ELLA
Evidence and lessons from Latin America

Amidst rapid urbanisation, Latin American countries have been scaling-up green building, in some cases achieving significant reductions in energy consumption, water use, carbon dioxide emissions, and solid waste. This Brief explores how…

GREEN BUILDING IN LATIN AMERICA

SUMMARY

In Latin America, buildings consume 21% of treated water and 42% of electricity, while producing 25% of CO_2 emissions and 65% of waste. Green buildings are defined as structures that are environmentally responsible and resource-efficient over their full lifecycles. By transitioning to green buildings, the sector could reduce energy consumption by up to 50%, water use by 40%, carbon dioxide (CO_2) emissions by 39%, and solid waste by 70%. They also reduce operating costs, improve workplace productivity, and use sustainable materials. Amidst mounting concerns related to climate change and the demand for energy and water, it is imperative that policymakers and companies alike continue to improve efficiency in the real estate sector, using market mechanisms, certification schemes, and building codes. This Brief examines a selection of green building practices, programmes, and regulatory frameworks from Latin American countries including Brazil, Chile, Colombia, Cuba, Mexico and Peru. Latin American experience demonstrates that the environmental and economic gains are not limited to high-end buildings for large organisations and the wealthy; government programmes supported by development loans and grants are creating innovative approaches to pilot and scale-up green housing for low-income families for truly inclusive green economies.

THE CHALLENGES OF PROVIDING GREEN BUILDINGS IN A DEVELOPING COUNTRY CONTEXT

Conventional buildings are inefficient, often causing unnecessary harm to the environment and local economies. As a glaring example, Latin America's 17 largest cities lose on average 35% of water to leakages – Rio de Janeiro in Brazil has the highest water loss rate at 58%.[1] In the face of rapid urbanisation within developing and emerging economies (Figure 1),[2] urban construction will only continue to accelerate, leading to even greater ecological and financial losses if building inefficiencies are not remedied.

KEY LESSONS LEARNED

In countries that lack mechanisms to regulate building efficiency, voluntary certification systems and programmes are a great starting point to catalyse the adoption of green buildings.

Fostering broad support from key industry stakeholders is essential for countries to ensure that their green building strategies are scalable.

Rapid urbanisation is a challenge for any government, however green buildings present an opportunity for leaders to improve housing standards while also reducing the nation's environmental footprint.

Given the long-term investment required by the real estate industry, the core principles of a business-friendly environment – transparency, predictability and accountability – cannot be overstated.

[1] Siemens. 2010. *Latin America Green City Index*. Siemens, online publication.
[2] Projections indicate that the populations of our global cities are set to double by 2050. World Green Building Council. 2013. *The Business Case for Green Building: A Review of the Costs and Benefits for Developers, Investors, and Occupants*. World Green Building Council, Washington, DC.

Figure 1: Percentage of Population Living in Urban Areas, by Region

Region	yr 2000	yr 2020
Latin America	76%	89%
Africa	36%	62%
Asia	37%	65%

Source: Managan, K. *et al.* 2012. *Driving Transformation to Energy Efficient Buildings: Policies and Actions: 2nd Edition*. Institute for Building Efficiency, Johnson Controls, Milwaukee, WI.

Cities – when built according to green economic principles – can actually lessen a society's impact on the environment. For example, some densely populated cities emit less carbon dioxide per capita than the national average. This is true for São Paulo, Brazil, where per capita CO_2 emissions are half the national average.[3] A key reason for this is the development of green buildings. Green buildings also make economic sense. In most cases, any premiums associated with green buildings and efficiency retrofits are generally cost negative, that is, they actually save money in the long run.[4] By transitioning to green building practices, Latin America could reduce its energy consumption by 10% over the next 10 years. At US$16 billion, the regional cost associated with this transition may appear steep, but it would cost US$53 billion to supply the energy (143,000 GWh) that could have been saved by more efficient buildings. [5]

Unfortunately, in developing countries, the obstacles to broad development of such buildings are many, including potentially higher up-front costs, complexity in design and technology, lack of financing due to country-specific commercial determinants, and access to information.[6] This is the case, not only in Latin America, but also across much of Africa and South Asia. As a result, green buildings in these regions still represent a niche market for expensive corporate offices or high-end residential buildings poised for growth. However, significant opportunities to green the low-income housing sector are emerging and Latin American countries have been taking advantage of new funding streams to extend the benefits of green buildings to a wider demographic.

