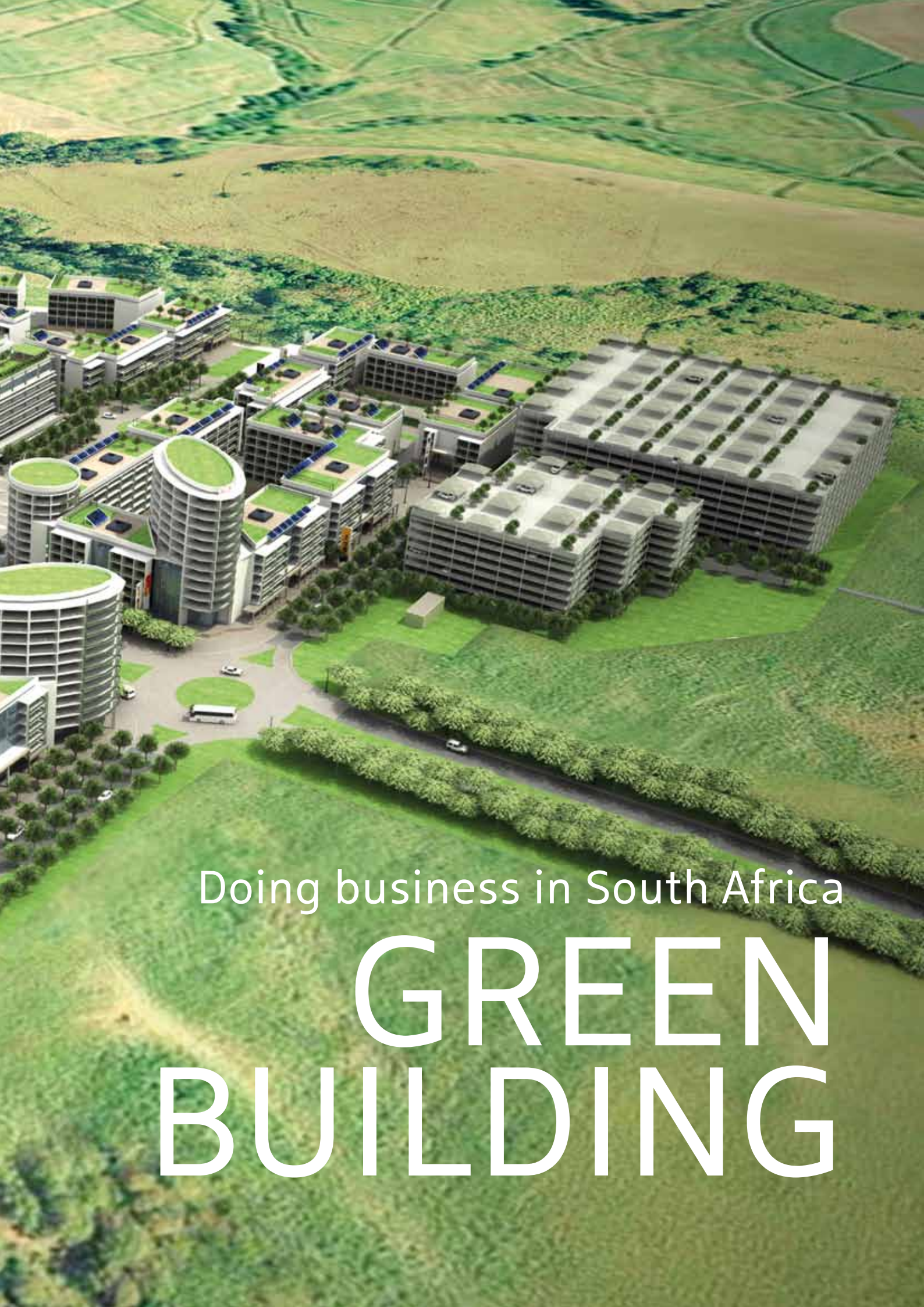

Doing business in South Africa

GREEN BUILDING

URBAN-ECON
Development Economists

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FOREWORD

This market entry study provides an overview of the South African Green Building market. The study is one of four aimed at informing the entrepreneurs in the Netherlands about the South African renewable energy market with a special focus on Green Buildings, Waste-to-Energy, Biomass-to-Energy and Wind energy.

The South African demand for energy is growing and renewable energy is part and parcel of government policy. This offers interesting market opportunities for the Netherlands. The Embassy of the Kingdom of the Netherlands welcomes this development and sees potential for bilateral cooperation to strengthen the renewable energy sector in South Africa with active participation of the Dutch private sector. The Dutch renewable energy and energy efficiency industry has significant expertise in several fields of clean energy, with a high degree of knowledge, reputable research institutes and innovative industry players. The Embassy believes that cooperation between South Africa and the Netherlands could benefit both countries, as it will allow for technology and knowledge transfer and exploring new market segments.

The Embassy in Pretoria and the Consulate General in Cape Town – in cooperation with Agency NL the implementing agency of the ministry of Economic Affairs- offer support to Dutch companies that are already active or want to become active in South Africa. For more information about doing business in South Africa, our services and financial support please visit: zuidafrika.nlambassade.org or www.agentschapnl.nl.

We hope this study will assist you in exploring South Africa or expand your activities in this interesting and beautiful country. If based on this information you would like to further discuss then please contact us through pre-ea@minbuza.nl

June, 2013
André Haspels
AMBASSADOR
of the Kingdom of
the Netherlands
to South Africa.

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ACRONYMS

B-BBEE	Broad-Based Black Economic Empowerment
BMS	Building Management System
BRICS	Brazil, Russia, India, China, South Africa
CFL	Compact Fluorescent Light
cidb	Construction Industry Development Board
CSIR	Counsel for Scientific and Industrial Research
DPW	Department of Public Works
EPC	Engineering, Procurement, and Construction
ESCo	Energy Services Company
ESD	Environmental Sustainable Designer
FPC	Glazed Flat-Plate Collector
GBCSA	Green Building Council of South Africa
GHG	Green House Gas
HPS	High Pressure Sodium lights
HVAC	Heating, Ventilation and Air-Conditioning
IDM	Integrated Demand Management
LED	Light Emitting Diodes
MV	Mercury Vapour
NDP	National Development Plan
NGP	New Growth Path
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SABS	South African Bureau of Standards
SANES	South African National Eco-Labelling Scheme
SANS	South African National Standard
SAPOA	South African Property Owners Association
SASGI	South African Smart Grid Initiative
Stats SA	Statistics South Africa
SWH	Solar Water Heater
TJ	Teraloule
VAT	Value Added Tax

EXECUTIVE **SUMMARY**

South Africa is one of the most sophisticated, diverse and promising emerging markets globally. Strategically located at the tip of the African continent, South Africa is a key investment location, both for the market opportunities that lie within its borders and for the opportunity that exists to use the country as a gateway to the rest of the continent, a market of nearly one billion people. South Africa is the economic powerhouse of Africa and it was welcomed to the BRIC group of countries of Brazil, Russia, India and China (now called BRICS) in 2011 (1).

The recent developments in the South African policy environment give a strong notion of the acknowledgement of the needs and benefits that the transformation into the integrated green economy can bring. Improvements to the built environment, and in particular the adoption of green building practices, are clearly recognised by government as an integral component of this transformation. This is evident through the promulgation of a number of policies and regulations such as the Green Economy Accord (2011), amendments to the National Building Regulations for Energy Usage, South African National Standard SANS 204: Energy Efficiency in Buildings, and the Electricity Regulation Act of 2008. The launch of the Green Star SA Rating tool for greenfields, The Green Lease Toolkit, the South African National Eco-Labelling Scheme and other initiatives by private and public sectors are further examples of the transformation in the built environment.

Historically, the South African building construction industry generated at least a quarter of the revenues of the construction sector. In the past few years, this has largely stagnated due to the effects of the global financial crises on the national economy that led to a significant slowdown of private sector's investments in the residential and non-residential building market segments. The situation, however, is improving with the increase in business confidence and public sector's plans to significantly improve social infrastructures in the country in the short to medium terms.

The deployment of green building technologies and adoption of green building practices in the country has been steadily increasing. This is evident from the number of projects that have been registered for Green Star SA certification (2012:11 vs. 2009:1), as well as the implementation of the Energy Efficiency Programme in the public sector and the growing adoption of selected green building technologies in the residential building market segment (such as Solar Water Heaters, rooftop PV, net metering, etc.). Nonetheless, the green building industry is still in its nascent stage as only 16% of firms in the country primarily focused on green projects in 2012. The development of the non-residential building market (particularly office space) is more advanced than the residential building market segment. Furthermore, there is a growing trend towards deployment of green building technologies in retrofits that offers significant business opportunities for companies operating in the green building industry.

Aside from adopting passive solar design practices, the most common types of technologies employed in green building in South Africa are electrical products (lighting and control, electricity metering, PV modules). The deployment of thermal, waste management systems, green furnishings, and mechanical products is considerably slower, but it is expected to accelerate. As far as renewable energy is concerned, South Africa is endowed with solar and wind energy resources. Solar energy technologies dominate this market and their deployment is expected to considerably accelerate in the next few years.

South Africa is a fast growing market for green building professionals and technologies with enormous potential for growth considering climatic conditions, as well as endowments with solar and wind resources. Social and economic factors, followed by government regulations, are the key drivers behind the development of the green building industry in South Africa. However, socio-economic inequality and the high cost of technologies are among the greatest constraints to the wider adoption of green building practices in the country. Furthermore, skills shortage and lack of R&D investment in the industry both in the supply chain and the construction sector are other barriers to the growth of the sector; while wide-spread inequality, limited public knowledge of technologies, and the slow recovery of the construction industry prevent the industry from realising its full potential. Nevertheless, the green building sector in South Africa is growing and offers numerous opportunities for new market entrants. These are created through among others the increased public awareness of energy conservation needs and benefits; developing stricter legislative environment; and incentives offered by the true state owned utility Eskom.

