



Greening the Construction Sector

–

2015

Market Intelligence Report

–



Disclaimer

While every attempt was made to ensure that the information published in this report is accurate, no responsibility is accepted for any loss or damage that may arise out of the reliance of any person or entity upon any of the information this report contains.

Copyright © GreenCape 2015

This document may be downloaded at no charge from www.greencape.co.za. All rights reserved.

Subscribe to receive e-mail alerts or GreenCape news, events and publications by sending an e-mail to: communications@greencape.co.za



18 Roeland Street
Cape Town
8001
South Africa

GreenCape would like to acknowledge and thank **Songo Didiza** for the time and effort that went into compiling this Market Intelligence Report. We also thank **Bruce Raw** for his contributions.

Contents

List of figures	5
List of tables	5
List of acronyms	6
1.1. Purpose of this report	9
2. Executive Summary	10
3. Market Overview	12
3.1. Market segmentation	13
3.2. Energy efficiency	15
3.3. Drivers	15
3.4. Legislative	15
3.5. Implications of non-compliance	15
4. Electricity prices and shortages	16
5. Economics and environmental stewardship for green buildings	17
5.1. Green Star SA rated buildings	17
6. Opportunities and trends	18
7. Bulk insulation opportunities	21
7.1. Local products and players	22
7.2. Alternative Building Technologies	24
7.3. Market trends	24
7.3.1. Growth of LSFBS in SA Construction Sector	24
7.4. Opportunities	25
7.4. ABTs for social infrastructure	26
7.5. Residential market arising from urban densification	26
7.6. Barriers	26
7.7. Market incentives	26
7.8. Manufacturing incentives	27
7.8.1. Atlantis greentech SEZ	27
7.8.2. CCT incentives	27
7.9. Development incentives	27
8. Overview of GreenCape's activities in this sector	29
8.1. Information sharing and networking platform	29
8.2. Investment facilitation support	29
8.3. Atlantis greentech manufacturing Special Economic Zone (SEZ)	29
8.4. Market development support	29
8.5. Advocacy	29
9. Appendix A - Regulatory framework table	30
10. Appendix B - Overview of subsidy housing programmes in South Africa	34
10.1. Individual Housing Subsidy	34
10.2. Finance Linked Individual Subsidy Programme (FLISP)	34
10.3. The Integrated Residential Development Programme	34
10.4. Upgrading of Informal Settlements Programme (UISP)	34
10.5. Institutional Programme	34
10.6. Community Residential Units Programme	34
10.7. Consolidation Subsidy Programme	34
11. Appendix C - Overview of bulk insulation opportunities in the subsidized housing programme	35
12. Appendix D - Overview of public sector construction activity in South Africa	36
12.1. Market Size: Government residential market in South Africa	36
13. Appendix E - Areas suitable for urban development in the Western Cape	37
14. References	38

List of figures & tables

Figure 1	
Overview of energy efficiency construction market segmentation in South Africa	13
Figure 2	
History of Eskom price increases	16
Figure 3	
Green Star SA registered projects since the inception of certification tools in 2007	17
Figure 4	
Selected private building projects as reported by local government institutions	18
Figure 5	
Market Size: Government residential market in South Africa	36
Table 1	
Residential building activity by province	19
Table 2	
Overview of local players in energy efficiency construction market in South Africa	22
Table 3	
Floor area of buildings erected with LSFBS in South Africa by 2013	25
Table 4	
Selected building statistics of the private sector as reported by local government institutions	35
Table 5	
Areas targeted for urban development in the Western Cape	37

List of acronyms

AAAMSA	Association of Architectural Aluminium Manufacturers of South Africa
ABT	Alternative Building Technology
BASA	Banking Association of South Africa
BMS	Building Management System
BNG	Breaking New Ground
CIDB	Construction Industry Development Board
CCT	City of Cape Town
CRU	Community Residential Units Programme
CSIR	Council for Scientific and Industrial Research
DAMS	Development Application Management System
DoHS	Department of Human Settlements
EE	Energy Efficiency
ESCO	Energy Service Company
EPS	Expanded Polystyrene
ERMD	Environmental Resource Management Department
FLISP	Finance Linked Individual Subsidy Programme
GBCSA	Green Building Council of South Africa
GHG	Green House Gas
HDA	Housing Development Agency
HVAC	Heating, ventilation and air conditioning
ICF	Insulated Concrete Formwork
IDC	Industrial Development Corporation
IRD	Integrated Residential Development Programme
ISUP	Informal Settlements Upgrading Programme
IZS	Integrated Zoning Scheme
KZN	Kwazulu Natal
LED	Light Emitting Diode
LSFB	Light Steel Frame Building
MTSF	Medium Term Strategic Framework
NBR	National Building Regulations
NBRBS	National Building Regulations and Building Standards Act (No 103 of 1977)
NERSA	National Energy Regulator of South Africa
NHBRC	National Home Builders Registration Council
NRCS	National Regulatory Compulsory Specifications
PHP	Peoples Housing Process
RDP	Reconstruction and Development Programme

List of acronyms

SA	South Africa
SABS	South Africa Bureau of Standards
SAFEIRA	South African Fenestration & Insulation Energy Rating Authority
SAIA	South African Institute of Architects
SANEDI	South African National Energy Development Institute
SANS	South African National Standard
SASFA	Southern African Light Steel Frame Building Association
SEZ	Special Economic Zone
SIPs	Structural Insulated Panels
SWH	Solar Water Heaters
TIASA	Thermal Insulation Association of Southern Africa
UDZ	Urban Development Zone
UISP	Upgrading of Informal Settlements Programme
WC	Western Cape
WCDHS	Western Cape Department of Human Settlements

Rising energy costs and changing regulations driven by environmental realities have led to an urgent need for more energy efficient buildings in South Africa.

This has resulted in greater awareness of and increased demand for designs and products that reduce the energy intensity of buildings

—

1 – Introduction and purpose

This market intelligence report was compiled by GreenCape’s construction sector desk. The report covers green economy activities within the construction industry, with a specific focus on residential, commercial and industrial buildings. It is aimed at investors and businesses who are currently active in or interested in the construction sector in South Africa, and the Western Cape specifically. It provides an overview of the market, including the key players, legislation and regulation, opportunities and challenges, key developments and achievements. The report aims to serve as an investment guide on the market trends and major economic activities that are taking shape in South Africa.

GreenCape is a not-for-profit organisation that was established in 2010 by the Western Cape Government and the City of Cape Town to support the accelerated development of the green economy. The vision is for the Western Cape to be the green economy hub for Sub-Saharan Africa – the investment destination of choice, regional headquarters and manufacturing centre for leading companies in this space.

GreenCape’s aim is to help unlock the investment and employment potential of green business, technologies and manufacturing. This, in turn, also contributes to improving the resource efficiency, carbon intensity and resilience of the regional economy.

We do this this by assisting viable green businesses across a range of sectors, including energy, waste and resources, to remove barriers to their establishment and growth – working with our partners in government, the private sector and academia.

Our business support activities range from helping potential investors to understand the local market and connect with the right people; providing policy and regulatory advocacy and support; facilitating access to funding; facilitating market access; establishing skills development partnerships; networking and information-sharing events; and publications.

For more information see www.greencape.co.za or email songo@greencape.co.za.

2– Executive summary

The Western Cape Government and City of Cape Town (CCT) have prioritised the green economy as a key growth sector. Both the Province and the City have a stated aim to position the region as the green economy hub of Africa, by creating an enabling environment for businesses specialising in green products and services.

Rising energy costs and changing regulations driven by environmental realities have led to an urgent need for more energy efficient buildings in South Africa. This has resulted in greater awareness of and increased demand for designs and products that reduce the energy intensity of buildings. The market for improved energy efficiency interventions and resource efficient building materials such as Alternative Building Technologies (ABTs), Light Steel Frame Building construction methods (LSFBs), many of which have a much lower environmental footprint, is also growing steadily within the South African construction sector.

The construction sector is one of the biggest energy consumers in South Africa. Its greenhouse gas (GHG) emissions are also among the highest. South Africa's electricity is supplied predominantly by coal-fired power stations, which means that buildings are also responsible for a significant portion of the country's carbon emissions.

That said, South Africa has taken significant steps towards introducing energy efficiency in its construction and secondary housing sectors.

The sector has a unique opportunity to introduce energy efficiency measures that will not only create economic opportunities but will also play an active role in reducing these emissions across the whole construction industry.

