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DEVELOPING BUSINESS LINKAGES

FOR GREEN AFFORDABLE HOUSING IN ZAMBIA

greenJobs PROGRAMME

United Nations ZAMBIA

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Executive Summary

This report investigates the potential for building business linkages between micro, small and medium sized enterprises (MSMEs) in the construction industry in Zambia and large domestic and international companies and investors. It adopts a step-by-step methodology, taking international firms and property developers through the full process of doing business in the low and middle income housing sector in Zambia – highlighting opportunities to partner with local MSMEs and others stakeholders.

Chapter 1 helps to understand the housing demand by describing the market from the demand side. It discusses the rise of the newly emerging middle class who are driving the continent wide household spending on residential housing construction that is estimated to grow annually by 4.5% between 2008 and 2020. It then draws attention to the fact that Zambia offers investment opportunities for an unmet demand of affordable and quality residential housing estimated at 46,000 units per annum, for a total of 1.3 million new housing units by 2030.[1] Zambians, from the poorest households to the best-off, spend a significant share of their consumption expenditure on housing but scarcity and inadequacy of financial tools make this option impractical for the large majority of prospective homeowners. The infancy of the mortgage market paired with the fact that only a few Zambian commercial banks offer mortgage finance, mainly to commercial clients, results in homebuilders turning to 'home improvement loans' offered by microfinance institutions with high interest rates.

Chapter 2 looks at the characteristics of the construction market for residential housing by examining its three segments that are firstly the construction of complete housing units, secondly incremental building, upgrading and retrofitting, and thirdly the construction of expandable starter cores. It then proceeds to examine the matrix of business opportunities for international firms and for local MSMEs. It launches into a discussion about the business case for green building for property developers, as in many developing countries conventional construction techniques struggle to meet housing demands, and shows that building materials are the single most promising area for reducing construction costs and introducing green technologies.

[1] UN Habitat(2012) “Zambia Urban Housing Sector Profile"

Chapter 3 outlines four successful business models and best practices in the construction industry that cater to the low market segment, and addresses challenges like the lack of mortgages or skilled labour, inherent to the Zambian context. It examines the housing value chain by looking at the sourcing & design, production & construction, distribution, marketing & sales and after sales service & recycling, in order to identify opportunities for business linkages for MSMEs. From there, it explores the importance of developing local green building materials to thwart the negative price effects of a heavy reliance on imported materials, and shows that facilitating finance for green retrofitting is key. It presents four business models: Incremental Building Approach; Facilitating Finance for Green Retrofitting; Standardising Processes and Employment of Unskilled Labour; and Developing Local Green Building Methods, using case study examples from Lafarge, Kuyasa, Moladi and Enviro Board respectively.

Successful inclusive business models can only work in an enabling ecosystem; **Chapter 4** shows some of the existing gaps and roadblocks, reviewing possible medium and long term solutions, and calls for actions in the short-term. The core barrier remains the different needs of very low-income and emerging middle income families that demand that products are designed to match the needs and aspirations with affordability. A lack of practical examples of green housing on the side of the project developer, and little awareness of the green and affordable housing movement, however is a barrier to any ongoing efforts to mainstream practices. Furthermore, there is the need for an overall coordinating mechanism, responsible for orchestrating the stakeholders and facilitating the implementation of these actions.

Partnerships are vitally important at all levels and they have a crucial role to play in capacity building and creating sustainable employment which also align with the aims of the Zambia Green Jobs Programme. As we consider the 'business case' due consideration is given to the support necessary for building companies, building developers, building owners and investors, as well as tenants to form strong partnerships ensuring capacity sufficient for the large scale implementation of affordable green building projects.

Government, private business and the wider civil society all have a role to play; actions to address existing barriers are included as building sustainable construction value chains requires a structured and co-ordinated approach which engages with all existing and potential stakeholders.

Taken together, the actions put forth provide a comprehensive framework aimed to steer the trajectory of the Zambian building construction industry in the direction of more inclusiveness, competitiveness and sustainability. It does however provide sufficient flexibility to allow systematic monitoring and adaptation of individual elements, should they not be working efficiently.

From the outset it is understandable that there is no "one-size fits all" approach which can be taken; a number of innovative business solutions already operating in other developing

countries offer considerable potential for Zambia. The four short case studies presented in the report, illustrate different but successful approaches taken to the provision of affordable housing, with particular reference to low and middle income affordable housing solutions.

The implicit use of green technologies, a commitment to environmental responsibility and the adherence to the principles of sustainable development are all aspects which in respect of large multinational companies is already embedded in most cases; one of the challenges is to embed this *modus operandi* at all points in the value chain. Solutions to address these issues in the short to medium term are presented for all stakeholders to consider.

Introduction

Zambia's long-term development objective, as articulated in the National Vision 2030, is "to become a prosperous middle income country by the year 2030." The associated goals call for policies that accelerate and sustain economic growth, and which enable the poor to participate in, and benefit from, the growth process. The theme of the Fifth National Development Plan is Achieving Broad Based Wealth and Job Creation.[2] The Zambia Green Jobs Programme will contribute to this objective, in particular by stimulating investment, entrepreneurship and decent employment creation within the MSME sector and through the adoption of 'pro-poor' business models.

The programme seeks to unlock the job creation potential of the rapidly growing building construction sector in Zambia and aims to strengthen the value chain for green building goods and services, from local production of environmentally friendly building materials through to more energy efficient building design (see Annex I).

The building construction industry, especially the residential housing sub-sector in particular, offers excellent potential for enabled MSMEs to adopt internationally competitive, state-of-the-art sustainable construction methods, at the same time helping to:

- Reduce building costs and energy bills;
- Enhance supply capacity, national competitiveness and local value-addition;
- Avoid environmental damage from deforestation, waste and inefficient energy use.

Foreign direct investments (FDI) have been a significant driver of new job creation in the Zambian construction industry, with roughly 1 in 8 formal sector jobs a direct consequence of being originated by FDI (see Table 1). Over the past decade, the construction sector has been Zambia's highest growth industry, recording average annual growth of more than 15% and contributing nearly 10% of GDP in real terms.

There are currently a range of real estate developments underway in Zambia (Chapter 2) that might offer particularly strong opportunities for impact investment and green FDI into Zambia's emerging green building construction industry (see Annex II).

[2] In full, "Broad Based Wealth and Job Creation through Citizenry Participation and Technological Advancement".

Table 1: Foreign Direct Investment in Zambia and Employment Generation, 2014

	FDI, % of total investment value	Employment
Agriculture	5.90%	50275
Construction	**10.81%**	**27807**
Energy	14.16%	1426
Manufacturing	19.59%	70871
Mining	38.75%	23822
Tourism	5.61%	12715
Transport	0.92%	3845
Others	4.25%	30899
TOTAL	**100.00%**	**221660**

Source: Zambia Development Agency, Investment Database.

This report sets out to analyse the building companies, building developers, building owners and investors who are the ultimate decision-makers when it comes to financing and implementing green building projects, as well as the tenants who drive market demand. It serves as a useful practical guide for government and other agencies tasked with advancing opportunities for establishing a long-term sustainable affordable housing sector in Zambia. In particular, it provides concrete actions and suggests solutions that could be integrated in the country's investment promotion and linkages development, including useful promotion and facilitation tools that could be embedded in the Zambia Development Agency (ZDA)'s activities to attract foreign investors and assist local MSMEs.

Methodology

The aim of the study was to draw upon the wealth of practitioner experience and to distil their insights on building successful business models in the affordable housing sector. The study puts a special focus on affordable and green housing business models that would work in Zambia to develop sustainable business linkages.

In compiling the experiences of existing companies, we applied sound methods of modern qualitative research including case studies, interviews and focus groups.

We first assembled a list of 78 case studies on housing business models for low-income households via desktop research on the internet and reports. From these we selected 30 cases for in-depth analysis. The cases selected not only demonstrate successful examples of affordable housing businesses, but contained a sufficient level of detail for analysis. Our selection was also determined by the need for a diverse set of cases in terms of technology and type of business model (building material, project developer, construction companies, etc.) (see Annex III).

Our analysis of the selected cases was based on a protocol guided by the following main questions:

- **Business model**: What products and services do companies offer? Who is the target group? How are the products financed? What are the green aspects of their business model?

- **Ecosystem**: How are companies embedded in their ecosystem? How do they finance themselves? How do they acquire information? What are their incentives? Which partners do they work with?

- **Operations**: How do these companies organise their operations along the value chain? How do they source their raw materials? How do they manufacture their products? How do they distribute and sell them? How do they ensure after sales services like maintenance?

The case study research was complemented by telephone interviews conducted with eleven international and national experts in affordable housing solutions and green building technologies (see full list at the end of the report).

A field trip to Zambia provided the opportunity to meet with local stakeholders and visit sites during the period May 13 – May 28, 2014. This visit to Zambia helped to inform the choice of business models that would best suit the Zambian context. During 15 meetings and interviews, the research team discussed various business models with local experts and practitioners in Lusaka and in the Copperbelt and identified four models suitable to Zambia, which are presented in chapter 3.

Chapter 1: Understanding Housing Demand

The need for housing is universal and there is a massive shortfall in the provision of affordable housing in Zambia. However, one must delve a little deeper to appreciate fully the extent to which needs vary, particularly for the lowest income groups whose attentions are focussed on the basic needs of food and shelter.

Table 2: Characteristics of Low and Middle Income Housing Needs

	Low income families	Middle income families
Need	Shelter, security	Aspirational home
Way homes are built	• Informal buildings in need of improvement • Community projects, public housing	• Incremental Building • Whole House Construction
Financial situation	Unsteady income, very little savings or collateral	Regular income, might have savings and lending history
Access to financial services	• No Financial Services, often unbanked • Micro-Finance • Access to Subsidies	• Limited Financial Services, • Micro-Finance • Sometimes access to Subsidies
Partners for building homes	Public sector, NGOs	Commercial companies

Source: UNCTAD survey.

As people move up the income ladder, their housing needs also change. Neither the need of low nor the need of lower-middle income families can be solved maintaining the construction industry's traditional approaches because people invariably lack the financial means to build and/or buy a house. Thus, there is a clear need for a holistic strategy to address the different challenges of the unmet housing demand.

