BENCHMARKING HOUSING CONSTRUCTION COSTS ACROSS AFRICA

Using CAHF’s Housing Cost Benchmarking methodology to analyse housing costs in fifteen African countries - May 2019

DAVID GARDNER & JACUS PIENAAR
CONSULTANTS TO THE CENTRE FOR AFFORDABLE HOUSING FINANCE IN AFRICA
Executive Summary

This document reports on a study to implement a standardized methodology to calculate the cost of a benchmarked (standard design and specification) ‘CAHF house’ in thirty cities in fifteen countries across Africa. Countries included in the study are Cameroon, DRC, Ghana, Kenya, Liberia, Malawi, Morocco, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Uganda and Zambia.

The study methodology developed a detailed cost breakdown comprising up to 300 discrete cost elements that meets construction conventions across the continent. This costing framework was completed by professional Quantity Surveyors in each selected country and consolidated into a centralized database for comparison.

Total costs of the ‘CAHF house’ are aggregated from the basic cost elements of housing: land, infrastructure, compliance, construction, materials and labour, and other indirect costs of development. Further, each unique cost element is categorized into a Standard Industrial Classification (SIC) sector and sub-sector, and assigned a basic labour or material category, in order that the cost contributions from different types of materials and sectors of the economy can be analysed.

This housing cost benchmarking study shows wide variation in the total costs of the standard ‘CAHF house’ in the thirty cities and fifteen countries. Furthermore, there is significant variation in the composition of costs between the main cost elements. This analysis illustrates the difficulty of comparing affordable housing costs across cities, countries and continents without greater methodological rigour regarding how housing is defined and how costs are compiled.

The results of this study have implications for how affordable housing is defined and analysed, and for better understanding the cost drivers of affordable housing in different geographies. Further, analyzing housing costs beyond general figures such as cost per square metre provides a better platform for applied analysis that can ascertain where and how to tackle factors that drive up affordable housing costs in specific countries and cities.

CAHF has developed, and continues to broaden, deepen and update its extensive and detailed database of the elemental costs of a range of standardised housing typologies and product sizes and specifications across Africa. This information is being used to deepen the debate on affordable housing types and standards, major cost contributors to affordable housing costs, and strategies and policies to address the affordability of costs at a continental, country, city and industry scale.
Acknowledgements

This study is a part of CAHF’s Housing and the Economy project, funded with the support of FSD Africa and UKAid. The housing cost benchmarking study was conceptualized by CAHF, managed by David Gardner and implemented by the Affordable Housing Institute (AHI), with Olivia Caldwell as project manager.

The data framework was designed and implemented by Jacus Pienaar (Quantity Surveyor). The data was collected, analysed, interrogated and revised over the course of 2015 and 2016. Data for each country was collected with the support of local Quantity Surveyors.

During the development of the project methodology, a reference group provided essential inputs into the process. Members included Graham Tipple, Michael Majale, Allan Cain and David Smith.

Disclaimer

While every effort has been spared to ensure the accuracy of the data provided by the Local Quantity Surveyors (LQSSs), CAHF acknowledges that due to local variations and interpretations accuracy of some costing information may vary. It is noted that at the time of undertaking the study very different and difficult conditions prevailed in certain countries, making estimates of ‘normal’ costs challenging. For this reason, CAHF cautions on reliance on data for the DRC.

CAHF notes that since completing this study, its Housing Cost Benchmarking methodology has been applied in various other contexts. The methodology, approach and costing structure have been refined to overcome specific constraints and challenges experienced during this fifteen country study.
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Glossary

**Domestic production:** The production of goods within a particular geographic area – whether for consumption in that area, or for export.

**Domestic supply:** The supply of goods and services for consumption within a country’s borders - regardless of whether those products were produced locally or imported.

**Economic value chain:** An interlinked set of value-adding activities that convert inputs into outputs in the process of producing both intermediate inputs for use within other economic value chains, and final products.

**Factor income:** Income received from the different factors of production, including land (rent), labour (wages) and capital (profit).

**Final demand:** The total value of goods and services that are purchased in their final form in an economy in a given period. In national accounts terms, this includes products that are consumed by households and by government, capital goods that form part of gross capital formation, and products that are exported.

**Full-time equivalent employment:** The hours worked by a “typical” full-time employee in a particular sector or industry in a given period (day/week/month/year). The concept is used to convert the hours worked by part-time employees into the hours worked by full-time employees. For example, if a particular industry sector currently operates on a basis where full-time employees work 40 hours per week, and three people are employed on a part-time or casual basis to work 20 hours per week, their labour collectively represents 1.5 full-time equivalent employment opportunities.

**Government consumption:** Government expenditure used for the purchase of final goods and services. This excludes government expenditure on capital assets, which are accounted for under gross fixed capital formation.

**Gross domestic product (GDP):** The value of all goods and services produced within a particular geographic area (usually a country) within a particular period. It can be measured in three ways: i) as the sum of all factor incomes (labour remuneration, interest, rent and profits) earned within the defined geographic area (the income method); ii) as the value added in each sector of the economy (the production method); and iii) as expenditure on goods and services in their final form (the expenditure method). The first two methods measure the value of aggregate supply in the economy, while the third measures aggregate demand. Differences in the valuation of each method arise because of the levying of indirect taxes and subsidies at different stages of the production process, and at the final point of sale. The expenditure method is usually valued at market prices and takes account of all indirect taxes and subsidies. The production method is usually valued at basic prices and includes only indirect taxes and subsidies on production processes.

**Gross fixed capital formation (GFCF):** The expenditure on capital assets (buildings, civil works, machinery and equipment, transport equipment, computer and telecommunications equipment, research and development, computer software, mineral exploration, cultivated biological resources that yield repeat products - such as vineyards and orchards) - and transfer costs. It does not account for the consumption (depreciation) of fixed capital, and also does not include land purchases. The value of housing construction in a particular period (adjusted for work on hand at the start of the period) is included in GFCF.

**Gross operating surplus (GOS):** Represents the aggregate of returns to land (rent), capital (interest) and entrepreneurial endeavours (profits). This is often referred to generically as ‘returns to capital’. It reflects that part of the value added by a company that is not attributable to labour.

**Gross value added (GVA):** Represents the payments (returns) made to the owners of the different factors of production (labour, land, capital and entrepreneurship) by a producer of goods and services in a particular period. It reflects the difference between the sales/income of the producer and the payments made to third-party suppliers of intermediate goods and services.

**Highly skilled employment:** Employment requiring a high level of skill, often at a senior management or professionally certified level.
Household consumption: Expenditure on final goods and services by households, or on behalf of households. The purchase of these goods and services may be facilitated by the factor incomes of the households themselves (earned income), or from transfers and subsidies from government or individuals outside the household unit (unearned income).

Imports and Exports: An import is a good or service brought into a country from another country. An export is a good or service taken from a country to another. These imports and exports may be in either a final, or intermediate form. For simplicity, we consider houses themselves to be supplied and demanded only within the domestic market, albeit that small numbers of prefabricated houses may be exported or imported.

Imputed rent: Represents the opportunity cost of owning and living in a property. Choosing to occupy a property that you own means that any rent that could have been earned on that property is foregone. According to the OECD, 1 “Imputed rents are defined as rental equivalents – that is, the estimated rent that a tenant would pay for identical accommodation let unfurnished, taking into consideration factors such as the type of dwelling (single-family or multi-family), its size (useable surface, number of rooms), its facilities (running water, indoor toilet and bathroom, electricity, central heating, etc.), its location (city centre, suburban or rural) and neighbourhood amenities.” Failure to take account of imputed rents in the national accounts makes it difficult to compare the GDP of countries with significantly different levels of private home ownership, and - in the case of a single country with rapidly changing home ownership patterns – to compared GDP from one period to the next. For this reason the rental equivalent value of owner-occupied dwellings are imputed and the GDP of the country (and its components) is adjusted accordingly. Methods of determining the imputed rent vary depending on the nature and extent of the rental market in that country and the data available.

Informal employment: The informal sector or informal economy represents that part of the total economic activity that is not registered with, and directly monitored by, relevant government departments and agencies and not directly taxed (it will typically be subject to at least some forms of indirect taxation such as value added tax). Informal employment relates to all people deriving income from this informal activity. Because of its prevalence, most countries include some estimates of the economic contribution of the informal sector in the construction of their national accounts.

Intermediate demand: Demand for a product that undergoes further transformation through value adding activities during a production process. The output of a particular sector or industry can be used to satisfy either intermediate demand from other sectors and industries, or final demand.

Intermediate inputs: Goods and services that are inputs into a production process and that undergo further transformation as a result of value-added activities during the production process. For example, bricks, sand and cement are just some of the intermediate inputs that are used in the process of producing a house by the construction sector.

Labour: Economic measure of work done by human beings. Labour is a factor of production that is remunerated by wages and salaries that constitute one possible source of income for households.

Multiplier effect: a multiplier is an economic factor that, when increased or changed, causes increases or changes in other related economic variables. In terms of gross domestic product, the multiplier effect causes gains in total economic output that are greater than the change in spending that caused it.

National Accounts: National accounts or national account systems (NAS) are the implementation of complete and consistent accounting techniques for measuring the economic activity of a nation.

Net indirect taxes: The value of indirect taxes paid, less any subsidies received, by an economic actor. An indirect tax may be levied on part of a production process (such as a skills levy on labour remuneration) or on a product (such as an excise duty or value added tax). Indirect taxes are distinguished from direct taxes (such as corporate tax or personal income tax).

Primary sector: Those sectors of the economy related to primary industries including agriculture, forestry, fishing and mining and quarrying. They are often referred to as extractive industries because they extract resources and products from the environment. These extracted products may be “renewable” or “repeatable”

- as in the case of sustainable agriculture and fishing - or “non-renewable” - such as metals and minerals extracted by mining and quarrying.

**Secondary sector**: Those sectors of the economy related to secondary industries including manufacturing, electricity, gas and water and construction works of finished goods and services.

**Semi- and unskilled employment**: Employment requiring less skills than skilled employment.

**Skilled employment**: Employment requiring a special skill, training, knowledge, and (usually acquired) ability to be productive. Organisationally, skilled employment typically includes artisans, supervisors and lower levels of management.

**Tertiary sector**: Those sectors of the economy that produce and sell a wide range of services including wholesale and retail trade, transport, storage and communication, financial, insurance, professional business advisory, and community and personal services. For this reason, the tertiary sector is often referred to as the services sector.
1 Introduction

This document presents the purpose, methodology and results of the Centre for Affordable Housing in Africa's (CAHF) housing cost benchmarking study in fifteen African countries. The aim of this project is to explore the cost of a basic, entry-level house across different countries in Africa, and to understand what drives cost differences. This study aims to answer the following questions: How much does it cost to build a typical house in Africa? How do housing prices vary from one country to another, and what are the reasons for these cost differences?

1.1 Project background

This project is part of CAHF’s wider effort to collect, analyse and disseminate relevant data on the housing finance sector in Africa, to create a better understanding of how the sector operates in practice, and how it might be supported towards increasing investment in affordable housing and housing finance. Across Africa, housing affordability is a critical challenge. The high cost of construction is often cited as a key factor undermining housing affordability across the continent. Yet, the extent to which this is true or not, and how this varies between countries has not been studied with any rigor. High building costs often do rise ahead of the rate of inflation, due to local demand pressures that push prices up. Furthermore, factors such as the need to import materials that aren’t produced locally, the shortage of and high cost of local skills, or the absence of financial mechanisms that allow for materials to be bought in bulk, impact on construction costs.