The economic opportunities presented in this report are presented in two parts: Energy Efficiency, and the introduction of alternative building systems (ABTs, LSFBS, etc.) in the country's infrastructure programmes. Most of these opportunities have been identified in both private and public sector financed projects.

The sector has a unique opportunity to introduce energy efficiency measures that will not only create economic opportunities but will also play an active role in reducing these emissions across the whole construction industry

As at 2015, the value of energy efficiency projects is estimated to be over R9 billion in the next five years for the public sector alone. This value is found mostly in improved bulk insulation for residential markets. Other significant opportunities exist in the non-residential market, predominantly in the multi-unit office development and retail.

The key drivers of these opportunities are:

- Rising electricity prices: electricity prices have increased by over 200% since 2009
- Energy efficiency building legislation: SANS 10400 XA is mandatory for all building projects in the country
- Leading multinationals in the country showing improved environmental stewardship towards introducing sustainability: over 210 projects have been registered for Green Star SA green building certification. Of these, 67 are in the Western Cape (refer to figure 2 below)

The second part of this report highlights the market potential for introducing ABTs in the country's social infrastructure programmes, including housing, student accommodation, clinics and schools.

Since the new energy efficiency legislation was introduced in 2011, the construction sector has shown improved awareness about the benefits of energy efficient building technologies. In the Western Cape, GreenCape published the first ever Green Building Materials catalogue. The catalogue aims to educate professionals and local government institutions on the different construction technologies that are available in the marketplace that effectively comply with the new energy efficiency building regulations (SANS 10400 XA). The province also hopes to be the economic hub of green technology manufacturing and investments, and has taken active steps towards this goal by establishing the first ever greentech special economic zone (SEZ) in Atlantis.

3 – Market overview

There are two main categories of green economy opportunities in the construction sector: in energy efficiency and in alternative building technologies. Though not mutually exclusive, this report will deal with these separately as there are distinct drivers for each. But what do these terms mean?



Energy Efficiency

Products and services that reduce the energy and resource intensity of buildings, including building design, thermal insulation and energy efficient lighting.



Alternative Building Technologies

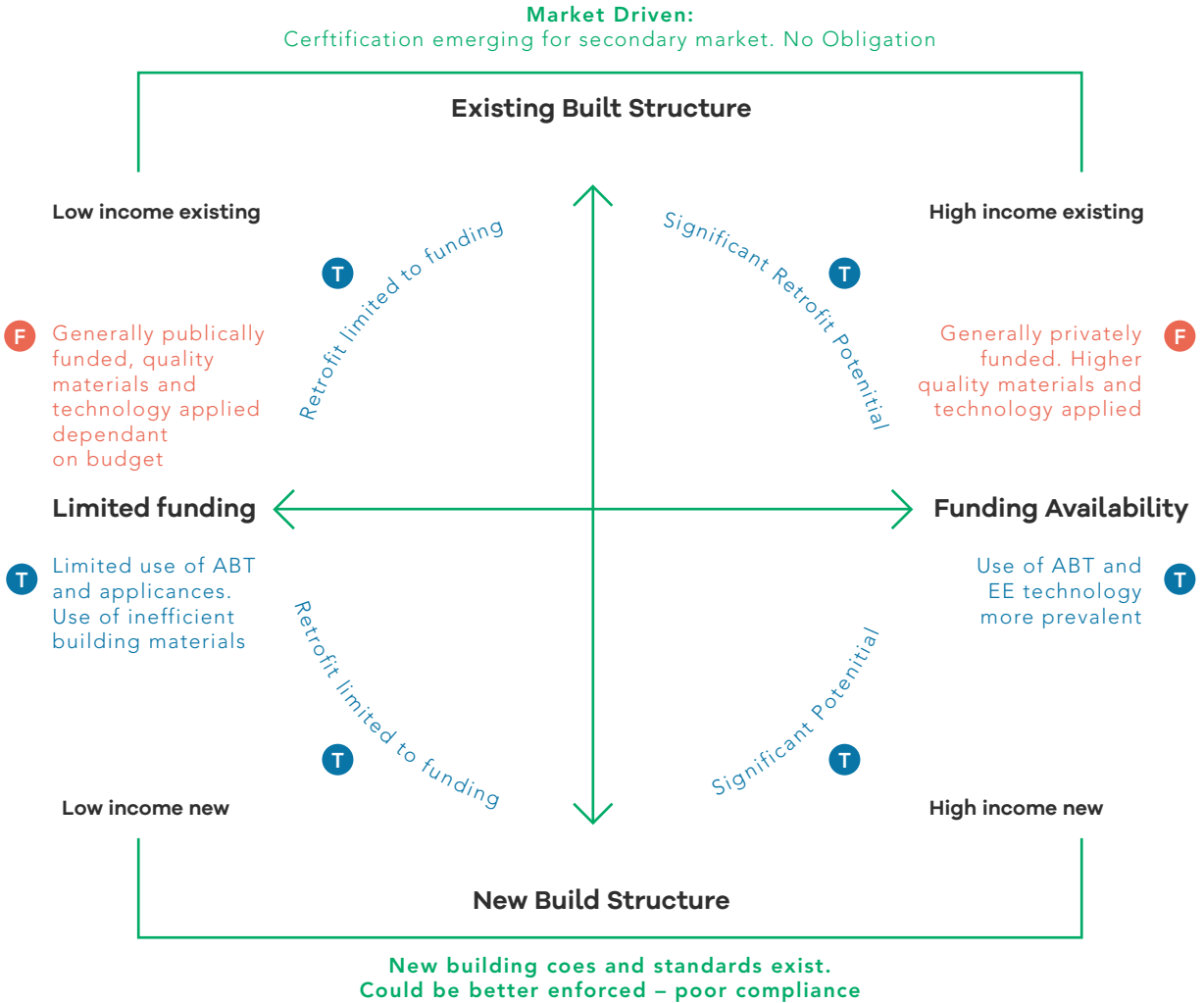
Building materials and modular construction technologies with a lower environmental footprint, including building products made from recycled materials, or those that result in significant reductions in building waste

3.1. Market segmentation

To understand the markets for these products in South Africa and the Western Cape, it is useful to segment the construction sector into the respective energy efficiency and ABT markets that have been identified below (see diagram below).

The graphic representation below illustrates two key factors that segment the markets, which are availability and source of funding, either public sector or privately financed markets; and new build or addition, extension or refurbishment.

Figure 1: Overview of energy efficiency construction market segmentation in South Africa



F Finance

South Africa has two distinct housing markets:

1. Social (low-income/ subsidised housing). Social housing is publicaly / donor funded
2. Mid to high income housing which is privately funded.

T Technology

ABT technology types are applicable to the entire market.

Applicability for retro fitting and new build is dependant on funding availability

P Policy

EE and energy Policy covers the entire sector and does not make a distinction between low and high income housing. Policy and other mechanisms make a distinction between existing structures and new build

3.2. Energy efficiency

The energy efficiency construction market comprises services and products, that each has distinct elements:

- Services, comprising design and energy management services (viz. ESCO's); and
- Products, which comprise:
Low-to medium electrical resistance appliances such as solar water heaters (SWHs), heat pumps, efficient lighting (LEDs), and heating, ventilation and air conditioning (HVAC), among others; and Building materials, comprising mainly insulation, fenestration and walling technologies

3.3. Drivers

The primary drivers of this market are legislative and regulatory changes, and rising energy prices in South Africa. The secondary driver is the improved economics of energy efficient building technologies demonstrated by environmental stewardship.

3.4. Legislative

The National Building Regulations and Building Standards (NBRBS) Act (No 103 of 1977) governs the construction sector in South Africa. The Act was amended in 2008 with the aim of achieving the following energy efficiency objectives:

- Reduce electrical resistance heating of hot water in the building envelope
- Reduce energy usage and demand for new and renovated buildings in South Africa

As a result of the amendment, the relevant South African National Standards (SANS) applicable to the building industry were updated. SANS 10400 contains prescriptive rules for any form of construction that is deemed to fall under the National Building Regulations. Specifically, SANS 10400XA covers energy usage.

Three regulations were affected by the amended building regulations, as announced in the Government Gazette of 9 September 2011:

XA1: states that buildings should use energy efficiently and reduce GHG emissions in accordance with a checklist of requirements listed as the Functional Regulations

XA2: states that not more than 50% of the annual volume of domestic hot water must be heated using electricity, i.e. electrical resistance heating

XA3: states that compliance with the XA1 regulations can be achieved by one of three methods:

- **Prescriptive route,**
by following specific requirements regarding the design and construction of the building, including services such as the HVAC installation. The requirements for the services are detailed in SANS 204 (see Appendix A). No rational design is required with this route.
- **Performance route,**
which requires rational design by a competent person to demonstrate that the building's theoretical annual energy consumption and demand do not exceed the values specified in the Standard. A competent person can either be an engineer or architect.
- **Reference building route,**
which requires rational design by a competent professional to demonstrate that the building's theoretical annual energy consumption and demand do not exceed the values for a reference building that complies with the requirements of the prescriptive route.

