Enterprise Development and Microfinance, 32:3, 179–192
<http://dx.doi.org/10.3362/1755-1986.21-00013>

Building the business case for green affordable housing

Rusmir Musić

Abstract: *The emerging business-driven case for green affordable housing reveals six drivers of profitability: 1) access to international green finance flows for better financing terms; 2) minimized incremental cost through early planning; 3) faster sales through market differentiation; 4) savings on utility bills for owners and renters; 5) lowered default rates and superior collateral value for green mortgages; and 6) fiscal and non-fiscal incentives from local or national governments. Additionally, fiscal and non-fiscal incentives from local or national governments can further catalyse the market. Case studies from several emerging markets show that the right combination of government incentives (including non-fiscal policies), education and technical assistance to developers (including a no-cost option), and green finance (including green bonds and green mortgages) can transform housing markets. In order to reflect the total life-time cost of ownership, the concept of affordability in housing should include the impact of resource-efficiency and resilience on the costs and risks of ownership.*

Keywords: green, affordable, housing, mortgages, climate

Introduction

The residential construction sector has a tremendous opportunity to avoid harmful emissions through energy efficiency, green materials, and improved design and construction that create affordable and healthy homes. The global need for housing is both contributing to climate change and exacerbated by it as extreme weather events damage existing homes and displace residents. Countries are trying to address the needs of 1.6 billion people living in substandard accommodation (Habitat for Humanity, 2020) through incredible construction growth. Half of the buildings expected to stand in 2060 have not yet been built (Global Alliance for Buildings and Construction, 2020a).

Unfortunately, the building boom is not incorporating sustainability considerations. Residential buildings now represent 18 per cent of total global energy-related CO_2 emissions, with an additional 10 per cent of emissions coming from buildings construction (Global Alliance for Buildings and Construction, 2020a). Decarbonization efforts have not matched the overall construction volumes, with the speed of decarbonization falling by half from 2016 to 2019 (Global Alliance for Buildings and Construction, 2020a). The Buildings Climate Tracker determines decarbonization speed through: investments in buildings efficiency, policies, and green certifications (Global Alliance for Buildings and Construction, 2020a.)

Rusmir Musić (rmusic@ifc.org), International Finance Corporation, Washington, DC

Building without regard to resource efficiency adds to the underlying causes of climate change and saddles occupants with high utilities costs. Low-income families spend up to 25 per cent of their total expenditures on housing and utility costs (Global Consumption Database; World Bank, n.d.). Extreme weather and sea-level change caused by climate change are likely to create 140 million 'climate refugees' by 2050 (Rigaud et al., 2018) who will need new homes. To avoid a vicious cycle, homes have to be both resource efficient and resilient. The world cannot afford housing that is liable to be washed away by typhoons and rising seas.

Too frequently, green building is viewed as a construction method available only to high-end, mostly commercial properties, in industrialized countries. For example, out of about 10,000 green residential projects tracked by Leadership in Energy and Environmental Design (LEED), 97 per cent are in the United States (Green Building Information Gateway, n.d.). Regrettably, most existing rating systems are designed for leadership, rather than adoption at scale, with the extensive compliance criteria requiring significant investment of time, labour, and money (Thomas et al., 2020). Developers thus perceive incremental capital costs of green construction to be as high as 29 per cent, while the actual premium has ranged from –0.4 per cent to 12.5 per cent (World Green Building Council, 2013). Disproving this perception and showcasing business case drivers for green action has led to market transformation in several countries described below, with demonstration case studies offering a possibility of worldwide replication.

Six drivers of profitability in the green and affordable housing sector

Despite the challenges outlined above, developers are building profitable green homes, while lenders are providing construction finance and green mortgages at attractive returns. The business case for green affordable housing stems from five drivers of profitability: 1) access to international green finance flows for better financing terms; 2) minimized incremental cost through early planning; 3) faster sales through market differentiation; 4) savings on utility bills for owners and renters; 5) lowered default rates and superior collateral value for green mortgages; and 6) fiscal and non-fiscal incentives from local or national governments. Table 1 describes the benefits of the profitability drivers for each of the main stakeholders in the residential value chain: government, lenders (banks and funds), developers, and homebuyers.

The profitability drivers are focused on *new* residential construction, where green measures can be incorporated early to minimize incremental costs. However, as green proof of concept penetrates new construction, accumulated learnings can also be applied to the retrofit market.

