest-free or deferred-interest loans recovered at resale. In London, the Help-to-Buy programme provides equity loans up to £600,000 (\$777,000) for new homes (Greater London Authority, 2018). In San Francisco, the Below Market Rate Downpayment Assistance Loan Program (BMR DALP) lends eligible buyers up to 15% of the selling price. Austin provides interest-free loans up to \$14,999 to buyers with up to 80% of median family income. However, such mechanisms are not conducive to long-term affordability of homes.

Some governments have started to intervene when homeowners default and are at risk of losing their homes. The State of New York Mortgage Finance Agency's Community Restoration Fund purchases their mortgages and connects them with non-profit advocates who either assist with restructuring the debt or provide transitional support and resell the property as affordable housing (Riggs, 2018).

Mechanisms to keep units affordable on resale include **subsidy recapture** and **subsidy retention**, which either claim back subsidies when a supported home is resold at a higher price or tie the subsidies to the resale value (Habitat for Humanity, 2017). A web-based application, Homekeeper, helps organizations manage this process by capturing home application workflows, eligibility requirements, payment transaction details, use and resale restrictions, and grants, loans and subsidies received for each home.

Fintech lenders have captured a growing share of the lending market. A recent paper by the Federal Reserve Bank of New York and New York University found that fintech lenders processed loans 10 days faster than traditional lenders (15 days in the case of refinancing) and achieved a 25% lower default rate (Kilpatrick Townsend & Stockton LLP, 2018). Fintech firm LendingHome, which has made loans totalling over \$2 billion, now finances 80% of loans without any human intervention (Business Wire, 2018).

The **shared-equity ownership** business model is an example: In return for a low-cost loan, homebuyers give up part of potential gains from future property appreciation. Eligibility for such programmes is typically determined by

Other platforms assist prospective homeowners to find the best lending deal. In Australia, LoanDolphin captures the customer's risk profile and allows mortgage brokers

the loan amount, income of the buyer and household size. Some shared-equity models place a cap on the amount of equity that homeowners can dissolve on resale, or cap rents if part of the property can be leased, to ensure that subsidies and any appreciation are retained and lower the price for the next qualified homebuyer.

Unison – private-sector shared-equity ownership programme

In San Francisco, Unison Homeownership Investors double a homebuyer's down payment in return for a share of the property – typically 35% – which is cashed in at the time of resale. Buyers can choose to buy out the amount provided by Unison after three years on the basis of an independent appraiser's valuation.

Source: (Pender, 2017; Unison, 2018)

Shared equity ownership models differ from **shared ownership models**, in which a housing association or community provider owns part of the property and the homebuyer pays rent on it. Typically, the rent is low and homebuyers have the option of “staircasing” – increasing their share of ownership as their financial circumstances allow.

A variant is rent-to-buy schemes (also known as Try Before You Buy, Rent Save Buy, Rent to Own, Intermediate Market Rent, etc.), in which newly built homes are initially rented out – usually at a subsidized rate, to allow savings for a down payment – for a fixed period during which the tenant can decide whether to buy the property or part of it under a shared ownership model. The London Living Rent programme for middle-income households is an example: It encourages tenants to own their home within 10 years (Mayor of London, n.d.).

Melbourne Apartment Project – encouraging homeownership among low-income households

The Melbourne Apartment Project is a privately funded apartment development supported by Melbourne City Mission in which 28 of the 34 units were sold to social housing tenants and the remaining six at market rate. The project reduces homebuyers' upfront costs by combining their deposit with a bank loan and second mortgage from the developer. A similar project in Toronto, Options for Homes, has delivered 6,000 homes in 20 years.

Source: (Raynor, Palm, O'Neil, & Whitzman, 2018)

Upgrading informal settlements

In the informal sector, it is more complicated to use property as collateral for loans. Local governments can help through measures to strengthen credit assessment, underwriting and risk management. So can fintech: Tala, for example, uses data such as merchant transactions and SMS messages to decide on an applicant's creditworthiness (Devdiscourse, 2018; Sharf, 2018). As noted earlier, in some models, initial loans are used to improve informal structures so they become more suitable as collateral for further loans. This entails a transition from the conventional method of underwriting loans by addressing how titles can be associated with a mortgageable value.