XA3 stipulates that the reference route will involve the use of Certified Thermal Calculation Software but does not stipulate whether or not this is performed by a competent person. In this case Agrément certification applies. The applicable thermal calculation software is certified by the Board of Agrément South Africa, in terms of Agrément South Africa's Energy Software Protocols.

These regulations became legally active from 10 November 2011 and are now mandatory for all building projects undertaken in South Africa. These amendments set minimum standards that apply to new buildings and building renovations, but do not require existing buildings to be retrofitted at this point.

The implication of XA1 is that all new and renovated buildings need to be designed and insulated for improved energy efficiency. This has created market demand for a range of building insulation products. XA2 stimulates the market for SWHs and heat pumps.

Enforcement of the new regulations is key to driving the market growth, but in both cases, they have not been consistently applied around the country.

The Western Cape municipalities are leading the rest of the country in monitoring effective compliance with the energy efficiency building regulation requirements (SANEDI, 2014). Since 2014, it is now mandatory for all building plans to be accompanied by a thermal insulation certificate for all bulk insulation that meets the SANS 10400 XA requirements. At the time of writing, only the Western Cape is driving this requirement, and this is widely being used by industry professionals involved in the thermal insulation market activities.

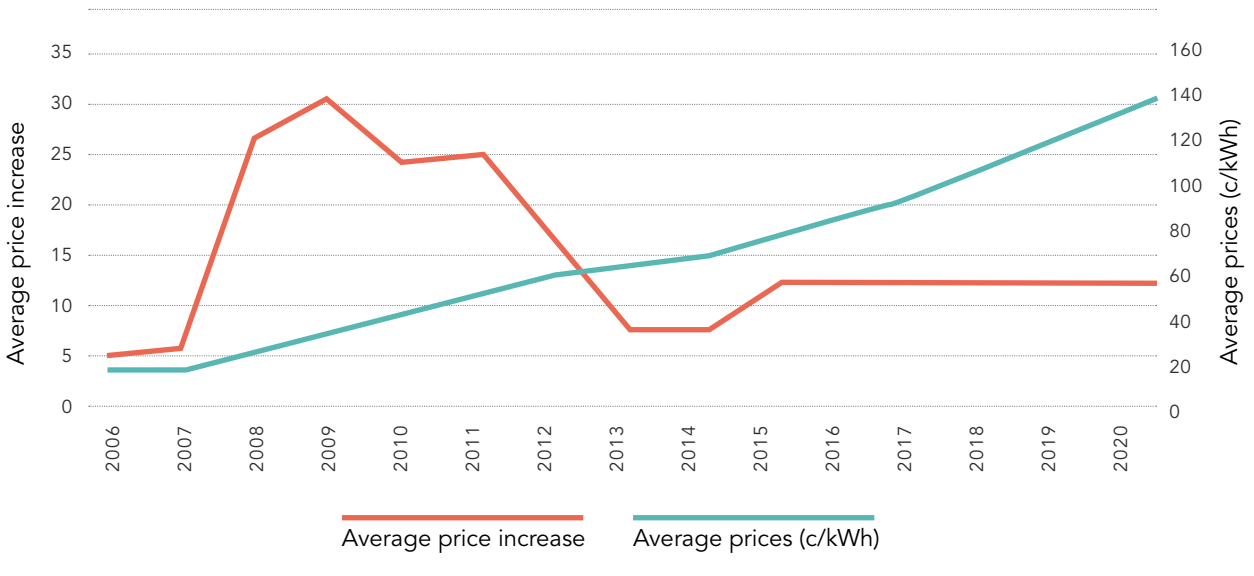
3.5. Implications of non-compliance

It is an offence to erect a building without approval. In terms of section 4(4) of the National Building Regulations (NBR), guilty offenders are liable to a fine not exceeding ZAR100 for each day of unapproved construction. Under Section 24, if no penalties have been stipulated, non-compliance with the provisions could lead to a criminal conviction, and a fine not exceeding ZAR100 000, or up to 12 months in prison. In addition, under Section 21 the local authority may apply to the magistrate's court for an order prohibits a person from commencing or proceeding with erecting any building. If the magistrate is satisfied that the construction does not comply with the NBR provisions, then the local authority is also authorised to demolish the building.

4 – Electricity prices and shortages

In South Africa electricity prices have increased by more than 200% since 2009. The country also has a shortage of electricity supply and consumers are being asked to reduce their energy consumption. Combined with the power price increases, there is more awareness of how much power consumers are using. This has boosted the market for energy efficient designs and products.

Figure 2: History of Eskom price increases



(Source: NERSA, 2014)

5 – Economics and environmental stewardship for green buildings

The improved economics of energy efficient construction technologies are highlighted as a secondary driver of the growth of this market in South Africa. This is demonstrated by the significant growth of Green Star South Africa certified buildings, as shown below.

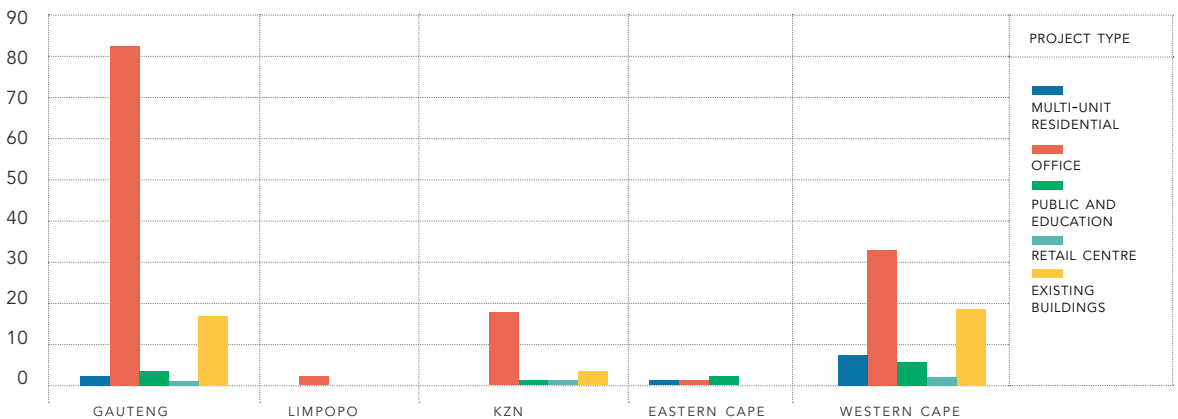
5.1. Green Star SA rated buildings

The Green Building Council of South Africa (GBCSA) has a Green Star SA rating programme that sets standards and benchmarks for green buildings, to enable an objective assessment to be made as to how energy efficient – or green – a building is.

The Green Star SA building certification trend has shown significant growth in South Africa within a very short period – around seven years. To date, the GBCSA has certified just over a million square metres of commercial space alone. The South African market is becoming increasingly competitive with other larger global regions such as Europe, Australia, United States, United Arab Emirates, Singapore and Brazil, among others (McGraw-Hill Construction, 2014).

The graph below illustrates how the public and private sector in the Western Cape is showing leadership and environmental stewardship in a significant number of the total projects registered in South Africa to date. This includes leading in energy efficiency retrofits currently underway in the Existing Buildings category. Gauteng is the only other province leading with similar figures. To date, over 210 Green SA certifications have been initiated for the whole country. The Western Cape accounts for 67 of these projects, with the majority being in multi-unit office developments.

Figure 3: Green Star SA registered projects since the inception of certification tools in 2007



(Source: GBCSA 2014)

6 – Opportunities and trends

It is estimated that SANS10400XA adds approximately 3-5% to a project's upfront construction costs (SAIA, 2014). The value added by the South African construction sector was estimated at just ±R45 billion in 2014¹ (StatsSA, 2015). The Western Cape makes up around a quarter of the national construction market, representing a local market of just over ±R11.2 billion (Stats SA, 2014).

Private sector construction activity represents the lion's share of the energy efficiency market. The chart below provides a summary of privately financed building projects in 2014 (Stats South Africa, 2014) based on approved plans, by square meters, by the municipalities.

Figure 4: Selected private building projects as reported by local government institutions



(Source (Stats SA, 2014).)