This article draws on the experience of the International Finance Corporation's (IFC) Green Building Market Transformation Program. At the heart of IFC's Program lies the EDGE ('Excellence in Design for Greater Efficiencies') application: a free, cloud-based software that allows developers to self-assess efficiency improvements, while comparing incremental costs with return on investment. Invented by a bank to help guide financing for measurable environmental benefits, the EDGE certification

Table 1 Benefits of green affordable housing for main stakeholders

Profitability driver	*Main stakeholder*			
	Government	*Lender*	*Developer*	*Homebuyer*
Access to green finance	Attract better financing and increase access	Attract better financing	Attract better financing	Receive pass-through better financing terms
Minimized costs	Minimize costs for socialized housing		Minimize costs for a differentiated product	
Faster sales			Reduce total cost of financing	
Utility bill savings	Lower burden on utilities	Leads to lower default rates	Marketing for differentiated product	Increase in disposable income
Lowered default rates	Possibility for regulatory change	Possibility for financial innovation		Receive pass-through better financing terms

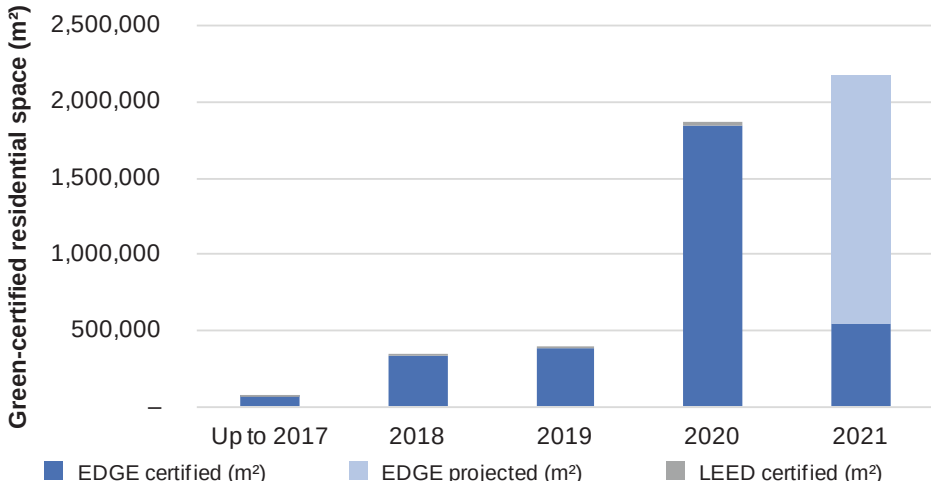
system delivers streamlined certification, based on design and post construction checks. The motivation behind the EDGE programme, along with technical details and impact results, are described in a paper by Thomas et al. (2020).

The case study of Colombia illustrates how rapidly green residential construction can take off when all stakeholders utilize a finance-focused, data-driven approach. In 2017, Colombia had only one residential building certified by LEED (Thomas et al., 2020). At that time, the national government issued tax incentives for technical solutions such as insulation and energy-efficient air conditioning systems (Government of Colombia, 2018). The green market took off when two commercial banks, Bancolombia and Davivienda, launched green investment programmes for new housing, which included the following:

- Common green standard: the banks adopted IFC's EDGE as the basis of green eligibility.
- Incentivized loans to developers: while Davivienda offered 0.1 per cent reduction on construction loans, Bancolombia's offer ranged from 0.5 per cent to 2 per cent lower than typical financing.
- Education campaign to developers: Bancolombia partnered with CAMACOL, the Colombian Chamber of Construction, to hold events in 17 cities with 300 property developers.
- Technical assistance: Bancolombia provided free technical support to developers, while Davivienda covered 50 per cent of certification costs.
- Partnership for mortgages: Bancolombia's developers introduced their home buyers to the bank, which provided preferential mortgage rates based on certificates issued to each home.
- Green mortgages: Bancolombia discounted the mortgage financing rate by 0.65 per cent (IFC, 2019).

The above programme components, and the majority of the case studies described below, were possible on fully commercial terms, without grants or concessional finance. Bancolombia's ability to pass through lower rates was enabled by its own ability to raise cheaper financing through a green label, to capture a greater market share, and to cross-sell construction finance and green mortgages (Menes, 2019).