Home Asset Loan Finance (HALF) – lending for the informal segment

There is growing demand for lending products that can cater to the informal sector. Providers on the other hand are unable to supply mid-sized, mid-length loans (depicted in Figure 11) due to challenges resulting from informality. In order to meet this demand, the US-based Affordable Housing Institute has developed the concept of Home Asset Loan Financing (HALF), implemented in developing economies such as Peru (Mi Banco, Mi Casa), Mexico (Patrimonio Hoy), South Africa (Kuyasa Fund) and India (Sewa Grih Rin). The model addresses the supply gap between microfinance and mortgage lending products by making a series of loans on informal settlements as a real estate asset, increasing in size and length and at a lower interest rate to reflect physical improvements to the structure. Suitability depends on factors such as an applicant's length of occupancy and the property's viability for resale in the informal market and connectedness to municipal services.

Source: Affordable Housing Institute contribution to World Economic Forum study

Governments have devised support mechanisms for slum improvement. In Mumbai, subsidies for redevelopment are based on when an informal structure was constructed and factors such as the cost of rehabilitation, infrastructure development and administration; they can go up to approximately \$11,125 for a 25-square-metre home (Ashar, 2018). Such improvements could pave the way for settlements to be regularized, with support from government agencies. Rapid development of urban infrastructure and services, such as sewers, access ways and public spaces, could also encourage redevelopment to create houses that can be insured (Ghani, 2017).

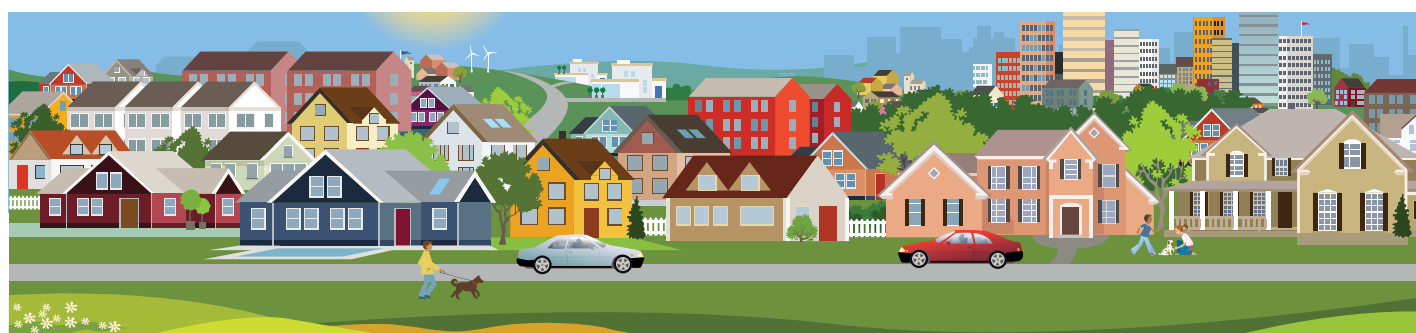
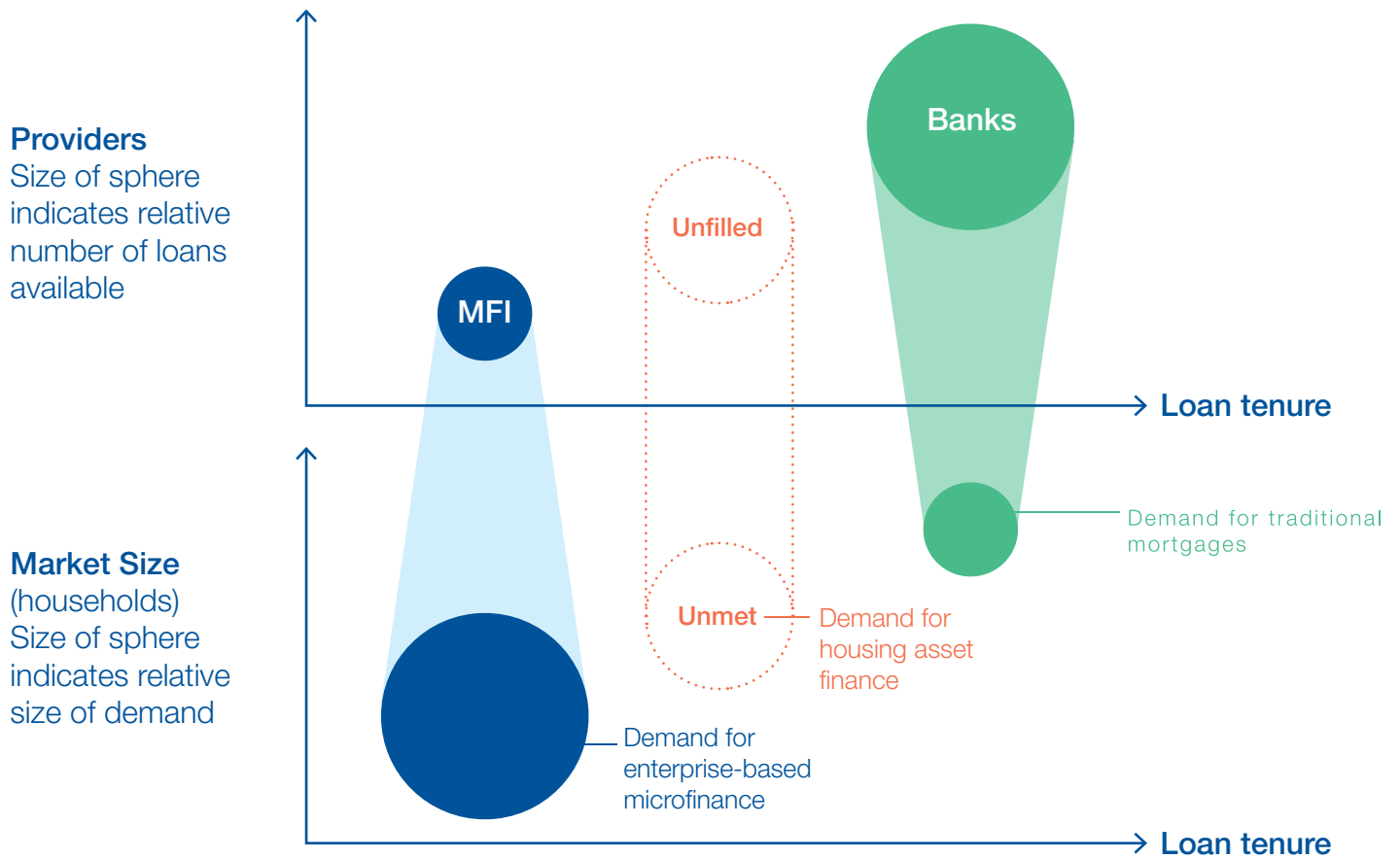