1.1 The Market for Low and Middle Income Housing

The unmet demand for affordable and quality residential housing in the emerging world presents one of the biggest challenges and investment opportunities of our time. Comprising such major spending items as rent, mortgages, home improvements and building extensions, the total market for low and middle income housing in the developing world is conservatively estimated to be worth at least some US$200 billion globally over the next ten years.[3]

With stable and strong economic growth, youthful demographics and increasing urbanisation, Africa now is firmly part of that story. In 2010 Africa had 51 cities with more than a million inhabitants. By 2040, it is expected to have more than 100 cities.[4] Across the

[3] J.P. Morgan Global Research (2010) "Impact Investments: An emerging asset class".
[4] Deloitte on Africa (Issue 4, 2012) "Construction on the African Continent: Opportunities, Risks and Trends".

continent, household spending on residential housing construction is estimated to grow annually by 4.5% between 2008 and 2020.[5]

The rise of the newly emerging middle class drives much of this booming demand, in Africa and beyond. Yet an increasing number of housing developers are finding ways of partnering with international companies, the public sector, non-governmental organisations (NGOs) and MSMEs in order to reach lower income market segments as well. To provide companies and policymakers with a practical guide on how to make this happen, as a first step, it is important to understand the demand side of the equation.

Figure 1: Residential Housing Construction Market Hotspots: Zambia

The Opportunity: Estimating Zambia's low and middle income housing demand

There is enormous potential for residential housing development in Zambia, particularly in the capital city of Lusaka and in rapidly growing towns in the Copperbelt and North-Western province, where Zambia's mining companies are creating large-scale new housing developments for their employees with the help of private developers. UN Habitat estimates a population growth and urbanisation driven demand for 1.3 million new housing units by 2030, recommending an annual delivery rate of 46,000 units (compared to an actual annual delivery rate between 2001 and 2011 of barely 11,000 units). In addition, there is the issue of poor quality housing, and it is estimated that there are a further 800,000 existing households living in unsatisfactory conditions looking to upgrade their accommodation.

1.2 Current Expenditure on Housing in Zambia

With average annual GDP growth of more than 6% for the past decade, driven largely by the mining and construction sectors, Zambia successfully weathered the global financial and economic crisis, and, at a current per capita income of US$ 1,480, has recently been reclassified by the World Bank as a lower middle income economy. Unsurprisingly in light of improved economic condition, the country recently experienced a building boom. The construction sector has been Zambia's highest growth industry, recording average annual growth of more than 15% and contributing nearly 10% of GDP in real terms on the back of public sector funded infrastructure projects and strong demand across the residential housing, office and retail markets.

[5] McKinsey Global Institute (2010) "Lions on the move: the progress and potential of African economies" .

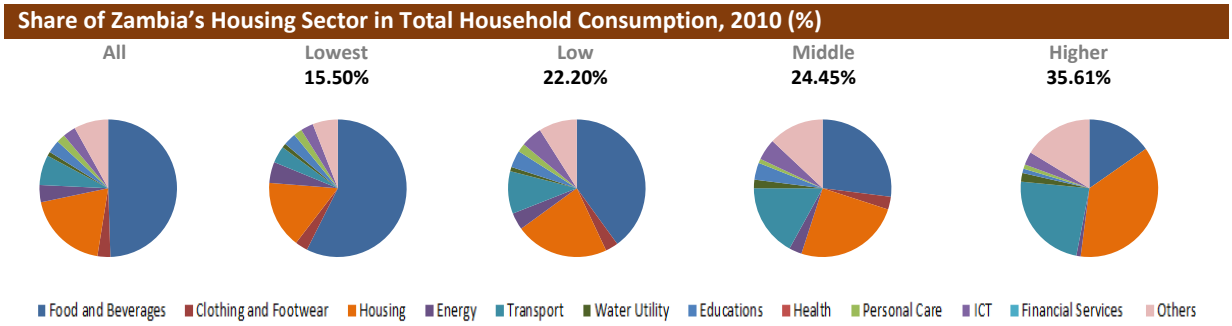
However, notwithstanding the country's recent economic performance, availability of significant disposable income is still limited to a relatively small segment of the population. Some 1.2 million Zambians – only about 10% of the country's citizens – belong to the emerging low and middle classes, almost all of them living in the urban areas.

Table 3: Zambia's Population by Area and Consumption Segment, 2010 (Population; %)

Zambia's Population by Area and Consumption Segment, 2010 (Population; %)								
	Consumption Segment							
	Lowest		**Low**		**Middle**		**Higher**	
Area	**< $2.97 / day**		**$2.97 - $8.44 / day**		**$8.44 - $23.03 / day**		**> $23.03 / day**	
National	11,750,471	(90.9%)	1,009,452	(7.8%)	163,629	(1.3%)	2,857	(< 0.1%)
Rural	7,838,575	(99%)	80,943	(1%)	--	(< 0.1%)	58	(< 0.1%)
Urban	3,911,896	(78.1%)	928,508	(18.5%)	162,548	(3.2%)	2,800	(< 0.1%)

Source: World Bank Global Consumption Database, http://datatopics.worldbank.org/consumption/country/Zambia, *accessed: 21 July 2014*.

Figure 2: Share of Zambia's Housing Sector in Total Household Consumption, 2010 (%)



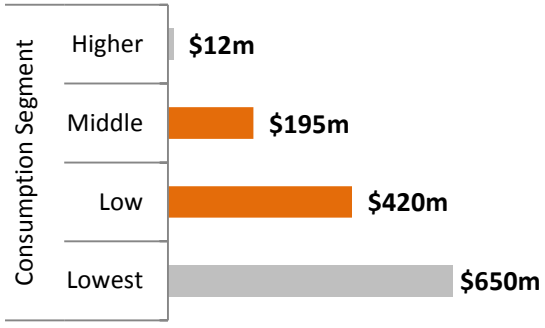
Source: World Bank Global Consumption Database, http://datatopics.worldbank.org/consumption/country/Zambia, *accessed: 21 July 2014*.

Zambians, from the poorest households to the best-off, spend a significant share of their consumption expenditure on housing (Figure 2, orange coloured slice of the pie charts). In total, the Zambian housing market was worth **US$ 1.28 billion** in 2010.

Looking at figure 3, two distinct market segments stand out:

- A largely urban low and middle income market, relatively easier to reach; the annual expenditure on housing is roughly $ 615m.

Figure 3: Zambian's Annual Household Expenditure on Housing, 2010, $PPP



Source: World Bank Global Consumption Database, *accessed: 21 July 2014.*

- A largely informal rural housing market, comprising the majority of the population. The 11.75m Zambians in this market segment spend 650m per year on their homes.

1.3 Housing Affordability and Finance

Conventional property developers are starting to pay attention to the Zambian market as it is difficult for low and middle income families to finance new homes.

Based on primary market research, UN Habitat suggests that for a house in Zambia to be genuinely affordable it should cost between US$10,000 and US$40,000 (ZMW50,000 to ZMW200,000). By contrast, the cheapest newly-built house in Zambia, built by a formal contractor or developer, was US$68,363 in 2013.[6] At such cost, few prospective homeowners in Zambia dispose of the financial means to build or buy a house upfront.

Aggravating this situation is the fact that the Zambian mortgage market – whilst growing rapidly – remains in its infancy. Only a few of Zambia's commercial banks currently offer mortgage finance, predominantly targeted at commercial clients rather than households.

As of 2013, the country's total mortgage loan portfolio stood at US$250.6 million, of which 88% was held by commercial banks and 12% (US$29.4 million) by the country's three main building societies, principally the Zambia National Building Society (ZNBS). Average mortgage interest rates – whether offered by commercial banks or the building societies – are high, hovering around 20%. A key challenge for residential mortgage lenders is access to funding, as the wholesale finance sector and capital market remain underdeveloped. As a simple model calculation shows (Table 4), stringent loan terms, such as equity deposit requirements as high as 20% and short repayment periods further make it difficult to obtain mortgage finance for all but the highest income earners.[7]

Table 4: Affordable financing for a medium cost house?

house value	US$65,000
interest rate	21%
equity/deposit	20%
term	5 years
principal	US$52,000
monthly debt service	US$1,050
Gross Debt Service ratio	40%
required monthly income	**US$2,625**

Source: Model calculation, based on Knight Frank Zambia Research Report (Q3/2011).

As a popular, albeit expensive, alternative to conventional mortgages Zambian homebuilders have turned to "home improvement loans" offered by many microfinance institutions with maximum loan terms of 60 months and 30-42% interest annually. It is estimated that some 20% of all MFI borrowing goes towards housing in this way, even if it is not reported as such.

[6] Centre for Affordable Housing Finance in Africa (CAHF), Zambia Country Profile, http://www.housingfinanceafrica.org/country/zambia, *accessed: 21 July 2014*.
[7] Ibid.

Moreover, those in secure formal employment – principally civil servants – are often able to obtain a favourable assessment of their ability to repay. The usual arrangement is to deduct mortgage repayments directly from payrolls, lowering risk of unsettled repayments.

Globally, a number of successful business models for reaching the low and middle income housing market are based on integrating a financing component in the product offer (Chapter 3.2). However, given the current absence of such models in Zambia, for the vast majority of people the formal housing market remains beyond reach. Instead, the average Zambian household relies on a number of alternative channels – such as incrementally self-building and self-financing houses over a longer period of time – to realize their dream of homeownership. This also has some important implications for the structure of the housing market as a whole (Chapter 2.2).

1.4 Key Stakeholders

This section sums up the key Zambian institutions with regard to their prospective role in creating and enabling business linkages in the Zambian green building construction sector.

Zambia Development Agency (ZDA), established in 2006, is the country's "one-stop-shop". It is the investment and enterprise promotion and licensing agency, thereby the first point of contact for foreign real estate investors and MSMEs. In this regard, the ZDA Act No. 11 of 2006 defines development of housing estate (as defined under the National Housing Authority Act) as a qualifying priority investment sector. ZDA also assists investors with land acquisition and dealing with the National Council for Construction (NCC), NHA and other agencies. Moreover, ZDA houses an in-house division on MSME development and is UNCTAD's designated national counterpart for the Business Linkages and Empretec programmes.

National Housing Authority (NHA), a parastatal falling directly under the Ministry of Local Government and Housing, is technically mandated by the NHA Act (Cap. 426) of 1971 to act as the main housing developer in Zambia, including by entering into Public Private Partnerships. However, despite its name and mandate, the NHA faces considerable challenges meeting its objectives due to erratic government funding, resulting in the organization commercializing its operations to survive. Accordingly, its role has recently been limited to developing a few hundred contractor-built housing units per annum for sale to the emerging middle class in partnership with private developers. Significantly, it has not had the means to service plots and inventory since the 1980s. In its other role, NHA controls land allocation for outright sale to private developers, curbing the influence of local authorities.