As of February 2021, Colombia had 3.2 million m² of certified green residential space, as seen in Figure 1. Of the total, 58 per cent was in the affordable category, defined as a sum of low-income and lower middle-income housing, as seen in Figure 2. Overall, the case study supports the argument that the right combination of government incentives, education and technical assistance to developers, and green finance, can transform housing markets.



	Up to 2017	*2018*	*2019*	*2020*	*2021*	*Total*
EDGE certified (m²)	75,055	325,243	384,805	1,841,762	543,071	**3,169,936**
LEED certified (m²)	4,480	16,787	9,805	20,137	–	**51,209**
Total	**79,535**	**342,030**	**394,610**	**1,861,899**	**543,071**	**3,221,145**
EDGE projected (m²)	–	–	–	–	1,629,213	–

Figure 1 Annual green-certified residential space in Colombia
Source: EDGE Database and Green Building Information Gateway

Access to international green finance flows

Following the Paris Climate Agreement, the UN tracks more than 1,100 investors and 5,000 companies with climate pledges and more than 10,000 cities with green programmes (NAZCA, n.d.). Institutional investors representing US$9 tn in assets under management pledged toward net zero carbon emissions by 2050 (Net Zero Asset Managers Initiative, n.d.). These investors are looking for qualified green

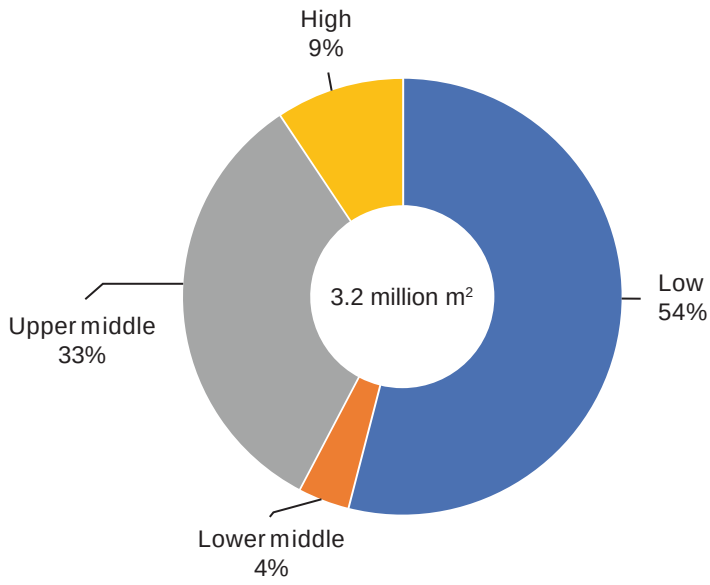


Figure 2 Breakdown of Colombia's EDGE-certified residential space by income category
Source: EDGE Database

projects but the demand is much greater than the supply. On the other hand, greening even a modest portion of the residential sector could create a $15.7 tn investment opportunity until 2030 (IFC, 2019). If this number seems staggering, remember that global spending on residential construction reached $4 tn per year in 2017, with an expected compound annual growth rate above 10 per cent (BCC Research, 2018). Certified green buildings are a way to connect supply and demand through green finance, enabling better financing terms.

Standardized definitions are necessary to grow green markets. A number of standard-setting bodies have established green building definitions, such as the International Capital Markets Association, the Climate Bonds Initiative, and GRESB. Their common elements are that a green building must:

- be certified under an internationally recognized green certification standard;
- show at least 20 per cent improvements in energy consumption over the local baseline;
- be able to quantitatively report impact metrics, such as energy and water savings and greenhouse gas (GHG) reductions (IFC, 2019).

This standard allows governments, developers, and lenders access to international green finance markets. Compliance with this standard allowed Bancolombia, mentioned above, to finance its investment programme by a pair of green bonds.

The green bond market has rapidly grown to $1 tn (Climate Bonds Initiative, n.d.) and there is emerging evidence that investors are willing to pay a premium on green bonds, which lowers the cost of financing (Harrison, 2020). Bancolombia's

green bond was oversubscribed 2.8 times, with 72 new investors participating, leading to better financing terms for the bank (Menes, 2019). Webinars such as 'Green Bonds for Green Buildings' train developers and lenders on how to utilize capital markets for green buildings (IFC, 2020).