Figure 11: The “missing middle” of lending for housing - Mismatch in demand and supply of mid-size, mid-length lending products



Source: Affordable Housing Institute



7 Recommendations

This closing chapter defines both supply-side and demand-side challenges for the interdependent main actors: city governments, which need to define a strategy and action plan; the private sector, which typically dominates the development of urban housing; and the non-profit sector, which has a crucial role as a catalyst, advocate and provider of technical support. Effective strategies must encompass both short-term action to address the crisis in affordability, and measures that could preserve or increase affordability in the long term.





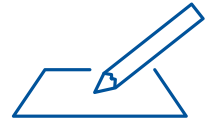
Land acquisition & securing title



Land Use - Zoning & Regulation



Financing Housing Supply



Design & Construction

Supply-side recommendations

Role of Cities

- The land acquisition process should be transparent and fair. Cities should use statutory rights to expropriate lands only after exhausting voluntary methods such as land pooling and negotiated settlements.
- Cities should emphasize property rights (e.g. measures preventing forced evacuations and unjust relocations) over formal property titles, support the development of collective tenure operatives (e.g. community land trusts) and explore municipal land bank partnerships to release land for affordable housing.
- Cities should explore the transition from conventional segregation of single-use land to more mixed use, including inclusionary zoning to help prevent low-income households being pushed out into the suburbs.
- Cities need to outline a research-based, long-term vision of anticipated growth for the next 25-30 years, with a plan to phase housing development in important areas. A flexible and transparent land policy should encourage different forms of development that create avenues for affordable housing, accounting for land holdings of all public agencies.
- Financing models should go beyond meeting initial costs and seek to ensure long-term affordability.
- Tax credits are not a viable solution in the long term. Real estate developers can be encouraged to provide affordable housing units through measures such as relaxation in development controls (e.g. height, density, building setback, energy efficiency), bonus systems, fast-track approvals, and reduction, exemption or refund of application fees, infrastructure charges or rates for such projects. When relaxing restrictions, cities need to account for environmental impacts and effects on other local structures.
- Sound urban planning and an integrated urban development framework are needed to ensure infrastructure is rolled out in tandem with affordable housing projects on greenfield sites.
- Cities should explore tools to generate funds for infrastructure development, such as developer or employer contributions, land access charges from lease of public land assets, and sale of development rights to fund infrastructure development.
- Taxation can be structured to raise funds for urban infrastructure or incentivizing developers to do so. Taxation models can also help optimize land use by disincentivizing lands or properties being left vacant.
- Redevelopment should be encouraged where practical, such as conversion of offices or “repurposing” underused or decommissioned land or buildings to improve housing supply.
- When cities have informal settlements, they should identify mechanisms to provide alternative housing or improve living conditions.
- ICT tools can help to streamline regulatory requirements into a single integrated system for approvals and monitoring of compliance.
- Smart grids can help alleviate pressure on energy in cities with a growing population.
- To address labour shortages, cities need to work with the construction industry to identify skills gaps and develop strategies to encourage training.
- Cities can encourage large, medium and small real estate developers to participate collectively in large-scale affordable housing projects, with a master developer guiding smaller-scale developers with experience of affordable housing.



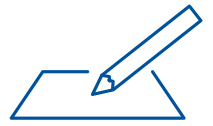
**Land acquisition
& securing title**



**Land Use -
Zoning & Regulation**



**Financing
Housing Supply**



**Design &
Construction**

Supply-side recommendations

Role of private sector

Investors:

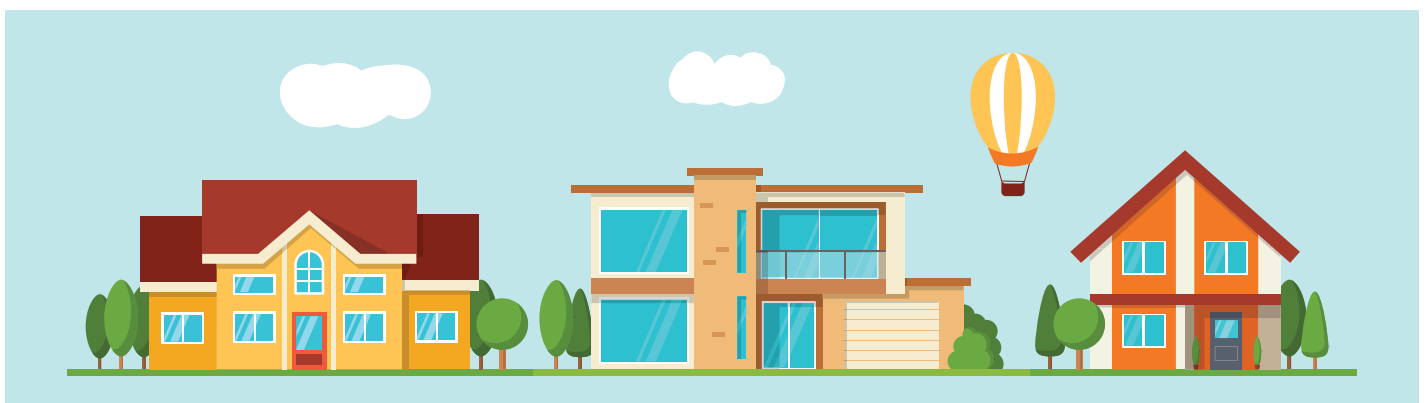
- The private sector needs to embrace innovative technologies to finance land acquisition, securing title, development of urban infrastructure, construction and subsequent operation and maintenance of affordable housing. Crowdfunding and blockchain offer potential, as do Islamic bonds (sukuk) in Islamic countries.
- In developing countries, where it is complex or impossible to raise funds from capital markets, the private sector needs to work with national or state governments to set up mortgage liquidity facilities and develop a secondary mortgage market.
- Where it does not yet exist, the private sector can develop the residential Real Estate Investment Trust (REIT) market, which can become a useful tool in scaling the supply of rental units in the city.
- Impact investing in affordable, energy-efficient housing can help bring positive social change along with investment returns.