At December 2014, the total value of recorded building plans passed by South African municipalities was valued at over R96 billion. This represents an increase of 11,1%, or R9.6 billion, compared with 2013. The Western Cape accounts for over 21% of the total building plans that were approved by South African municipalities in 2014, which translates to just over R21 billion (StatsSA, 2014).

Commercial property developments have been leading the uptake of energy efficient construction technologies and designs. These include

double glazed fenestration - windows, skylights, and facades, shading devices that improve natural and day lighting and solar control factors in large buildings.

Other key energy efficient technologies include solar water heaters (SWHs), heat pumps, rooftop embedded generation technologies such as solar photovoltaic (PV), heating, ventilation and cooling (HVAC), and smart building management systems (BMS) and efficient lighting technologies such as Light Emitting Diodes (LEDs) .

Accounting for nearly half of the total construction sector's building activities (Stats SA, 2014), residential dwellings also represent a large segment of the market. The Western Cape is second only to Gauteng in terms of share of private sector building activity. The table below

shows that, at February 2015, in the last two years, between a quarter and one third of new privately financed houses in South Africa, and between a third and half of the residential building alterations, by area, have been in the Western Cape.

Table 1 Residential building activity by province

Building Plans Approved												
Subsidy Type	Period	Variable	WC	EC	NC	FS	KZN	NW	GAU	MPU	LIM	SA
Total new houses, flats & town-houses	Jan – Nov 2013	Number	12 216	1784	409	2342	3782	3997	18 252	3071	1588	47 441
	Jan – Nov 2014	Number % Change % of SA	12 225 01 22.8	2272 27.4 4.2	569 39.1 1.1	2498 6.7 4.7	6024 59.3 11.3	2425 -39.3 4.5	22 808 25.0 42.6	3472 11.6 6.4	1284 -19.1 2.4	53 532 12.8 100.0
Alterations & additions to existing houses	Jan – Nov 2013	m ²	838199	273152	41885	139084	312943	151069	969073	155738	63077	2 944 220
	Jan – Nov 2014	m ² % Change % of SA	780516 -6.9 26.3	303946 11.3 10.2	58301 39.2 2.0	142608 2.5 4.8	341265 9.1 11.5	148668 -1.6 5.0	939586 -3.0 31.6	193232 24.1 6.5	61250 -2.9 2.1	2 969 372 0.9 100.0

Buildings Completed												
Subsidy Type	Period	Variable	WC	EC	NC	FS	KZN	NW	GAU	MPU	LIM	SA
Total new houses, flats & town-houses	Jan – Nov 2013	Number	13357	2867	154	941	2261	1637	15162	2031	593	39003
	Jan – Nov 2014	Number % Change % of SA	8957 -32.9 26.0	1565 -45.4 4.5	194 26.0 0.6	1032 9.7 3.0	2058 -9.0 6.0	1963 19.9 5.7	14761 -2.6 42.9	3178 56.6 9.2	716 20.8 2.1	34 424 -11.7 100.0
Alterations & additions to existing houses	Jan – Nov 2013	m ²	785806	118373	26037	54736	169773	26572	370824	73693	7915	1 633 729
	Jan – Nov 2014	m ² % Change % of SA	357492 -54.5 34.6	84388 -28.7 8.2	24494 -5.9 2.4	20759 -62.1 2.0	135635 -20.1 13.1	26138 -1.6 2.5	280443 -24.4 27.2	96744 31.3 9.4	6805 -14.0 0.7	1 032 898 -36.8 100.0

(Source (Stats SA, 2014).)

The high-end housing market uses many of the same products as the commercial sector listed above. The mid-range housing market mainly represents a market for bulk insulation – ceiling and walling, fenestration technologies – windows and doors, and SWHs and heat pumps to meet the minimum regulatory standards.

To some extent, low-income housing is typically government-subsidised due to a lack of financing alternatives for customers in this bracket. Government subsidies have been increased to include an allocation for ensuring compliance with SANS10400XA. The National Breaking New

Ground (BNG) housing subsidy of R110 970 allows for a minimum specification towards bulk insulation for the ceiling and walling assemblies respectively, which effectively accounts for around 10% of the total subsidy.

The Western Cape Minimum Standards specify that ceiling insulation is to be either fibreglass or mineral wool. These standards can be accessed on the Department of Human Settlements website or alternatively on the GreenCape website (<http://green-cape.co.za/assets/Uploads/WC.pdf>).

¹Based on income from capital expenditure on buildings, improvements and construction works for all the industries in the South African economy, excluding agriculture, financial intermediation, insurance and government institutions (Stats SA, 2014)

7 – Bulk insulation opportunities

It is estimated that the public sector will create over R9 billion for bulk insulation opportunities from housing subsidy programmes. In the Western Cape these opportunities are expected in the following subsidy housing programmes:

**Breaking
New Ground
(BNG):**

**R128m –
(annually)**

**People's
Housing
Process (PHP):**

**R34m –
(annually)**

**Informal
Settlement
upgrading:**

**R19m –
(annually)**

**Rental
Housing
(GAP):**

**R15m –
(annually)**

Please refer to Appendix C for an overview of bulk insulation opportunities in the respective housing markets in the country.

Appendix D contains an overview of the public sector's housing programmes and policies.

Spotlight on Mamrey Ceiling Insulation Project

In the Western Cape, the CCT has been allocated market development funds from the Jobs Fund of up to R30m to retrofit ceilings for government subsidy houses. Within CCT approximately 50 000 subsidy houses were built without insulated ceilings between 1994 and 2005. This retrofitting project is in force and was initialised with the Mamrey pilot project, creating local jobs.

The implementation is being carried out by CCT Human Settlements Directorate with Environmental Resource Management Department (ERMD) support.

For more information on this project please contact the CCT's Human Settlements department or find it on the Environmental Affairs and Development Planning website (<http://eadp.westerncape.gov.za>).

7.1. Local products and players

The South African energy efficiency construction market comprises a wide variety of design and service providers ranging from architects, urban planners, design engineers (civil, mechanical, etc.), and construction cost consultants. Where energy efficiency and cost effectiveness has become a primary design consideration,

these service providers are stimulating the demand of these related energy efficient construction products. Most of the key product component manufacturers are local, with the exception of the fenestration technologies. The latter is still mainly sourced from European regions such as Germany.

The list below is not an exhaustive one.

Table 2 Overview of local players in energy efficiency construction market in South Africa

Technology	Type	Manufacturers	Fabricators and /or Distributors
Energy Efficiency	Solar Water Heaters	Suntank (Gauteng) Kwikot (Western Cape). Apollo (Western Cape), Novasun (Gauteng), Nupower (Gauteng), Solsquare (Gauteng), Aquasolar (Western Cape), Solarhart (Gauteng), Tasol (Gauteng)	Euroheat, Paarl Apollo, Karoo Apollo, Solar Distributors (Western Cape), ITS Solar (Western Cape)
	Heat Pumps	Enerflow (Gauteng) Stiebel Eltron (Western Cape)	Tasol (Gauteng), ITS Solar, One Energy (Gauteng)
	Lighting (LEDs)	Eurolux, Cree, LED Lighting SA, Sunfor (Gauteng), Afrison LED (Gauteng),	Venture Lighting, Light Kinetics (Western Cape)
Walling	Masonry - clay bricks	Corobrik (Western Cape) Claytile (Western Cape)	Apollo, Crammix, Bredasdorp Steenwerke Cabrico Worcester Bakstene – All Western Cape based
	Non-masonry – Light Steel Frame Building methods (LSFBs)	ArcelorMittal (Gauteng) BluScope (Western Cape)	Durobuild (Western Cape) Trumod (Gauteng) Silverline Group (Western Cape) Mitek (Gauteng) (Cold Rolled Form steel fabricators)

Technology	Type	Manufacturers	Fabricators and /or Distributors
Bulk insulation	Rigid board insulation (EPS, XPS and Polyutherane)	Expanded Polystyrene (EPS) manufacturers: Isover Saint-Gobain Construction Products (Gauteng), Automa Multi Styrene (Gauteng), Isolite (Gauteng), Isowall (Gauteng), Technopol (Gauteng) Extruded Polystyrene (XPS) manufacturers: Isofoam SA (Gauteng) Polyutherane manufacturers: Rigifoam, Isover (both Gauteng)	Datlinks & Acoustics (Western Cape) Africa Thermal Insulation (Gauteng)
	Blanket and matt insulation (fibre glass, mineral/ rockwool, polyester fibre)	Isover Saint-Gobain Construction Products (Gauteng), Everite (KZN), Brits Nonwoven Isotherm (Gauteng), Platinum Fibre (Gauteng)	Datlinks and Acoustics (Western Cape)
	Loose-fill (cellulose fibre)	None	Eco Insulation Western Cape (Cape Town), Thermguard (KZN), Top Hat135 (Western Cape)
Fenestration	Aluminium	National Glass Wispeco	Primador (Cape Town)
	Timber	Swartland (Atlantis)	None
	UPVC un- (plasticised polyvinyl chloride)	None	Suppliers currently importing the raw material and fabricating the casements locally: Betcrete, New Look Windows Windoor SA Nordic windows Moonstar T&T Plastics UPVC window Systems Volkel and Sons Advanced Window System cc

Source: GreenCape (2014) – GreenCape’s Green Building Material Catalogue

Key industry bodies include the Thermal Insulation Association of Southern Africa (TIASA), South African Fenestration & Insulation Energy Rating Authority (SAFEIRA). The bodies also provide a regulatory function for the product component testing. For further information on these testing procedures please refer to <http://www.tiasa.org.za/> or <http://www.aaamsa.co.za/>, respectively.