Compliance with international standards allowed Belhar Gardens, a social housing project in Cape Town, to access South Africa's Green Fund. In this public–private partnership model, the City of Cape Town made land available for development (Cairncross and Naicker, 2020), to make rental costs affordable at $53 to $158 per month. Due in part to significant utilities bill reduction, one family indicated saving $70 per month compared to their previous living situation, allowing them to buy extra food and clothing, or save money (BBC, 2020). Belhar Gardens was recently profiled by the BBC in their 'Building a Better Future' video series (BBC, 2020).

Recognizing the benefits of green finance, many lenders are launching green incentives outlined in Table 2. The Global Climate Partnership Fund (GCPF) provides financing to local financial institutions who then on-lend to their developers, along with free technical assistance and subsidized certification fees (GCPF, n.d.). ProCredit Bank offers interest rate reduction and technical assistance (ProCredit, 2021). Reall, the UK-based affordable housing investor, found that although the local developers intend to build green, they lack a standardized approach. Offering technical assistance, along with preferential finance rates, allowed for a transition to a green portfolio, with commercially viable homes starting at $7,500.

Minimized incremental cost

The green residential market is taking off because the incremental costs of green construction are far less than previously understood, as illustrated in Table 3. The lowered costs come from utilizing passive design in early planning stages and incorporating green technologies early in the procurement process. Passive design also reduces the likelihood of a performance gap between expectations and results due to sub-optimal management of building systems.

In Mexico, Vinte builds affordable communities that include hospitals, parks, and schools, with homes selling for about $20,000. Vinte's $38 m green bond, listed on the Mexican Stock Exchange, had 50 per cent more interest than funding needed, demonstrating the growing demand for green products from institutional and commercial investors (Cairncross and Naicker, 2020). In the Philippines, Imperial Homes uses the Connovate construction system, which boasts quicker construction times and resilience to earthquakes and severe weather (Cairncross and Naicker, 2020). Selling for about $28,000, each unit has a PV system that allows residents to sell electricity back to the grid (Imperial Homes Corporation, n.d.). Both developers received recognition from the press: Vinte from *Fortune Magazine* and Imperial Homes from the *Financial Times*.

An upcoming report on Argentina's Barrio 31 neighbourhood shows the opportunity for low-cost interventions with significant green benefits in slum improvement programmes (World Bank, 2021, forthcoming). Technical assistance to identify green design measures was combined with behavioural change

Table 2 Investor-led incentives for green buildings

Investor	*Country of operations*	*Technical assistance offered*	*Financial incentive offered*
Davivienda	Colombia	50% of certification costs	Interest rate reduction of up to 0.1%
Promerica	Costa Rica	N/A	Interest rate reduction of 0.5%; extended tenor and grace period
Pinchicha	Ecuador	Free training, auditing, and certification	N/A
ProCredit	Ecuador	Free technical assistance	Interest rate reduction of 0.5%, extended tenor
ProCredit	Kosovo	Free technical assistance	Interest rate reduction of 0.5%
Asia Green Real Estate	Asia	Free technical assistance	N/A
Reall	Africa and Asia	Free training, subsidized auditing and certification	Preferential finance terms
International Housing Solutions (IHS)	Select countries in Africa	Free training	Subsidized finance for green component
Shelter Afrique	Select countries in Africa	Education and technical assistance	N/A
IFC – UK Market Accelerator for Green Construction (MAGC) Program	Select countries globally	Training, auditing, and certification	Preferential terms to local banks to pass on
Global Climate Partnership Fund (GCPF)	Global	Free technical assistance and auditing	N/A

Source: EDGE website

Table 3 Incremental costs for green residential construction

Developer	*Country of operation*	*Incremental costs for green components*
International Housing Solutions	South Africa	Less than 1% of total costs
Vinte	Mexico	About 1% of total costs
Ciputra	Indonesia	4.7% of total costs
Capital House	Vietnam	1% of total costs

Source: IFC, 2019

education for the residents, while measures such as LED street lighting further reduced the city's operating costs, without significantly increasing capital expenditures. After realizing that the benefits of green homes far outweigh incremental costs, Shelter Afrique committed to certifying as green affordable units across Africa (Shelter Afrique, 2020). Shelter Afrique will provide education and technical assistance to developers, and is investigating whether funding needs can be met through green finance (Shelter Afrique, 2020).

Faster sales through market differentiation

Green certification delivers financial benefits for commercial buildings, with new growing evidence of returns to residential developers. The commercial sector enjoys decreased operational costs by 37 per cent, higher sale premiums of up to 31 per cent, and increased occupancy rates up to 23 per cent (IFC, 2019). While home buyers are not able to bear higher prices, green developers can speed up their sales cycles, with a direct effect on their bottom line through reduced cost of financing.