Ministry of Local Government and Housing (MLGH): While the National Housing Policy of 1996 aims to allocate 15 percent of the national budget to housing; the government's capacity to make any difference is limited by fiscal constraints. In the 2012 budget, housing development has been allocated a mere ZMK20 billion (US$4 million), representing six percent of the overall budget for infrastructure and support services. A new housing policy is being drafted – this, however, is a lengthy process.

Local authorities have seen their direct housing function taken away by NHA. They retain control over planning regulations and enforcing building standards, which few of them are able to fulfil effectively due to staffing and resource constraints. Accordingly, most housing construction in Zambia occurs informally outside local planning guidelines and permissions.

The **Buildings Department (BD)**, under the Ministry of Works and Supply, is formally responsible for the design, construction and maintenance of all Government Buildings in Zambia, including architectural, quantity surveying and engineering tasks. It retains a qualified body of technical staff to this end but is poorly resourced and lacks representation on Tender Selection Committees and political clout with other government departments (e.g., Health, Education), which have frequently put into place their own parallel structures.

National Council for Construction (NCC), established in 2003, is the statutory and regulatory body for the Zambian construction industry. In conjunction with the Zambia Bureau of Standards (ZABS) it is also tasked with the development of standards for local and new construction materials. The NCC comprises two operational departments: Training ("Construction School"), offering a wide range of courses to Zambian contractors; and Registration of contractors and inspection of construction sites. NCC grades contractors in categories (1-6) according to the maximum value for which they can tender. The NCC Act No. 13 of 2003 stipulates that only contractors registered with NCC can be engaged for construction works, and the organization is able to enforce this with regard to government tenders and foreign companies, thereby acting as the gatekeeper between the formal and informal construction sectors.

Industry Associations: Zambian building contractors registered with NCC may choose to affiliate either to the **Association of Building and Civil Engineering Contractors (ABCEC)** [for grades 1-4] or to the **National Association for Medium and Small Scale Contractors (NAMSSC)** [for grades 5-6] as well as **Zambia Association of Women in Construction (ZAWIC)**. Affiliation helps in case of contractual disputes and stakeholders indicate a generally high level of satisfaction with the level of representation provided by these associations.

Professional Bodies: Several professional bodies are involved in housing research and development in Zambia. These include the Zambia Institute of Architects (ZIA), the Surveyors Institute of Zambia (SIZ) and the Engineering Institute of Zambia (EIZ). However, according to UN-Habitat (2012), the institutes have been more effective in promoting their member's interests than as pressure groups to catalyse government policies and programmes in the housing sector.

National Pension Scheme Authority (NAPSA), jointly with several other smaller pension funds, is responsible for administering the principal social security programme in Zambia. Having already administered a large real estate portfolio in the past, most of which has subsequently been privatized, there have been renewed calls for NAPSA to become involved in real estate development schemes, with the fund currently developing medium-range

housing projects with NHA (at Leopard's Hill in Lusaka) in addition to a recently completed large retail complex (Levy Junction). In 2008, the National Housing Bond Trust (NHBT) issued its first housing bond on the Lusaka Stock Exchange, with the intent of harnessing capital from pension funds to channel into housing development. Overall, Zambia's pension funds have some US$600 million to invest in real estate development, with most of this managed by NAPSA. The Bank of Zambia (BoZ) is the national regulator for all financial products.

Private Real Estate Developers: Most housing developments in Zambia take place through private households and small-scale contractors. Individual home-owners are limited to ownership of a few housing units. There are, however, an increasing number of private developers owning and financing the construction of bulk housing stock for rent or resale to Zambia's growing middle class. These include a range of foreign investors, notably from China, Malaysia and India, many of whom establish joint ventures with NHA and ZDA. A growing role in this market segment is played by corporate providers of employee housing for Zambia's mining industry and community housing projects funded by the mining sector as part of its Corporate Social Responsibility (CSR) policy[8].

1.4 Target Groups and Delivery Channels

Low and middle income families are the market's target group for companies offering affordable housing. However, business models directed at this group usually only aims at retrofitting, e.g. the improvement of existing homes. Companies, ranging from large international cement manufacturers such as *Lafarge* and *Dangote*, to providers of specialist building materials and elements, to solar equipment providers, do sell directly to private households and have set up local distribution channels to serve the market.

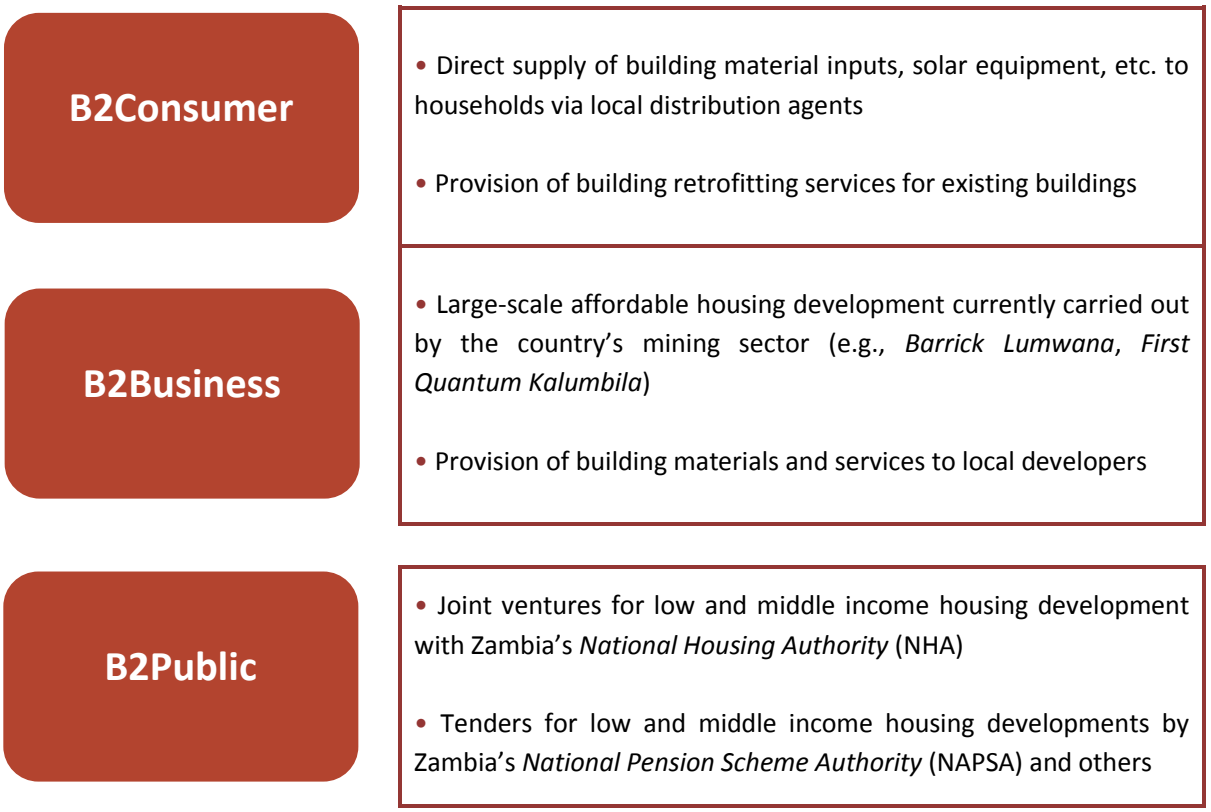
For international or local companies seeking to offer affordable accommodation, families are usually not the first point of contact. A large segment of the low and middle income housing market is an intermediate business-to-business market for construction services and building materials. Currently by far the most significant and large-scale affordable housing development is carried out by the country's mining industry, in order to provide quality and affordable accommodation to its workforce. To do this, mining firms have utilized different business models, ranging from setting up their own property development arms, to contracting local and international private property developers directly, to merely facilitating access for private developers to their workers and providing sites for demonstration houses that would enable their employees to make informed choices.

The public sector, too, is playing a role in the market – for example by entering public private joint ventures for housing development via Zambia's government-owned housing development agency, the *National Housing Authority* (NHA), and the *National Pension*

[8] For example, First Quantum Mines has started the construction of 10,000 housing units in Solwezi at an estimated cost of USD 500 million under its corporate homeowner scheme. The homeowner scheme is targeted at company employees and residents of Solwezi and offers housing finance at preferential rates (Source: Zambia Daily Mail, December 12, 2012).

Scheme Authority (NAPSA), the country's biggest institutional investor in housing development schemes.

Figure 4: Overview of target groups



Companies looking to enter Zambia's housing market will need to make their own informed assessment which of these market channels and entry points is the most appropriate for their product offering, bearing in mind the structure of the market and the most promising business opportunities (Chapter 2).

1.5 The Business Case for Green Building for Prospective Homeowners in low and middle income households

The structure of low and middle income household demand for quality accommodation means that, in order to be attractive, houses need to provide the greatest possible value within a limited and more or less fixed maximum budget. Although the concept itself will often be new to prospective Zambian homeowners, one promising way of achieving this balance is by embracing elements of "green building". This report has made a conscious decision to focus on the economic benefits of green building because green buildings have a range of important and well-documented environmental benefits.[9] From the demand side, there are two aspects to this: a building's upfront construction costs, and its subsequent maintenance and operating costs. The mainstream real estate industry has accepted and embraced the notion that green buildings save money through reduced energy costs from

[9] World Green Building Council (2013) "The Business Case for Green Building: A Review of the Costs and Benefits for Developers, Investors and Occupants".

heating, cooling, lighting and ventilation as well as reduced water consumption. The energy savings in green buildings typically exceed the higher design and construction cost within a reasonable payback period.[10] Thus, any upfront cost increases in green buildings are offset by a decrease in running cost and might add up to lower cost over the life cycle of a building.

Whilst this argument is compelling – and green real estate, globally, is growing fast – two caveats must apply in a developing country such as Zambia.

Firstly, whilst the "life cycle cost" perspective may be very relevant for commercial properties and others, in the residential market prospective Zambian home-owners, whether they are self-building or buying a complete unit within a larger development, have a more or less fixed maximum budget for their home acquisition. Consumer education can and should play an important role here to raise awareness but, ultimately, consumers will also need to be "financially empowered" to make the right decision, as one industry expert put it.[11]

Secondly, however, the cost of green buildings is not always more expensive than conventional ones. In fact, as emphasized in Chapter 2, a range of alternative, sustainable building materials could potentially reduce the upfront costs of construction; substantially decrease the maintenance costs, increasing affordability significantly.