CONSIDERING THE EXPERTISE OF THE DUTCH COMPANIES, THE AREAS THAT OFFER THE GREATEST POTENTIAL FOR GROWTH AND SUBSEQUENTLY OPPORTUNITIES FOR MARKET ENTRY INCLUDE, INTER ALIA:

- **Provision of built environment professional services for both residential and non-residential market segments but particularly in the following areas:**
  - **New and retrofits of non-residential buildings.**
  - **Green interior design.**
  - **Landscaping of rooftop and self-sufficient gardens with integration of rain water harvesting and waste water management systems.**
  - **Passive house (middle to high-income residential market segment).**
  - **Affordable green building solutions for low-cost or social housing (including new buildings and retrofits).**
- **Establishment of local manufacturing facilities of solar water heater collectors and solar tanks.**
- **Small-scale wind energy technologies.**
- **Geothermal heating and cooling systems for upmarket residential developments.**
- **Variety of urban waste management technologies.**
- **Waste separation/recycling and waste conversion technologies.**
- **Cost effective efficient ventilation systems for non-residential market segment.**
- **Design of complete roofing systems in line with SANS 10400 XA regulations.**
- **“Green” mechanical insulation products and systems.**
- **Affordable building intelligence systems and advanced metering systems for middle to lower high income groups of households.**
- **Expertise in smart grid (particularly mini grid) systems and building intelligence.**
- **Variety of efficient lighting products.**
- **Advanced metering of both water and electricity consumption.**

1 DEVELOPMENT FRAMEWORK

1.1 Applicable General Government Policies and Frameworks

1.2 Green Building Industry Regulations

1.3 Green Building Tools and Schemes

1.3.1 Green Star SA Rating Tools

1.3.2 Green Lease Toolkit

1.3.3 South African National Eco-labelling Scheme

1.3.4 The Sustainable Building Assessment Tool (SBAT©)

1.3.5 The Agrément System for Technical Evaluation of Building Materials and Methods in South Africa

1.3.6 Eco Standard

1.4 Incentive Schemes

In 2011, South Africa was ranked 14th in the world for Green House Gas (GHG) emissions, emitting a total of 369.4 million tonnes for that year (2). This large quantity of emissions is due to the relatively high energy intensity of the national economy and its reliance on coal as the primary energy source.
The energy crisis in 2008 fuelled public awareness of the need to use energy efficiently. In light of this, South Africa recognised the need for transformation and the shift towards a more resource efficient low-carbon economy that can lead to new sources of growth and compliment economic reforms that support greater competitiveness (3). Government has become increasingly committed to a more environmentally sustainable economy in all sectors through a range of policies and programmes to minimise emissions and maximise the efficient use of energy.
The following sections outline the prominent policies and regulations that directly or indirectly promote the development of the Green Building industry in the country.

1.1 Applicable General Government Policies and Frameworks

The overall green building trend in the country stems from government's focus on greening the economy and improving energy efficiencies. The core strategic documents that directly or indirectly promote the development of the green building industry in the country are outlined in Table 1.

TABLE 1: GENERAL GOVERNMENT POLICIES APPLICABLE TO THE GREEN BUILDING INDUSTRY

THE ENERGY EFFICIENCY STRATEGY, 2008 – FIRST REVIEW[1]

- **The Energy Efficiency Strategy is the first governmental document that guides the development and implementation of energy efficiency practices in the country.**
- **The building industry is noted as one of the leading sectors in which energy efficiency can be notably implemented.**
- **In the commercial and public building sector, a target of final energy demand reduction of 20% by 2015 is set.**
- **A target final energy demand reduction of 10% by 2015 for the residential sector is established.**

NEW GROWTH PATH (NGP) FRAMEWORK, 2010

- **The NGP is a policy aimed at enhancing growth, employment creation and ensuring that the country's benefits are shared equitably by all citizens.**
- **The development of the green economy is identified as a facilitator for employment creation, whereby 400 000 additional jobs are targeted to be created in the green economy by 2030. Construction, operation and maintenance activities are envisaged to be the biggest contributors to these targets.**
- **The NGP asked for the development of codes for commercial buildings to reduce energy use and waste and called for the promotion of greater investment by the private sector in green technologies.**

NATIONAL STRATEGY FOR SUSTAINABLE DEVELOPMENT (NSSD) AND ACTION PLAN, 2011 – 2014

- **The (NSSD) is a proactive strategy that regards sustainable development as a long-term commitment, combining environmental protection, social equity and economic efficiency with the vision and values of the country.**
- **Green buildings and the built environment are defined as one of the nine focus areas in the strategy. It refers to the development and implementation of the Green Building Regulatory Enforcement Programme, as well as awareness and capacity-building programmes at local levels of governance.**
- **The strategy calls for the diversification of energy sources and implementation of energy efficiency programs, encouraging investment in renewable energy.**
- **The strategy promotes the implementation of green cities and towns, event greening and tourism.**

1. The Draft Second National Energy Efficiency Strategy Review was published on 27 July 2012 but has not yet been finalised

THE NATIONAL DEVELOPMENT PLAN (NDP) 2030, 2011

- The NDP is a long-term economic strategy, encompassing political and social development objectives.
- The NDP sets out steps that aim to transform South Africa's energy system and reduce greenhouse emissions. The target is set up to procure 20 000MW of electricity from renewable energy by 2030 and entrench an economy-wide carbon price by 2030.
- As part of the objective to achieve environmental sustainability and resilience, the NDP sets out to achieve zero emission building standards by 2030 and reduce the total volume of waste disposed to landfill each year.
- Since November 2011, all new buildings are to meet the energy efficiency criteria set out in the South African National Standard 204.

NEW GROWTH PATH: ACCORD 4. GREEN ECONOMY ACCORD, 2011

- The Green Economy Accord is an outcome of the social dialogue on the NGP Framework and is a commitment signed by government, organised labour, businesses, and community constituents.
- The following core commitments related to the Green Building industry can be highlighted:
  - Target installation of one million Solar Water Heaters (SWH) at household level by 2014.
  - Transition to the aspirational sectoral energy intensity targets by 2015 with a view to increasing them to, among others, 10% for commercial and public buildings and 15% to residential buildings.
  - Promotion of re-use of waste, including through the finalisation of a Waste Innovation Programme.
  - Promotion of measures to separate waste for the purpose of recycling.
  - Commitment to put in place regulatory measures to phase out incandescent lighting for domestic and commercial use, including public buildings through the combination of incentives for energy efficient lighting and increased customs duties on incandescent lighting.
  - Acknowledgement of the opportunities in introduction of new heating and insulation systems for commercial buildings.

1.2 Green Building Industry Regulations

THREE DISTINCT LEVELS OF LEGISLATION AFFECTING THE LAND-USE AND THE DEVELOPMENT OF THE GREEN BUILDING INDUSTRY (DIRECTLY OR INDIRECTLY) EXIST IN SOUTH AFRICA UNDER THE THREE SPHERES OF GOVERNMENT, NAMELY:

- **Acts, which are introduced in parliament and passed into law by the national Government.**
- **Ordinances and acts that are drafted by the provincial Government.**
- **Town planning schemes and by-laws, which are operated by the municipalities (local authorities).**

Very broadly speaking, land development and building work are governed by a planning and regulatory framework which operates at all three levels of government. On one hand, there are the various land, physical planning, development control and environmental protection acts, regulations and measures; on the other hand, there are the National Building Regulations and Building Standards Act that are enforceable by municipalities.

The core set of regulations and standards that promote green building practices in the country are described below:

NATIONAL BUILDING REGULATIONS AND BUILDINGS STANDARDS ACT NO. 103 OF 1977:

- The act provides guidelines for building site operations, design and construction.
- The South African Government has made use of the act to introduce sustainability into the building sector by drawing up amendments, which are intended to reduce the Green House Gas production in the South African Building Sector.
- The amendment to the National Building Regulations for Energy Usage (SANS 10400 XA) related only to new buildings and buildings which are changed such as to require an application to Local Authority for Building Planning approval.
- The amendments to the National Building Regulations set the following requirements:
  - XA1: buildings need to use energy efficiently and reduce GHG emissions in accordance with requirements detailed (functional regulation).
  - XA2: no more than 50% of the annual volumetric requirement of domestic hot water may be supplied by means of electrical resistance heating.
  - XA3: provides three means, by which the functional regulation (XA1) is complied with.
- SANS 10400 XA (Paragraph 4.2.1) sets out three routes to compliance with SANS 10400 XA, all of which are deemed-to-satisfy the regulations. The three methods of compliance are all deemed-to-satisfy the regulations; however, not all routes are generally available.
  - The energy usage and demand performance requirement method (Paragraph 4.2.1.a).
  - Prescriptive provisions for the building envelope and services (Paragraph 4.2.1.b).
  - A reference building route (Paragraph 4.2.1.c).
- The regulations, as published, became legally effective from 10 November 2011, and the government is bound to promote and defend their implementation.

SOUTH AFRICAN NATIONAL STANDARD SANS 204: ENERGY EFFICIENCY IN BUILDINGS:

- The SANS 204 series of standards have been developed to provide a framework for energy-efficient buildings.
- SANS 204 has become a requirement for new building plans and renovations that need plan approval in 2011.
- Commercial buildings will typically be required to be designed to meet the following maximum levels:
  - A maximum energy demand of 75 to 90 VA/m2.
  - A maximum consumption of 185 to 210 kWh/m2 per annum for offices and 240 to 260 kWh/m2 per annum for retail buildings.
- Residential houses (excluding low-income houses) need to comply with SANS 204-2 which specifies requirements for, amongst others, the following:
  - Orientation requirements.
  - Slab-edge insulation.
  - Minimum r-value for walls.
  - Minimum levels of insulation for roof and ceiling construction.
  - Requirements on roof lights.

THE ELECTRICITY REGULATION ACT, 2008:

- The purpose of these regulations is to maintain good quality of supply to ensure stability of the electricity network, to minimise electricity load shedding and avoid blackouts but it will also impact the energy efficiency of buildings.
- Amongst others, in terms of these regulations:
  - Energy-efficient fittings must be used in all buildings except where a specific fitting is required for some purpose and the nature of that purpose does not allow an energy-efficient fitting.
  - Street and highway lighting must be energy efficient and the licensee must ensure that it is switched off during the day.

1.3 Green Building Tools and Schemes

With the acceleration of Green Building tenders, a number of tools and schemes have been developed in the past few years that stimulate the deployment of green building practices. Most of these tools are voluntary and initiated by the private sector. They are aimed at promoting green building practices and create awareness. They also inform the extent to which green building trends are being integrated in the building construction industry in South Africa.