In Vietnam, Capital House sold homes 20 per cent faster than average, reducing overall financing costs by 3 per cent (EDGE, n.d.). A key factor was the expected 30 per cent reduction in utility consumption, achieved with only 1 per cent increase in construction costs (Cairncross and Naicker, 2020). In Mexico, Casas Krea increased the speed of sales despite the COVID-19 pandemic. The homes retail for about $30,000, with features such as high-efficiency boilers and solar hot water (EDGE, n.d.). Both Casas Krea and Capital House utilized IFC's freely available Marketing Toolkit to position their properties as certified green and thus gain competitive advantage and quicker sales.

Governments can also catalyse faster sales by increasing the purchasing power of home buyers while incentivizing green construction. In 2019, the Central Bank of Indonesia started offering a 5 per cent lower loan-to-value ratio for green home purchases (Bank of Indonesia, 2019).

Savings on utility bills

The faster sales outlined above are the result of growing evidence of utility savings, backed by third-party certification. International Housing Solutions (IHS) tracked smart meter data in three of its rental properties in South Africa, with results shown in Table 4. Using this data, IHS claims lower utility bills save residents the equivalent of one month of rent per year (Cairncross and Naicker, 2020).

Table 4 Smart meter data in South Africa

	Development		
	Ravenswood	*Candlewood*	*Goedeberg*
kWh savings (%)	54	68	41
Total savings per year ($)	128	181	338

Source: Cairncross and Naicker, 2020

In Haiti, where 58.5 per cent of the population lives on less than $2 per day, the need for affordable, green, and resilient housing is particularly urgent (Caldwell, 2019). Haiti HOME trained local developers to apply environmental standards and helped offset incremental costs. Homes selling for less than $20,000 were equipped with technologies such as solar panels and rainwater collection, reducing utility consumption by over 40 per cent (Caldwell, 2019). This project is an early leader showing the possibility of green and affordable construction, even in the poorest countries.

Reduced demand for utilities means governments do not have to invest as much to provide amenities for citizens. If 100 homes are built with a 20 per cent reduction in energy and water usage, then 20 more could be built without having to provide additional utility services. In the social housing segment, lower energy and water consumption also reduces any ongoing housing subsidy payments by the government and reduces the total cost of occupation for low-income households.

Lowered default rates and superior collateral value for green mortgages

For banks, the utility savings – which can improve a borrower's risk profile – offer a possibility for financial innovation (IFC, 2019). Buyers of green homes have a lower likelihood of defaulting on their mortgages, in part because they can use utility savings towards their loan repayment. Default risks are on average 32 per cent lower in energy-efficient homes (University of North Carolina, 2013), while the degree of efficiency matters: more energy efficient buildings are associated with lower risk of default (EeDaPP, 2020). As we saw from Table 2, banks are starting to recognize the superior attractiveness of green mortgages through incentives. Even without preferential terms, green homes can benefit both banks and homeowners. However, preferential mortgages can help banks access green funding sources and differentiate their brand, helping their bottom line.

Table 5 illustrates the options available to increase the attractiveness of a green home purchase by comparing a conventional home (with a 20 per cent down payment requirement, 18 per cent interest rate, and 10-year term) with alternative green home scenarios. Green incremental cost was based on examples from Table 3 and utility bill savings were based on the South Africa example from Table 4. The bold figures represent the main difference between each scenario and the base case.

In Scenario 1, which presents a green home with a conventional mortgage, we see that monthly utility savings exceed higher mortgage payments and decrease the overall cost of ownership by 6 per cent. In Scenario 2, the developer sells the green home without any price premium in order to save financing costs by accelerating the pace of sales, for a total reduction in cost of ownership of 7 per cent. Scenario 3 illustrates the impact of a lower down payment, which is a particularly strong incentive for low-income home buyers and can be enacted through government policies. The down payment in Scenario 3 is reduced from 20 per cent to 15 per cent

Table 5 Relative benefits of a conventional home and mortgage versus green home and innovative mortgage scenarios