GREEN BUILDING IN LATIN AMERICA

Broadly speaking, the mechanisms available to promote the development of green buildings are similar to other sectors trying to foster technological innovation, namely:

- Market instruments - commercial loans and project financing
- Public instruments - subsidies, taxes, building codes, conditional permitting
- International cooperation – multilateral, bilateral banking, and labelling

This Brief analyses how these mechanisms are being used to support the development of green buildings in Latin America, with a focus on three broad categories:

1. Green labelling: LEED's success in Latin America
2. International support and finance
3. National government efforts to green low-income housing

GREEN LABELLING: LEED'S SUCCESS IN LATIN AMERICA

Like most regions, growth in the Latin American green building market was catalysed by green labelling systems supported by a broad partnership of industry stakeholders. Although national green building certification systems do exist in Latin America, such as the Colombia Green Building Council and The Energy Efficiency Seal in Brazil, international certification systems are most widely used for green building labelling. Since most developing countries lack effective regulations to control resource use in buildings, these voluntary certification systems provide an important catalyst for the adoption of green buildings.

The most successful international labelling initiative for the promotion of green buildings in Latin America is the Leadership in Energy and Environmental Design (LEED) Certification System, administered by the World Green Building Council. The Council is a non-profit organisation

[3] World Resources Institute. 2013. *Sustainable Cities*. World Resources Institute, online presentation.
[4] Scott, M. 2013. *Market for Green Buildings Warms Up - Energy Efficiency*. Financial Times, online publication.
[5] Inter-American Development Bank. 2012. *Green Buildings Workbook: A Guide for IDB Practitioners*. IDB, Washington, DC.
[6] Cushman & Wakefield. 2013. *Occupier Insight: Navigating Emerging Markets*. Cushman & Wakefield, New York.

comprised of real estate professionals that support cost-efficient and energy-saving green buildings worldwide. The group has grown quickly, and local councils have been established in five Latin American countries over the last eight years: Mexico (2005), Brazil (2007), Argentina (2009), Columbia (2009) and Peru (2011).[7] In contrast, only two countries in Sub-Saharan Africa and South Asia have set up local LEED councils: India in 2001 and South Africa in 2008. Local councils in Latin America operate as hubs to coordinate and support green building initiatives at the national level. In Brazil, for example, there are 700 member companies whose interests are steered by an executive committee, along with numerous sub-committees.[8] Thanks to the emergence of local councils in Latin America, newly formed partnerships in the region have been able to use LEED certification to demonstrate innovative green building practices to governments, as well as the viability of replication. These new collaborations also lobby for innovative green building legislation. One of the primary objectives of Colombia's Green Building Council, for example, is to provide technical support to the government in the formulation of pro-green building policies and incentives.[9] Groups of professionals in other regions have used similar approaches, especially in countries where policymakers were holding back support for green building legislation.[10] Additionally, local councils cooperate regionally via the World Green Building Council (WGBC) Americas Network (ARN), which is dedicated to sharing valuable knowledge and experiences between network members.

As of 2012, the number of registered LEED projects in Latin America totalled 1,356, with Brazil (550), Mexico (285), Chile (155), Columbia (80) and Argentina (72) accounting for the largest share of projects. "LEED-registered" means these projects are in the pipeline. The top-five countries for LEED-certified (implemented) projects are Brazil (62), Mexico (29), Chile (13), Costa Rica (10) and Colombia (9). On the world ranking of registered-LEED buildings, Brazil is fourth, with Mexico and Chile also in the top 10. There are various factors that help to explain Brazil, Mexico, and Chile's global competiveness in terms of LEED green buildings, and these are discussed in the 'Enabling Factors' section below.