1.3.1 Green Star SA Rating Tools

CURRENTLY, THE RATING TOOLS HAVE BEEN DEVELOPED FOR THE FOLLOWING FOUR TYPES OF BUILDINGS:

- Green Star SA Office Rating Tool v1
- Green Star SA – Public & Education Building
- Green Star SA Multi Unit Residential v1
- Green Star SA Rental Centre v1

The Green Building Council of South Africa (GBCSA) was established in 2007 and has to date launched a number of rating tools. The rating system is an adaptation of the Australian Green Star system and includes an assessment of the environmental performance of the building on a range of issues including energy, water, materials and emissions. Six levels of performance are provided for, namely:

★ 1 Star	Minimum Practice
★★ 2 Star	Average Practice
★★★ 3 Star	Good Practice
★★★★ 4 Star	Best Practice
★★★★★ 5 Star	Local Excellence
★★★★★★ 6 Star	World Leadership

The system is at present a market-driven voluntary system and is not subject to any government regulations. Nevertheless, government represented by the Construction Industry Development Board (cidb) and the Department of Public Works (DPW) consider following the lead of several other countries requiring all new public buildings to be designed to achieve a 4-Star rating as a minimum. The possible roll-out for Green Building Certification that is applicable to contracts with a minimum size of R40 million, is indicated in Table 2.

It is also envisaged that mandatory retrofitting of buildings in the public sector is to take place in the medium future, satisfying public sector norms and standards. Buildings in the private sector are to satisfy minimum requirements on change of ownership and/or major retrofitting.
More information: www.gbcsa.org.za

TABLE 2: GREEN BUILDING CERTIFICATION POSSIBLE ROLL-OUT (4)

IMPLEMENTATION DATE	CLIENT DEPARTMENT
2013	National Public Works And Regions
2013	National Government Departments
2013	Provincial Government Departments
2013	Public Entities
2013	Metros
2014	High-Capacity Municipalities
2015	Medium-Capacity Municipalities
2015	Low-Capacity Municipalities

1.3.2 Green Lease Toolkit

Responding to both market needs and market demands, the GBCSA and South African Property Owners Association (SAPOA) have developed a Green Lease Toolkit that was launched in May 2012.
Its purpose is to assist owners, managers and tenants with guidelines to prepare lease documentation that takes both green building design and operational principles into account. At this stage, the adoption of a Green Lease in South Africa is voluntary. The adoption of this toolkit is voluntary and the absence of regulations governing the operational energy use of buildings means that performance-driven green leases with penalties are unlikely to be widely adopted in the short-term.
More information: www.gbcsa.org.za/resources/green_lease_toolkit

1.3.3 South African National Eco-labelling Scheme

The concept of the South African National Eco-Labelling Scheme (SANES) for the built environment was launched in 2011.
It is driven by the private sector but remains to be voluntary.
In conjunction with Indalo Yethu (an agency of the Department of Environmental Affairs aimed at mobilising the country around environmental and sustainability issues), the DPW intends to develop the eco-labelling scheme as part of the Department's 'Green Building Programme' in the medium-term. The scheme will involve the scientific eco-endorsement of construction materials and property development processes. More specifically, the system will track the extraction of natural resources to be manufactured into products for use in the built industry and monitor them through the construction and disposal phases in the life-cycle of a building.
The goal of SANES is to create an enabling environment for the industry to use voluntary eco-labelling as a self-regulatory measure. SANES provides third-party certification of environmental claims in accordance with the ISO Type I eco-label standard. The scheme serves as a means for manufacturers to communicate the consequences of consumption choices on the environment for consumers.
Table 3 summarises the progress of the level of certification for construction product groups and outlines the labelling criteria for which data must be provided.
More information: www.indaloyethu.com/index.php?q=node/1864

TABLE 3: STATUS OF SOUTH AFRICAN CONSTRUCTION PRODUCT LABELLING (5)

CONSTRUCTION PRODUCT GROUP	CERTIFICATION ADMINISTRATOR	AREA OF PROTECTION	LABELLING CRITERIA
Cement	First-Party	Outdoor	Energy, GHG Emissions
Masonry	First-Party	Outdoor	Materials, Energy, GHG Emissions
Floor Covering	Third-Party	Outdoor/Indoor	Materials, Energy, GHG, Indoor Air Quality (IAQ)
Decorative Paint	Third-Party	Outdoor	External Volatile Organic Compounds (VOCs)
Doors And Windows	Third-Party	Outdoor	Forest Stewardship Council (FSC) Certified
Particleboard / MDF	First-Party	Outdoor	Materials, Energy, GHG Emissions
Glass And Mirror	First-Party	Outdoor	Materials, Energy, GHG
Insulation	First-Party	Outdoor	Chlorofluorocarbon (CFC) and Hydrochlorofluorocarbon (HCFC) Emissions

1.3.4 The Sustainable Building Assessment Tool (SBAT©)

CSIR Boutek provides cost effective technology solutions to the building industry. It provides services relating to the materials, methods and systems used in construction, as well as analytical expertise, forensic engineering expertise, wind engineering facilities and an internet information service for the building and construction industry.

The SBAT© was developed by the Council of Scientific and Industrial Research (CSIR) Building and Construction Technology (CSIR Boutek) to relate strongly to the context of a developing country and is designed to support sustainable development. The tool describes 15 sets of objectives, under the headings economic; environmental; and social that should be aimed for in buildings. It suggests that the extent to which these objectives are achieved in buildings provide a simple, yet reasonably effective measure of the level of support for sustainable development. The application of the tool is voluntary and failure to apply it does not carry any sanctions.
More information: www.csir.co.za/Built_environment/Architectural_sciences/sbat

1.3.5 The Agrément System for Technical Evaluation of Building Materials and Methods in South Africa

Agrément South Africa was established by the Minister of Public Works in 1969 as an independent organisation to bring impartial judgement to the evaluation of innovative construction products and systems in the interest of the consumer. Obtaining Agrément approval is compulsory for new building methods that are not adequately covered by existing building regulations and standards. The purpose is to confer "deemed-to-satisfy" status on such methods in order to assist designers and specifiers, developers and contractors, local authority building control officers, finance institutions, government user departments, and implementing agencies such as works departments in their evaluation and approval thereof. Agrément South Africa certification is recognised in the National Building Regulations. Its certificates may be used to demonstrate compliance with those sections of the regulations that are specifically listed in the certificate. Minimum Agrément Norms and Technical Advisory Guide (MANTAG) approval is a second tier certification that grew out of the need for affordable housing materials and methods, and is meant only for products used in simple single-storey buildings with or without waterborne sanitation systems.
More information: www.info.gov.za/view/DownloadFileAction?id=187494

1.3.6 Eco Standard

Eco Standard South Africa is a Resource and Standards Council for the sustainable building product and material sector. Their material and product assessment tool is designed specifically for South Africa and serves as an accurate measurement to be used as a reference to identify materials and products for responsible environmental practice. Eco Standard launched its construction product certification programme in January 2012. This initiative though is driven by the private sector and does not carry any official sanction.
More information: www.ecostandard.co.za

1.4 Incentive Schemes

The deployment of energy efficiency technologies and the facilitation of adoption of green building practices are incentivised through Eskom's Integrated Demand Management (IDM) programme.
The Eskom IDM is a supply chain or process that constitutes the planning, implementation, and monitoring of consumer's electricity use. This programme ensures that in the short-term, sufficient electricity is available relative to demand by promoting and implementing more energy efficient technologies, processes, and consumer behaviour. This is done by incentivising the end-user to adopt new technologies aimed at optimising energy consumption.
More information: www.eskomidm.co.za

There are a variety of funding programmes that have been designed to cater towards various sectors of the market; residential, commercial and industrial, and the investments most applicable and beneficial to each sector. These funding programmes include, inter alia:

REBATE MODEL	**An incentive for end-users to convert their inefficient technologies to energy saving solutions.**
SOLAR WATER HEATING PROGRAMME	**Provides financial incentives for consumers to shift to solar water heating.**
THE STANDARD OFFER PROGRAMME	**For customers with a potential load saving of 50kW to 5MW.**
THE STANDARD PRODUCT	**For customers with a potential load saving of between 1kW and 250kW.**
THE ESCO FUNDING	**A fund for Energy Service Companies (ESCOs) that specialise in energy efficiency when they submit projects with potential load saving of 100kW or more.**
PERFORMANCE CONTRACTING	**Purchasing of bulk verified energy savings through a project developer, ranging across multiple sites and technologies. The minimum project size must be more than 30GWh of savings over a three-year sustainability period.**

2 GREEN BUILDING CONSTRUCTION INDUSTRY OVERVIEW

2.1 Building Construction Industry

2.1 Building Construction Industry

2.1.1 Size

2.1.2 Trends and dynamics

2.1.3 Employment and Sub-Contracting

2.1.4 Market Segments

2.1.5 Role of the private and public sector in the building construction industry

2.2 Green Building

2.2.1 State of Development

2.2.2 Trends and Dynamics

2.2.3 SWOT Analysis

2.1.1 Size

THE SOUTH AFRICAN CONSTRUCTION SECTOR IS VERY DIVERSE AND COMPLEX. THESE COMPLEXITIES ARE DUE TO AN ASSORTMENT OF FACTORS BEING, INTER ALIA (6):

- **The structure of the labour force, which consists of both informal and formal labour of which a large portion has a low skills base.**
- **The dominance of the sector by small and medium size companies (about 80%).**
- **Huge fluctuations of labour figures in the industry on an annual basis, which are largely due to the relatively short duration of projects (i.e. 90% of projects are shorter than three months) and a very common practice of sub-contracting/casualisation of employment that limits the duration of contract workers' terms.**

In 2011, the construction sector in the country generated R269 100 million of revenue and contributed 3% to the national economy (7). The building construction industry was the second largest sub-sector accounting for 26% of the above-mentioned revenue or R68 758 million in sales (refer to Table 4). The profit margin of the entire construction sector stood at 2.8% in 2011 with the building construction industry achieving a slightly greater profit margin for that year of 3.2% (8). Compared to 2007, when a 4.0% profit margin was reported, the profit margins of the building construction industry decreased.