Box 1. Life Cycle Cost Assessment

Green building advocates have long held great hopes for Life Cycle Cost Assessment (LCCA), where costs and savings associated with construction, and long-term operations and maintenance, are modelled and presented in the form of simple paybacks or more sophisticated financial models with time value of money, Net Present Value and Internal Rate of Return. The hope was that LCCA would allow property developers and home-builders to see exactly how higher upfront costs would more than pay off in the long run. Experiments show, however, that human beings do not always act logically in their decision-making – especially when they still have to pay today's bills before making tomorrow's savings![12]

The benefits of occupancy of a green building for Zambian homeowners are essentially threefold:

- Cost savings from lower energy and water bills
- Self-reliance (e.g., electricity from solar panels, rather than erratic supply from the main grid)
- Health-related benefits and improved quality of life (e.g., better insulation and ventilation of the building; avoidance of hazardous building materials such as asbestos)

[10] Ibid.
[11] *Interview with Lafarge Zambia.*
[12] Source: Based on World Green Building Council (2013).

Importantly, in some way or other, most of these benefits can be realized by homeowners regardless of the size of their initial outlay or the complexity of their building project – be it via energy-efficient light bulbs or solar lighting in an incrementally-built 2-bedroom low income house or a solar geyser water heating system for a multi-unit middle class compound. Some of the most promising green building technologies for the average Zambian homeowner include the following:[13]

Figure 5: Examples of green building technology

For example, **solar water heaters** collect sunlight energy and convert it to heat energy via a solar collector mounted on the roof. Solar-heated water is stored in an insulated tank and replaced by cold 'make-up' water when the tank is drawn upon through the building's water taps. Solar water heaters tend to have a slightly larger hot water storage capacity than conventional water heaters, to account for the fact that enough solar heat must be collected during the day to meet evening and morning requirements. Solar water heaters are a good example of a green building technology that may seem slightly expensive when first purchased, but which over time will subsequently reduce electricity bills significantly. A typical Zambian household water heater stores about 150 litres of water and takes approximately 3 kW to heat. For an average family, this amounts to about 5% of the total monthly energy used by the household and therefore a potential 5% cost saving on its electricity bill every month.[14]

[13] Source: Prashant Kapoor (May 2012) "Financing Green Homes", International Finance Corporation.
[14] Source: *Calculations by Afrospace Architects and Mutinta Sichali Architects.*

Box 2. The business case for green building retrofitting

Green Buildings' maintenance and operational savings are not limited to new buildings. At the international level, public and private developers as well as individual homeowners are increasingly aware of the energy inefficiency of their existing building stock. Common retrofit measures include heating and ventilation system upgrades, replacement of windows, water saving fittings & fixtures and renewable energy installations. One current dampener for the offtake of a Zambian retrofitting market are the high interest rates on home improvement loans. However, as energy prices continue to rise, the relative benefits of energy efficiency will become increasingly important and the business case for energy efficiency retrofits will strengthen.[15]

[15] World Green Building Council (2013) "The Business Case for Green Building: A Review of the Costs and Benefits for Developers, Investors and Occupants"

Chapter 2: Identifying Business Linkages Opportunities in the property market in Zambia

This chapter examines in detail the main economic characteristics of the property market in Zambia, explores a number of business opportunities with a focus on low and middle income residential housing, points at key partners, and details the main costs involved in construction.

2.1 Characteristics of the Construction Market for Residential Housing

In many developing countries, including in Zambia, the inability of the majority of individual homebuilders to access the formal market has given rise to a thriving market in "incremental" house building and extension. Typically financed piecemeal over time out of monthly wages and irregular additional incomes, homebuilders will handle simple works themselves and source building materials from the local neighbourhood hardware shops. For more specialist work such as electricity, roofing and plumbing they might hire architects or local contractors. Buildings are then extended or upgraded as the homeowners personal or family circumstances necessitate and allow.

Local Zambian architects' estimate that the cheapest feasible self-build will cost about US$30,000 (ZKW 150,000) for a 2-bedroom house.[16] Whilst incremental buildings are typically informal, in the sense of being constructed at city outskirts on un-serviced plots – necessitating boreholes for water fetching, and so on – they are far from only appealing to the poor. In fact, Zambia's emerging middle class has been one of the keenest up takers of this form of housing construction, creating new, largely unplanned suburban neighbourhoods in the country's major cities.

Any construction of complete housing units by formal developers aimed at the lower or middle income segment will therefore have to be broadly price-competitive with the self-build option, or offer additional incentives, such as an integrated mortgage plan. Whilst good practices from other African countries and from around the world point to a number of innovative strategies how this can be done (see Chapter 3), the market remains restricted in Zambia.

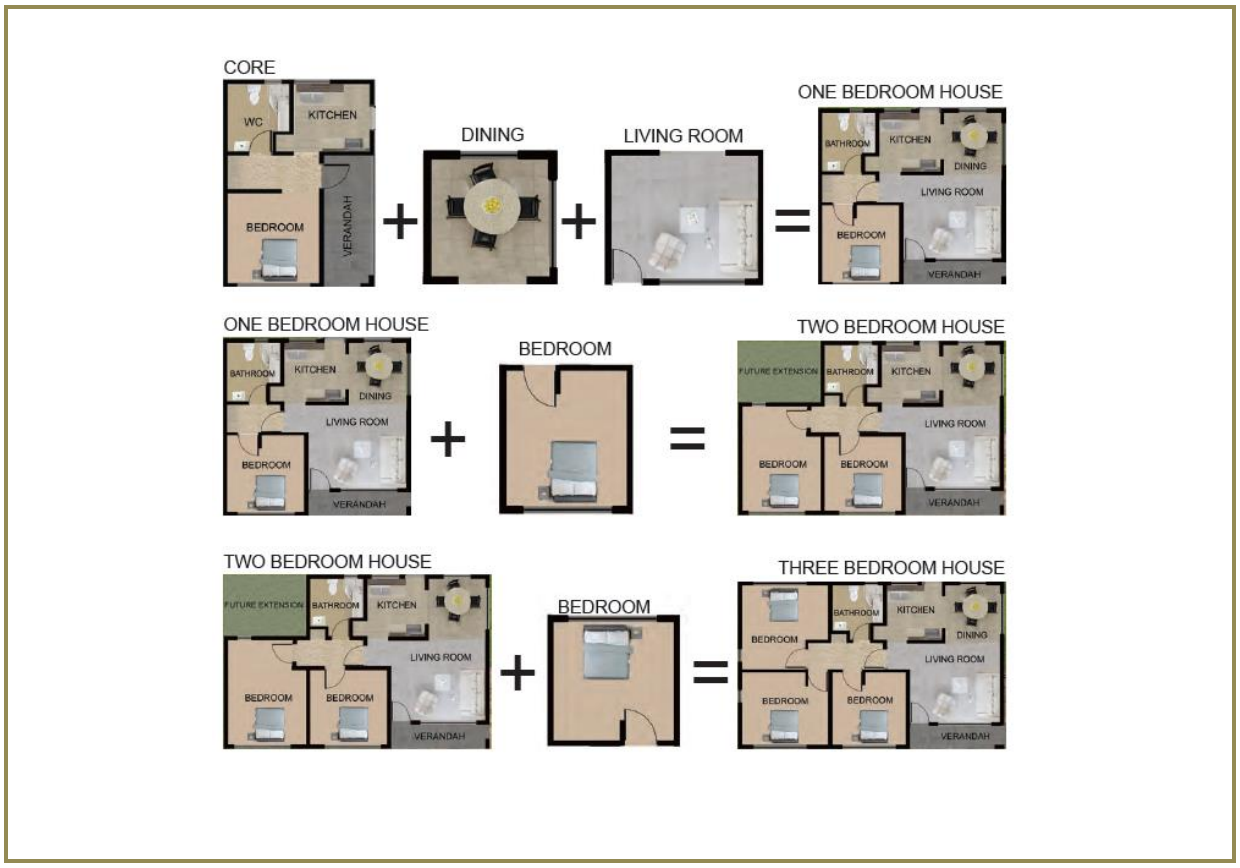
Part of the constraint has been an aversion on the part of Zambian house-buyers to prefabricated homes ("prefabs") due to negative experiences with substandard accommodation of this type in the past. Cultural perceptions strongly favour solid brick structures, and walls are typically subjected to what is locally known as the "knock test". If a knock on the wall produces only a hollow sound, people will not accept the building as their home.

[16] Source: *Fieldwork interviews with Afrospace Architects and Mutinta Sichali Architects, 13-28 May 2014.*

A further peculiarity of Zambia's formal housing market is that, due to the limited availability of mortgage financing, developers are faced with a low sale-to-rental ratio on the properties they build, meaning that they cannot sell off existing properties to raise capital for new developments. To mitigate this, a popular arrangement in Zambia are "lease-to-own" schemes, whereby tenants top-up their rent every month with an amount that will over time build up to become the deposit base for a mortgage.[17] With mortgage repayments roughly set equal to previous rentals, such schemes offer an opportunity to increase home ownership whilst providing sales and refinancing opportunities for developers.

A third element of the housing market – which is still at an early stage in Zambia but well-established elsewhere in the developing world – is the construction of so-called "expandable starter cores". Combining elements of the formal housing as well as incremental building markets, starter cores are effectively pre-approved house design blueprints provided to prospective homebuilders by large-scale contractors, developers and others with an eye to future extension. In this way, they conform to the dynamics of incremental construction whilst ensuring building conformity with set specifications and more predictable market demand over time.

Figure 6: Example of an "Expandable Starter Core" System offered by Lafarge Zambia



[17] AfDB (2013) "African Housing Dynamics: Lessons from the Kenyan Market". Africa Economic Brief, Volume 4, Number 3/2013 and *fieldwork interviews.*

In summary, the market for residential housing in Zambia therefore consists of three segments:

- Construction of complete housing units
- Incremental building, upgrading and retrofitting
- Construction of expandable starter cores

Each of these market segments offers distinct opportunities for both local and international firms interested in serving lower and middle income households. Given the cost consciousness of the majority of Zambia's prospective homeowners, an important key to success is a clear understanding the structure of the Zambian housing market demand and offering an attractive balance of quality and affordability. One promising way of doing this entails embracing innovative elements of "green building", (see chapter 2.4).