There are four levels of LEED certification, calculated on a 100-point assessment of the following credit categories:

- Sustainable credits for strategies minimising the impact on ecosystems and water resources
- Water efficiency credits for strategies reducing potable water consumption
- Energy and atmosphere credits for energy efficiency
- Materials and resources credits for sustainable building materials and waste reduction
- Indoor environmental credits for better indoor air quality, daylight and outdoor views

The LEED certification levels range from certified to platinum as follows: certified 40–49 points; silver 50–59 points; gold, 60–79 points; and platinum: 80+ points.

Two Latin American experiences with LEED buildings are described below. The first building is the LEED-Gold HSBC Tower in Mexico City, which was the first LEED-Gold certified building in Latin America and illustrates the efficiency gains and cost savings of green buildings compared to conventional structures (Figure 2). The second is the Eco Berrini Tower in São Paulo, which is the only LEED-Platinum certified building in Latin America, demonstrating a comprehensive array of cutting-edge innovations.

Mexico City's HSBC Tower

In 2007, industry professionals managed to create a coalition large enough to push through the construction of the first Latin American LEED-certified green building – the HSBC Bank headquarters in Mexico City.[11] At the time of its construction, this building was cutting-edge in many ways, including energy efficiency, water consumption, wastewater technologies, waste management, and the use of recycled furniture. Highlights include a green roof (the largest in Latin America at the time) that captures 75% of rainwater and insulates the building, a water treatment plant, intelligent lighting systems, energy efficient equipment, and specially designed windows to keep the building cool.

[7] Jennivine, K. 2008. *Emergence and Growth of Green Building Councils in Latin America*. US Green Building Council, Washington, DC.
[8] Green Building Council Brazil. No date. *About Green Building Council Brazil*. Green Building Council Brazil, online.
[9] Gallo, M., Fernandez, J. 2012. *Colombia: An Emerging Country in Sustainable Construction*. NEOCON, Chicago, IL.
[10] Richards, J. No date. *Sustainable Industry Sector Retrospectives*. Institute for Environmental Entrepreneurship, Berkeley, CA.

The Eco Berrini Building in São Paulo, Brazil

The 47,000 m^2 Eco Berrini corporate tower, which was bought for US$330 million,[13] has a small environmental footprint thanks to the following state-of-the-art green innovations: water conservation, treatment and reuse of grey water, energy efficiency, waste management and rational use of materials during construction. Its glass facades were designed according to solar orientation, ensuring lower thermal load and, consequently, lower electricity consumption of lighting systems and air conditioning. The air conditioning system uses high efficient frequency inverters, working in conjunction with a system of outside air flow and night cooling to pre-cool the outside air. Together, these actions yield savings of 40% in water and 30% in energy compared to conventional commercial buildings.[14]

Figure 2: The Environmental and Economic Benefits of Mexico City's HSBC Tower

Size	78,000 m^2
Total cost	US$160 million
Green equipment (1.6% total)	US$2.56 million
Green labour[12] (6.7% total)	US$10.7 million
Benefits vs. conventional building (per year)	
Energy consumption	-20%
Water consumption	-76%
CO_2 emissions	-1,229 tonnes

Source: Green Building Council Bolivia. 2009. *Green Building Worldwide Case Study: Torre HSBC*. GBC Bolivia, La Paz.

The upfront costs of high-end green buildings are generally 3-7% higher than conventional buildings,[15] but can be up to 20% in some cases.[16] This can represent an obstacle for developing and emerging economies and goes a long way to explaining why private companies have been leading investments of this type. The World Green Building Council's Green Earth Campaign may be of interest to developing countries, as LEED will waive certification fees for any UN member country attempting to build its first LEED buildings.[17] International funding mechanisms also exist to help developing countries adopt more efficient buildings and the following section points to some examples of funding sources that are helping overcome these obstacles.