7.2. Alternative Building Technologies²

Alternative building Technology (ABT) refers to all structural construction technologies and modular designs different from the conventional brick and mortar or reinforced concrete construction methods in South Africa. It includes both traditional and new innovative technologies.

The alternative construction systems that do not have national standards or SABS certification are required to be certified under Agrément South Africa. A valid Agrément certificate signifies compliance with the NBR and is accepted by National Builders Registration Council (NHBRC) for enrolment of non-standardised and alternate housing construction.

There are presently 40 ABTs nationwide, of which eight are in the Western Cape. These technologies include structural insulated panels (SIPs), insulated concrete formwork (ICF), radiant wall systems, and modular timber frames. These technologies are currently imported from outside South Africa and assembled locally. Key import sources include Malaysia, Australia and Germany.

The advantages of building with ABTs differ from product to product, but include improved energy efficiency, reduced waste and shorter building periods. These benefits owe to the modular nature of these technologies – as many of these construction systems are fabricated under factory conditions and can be assembled onsite. A key attribute of these construction technologies is reduced time to build and reduced material waste on the construction site (refer to GreenCape's Green Building Material Catalogue for more

information on these technologies).

7.3. Market trends

There has been an increased interest towards ABTs in South Africa and the Western Cape in recent years. However, the technologies are yet to be widely used in upscale construction projects in the country – with most of these being implemented at pilot level. The pilots will be discussed in the next section (under "ABTs for social infrastructure" section).

7.3.1. Growth of LSFBS in South African Construction Sector

In terms of emerging opportunities for optimising energy efficiency within the South African construction sector, the lightweight steel frame building (LSFB) construction method has grown extensively in the past five years in both the private and public sector. It is widely used in the commercial sector for multi-storey office and commercial buildings, where it is replacing heavy masonry curtain walls. Nationwide, the LSFBS method is increasingly being used for both external and internal walling of multi-storey office and commercial buildings. It has also been adopted in a growing number of additions to existing buildings, owing to its lightweight properties (SASFA, 2014). Retail franchise businesses such as McDonalds and KFC are also building all their new stores with the LSFBS method of construction. LSFBSs are increasingly also being used in large-scale industrial developments, with a number of examples in the Western Cape.

The South African residential market had initially been slow in taking up LSFBS method however the improved economics introduced through energy efficiency benefits has developed an upward trend for the residential market. This growth is attributed to economic factors such as rising electricity prices and rapidly increasing costs³ of conventional building methods (SASFA, 2013). However, there are examples where they are being used in both bonded and subsidised affordable housing segment of the property market.

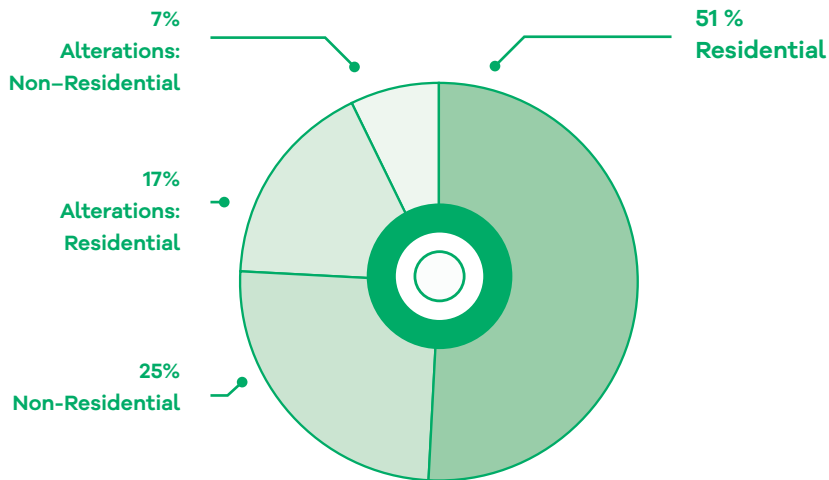
²The technologies are generally defined as framed panels fabricated off site and assembled on site. They are classified according to mass into heavy or light materials, and on-site or off-site fabrication (CSIR, 2012).

³ Estimated at just over R5500/sqm in 2014 (Bureau of Economic Research, 2014)

The following pie diagram highlights the implications of this development in South Africa as a whole. This is a representation of how LSFBs are being taken up in the respective housing markets

in the country. The residential market is leading, followed closely by non-residential buildings such as commercial and industrial developments.

Table 3: Floor area of buildings erected with LSFBs in South Africa by 2013.



(Source: SASFA, 2014)

The growing popularity of LSFBs is being driven by energy efficiency regulations, cost and shorter building periods, as well as legislation in the form of SANS 10400 XA. Cost benefits associated with LSFBs have also played a role in driving demand, with quick construction times and reduced transportation and labour costs (the reduced labour costs of the LSFB technology relate to the predominant use of unskilled labour).

The demand for light steel frames in the country has in turn boosted the demand for cladding, bulk insulation, among other associated materials. Based on average ratios of wall-to-floor area, in 2013 LSFBs resulted in a demand for:

- 0.6 million m² of external cladding, typically fibre cement board
- 0.9 million m² of bulk insulation, typically glass wool
- 1.3 million m² of internal lining or gypsum board
- 0.6 million m² of vapour permeable membrane used in external walls

(Source: SASFA, 2014)

The major suppliers of cold rolled form steel structures for the South African market are steel mills based mainly in Gauteng and KwaZulu Natal. The Western Cape market consists of fabricators, distributors and installers, as well as suppliers of the cladding and insulation products listed in Table 1 above.

7.4. Opportunities

In addition to the continued growth of the market listed above, there are two other key growth markets for ABTs: social infrastructure such as schools, housing and student accommodation, and residential applications in the face of urban densification.

***At the time of publishing this report the figures for 2014 were yet to be made public.**

7.4.1. ABTs for social infrastructure

The government's commitment to using ABTs for 60% of its social infrastructure plans represents a major opportunity (CSIR, 2013). In addition to subsidised housing market, schools, universities, student accommodation and healthcare facilities such as clinics and hospitals represent substantial opportunities for deploying LSFs and other ABTs.

○ Schools

After a successful pilot project during 2012 to construct 12 schools in the Eastern Cape, the South African National Government has committed to using ABTs for 60% of all new social infrastructure projects. A further 16 schools were built in 2013 and an additional 30 schools are due to be constructed in 2015 (CSIR, 2014).

Research is currently underway to assess the potential market size for ABTs. While estimates suggest the market is very small, the political will to introduce these technologies is highly documented with the introduction of scalable pilot projects.

○ Housing

The use of these technologies in the housing market has been slow, but there has been some movement. In the Western Cape these technologies were used in the large scale ABT pilot roll out in Delft 3 and 5 government subsidy housing projects. For more information on the Delft project please refer to the Western Cape DoHS website (www.westerncape.gov.za). The Delft project in the Western Cape is the largest of these scaled up residential projects with over 1 900 units planned and currently being implemented in the province.

○ Student accommodation

A handful of turnkey projects have been introduced in the Western Cape, such as the new Tygerberg student accommodation in Stellenbosch University. This project is a 2 phased 368 bed, triple storey construction project. The Department of Education estimated that over R147 billion of investment is required to address the countrywide student accommodation backlog, presently estimated at over 400 000 beds (SA Government News, 2014).