2.2 Matrix of Business Opportunities

	… for international firms	… for local MSMEs
Construction of complete housing units  ► *Capital-intensive approach reduces affordability, unless otherwise mitigated*	• Leading bids for new housing development projects (e.g. for workforce accommodation in the mining industry) • Providing advanced technical know-how or building materials to local partners • Transferring successful business models for low and middle income housing to the local Zambian market	• Providing local building material inputs • Sub-contracting works or building-related services from larger firms • Participating in building maintenance • Providing insights into local market conditions to international firms
Incremental building, upgrading and retrofitting  ► *Largest currently existing market segment*	• Working with building material wholesalers to market innovative construction materials and inputs • Developing own distribution channels for building material inputs	• Providing specialist works and services (e.g., electricity, plumbing) • Providing local building material inputs

Construction of expandable starter cores  ► *High affordability and strongly growing demand projected for the future*	• Transferring successful business models for low and middle income housing to the local Zambian market • Developing own distribution channels for building materials and services	• Providing specialist works and services (e.g., electricity, plumbing) • Participating in building maintenance and expansion

2.3 Key Partners: Local Property Developers

Not only is the product an important success factor, international and national construction companies also need suitable partners in the market. It requires co-ordination of disconnected players across the supply chain required to deliver the end product – a building. Local real estate developers play a central role here; their capacity to execute projects as well as to bring well-built units at a reasonable price into the local market is a key determinant of housing supply. In this way, real estate developers function as "integrators" of the various components of the construction value chain.

Some of the key actors in the building market brought together by developers in this way include:

- ***Building contractors*** – depending on the complexity of the project one or more general contractors and various MSME sub-contractors
- ***Building material producers*** – both small-scale producers of local building materials (timber products, bricks, etc.) and potentially international providers of more advanced building components (such as energy-saving, solar and rain water conservation technology)
- ***Building professional service providers -*** especially architects

In Zambia, many local developers are family-owned businesses that grew from an initial one or two housing unit investment into a small to medium-sized operation. Most of these "semi-professional" developers may still lack some experience and capacity in terms of financial management, safety and occupational health, marketing and sales, and relationship management with contractors. Indeed, the difference between such home-grown property developers and individual households planning, financing and supervising their own homebuilding projects may not be very large.

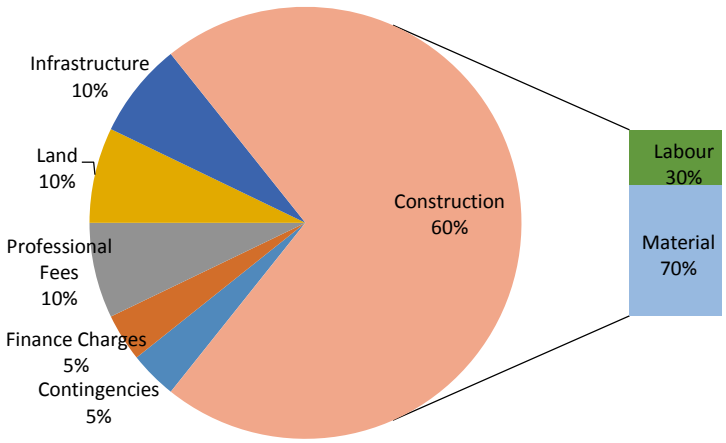
However, there is also a fast-growing number of fully professional property developers in Zambia including local firms that have reached scale, Zambian units of international property development firms and the housing development arms of Zambian corporates. They have all developed considerable expertise in understanding and coping with a range of issues that have an impact on the way the Zambian housing market operates and are thus valuable partners in starting construction businesses in Zambia.

2.4 The Business Case for Green Building for Property Developers

In many developing countries, conventional construction techniques have struggled to meet housing demand. Based on the heavy use of bricks and cement, the "business-as-usual" way of building a house is both slow and expensive. One solution to scaling up affordable housing is to adopt building technologies that make it possible to build good quality houses quickly and at lower cost than the standard Western methods. Recent years have seen a steady increase in the uptake of alternative building technologies in Africa. Prospective low and middle income housing developers have much to gain from these technologies, and from understanding the business case they present.

Residential buildings can be constructed in many configurations, from detached houses to high-rise apartments. Different housing types have different implications for building costs. For developers, the choice of the building solution is usually determined by the targeted market. By far the most common type of low and middle income accommodation in Zambia, based on prevailing market preferences from buyers, is cement built, 2 to 3 bedroom (detached or semi-detached) houses of 80 m^2 to 100 m^2. Similar to conditions in other African markets, the approximate cost structure for building such a unit is as follows: 60% of a unit's total cost on construction (of which 70% in materials and 30% in labour); 10% on infrastructure; 10% on professional fees (architects, engineers, required public permits, etc.); 5% on financing; and 5% contingency.[18]

Figure 7: Cost Structure of Building a Typical Zambian House



Source: AfDB Informal Survey of Developers 2012, Shelter Afrique Information to the Authors 2012

[18] Source: AfDB (2013) "African Housing Dynamics: Lessons from the Kenyan Market", Africa Economic Brief, Volume 4, Number 3/2013 and *fieldwork interviews*

What emerges clearly from this is that building materials are the single most promising area for reducing construction costs, accounting for 42% of the total. In many cases green building materials such as compressed earth blocks or sustainably harvested timber can provide developers with significant cost savings whilst offering residents the same or superior levels of quality and comfort. Hydraform Compressed Earth Blocks, for example, constitute a highly viable alternative to conventional cement blocks. Their thermal insulation is equivalent to 10 times that of cement blocks, significantly reducing heating and cooling costs. Like many African countries, Zambia is endowed with clay-rich natural earth that through compression can be easily turned into cement-like blocks, affording a significant competitive advantage to the use of Hydraform Compressed Earth Block technology compared to European and Asian countries.[19]

A typical Zambian 80m^2 house requires approximately 3000 cement blocks, equivalent to 75 cement bags of 50kg which are commonly found in local building material outlets all over Zambia. Cement blocks are then produced by hand shovelling and filling the appropriate moulds. The material cost for this amounts to about US$ 15,000 (ZKW 80,000), including about 25 tons of concrete blockmix and 12 tons of sand. Alternatively, the same structure could be built utilizing approximately 5500 hydraform compressed earth blocks, for which about 66 cubic metres of packed earth, equivalent to 100 tons, is required. While it is difficult to estimate the price of natural earth, which is currently not fully commercialized in Zambia, as a proxy a 10 ton lorry load of earth costs about $400 (ZKW 2,000); at a total of 5500 blocks, building material costs using earth blocks therefore amount to about US$ 4,000 (ZKW 20,000).[20]

Material cost of a 80m^2 house with traditional concrete *vs* hydraform compressed earth blocks

3000 cement blocks
75x bag of 50kg cement
+ 12 tons of sand
US$ 15,000

5500 hydraform blocks
100 tons of natural earth
+ Block pressing machine
US$ 8,000

[19] ILO (2013) "Actor network analysis of the Zambian building industry"
[20] Ibid.

To produce the hydraform blocks, a one-off payment of about US$ 4,000 for the purchase of a hydraform pressing machine—locally available, for example, from the University of Zambia—will be required, placing the technology within reach even of small contractors and individual building projects. Many other innovative green building materials exist, for example, for roofing solutions. Some of these are similarly based on traditional natural materials, e.g., straw, whereas others have been specifically developed by international companies that might find an interesting new market for their technology in Zambia.

Figure 8: Machine to Produce Hydraform Blocks

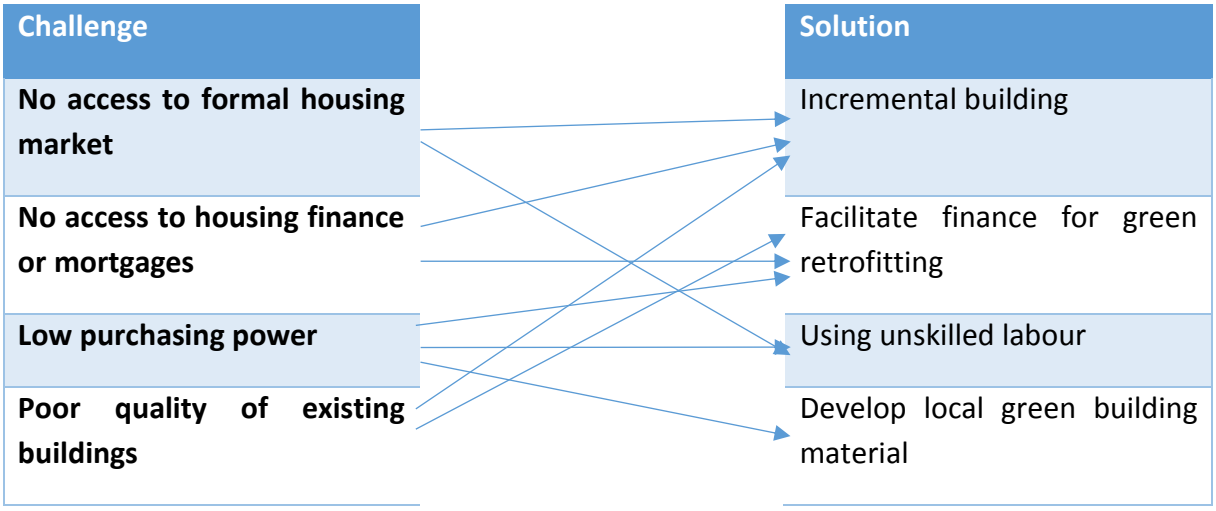
To be successful in the market, green building technologies need to strike the right balance in utilizing the best – ideally locally available – alternative building materials whilst also keeping an eye on social acceptability. As explained in Chapter 2.1, the diffusion of prefabricated building systems ("prefabs"), for example, in Zambia and elsewhere in Africa, has been limited by unfavourable perceptions about their quality and durability. Similarly, "green" construction methods – to the extent that they utilize traditional methods and materials – have sometimes been associated with rural and traditional settings and thereby failed to adequately cater to the "aspirational" dimension of homeownership. Consumer education is therefore often as critical to market success as the green technology itself.

Chapter 3: Four Successful Models for Zambia

The starting point of this study was a database of 30 companies offering affordable housing for the low and middle income markets. They all seek to address the massive shortfall in affordable housing and offer a variety of solutions to whole house construction, incremental building or retrofitting. Some provide building materials; others act as a property developer, whilst others finance new homes. What they all have in common is that they found ways to operate in the challenging affordable housing market. Many of them offer solutions that are environmental friendly due to the use of innovative materials or a higher energy efficiency of their buildings.