HARNESSING INTERNATIONAL SUPPORT AND FINANCE

In terms of funding, there are many options available to developing country leaders interested in initiating and/or expanding their green building sectors. Development banks and international agencies are becoming increasingly active in terms of green building financing and are augmenting the resources they make available to developing countries for green building programmes in both residential and commercial sectors. This is not surprising given building energy efficiency is one of the most cost effective measures for transitioning to a green economy. Generally, every US$1 spent on energy efficiency equates to a 2.2 tonne reduction in CO_2, whereas every US$1 spent on renewable energy is only equivalent to a 0.4 tonne reduction in CO_2.[18]

The International Finance Corporation (IFC) is the largest private sector-focused development bank in the world and supporting the green building industry is at the center of its climate-related investment portfolios. In 2012 the IFC devoted US$1.6 billion to this portfolio and, although projects range from renewable energy, waste management, sustainable water, agriculture and forestry, the green building sector is emerging as the most effective strategy to reduce global carbon emissions and support transition to a green economy in urban environments.[19] A case from Mexico illustrates how these IFC-funded projects can

[11] Beautyman, M. 2008. *HOK Designs First LEED Gold for Latin America*. Interior Design, online publication.
[12] Green labour refers to all of the additional work (such as construction, installation and maintenance) required to facilitate green equipment and services, in other words, the labour that is not required to create conventional buildings.
[13] Caixa de Previdência. 2011. *Edifício Sustentável é Destaque na Imprensa (Sustainable Building is Featured in the Press)*. Caixa de Previdência, online publication.
[14] EcoD. 2012. *Retrospectiva 2012: Seis Construções que Receberam Certificação Leed no Brasil (2012 Overview: Six Constructions Received LEED Certification In Brazil)*. EcoD, online publication.
[15] Caixa de Previdência. 2011, above n13.
[16] Mapp, C., Nobe, M. C., Dunbar, B. 2011. The Cost of LEED — An Analysis of the Construction Costs of LEED and Non-LEED Banks. In: *Josre* 3(1) 254-273.
[17] Buildings must be certified before 5th June 2016.
[18] Managan, K. *et al.* 2012. *Driving Transformation to Energy Efficient Buildings: Policies and Actions: 2nd Edition*. Institute for Building Efficiency, Johnson Controls, Milwaukee, WI.
[19] World Green Building Council. 2013, above n2.

play out in developing countries. Since 2008, the IFC has been collaborating with VINTE, a Mexican company that specialises in green housing for low and middle-income families. VINTE has built 8,500 homes over the last six years, serving as a business model for the rest of Mexico. In their most recent collaboration, the IFC finalised its second credit-enhanced bond procurement with VINTE, which provided the company's bond programme with a total of US$84 million. Loan guarantee programmes such as these help mitigate risk for investors wary of committing large funds to emerging markets. In addition to loan guarantees, IFC provides VINTE with lending services and equity investment. [20]

In collaboration with the World Green Building Council, the IFC also runs its own green building international certification scheme called Excellence in Design for Greater Efficiencies (EDGE), aimed at rapidly scaling-up green building construction in emerging markets. This new programme is helping to "democratise" the green building market by promoting resource efficiency in developing countries and extending green building gains beyond niche, top-tier clients to the mass market (Figures 3 and 4). The programme was announced in July 2013, with pilot projects operating in Brazil, China, India, Mexico, and South Africa, and another 20 countries to be selected for 2014. Developers in participating countries gain access to online tools for assessing construction projects and resource-saving solutions, all based on local climate considerations for the region in question. Furthermore, to establish cost efficiency, EDGE carries out impact analysis at every stage of the building process (to identify, for example, reduced material costs during construction and lower maintenance and operating costs after construction completion). [21]

The United Nations Framework Convention on Climate Change (UNFCCC) developed the Nationally Appropriate Mitigation Actions (NAMAs) in 2007. The NAMAs database facilitates green project financing, capacity building, and/or technology transfer in developing countries by helping decision-makers identify feasible opportunities and, subsequently, linking those opportunities to technical

Figure 3: EDGE Residential Case Study

PROJECT TECHNOLOGY	COST SAVINGS (US$)
Low-energy lights (limiting power density)	110 / yr
Solar collectors (hot water)	110 / yr
Low-flow taps (kitchen sinks)	20 / yr
Dual flush toilets	20 / yr
Hollow concrete blocks (external walls)	100