Investors:

- Work with the community on the provision of affordable housing, as employees will benefit from affordable homes that do not require long commutes.

Developers:

- Investment in sustainable design concepts and energy-efficient housing can help optimize space (particularly co-living, micro-housing and macro-housing) and reduce energy costs (with use of green roofs and energy efficiency measures).
- Developers should stay abreast of innovative construction techniques such as 3D printing and prefabrication, which are evolving rapidly and could soon reach the mainstream.
- Alternative materials to cement and concrete should be explored with a view to reducing costs without sacrificing significant strength or durability.
- Advanced automated equipment and tools such as building information modelling, building automation and control, and material passports could improve productivity.
- Developers should work with educational institutions to increase investment in research and encourage skills development.





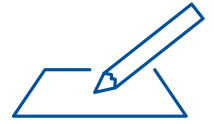
**Land acquisition
& securing title**



**Land Use -
Zoning & Regulation**



**Financing
Housing Supply**



**Design &
Construction**

Supply-side recommendations

Role of non-profit sector

Housing providers:

- Work with city governments and the private sector on ways to offer alternative tenure models for those unable to access social housing or afford private rental housing. Mechanisms could include shared ownership, shared equity ownership and community housing providers investing in market-rate housing and using revenues to subsidize affordable housing.

Financing:

- Explore avenues to develop more community land trusts and non-profit residential REITs.
- Work with private-sector investors, governments and international organizations to raise long-term funding and develop financial products that encourage private investment through government guarantees. Exploit funding channels such as foundation grants, charities, donations, local bond issues, government contributions to supporting infrastructure and loans backed by government or international financial organizations.

Advocacy and support:

- Help would-be homeowners and self-builders to access information on issues such as land-use regulations, legislative instruments, property rights, acquisition mechanisms, titling processes, building codes, low-cost construction techniques and energy-efficient housing.
- Create awareness on the benefits of mixed-income, mixed-use development to address concerns around nimbyism.
- Provide technical support services to communities that want to undertake self-construction or retrofit projects.





Determining Eligibility



Evaluate Purchase Model - Rent or Own



Access to Credit

Demand-side challenges

Role of city government

- Deploy clear and transparent rules to determine eligibility and identify beneficiaries for affordable housing, accounting for characteristics such as occupation (e.g. higher priority for key workers), years of residency, income, household size, age, health risks and productivity.
- Encourage a balanced mix of tenure models ranging from rental housing, including long-term leases, through shared-equity ownership and shared ownership to complete homeownership.
- Develop a regulatory framework that protects tenants without distorting supply, and protects landlords from the unfair effects of first-generation rent controls.
- Reach out to community representatives, private developers and employers to discuss their opinions and concerns related to affordable housing projects.
- Use regulations to encourage uptake of new technologies, while addressing risks such as privacy.

Role of private sector

Investors:

- Develop innovative ways of establishing creditworthiness and serving low-income households seeking to improve their informal housing.

Developers:

- Explore the potential of diversifying tenure structures through models such as build-to-rent and long-term rentals.

Employers:

- Consider supporting employees to meet housing costs through loans, subsidies or mortgage deals.

Role of non-private sector

- Explore innovative methods to provide financial assistance to the informal sector, working – where useful – with the private sector and city government.
- Provide education to improve the financial literacy of borrowers, helping them to plan expenses and minimize costs of construction or home improvement.