	Base case: Conventional home, conventional mortgage	*Scenario 1: Green home, conventional mortgage*	*Scenario 2: Green home, developer absorbs incremental CapEx*	*Scenario 3: Green home, lower mortgage down payment*	*Scenario 4: Green home, lower mortgage interest rate*
Price of conventional home	15,000	15,000	15,000	15,000	15,000
Incremental cost of green measures	–	150	150	150	150
Price of green home	15,000	15,150	**15,000**	15,150	15,150
Down payment (% of price)	20%	20%	20%	**15%**	20%
Down payment ($)	3,000	3,030	3,000	2,273	3,030
Loan amount	12,000	12,120	12,000	12,878	12,120
Interest rate	18%	18%	18%	18%	**17.5%**
Term (years)	10	10	10	10	10
Monthly mortgage	216	218	216	232	214
Monthly utility savings	–	–15	–15	–15	–15
Monthly cost of ownership	216	203	201	216	199
Change in resident's monthly cost of ownership	–	**–6%**	**–7%**	**0%**	**–8%**
Change in bank's monthly income	–	**1%**	**0%**	**7%**	**–0.8%**
Applicable case study		n/a	Capital House, Vinte	Government of Indonesia	Bancolombia, ProCredit

Source: Adapted from IFC, 2019

Note: CapEx, capital expenditure; figures in US$

without any increase in the total cost of ownership. Finally, Scenario 4 incorporates a lower interest rate offered by the bank, based on the lower risk of default, and reduces the total cost of home ownership by 8 per cent.

From the banks' point of view, green mortgages have multiple benefits. As seen above, green homeowners have been demonstrated to be lower risk borrowers (University of North Carolina, 2013; EeDaPP, 2020), leading to better portfolios for the banks. Based on the green appetite from institutional and ESG (environmental, social, and governance) investors described in the section on accessing green finance, banks may also be able to securitize and sell off their green portfolios, enjoying better financing terms by meeting green criteria. In Scenarios 1 to 3, the bank's monthly income is stable or higher. In Scenario 4, slightly lower

income can be weighed against the above-mentioned benefits, potential for greater market share, and the enhanced reputation of the institution in terms of its corporate social responsibility.

Philippines' National Home Mortgage Finance Corporation (NHMFC) is leading in promotion of green affordable homes through the BALAI BERDE Program, which issues green bonds to acquire mortgages from green housing loan originators (Ogrimen et al., 2021). In addition to lower utility bills, homebuyers benefit from a lower interest rate (Ogrimen et al., 2021). There is a great potential for secondary mortgage institutions to be green market-makers, by emulating NHMFC's example to create a green affordable stock.

Fiscal and non-fiscal incentives from local or national governments

National and local governments have a tremendous role to play in catalysing the green affordable housing market. Since the Paris Agreement, 136 countries have submitted NDCs (Nationally Determined Contributions, or plans that outline their commitment to reducing GHG emissions) that mention the buildings sector (IFC, 2019). Table 6 describes incentives already launched, while deep-dive case studies are available from the Global Alliance for Buildings and Construction (GABC, 2020b).

In Peru, local municipalities are providing non-fiscal incentives to green developers, which do not burden government budgets, yet provide benefits that developers can monetize. Municipalities provide a height bonus that delivers multiple benefits: developers sell more housing units on the same plot of land; governments collect more real estate taxes from additional units; buyers get lower utility costs; and the incentive kick-starts a green trend as all stakeholders amass green experience and know-how. Peru now has over 3,400 certified green homes, totalling over 400,000 m^2.

Table 6 Emerging markets government incentives for green buildings

Country (city)	*Incentive*
Argentina	Exclusion of VAT (10%)
Brazil (Salvador)	Point-based system for a 5%, 7%, or 10% discount on property taxes
Colombia	Exclusion of VAT (19%) and income tax deduction (25%) for technical solutions
Ghana (Takoradi)	30% reduction in permit fees for green certified buildings
India (Pune)	3–7% extra floor area ratio (FAR) for a 30–50% improvement in energy, water, and materials
Indonesia	5% lower loan-to-value ratio
Kenya	100% tax exemption on interest income for bonds used for green building projects
Peru (Arequipa, Cusco, Miraflores, San Borja)	Height bonus for one or two extra floors, or 15–25% extra floor area ratio (FAR)

Source: EDGE website

Countries that further want to incentivize green and affordable housing can look to public-private partnership models and public procurement norms, such as those found in Kenya. Kenya's Department of Housing and Urban Development is providing free land to developers of affordable housing with green criteria (Menes, 2020). The programme is a result of collaboration between the Government and the Kenya Green Building Society (KGBS) to demonstrate that green construction would not be prohibitively costly for the developers but would result in tremendous benefits to home owners (Menes, 2020).