The idea for this project emerged through a variety of streams. CAHF has been collecting a few basic housing cost indicators for the past decade, as part of its Housing Finance Yearbook initiative, now in its ninth edition. This includes the price of a standard 50kg bag of cement, the price of the cheapest, new house built by a private developer; the average size of this house; and so on. This simple data exercise has been very enthusiastically received by the market and indications are that a formalisation of the process, and the addition of greater rigor in the data collection methodology, would contribute significantly to our understanding of cost drivers in Africa’s affordable housing market. In the course of discussion with a South African developer who wanted to build housing in response to a government tender in Cameroon, it emerged that his intention was to import South African building materials to Cameroon. He argued that this was a viable and cost-effective approach in a market where housing delivery capacity was limited. Why would importing building materials from South Africa for a development in Cameroon be considered viable? What are the constraints in the Cameroon market that might make this true? Finally, data presented by the African Development Bank at their housing markets conference in Addis Ababa in February 2015 clearly illustrated the limited extent of the data that is available on continental housing costs, and the importance of building cost data to understanding and responding to the housing finance challenge in Africa.

These are some of the questions which drove this study to develop a proxy of a “Big Mac Index” to benchmark housing costs and provide a sense of housing cost parity across Africa.3

1.2 Project aim and objectives

This project seeks to determine the relative cost of an entry-level, newly-built house across sixteen African countries. This is achieved through meeting the following objectives:

1. Establish a standard specification for a realistic, but idealised, entry-level house that one could imagine being built across Africa, targeted at middle-income earners.
2. Develop a consistent Bill of Quantities for this standard house specification as though it were being set out for construction. This standardized data collection and reporting tool breaks costs into primary elements, sub-elements and detailed components, down to the level of individually identifiable inputs (such as doors, bricks or cement).

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3. Cost the standardized house through populating the Bill of Quantities in each city and country with locally-relevant rates and cost data. Costing was undertaken for a primary city (often the capital city) and a secondary city in each country, with the support of local, professional Quantity Surveyors identified in each country. Costs were collected in the local currency and converted to US Dollars at the prevailing exchange rate at the time.

4. Consolidate, analyse, compare and report on data across countries and cities to determine cost differences, and the reasons for these differences.

5. Engage in debate with public and private developers across the continent to fine-tune, extend and share the housing cost benchmarking approach in order to deepen the conversation regarding the true comparative costs of housing construction across Africa.

1.3 Countries and cities included

The study collected data for two cities in each of fifteen countries: Cameroon, DRC, Ghana, Kenya, Liberia, Malawi, Morocco, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Uganda and Zambia. Figure 1 highlights the countries and cities included in the study. These countries were selected based on their importance to CAHF’s research agenda and existing contacts in each country, as well as being representative countries from across the continent with respect to geographic location and primary language spoken.

![Figure 1: Countries and cities included in the housing cost benchmarking study](image)

2 Housing Cost Benchmarking Methodology

Comparing residential construction costs across countries is difficult for many reasons, not least of which is the fact that no single, idealized, “standard house” exists. A two-bedroom unit, for example, may be as small as 30m², 56m², or as large as 180m² and it may be on an 80m² or a 400m² plot of land – or indeed in a multi-story building. In addition, the specifications and finishes of exactly the same house can vary significantly. Compare
for example a standard 65m² house in a South African suburb costing around $850 per m², versus a similar sized unit in a luxury apartment block costing over $7 000 per m². 4

Moreover, there are other determinants to the cost of housing construction, as well as materials that are used to construct a basic, entry-level house including: bricks, wooden roof trusses, corrugated iron or tiles for the roof, door and window frames, glass panes, plumbing, tiling, electrical fittings, land, labor, and so on. How do these contribute to the affordability of housing across the continent? And what is it that determines their costs?

As a result of these and other variances, efforts to build cross-country comparisons of the cost of housing are challenging – in reporting the cost of newly built entry level houses we may well be comparing “apples with oranges”. The primary approach of this study is to compare “apples with apples” – to define a “standard” (albeit, possibly fictional) house, and to cost this in each country using a standardized specification and costing framework. At the same time, our intent is to identify the most readily, comparable, “real” house across the continent – one that actively exists in the market – and to cost this in the same way.

2.1 Defining the ‘standard CAHF house’

Housing literature and conference papers from across Africa inevitably use terms such as “conventional housing”, “affordable housing” and “basic housing”. Yet, these terms are seldom clearly defined. This causes confusion in debates around affordable housing and house construction costs. Consider a conversation about the relative costs of building an affordable house in, say, South Africa, Zambia and Nigeria. This discussion becomes almost meaningless when different cultural housing norms, policies, acceptable standards (to households, governments and banks) and modes of land provision, servicing, financing and construction are also not taken into account. The South African may have a basic, state-subsidised, mass-developed 42m² basic unit in mind, the Zambian, a self-built core structure on leasehold stand, and the Nigerian a private developer-built, diaspora-funded double story ‘dream’ house. Yet to many households living in slums in all of Africa’s major cities, all of these options seem far out of reach. Add to this the high cost of raw land in, say, Nairobi versus very cost-effective land made available in Kigali, or municipally-provided services in South Africa versus the full on-site services that need to be paid for in other African cities. The implication of this is that it is very difficult to compare the cost of housing on a ‘like for like’ basis across countries and cities.

In order to undertake a housing cost benchmarking exercise, the first step is to define a ‘standard house’ to be benchmarked. This study grappled with the complexities of what an acceptable ‘standard house’ is across divergent cultures, geographies and climates. After extensive consultation and debate, we settled on a basic, generic free-standing house - not very big and not very small - hopefully just right to be viewed as acceptable across Africa.

The specified product is a 4.6m² two-bedroom, one-bathroom house with a 9m² balcony (making a total built area of 55m²), built on a 120m² stand and provided with basic municipal or on-site services: water, sanitation, road access and an energy source.

The basic plans and specifications for this CAHF House are included in Annexure A. CAHF is well aware that this is indeed not the most affordable house that can be constructed and differs in many ways from what particular interest groups deem to be ‘acceptable’. Given that our aim is to make housing more affordable across Africa, we debated whether a smaller housing unit should be used. Ultimately, we selected this product because we believe it to be recognizable as a core typology across the continent, and one that is currently deemed acceptable by governments, households and could potentially attract mortgage finance in most stable housing markets in Africa.

2.2 Disaggregating housing into component parts

The next challenge CAHF faced is how to break this standard CAHF house down into its component parts, and how to ensure that costing is consistent and comparable across English, French and Portuguese speaking countries that have different quantity surveying and costing conventions. The overall cost of the standard

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4 The former figure is calculated from 2018 housing cost benchmarking statistics collected by CAHF, and the latter from an interview with an upmarket residential developer in South Africa.
A house is broken down into a number of sub-components, or elements of construction, which are then further sub-divided until they result in a basic unit of the house (such as, say, the cost of land, the cost of a brick, the cost of finance during construction or the cost of linking to or providing on-site infrastructure). The main divisions (Level 1) and sub-divisions (Level 2) of the house cost are illustrated in Figure 2.

Each of these Level 2 elements were further disaggregated down to five levels, in order to reach a discernible individual item for costing – such as cement, bricks, roofing materials, windows or doors, glazing, kitchen sink, etc. In addition, the materials cost and labour required to undertake or construct or fit the item in question are also captured separately in order to allow for a differentiation of materials and labour costs. The Level 1 to Level 3 breakdown is shown in Table 1.

Using these elements, a detailed Bill of Quantities (BoQ) was developed that specifies all materials and labour and financing inputs required to calculate the full and true cost of constructing the standard ‘CAHF House’ in each identified city. This BoQ incorporates up to 300\(^5\) cost items required to complete a house: land, bulk and internal services, construction materials and labour inputs, professional services, authorisations and approvals, office overheads, profit, financing costs and taxes. A full list of this five-level costing framework is included in Annexure C.

\(^{5}\) A minimum of 274 cost items are required to complete the costing, with a further 36 optional cost categories provided for to make allowance for regional differences in construction approach.
Table 1: Level 1 to Level 3 Basic elements of the standard ‘CAHF house’
Source: CAHF Housing Cost Benchmarking Model.

2.3 Collating country and city costs

The standard BoQ was sent to qualified Quantity Surveyors identified in each country and was costed based on prevailing in-country costs for a notional development in the identified capital city and a secondary city. This costing information has been collated, checked, consolidated and analysed. In order to ensure as much comparability between countries, Local Quantity Surveyors were asked to cost the unit within the following set of parameters:

- The CAHF house is built by a private sector developer (that is, there are no subsidies or exclusions in the cost calculations).
- The development is assumed to be within a reasonable distance from the central business district, and land must be purchased and zoned for the development.
- The CAHF House is one unit in a twenty-unit development. This provides for certain assumptions around the procurement of bulk materials, access to services, the employment of labour and allocation of overhead costs.
2.4 Exchange rates

Table 2 below records the exchange rate used at the time of completing the benchmarking costing between the local currency and the US Dollar.

<table>
<thead>
<tr>
<th>Country</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameroon</td>
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</tr>
<tr>
<td>Democratic Republic of the Congo</td>
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</tr>
<tr>
<td>Ghana</td>
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<tr>
<td>Kenya</td>
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<tr>
<td>Liberia</td>
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<tr>
<td>Malawi</td>
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<td>Morocco</td>
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<tr>
<td>Mozambique</td>
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<tr>
<td>Nigeria</td>
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<tr>
<td>Rwanda</td>
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<td>Uganda</td>
<td>3,500</td>
</tr>
<tr>
<td>Zambia</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 2: US Dollar – Local currency exchange rates (2016)

Source: These exchange rates were provided by the local quantity surveyors who undertook the costing at the time the costing was completed in 2016.

2.5 Collating and analysing costs

Once costs were received from the local QSs, each costing sheet was included in a central database. A quality assurance process ensured anomalies and questions were answered by the local QSs, in order that the data could be analysed across countries and cities. CAHF has launched a Benchmarking Housing Costs in Africa dashboard on its website that allows users to interact with this cost data for the fifteen countries surveyed.6

3 Comparing the Costs of Housing Construction Across Countries and Cities

In this section, we analyse the results from the fifteen countries and thirty cities for which data was obtained.

3.1 Total housing construction costs

The housing cost benchmarking database shows that the dollarized cost of building this generic CAHF house varies by over two and a half times between the thirty cities, and some costs even vary significantly between cities in the same country. Figure 3 illustrates the total construction cost variance of the standard CAHF House across the fifteen countries. The city costs vary from a high of US$63,241 in Nairobi, Kenya to a low of US$28,346 in Lusaka, Zambia for the main cities. The lowest construction cost was found in Kitwe, Zambia at US$24,971.

Figure 3: Total construction cost of CAHF House in fifteen countries and thirty cities across Africa.

Source: CAHF Housing Cost Benchmarking data (2016).
Table 2 shows the cost distribution of total house costs across all thirty cities in fifteen countries. Kenya, DRC and Malawi have consistently high total housing costs in both cities surveyed. On the other side of the scale, Zambia, Tanzania, South Africa, Cameroon and Rwanda are grouped at the lower end. It is interesting to note that generally major cities are more expensive than secondary cities, but by an average factor of less than US$5000. Exceptions to this are Uganda, Nigeria, Liberia and Kenya where secondary cities are significantly cheaper than the main cities.

Figure 4: Cost distribution of the CAHF house in thirty cities in fifteen African countries
Source: CAHF Housing Cost Benchmarking data (2016).

Considering total costs, these large differences are difficult to understand. However, in many cities practical development experience corroborates these overall figures.