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Endnotes

- 1 https://ec.europa.eu/energy/intelligent/projects/sites/iee-projects/files/projects/documents/factor_4_typology_of_building.pdf (link as of 7/2/19).
- 2 Key workers are employees of the public sector or government providing essential services in the city. These include nurses, police officers, teachers, social workers, firefighters etc.
- 3 This is based on the historical trend of six nations (Australia, Canada, Ireland, New Zealand, the UK and US) where housing purchase prices considered “affordable” generally ranged between 2.0 and 3.0 times median income through the 1980s and 1990s.
- 4 Housing expenditure needs to consider energy costs of operation, as keeping energy bills down is important to overcome energy poverty. More information on the subject can be found here: https://www.unece.org/fileadmin/DAM/hlm/documents/Publications/good_practices.ee.housing.pdf (link as of 6/2/19).
- 5 Relocation costs could significantly affect the viability of a housing project, making it either more expensive or prohibitive altogether. Demolition of dilapidated buildings and the relocation of residents that often form part of urban regeneration or housing renewal programmes tend to become complex in efforts to minimize disruption, meeting diverse aspirations with housing options that balance the needs in the concerned area. Sometimes the compensation offered as relocation allowance may not be able to bridge the affordability gap in buying or renting a new property in the same area. This problem is compounded by, and could have political consequences as a result of, the relocation of slum dwellers that have encroached upon the land under consideration.
- 6 The benchmarking was undertaken on 400 different cost elements for a 46-square-metre house with 9 square metres of balcony, built on a 120-square-metre stand with basic furnishings developed as part of a greenfield project comprising 20 units.
- 7 https://www.unece.org/fileadmin/DAM/hlm/documents/Publications/good_practices.ee.housing.pdf (link as of 7/2/19).
- 8 For more information, refer to the report by UNEP, District Energy in Cities – Unlocking the Full Potential of Energy Efficiency and Renewable Energy, which can be found [here](#) (link as of 7/2/19).
- 9 Land tenure refers to the mode by which land is held or owned, or the set of relationships between people concerning land or the product on it.
- 10 Property rights can be defined as a recognized interest in an individual or group concerning land or development on it. They cover a wide range of activities or issues such as access, use, transfer, development, inheritance and access to credit and services.
- 11 In Mozambique, the state owns all land. Land rights cannot be sold, mortgaged or otherwise alienated. It recognizes a “use right to land”, known by the Portuguese acronym DUAT (directo de uso e aproveitamento dos terras), and investments made on the land are considered to be private property that can be bought, sold or mortgaged.
- 12 In the US, single-family homes are usually taxed lower than multifamily units owing to the different assessment methods employed by different regional authorities. Some jurisdictions value single-family homes at market price and value apartments by rental revenue or net operating income with the resulting valuations not being comparable and sometimes far from market value. A few jurisdictions also introduce caps on tax increases for single-family homes without a corresponding cap on multifamily units. A lower value per unit for a multifamily unit could also incur higher taxes should regulations be designed to tax lower-value-per-unit properties more heavily than higher-valued properties. The difference in taxation also has a political angle, as single-family homes represent a much larger share of the vote than those living in multifamily units, making adjustments to property taxes quite challenging (Goodman, 2005).
- 13 The minimum distance that a building or other structure must be set back from a street or road, a river or other stream, a shore or floodplain, or any other place deemed to need protection (Wikipedia, n.d.).
- 14 For instance, an FSI of 2 means a developer can build a space twice the size of the total area of the land – so, if more storeys are built, the effective space of each storey will have to be reduced, etc.
- 15 Mumbai recently revised its FSI from 1.33 to 3 in the Island City, and from 1 to 2.5 in the suburbs for residential construction in its development plan 2034.
- 16 In India, the airport authority has set limits on building heights within a 20-km radius of domestic and international airports to avoid interference with air traffic management.
- 17 <https://www.fool.com/knowledge-center/what-is-a-mortgage-reit.aspx> (link as of 6/2/19).
- 18 Islamic bonds, structured in such a way as to generate returns to investors without infringing Islamic law (Financial Times, n.d.).
- 19 For a comprehensive list of innovations in technologies, materials and tools in the construction sector, please refer to the World Economic Forum report on Shaping the Future of Construction: A Breakthrough in Mindset and Technology: http://www3.weforum.org/docs/WEF_Shaping_the_Future_of_Construction_full_report_.pdf (link as of 6/2/19).
- 20 For more information on the concept, see the white paper Circular Economy in Cities: Evolving the Model for a Sustainable Urban Future: <https://www.weforum.org/Insight-Reports/circular-economy-in-cities-evolving-the-model-for-a-sustainable-urban-future> (link as of 8/2/19).
- 21 Widowed persons with children are considered family units in Singapore.
- 22 Real estate prices in Beijing soared between 2015 and 2017, prompting authorities to ban property resale, limit the number of property purchases and increase down-payment requirements for first-time homebuyers (Tang, 2017).



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