TABLE 4: SA CONSTRUCTION SECTOR SIZE AND PROFIT MARGINS, 2011 (8)

SECTOR	INCOME, RML	% OF GROUP	PROFIT MARGIN, %
Construction Sector	268 100	100%	2.8%
Civil engineering	104 646	39%	2.2%
Construction Of Buildings	68 758	26%	3.2%
Other Building Installations	20 129	8%	4.9%
Building Completion	15 198	6%	3.4%
Other Income	59 369	22%	2.3%

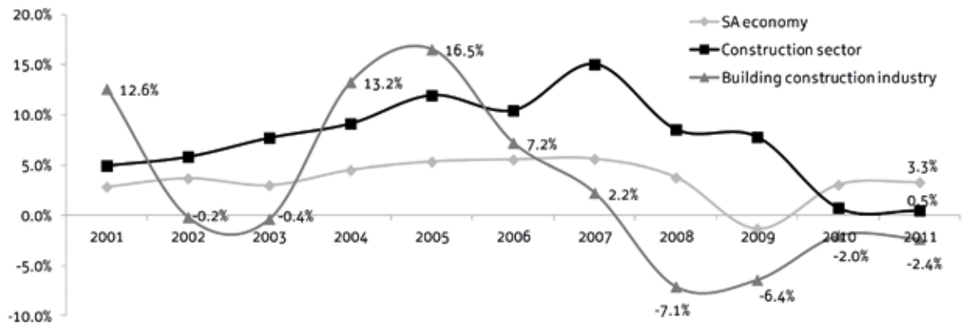
2.1.2 Trends and dynamics

The building construction industry in South Africa has been struggling over the past few years being indirectly affected by the aftermath of the global financial crises. Its performance over the past few years was worse than the performance of the construction industry and the national economy in general. This was largely attributed to the contraction of investment in buildings during the period between 2008 and 2011 as a result of worsening of macro-economic conditions post the global financial crises of 2008. The situation, however, is improving and the pace of deceleration of investment in the building construction sector is slowing down. For example, although the residential sector is still under pressure, the demand for housing and more specifically affordable housing is growing (9).

The confidence levels amongst building contractors, manufacturers of building materials and quantity surveyors are improving, which is shown by an increase in the FNB/BER building confidence index by 5 points to 34 points in the first quarter of 2012, reaching its highest level since the last quarter of 2010 (9). The increase in the building confidence index was accompanied by the growth in both residential and non-residential contractor confidence levels during the same period with the latter increasing at a greater rate than the former.

The increase in confidence occurred due to a positive shift in activity levels and profitability in the sector. It is the opinion of FNB/BER that the building cycle has bottomed and it is anticipated to show slow recovery from the end of the fourth quarter of 2012 (9). The growth rate, however, is expected to be moderate due to uncertainties in the global market with the investment in residential buildings and non-residential buildings projected to increase at 2.5% and 2.1% on an annual basis respectively (9).

FIGURE 1: CONSTRUCTION INDUSTRY TRENDS 2001-2011 (10)



2.1.3 Employment and Sub-Contracting

The South African construction sector is an essential component of the economy because of its labour intensive character, and its role in supporting other economic sectors such as manufacturing, mining, and retail to name a few (11). At the end of June 2011, the construction sector created 479 700 formal employment opportunities, showing a 2.9% annual decline in since 2007 primarily due to jobs losses in building construction industry that contributed 24% to total employment in the sector (8). The decline in employment in the industry was directly correlated with the contraction of investment in residential and non-residential building construction over the past few years.

TABLE 5: SA CONSTRUCTION SECTOR FORMAL EMPLOYMENT, 2011 (8)

SECTOR	EMPLOYMENT	% OF SECTOR
Construction Sector	268 100	100%
Civil Engineering	154 018	32%
Construction Of Buildings	117 495	24%
Electrical Contractors	39 305	8%
Other Building Installations	34 487	7%
Other Construction Industries	134 395	28%

The actual number of employed people by the industry is significantly greater due to the vast informal employment base observed in the construction industry (10). The cidb estimated that the construction sector inclusive of both formal and informal employment contributed 8% (i.e. 1 046 000) to national employment in the third quarter of 2012 (12). In 2012, the employment in the formal construction sector declined by 60 881 opportunities, which could be attributed to be the driving force behind the growth of the informal sector by 20 000 during the same year (12).

THE FOLLOWING CHARACTERISTICS OF THE SOUTH AFRICAN CONSTRUCTION INDUSTRY SHOULD BE NOTED:

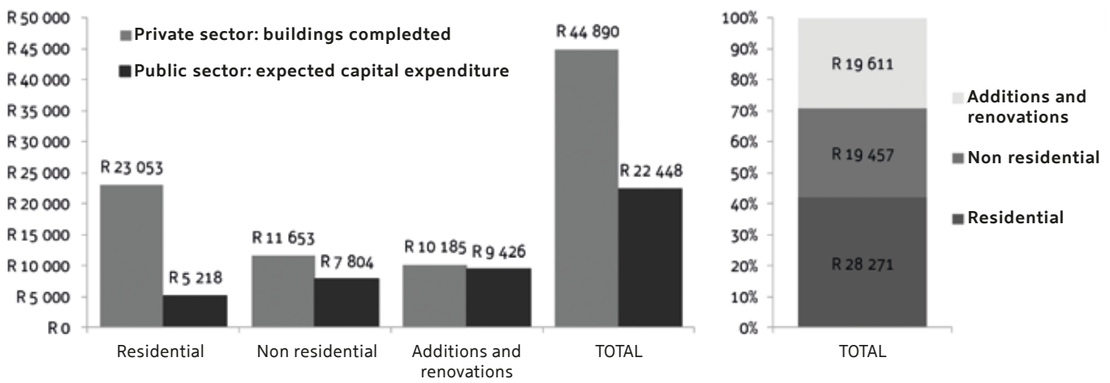
- **EXTENSIVE SUB-CONTRACTING: up to 70% of building projects and 30% of civil construction projects are sub-contracted in South Africa (13). The most prevalent types of sub-contracting include labour only sub-contractors, trade contracting in the building sector, and specialist sub-contracting in the building and civil sectors. The duration of typical sub-contracts in the building industry is between three to six months.**
- **SKILLS SHORTAGE: availability of technical and managerial skills in the general construction sector in South Africa is a massive challenge, which also means that skills required for Green Building are difficult to source.**

2.1.4 Market Segments

The building construction industry can be divided into three market segments, i.e. residential building, non-residential building and additions and alternations. Both private and public sectors are active in these market segments as illustrated in Figure 2. The private sector, though, is by far the biggest investor in the building industry as it accounted for about two thirds of building investment in 2012.

The residential buildings market segment is the biggest category in terms of investment and is dominated by the private sector. The other two market segments are relatively equal in size accounting for 28% to 29% of building volume in 2012. Within the non-residential market segment, the private sector has a slight dominance over the public sector, while the involvement in additions and renovations is almost equally divided between private and public sectors.

FIGURE 2: RAND WORTH OF BUILDING ACTIVITIES BY PRIVATE AND PUBLIC SECTORS IN 2012 (14) (15)



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2.1.5 Role of the private and public sector in the building construction industry

PRIVATE SECTOR

During 2012, the private sector built or renovated 9 149 652 m2 of residential and non-residential building space and built 43 031 residential units. The above suggests that the private sector plays a pivotal role in the development of the building construction industry in the country, which indicates that it is well positioned to drive the deployment of Green Building trends in South Africa. However, its role in the industry has been deteriorating due to consumer affordability constraints (i.e. high debt-to-income ratio, lending rates, and rising costs of living), large numbers of consumers with impaired credit records, and limited access to funding (i.e. stricter lending criteria) (9). It is expected that the sector will continue to be under strain in the future but it is still expected to remain the largest investor by client type (9).

RESIDENTIAL BUILDINGS SEGMENT:

- **Accounted for slightly more than half of the total building space added by the private sector.**
- **Dwellings/houses smaller than 80 m2 was by far the dominant type of units completed in 2012.**
- **Dwelling/houses with greater than 80 m2 accounted for the largest space area added.**
- **The number of flats/ townhouses as well as the total space added in this category showed the largest growth in 2012 compared to 2011, which affirms the earlier statement of the growing demand for affordable housing in the country.**

NON-RESIDENTIAL BUILDINGS SEGMENT:

- **The investment in non-residential buildings by the private sector was about half of that of residential buildings.**
- **The growth in this market was integral to offsetting losses in the building construction industry brought by the decline in residential investments.**
- **The largest category in terms of building space completed in 2012 was industrial and warehousing, which showed a significant year-on-year growth of 42%.**
- **Considering government objectives to drive the development of the manufacturing sector in the country, the demand for industrial and warehousing space could continue showing a positive trend in the future.**
- **Office and banking, as well as shopping centre building space together accounted for about 42% of square meters added in 2012. While the total number of square meters added in 2012 in terms of shopping centre declined, the construction of office and banking space in 2012 increased compared to the 2011 level.**

ADDITIONS AND RENOVATIONS SEGMENT:

- **In terms of square meters and Rand worth of investment, this segment was almost as big as those of the non-residential market segment in 2012.**
- **Almost three quarters of additions and renovations completed by the private sector were done in the dwellings/houses category.**
- **The extent of this category and specifically with respect to residential buildings suggests that many home-owners still opted to renovate their houses to add value to it than to buy a new property (9).**

PUBLIC SECTOR

Investment in the building industry by the public sector is expected to increase significantly, supported by growing demand for social infrastructure including health, education and protective services (9). Government plans to significantly increase its spending on the building industry compared to the 2011 level.

ADDITIONS AND RENOVATIONS SEGMENT:

- **This segment is expected to account for the biggest portion of the expected capital spending by the public sector.**
- **The national government and public corporations are to be the largest spenders.**

NON-RESIDENTIAL BUILDINGS SEGMENT:

- **This segment is the second largest market segment in the building industry in terms of the expected public sector investment.**
- **Provincial government is expected to dominate the capital expenditure, of which a significant portion could be appropriated to hospitals in view of preparation for the roll out of the National Health Insurance Scheme (NHIS).**

RESIDENTIAL BUILDINGS SEGMENT:

- **This segment is expected to be dominated by municipalities followed by provincial governments through the social housing programmes aimed at addressing the housing backlog in the country.**
- **Government is considering the use of alternative and innovation building materials to address the back-log, which opens opportunities for industry players.**
- **Since 1994, the South African government has built more than three million low-cost houses and further three million are targeted to be built by 2025 (16).**

2.2 Green Building

2.2.1 State of Development

The Green Building industry within the South African construction sector has shown a steady increase in the adoption of technologies and energy efficient design practices in the past few years. This is clearly illustrated in the number of registered Green Building projects since 2009 outlined in Figure 3. As of beginning 2013, there were 26 Green Star SA certified projects and 40 projects registered for certification. Most of the certified projects were 4-Star Green Star SA rating, with five projects receiving 5-Star Green star SA rating and two achieving 6-Star Green Star rating Figure 4. Except for four projects that achieved certification on "As Built" basis, all other projects received "Design" certification. All projects were located in three provinces, i.e. the Western Cape, Gauteng and KwaZulu-Natal, with Gauteng (being the economic hub of South Africa) accounting for the greatest number of certified projects. The majority of projects were office buildings, which shows a highly concentrated market in South Africa. Furthermore, the private sector clearly dominates Green Building in the country with the majority of projects being completed for private customers.