CAHF notes that since this data was launched, we have had many robust conversations with private and public developers and public officials about these cost statistics. Inevitably, after detailed debate, a number of differences in interpretation, or omissions of other costing data, are identified as reasons for the differences between the benchmarked housing costs and practical experience. The main causes of perceived costs differences include (in no particular order):

- The exclusion of land and/or infrastructure costs (which in many countries are seen as the responsibility of government);
- Not including contractor and developer margins (specifically with public sector developers);
- Not accounting for finance and holding costs (as many developments are currently required to be funded with capital); and
- Variances in land price (for instance, many private developments occur on already secured land, and full land value is not included, or developments are being undertaken in more remote, less central locations than the CAHF specification).
- Differences in overall specifications between the CAHF house and locally specified and constructed units.
The benchmarked approach to costing such as the inclusion of contracted professionals to undertake specific functions such as design, engineering specifications and other regulatory compliance costs.

CAHF has consciously been conservative with this costing, and each component cost or rate can be viewed and debated. This is exactly why we undertook this exercise – in order to start a robust yet more empirical debate on costs of building houses across the continent, rather than remaining in the realm of difficult-to-quantify concepts such as ‘affordable housing’ and ‘high costs of building’. In order to understand why overall costs differ so much, it is necessary to disaggregate the total development costs further into their different constituent elements: land; infrastructure; compliance costs, construction costs and other development costs.

Figure 5 shows the breakdown of total house cost into its Level 1 components of land, infrastructure, compliance costs, construction and other costs of developing the standard ‘CAHF house’. Major cost differences are evident across countries and cities in relation to all Level 1 elements.

The comparison of each Level 1 cost element in Figure 6 further shows the large variances between countries at this first level of cost breakdown. While certain elements, such as land, show very high differences (from $8 to over $15,000), even construction (which is the largest cost on average overall) varies by over 100% between countries. This highlights the difficulties of comparing costs as a singular item between countries and cities across the continent. The component cost composition is too variable for reasonable comparison without greater disaggregation of cost elements. These are discussed in the next sections.

Figure 7 shows a comparison of cost composition between the countries, which again illustrates the significant variations in cost composition. It is at this level of analysis that the importance of understanding the composition of housing construction costs becomes evident. While construction costs are the highest contributor to costs as well as the most consistent cost element across cities, specifically land and servicing costs vary significantly.

Table 3 shows the cost per square metre of the standard CAHF house across the main cities surveyed, disaggregated into the Level 1 cost components.

<table>
<thead>
<tr>
<th>Country</th>
<th>City</th>
<th>A. LAND COSTS</th>
<th>B. INFRASTRUCTURE COSTS</th>
<th>C. COMPLIANCE COSTS</th>
<th>D. CONSTRUCTION COSTS</th>
<th>E. OTHER DEVELOPMENT COSTS</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cost (USD)</td>
<td>Cost per m² (USD)</td>
<td>Cost (USD)</td>
<td>Cost per m² (USD)</td>
<td>Cost (USD)</td>
<td>Cost per m² (USD)</td>
</tr>
<tr>
<td>Cameroon</td>
<td>Yaounde</td>
<td>$5,607</td>
<td>$122</td>
<td>$3,006</td>
<td>$612</td>
<td>$18,007</td>
<td>$3,913</td>
</tr>
<tr>
<td>DRC</td>
<td>Kolwezi</td>
<td>$3,352</td>
<td>$73</td>
<td>$4,006</td>
<td>$350</td>
<td>$36,371</td>
<td>$7,791</td>
</tr>
<tr>
<td>Ghana</td>
<td>Accra</td>
<td>$3,158</td>
<td>$69</td>
<td>$1,538</td>
<td>$558</td>
<td>$25,634</td>
<td>$5,557</td>
</tr>
<tr>
<td>Kenya</td>
<td>Nairobi</td>
<td>$14,826</td>
<td>$322</td>
<td>$9,142</td>
<td>$1,385</td>
<td>$26,186</td>
<td>$5,699</td>
</tr>
<tr>
<td>Liberia</td>
<td>Monrovia</td>
<td>$3,000</td>
<td>$65</td>
<td>$16,426</td>
<td>$1,450</td>
<td>$20,123</td>
<td>$4,347</td>
</tr>
<tr>
<td>Malawi</td>
<td>Lilongwe</td>
<td>$721</td>
<td>$16</td>
<td>$19,971</td>
<td>$1,153</td>
<td>$19,083</td>
<td>$4,145</td>
</tr>
<tr>
<td>Morocco</td>
<td>Casablanca</td>
<td>$8</td>
<td>$0</td>
<td>$2,174</td>
<td>$997</td>
<td>$31,792</td>
<td>$6,691</td>
</tr>
<tr>
<td>Mozambique</td>
<td>Maputo</td>
<td>$308</td>
<td>$7</td>
<td>$4,299</td>
<td>$3,021</td>
<td>$27,190</td>
<td>$5,591</td>
</tr>
<tr>
<td>Nigeria</td>
<td>Abuja</td>
<td>$4,658</td>
<td>$101</td>
<td>$5,204</td>
<td>$680</td>
<td>$22,845</td>
<td>$4,977</td>
</tr>
<tr>
<td>Rwanda</td>
<td>Kigali</td>
<td>$1,186</td>
<td>$26</td>
<td>$4,945</td>
<td>$941</td>
<td>$19,583</td>
<td>$4,426</td>
</tr>
<tr>
<td>Senegal</td>
<td>Dakar</td>
<td>$14,874</td>
<td>$323</td>
<td>$6,044</td>
<td>$1,132</td>
<td>$21,034</td>
<td>$4,547</td>
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<tr>
<td>South Africa</td>
<td>Pretoria</td>
<td>$1,769</td>
<td>$38</td>
<td>$3,365</td>
<td>$327</td>
<td>$17,660</td>
<td>$3,848</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Dar es Salaam</td>
<td>$758</td>
<td>$16</td>
<td>$2,646</td>
<td>$635</td>
<td>$18,630</td>
<td>$4,045</td>
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<tr>
<td>Uganda</td>
<td>Kampala</td>
<td>$15,229</td>
<td>$331</td>
<td>$4,864</td>
<td>$509</td>
<td>$21,063</td>
<td>$4,585</td>
</tr>
<tr>
<td>Zambia</td>
<td>Lusaka City</td>
<td>$2,908</td>
<td>$63</td>
<td>$2,956</td>
<td>$374</td>
<td>$17,349</td>
<td>$3,377</td>
</tr>
</tbody>
</table>

Table 3: Total cost and cost per square metre of the CAHF House in fifteen major cities
<table>
<thead>
<tr>
<th>City</th>
<th>Level 1 Construction Costs (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi</td>
<td>$69,741</td>
</tr>
<tr>
<td>Dakar</td>
<td>$61,164</td>
</tr>
<tr>
<td>Kampala</td>
<td>$52,259</td>
</tr>
<tr>
<td>Lilongwe</td>
<td>$52,259</td>
</tr>
<tr>
<td>Kolwezi</td>
<td>$51,504</td>
</tr>
<tr>
<td>Maputo</td>
<td>$46,352</td>
</tr>
<tr>
<td>Casablanca</td>
<td>$44,822</td>
</tr>
<tr>
<td>Abuja</td>
<td>$43,454</td>
</tr>
<tr>
<td>Monrovia</td>
<td>$43,343</td>
</tr>
<tr>
<td>Accra</td>
<td>$42,842</td>
</tr>
<tr>
<td>Yaounde</td>
<td>$42,244</td>
</tr>
<tr>
<td>Kigali</td>
<td>$41,953</td>
</tr>
<tr>
<td>Lusaka</td>
<td>$41,123</td>
</tr>
<tr>
<td>Pretoria</td>
<td>$40,685</td>
</tr>
<tr>
<td>Dar Es Salaam</td>
<td>$40,080</td>
</tr>
<tr>
<td>Average</td>
<td>$42,771</td>
</tr>
</tbody>
</table>

**Figure 5:** Breakdown of Level 1 construction costs of the CAHF House in the main cities of fifteen countries in Africa

### Figure 6: Comparison of Level 1 element costs

Source: CAHF Housing Cost Benchmarking data (2016). See CAHF’s [Housing Costs Dashboard](#) to view and sort these costs further.
Figure 7: Comparison of Level 1 element costs Source: CAHF Housing Cost Benchmarking data (2016).
3.2 A: Land costs

Land proved to be the most challenging cost element to obtain consistent pricing for and is perhaps the most contentious cost element in this exercise. This is unsurprising, given the attention given to land issues across Africa’s cities. In order to provide the best opportunity for standardisation of land costs, the following clear parameters were used by the LQSs to benchmark land costs:

- Development status and size: A parcel of undeveloped land large enough to subdivide (with attendant infrastructure) into twenty stands for single free-standing dwellings.
- General Location: Reasonable access and proximity to city centres or development nodes where existing social and economic amenities are available (e.g. shopping, banking, schools, clinics/hospitals, government offices, pay points, etc). Either within reasonable walking distances of such nodes (800 m/10 minutes) or within such walking distances of affordable and reliable public transport stops that can take one to such nodes within 15-20 minutes in normal off-peak traffic.
- Access to transport: Located near to main roads (less than 3 km) or roads feeding such main roads, preferably within comfortable walking distance (less than 800 m/10 minutes) of affordable public transport stop where possible.
- Access to bulk infrastructure: Preferably with access to bulk/trunk infrastructure, but it is recognised in many areas such access does not yet exist fully and provision has to be made for a degree of on-site services such as borehole water and own waste water treatment installations. This was therefore not an absolute requirement.
- Provision for purchase: It is assumed that land still has to be acquired by the developer, or if already owned, it must be accounted for in the costing at reasonable market value of similar properties in similar areas
- Physical attributes: Shape and size that allows comfortable layouts and building massing, reasonable topography and geotechnical (sub-soil) conditions, not in wetlands, flood-prone valleys, on hill or ridge tops or any other environmentally sensitive areas, or subject to any other conditions that may cause abnormal development costs
- Zoning attributes: For single dwellings, site must be in a recognised or established low to middle income residential area with some existing formal development evident. It must be zoned for or relatively easily “zone-able” for this particular land-use or land use mix which allows this use.

However, different approaches to land tenure, planning, development rights and release create significant differences in deemed land costs between countries. Land availability and prices vary substantially depending on the prevailing land dispensation in a country or city, the current use and development rights, its location to areas of employment and also in relation to proximity to infrastructure networks such as paved roads, bulk water and sewer lines and energy reticulation.

Differences in whether land is government-controlled, leased, purchased or made available at little or no cost is the major differentiator in cost. For instance, land in Mozambique and Morocco is allocated free or at very low cost, yet in many rapidly growing cities such as Nairobi, Dakar and Kampala, land must be purchased in superheated land markets. However, on average land markets in Africa’s major cities are based on patterns of supply and demand and as a result purchasing reasonably located land inevitably involves significant cost.

Location of the land is also a critical cost factor. While we specified an average distance from a central business area, this can have very different price implications for a coastal city (such as Dar es Salaam, Tanzania) versus a relatively low density city such as Tshwane, South Africa. Furthermore, the total size of a city is important. The cost of land which is a certain distance outside a multi-million population city such as Nairobi (3.1 million people) will differ from land in a smaller city such as Abuja (776 000 people).