This chapter looks at the good practices of some of these companies that offer housing solutions that may be replicated in Zambia. They address challenges in the Zambian market like the lack of mortgages or skilled labour as shown in the figure below.

Figure 9: Challenges and Solutions in Housing Business Models in Zambia



The business models presented on the following pages make use of these solutions, and are all suited to the Zambian market. This chapter presents some case studies of companies which already offer their products and services in Zambia and neighbouring countries to demonstrate that these solutions work in the Zambian context. Other companies may follow their example to help the building of 1.3 million new houses in Zambia before 2030. These can be large building companies from Africa, Asia or Europe or social businesses with an innovative approach – they all will find their share in the vast Zambian housing market that is characterized by large demand and an investment regulation that allows foreign investment while encouraging the use of local procurement.

In addition, we place emphasis on highlighting those aspects which provide opportunities for local Zambian MSMEs to develop business opportunities in the green housing construction value chain.

The business models are structured and described along the construction value chain: starting with the sourcing of building material and the commissioning of service providers including architects for the design of the buildings, the actual building of the house, distribution (more applicable for building materials), and sales to the customer. After completion of the main business it is important not to forget after-sales service like maintenance and the recycling or reuse of derelict buildings and devices.

Figure 12: Housing Value chain

The four models presented in the following pages touch upon specific steps of the housing value chain illustrated above. The relevant ones are highlighted in the description of each model.

3.1 Taking the Incremental Approach

Good Practice Examples		
Company	**Country/Region**	**Website**
Lafarge Zambia	Nigeria, Zambia	www.lafarge.co.zm
Cemex - Patrimonio Hoy	Mexico	www.cemexmexico.com
Domogeo	South Asia	domogeo.com

A number of international building material and modular housing system companies have successfully entered low and middle-income markets in developing countries by leveraging the dynamics of the informal market for incremental building.

They offer building components and materials (bags of cement, modular room extensions, etc.) in smaller, affordable quantities in a structured fashion. This meets the needs of homebuilders who finance their project over time out of their volatile cash flows. These product offerings are often combined with a micro-finance component, either offered by the building company itself or in partnership with a local financial service provider.

As the recent market entry of Lafarge and others indicates, this model holds great promise for unlocking the Zambian market.

Business Linkages for Zambian MSMEs

The approach of building homes over time and without a formal building company offers a variety of opportunities for Zambian MSMEs.

- Construction: Register as certified building service provider: Families usually need support with more specialised tasks like pluming or electric installations. For this, they hire local crafts men and labour. Some of the suppliers of building material like Lafarge pre-qualify contractors and gather them on a list that they provide to their customers.

- Distribution & Sales: Companies that offer incremental housing models need partner in distribution and sales. Small and medium sized retailers for construction material act as a contact point to the end consumers, make customers aware of affordable housing offerings and provide basic technical advice.

- Maintenance work: Once the homes have been built, they need maintenance from local contractors or even the expansion over time. To serve these requests, local craftsmen need to develop their skills with the help of vocational training in public or private institutions.

Case study: Lafarge

Lafarge

- Lafarge was founded in 1833 in France. Today it is global leader in the cement industry, n° 2 in aggregates, and n° 4 in concrete. The company aims at improving the housing condition of 2 million lower income people by 2020. Lafarge Affordable housing programmes are available in 18 countries and have been helping improve the housing conditions for 250,000 people since 2012. In 2013, the initiative generated 2.5 million euros EBITDA[21] at the global level.

Key Features of approach to affordable construction

- The affordable housing offers are part of the core business of the respective subsidiaries of Lafarge in emerging and developing countries. They are profitable businesses aiming at low income customers. The group's local presence and its contacts help to build up a network of distributors and retailers.
- In Zambia, the company offers "expendable starter cores" which are pre-approved house design blueprints that are built by the home owners and small contractors over time with Lafarge supplying building materials.
- Lafarge offers micro-financing with its products to make them affordable. The retailers spread information about the loans and ensure that the money is used on building material; they also control the repayments. For more complicated issues a dedicated team supports customers in all countries.
- The local retailers also provide basic technical assistance for people who construct their house on their own. For families who want to have their house build by professional companies, Lafarge provides a list of approved masons and constructors.

Green and sustainability aspects

- Lafarge develops and offers solutions to promote efficient sustainable construction. It explores practical means of minimising energy consumption in buildings, reducing greenhouse gas emissions of construction, while improving other environmental and social footprints as much as possible.

Business linkages with MSMEs

- A network of retail outlets for consumers to have direct access to Lafarge's products offering.
- Micro-finance industry to be able to offer attractive financing schemes for their customers.

[21] Earnings Before Interests, Taxes, Depreciation, and Amortization

3.2 Facilitating Finance for Green Retrofitting

Good Practice Examples		
Company	**Country/Region**	**Website**
Vinte	Mexico	www.vinte.com.mx
Brilla Promigas	Colombia	www.promigas.com
Kuyasa	South Africa	www.kuyasacdm.co.za

A second set of promising approaches looks at equipping newly built or existing homes with energy-efficient and affordable appliances, such as solar panels and water heaters, insulation or water efficient sanitation facilities.

As we have seen, the lifecycle cost savings of such appliances make them an attractive proposition for Zambian homeowners in principle – but any such product offering needs to be fined-tuned to ensure affordability and appeal. One of the most important elements of these business models is the built-in financing component. Consumers usually cannot afford to buy a solar home system or a solar water heater outright. Providers of these appliances therefore need to partner with a micro-financing institution or provide a payment or leasing scheme over time themselves. A successful distribution, marketing & sales strategy will help building a market with high-visibility information campaigns and dedicated quality standards. Additionally there is the barrier of social acceptance which must be overcome with any solution offered i.e. should 'look', 'feel', and 'sound' right ("Knock-test").

Box 3. Opportunities for Zambian MSMEs

Fortunately, firms hoping to enter the Zambian market with such offerings will find a range of competent local firms that could be involved in distribution, marketing and after-sales services.

- **Involvement in distribution**: Zambian companies that are already active in the distribution of building material or electrical appliance are a natural partner for companies selling building equipment. Technology companies can benefit from existing distribution channels and retail outlets; Zambian companies may enlarge their offerings and learn about new technologies and their implementation.

- **Implementation of marketing campaigns**: Zambian marketing companies can support companies entering the Zambian market, adapting customer information about the advantages of solar equipment etc. matching the needs and aspirations of Zambian consumers and local distributors and helping implement awareness raising campaigns in communities.

- **Installation, maintenance and recycling**: it takes skilled craftsmen to install solar home systems, sanitation facility or solar water heaters. These skills can be acquisitioned through local contractors that now do plumbing and electrical installation. In this way they can become a valuable partner for companies new to the Zambian market; installing, maintaining and recycling their products.

Case study: Kuyasa

Kuyasa

Founded in 2008, the Kuyasa Fund is a non-profit social development organization that uses microfinance as a tool for improving the housing conditions of South Africa's poor communities.

Key Features of Approach to affordable housing Financing

Kuyasa provides microfinance services to South African home owners who are excluded from formal finance. Customers are encouraged to use the funds for renewable energy products such as solar water heaters, stoves, and lamps along with general renovations.

By encouraging poor South African's to mobilize their savings and apply for housing finance, Kuyasa strives to help people capitalize on their assets thereby ensuring financial stability.

Green aspects of the approach

The Kuyasa CDM Pilot Project involves the retrofitting of solar water heater (SWHs), insulated ceilings and energy efficient lighting in over 2,300 low-cost homes in South Africa. This retrofitting has already resulted in much improved energy efficiency and a 56% decrease in number of households spending more than R100/month on electricity.

Business linkages with MSMEs

Kuyasa has partnered with South African renewable energy companies to vertically integrate their solar products. Lighting systems on display in their customer service centres offer clients the opportunity to see and test the products. Kuyasa sells small solar lanterns and reading lights at a nominal price to encourage rapid adoption of solar products.

3.3 Standardising Processes and Employing Unskilled Labour

Good Practice Examples		
Company	**Country/Region**	**Website**
Fez Ta Pronto	Brazil	www.feztapronto.com
Moladi	South Africa	www.moladi.net
TARA Machines	India	www.taramachines.com
¡Échale! a tu casa	Mexico	www.echale.com.mx

A third set of successful business models for reaching the low and middle income housing segment involves standardizing the construction process, usually by adopting a unified construction system based on some alternative building material (such as gypsum, compressed earth blocks or fly ash). This lowers the cost of the construction phase, allowing costs savings to then be passed on to the market to make the offering affordable.

Moreover, because such construction systems usually involve following a simple "step-by-step" approach, they can be easily taught to local semi- or unskilled builders. It is even possible that a community of prospective homeowners builds their houses themselves. Spreading the knowledge about these techniques generates opportunities for micro-entrepreneurship. Larger companies benefit from training small contractors because they ensure that they work according to the standards and the quality needed. In addition to that, they build up a workforce needed to construct houses in Zambia in the long run.
Most such standardised systems are also deliberately based on the utilization of local materials and green construction methods, with very good prospects for successful adoption in Zambia.

Business Linkages for Zambian MSMEs

- **Sourcing**: Local Zambians can set up micro-enterprises to provide building material needed for standardised construction. One existing example is the hydraform brickmakers, part of the Kabompo resettlement project.

- **Construction**: Local semi-skilled or unskilled craftsmen can adapt or license successful green construction technology packages and thus make a more attractive offer to their customers

- **Quality Standards**: SME Health Checks carried out by UNCTAD revealed that the majority of them lacked expertise related to green construction. Furthermore, none implement environment management systems. SMEs can pursue ISO 14001 accreditation to improve their standards.

Case study: Moladi

Moladi

Moladi was established in 1986 in South Africa. Its founder Hennie Botes was frustrated with his attempts to build a brick wall for his house and - unintentionally - ended up with an efficient construction technique for whole buildings.

Key Features of Approach to Affordable Construction

Moladi's approach overcomes challenges of affordable housing like lack of material resources, insufficient funds and time constraints. It only takes one day to build a Moladi house.

By inventing a system of moulds that are filled with a cement mix, they managed to de-skill the construction process allowing the utilization of local unskilled labour. Following two weeks of training provided by Moladi, local builders are able to assemble the units themselves.