FIGURE 3: NUMBER OF REGISTERED PROJECTS FOR CERTIFICATION (16)

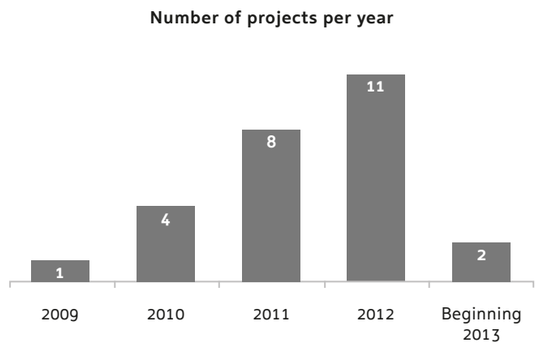
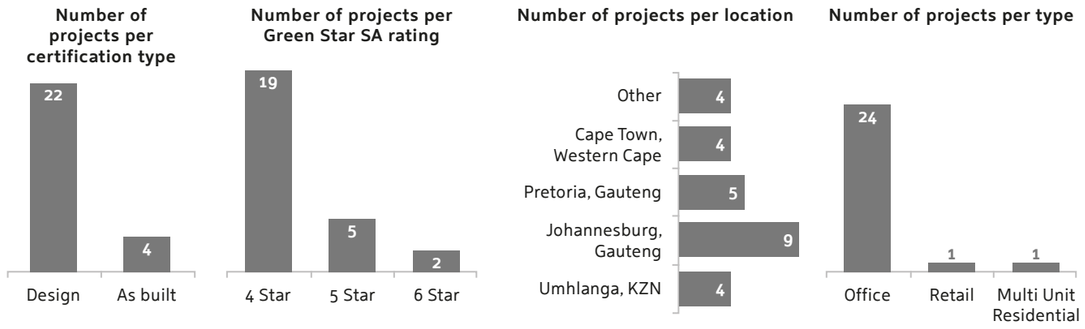
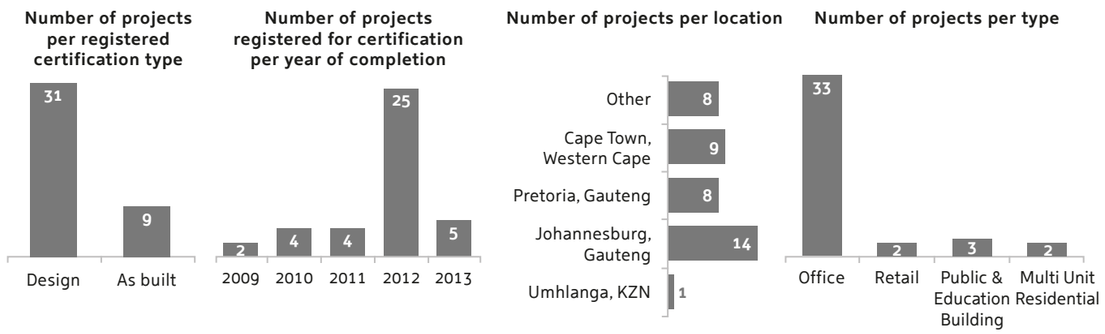


FIGURE 4: DISTRIBUTION OF CERTIFIED PROJECTS PER GRADING RATING, LOCATION AND TYPE (16)



Considering the range of projects registered for certification though it is clear that a greater number of multi-unit residential and public and educational building projects are being planned to be certified in the future, which again shows a positive trend in the industry in the country. Some of the projects that received "Design" certification were also registered for "As Built" certification. The geographical distribution of projects is also broadening. Although the greatest number of projects to be certified is still in Gauteng, a number of projects in other provinces (i.e. Limpopo, Eastern Cape) and towns are being applied for certification.

FIGURE 5: DISTRIBUTION OF REGISTERED PROJECTS PER YEAR OF COMPLETION, LOCATION AND TYPE (16)



2.2.2 Trends and Dynamics

The following key statistics and trends can be observed in the Green Building industry in the country (17):

GREEN BUILDING ACTIVITY:

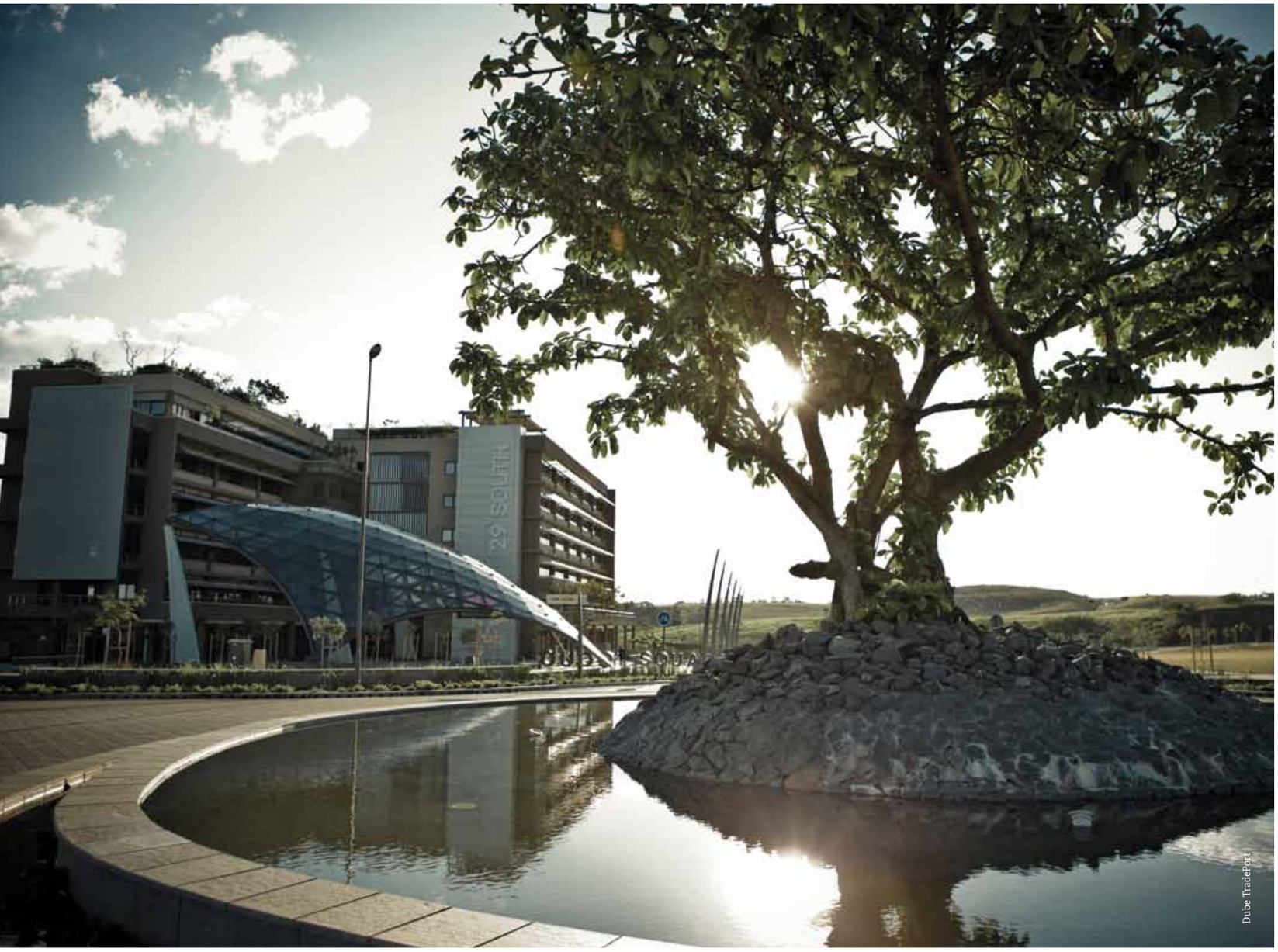
- **In 2012, about 31% of building project activity in the country was attributed to green buildings.**
- **About 16% of architects, engineers, contractors, building owners, and building consultants in South Africa focused on sustainable design and construction by doing at least 60% of their projects green in 2012, which is a significant increase from 2% observed in 2009. By 2015, this figure is expected to more than triple and to reach 52%.**

ACTIVITY BY PROJECT TYPE:

- **Green building in the country, as observed from the majority of green building projects in South Africa, falls mostly within the non-residential market segment and included both new and retrofit projects:**
  - **About 60% of firms plan to work on new green commercial projects.**
  - **About 58% of firms plan to do green retrofit projects.**
- **New low-rise residential buildings, new public projects (schools, hospitals, etc.) and mixed-used developments are the next most common type of green projects planned by companies in the country with 26% to 36% of firms in South Africa indicating planned green projects in these categories.**
- **New high-rise residential and commercial interiors were the least common type of green project planned in South Africa in 2012.**
- **The adoption of green building practices in low-cost housing or social housing market segment is negligible. A few pilot projects were undertaken in the past few years focusing on retrofits (i.e. Cato Manor Green Street retrofit in Durban, Cato Manor Green Street retrofit).**

PRODUCTS AND MATERIALS:

- **South Africa is among the early adopters of green products with the overwhelming majority of firms acknowledging installation or indicating that they used green products in their projects.**
- **Among the most common types of products used are the electrical green products. However, it is expected that South Africa will embrace "close to full" of emerging green products including mechanical, thermal and moisture protection, green furnishings, and waste management.**
- **Adoption of renewable energy sources in the country in green building construction is not the highest in the world but is still relatively large with almost three quarters of firms reporting the use of some form of renewable energy in building design, construction or retrofit. Solar power is the most common form of renewable energy source exploited and firms in South Africa (82%) are globally among the greatest users.**
- **Durability and industry performance of green products are among the most widely used criteria for the selection of green products in South Africa; globally, though, high energy efficiency is the most favoured criterion.**



Dube TradePort

In South Africa, it is common that buildings which are occupied by tenants are not focused on green operations as it is commonly assumed that green technologies are expensive and do not benefit owners. This perception is however changing with the launch of the new green leasing measurement toolkit (refer to the Development Framework on page 11). Although some entities are interested in greening their office environment, they do not own the building in most cases and thus have limited influence on the technologies applied. Thus, large property groups and owners of buildings show a greater rate of adoption of green building practices compared to smaller companies. In conjunction, it is currently new buildings, specifically within the private sector, that are noted as a driving force behind the Green Building movement (largely in the non-residential building sector).