7.5. Residential market arising from urban densification

Historically, the greatest component of the Western Cape's housing delivery programme was new greenfield development, predominantly on the periphery of Cape Town. However, CCT and many of the other metros in South Africa have recognised the need to increase urban density along public transportation corridors. This will make service delivery more cost-effective and provide low-income communities better, easier access to employment opportunities. The key to achieving this is more brownfield development and multi-storey housing types, especially in the low-to middle-income markets. This in turn presents an opportunity for lightweight ABTs (DoHS, 2014).

7.6. Barriers

The leading market entry barriers include:

○ Lack of awareness and trust of the benefits of ABTs by specifiers

○ Lack of acceptance by end users, especially low-income households who are beneficiaries of BNG dwellings

○ The costs of Agrément certification: the majority of ABT suppliers are SMEs with limited resources

GreenCape is working in partnership with the Western Cape DoHS and other ABT stakeholders to improve end-user awareness towards these newer technologies. The publication of the Green Building Material Catalogue is the first step toward these market directed initiatives.

7.7. Market incentives

The Western Cape Government and CCT aim to make the Western Cape the hub of the African green economy. In support of this objective, it is seeking to create an enabling environment for businesses specialising in green products, design and fabrication.

One key intervention has been the establishment of a green technology manufacturing hub in Atlantis, 40 kilometres north of Cape Town. The City of Cape Town already offers investors a range of financial and non-financial incentives.

As at February 2015, work is also at an advanced stage to apply for the area to be declared a greentech SEZ, as part of the Department of Trade and Industry's industrial development policy and programmes.

7.8. Manufacturing incentives

7.8.1. Atlantis greentech SEZ

The first of these incentives is the proposed incentives included under the Atlantis greentech SEZ programme. The CCT has provided broad industrial support in Atlantis to enable the manufacturing of green technologies. Some of the proposed incentives include a 15% company tax and building allowance

7.8.2. CCT incentives

The CCT has developed an accelerated land disposal process for greentech manufacturing companies which effectively reduces the time to purchase or lease CCT-owned land

7.9. Development incentives

Urban Development Zone (UDZ) tax incentives

The UDZ tax incentive is a scheme aimed at encouraging inner city renewal across South Africa. It aims to encourage private sector-led residential and commercial development in inner city areas with developed public transport facilities

Any individual or entity that pays tax and owns property may claim the tax benefits of the UDZ incentive. The incentive takes the form of a tax allowance covering an accelerated depreciation of investment in refurbishing existing properties or creating new developments within the inner city over a period of five, or 17 years, respectively. The UDZ incentive works in conjunction with the CCT's planned Integrated Zoning Scheme (IZS) to provide further incentives for developers and investors to focus on the Central City. For more info on how to access this incentive please refer to the CCT's website (<http://www.capetown.gov.za>).

Please refer to Appendix E for a spatial view of the urban areas that have been identified for urban development in the Western Cape.

GreenCape is a sector development agency of the Western Cape government, working in between the various spheres of government, the private sector and academia, to facilitate the growth of the green economy in the province. The organisation's work is briefly highlighted on the following page.

—

8 – Overview of GreenCape's activities in this sector

The Built Environment Sector desk, which wrote this report, focuses on alternative building materials, and works with manufacturers to understand what materials exist for green growth. The sector has been communicating with local authorities to develop an understanding of procurement processes and tender specifications so that the procurement of green products can be encouraged and supported in the region. The sector has a specific interest in the interaction of the low cost housing market with the new building regulations (SANS 10-400).

8.1 Information sharing and networking

platform Throughout the year GreenCape hosts networking functions which provide a unique platform for industry to engage experts and government on issues affecting their sector. These are typically hosted at a neutral, accessible facility, free of charge to GreenCape members, providing easy access to good quality information and great networking opportunities. Topics covered in 2014 include: Eskom on planning for grid connection, Mazars on tax regimes and the secondary market in the REIPPPP and Eskom on grid capacity. These can be found on GreenCape's website.

8.2 Investment facilitation support

In conjunction with relevant government departments, GreenCape facilitates moves by companies and investors into the province's renewable energy market. During 2014, GreenCape played various roles in facilitating significant investments into the province – and hence into the national green economy – listed earlier in this document, namely: Jinko Solar, Gestamp Renewables Industries and SMA inverter manufacturing.

8.3. Atlantis greentech manufacturing Special Economic Zone (SEZ)

GreenCape is the project management office tasked with the preparation of an application for designation of the greentech Manufacturing Special Economic Zone (SEZ) in Atlantis, Cape Town (dti, 2015). As part of the national SEZ programme, the Atlantis SEZ will provide incentives for invest-

ments into greentech manufacturing (dti, 2015), which includes the manufacturing of energy efficiency, renewable energy and related technologies. These regulations are yet to be ratified by the dti. Some of the proposed incentives include a 15% company tax and building allowance. The dti also offers a wide range of incentives across industries and sectors for business located anywhere in South Africa .

8.4 Market development support

GreenCape's Smart Grids team is working on various case studies with municipalities, aimed at understanding issues around municipal revenue; tariff design and advances in grid technologies; and EG. The project investigates the viability of various technologies that improve electricity provision. Drawing on the team's experience, GreenCape is the technical lead on the development of a national smart meter standard.

8.5 Advocacy

GreenCape is also involved in advocacy at both national and provincial government levels. Prime examples are GreenCape's contribution to both the wind energy and solar PV localisation studies commissioned by the Dti; and submission of comments on NERSA's discussion paper and on amendments to the National Environmental Management Act (NEMA). GreenCape also anticipates and assists with resolving issues arising when transporting the abnormal loads associated with wind turbine components across the region.

9– Appendix A

Below is an overview of the regulatory frameworks applicable to the built environment sector in South Africa. These effectively comprise legislation, national and provincial policies and industry standards.

Year	Legislation, policy or standard	Objective
Legislation		
2008	National Building Regulations and Building Standards Act (Act 103 of 1977)	Outlines a set of functional guidelines for anybody building any type of structure in South Africa.
Policies and government strategies		
Social housing policies		
2004	Breaking New Ground – a comprehensive plan for the development of sustainable human settlements	<p>Outlines an extensive plan to promote densification and integration of urban areas through enhanced regulatory mechanisms, planning functions and financial incentives.</p> <p>Objectives include:</p> <p>Using the provision of housing as a job creation strategy</p> <hr/> <p>Ensuring that property can be accessed by all as an asset for wealth creation and empowerment</p> <hr/> <p>Leveraging growth in the economy</p> <hr/> <p>Using housing as an instrument for economic development</p>
2005	Social Housing Policy for South Africa	Provides an overview of the national housing programmes for the development of social housing in South Africa (refer to Appendix section for an overview of social housing programmes).
2009	National Housing Code	Outlines the National Norms and Standards for the construction of stand-alone residential dwellings, which apply to all units built through one of the National Housing Programmes (refer to appendix for full schedule of programmes).

Year	Legislation, policy or standard	Objective
Green building framework		
2011	National Framework for Green Building	<p>Promotes green building in the public sector, with stated objectives as follows:</p> <p>Pro-actively inform and support development of plans and programmes for green buildings</p> <p>Identify opportunities and constraints for green buildings</p> <p>Identify key strategic areas</p> <p>Integrate principles of green building across areas, regions and sectors</p> <p>Focus on enhancement of human settlements</p> <p>Integrate concept of green building into immovable asset formation in South Africa</p>
2011	Green Economy Accord	<p>Outlines the South African government pact, made between government, private business, trade unions and civil society, to create 300 000 new green jobs and double the country's energy generation capacity by 2020, including the commitment to install one million SWH systems in South Africa by the end of 2014; promotion of retrofitting in commercial buildings to reduce energy use; and the provision of R25 billion by the Industrial Development Corporation (IDC) for investment in green economy activities over a five year period.</p>
2013	Income tax allowance on energy efficiency savings	<p>Regulations in terms of Section 12L of the Income Tax Act administered by the dti, aimed at large manufacturing investments such as upgrades, expansions or new facilities that exceed R30 million and R200 million respectively.</p>