The materials used are a mix of local material and a special chemical invented by Moladi: the mortar mix cement, local river sand, water and MoladiCHEM. Because the house has the same "look and feel" as any other concrete building, it is culturally very well accepted in Africa where there is no tradition or appreciation of timber in construction.

Green and sustainability aspects

In pursuit of minimising the environmental impacts of construction, Moladi has adopted a 'Cradle to Grave' approach: The plastic formwork for example is used about 50 times and at end-of-life is recycled into moulds for roof tiles or paving bricks, or into toilet seats and cisterns.

Business linkages with MSMEs

Moladi prefers partnership with property developers because they can share both the risk and profits of selling the housing units either directly to end-customers or to governments; for example in the case of government subsidized low-income housing projects.

Moladi trains unskilled man power and employs them to assemble their houses. Thus they provide opportunities for employment and entrepreneurs.

3.4 Developing Local Green Building Materials

Good Practice Examples		
Company	**Country/Region**	**Website**
Enviroboard	Latin America, Zambia	enviroboard.com/?p=2871
Ecobuild	Nigeria	www.ecobuildnigeria.com
EarthHouse	Finland, Africa	www.earthhouse.fi

Yet another set of successful approaches to providing affordable housing in developing countries involves maximizing the use of locally available green materials, such as compressed earth, timber, straw, elephant grass or sand and gravel.

Unlike the previous model, this approach may entail a relatively complex or mechanized construction process to transform these inputs into the necessary state, deriving cost savings from the low cost and local availability of the materials themselves.

The heavy reliance on imported materials has negative price effects so the development of new materials and the use of existing materials helps to reduce the use of imported goods. New products need to be designed in such a way that matches needs and aspirations with affordability.

As in the case of the previous model, these cost savings can then be passed on to prospective homebuyers. Given the relatively abundant availability of many green building materials in Zambia, and the existence of a large number of local firms that could be involved in local sourcing, this is another approach with great promise for unlocking the Zambian market.

Business Linkages for Zambian MSMEs

- Sourcing: The local sourcing of green building materials provides a chance for smallholder farmers and companies active in the collection of material like elephant grass. Other companies may support the production of the new materials like the production of pressed bricks.

Case study: Enviro Board

Enviro Board
Enviro Board was established in 1980 in the United States. It is a manufacturer of low-cost, environmentally friendly building panels and near "net-zero" energy housing systems.

Key Features of Approach to Affordable Construction
The Enviro Board approach is one which focusses directly on affordability: it uses local raw material and local unskilled labour to produce panels that are then used to build houses.

In addition to that they create a new stream of income as they source from local farmers through associations: In Zambia local collection points are organized by 3rd party associations like National Farmers Union or Zambia Women in Agriculture because they have the capacity to deal with the masses to co-ordinate collection of raw materials.

Green and sustainability aspects
Enviro Board's panels contribute significantly to a healthier environment by recycling agricultural waste, reducing pollution and preserving natural resources. The technology is able to process up to a ton of straw at one time and converts many varieties of these agricultural waste fibres such as rice, wheat and rye into low-cost, environmentally friendly building panels.

Business linkages with MSMEs

Enviro Board will not want to deal directly with individuals but with building society and commercial bank that finance the houses; individuals will go to these institution, finance their new homes. In Zambia, Enviro Board has engaged with Zambia National Building Society, Local Authorities Superannuation Fund, Workers' Compensation Fund Control Board (WCFCB), and commercial banks.

Chapter 4: Helping To Make It Happen

While clear market opportunities exist to address the unmet demand for quality affordable housing of Zambia's low and middle income households, a number of challenges limit the development of large-scale residential housing projects and the integration of MSME building contractors into the entire value chain.

Building affordable housing and the achievement of tangible progress in creating green jobs requires not only local capacity building, but also the establishment of international linkages and partnerships in order to develop and integrate green solutions in construction. It requires careful identification, selection and negotiations with international players to attract them into partnering with Zambian institutions and local MSMEs for housing projects and beyond. It is in effect unrealistic to attract the interest of foreign companies to invest in Zambia only in projects related to low and middle income households. What matters is the launch of realistic and rewarding projects, linked to partnership development with local professionals and suppliers. Moreover, the implementation of green solutions along the entire value chain will ensure a complete “market screening” of available opportunities and collaborations with all relevant players.

There are opportunities along all the value chain comprising of three “core” phases: Financing & Sales, Production & Project Management (i.e. Construction) and Operations & Maintenance. In construction, there are at least 25 major processes / activities that can attract potential international investors for business linkages development. However, to tap these opportunities it is important also to offer an enabling investment policy framework, develop adequate communication and information channels (about the Zambian competitive advantages and the return on investment of available projects) and local capacity building activities.

It should be noted that in Zambia there are no specific incentives to promote "green growth" and encourage the adoption of more sustainable production and consumption methods in the construction sector. Moreover, local capacity building could address the low skills base among small contractors and construction companies. Small contractors are often informal, making the supply market for construction companies un- transparent and very uncertain about their ability to meet quantity, quality and lead time standards. There are also very few practical examples of green building/housing on the side of project developers and little awareness of the green and affordable housing movement borne out of common misconceptions that green buildings are more expensive than traditional ones.

The following table (Table 6) summarizes the barriers that exist to building a sustainable construction value chain and it proposes possible solutions for policy makers and other Zambian stakeholders. It is not intended to be exhaustive, but rather to point out to the priorities for actions in the short and medium term.

Table 6: Opportunities to develop linkages in the construction sector in Zambia

OBJECTIVE	BARRIERS	OPPORTUNITIES FOR IMPROVEMENT	MAIN PLAYERS
Improve the design and planning	Different needs between income groups	Product design for particular segments	Ministry of Education Science and Vocational Training and Early Education,
	Availability of skilled labour R&D.	Establishing Research and Technology Centres offering scholarships, training or internships. Innovation Incubators to support Technology Transfer and Skills Development	Ministry of Finance,
			Ministry of Commerce, Trade and Industry,
			Ministry of Local Government and Housing,
	Reliance of imported materials with negative price effects	Develop new material and use existing material for building	Ministry of Lands Natural Resources and Environmental Protection,
			National Council for Construction,
		Introduce exemptions for import duties on green building capital goods, equipment or raw materials, and components	Business Associations
			Universities and Academic institutions,
			Private sector
Develop production and convert it into value adding activities	Low skill base among SMEs	Stimulate 'business sense' by offering training and apprenticeships with vocational skills certification	Ministry of Education Science and Vocational Training and Early Education,
		Improve labour conditions of women and youth in construction	Ministry of Commerce Trade and Industry,
	Low Quality Assurance		Ministry of Land
		Develop measures and standard for green jobs and processes	Ministry of Local Government and Housing
	Improve market information	Provide on-line databases of registered local construction contractors and services provides	Ministry of Labour and Social Services
	Land rights are often very unclear		ZDA, National Council for Construction,
		Digitize land and property registries – make publicly available	Private Sector
			Business Associations
Client engagement, trade activities and information sharing to build long term relationships and competitiveness.	Underdeveloped distribution networks and logistics	Support the development of distribution networks of registered suppliers	Ministry of Commerce Trade and Industry, Ministry of Local Government and Housing,
		High-visibility awareness and green building campaigns and dedicated quality standards	Ministry of Lands Natural Resources and Environmental Protection,
	Social acceptance - should 'look', 'feel', and 'sound' right ("Knock-test")	Communicate quality standards, benefits and affordability. Financing should be built-in to any programme as an integral part	National Housing Authority, National Council for Construction, Universities and Academic Institutions, Research Centres
			Private Sector
	Underdeveloped After Sales Market	Promote retrofitting	
		Celebrate CSR awards	
	Lack of demonstrations of green building/housing project development	Promote community building and encouragement of home-ownership	

Source: UNCTAD survey.

For the replication of successful models (see Chapter 3.2) to be effective in Zambia and to exploit untapped opportunities, all stakeholders in the building and construction sector are asked to embrace of the concept of affordable and green housing. To make this happen, the Government should:

- Establish high-level strategic partnerships to attract new investors that would embed in their business models the building of affordable housing with green solutions and would commit to local suppliers development;
- Initiate early dialogue to establish strategic alignment so all stakeholders garnering support of the whole government and mobilizing the National Housing Authority, National Council for Construction and the Zambia Development Agency to lead and co-ordinate the whole implementation process to ensure a long-term sustainable affordable housing sector in Zambia.

Partnerships are critically important to establish sustainable inclusive value chains. The predominance of informal solutions presents several challenges which can only adequately be addressed if there is partnership and co-operation at all levels from government to local communities. Taken together, these actions provide a comprehensive framework to steer the trajectory of the Zambian building construction industry in the direction of more inclusiveness, competitiveness and sustainability. At the same time, it should provide sufficient flexibility to allow systematic monitoring and adaptation of individual elements should they not be working efficiently. The selection of the case studies presented here offers examples of good practices, demonstrating that there are a number of companies that offer affordable housing with green solutions. Further research will be directed to producing a methodology for scoring which can then be used as a tool to test for ‘best-fit‘ for linkages development, according to projects' types and objectives.

Annex I. Selecting sustainable building materials

Construction methods for walls		
Technique	**Pros**	**Cons**
Rammed earth	• Community involvement • Cheap • No cement requried • Very good thermal properties • Some design advantages	• Framework needed • Quality control important • Some design limitations • Maintenance requirements may be greater than other materials
SSBs	• Widely acceptable • Very flexible (building designs) • Teaches bricklaying skills • Long life (25-30 years) • Can drill to reinforce if necessary	• Quality control still an issue • Needs a block press (cost) • Mortar required between courses • Uses some cement in blocks
Interlocking SSBs	• Attractive when done properly • Quick (when laying courses) • Lower skill-level required • Well known and understood	• Quality control still an issue • Needs a block press (cost) • No bricklaying skills gained • Hard to maintain straight courses • Uses some cement in blocks
Adobe	• Community involvement • Cheap • No cement required • Can improve/transfer skills	• Weaker blocks than SSB or ISSB • Questionable life span • Slow • Frequent maintenance required
Construction materials for roofing		
Technique	Pros	Cons
Micro-concrete tiles	• Attractive when installed properly • Good thermal/sound properties • Lower carbon	• Serious quality-control issues • Need a machine to manufacture • Proper installation

	footprint than iron • Community involvement	slow & difficult • Heavy roof structure required • Prone to breakage & leakage
Iron sheet (standard)	• Widely available and trusted • Cheap • Light roof structure • Quick to install • Good for rainwater harvesting	• High carbon footprint • Poor thermal/sound properties • Often poor quality (too thin) • Ugly when old/rusty
Iron sheet (improved)	• Attractive (can mimic tile effect) • No quality issues • Light roof structure • Quick to install • Good for rainwater harvesting	• High carbon footprint • Poor thermal/sound properties • Expensive
Thatch	• Community involvement • Very low carbon footprint • Good thermal/sound properties • Attractive when done properly	• High skill-level for good thatching • Difficult for large buildings • Often perceived as 'backward' • File risk • Cannot harvest rainwater

Source: Fielding, Rob (2012)."Review of Sustainable Materials & Design". Build it International.