Access to often limited infrastructure also creates price increases. For instance, discussions with a developer in Kigali, Rwanda indicate that the price of a parcel of land could double in price when access roads are paved. Notwithstanding these differences, land prices estimated varied from as low as US$8 for a 120m² stand in Casablanca, Morocco and US$308 in Maputo, Mozambique to as high as US$15 239 in Kampala, Uganda, with costs in Nairobi and Dakar not far behind at over US$14 000. In countries where land can be a significant proportion of total development costs (such as Nairobi, Kenya; Dakar, Senegal; Kampala, Uganda; and
Yaounde, Cameroon where land costs are between 18 percent and 29 percent of total development cost) debates around site size, location and higher density development also become critical.

While a standard site size of 120m² was assumed in this cost benchmarking, expectations regarding site size vary significantly across the continent. For instance, in South Africa a site of 250m² has been common up until a few years ago, and now site sizes (for government-subsidised houses at least) of 80m² to 120m² is more common. However, engagements in Rwanda found that sites of less than 450m² are considered small – even unacceptable. At this size, the normal cost of land would be much higher than that costed in the standardised CAHF house.

The significance of estimating the cost of land in developing housing must be highlighted. In many cases, development costs don’t account for land purchase (such as in Rwanda and Kenya) where land access is assumed to be the responsibility of governments. If house construction is to happen at scale, considering the costs of purchasing, obtaining rights and subdividing land for development must be given due consideration.

3.3 B: Infrastructure costs

The CAHF cost benchmarking study is based on the assumption that the house to be constructed had paved access roads, storm water drainage, a waterborne sanitation system, access to an internal potable water supply and an energy system. These were considered to be the basic level of service in a capital city, for a house of the specifications used for the standard CAHF House. It is assumed that if such a house cannot be connected to municipally-provided bulk services, then these services must be provided on-site. One of two elements of servicing costs are therefore considered in the benchmarking cost. First, the costs of internal services (linking the house to bulk infrastructure networks), or alternatively the cost of on-site services (such as a septic tank in place of municipal sewer, a well in place of a water connection, and a generator in place of an electricity supply connection from an energy service provider).

Bulk and internal service installation are significant cost components. Estimates for service reticulation vary from US$1,538 in Accra, Ghana to US$19,971 in Lilongwe, Malawi with the normal range of between US$4,000 and US$6,000 per stand. Provisions were made by LOSS where feasible for connections to infrastructure, but even this varies significantly. For instance, electricity reticulation in South Africa (depending on capacity) is achieved via a routine connection fee, whereas in other cities such as Dar es Salaam, Tanzania developers are required to ‘buy a pole’, indicating that the cost of connecting the development site to the nearest substation (which could be kilometres away) is to be paid for by the developer. In other cities, no reliable distribution networks for many infrastructure services exist. In these cases the full costs of on-site septic tanks, generators and wells / boreholes were provided for, and even costs of these infrastructure elements vary depending on topography, soil conditions and acceptable local standards.

The importance of providing for full costs of infrastructure in many African cities is that at present development outcomes are far from optimal. Anecdotal stories from Nairobi, for instance, indicate that high-end apartment blocks are constructed with high level internal service reticulation, yet the lack of suitable municipal sewer networks imply that residents are forced to step into their own effluent as they leave the building and endure water shortages if city supplies are not sufficient. In other cities, basic sanitation systems (such as pit latrines) pose serious risks to water quality, which is often pumped out of boreholes or wells meters away.

3.4 C: Compliance costs

While not a significant cost factor overall, the costs of meeting regulatory compliance requirements still vary considerably across the countries surveyed. Costs vary from US$350 in Kolwezi, DRC to US$3,021 in Maputo, Mozambique. The average range is between US$500 and US$1,000 per site. What is difficult to capture in these figures is the impact of the time it takes to obtain regulatory approvals and transfers on the total holding costs of housing developments. For instance, the World Bank’s Doing Business (2018) report shows important
discrepancies in the complexity of obtaining development rights in these countries. Some examples are given below.\footnote{For further information on the Doing Business indicators, see CAHF’s dashboard on Housing and Construction in Africa: 2010-2018: \url{http://housingfinanceafrica.org/dashboards/housing-construction-africa/}}

- South Africa (Pretoria): Score = 68.25 (20 steps, 155 days)
- Rwanda (Kigali): Score = 67.01 (15 steps, 115 days)
- Kenya (Nairobi): Score = 63.49 (16 steps, 159 days)
- Malawi (Blantyre): Score = 61.17 (13 steps, 153 days)
- Cote d’Ivoire (Abidjan): Score = 59.37 (21 procedures, 162 days)
- Tanzania (Dar es Salaam): Score = 57.10 (24 steps, 184 days)
- DRC (Kinshasa): Score = 53.67 (13 procedures, 122 days)

3.5 D. Construction costs

This section analyses the costs of building the CAHF house on its serviced site. Construction costs consistently make up the largest proportion of total Level 1 costs, comprising between 35 percent of total costs in Blantyre, Malawi to a high of 71 percent in Casablanca, Morocco. Within these proportions, construction costs vary by a factor of over 100 percent, with a low of US$17,349 in Lusaka, Zambia to a high of US$36,371 in Kolwezi, DRC.

The main components of construction cost are intermediate input materials required for the construction, labour required to prepare the site and build the house and a range of indirect costs necessary to make the development work. \textbf{Figure 8} shows the disaggregation of construction costs in labour, materials and indirect costs broken down into Level 2 components.

\textbf{Figure 9} shows the cost composition of house construction costs only (labour, materials and indirect cost components) across the fifteen countries. Materials comprise the largest proportion of construction costs followed by labour and indirect costs (which are generally proportionately equal to each other, but show significant variation). The high variance in labour costs is notable across countries, and is discussed further in Section 3.5.2. \textbf{Figure 10} compares the costs of labour, materials and other costs separately. This shows that across the countries materials costs are the most consistent, even though their variation is still significant. Labour costs have a higher variance than materials. These three cost categories are discussed in the next sections.
## Figure 8: Level 2 construction costs of CAHF House in fifteen countries across Africa

Source: CAHF Housing Cost Benchmarking data (2016).
Figure 9: Construction costs of CAHF House disaggregated into labour, materials and indirect costs
Source: CAHF Housing Cost Benchmarking data (2016).
### Figure 10: Building cost Level 2 comparison - labour, materials and indirect costs

Source: CAHF Housing Cost Benchmarking data (2016).

<table>
<thead>
<tr>
<th>Second Level Costs</th>
<th>First Level</th>
<th>Cameroon</th>
<th>Democratic Republic of the Congo</th>
<th>Ghana</th>
<th>Kenya</th>
<th>Liberia</th>
<th>Malawi</th>
<th>Morocco</th>
<th>Mozambique</th>
<th>Nigeria</th>
<th>Rwanda</th>
<th>Senegal</th>
<th>South Africa</th>
<th>Tanzania</th>
<th>Uganda</th>
<th>Zambia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour Costs</td>
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<td>$21,945</td>
<td>$4,950</td>
<td>$26,603</td>
<td>$41,121</td>
<td>$26,976</td>
<td>$62,966</td>
<td>$16,206</td>
<td>$34,323</td>
<td>$16,314</td>
<td>$14,270</td>
<td>$12,700</td>
<td>$12,356</td>
<td>$12,629</td>
<td>$11,992</td>
<td>$15,628</td>
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<tr>
<td>Materials Costs</td>
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<td>$24,803</td>
<td>$26,518</td>
<td>$26,603</td>
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<td>$37,070</td>
<td>$15,304</td>
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<td>$10,304</td>
<td>$8,863</td>
<td>$9,472</td>
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<td>$8,202</td>
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<td>Indirect Costs</td>
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<td>$5,560</td>
<td>$7,954</td>
<td>$2,950</td>
<td>$3,342</td>
<td>$4,374</td>
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<td>$2,103</td>
<td>$3,376</td>
<td>$3,135</td>
<td>$2,006</td>
<td>$2,700</td>
<td>$2,966</td>
<td>$2,044</td>
<td>$5,315</td>
</tr>
</tbody>
</table>

| Second Level Costs | Yaounde | Kinshasa | Accra | Nairobi | Monrovia | Lusaka | Casablanca | Maputo | Abidjan | Kigali | Jakarta | Pretoria | Dar Es Salaam | Kampala | Lusaka |
|--------------------|---------|---------|-------|---------|----------|--------|-------------|--------|---------|--------|---------|---------|--------------|----------|--------|--------|
| Labour Costs       | $3,560  | $4,394  | $6,135| $2,950  | $3,342   | $2,103 | $4,374      | $2,401 | $3,376  | $3,135 | $2,700  | $2,966  | $12,992     | $15,626  | $12,629 |
| Materials Costs    | $3,956  | $3,342  | $4,950| $2,950  | $5,372   | $2,103 | $4,374      | $2,401 | $3,376  | $3,135 | $2,700  | $2,966  | $12,992     | $15,626  | $12,629 |
| Indirect Costs     | $3,956  | $3,342  | $4,950| $2,950  | $5,372   | $2,103 | $4,374      | $2,401 | $3,376  | $3,135 | $2,700  | $2,966  | $12,992     | $15,626  | $12,629 |
### Table 4: Detailed labour and materials breakdown of construction costs

| Source: CAHF Housing Cost Benchmarking data (2016). |

<table>
<thead>
<tr>
<th>Fourth Level Code</th>
<th>Fourth Level</th>
<th>Third Level Code</th>
<th>Third Level</th>
<th>First Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameroon</td>
<td>Democratic Republic of Congo</td>
<td>D.1.2.3 House Finishes</td>
<td>B.4.4 “Green” Shell</td>
<td>“Green” Shell</td>
</tr>
<tr>
<td>Democratic Republic of Congo</td>
<td>D.1.2.3 House Finishes</td>
<td>B.4.4 “Green” Shell</td>
<td>“Green” Shell</td>
<td>“Green” Shell</td>
</tr>
<tr>
<td>Ghana</td>
<td>Kenya</td>
<td>D.1.2.1 Services and Installations</td>
<td>D.1.4 Construction Costs</td>
<td>Construction Costs</td>
</tr>
<tr>
<td>Libya</td>
<td>Morocco</td>
<td>D.1.2.1 Services and Installations</td>
<td>D.1.4 Construction Costs</td>
<td>Construction Costs</td>
</tr>
<tr>
<td>Malawi</td>
<td>Mozambique</td>
<td>D.1.2.1 Services and Installations</td>
<td>D.1.4 Construction Costs</td>
<td>Construction Costs</td>
</tr>
<tr>
<td>Morocco</td>
<td>Mozambique</td>
<td>D.1.2.1 Services and Installations</td>
<td>D.1.4 Construction Costs</td>
<td>Construction Costs</td>
</tr>
<tr>
<td>Nigeria</td>
<td>Rwanda</td>
<td>D.1.2.1 Services and Installations</td>
<td>D.1.4 Construction Costs</td>
<td>Construction Costs</td>
</tr>
<tr>
<td>Senegal</td>
<td>South Africa</td>
<td>D.1.2.1 Services and Installations</td>
<td>D.1.4 Construction Costs</td>
<td>Construction Costs</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Uganda</td>
<td>D.1.2.1 Services and Installations</td>
<td>D.1.4 Construction Costs</td>
<td>Construction Costs</td>
</tr>
<tr>
<td>Zambia</td>
<td>Lesotho</td>
<td>D.1.2.1 Services and Installations</td>
<td>D.1.4 Construction Costs</td>
<td>Construction Costs</td>
</tr>
</tbody>
</table>
Table 4 provides detailed cost break downs of labour, material and indirect costs across the fifteen countries. This allows for a comparison of the labour and materials costs disaggregated to Level 4.