Conclusion

This article collates some of the growing number of data points showing that green and affordable housing construction can be profitable. In countries from the case studies mentioned, where all stakeholders worked together, a fundamental market transformation is already under way, as seen in Table 7.

Table 7 Residential units certified by EDGE

Countries with case studies in this article	*Residential floor space in the affordable housing segment certified by EDGE (m^2)*	*Number of units in the affordable housing segment certified by EDGE*	*All residential floor space certified by EDGE (m^2)*
Colombia	1,827,722	30,582	3,169,935
Indonesia	327,458	6,906	554,010
Mexico	447,697	6,977	698,765
Peru	61,577	683	442,124
Philippines	128,896	3,388	135,937
South Africa	395,429	5,819	1,554,629
Vietnam	1,477,253	15,216	1,899,794
Other countries	792,970	9,389	1,360,404
Global total	**5,459,003**	**78,960**	**9,815,597**

Source: EDGE Database

Note: All numbers correct as of February 2021; numbers include projects receiving preliminary or final certification

To accelerate the pace of change, the affordable housing sector must overcome the asymmetry of information and value creation between developers, lenders, and buyers, by collecting and sharing evidence that green homes represent a lower risk for lenders, a more profitable solution for developers, and cost savings for the buyers. The case studies in this article are one step toward building a sector-wide business case. Instead of adding to pressures of climate change, the current housing boom can become an opportunity to provide more affordable housing for everyone and a cleaner planet for all.

References

Bank of Indonesia (2019) 'Macroprudential policy instrument: loan to value/financing to value' [website] <https://www.bi.go.id/en/fungsi-utama/stabilitas-sistem-keuangan/instrumen-makroprudensial/default.aspx> [accessed 26 February 2021].

BBC (2020) 'Building a better future: green social housing in Cape Town' [website] <http://www.bbc.com/storyworks/building-a-better-future/ifc-sa> [accessed 26 February 2021].

BCC Research (2018) 'Residential building construction industry: global markets to 2022' [online] <https://www.bccresearch.com/market-research/manufacturing/residential-building-construction-industry-global-markets.html> [accessed 26 February 2021].

Cairncross, L. and Naicker, E. (2020) 'Green innovation for long-term affordability', *Housing Finance International* 34(3): 39–44.

Caldwell, O. (2019) 'Breaking new grounds: EDGE certified affordable housing in Haiti' [website], EDGE <https://edge.gbci.org/breaking-new-grounds-edge-certified-affordable-housing-haiti> [accessed 26 February 2021].

Climate Bonds Initiative (no date) 'Home page' [website] <https://www.climatebonds.net/> [accessed 26 February 2021].

EDGE (no date) 'Landing site for developers' [website] <https://edgebuildings.com/market-players/developers/#toggle-id-11> [accessed 26 February 2021].

Energy Efficiency Data Protocol and Portal (EeDaPP) (2020) 'Final report on correlation analysis between energy efficiency and risk' [online] <https://www.buildup.eu/en/practices/publications/final-report-correlation-analysis-between-energy-efficiency-and-risk-d57?gid=50716> [accessed 26 February 2021].

Global Alliance for Buildings and Construction (2020a) *2020 Global Status Report for Buildings and Construction* [online] <https://globalabc.org/news/launched-2020-global-status-report-buildings-and-construction> [accessed 26 February 2021].

Global Alliance for Buildings and Construction (2020b) 'Stimulus programmes for green buildings – best practice examples' [website] <https://globalabc.org/resources/publications/stimulus-programmes-green-buildings-best-practice-examples> [accessed 26 February 2021].

Global Climate Partnership Fund (GCPF) (no date) 'Green lending booklet' [website] <https://green-lending-forum.gcpf.lu/green-lending-booklet/> [accessed 26 February 2021].

Government of Colombia (2018) 'Resolution 463' [online] <http://www1.upme.gov.co/Normatividad/463-2018.pdf> [accessed 30 June 2021].

Green Building Information Gateway (no date) 'Home page' [website] <http://www.gbig.org/> [accessed 26 February 2021].

Habitat for Humanity (2020) 'Global policy and advocacy agenda' [website] <https://www.habitat.org/sites/default/files/documents/Global-Policy-and-Advocacy-Agenda.pdf> [accessed 26 February 2021].