PROJECT'S FINANCIAL DETAILS	
Incremental capital costs	US$500
Energy cost savings	37%
Water cost savings	40%
Payback time	3 years

Source: IFC. 2013. *Introducing EDGE*. IFC, Washington, DC.

support and funding. Geographically, with 45%, Latin America has the highest concentration of NAMAs, followed by the Middle East and Africa with 37% and Asia with 18%. As of 2012, there were fewer than 5 projects in the implementation and planning stages worldwide. There are, however, 45 projects in the conceptualisation stage. In terms of the distribution of NAMAs by sector, buildings accounted for 11% of all proposed projects submitted to the UNFCCC. Peru is currently in the NAMA conceptualisation phase for the widespread deployment of energy-efficient lighting in its residential, industrial, and public buildings. In general, specific financing mechanisms remain unclear. That being said, NAMAs could emerge as a primary avenue to securing funding from the UN's Green Climate Fund, which is expected to amass US$30 billion in fast start funding and US$100 billion per year by 2020.[22] Though still uncertain, the effects of this fund could dramatically alter the investment landscape for emerging green economies.

Lastly, effective integration of green economy goals, such as green buildings, across various government agencies and industries is challenging. To drive solutions,

[20] Price, E. 2011. *IFC's Support will Help VINTE Build Green and Affordable Housing for Low- and Middle-Income Families in Mexico*. International Finance Corporation, online publication.
[21] Willet, B. 2013. *New Effort to Accelerate the Construction of Green Buildings in Emerging Markets*. Environmental Law Resource, online publication.
[22] Van Tilburg, X. *et al.* 2012. *Status Report on Nationally Appropriate Mitigation Actions*. Mitigation Momentum, Amsterdam.

in 2007, the World Bank started a low-carbon building development planning project called the Energy Sector Management Assistance Program (ESMAP), which helps streamline climate-related needs assessments, planning, and programme implementation strategies for developing countries. Government donors such as Belgium, Canada, Denmark, Finland, France, Germany, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom also support ESMAP. The programme expects to achieve an 18 million tonne reduction of CO_2 equivalent per year, with a net benefit of US$62 per tonne to participating developing countries.[23]

Figure 4: EDGE 3-Star Hotel Case Study

ENERGY EFFECIENCY MEASURES	ENERGY SAVINGS (% total baseline consumption)
Window glazing	7%
Solar shading	5%
Glass performance	11%
Efficient air-conditioner	6%
Heat recovery	1.5%
Solar collectors	5%
Low-energy lights	6%
TS flourescent lamps	0.4%
Movement control sensors	0.5%

PROJECT'S FINANCIAL DETAILS	
Incremental capital costs	US$300,000
Cumulative energy savings	30%
Energy cost savings	US$144,000
Payback time	2 years

Source: IFC. 2013. *Introducing EDGE*. IFC, Washington, DC.

ESMAP is a comprehensive process, which uses thorough data collection, advanced climate-scenario analysis, refined stakeholder engagement and careful prioritisation of mitigation strategies. In the case of Brazil, ESMAP used four advanced climate-related scenarios – the Brazilian Land Use Model (BLUM), Simulate Brazil (SIM Brazil), the Marginal Abatement Cost Tool, and the Energy Forecasting Framework & Emissions Consensus Tool (EFFECT). These scenarios will help to develop more refined cost-benefit analyses between new, green projects (such as green buildings) as compared to conventional approaches. ESMAP analyses and support led to the development of Brazil's 2010 Low Carbon Study in which increasing energy efficiency is identified as a key goal, among others. As a result of this report, the World Bank allocated US$99 million to a partnership with the Brazilian Ministry of Mining and Energy, which will focus on a technical assistance programme to help achieve these goals.

NATIONAL GOVERNMENTS' EFFORTS TO GREEN LOW-INCOME HOUSING

With regards to green building promotion, the above sections show the invaluable roles played by certification schemes, as well as international support and finance. However, to tackle energy inefficiencies across all social classes in developing countries, there is a strong need for government programmes to promote or incorporate building efficiency targets.