Materials costs

Materials comprise the largest proportion of house construction costs. Yet, the data shows that materials costs only comprise on average 25 percent and 35 percent of total unit costs when including land, infrastructure, labour and other costs. Looking at the cost of building the housing unit (excluding land, services and other costs) materials costs comprise between 41 percent (Monoravia, Liberia) and 75 percent (Yaounde, Cameroon) of total building costs with most countries being between 50 and 60 percent of total building costs. Absolute costs vary from US$7300 in Younde, Cameroon (US$160/m²) to US$21523 in Kolwezi, DRC (US$468/m²). The normal range is between US$200/m² to US$250/m².

Analysing the composition of the highest component cost element of constructing the ‘CAHF house’ - that is building materials – shows that it is manufactured goods from the secondary economic sector that add most significantly to the costs of construction. It is noteworthy that limited materials inputs come from the primary sector (Agriculture, Mining and Quarrying) - that is sand, stone and raw timber. This has important implications for understanding the housing economic value chain, given the high demand for manufactured products that are intermediate inputs into house construction.

Analysing materials costs further, Figure 11 disaggregates the total building materials cost composition into general materials types used as inputs into construction. This illustrates that the major materials cost inputs (based on prevailing costs at the time of the benchmarking study) are steel and manufactured steel products, followed by manufactured cement products and manufactured timber products. Raw cement and plastic products then generally comprise the fourth and fifth largest cost contributors. Note however that between countries the relative cost contributions of these product categories do differ.

This analysis enables an assessment of whether each country faces a general building materials price inflation, or whether it is specific economic sectors and industries that face specific constraints that result in abnormally high cost contributions to total materials costs. For example, the cost of steel in Nairobi, Kenya; Monrovia, Liberia and Casablanca, Morocco are significantly above average. Similarly, cement prices in Kolwezi, DRC and Abuja, Nigeria are above the normal range.
BENCHMARKING HOUSING CONSTRUCTION COSTS ACROSS AFRICA

Using CAHF’s Housing Cost Benchmarking methodology to analyse housing costs in fifteen African countries - May 2019

<table>
<thead>
<tr>
<th>Country</th>
<th>City</th>
<th>Level 2020</th>
<th>Primary Sector</th>
<th>Secondary Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameroon</td>
<td>Yaounde</td>
<td>4,759</td>
<td>3,354</td>
<td>2,444</td>
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Product Categories:
- Cement
- Cement Product
- Ceramic
- Chemicals
- Electrical
- Glazing
- Petroleum
- Plastics
- Porcelain
- Steel
- Stone
- Timber
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<th>Country</th>
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<td>$1,200</td>
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<td>$1,600</td>
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<tr>
<td>Zambia</td>
<td>Lusaka</td>
<td>$1,500</td>
<td>$1,800</td>
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</table>

Figure 11: Building materials costs per material type
Source: CAHF Housing Cost Benchmarking data (2016).
Labour costs

Total labour costs vary more significantly than materials costs, with the range from a low of US$2,662 in Dakar, Senegal (US$58/m²) and a high of US$11,308 in Kolwezi, DRC (US$246/m²) – the city which also has the highest materials costs. The normal range is between US$60 and US$80/m² (US$2,500 to US$3,600). However, it is when labour is disaggregated into its component parts that a clearer picture emerges of the major cost differences.

Figure 12 shows the high variation in labour costs in the different cities, in relation to basic building work, house finishes and services installations. It is noted that these rates were collated by LQSs in the labour context prevailing in each city, which can vary substantially in respect of the availability (scarcity) of specific skills, salary expectations and legal wage parameters. Nigeria, Ghana, DRC and Morocco show significant premiums even on semi-skilled labour, whereas Cameroon, Liberia, Rwanda, Senegal, South Africa, Tanzania, Uganda and Zambia all have relatively low labour costs. House finishes are relatively stable, with only DRC and Morocco showing up as outliers. In respect of service installations, this is also relatively consistent but it must be noted that different cities have very different service installation requirements, which results in differences in labour inputs required (for instance, construction of on-site septic tank versus connecting to municipal mains).

This cost breakdown provides important pointers for specific further analysis into the constraints that exist in specific cities’ and countries’ labour markets, notably Kenya, Ghana and the DRC. It is also important to note that certain cities’ labour markets are significantly more inflated than other cities within that same country, implying a need for a regionalised approach to managing down labour costs as a component of house construction.

3.6 E: Other development costs

A range of other development costs are included in this category, such as marketing, finance and holding costs and VAT / sales taxes. On average, these costs amount to around US$10,000 per unit with Ghana, Kenya, Malawi, Senegal, Mozambique and Uganda all being around US$11,000. Sales taxes are mostly between US$4,000 and US$8,000, with the main variance being based on the total cost of development that attracts taxes.

The calculation of holding costs varied greatly, due to the very different financial dispensations used by developers in each country. For instance, the relative ease of obtaining development financing in South Africa and the relatively fluid development process keep finance and holding costs to US$1,082 per unit, whereas at the other side of the scale in Mozambique these were estimated to amount to over US$5,000. In some countries, it was simply not possible to estimate finance and holding costs due to the very underdeveloped financial systems and the lack of any development finance, meaning most developers would be required to either rely on their own capital resources or would raise the full development costs from purchasers prior to commencing development.

A further strategy often used by developers to circumvent the need to raise development finance is to offer tailored financial solutions to purchasers, such as five to seven year repayment periods with no mortgage finance. This places significant burdens on the financial resources of developers, and can substantially raise the total costs of purchasing housing for consumers.
Figure 12: Labour cost breakdown: general construction, house finishes and services installation
Source: CAHF Housing Cost Benchmarking data (2016).
Financing and holding costs, marketing and sales taxes were reported very unevenly across the cities. CAHF has recognised the difficulties faced in accurately estimating these costs, and in more recent cost benchmarking exercises more attention is given to how to consistently cost for these items.

Reasons for differences in the calculations of holding costs have been given earlier in the report. As a result of these challenges, figures vary from no cost - the assumption being that financing would have to be provided from the developer’s own capital – to a high of US$6,300 in Mozambique.

Considering marketing costs, these were also highly variable, with some LQSSs simply reporting that a development would not start unless there was 100 percent pre-sales. The normal range however is between US$250 and US$1,000 per unit.

Sales tax or VAT adds a significant cost burden in most countries, with the sales tax range varying between US$4,000 and US$8,000. Mozambique is the outlier, as sale of immovable property is exempted from VAT.
Figure 13: Indirect costs – financing & holding costs, marketing and sales taxes
Source: CAHF Housing Cost Benchmarking data (2016).

BENCHMARKING HOUSING CONSTRUCTION COSTS ACROSS AFRICA | Using CAHF’s Housing Cost Benchmarking methodology to analyse housing costs in fifteen African countries - May 2019
4 Industrial Sector Breakdown and Economic Value Chain Composition

CAHF’s housing cost benchmarking methodology builds up the total cost of each housing type from a detailed Bill of Quantities comprising hundreds of discrete cost elements. From the BoQ, each item – whether materials, labour or other inputs – can be allocated to a standard industrial classification.

Using CAHF’s housing economic value chain approach, this then enables a calculation of the impact that constructing this standard CAHF House has on the economy of a specific country. This shows the intermediate inputs into the house construction (primary sector, secondary sector and tertiary sector inputs), and quantifies the gross value added to these materials during construction, comprising labour remuneration, gross operating surplus and net indirect taxes less subsidies.

4.1 Industry sector and product/service breakdowns of subsidised house types

Table 5 shows the International Standard Industrial Classification (ISIC) sectors and subsectors of products and services required to construct our standard CAHF House in each country. Each item in the BoQ is allocated to an economic sector and sub-sector in relation to the ISIC Code. A further breakdown to a product / service level is also shown, taking this breakdown to recognisable product and service descriptions.

4.2 Economic value chain breakdown of the standard house

Figure 14 shows the breakdown of the CAHF House in each country into its economic value chain components of gross value added (labour, gross operating surplus and net indirect taxes less subsidies) and intermediate inputs (from the primary, secondary and tertiary sectors). Note that land is isolated in its own category, as it is of itself does not create any economic value added – only services related to it (such as sales and registrations) and activities that happen on it (construction, rental etc) are generators of economic value. The value chain calculations show the total costs incurred in constructing that unit in the benchmarked country, and does not take into account the extent to which subsidies may have been paid towards, for instance the purchase of land or installation of infrastructure.

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9 Note that South Africa’s SIC categories generally follow the ISIC classification, but do differ in specific instances. CAHF has elected to use the ISIC categorization as the standard due to the cross-continental benchmarking studies it is undertaking, in order to allow for comparisons.
<table>
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</tbody>
</table>

BENCHMARKING HOUSING CONSTRUCTION COSTS ACROSS AFRICA | Using CAHF’s Housing Cost Benchmarking methodology to analyse housing costs in fifteen African countries - May 2019 | 28
| SIC: Metal Products Excl Machinery | Electrical: Materials | $238 | $300 | $1,316 | $822 | $400 | $977 | $826 | $1,154 | $881 | $588 | $756 | $569 | $837 | $714 | $581 |
| — Plumbing: Metal | $7 | $525 | $441 | $1,460 | $450 | $854 | $599 | $1,225 | $282 | $389 | $276 | $819 | $497 | $1,243 | $683 |
| — Steel: Bathroom | $0 | $180 | $66 | $193 | $50 | $45 | $103 | $146 | $126 | $52 | $29 | $122 | $140 | $286 | $208 |
| — Steel: Door Fittings | $34 | $175 | $79 | $242 | $150 | $248 | $46 | $146 | $93 | $33 | $92 | $58 | $166 | $143 | $70 |
| — Steel: Door Frame | $281 | $235 | $145 | $496 | $480 | $169 | $517 | $266 | $164 | $924 | $99 | $502 | $100 | $158 |
| — Steel: Screws | $102 | $100 | $105 | $290 | $600 | $26 | $66 | $456 | $50 | $105 | $50 | $16 | $93 | $14 | $123 |
| — Steel: Window Frame | $301 | $1,286 | $193 | $471 | $1,685 | $514 | $1,519 | $654 | $410 | $565 | $66 | $409 | $445 | $506 | $192 |

| SIC4: Electricity, Gas & Water | Government Service Contribution | $170 | $620 | $0 | $0 | $3,500 | $0 | $170 | $0 | $0 | $0 | $348 | $302 | $114 | $0 |
| — On Site Energy System | $238 | $50 | $1,934 | $600 | $4,507 | $0 | $423 | $378 | $1,961 | $0 | $0 | $0 | $143 | $0 |
| — Partial Municipal Energy Supply | $102 | $200 | $329 | $338 | $0 | $75 | $0 | $45 | $403 | $78 | $151 | $0 | $233 | $229 | $67 |

| SIC4: Electricity, Gas & Water | Water Supply | Government Service Contribution | $0 | $720 | $0 | $484 | $8,000 | $0 | $284 | $1,064 | $0 | $89 | $0 | $882 | $285 | $429 |
| — Municipal Infrastructure Contribution | $170 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $286 | $0 |
| — On Site Sanitation System | $0 | $438 | $316 | $1,451 | $1,000 | $3,305 | $0 | $962 | $2,159 | $1,176 | $672 | $0 | $264 | $1,429 | $0 |
| — On Site Water System | $0 | $1,000 | $311 | $967 | $700 | $10,517 | $0 | $103 | $0 | $78 | $0 | $0 | $136 | $229 | $0 |
| — Partial Municipal Water Supply | $0 | $292 | $0 | $193 | $650 | $60 | $0 | $145 | $881 | $0 | $788 | $0 | $465 | $714 | $250 |