Year	Legislation, policy or standard	Objective
South African National Standards (SANS)		
2011	SANS 10400	Provides guidelines for the application of the technical aspects of the NBR. Refer to appendix section for full schedule of chapters: Chapter A – XA.
2011	SANS 10400-XA	<p>Provides technical guidelines for the implementation of the revised National Building regulations of 2008. These are the first set of minimum standards for energy efficiency and environmental sustainability for buildings in the NBRs.</p> <p>These regulations are applicable to new and refurbished buildings.</p>
2011	SANS 204	<p>SANS 204: Energy Efficiency The South Africa Bureau of Standards (SABS) developed the SANS 204 series of standards prior to introducing SANS 10400 XA. The requirements of SANS 204 are regarded as best practice and considered the most appropriate to address the country's energy security challenges.</p> <p>SANS 204 is presently only a voluntary standard but, once it has been incorporated into the National Building Regulations, is expected to become mandatory for all new buildings in the next two to three years.</p> <p>The major barrier is that this will take a long time – around three to five years – to implement as the industry is still acclimatising itself to SANS 10400 XA. There have also been wide industry calls to streamline SANS10400 XA to ensure compliance.</p>
2014	SANS 1544	<p>SANS 1544: Energy performance certificates for buildings It specifies the methodology for calculating energy performance in existing buildings. It will initially be a voluntary standard but may become a mandatory standard through the National Regulatory Compulsory Specifications regulation process. This standard was published in December 2014 and will be mandatory for all publically owned buildings</p>

Year	Legislation, policy or standard	Objective
Western Cape policies		
2010-2014	Rental Housing Strategy (Building Sustainable Communities)	Presents a ten-year strategic plan for the roll-out of rental stocks in the province. This strategy focuses on three tiers of the rental market: social housing rental housing for low- to medium-income households, community residential units or CRUs, which include former hostels that have been converted into low-income family units and other public housing stock; and backyard dwellings, which form a large part of the rental market in townships and informal settlements.
2012	Information and guideline documents on the implementation of green procurement in the CCT	Provides information and describes the desirable state of practice for the implementation of green public procurement and environmental legal compliance in the CCT.
2012	City of Cape Town's Green Building Smart Building Handbook	The CCT has developed the Smart Building Handbook to promote resource-efficient building practices, which will reduce the impact that buildings have on the environment, as well as the operating costs of running them.
2012	Green Building Manual (Drakenstein Municipality)	Outlines a set of guidelines for green construction principles for built environment professionals.

10– Appendix B

Overview of subsidy housing programmes in South Africa

10.1. Individual Housing Subsidy

Individual housing subsidies are available to low-income households, where an applicant wishes to buy a residential property for the first time. The subsidy can be used to buy an existing house, including the property on which the house stands. It can also be used to buy a house on a plot-and-plan basis, or to finish an incomplete house. Successful applicants will receive this subsidy only once. It is not a cash pay-out, but is paid directly to a financial institution or a conveyancing attorney.

10.2. Finance Linked Individual Subsidy Programme (FLISP)

The Finance Linked Individual Subsidy Programme (FLISP) is an instrument that assists qualifying households by providing a once-off down payment to those households who have secured mortgage finance to acquire a residential property for the first time.

10.3. The Integrated Residential Development Programme

The Integrated Residential Development Programme (IRDP) provides for the acquisition of land, servicing of stands for a variety of land uses including commercial, recreational, schools and clinics. It also provides for residential stands for low, middle and high income groups. The land use and income group mix will be based on local planning and needs assessment.

10.4. Upgrading of Informal Settlements Programme (UISP)

The Upgrading of Informal Settlements Programme (UISP) seeks to upgrade the living conditions of millions of poor people by providing secure tenure and access to basic services and housing.

10.5 Institutional Programme

The Institutional Programme provides capital grants to social housing institutions which construct and manage affordable rental units. The Programme also provides for the sale of units by the social housing institution after at least four years has lapsed.

10.6. Community Residential Units Programme

The Community Residential Units Programme (CRU) aims to facilitate the provision of secure, stable, rental, tenure for low income housing households. The programme provides a coherent framework for dealing with many different forms of existing public sector residential accommodation.

10.7. Consolidation Subsidy Programme

The Consolidation Subsidy Programme seeks to assist households who have received serviced sites in terms of the state housing scheme instituted pre-1994. It provides for the completion of houses on the serviced sites.

11- Appendix C

Overview of bulk insulation opportunities in the subsidized housing programme

Table 4 Selected building statistics of the private sector as reported by local government institutions

Subsidy Type	BNG		Informal Settlements		Rental Housing		PHP		Total	
	SITES	UNITS	SITES	UNITS	SITES	UNITS	SITES	UNITS	SITES	UNITS
E/Cape	10 625	14 230	2 672	4 911	0	493	0	39	13 297	19 673
F/State	8 347	7 603	1 434	3 880	0	1 994	0	0	9 781	13 477
Gauteng	10 409	23 592	3 136	9 809	0	2 265	0	128	13 545	35 794
KZN	8 311	32 290	7 051	13 158	0	507	0	2 800	15 362	48 755
Limpopo	3 870	13 980	3 155	0	514	120	0	100	7 539	14 200
Mpumalanga	2 451	9 183	250	4 057	0	0	0	1 677	2 701	14 917
N/Cape	5 174	1 752	0	202	194	233	0	0	5 368	2 187
N/West	2 924	10 891	2 259	2 694	0	793	0	215	5 183	14 593
W/Cape	5 953	12 831	2 925	1 980	179	1 541	0	3 456	9 057	19 808
Total	58 064	126 352	22 882	40 691	887	7 946	0	8 415	81 833	183 404
Subsidy Type	BNG		Informal Settlements		Rental Housing		PHP		Total	
WC as % of Total Build	10%	10%	13%	5%	20%	19%		41%	11%	11%
Estimated Bulk Insulation (Ceilings Only) WC	R10000	R128 310 000		R 19800 000		R15 410 000		R 34 560 000		R 198 080 000
WC as % of total housing market - Year 1										R 198 080 000
Year 2										R 198 080 000
Year 3										R 198 080 000
Year 4										R 198 080 000
5 year Projections	R 990 400 000									
National Bulk Insulation										
5 year Projections	R 1834 040 000									
5 year Projections	R 9170 200 000									

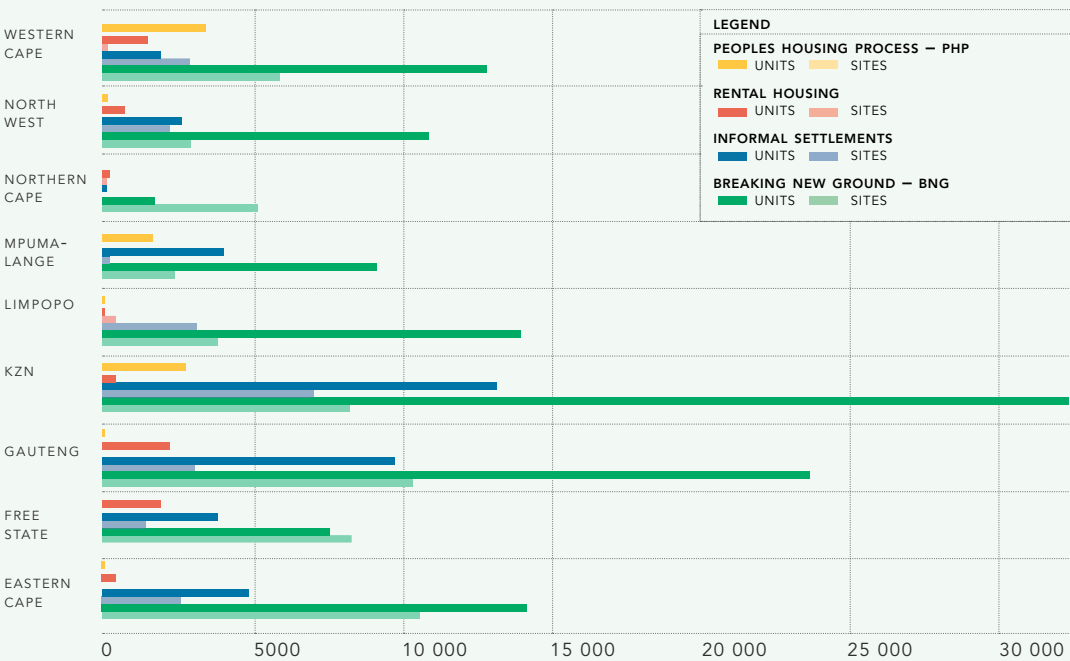
(Source: Stats SA 2014)

12- Appendix D

Overview of public sector construction activity in South Africa

The residential market activities discussed in this report mainly include: BNG; upgrading of informal settlements; affordable rental housing and the Peoples Housing Process (PHP).