Harrison, C. (2020) 'Green bond pricing in the primary market H2 2020' [online], Climate Bonds Initiative <https://www.climatebonds.net/resources/reports/green-bond-pricing-primary-market-h2-2020> [accessed 7 July 2021].

Imperial Homes Corporation (no date) 'Victoria Highlands' [website] <https://www.imperialhomescorp.com/listings/tiarra-premiere-victoria-highlands/> [accessed 26 February 2021].

International Finance Corporation (IFC) (2019) *Green Buildings: A Finance and Policy Blueprint for Emerging Markets* [online] <https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/climate+business/resources/green+buildings+report> [accessed 26 February 2021].

IFC (2020) 'Green bonds for green buildings: accessing a $23 trillion investment opportunity' [webinar] <https://www.youtube.com/watch?v=jfviRRA6iIY&list=PL6UOCLcBTJQUok5ahuBsuEyW0GKmnFNwd&index=16&t=3531s> [accessed 26 February 2021].

Menes, R. (2019) 'Green building through green bonds in Colombia' [online], EDGE <https://edgebuildings.com/green-building-through-green-bonds-in-colombia-story/> [accessed 4 May 2021].

Menes, R. (2020) 'EDGE standard provides key benefits for Kenya's affordable housing developers' [online], EDGE <https://edgebuildings.com/edge-standard-provides-key-benefit-for-kenyas-affordable-housing-developers/> [accessed 26 February 2021].

Net Zero Asset Managers Initiative (no date) 'Home page' [website] <https://www.netzeroassetmanagers.org/> [accessed 26 February 2021].

Non-State Actor Zone for Climate Action (NAZCA), United Nations Framework Convention on Climate Change (UNFCCC) (no date) 'Global climate action tracker' [website] <https://climateaction.unfccc.int/> [accessed 26 February 2021].

Ogrimen, A., Tan, A. and Cortez, C. (2021) 'BALAI BERDE promotes resilient recovery in PH housing with IFC's EDGE', *Philippine Daily Inquirer* [online] <https://business.inquirer.net/318163/balai-berde-promotes-resilient-recovery-in-ph-housing-with-ifcs-edge> [accessed 26 February 2021].

ProCredit Bank Georgia (2021) 'ProCredit Bank launches special Green Building Finance Programme with Sintali-SGS' [website] <https://www.procreditbank.ge/en/news/procredit-bank-launches-special-green-building-finance-programme-sintali-sgs> [accessed 26 February 2021].

Rigaud, K., de Sherbinin, A., Jones, B., Bergmann, J., Clement, V., Ober, K., Schewe, J., Adamo, S., McCusker, B., Heuser, S. and Midgley, A. (2018) *Groundswell: Preparing for Internal Climate Migration* [online], World Bank <https://openknowledge.worldbank.org/handle/10986/29461> [accessed 30 June 2021].

Shelter Afrique (2020) 'Shelter Afrique recognized by IFC for its commitment to building green affordable housing in Africa' [website] <https://www.shelterafrique.org/en/newsroom/view/shelter-afrique-recognized-by-ifc-for-its-commitment-to-building-green-affordable-housing-in-africa-2?title=0> [accessed 5 March 2021].

Thomas, S., King, G., Mitchell, M., Saberi, O. and Music, R. (2020) 'Why did an international bank create a green building rating system', *Summer Study on Energy Efficiency in Buildings* [online], American Council for an Energy-Efficient Economy <https://www.aceee.org/files/proceedings/2020/event-data> [accessed 26 February 2021].

University of North Carolina Center for Community Capital (2013) *Home Energy Efficiency and Mortgage Risks* [online] <https://www.imt.org/wp-content/uploads/2018/02/IMT_UNC_HomeEEMortgageRisksfinal.pdf> [accessed 26 February 2021].

World Bank (no date) 'Global consumption database' [website] <https://datatopics.worldbank.org/consumption/> [accessed 26 February 2021].

World Bank (2021 forthcoming) 'Green Neighborhoods: A Framework for Integrating Energy Efficiency into Slum Upgrading Initiatives: Experiences from Buenos Aires, Argentina'.

World Green Building Council (2013) *The Business Case for Green Building: A Review of the Costs and Benefits for Developers, Investors and Occupants* [online] <www.worldgbc.org/sites/default/files/Business_Case_For_Green_Building_Report_WEB_2013-04-11-2.pdf> [accessed 30 June 2021].