The focus of the green building industry is slowly shifting towards greening existing buildings (18). These retrofits are inclusive of individual tenant refits, soft building retrofits, and deep retrofits. Thus, the growing market in South Africa is anticipated to focus on retrofitting and more so in the non-residential building segment. This is apparent in the continuing trend of urban development that is increasingly favouring renovations over new buildings (18). Essentially, within the current economic climate, capital outlays for new buildings are often not deemed as financially viable. Furthermore, Eskom made the business case with their previous electricity price increases that brought the payback period for many technologies from seven plus years to three to five years. Another trend noted is the increasing use of natural lighting and interior designs in both new buildings and retrofitting that are aligned with guidelines and principles as established by the government (18).

All of the above shows apparent growth in the Green Building industry in the country. The industry though is still in the emerging stage considering that only 16% of firms in the country are heavily invested in green (17). High costs associated with employment of Green Building technologies and products, as well as limited political support and financial incentives offered by government are among the key challenges that the industry is facing at the moment (17). On the other hand, social and economic factors, followed by government regulations, have been highlighted among the top three drivers of the green building activity in the country (17). More than half of the firms in the country expect operation costs savings of more than 10% in the first year and a dominant majority expect the same savings over a five-year period (17). Nevertheless, of those adopting Green Building, the overarching reason is environmental conscience.

2.2.3 SWOT Analysis

The following table outlines the external and internal drivers and constraints that the green building industry in the country faces.

TABLE 6: SOUTH AFRICA GREEN BUILDING SWOT ANALYSIS

INTERNAL STRENGTHS

- **Emerging industry with enormous potential for growth considering climatic conditions, as well as endowments with solar and wind resources.**
- **Established local capabilities in selected industries (solar water heating, PV module assembly, net metering, etc.).**

INTERNAL WEAKNESSES

- **Limited local R&D investment and South African-developed know-how in green building technologies.**
- **High costs of technologies that prevent a wider adoption in the residential market.**
- **Limited competition in the green building technologies in South Africa.**
- **Shortage of skills in the green building industry and within the applicable technology sectors.**
- **Limited range of compulsory standards.**

EXTERNAL OPPORTUNITIES

- **An increased public awareness of energy conservation needs post the 2008 energy crisis.**
- **Legislation and government policy related to energy savings and green building practices.**
- **Introduction of the Green Star SA rating and other toolkits and schemes related to Green Building.**
- **Introduction of rebates and incentives by Eskom to promote and educate energy efficiency practices and technology adoption.**
- **The development and growth of Corporate Social Responsibility (CSR) as a part of business models.**
- **Pressure from international partners and affiliates of firms participating in the South African market to incorporate Green Building into building designs and retrofits.**
- **The incorporation of greening into marketing techniques for a range of products in the market (both building-related and general).**
- **Increased awareness of economic benefits associated with green technologies.**
- **Emergence of a focused health consciousness.**
- **Growing consumer demand and general growing community consciousness of living a "green lifestyle" influenced by recycling initiatives, sustainable community projects, educational programmes and corporate investment.**
- **International technology advances that reduce capital requirements and make technologies more affordable.**
- **Low-cost housing programmes that offers opportunity for retrofitting more than three million low-cost houses and building another three million low cost houses by 2025 following green building practices.**

EXTERNAL THREATS

- **Limited public awareness of technologies that can be applied.**
- **Significant inequality and high unemployment rate that reduces purchasing power of average South African's and affects their ability to afford technologies.**
- **Slow recovery of the building construction industry due to the economic downturn.**
- **Lack of nation-wide incentives.**
- **Absence of regulations that enforce green building standards in national housing programmes.**
- **Absence of net metering and self-consumption policies at the municipal level that restrict a wider deployment of energy generating technologies in the residential market.**
- **False/ misleading claims regarding green products on the market.**

3 OPPORTUNITIES IN GREEN BUILDING **PRODUCTS** AND **SERVICES** USED

3.1 Built Environment Professional Services

3.2 Renewable Energy Technologies

3.3 Energy Storage and Exchange

3.4 Smart Urban Waste Management

3.5 Energy Efficient Ventilation and Roofing Systems

3.6 Building Intelligence

3.7 Smart Systems

3.8 Sustainable Lighting

3.9 Energy Metering for Energy Use Awareness and Education

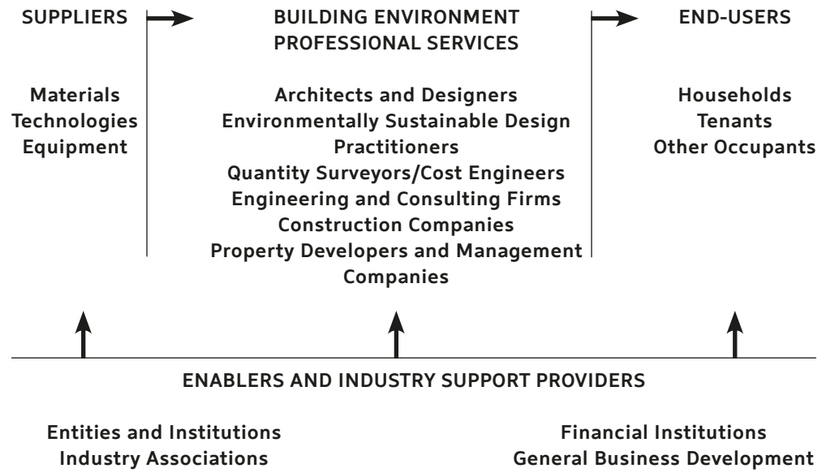
3.10 Building with Nature

The Green Building industry value chain comprises of four core groups of sectors and industry participants. These include green products and services suppliers, built environment professional services firms, end-users, and enablers as outlined in Figure 6.

Considering that in three years more than half of the firms in the country are expected to report heavy levels of green (17), tremendous opportunities exist in growing the provision of built environment professional services and the development of upstream activities (i.e. the range of products, materials, and services that are offered in the market). This section explores these opportunities particularly focusing on areas of Green Building, where the Dutch companies have expertise.

Companies that are currently operating in the South African market and the range of enablers and industry support providers are listed in an annex which can be obtained from the Embassy in Pretoria. In addition, the following websites can be accessed to search for the specific industry participants namely:
www.ecospecifier.co.za
www.specifile.co.za
www.gbcsa.org.za/membership/member_list.php
www.greenbusinessguide.co.za
and energy.sourceguides.com.

FIGURE 6: GROUPS OF KEY ROLE-PLAYERS IN THE GREEN BUILDING INDUSTRY VALUE CHAIN



3.1 Built Environment Professional Services

3.1.1 State of Development

The built environment professional services sector includes a variety of businesses such as architects, quantity surveyors, engineering and consulting firms, contractors, etc. According to the GBCSA's membership list, there are over 450 firms forming part of this industry and having an understanding of the Green Star SA rating system, as well as the ability to apply the Green Star rating tools to building projects. Of these firms, the largest group is architects and designers, followed by engineering and consulting firms (refer to Table 8).

As indicated in the previous chapter, about one out of six companies in the built environment professional services industry is heavily invested in green at the moment. This is expected to increase significantly in a few years as the deployment of green technologies and green building practices increases. Environmentally Sustainable Design (ESDs) practitioners, engineering consulting firms and facility management firms are increasingly becoming involved in the design process so as to facilitate an integrated approach in Green Building planning.

TABLE 7: BUILT ENVIRONMENT PROFESSIONALS INDUSTRY COMPOSITION AS PER GBCSA MEMBERSHIP LIST (19)

NUMBER	SECTOR
151	ARCHITECTS AND DESIGNERS
132	Architects
11	Interior Designers
7	Landscape Architects
1	Building designers
33	QUANTITY SURVEYORS
141	ENGINEERS AND CONSULTANTS
15	Engineers
34	Consulting Engineers
12	Building Services Engineers
13	Civil Engineers
35	Electrical Engineers
21	Structural Engineers
1	Environmental Engineers
10	Energy Consultants
75	ENVIRONMENTALLY SUSTAINABLE DESIGN (ESD) PRACTITIONERS
15	Environmental Consultants
60	Green Building Consultants
54	PROPERTY DEVELOPERS AND MANAGERS
10	Developers/Owners
5	Facility Managers
39	Project Managers
15	CONSTRUCTION COMPANIES

3.1.2 Opportunities

AREAS WHERE THE GREATEST GAPS IN THE MARKET ARE EXPECTED INCLUDE, INTER ALIA:

- **Green interior design for new buildings and retrofits.**
- **Landscape design for roof gardens and sustainable self-sufficient gardens that integrate rain harvesting and waste water management systems.**
- **Affordable green building solutions for low-cost or social housing (including new buildings and retrofits).**

South Africa has shown a faster growth rate in deployment of green building technologies and adoption of green building practices than many other countries in the world (17). Considering that in three years every second company in the built environment professional services sector is expected to be heavily invested in green, the South African market offers significant opportunities for firms in the building environment professional services sector. Although business prospects exist in both residential and non-residential market segments, the non-residential market is expected to be particularly fast growing and rewarding (refer to Chapter 4.2). This concerns both new buildings (office, retail, hotel, etc.) and retrofits with the focal areas being interior design, insulation, and application of energy efficient systems and technologies. This creates the opportunities for Dutch companies with experience and expertise in green building in both residential and non-residential segments to enter the South African market.

3.2 Renewable Energy Technologies

3.2.1 State of Development

Historically, South Africa had the cheapest electricity in the world. However, in the recent years the price of electricity in the country significantly increased, which had a negative effect on operating and maintenance costs of companies and purchasing power of citizens. Load shedding and/or electricity blackouts that took place as a result of the imbalance in electricity supply and demand in the past few years also forced companies and households to look for alternative sources of electricity.
As a result, more and more companies, as well as households opt to employ renewable energy technologies to supplement and in some cases substitute the electricity usage from the grid.

Commercial[2] and residential sectors (urban and rural) in the country accounted for 10.2% and 13.3% of energy usage in 2009, respectively (20). In the commercial sector, electricity is the main energy source that is primarily consumed by HVAC systems, lighting, and office equipment (20). In the residential sector, energy is mainly used for cooking, water heating, space heating and lighting (20). In urban areas, households primarily use electricity, of which 40% to 50% is used by electrical geysers (2). In rural areas household may use wood for energy particularly for cooking and heating.