Figure 5: ESMAP Participating Countries

Country	Completed ESMAP (yr)
Brazil	2010
China	2010
India	2010
Indonesia	2010
Macedonia	2012
Mexico	2010
Nigeria	2012
Poland	2010
South Africa	2010
Vietnam	2013

In 2004, Mexico developed energy-efficient housing policies under the National Housing Commission (CONAVI) to help meet both development and climate objectives of the country. In 2012, thanks to NAMA, a residential building efficiency programme expanded from 150,000 homes up to 800,000 per year.[24] In 2007, The National Workers' Housing Fund (*Instituto del Fondo Nacional de la Vivienda*

[23] World Bank. 2006. *Mexico: Technical Assistance for Long-term Program of Renewable Energy Development*. World Bank, Washington, DC.
[24] Managan *et al.* 2012, above n17.

para los Trabajadores – Infonavit) started a green mortgage programme to provide additional credits to workers to buy homes and technologies that reduce residential CO_2 emissions, water use, and energy consumption. Solar water heaters, thermal roof insulation, and energy-efficient electrical appliances (such as air conditioning) are just some of the measures funded by the programme. By 2011, over 630,000 green mortgage loans were granted, reducing energy consumption between 30% and 50% compared to homes funded with loans outside the programme; and also reducing an average of 0.8 tonnes/CO_2eq per year per mortgage. [25]

In 2005, Brazil's National Agency of Electric Energy (*Agência Nacional de Energia Elétrica* - ANEEL) assigned 50% of its US$876 million fund for energy efficiency projects to low-income housing. In 2010, this figure increased to 60% and the funding mechanism was tied to the Social Electricity Tax (*Tarifa Social de Energia Eléctrica*). [26] In 2007, Brazil also started to pursue market-based reforms to address a substantial low and middle-income housing deficit. The My Home My Life (*Minha Casa Minha Vida*) programme was launched as part of the US$349 billion Acceleration of Growth (*Programa de Aceleração do Crescimento* - PAC) programme which ran from 2007 to 2011.[27] Since 2010, the programme has been addressing environmental concerns. For example, two low-income housing projects in Juazeiro, Bahia, received US$3.1 million through Brazil's Federal Savings Bank (*Caixa Economica Federal*) to install rooftop solar technology.[28]

Each household receives a monthly bonus of US$48 for its rooftop energy system, which is connected to the grid and sold to the broader energy market in the region. Two more disbursements have already been approved for the PAC programme for the periods 2011 to 2014 and post-2014 – accounting for an additional US$872 billion.

In 2005, Cuba faced a supply-side energy crisis. The government identified increasing household efficiency as the most cost-effective solution to the problem. The newly created National Savings and Energy Efficiency Strategy (*Estrategia Nacional para el Ahorro y la Eficiencia Energética*) targeted the country's 3.3 million homes and their appliances. Overall, 2.5 million refrigerators, 250,000 air conditioners, a million fans, 9.5 million compact florescent light bulbs, over 230,000 TVs, and more than 260,000 water pumps were provided. Households that used kerosene received support to purchase electric rice cookers, stoves, and heaters. From 2006 to 2008, the programme saved more than 651,000 tonnes of oil,[29] equivalent to 4.8 million barrels.[30] In terms of cost savings, the programme saves Cuba approximately US$276 million per year and demonstrates very positive cost-benefit ratios (Figure 6). [31]

Figure 6: The Benefit-Cost Ratio of Fans and Fridges in Cuba's Energy Efficiency Programme

ENERGY EFFICIENT EQUIPMENT	FANS	FRIDGES
Cost of investment (million Euros)	10.4	383
Annual energy savings (MWh)	62,640	1,147,500
Useful life (years)	7	15
Total energy savings (MWh)	438,480	17,212,500
Benefit (million Euros)	88	3,443
Benefit-to-cost ratio	8.4	9

Source: Seifried, D. 2012. *The Energy Revolution in Cuba- A Model for Climate Protection?* Quadrat, Freiburg.* On average, in 2005, 1 Euro = 1.38 USD.