| SIC5: Construction | Gross Value Add | $6,117 | $1,020 | $5,127 | $3,337 | $1,500 | $1,768 | $5,165 | $3,990 | $2,077 | $3,199 | $4,874 | $2,944 | $2,911 | $3,429 | $3,991 |
| — Labour: Highly Skilled (Management,..) | $1,359 | $2,523 | $977 | $967 | $750 | $1,574 | $207 | $3,513 | $1,259 | $1,016 | $1,429 | $1,286 | $1,164 | $1,429 | $1,404 |
| — Road: Stormwater Retention | $1,020 | $300 | $287 | $2,660 | $1,750 | $751 | $0 | $1,218 | $1,032 | $0 | $2,403 | $1,992 | $0 | $429 | $1,991 |

| SIC8: Financial Intermediation, Real Estate, Bus Services | Financial Services | | $0 | $0 | $1,193 | $0 | $0 | $3,530 | $417 | $5,879 | $1,284 | $0 | $1,078 | $996 | $0 | $1,743 | $541 |
| — Financial Services | | $0 | $0 | $513 | $0 | $0 | $0 | $815 | $210 | $755 | $0 | $719 | $0 | $0 | $571 | $0 |
| — Financial Services | | $0 | $150 | $513 | $290 | $0 | $191 | $0 | $192 | $755 | $0 | $504 | $0 | $0 | $14 | $0 |
| — Labour: Highly Skilled (Management,..) | | $0 | $300 | $2,523 | $2,689 | $280 | $143 | $1,148 | $5,192 | $3,323 | $0 | $588 | $612 | $0 | $129 | $386 |
| — Labour: Semi & Unskilled | | $400 | $1,218 | $434 | $1,498 | $163 | $649 | $1,764 | $730 | $568 | $332 | $349 | $1,301 | $1,063 | $333 | $331 |
| — Professional Fees | | $425 | $300 | $293 | $1,153 | $1,650 | $1,054 | $783 | $3,013 | $629 | $954 | $1,176 | $694 | $581 | $1,214 | $331 |

| SIC9: Community, Soc., Gov. Services | Government Leases | $2,736 | $300 | $1,197 | $522 | $550 | $164 | $222 | $8 | $176 | $75 | $1,284 | $407 | $81 | $809 | $100 |
| — Land | | | | | | | | | | | | | | | |
| — Raw Land: Freehold | | $3,059 | $3,000 | $3,158 | $14,507 | $2,500 | $721 | $0 | $338 | $4,532 | $1,088 | $13,445 | $1,000 | $970 | $14,286 | $2,851 |
| — Raw Land: Other | | $0 | $0 | $0 | $250 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| — Raw Land: PTO | | $0 | $102 | $0 | $29 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
## BENCHMARKING HOUSING CONSTRUCTION COSTS ACROSS AFRICA

Using CAHF’s Housing Cost Benchmarking methodology to analyse housing costs in fifteen African countries - May 2019

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<td>Net Indirect Taxes</td>
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5 Conclusions and Policy Implications

Following are the key findings from CAHF’s pilot housing cost benchmarking study.

5.1 Cost composition and comparability of data

Until now, limited credible, comparative data exists on these critical input costs. In addition, while some attempts have been made to collect and compare construction cost information across countries, very little effort has gone into understanding why these costs are so different – and then, how the identified cost drivers might be better managed towards an overall goal of improved affordability. CAHF now has an extensive database of the elemental costs of a standardised house in thirty cities across fifteen countries. We can compare the total cost of building to completion this standard house across these countries and cities. We can break this cost down into broad categories (land, infrastructure, construction, other costs), sub-categories (foundations, walls, roof, finishes), or into component costs (labour vs materials, cost of cement, or timber, or steel). Finally, we have categorised the input costs according to their Standard Industry Classifications (SIC), so that we know what economic sectors are stimulated, and to what extent other parts of the economy are stimulated by the construction of this house. Most importantly, we can compare these things - categories, components, inputs, products, sectors - across cities and countries and economic sectors.
5.2 Understanding the full costs of construction

In many countries in which CAHF has undertaken the cost benchmarking exercise, the final costs of the CAHF House have been queried by developers and public officials. While CAHF accepts that, given the level of detail of the costs collated there may be certain variations and anomalies in the data, without fail when interrogated in greater detail the costing methodology has proved to be a robust framework for analysing housing construction costs across countries and cities. Inevitably, further analysis of other cost information provided to CAHF quickly identifies differences, omissions or other reasons for cost inconsistencies. While CAHF does not dispute that a similar house could under certain circumstances be (and in cases, has been) developed at lower cost than our estimates, this is generally because:

- Full and true costs are not calculated, such as the full (assumed) cost of land;
- Cost elements of costs are excluded from the calculation, most importantly the deemed costs of linking to bulk infrastructure networks or providing on-site infrastructure; or
- Calculations of certain costs are not accurately reflecting the real situation, such as for holding costs.

5.3 Housing cost differences

Perhaps the most notable feature of this analysis is the high variance in total housing development costs across the thirty cities included in the study; not only the variance in total costs of constructing the same house, but also major differences in the composition of the total cost across land, infrastructure, construction, and other costs. The initial premise of the study, which was to provide better empirical data on the composition of housing costs in Africa, is borne out by this finding: even a house of standard design and the same specification is not created equal, and what it requires to be constructed varies significantly from city to city. Figure 15 shows the total cost and cost compositions across the fifteen cities. It is important to note that at least half of total housing costs are for non-construction items (such as land, infrastructure, compliance, tax, etc). This shows the importance of a multi-faceted approach to reducing housing costs, rather than a singular focus on construction cost.

This finding has important implications for housing strategy across the continent. While generic strategies are important in reducing housing costs (such as how to reduce the cost of intermediate input building materials), it points to the need for specific strategies to combat particular reasons that are escalating overall housing costs in a particular country, or even city. The huge variances in land costs is one such case in point, as is the availability of, and approach to provision of bulk infrastructure.
Figure 15: Cost composition of CAHF House in fifteen African cities
Source: CAHF Housing Cost Benchmarking data (2016).
5.4 Affordability & reduction in housing construction costs

It is noted that this standard CAHF house sits in the middle of a spectrum of potential affordable housing typologies and products that should be provided in any city to meet the housing demand profile. However, the large variances in cost of the same product have important implications for the type and size of house that households in specific countries and cities can afford. Housing affordability is generally a function of three things: (1) a household’s income, (2) the price of the house that is available for sale, and (3) the availability of, and terms of housing finance available for which the household qualifies. This analysis shows that even with readily available and affordable housing finance, a household with a similar dollarized income in different cities have fundamentally different effective demand for housing, given its availability, specifications and cost.

The key housing cost drivers must therefore be targeted to drive housing cost reductions in each country and city. This may be the high cost of land, the need to provide on-site infrastructure, or high building costs due to the level of Importation of specific manufactured building materials, or high labour costs, and/or high tax rates – or indeed, a combination of some or all of these factors. CAHF envisages that a more empirical and robust conversation on what an ‘affordable house’ is and how its cost is comprised will further the continental debate around the range of solutions necessary to ensure housing affordability.

This more rational debate on affordability and housing component costs also enables better analyses on proposed solutions to affordable housing across Africa. In many countries, Alternative Building Technologies (ABTs) are often proposed as the solution to affordable housing. However, CAHF’s cost benchmarking analysis indicates that ABTs must be considered carefully. Often, the proportion of total housing costs impacted by such technologies are limited, and they do little to reduce many other cost components such as land, infrastructure and registration costs. Further, few ABTs significantly reduce high-cost items such as plumbing, electrification and the professional costs required to complete and register a house. Importantly, inputs to many ABTs, such as cement, cement products and steel, could remain the major cost driver, albeit such technologies may decrease housing costs to some extent. Therefore, the major cost drivers of conventional construction could remain major cost drivers in ABT housing, if not addressed at source. Annexure E outlines the most important considerations when considering ABTs.

5.5 Property typologies & standards

Property and housing standards and high household expectations regarding what appropriate housing is across Africa are major contributors to housing affordability. While many new developments show a move towards smaller sites and units, prevailing development densities are still low, and formal house sizes are high in comparison to overall affordability levels in all African countries. Rather than attempting to benchmark ‘affordable housing’ around the standard CAHF House used for this study, CAHF wishes for this house to be seen as a placeholder in the affordable housing spectrum.

As the debate around affordability, house typology and size opens up across the continent, we will endeavour to introduce a range of other products into the cost benchmarking analysis. We have already commenced with this process. A recent study on South Africa’s subsidised housing value chain has specified and benchmarked seventeen different housing typologies, and more recent housing cost benchmarking work in Kenya and Rwanda have specified and costed a further set of seven housing products. These include smaller housing units, as well as higher density and higher-rise built forms. These include multi-storey construction (such as double storey ‘row houses’); higher-density semi-detached or row housing; medium-density four or five storey ‘walk-up’ apartments; high-rise apartments (5+ storeys); ‘backyard tenements, rooms and cottages’, serviced sites and even the provision of services in in-situ upgrading programmes.

As an example, Figure 16 shows the calculated costs (2018) of a range of different housing typologies in South Africa. Reports analysing housing costs and the economic impacts of housing in South Africa, Kenya and Rwanda are available on CAHF’s website. 10

### Figure 16: CAHF calculated capital costs of key housing typologies in South Africa

**Source:** CAHF (2019). Economic Impact of South Africa’s Subsidised Housing Value Chain; CAHF (2019) Assessing Rwanda’s Affordable Housing Sector; and CAHF (2019) Assessing Kenya’s Affordable Housing Sector.

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</tr>
<tr>
<td>A2. Ownership 32m² SHP (with material)</td>
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<td>A3. Ownership 65m² SHP</td>
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<td>A4. Ownership 100m² SHP</td>
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<td>C9. Nairobi CAHF 5m² 2018 new</td>
<td>$1,004</td>
</tr>
<tr>
<td>D1. Nairobi CAHF 55m² 2018 new</td>
<td>$8,769</td>
</tr>
<tr>
<td>D2. Nairobi CAHF 45m² 2018 new</td>
<td>$5,572</td>
</tr>
<tr>
<td>D3. Nairobi CAHF 35m² 2018 new</td>
<td>$4,693</td>
</tr>
<tr>
<td>D4. Nairobi CAHF 25m² 2018 new</td>
<td>$3,952</td>
</tr>
<tr>
<td>D5. Nairobi CAHF 15m² 2018 new</td>
<td>$3,262</td>
</tr>
<tr>
<td>D6. Nairobi CAHF 5m² 2018 new</td>
<td>$2,622</td>
</tr>
<tr>
<td>D7. Nairobi CAHF 5m² 2018 new</td>
<td>$2,006</td>
</tr>
<tr>
<td>D8. Nairobi CAHF 5m² 2018 new</td>
<td>$1,430</td>
</tr>
<tr>
<td>D9. Nairobi CAHF 5m² 2018 new</td>
<td>$1,004</td>
</tr>
</tbody>
</table>
6  The Way Forward

CAHF has already commenced with improvements to its housing cost benchmarking methodology, based on the findings of this pilot study. Additional, more detailed cost benchmarking work has been undertaken in South Africa, Kenya and Rwanda that includes the benchmarked CAHF House, but extends the cost benchmarking analysis to include a range of other continentally and locally relevant house typologies and sizes.

CAHF will also be extending the range of benchmarked products costed in Nigeria, Tanzania, Uganda and Cote d’Ivoire during 2019. These updates will be based on a refined costing framework and extended BoQ that enables more detailed assessments of costs in these housing markets. In addition we continue to place greater emphasis on ensuring accuracy of cost inputs through wider consultations with public and private developers in the countries surveyed.