Various options exist to reduce energy consumption by commercial and residential sectors by means of capturing renewable energy. The most common technologies employed to exploit the potential of renewable energy within the built environment in the country include solar water heaters and PV panels, which use solar energy. However, potential for capturing renewable energy from other sources such as wind and biomass also exist (see other market entry studies on waste-to-energy, wind energy, and biomass that can be obtained through the Embassy).

2. Commercial sector consists of government, office buildings, financial institutions, shops, and recreation and education

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SOLAR WATER HEATER (SWH) MARKET

The deployment of solar water heaters in South Africa is driven by the Government's commitment to install one million SWHs in the residential market by 2014. About 310 000 SWHs have already been installed in the country with 70% installed through the Eskom rebate programme (21). Overall, 1 163 360 m2 of water collectors were installed in South Africa in 2010 (22).

Currently, the SWH market is dominated by the residential market segment; however, the application of SWH in the non-residential market segment is also growing particularly as far as greenfields projects are concerned in lieu of the SANS 204 regulations (refer to page 8). The residential market alone, though, provides for a significant growth of SWH applications considering that there were 14 450 161 households in the country in 2011 (23). At that time, only 59% (8.5 million) of households made use of electricity and an additional 0.3% (>38 000) households made use of solar energy for heating. Taking into account the number of SWHs reported to be installed in 2012, the actual number of SWH penetration in the residential market would be greater but still relatively small (1.9%).

The above shows that there is a significant market not only for replacement of existing electrical geysers but also for installation of SWHs in dwellings that do not have geysers. Considering that a weighted national average for solar collectors installed per household is 4.69 m2 (24), which corresponds with the major market share of 200-litre SWHs installed in South Africa, the potential demand for solar collectors is around 66.4 million square meters for a 100% market penetration level.

Since the beginning of 2013, SWHs is on the list of designated products that must be purchased locally as part of South Africa's public sector procurement programmes. This means that any SWH procured by government departments and public entities in South Africa will need to adhere to the minimum local content threshold, i.e. certain components thereof will need to be manufactured locally. Furthermore, solar water heating is obligatory for the majority of new buildings under the Energy Efficiency Building Regulation (refer to page 8), including public buildings. The combination of these two regulations create an opportunity of establishment of new or expansion of existing SWH manufacturing capacities in the country.

Solar collectors and storage tanks account for the largest share of SWHs system costs.

Three types of water collector technologies are employed globally, i.e. glazed Flat-Plate Collectors (FPC), unglazed water collectors, and Evacuated Tube Collectors (ETC). The application of these technologies in South Africa is outlined below.

UNGLAZED WATER COLLECTOR:

- Unglazed flat-plate collectors share the biggest percentage of the market. In 2010, these accounted for 69% (803 678 m2) of total water collector installed capacity in the country (22).
- These systems are primarily used for heating swimming pool water and thus have greater footprints.

GLAZED FLAT-PLATE COLLECTOR (FPC):

- Glazed flat-plate collectors are the second most common type of water collector used in South Africa. It accounted for 28% (331 010 m2) of the market share in 2010.
- These types of collectors are primarily used to satisfy hot water requirements by households.
- The majority of systems used in South Africa are closed loop systems or indirect systems. This is due to the probability of water freezing during winter months and high water calcium content.

EVACUATED TUBE (ETC):

- This type of SWH systems account for the smallest percentage (3%) of installed systems in the country (22).

SWH COLLECTOR MANUFACTURERS:

- There are 13 companies manufacturing SWH flat-plate panels in the country: five have established their own supplier network while the other eight manufactures supply to the market themselves (21).
- Evacuated tube collectors are not manufactured in South Africa (21).
- The most common sizes of SWHs are 150 and 200 litres SWH systems.
- The price of these systems ranges between R7 000 and R35 000.
- Most of the SWH systems manufactured are supplied to the domestic market; export of SWHs manufactured in South Africa is decreasing (21).

SWH COLLECTOR MANUFACTURERS – INTERNATIONAL COMPANIES:

- 37 international manufacturers produce SWHs for the domestic market (21).
- More than half of the foreign companies supplying SWHs in South Africa are from China with other country suppliers including Greece, India, Israel, Turkey, Australia, Taiwan, and South Korea (21).
- Evacuated tubes are sourced from manufacturers mainly located in China and Germany (24).
- A full range of 100 to 300 litres SWH systems is offered by international companies.
- The prices of imported SWH systems, particularly from China are below that of local manufacturers.

SUPPLIERS:

- Over 650 suppliers are registered with Eskom; however, the majority of these are once-off suppliers that serviced specific towns or areas (21).

INSTALLERS:

- There are approximately 170 registered independent installers in the country (21).

As far as storage tanks are concerned, a range of 100 to 1 000 litres products is available in South Africa. This market encompasses 17 local manufacturers and 18 international manufacturers (21). Contact details of some of these companies can be found further in the report.

PV MARKET

The PV industry in the country is in its early stage of development compared to the European, Asian and the US markets, despite the fact that PV technology was introduced in South Africa in the 1980s. By the end of 2012, an estimated 30 MW of solar PV was installed in South Africa with the majority of installations accounting for small non-residential applications such as telecommunications (25). The PV market, however, is expected to increase significantly from 2013 onwards, particularly as far as the utility scale market segment is concerned that is driven by the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).
The opportunity for expansion of the non-utility market segment (i.e. residential and non-residential) is also vast and depending on the rate of adoption of PV technologies, the non-residential and residential market segments could by far exceed the utility-market segment by 2030.

The rate of adoption of PV technologies in South Africa is subject to a number of factors. These include relatively high systems costs and the lack of self-consumption or net metering policies in South Africa that would reduce the costs and incentivise the deployment of this technology. Despite the limited government support, the residential and non-residential (commercial) PV market segments are expected to grow in the future. The growth is expected to accelerate once the rooftop PV systems reach Grid Parity, which will make them more feasible without financial incentives. The status and future dynamics of these separate market segments in South Africa are outlined below (25).

3. The fee-for-service model offers the end user to install the system without paying for the initial capital cost, which is borne by the concessionaire. The model implies the system being owned by the concessionaire and the end user paying an affordable monthly fee for the services that also covers maintenance of the system.

NON-RESIDENTIAL MARKET SEGMENT:

- This market segment is growing rapidly, with at least 1.7MW of rooftop PV systems alone added in the past few years. These included PV systems for retail, offices, warehouses, and covered parking.
- If 15% of the energy usage by the commercial sector is substituted by rooftop PV systems, it will create the opportunity to install an equivalent of 4.8GW of PV systems.
- The greatest impediment to the diffusion of PV technologies is the combination of high upfront costs and the lack of financial incentives offered by government.
- Most of the rooftop PV systems built in the country in the past are crystalline PV panels ranging between 30kW and 500kW with an average of 171kW.
- The average payback period of commercial rooftop PV systems is about five to seven years.
- The Grid Parity for these systems will be achieved in ±2017.

RESIDENTIAL MARKET SEGMENT:

- The development of this market started in the 1980s with the deployment of fee-for-service[3] concessions in rural South Africa.
- This market segment provides for the biggest growth opportunity in the long-term with over 10GW potential.
- The greatest impediment to the diffusion of PV technologies within this market segment is high upfront costs, absence of financial incentives, poor public awareness and the lack of regulatory rules regarding wheeling/selling of electricity via the grid.
- In rural areas, rooftop PV systems largely range between 50W and 110W; in urban areas these systems usually range between 2kW and 5kW.
- Solar PV systems installed for the residential end-user mainly use crystalline PV technology.
- Most of PV systems for households are being installed on rooftops; however, ground mounting or monopole systems can also be installed, but they cost approximately 5-10% more.
- The average payback period of residential rooftop PV systems is about 16 years.

The non-utility scale PV industry in South Africa comprises of manufacturers, distributors, and installers for the residential market segment or Engineering, Procurement, and Construction (EPC) contractors for the non-residential market segment. In the non-residential market segment, the list is augmented with project developers.

PV PANEL MANUFACTURERS:

- There are only four PV panel manufactures in South Africa with an approximate manufacturing capacity of 240MW of PV panels per annum, which could be expanded to 500MW if market requires. Three of these are located in Cape Town and one has recently been established in Durban. The feasibility of the establishment of two thin-film manufacturing facilities in South Africa is currently being investigated by private investors.
- All of the facilities are employed in the assembly of PV modules only; no PV cell or wafer manufacturing facilities exist in South Africa.
- All of the manufacturers produce c-Si (crystalline) PV technology.
- Local PV panel producer prices vary between R5.7/W and R7.5/W.
- Profit margins of local PV module manufacturers fluctuate in single digits, which is largely the global trend.

DISTRIBUTORS:

- The industry is fragmented and is dominated by wholesalers. A few online shops exist.
- Most of the distributors are situated in the Western Cape and Gauteng.
- Distributors serve both non-residential and residential market segment.
- The wholesalers' price of PV modules varies between R7.5/W and R11.5/W, which suggests a 30-53% mark up on producer prices.

EPC/INSTALLERS:

- Most of the companies are situated in Gauteng and the Western Cape.
- In the non-residential market segment, the industry is fragmented with the majority of companies offering turnkey solutions with certain tasks being outsourced to sub-contractors. Project developers that focused on the utility-scale market segment in the past are also entering the non-residential market segment.
- Companies servicing the residential market segment are located throughout the country, but the largest concentration is found in the Western Cape, Gauteng and KwaZulu-Natal.

3.2.2 Opportunities

- **Setting up new companies manufacturing water collectors and solar tanks, particularly if these products would allow for the notable reduction in current prices on SWHs.**
- **Introducing products that can capture wind energy in the built environment.**
- **Introducing building-integrated PV material and products that can substitute conventional building materials in parts of the building envelope.**

3.3 Energy Storage and Exchange

3.3.1 State of Development

The use of energy storage and exchange technologies is very uncommon in South Africa when compared to Europe. This is predominantly due to the differences in climate. In South Africa the primary focus for buildings is to retain cool air as opposed to heat. Nevertheless, because of the few months when temperature drops to just below zero and 12°C, heat retention is factored into building design, but is not as great a necessity as it is in European climates. Essentially, in South Africa, ventilation and insulation is used for this purpose. Furthermore, in South Africa the adoption is based on regional weather patterns.