[25] Infodavit. 2011. *Green Mortgage Program*. Infodavit, Mexico City.
[26] Mexican Ministry of Energy Development. 2012. *National Energy Effeciency Plan (Plano Nacional de Eficiência Energética)*. Departamento de Desenvolvimento Energético, Mexico City.
[27] Loudiyi, I. 2010. *Brazil Announces Phase Two of the Growth Acceleration Program*. World Bank, online blog.
[28] Petronoticias. 2013. *Caixa Financia Microgeração Solar e Eólica em Conjuntos Habitacionais (Solar and Wind Microgeneration Funding for Residential Housing)*. Petronoticias, online publication.
[29] United National Electricity. 2009. *La Eficiencia Energética en Cuba. Resultados y Perspectivas*. Unión Eléctrica Nacional, Havana.
[30] British Petroleum. 2013. *Oil-Electricity Conversion Factors*. BP, online publication.
[31] Seifried, D. 2012. *The Energy Revolution in Cuba- A Model for Climate Protection?* Quadrat, Freiburg.

CONTEXTUAL FACTORS

ENABLING THE DEVELOPMENT OF GREEN BUILDINGS

Despite growing demand, green building is still a niche market and a demand-driven industry, primarily focusing on corporate and government offices or high-end residential buildings. The key barriers to wider adoption of green buildings in Latin America are: higher upfront costs compared to conventional buildings, high levels of poverty, lack of public awareness and lack of green building professionals.[32] Partnerships between professional associations, investors, research institutions and legislators are needed to breakdown these barriers.

In Latin America, the green building movement gained a lot of momentum with the LEED certification system. In the middle of the last decade, Latin American project developers, engineers and architects worked together to promote LEED because it was a globally recognised green building label. As mentioned earlier, Brazil, Mexico, and Chile are among the top 10 countries in the world ranking of LEED-registered buildings. There are various factors that help to explain the exceptional performance of these countries.

In the case of Brazil, even though the country has a relatively low rank in terms of its ease of doing business (130 out of 185),[33] it has superb infrastructure, a high concentration of multinational companies, and some of the most expensive office space in the world.[34] As for Mexico, the key reasons it ranks so well can be attributed to the ease of doing business there (48 out of 185)[35] and geography: it shares a border with the United States, the founder of LEED and the world leader in LEED-certified buildings. Lastly, Chile, vastly smaller in size and population than the former examples, is arguably one of the most stable countries in Latin America, with great infrastructure, and reportedly the easiest country to do business in all of Latin America (37 out of 185). Additionally, Brazil and Mexico's high ranking in terms registered green buildings in the region can be partly attributed to the sheer size of their populations and economies – a similar situation is found in India. However, there is also a strong policy component that helps explain their surge to the top.

Mexico and Brazil adopted energy efficiency programmes throughout the 1980s and 1990s, early compared to the rest of the region.[36] In Brazil, for example, there are numerous examples of policies bolstering green building: [37]

- 1975 Energy Conservation Studies Programme (*Programa de Estudos da Conservação de Energia*)
- 1985 National Electricity Conservation Programme (*Programa Nacional de Conservação de Energia Elétrica* – PROCEL)
- 2003 Brazilian Label Programme (*Programa Brasileiro de Etiquetagem* - PBE)

Government involvement through specific policies, regulations, incentives, and building codes creates a reliable business environment. Such preconditions spur demand and reduce the perception of risk for motivated project developers and financial institutions to make long-term green building investments. Over time, client and market demand, lower operating costs, higher property values, and branding became key factors driving green building development in Latin America. This was the case in Brazil, which represents the largest and most advanced Latin American green building market, followed closely by Mexico.[38] The inflow of financial support from international organisations and development banks to Latin America for green building programmes is still insufficient,[39] but examples from this Brief show that conditions are improving. Interestingly, Latin American governments have made more direct interventions in greening low-income housing than high-end green buildings. This can be attributed the reduced complexity of engineering in low-income housing, as well as the broad overlap with existing government social programmes and policies.