CAHF aims to update the benchmarking exercise in these fifteen countries in the future, and to extend benchmarking into other African countries and cities. There has also been some interest in undertaking some international benchmarking comparisons.

Ongoing analysis continues to identify ways that the benchmarking of housing costs can be used to develop and refine affordable housing policy. We continue to apply this methodology to obtaining much more detailed understandings of local housing markets, to understanding the cost composition of house construction, to identifying leading and lagging input sectors into house construction, and working with governments, local developers and international bodies such as the World Bank Group to target policy in a way that will yield greater impact on making housing more affordable and more widely available.
7 References


Annexure A: Standard “CAHF House” plans and specifications

### CAHF HOUSING ECONOMIC VALUE CHAIN – SUMMARY SPECIFICATIONS FOR PRODUCTS COSTED

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>RSA</th>
<th>CITY</th>
<th>JOHANNESBURG</th>
<th>VERSION</th>
<th>V01</th>
<th>DATE</th>
<th>20190327</th>
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</thead>
<tbody>
<tr>
<td>PRODUCT</td>
<td>C0</td>
<td>CAHF RSA GENERIC 55M² HOUSE IN FORMAL SERVICED AREA (46m² Two bed, one bath house with 9m² veranda = total 55m²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>REF TO COST SHEET</th>
<th>ELEMENT/COMPONENT</th>
<th>BRIEF SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>LAND – PLOT SIZE</td>
<td>120m²</td>
</tr>
<tr>
<td>B1</td>
<td>BULK/TRUNK INFRASTRUCTURE</td>
<td>Fully connected to all bulk services: Water, sewer, electricity, roads, transportation and solid waste removal</td>
</tr>
<tr>
<td>B2</td>
<td>INTERNAL INFRASTRUCTURE:</td>
<td>Full reticulation of all services as below by developer</td>
</tr>
<tr>
<td>B2.1</td>
<td>Water</td>
<td>Full supply and reticulation by developer</td>
</tr>
<tr>
<td>B2.2</td>
<td>Sanitation</td>
<td>Full reticulation and connection to bulk by developer</td>
</tr>
<tr>
<td>B2.3</td>
<td>Energy</td>
<td>Full electrical supply and reticulation by developer</td>
</tr>
<tr>
<td>B2.4</td>
<td>Access and internal roads</td>
<td>Paved roads and sidewalks with street lighting by developer</td>
</tr>
<tr>
<td>B2.5</td>
<td>Stormwater disposal and sediment control</td>
<td>Kerb inlets and piped storm water disposal system connected to bulk by developer</td>
</tr>
<tr>
<td>B3</td>
<td>Common facilities provided by developer on site for all users</td>
<td>N/a</td>
</tr>
<tr>
<td>D1, D2</td>
<td>BUILDINGS</td>
<td>46m² Dwelling with 9m² covered veranda</td>
</tr>
<tr>
<td></td>
<td>Informal shack by owner</td>
<td>N/a</td>
</tr>
<tr>
<td></td>
<td>Toilet structure on serviced site</td>
<td>N/a</td>
</tr>
<tr>
<td></td>
<td>Foundations</td>
<td>Reinforced concrete strip footings under walls</td>
</tr>
<tr>
<td></td>
<td>Ground floor construction</td>
<td>100mm Thick concrete surface bed wood floated to receive cement plaster screed, steel mesh reinforced, on damp course membrane on insect-proofed compacted fill</td>
</tr>
<tr>
<td></td>
<td>Structural elements</td>
<td>N/a</td>
</tr>
<tr>
<td></td>
<td>Superstructure (walls, etc)</td>
<td>External: 200mm thick load bearing walls of cement maxi blocks; Internal: 100mm thick non-load bearing walls of cement maxi blocks</td>
</tr>
<tr>
<td></td>
<td>Windows</td>
<td>Frames: Steel residential profile, painted, with solid brass fittings Glazing: 3mm and 4mm clear and textured obscure glass (bathroom) as per National Building Codes, fixed with putty</td>
</tr>
<tr>
<td></td>
<td>Doors</td>
<td>Frames: Pressed steel rebated frames, painted External doors: 44mm Thick Solid hardwood single door, varnished or oiled, with 4-lever mortice locks and chrome plated door furniture Internal doors: 40mm Thick hollow-core, hardboard door, painted, with two-lever mortice lock and chrome-plated door furniture</td>
</tr>
<tr>
<td>Feature</td>
<td>Specification</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Roofs – construction and covering</td>
<td>0.5mm Thick “Fullhard” galvanised steel S-rib (corrugated) long sheets, unpainted, double pitched roof fixed at 10 degrees on 38 x 152mm timber rafters with ends built into walls.</td>
<td></td>
</tr>
<tr>
<td>Roofs – eaves, verges, rain water goods</td>
<td>Eaves/verges: 10 x 200mm Fibre cement fascias and barge boards, painted Rainwater goods: Galvanised sheet iron eaves gutters and downpipes, painted with precast concrete rainwater channel to each downpipe</td>
<td></td>
</tr>
<tr>
<td>Ceilings</td>
<td>Nailed up ceiling of 4mm Thick fibre cement boards, painted, fixed on timber bandering, and with glass or mineral wool blanket insulation as required by NBR for applicable climatic region</td>
<td></td>
</tr>
<tr>
<td>External finishes</td>
<td>One coat cement plaster and exterior quality acrylic paint</td>
<td></td>
</tr>
<tr>
<td>Internal finishes</td>
<td>One coat cement plaster and interior quality PVA paint. Glazed ceramic wall tiling in showers and splashbacks above basins and sinks</td>
<td></td>
</tr>
<tr>
<td>Floor finishes</td>
<td>Glazed ceramic tiling fixed with adhesive on cement plaster screeds</td>
<td></td>
</tr>
<tr>
<td>Fittings - kitchen</td>
<td>One 1200mm long enamelled steel floor cabinet, with doors, shelves, one drawer, and single bowl stainless steel sink top</td>
<td></td>
</tr>
<tr>
<td>Fittings – built-in bedroom cupboards/wardrobes</td>
<td>Main bedroom: Melamine-surfaced chipboard three-door built-in cupboard with doors, shelves and hanging rail Second bedroom: As above but two-door</td>
<td></td>
</tr>
<tr>
<td>Fittings - general</td>
<td>Curtain tracks to windows, toilet paper holder, towel rail, glazed aluminium shower side panel and door</td>
<td></td>
</tr>
<tr>
<td>Plumbing and drainage</td>
<td>Sanitary fittings, taps: One WC suite with flushing cistern and seat, one basin on pedestal with hot and cold pillar cocks, one shower set, one kitchen sink mixer, one kitchen wall-mounted stainless steel wash trough with bib taps Water supply: 22mm Incoming main, metered, 22 and 13mm copper tubing to fittings, with all necessary valves, etc Sanitary waste: 50mm PVC waste pipes, 110mm UVPVC soil stacks and 110mm PVC underground soil drains with all necessary inspection and rodding eyes. PVC gulley trap in precast concrete encasing, with PVC grating</td>
<td></td>
</tr>
<tr>
<td>Domestic hot water</td>
<td>Evacuated tube thermo-syphon solar hot water geyser with integrated 100 litre storage tank, mounted at 26 degrees on steel stand on roof, with gravity feed</td>
<td></td>
</tr>
<tr>
<td>Fire protection</td>
<td>N/a</td>
<td></td>
</tr>
<tr>
<td>Electrical installation and lighting</td>
<td>Wall-mounted distribution board with 60A main circuit breaker, earth leakage, overload trip switch, stove isolator, 10A and 15A circuit breakers, pre-paid meter, one single socket power outlet per bedroom (double in kitchen and living room), one light per room and one outside light at front and back door</td>
<td></td>
</tr>
<tr>
<td>Perimeter security and access control</td>
<td>N/a (to be provided by owner for own account)</td>
<td></td>
</tr>
<tr>
<td>Lifts</td>
<td>N/a</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>N/a</td>
<td></td>
</tr>
</tbody>
</table>
UNIT PLANS:
BENCHMARKING HOUSING CONSTRUCTION COSTS ACROSS AFRICA | Using CAHF’s Housing Cost Benchmarking methodology to analyse housing costs in fifteen African countries - May 2019
Annexure B: Factors influencing housing cost benchmarking

This cost benchmarking exercise required a standardised set of assumptions in order that like-for-like costings could be developed. However, there are a multitude of factors that influence costings across typologies and geographies that ultimately influence costs.Outlined below are the most important factors that were standardised for this analysis.

- Many locational factors influence construction costs (including proximity to central business areas, maturity of area, maturity of market, zoning, etc.).
- Non-locational regulatory factors influence overall construction costs (including town planning and building plan approvals, development contributions, etc.).
- Specific cost components may not be directly comparable (such as land costs, which may be influenced by existing rights to land, existing structures requiring demolition, site aspects and underlying geology).
- The specific type and grade of space developed influences ultimate construction costs of a development and may not be exactly comparable between developers and regions.
- Specific design parameters influence ultimate costs (for example, even top-grade residential accommodation can be priced in South Africa from, say, R25,000/m² to over R100,000/m²).
- Development models may differ and could influence ultimate costs (such as REITs that acquire existing built stock) or developer-contractor models with alternative mark-up structures, and developer-contractor-sales models (such as via housing developers developing for market sale vs holding for rental).
- Construction processes can also influence ultimate costs of a development (cashflows, construction delays, weather factors, holding costs, etc.).
- Project costing and feasibility approaches across companies and professionals can make direct comparisons of different developments problematic.

In addition to this, using a specific set of properties as benchmarks pose further difficulties:

- Obtaining detailed costing information from private developers may be challenging, and even if available, ensuring accurate comparability may be difficult.
- Specific developments may not be developed during the same construction timeframe, and hence will be influenced by prevailing market conditions at the time of construction.