According to Build it International, when it comes to ranking building technologies, according to their cost per m^3, natural stone (pumice panels) and a mixture of earth/stone with cement emerge at the top. The most effective with regard to economies of scale, and the associated ability to effectively mass produce, is load bearing plastics. Massive masonry block walls, rammed earth walls and sun dried blocks emerge triumphant when it comes to recycling potential. On the other hand, when looking at the time schedule and the ability to pre fabricate, degree plastics win. With regard to durability, burnt clay bricks and hollow masonry bricks are the obvious choice and when one looks at maintenance needs, synthetic materials are once more the recommended choice.

Annex. II. List of foreign investors in Zambia in the construction sector, 2015

No.	Project Name	Country of Origin
1	Ald Plant and Fleet Management Limited	Zambia
2	Angel Constuction limited	China
3	Angel Oak Limited	China
4	Anhui Shuian Construction Group Corp. (Z) Limited	China
5	Araaya Investments Limited	United Kingdom/Zimbabwe
6	Avex Techical Works Limited	Uganda/Zambia
7	B.M.K. Zambia Limited	Uganda
8	BSBK Limited	India/Zambia
9	Cemre Limited - Provision of Construction Services	Turkey
10	China Chongquing International Construction Corporation Limited	China /Zambia
11	China Gezhouba Group Company Zambia Limited	China
12	China Major Bridge Engineering Company Limited	China
13	China Nanchang Engineering Limited - Construction Services	China
14	China Railway Seventh Group Zambia Limited	China
15	China State Construction Engineering Corportion (Zambia) Limited	China
16	Chinese Commercial Trading Centre Limited	China
17	Combined Assisstance Development Growth Limited	United Kingdom /Zambia
18	Daehan Construction Limited	Korea/Zambia
19	Deniz Company Limited	Turkey
20	Dyna Boreholes Drilling and Exploration Limited	India
21	Ecofor Zambia Limited	Burundi
22	Edwall Enterprises Limited	Switzerland
23	Enviro Board Corporation Zambia Limited	United States of America /Zambia
24	Geology and Construction Services Limited	China
25	Golden Key Car Beauty Limited	Zambia

No.	Project Name	Country of Origin
26	Hantec (Propietary) Limited	(blank)
27	Hao Jing Investments Limited	China
28	Henan Guoji Investment Company Ltd - Project contracting, construction material, manufacturing building material	China
29	Henan Luyuan Investments Limited	China
30	Henan Zhongmeng Construction and Engineering Company Limited	China
31	Hengxin Infrastructure Engineering Company Limited	China
32	Hillary Construction (PTY) Limited	South Africa
33	HMF Transport and Construction Limited	Malawi/Lebanon
34	Homeland Builder Limited	(blank)
35	Hong Xin Construction Limited	China
36	Huate International Construction Company Limited	China
37	Inyatsi Roads Zambia Limited	Swaziland/ Zambia
38	Jan Africa Investments Limited	Pakistan
39	Jicona Construction Limited	China
40	Jin Tudi Investments Limited	China
41	King Heavy machinery Limited	Spain
42	Kounnas Zambia Limited	Cyprus
43	Lamco Investments Limited	Lebanon
44	Manekin Road Builders of Zambia Limited	United States of America /Ghana/Zambia
45	Maysen & Borowski (Zambia) Limited	Australia/Zambia
46	Mphangwe Construction Company Limited	China
47	New Mainland Corporation Limited	China
48	Nizam Crushers Limited	Zambia
49	Omicron Services (Z) Limited	Uganda/Zambia
50	Ozay Investments Zambia Limited -	Turkey
51	Paragon Steel Structures (Z) Limited	South Africa

No.	Project Name	Country of Origin
52	Plem Construction Limited	Mauritius
53	Poseidon Construction Company Limited	Switzerland/Zambia
54	Qiang Lin Investments Limited	China
55	Rockseed International Zambia Limited	China /Nigeria
56	Rui Long Investment	China
57	Sahutoglu Investments Limited	Turkey
58	Sandvik Mining & Construction Limited	United Kingdom/South Africa/Zambia
59	Sanyou Engineering Company limited	China
60	Sepco Zambia Limited	China
61	Shandong Dejian Group Company (Z) Limited	China
62	Shanghai Construction Group Company Limited	China
63	Shanghai Construction Zambia Limited	China
64	Soar Corporation Limited	China
65	SRR Water Drilling & exploration Zambia Limited	India
66	Standard Way Limited	China
67	Sunshare Construction Limited	China
68	Swift Cargo Services	Zambia
69	TBEA Electrics Zambia Company Limited	China
70	Tokosan Construction Limited	(blank)
71	Tong Bao Investments Company Limited	China
72	Tritrust Investment Company Limited	China
73	Veamet Properties Limited	Botswana /Zambia
74	Venda's Steel Products Zambia Limited	Zimbabwe
75	Victoria Drilling Explortion Limited	India
76	VR Boreholes Limited	India
77	Wacdi Construction & Real Estate Limited	United States of America/Canada/ Somalia

No.	Project Name	Country of Origin
78	Whitacon Zambia Limited	China
79	Xian Feng Construction Limited	China
80	Ya Investments Limited	China /Zambia
81	Zambian German Engineering Limited	Germany/Zambia
82	Zambian Jihai Agriculture Company Limited	(blank)
83	Zhejiang Engineering Construction (z) Ltd	China
84	Zhi Cheng Investments Limited	China
85	Zhongdu International (Z) Company Limited	China

Source: Zambia Development Agency, 2015.

Annex III. List of case studies

Company	Primary Categories	Countries of Operation
Ashoka FEC	Project developer	India
Moladi	Building material producer / construction company	South Africa, Nigeria, Ghana, Sierra Leone, Haiti, Panama, Angola, Kenya, Mozambique, Zambia, Botswana
Appropriate Development, Architecture and Planning Technologies (ADAPT)	Building material producer/wholesale construction material/architect/Urban development	Middle East and North African countries
Association la Voûte Nubienne (AVN)	Construction company / Project planning	Burkina Faso, Mali, Zambia and Senegal
Brilla Promigas	Other	Colombia
Brookfield	Construction company / Project planning	Brazil, US, Canada
Cemex	Building material producer	Mexico
DBS Affordable Housing	construction / project developer	India
Domogeo	Building material producer/wholesale construction material / architect	India, Bangladesh, Western Africa, Southern Africa, Eastern Africa
Ecobuild	Building material producer / Construction company / Project planning	Nigeria
Enviro Board Corp	Building material producer/wholesale construction material	Southern Africa (incl. Zambia), USA, Columbia, Costa Rica Panama, Southeast Asia, Europe
Fez tá pronto	Project developer	Brasil
Hilti Foundation	Project developer	Philippines
Holcim	Building material producer / wholesale construction material	production sites in around 70 countries
Inconhsa	Building Material Producer	Honduras
Jamii Bora Bank	Financing	Kenya
K.I.P. Technical Unit,Ir. Darrundono and Pik Mulyadi	Architect / Project Planner	Indonesia
Karibu Homes	Project developer	Kenya
KSA Design and Planning Services	Architect	India
Kuyasa	Financing	South Africa
Lafarge	Building material producer / wholesale construction material	64 countries
National Housing Authority	Project developer	Philippines
National Housing Corporation	Other	Kenya
NEDBANK	Financing	South Africa
Orascom	Large construction company // Utility (energy, water, waste) // urban development company	Egypt
Saraman	Construction material / architect / project developer	Iran
Swarna Pragati Housing India	Financing	India
Tara Machines	Building material producer	India, Afghanistan, Bangladesh, Bhutan, Cameroon, Indonesia, Sri Lanka
Tata Housing	Construction company / architects /property owners / project developer / Utility (energy, water, waste)	India, Sri Lanka, Maldives
Vinte Viviendas Integrales	Construction company, Project planning	Mexico

Acknowledgements

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1. Mr. Ruban Selvanayagam, Fez Tá Pronto, Brazil, 16/01/2014
2. Mr. Pranay Sampson, TARA Machines, India, 09/04/2014
3. Mr. Martin Vogelsang, FEM International, India, 09/04/2014
4. Mr. Manikandan KP, Ashoka, India, 10/04/2014
5. Mr. Irfan Keshavejee, Karibu Homes, Kenya, 14/04/2014
6. Mr. Chabuka Kawesha, Enviroboard, Zambia, 15/04/2014
7. Mr. Francois Perrot, Lafarge, France, 17/04/2014
8. Mr. Hennie Botes, Moladi, South Africa, 24/04/2014
9. Mr. Henning Alts, Cemex, Mexico, 06/05/2014
10. Mr. Damian Conway, iShack, South Africa, 14/05/2014
11. Mr. Bruno Walt, Hilti Foundation, Germany, 05/06/2014

List of Fieldwork Interviews

1. Mr. Mukula Makasa, Zambia Development Agency, Lusaka
2. Mr. Andrew Kambobe, Imani Development, Lusaka
3. Ms. Mutinta Sichali, Mutinta Sichali Architects, Lusaka
4. Mr. Hazem Kaddoura, Kaddoura Construction, Lusaka
5. Mr. Mohamed Salama, Flame Construction, Lusaka
6. Ms. Muchanga Mudenda, Lafarge Zambia, Lusaka
7. Mr. Victor Shidono, Ecobank Zambia, Lusaka
8. Afrospace Architects, Lusaka
9. National Housing Authority, Lusaka
10. Barrick Lumwana, Solwezi
11. Kalumbila / First Quantum Minerals, Solwezi
12. Copperbelt Energy Corporation, Kitwe
13. Lumwana Community Business Association, Solwezi
14. Zambia National Association of Sawmillers, Kitwe
15. National Association of Medium and Small Scale Contractors, Kitwe