Successful industry-wide, green building partnerships in Latin America have occurred in countries that demonstrate the following key characteristics: transparent regulatory

[32] World Green Building Council. 2013, above n2.
[33] International Finance Corporation. 2013. *Doing Business 2013 Fact Sheet: Latin America and the Caribbean*. IFC, Washington, DC.
[34] Cushman & Wakefield. 2013, above n6.
[35] IFC. 2013, above n32.
[36] IDB. 2012, above n5.
[37] Mexican Ministry of Energy Development. 2012, above n25.
[38] McGraw Hill Construction. 2013. *World Green Building Trends*. McGraw Hill Construction.
[39] Díaz, L. A. G. 2008. *Toward Sustainable Financing and Strong Markets for Green Building: Green Building Market and Finance in Mexico*. Synergia Capital, Veenendaal.

and institutional frameworks; operational maturity; consolidated technical expertise; political support to attract the private sector and solid long-term financial facilities and programmes.[40] Both Brazil and Mexico needed to address various legislative aspects before launching their wide-scale programme to ensure the three pillars of successful partnerships were in place: transparency, predictability and accountability.[41] Transparency ensures that bidding requirements and contract terms are clear. Predictability ensures that the private sector knows its rights and responsibilities. Accountability is important because it allows the government to uniformly enforce standards. All this requires stable macroeconomic policies, efficient foreclosure legislation, strict requirements on low-income housing construction, and rigorous financial reforms.[42] In low-income housing projects, governments tend to cap the rate of return allowed to investors in order to prevent the private sector from extracting unfair margins from the poor. However, some level of profit should be offered to market participants in order to attract them to invest.[43]

[40] Economist Intelligence Unit. 2010. *Evaluating the Environment for Public-Private Partnerships in Latin America and the Caribbean: The 2010 Infrascope*. IDB, Washington, DC.
[41] Marks, A.T. 2010. Public Private Partnerships: Navigating the Water in Latin America. In: *Latin American Law and Business Report* 18(4).
[42] IDB. 2007. *Promoting Private Sector Participation in Low-Income Housing Finance: Diagnosis and Policy Recommendations for Latin America and the Caribbean*. IDB, Washington, DC.
[43] Gonzales Arrieta, M.G. 2005. Mortgage Loans and Access to Housing for Low-income Households in Latin America. In: *CEPAL Review* 85 111-123.

LESSONS LEARNED

1 The use of internationally recognised green building standards simplifies the way in which green buildings are supported at local and national levels because they build on internationally acclaimed standards. If these standards are supported by a formal partnership of associations and organisations that represents the interests of the building industry, such as the case of the national Green Building Councils across Latin America, this may assist the expansion of the green building industry into other developing countries in the region.

2 Governments play a significant role in the transition to a greener construction industry by supporting policies, programmes, and organisations that drive energy efficiency gains in the construction industry. Pro-efficiency policies can be incorporated into existing building codes and housing programmes. However, where government action is weak, solid green labelling systems supported by a wide partnership of industry professionals, such as the LEED certification system, provide a powerful way to initiate a national green building programme.

3 The involvement and genuine commitment of government, international organisations, and development banks have been critical for improving and expanding green low-income housing. However, scalability in this sector is an iterative process. Generally, it is only possible to launch a large-scale "green" low-income housing programme after the government or organisation tests the specific development first.

4 In order to make green housing more financially accessible it is necessary to tackle housing costs, financing and the price of construction. The Latin American examples show that public-private partnerships are an effective way of achieving this end, with the government providing a certain amount of subsidies, and the private sector contributing its financial and technical capability.

5 Much of Latin America has already experienced a demographic wave of urbanisation. Asia and Sub-Saharan Africa have an opportunity to leap frog a generation of buildings in their urban areas. By developing green partnerships and policies that incentivise and hold accountable the real estate industry, there is an opportunity for leaders to bolster green economies in their countries by modernising one of the most resource-intensive physical components – their buildings.

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