Figure 5 Market Size: Government residential market in South Africa



(Source: DoHS (2014))

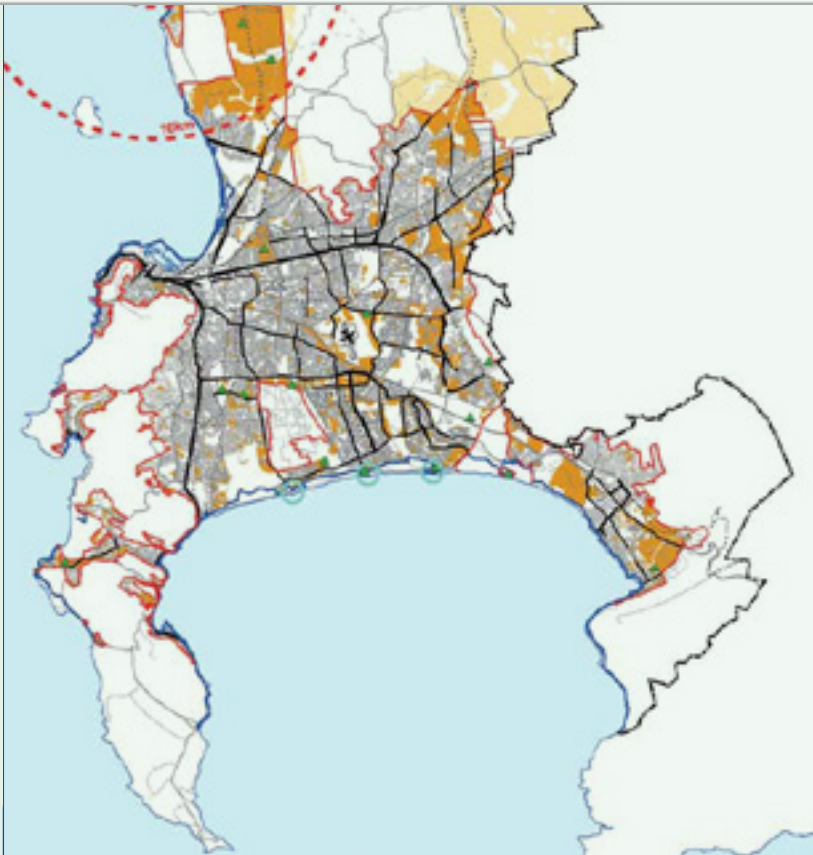
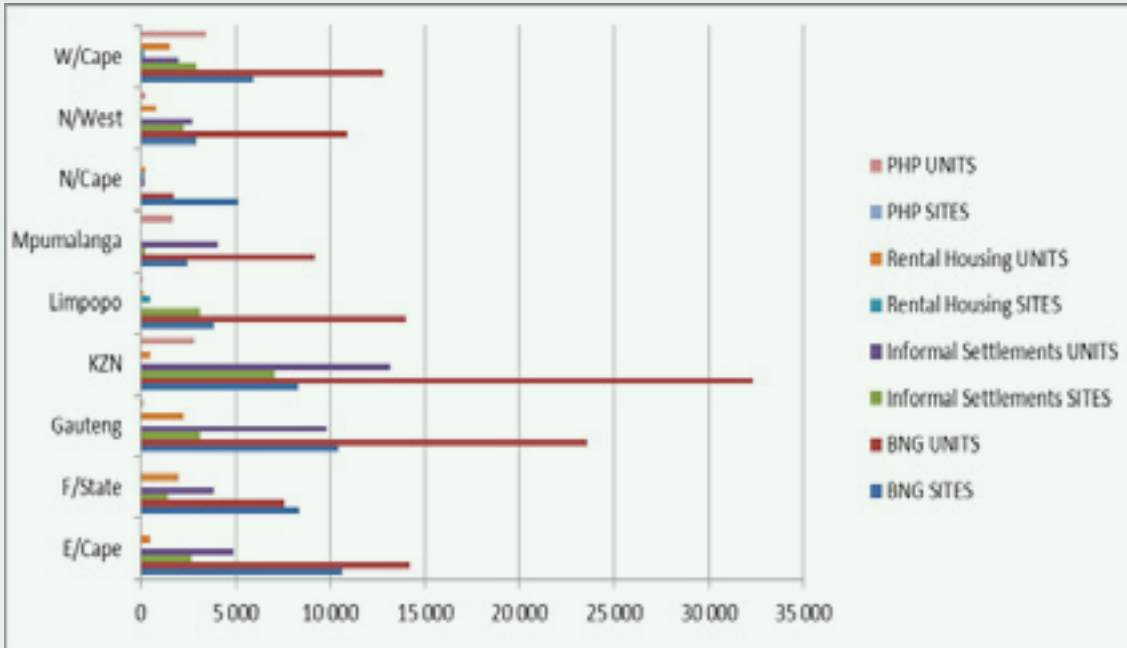
12.1. Market Size: Government residential market in South Africa

The table above refers to the estimated market size of the government subsidised residential dwelling sector. This market effectively comprises serviced sites and built super structure units respectively. As the table shows, the planned projects for the BNG programme are widely spread across the country, with KwaZulu Natal and Gauteng leading the scale: just under 33 000 units are being built annually in KwaZulu Natal and just over 23 500 in Gauteng.

The DoHS develops, regulates and controls the subsidy housing programmes in South Africa.

Appendix B contains a schedule of all subsidy programmes.

Designed by the national DoHS designed and previously known as the Comprehensive Plan for the Development of Sustainable Human Settlements, the BNG policy promotes the sustainable development of new settlements. This policy governs all state run housing programmes in the country. It was reviewed in 2014 to accommodate the new five year target to create 1.5 million housing opportunities by 2019.



Map 5.3: Areas potentially suited to urban development



14– References

1. Department of Human Settlements. 2014. <http://www.dhs.gov.za/sites/default/files/speeches/SPEECH%20BY%20MINISTER%20SISULU%20AT%20THE%20BANKING%20SUMMIT%2C%2031%20OCTOBER%202014.pdf>
2. Statistics South Africa. 2014. 'Selected building statistics of the private sector as reported by local government institutions'. Statistics South Africa. December 2014 Accessed on 8th January 2014 on www.statssa.gov.za
3. Moneyweb. 2014. 'SA the World's fastest Growing Green Building mark'. Accessed on 12 May 2014. <http://www.moneyweb.co.za/moneyweb-property/sa--the-worlds-fastest-growing-green-building-mark>
4. Mnguni, A., Tucker, C. Energy Efficient Buildings in South Africa. 2012. <http://www.bowman.co.za/FileBrowser/ArticleDocuments/Energy-Efficient-Buildings-in-South-Africa.pdf> [Accessed on 24 February 2015].
5. National Building Regulations and Building Standards Act 103 of 1977. 2011. [published in Government Gazette 34586 of 9 September 2011]
6. <http://cbn.co.za/manufacturing/item/2538-sa-steel-demand-set-to-grow-over-next-decade>
7. Western Cape Provincial Government. 2013. 'Green is Smart'.
8. National Homebuilders Registration Council. 2013 'Talking Alternative Building Technologies.'
9. Green Building Council of South Africa. 2012. 'Rands and Sense of Green Buildings.'
10. 25degrees. 2014. 'South Africa Green building Movement Gathering Momentum. <http://www.25degrees.net/index.php/Latest/south-africas-green-building-movement-gathering-momentum.html>
11. Government. 2013. National Building Regulations. Accessed on 12 January 2014. <http://www.buildingregulations.co.za/download-regulations/>
12. Mc GrawHill. 2013. World Green Construction trends report.
13. Commercial Property News. 2013. 'South Africa's Green Building' Accessed on 12 January 2014. <http://www.sacommercialpropnews.co.za/keywords/south-africa-green-building/index.3.html>
14. Western Cape Government. 2014. 'Making Affordable Housing Green'. <http://www.westerncape.gov.za/110green/impact/list/making-affordable-housing-green>
15. Statistics South Africa. 2014. 'Quartley Financial Statistics – September 2014'. <http://beta2.statssa.gov.za/publications/P0044/P0044September2014.pdf> [Table 1 – Selected income and expenditure items: All industries1 (concluded)]
16. <http://www.capetowncid.co.za/our-cbd/incentives-to-invest/>
17. SANEDI. 2014. The Status of Energy Efficient in Housing Workshop. http://www.sanedi.org.za/wpcontent/uploads/2014/04/reep_presentations/ee_housing_report.pdf. [Accessed on 24 February 2014.]
18. South Africa News. 'R147bn needed to address student housing backlog'. 2012. <http://www.sanews.gov.za/south-africa/r147bn-needed-address-student-housing-backlog>
19. http://www.westerncape.gov.za/dept/human-settlements/documents/public_info/A/20427