CAHF’s housing cost benchmarking methodology therefore attempts to standardise as many of these variables as possible to ensure accurate cross-country comparisons.
Annexure C: Five-level breakdown of CAHF costing framework
## Annexure D: Level 2 cost breakdown of CAHF House in fifteen countries’ main cities

<table>
<thead>
<tr>
<th>Country / City</th>
<th>Cameroon</th>
<th>DRC</th>
<th>Ghana</th>
<th>Kenya</th>
<th>Liberia</th>
<th>Malawi</th>
<th>Morocco</th>
<th>Mozambique</th>
<th>Nigeria</th>
<th>Rwanda</th>
<th>Senegal</th>
<th>South Africa</th>
<th>Tanzania</th>
<th>Uganda</th>
<th>Zambia</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Level</td>
<td>Second Level</td>
<td>Yaounde</td>
<td>Kolwezi</td>
<td>Accra</td>
<td>Nairobi</td>
<td>Monrovia</td>
<td>Lilongwe</td>
<td>Casablan..</td>
<td>Maputo</td>
<td>Abuja</td>
<td>Kigali</td>
<td>Dakar</td>
<td>Pretoria</td>
<td>Dar es Salaam</td>
<td>Kampala</td>
</tr>
<tr>
<td>E. OTHER DEVELOPMENT COSTS</td>
<td>E.1. Marketing</td>
<td>$0</td>
<td>$300</td>
<td>$1,230</td>
<td>$1,044</td>
<td>$280</td>
<td>$143</td>
<td>$1,148</td>
<td>$5,128</td>
<td>$1,939</td>
<td>$0</td>
<td>$588</td>
<td>$612</td>
<td>$0</td>
<td>$86</td>
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<tr>
<td></td>
<td>E.2. Finance &amp; Holding Costs</td>
<td>$0</td>
<td>$150</td>
<td>$4,342</td>
<td>$1,934</td>
<td>$0</td>
<td>$3,786</td>
<td>$1,233</td>
<td>$6,346</td>
<td>$4,179</td>
<td>$0</td>
<td>$2,301</td>
<td>$1,082</td>
<td>$0</td>
<td>$2,943</td>
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<tr>
<td></td>
<td>E.3. Sales Taxes</td>
<td>$5,131</td>
<td>$7,125</td>
<td>$6,381</td>
<td>$8,723</td>
<td>$2,064</td>
<td>$7,401</td>
<td>$7,470</td>
<td>$0</td>
<td>$3,950</td>
<td>$4,798</td>
<td>$8,275</td>
<td>$3,474</td>
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<td>D.2. Materials Costs</td>
<td>$7,370</td>
<td>$21,523</td>
<td>$12,169</td>
<td>$15,517</td>
<td>$15,128</td>
<td>$11,786</td>
<td>$16,116</td>
<td>$16,335</td>
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<td>$12,069</td>
<td>$9,092</td>
<td>$10,700</td>
<td>$12,629</td>
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<tr>
<td>C. COMPLIANCE COSTS</td>
<td>C.1 Municipal Compliance</td>
<td>$187</td>
<td>$50</td>
<td>$197</td>
<td>$213</td>
<td>$50</td>
<td>$99</td>
<td>$214</td>
<td>$7</td>
<td>$176</td>
<td>$26</td>
<td>$39</td>
<td>$41</td>
<td>$53</td>
<td>$0</td>
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<td></td>
<td>C.1 Prof Fees</td>
<td>$425</td>
<td>$300</td>
<td>$137</td>
<td>$1,076</td>
<td>$800</td>
<td>$1,054</td>
<td>$783</td>
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<td>$504</td>
<td>$915</td>
<td>$1,092</td>
<td>$286</td>
<td>$581</td>
<td>$486</td>
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<td>C.2 Health Safety &amp; Enviro Compliance</td>
<td>$0</td>
<td>$66</td>
<td>$77</td>
<td>$600</td>
<td>$0</td>
<td>$64</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$14</td>
<td>$0</td>
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<tr>
<td></td>
<td>C.2 Municipal Compliance</td>
<td>$0</td>
<td>$158</td>
<td>$19</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$1</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$9</td>
</tr>
<tr>
<td>B. INFRASTRUCTURE COSTS</td>
<td>B1. Bulk/Devt Contributions</td>
<td>$170</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$286</td>
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<tr>
<td></td>
<td>B.2. Water System</td>
<td>$0</td>
<td>$1,346</td>
<td>$311</td>
<td>$1,644</td>
<td>$4,500</td>
<td>$10,577</td>
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<td>$183</td>
<td>$881</td>
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<td>$294</td>
<td>$328</td>
<td>$415</td>
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<td>B.3. Sanitation System</td>
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<td>$1,104</td>
<td>$316</td>
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<td>$5,850</td>
<td>$3,305</td>
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<td>$1,176</td>
<td>$554</td>
<td>$734</td>
<td>$2,086</td>
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<td>B.5 Site Preparation</td>
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<td>$686</td>
<td>$582</td>
<td>$3,774</td>
<td>$1,976</td>
<td>$1,506</td>
<td>$1,720</td>
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<td>$1,562</td>
<td>$4,422</td>
<td>$2,135</td>
<td>$962</td>
<td>$1,292</td>
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<tr>
<td>A. LAND COSTS</td>
<td>A.1 Freehold Tenure</td>
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<td>$3,000</td>
<td>$3,158</td>
<td>$14,507</td>
<td>$2,500</td>
<td>$721</td>
<td>$0</td>
<td>$308</td>
<td>$4,532</td>
<td>$1,098</td>
<td>$13,445</td>
<td>$1,020</td>
<td>$670</td>
<td>$14,286</td>
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<td>A.2 Traditional Tenure (PTO)</td>
<td>$0</td>
<td>$102</td>
<td>$0</td>
<td>$29</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$60</td>
</tr>
<tr>
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<td>A.3 Registration Costs</td>
<td>$2,549</td>
<td>$250</td>
<td>$0</td>
<td>$290</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<td>$0</td>
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<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$229</td>
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<td>A.3a Registration Costs</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<td>$0</td>
<td>$0</td>
<td>$0</td>
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<tr>
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<td>A.4 Planning Approval</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$250</td>
<td>$0</td>
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<td>$0</td>
<td>$126</td>
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<td>$84</td>
<td>$408</td>
<td>$0</td>
<td>$714</td>
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<tr>
<td></td>
<td>A.5 Other</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$250</td>
<td>$0</td>
<td>$0</td>
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<td>$0</td>
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</tr>
</tbody>
</table>
Annexure E: Alternative Building Technologies (ABTs) for affordable housing

Alternative Building Technologies (ABTs) are often put forward as the solution to delivering affordable housing at scale. While ABTs have many potential advantages which do merit serious consideration as one option for delivering affordable housing, the belief in their ability to solve the delivery of affordable housing is often overstated. Therefore, ABTs must be considered to run in parallel with conventional construction methods and materials, and perhaps in time will overtake conventional approaches as the only feasible and desirable option. However, believing that ABTs offer the ‘silver bullet’ for solving affordable housing delivery often leads to unmet promises by government policy makers, programme leaders and technology providers. The usual reasons given for advancing ABTs are to:

- Save on both capital and running costs of accommodation;
- Save on construction / erection time, but still promoting labour intensive house construction, job creation and local economic development; and
- Promote more environment friendly use of resources.

There are many ways in which to define and categorise alternative technologies. A large body of literature and documentation exists of practices used all over the world, some used extensively from pre-industrial and pre-colonial times and still serving their user communities well in the appropriate settings. Much is made of the term “appropriate technology”, and in this approach, it is common to classify ABTs broadly into:

- High technology: Processed and synthetic materials, manufactured products or systems, industrialised production);
- Intermediate (or adapted conventional) technology: Hybrid approaches that replace some conventional or high technology materials and products used in construction (especially walling and roofing components) with recycled and/or other “found” materials.
- Low technology: Traditional materials and usually owner-built methods (mostly used in rural settings, but often also “informal” peri-urban/urban areas).
- ABTs are often not covered by the “deemed-to-satisfy” performance and health and safety guidelines for application of Building Regulations, and must therefore have some form of “fit for purpose” certification from competent authorities within a country (such as an Agreement Certification); or a certification from overseas organisations having reciprocal arrangements with a host country, or a rational engineering design that can be assessed in terms of the existing building regulations. This is true for application in formally constructed urban settings where building permits are normally required, and where the objective is to provide robust permanent structures delivered at scale and often requiring some form of long-term finance. This would preclude the consideration of most of the so-called Low Technologies used extensively in rural and urban informal self-help settings.

Within the broad classes of ‘high’ and ‘intermediate’ technologies, ABTs can be categorised as follows:

- Integrated systems through which an entire structure is erected (such as prefabricated completed units, 3D printing and industrially produced and locally assembled housing)
- Structural frames (often completed with intermediate or low technology solutions)
- Foundation systems
- Walling systems (including pre-fabricated panels, moulded shuttering methods, alternative materials such as fibre cement, insulated panels, biomass-plastic composites, etc.)
- Roofing systems
- Adapted conventional walling (variations on brick, block and cement)
- Alternative components or products (e.g. lightweight roof tiles of resin and recycled waste compounds) used in combination with conventional structural and envelope systems
- Energy and water saving services systems

Industrialised Building (IB) in the true sense, where monolithic cellular stacked systems, manufactured (“mobile”) homes, or pre-fabricated frame and panel systems are produced in large-scale assembly lines are
not currently produced or used at scale in Rwanda. All the products and systems that have been identified are used in some form of combination with conventional elements and/or alternative products from other suppliers. In countries that have not been extensively industrialised, it is usually found that most ABTs are suitable only for use in single storey, or possibly double storey structures consisting of free-standing dwellings, or simplex/duplex row or cluster housing. Where such technologies do not have a local manufacturing base, often logistics and transport costs can become prohibitive, and can reduce the cost advantage such systems may offer.

ABTs should be evaluated against critical “success” criteria involving technical, economic and financial aspects as well as softer issues such as market acceptance and proven track record. At minimum ABTs should demonstrate:

- Current relevant certification (or international reciprocal certification arrangement), or potential for rapid re-activation where certification has lapsed, but the certificate holder has the capacity to apply for rapid re-activation.
- Local material content and production capacity, as well as local ability to make adjustments and extensions to the technology without the original installers’ assistance.
- Technical engineering fitness (robustness and durability) independent of certification (critical for medium and high density sectional title or rental stock for long-term maintenance).
- Proven acceptance to mortgage and small loans providers who need to finance developments, and track record in subsidised and bank financed residential development (where appropriate).
- Evidence of acceptability to end users – this is especially critical for institutionally managed rental housing or government subsidised or supported developments where the slightest dissatisfaction with quality of accommodation can lead to costly community mobilisation and rent boycotts.
- Cost (capital and operational) and construction time savings that make a significant contribution to cost reduction and/or speed of erection. It is often believed that ABTs applied to walling and roofing have significant cost benefits, but given the relatively small proportion of total house costs incorporated in walls and roofs, this is often over-stated.
- “Greening” benefits such as more efficient use of materials, reduction in materials wastage, and/or thermal efficiency of the final product.

In a quick scan of ABTs currently available, or planned to be made available commercially in Rwanda (an in-depth survey and evaluation falls outside the scope of the present assignment), no truly integrated building systems were found. A number of walling products appear to be on the market, or are in pre-marketing development and trial stages, either by local Rwandan companies, or more commonly in joint ventures with international partners who seem to provide the initial technical and financial input required to bring the products to local market. These include pre-fabricated lightweight wall panels such as made by Strawtech and others, variations on moulded stabilized earth, fired clay, and cement brick and block alternatives, earthbags, plant-based oil sealant for earth floors, etc.

Some of these appear to have real potential to contribute to some degree to:

- Lowering of construction costs, but with no expectation that a single product will be able to reduce costs by an order of magnitude
- Reduction of construction times
- Promotion of local employment and local economic development, by enabling small-scale “backyard” production enterprise
- Importation replacement
- More sustainable resource utilization through use of renewable and recycled raw materials, and less energy intensive and polluting production processes

It is challenging to find solid information on the technical, economic, and financial aspects of many of these products, and their current state of application, readiness and acceptance in the market. Desk-top information is available, such as a 2008 report in the World Bank Africa Human Development series titled “Building Science, Technology and Innovation Capacity in Rwanda”, and the papers presented around the theme of the AUHF 30th anniversary conference held 17-19 November 2014 in Cape Town: “The next frontier in affordable housing: alternative building technologies.”
It is proposed that an event that assists in the evaluation of key ABTs and systems currently being considered in Rwanda be undertaken in order to ascertain true cost, technical, time and other benefits, as well as levels of community and financier acceptance. The cost benchmarking exercise can assist in identifying the proportion of total housing costs comprised of the potential alternative technology. A platform (expo or conference) through which ABT providers can engage with building experts and government officials to present specifications, experiences, pilot studies would be valuable. Such an event would enable providers and consumers to explore relationships with public and private implementers, financiers and end-user groups, and would be beneficial to the East African region generally where many alternative solutions are being proposed. For instance, a project has recently launched in Namibia, backed by the President, through which a pilot scheme of industrially produced houses will be constructed.