The following paragraphs provide an assessment of the technologies used in the country for energy storage and exchange.

GEOTHERMAL HEAT SINKS

The application of geothermal heat sinks technologies is not very common in South Africa, although the potential does exists. The industry professionals have indicated that the knowledge of geothermal technology in the market is not vast and high costs associated with the comprehensive site preparations necessary for the deployment of the technology and lengthy pay-back periods are the main deterring factors for a wider adoption of this technology.

The first building in South Africa to utilise the relatively new concept of a "rock store" as a thermal mass is the Vodafone Site Solution Innovation Centre in Midrand, Gauteng. In this case, this store is similarly used as part of the foundation of the building. The Vodacom Building is the first building to aim for a six Green Star building accreditation in Africa.

The current market for this technology is very small. It is primarily being employed in residential dwellings in the Western Cape and Gauteng for under-floor heating. It has been cited by industry professionals that awareness of this technology is growing; however, if there is a measurable uptake it is anticipated to be very slow.

The main target market for geothermal energy storage technologies is the end-user in the residential up-market sector and architects. It is indicated that although installations also occur during renovations, the focus is on new developments. The charge is approximately R2 500 per m^2, which can be afforded by high-income households only. Known applied technology is imported and sourced from Austria; thus the market is monopolistic at this stage.

"ROCK STORE" TECHNOLOGY

The "rock store" technology was recently introduced in South Africa, and was applied to the Vodacom building in Gauteng. The rock store was developed to take advantage of the vast differences in temperatures in Gauteng. The cool air which drops at night is used to pre-cool the building using fans that extract the cooled air. The incorporation of this technology into the building was done by foreign companies. The target market is currently limited to large-scale buildings in the commercial and industrial sectors of the building industry due to the extent of site preparation required and the financial implications.

OTHER RELATED TECHNOLOGIES:

- **Energy wheels, cross flow heat exchangers in HVAC systems for heat recovery is quite common in the country.**
- **Energy thermal storage in mass of building superstructure has been done in some instances in the country.**
- **Usage of ice to store cold and reduce workload on chillers during the day is limited. This technology has been included in building developments for a number of years. However, the rate of adoption and inclusion in buildings is declining due to the lack of expertise in maintenance. There have been innovations in technologies for cooling in terms of energy exchange, for example the V&A Waterfront in Cape Town uses cold water from the ocean to cool the air-conditioning system.**

3.3.2 Opportunities

- **The inclusion of energy storage technologies within large-scale developments holds a potential, but this will only be adopted if the developers are focused on reaching a five or six Green Star SA rated development.**
- **Use of geothermal heating and cooling in clustered up-market residential developments has potential, but the viability still needs to be assessed.**

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3.4 Smart Urban Waste Management

3.4.1 State of Development

The uptake of smart urban waste management technologies within the building industry has been relatively insignificant. All Waste-to-Energy (WtE) technologies use products that would otherwise not be used. The vast majority of waste generated in urban areas is still sent to landfill sites. As a result, the primary focus has been on landfill gas generation technologies, which is not applicable to the green building industry. Recycling of waste is slowly gaining momentum in the country; however, the concept remains foreign for the majority of South Africans.

WASTE SEPARATION AND RECYCLING

With the exception of a few periodic pilot studies, waste separation and recycling are not generally practiced in South Africa. Informal sector salvaging, both at street level and at landfills, constitutes the bulk of recycling activities in South Africa at present.

OTHER WASTE SEPARATION/RECYCLING PRACTICES INCLUDE INTER ALIA:

- **Collection pilots (e.g. yellow/blue bag systems).**
- **School/church/community fund raising projects.**
- **Recycling services offered at a fee in urban centres (e.g. Resolution Recycling, Mama She's Waste Recyclers, Whole Earth Recycling, etc.).**
- **Retailer take-back services (e.g. Makro, Pick 'n Pay, Woolworths).**
- **The inclusion of a waste sorting areas in building designs whereby subsequently the sorted waste is sent to landfills and recycling centres. This initiative of dedicated waste sorting areas is still new to the market and is chiefly incorporated in new buildings.**

ON SITE WASTE CONVERSION

Application of WtE technologies in the country at building level is practically non-existent. The extent to which buildings in the country incorporate smart urban waste management into their practices is restricted.

ON SITE WASTE CONVERSION RESTRICTIONS:

- **The use of processed sewerage as compost and the recycling of grey water used in gardens and for flushing toilets. An example is the Nedbank building in the Menlyn Maine complex in Pretoria.**
- **The practice of worm farming whereby organic waste is converted by worms into fertiliser which is then used within the grounds of larger buildings, for example hotels, as well as in the gardens of households. The Mount Nelson Hotel based in Cape Town uses this method to manage organic waste. Worm farms, although not new to the South African market, are not widely used, and are most common within the residential sphere.**

Aerobic digesters perform the same function as a worm farm, but on a vaster scale (e.g. gated residential communities). For more detailed information on WtE practices in the country, refer to the WtE market entry study compiled for the Embassy of the Kingdom of the Netherlands in Pretoria.

3.4.2 Opportunities

THE FOLLOWING OPPORTUNITIES CAN BE HIGHLIGHTED FOR THE DOMESTIC MARKETS (26):

- **Biological aerated filtration and trickling filters.**
- **Membrane bioreactors.**
- **Nitrification and dentrification systems.**
- **Technologies for enhanced biological phosphorous removal.**
- **UV disinfection.**
- **Anaerobic and aerobic sludge digestion.**
- **The utilisation of bio-solids.**
- **Improvements on the equipment used for waste management.**
- **Technology for pollution prevention, control and treatment.**
- **Innovative recycling processes that facilitate waste reduction.**
- **New recyclable materials.**

Despite the current emphasis of government policies and objectives on energy efficiency, there is going to be a greater need for the efficient use and recycling of water due to the forecasted probable national water shortages. In the context of green building, opportunities for the deployment of waste separation/recycling and waste conversion technologies and practices exist in all market segments:

- **Non-Residential: large office buildings.**
- **Residential: up-market residences, as well as large-scale residential developments.**
- **Municipal: there are a number of small municipalities that will have exceeded the capacity over the short-term and are thus increasingly pressured to find alternatives There is a constant potential for energy generation and development of waste management systems and technologies to assist in this regard.**

3.5 Energy Efficient Ventilation and Roofing Systems

3.5.1 State of Development

Ventilation systems and roofing is a fast-growing industry in South Africa and relatively advanced. The recent introduction of the SANS 204 regulations has significantly contributed to the establishment of a new market and continued development of the ventilations and roofing systems within the parameters of Green Building. Considering the South African climate, the main focus with respect to ventilation and roofing systems is to create a cooler interior environment as opposed to Europe where the chief focus is on heat retention systems.

INSULATIONS

The approach towards the use of insulation within Green Building is incorporated into the initial design of the building and project development phase. Although a part of the roofing systems; insulation, therefore, is a building material and design principle used towards regulating heat loss and retention, and as such, is a growing industry in South Africa. SANS 204 which identifies building aspects and regulates the industry is a critical piece of legislation as it has set the bar very high for the minimum standards of new buildings.

Other than low-income housing units that often do not meet regulation standards, all other new developments (residential and non-residential) are by law expected to have the correct degree of insulation as stipulated in SANS 204. As indicated, there is a gap for more “green” approaches to insulation products. Despite the regulations, a difference between “normal” developments and Green Buildings in the application of insulation is evident in terms of the material used for insulation, the actual building design, and how insulation is applied and placed to maximise the efficiency of cooling and heat retention. Essentially, buildings may meet the prerequisite R-value, but developments aspiring to a high Green Star SA rating make improvements and advancements on heat retention and loss by the incorporation of specific insulation criteria into designs.

THE RANGE OF MATERIALS USED IN THE MANUFACTURING OF THERMAL INSULATION PRODUCTS IN THE COUNTRY IS LISTED BELOW:

- **Synthetic polymers: polyester, polystyrene, polyicynene, polyurethane, polyisocyanurate.**
- **Mineral wools: fibre-glass, rock wool, slag wool, stone wool.**
- **Minerals: vermiculite, perlite.**
- **Natural plant materials: cellulose insulation, cork, hemp, cotton, straw, sawdust and hemlock fibre.**
- **Animal fibres: wool.**
- **Shredded recycled paper chemically treated: cellulose loose-fill insulation.**

HVAC SYSTEMS (MECHANIC VENTILATION)

HVAC systems are well established technologies with widespread acceptance, given the large quantities currently installed in the country. These systems are present in virtually all commercial and industrial buildings and account for a significant portion of energy usage within the buildings sector.

THE USAGE OF HVAC SYSTEMS IN DIFFERENT MARKET SEGMENTS IS OUTLINED BELOW:

- **In the non-residential market segment, the most advanced ducted air ventilation systems are largely not used in buildings because of the high upfront costs and similarity in effectiveness achieved to that of alternative systems, i.e. similar ducted yet less "cutting-edge" systems. The efficiency in these ventilation systems is fundamentally relative to the design of the building and in terms of large buildings, the extent to which the systems are managed and incorporated into other technology systems. A few years back, a solar-driven air-conditioning system was introduced in Pretoria that utilised absorption chiller technology; the application of these types of systems though is only at its nascent stage.**
- **HVAC systems that are used in residential buildings are in the majority of cases, not very efficient. These are the traditional HVAC systems that include recycling of air, which are generally installed by home-owners themselves. There are, however, a few residences that incorporate more advanced or high-tech HVAC systems into their homes during the construction and less often during renovations. Such HVAC systems are generally then connected to the home automation system, but due to their costs they can be afforded by a very small percentage of households in the country.**

THERE ARE TWO ALTERNATIVE SYSTEMS OF VENTILATION THAT ARE USED IN THE BUILDING SECTOR IN SOUTH AFRICA. THESE INCLUDE:

- **CONVECTION-DRIVEN TURBINES: this type of technology is not new in the South African industrial and non-residential market. Convection-driven turbines ventilate a building with no operational costs and are largely applied in the residential and industrial sector, warehousing, and non-residential markets. This technology is manufactured and distributed in South Africa, and is exported to Nigeria, Ghana, Dubai and the Reunion Islands. In the past four years, the deployment of these systems has shown a significant increase in its uptake. They were specifically applied in retrofitting of warehouses and factories so as to comply with the Health and Safety Standards.**
- **SOLAR-DRIVEN VENTILATION SYSTEMS: these systems are a relatively new concept in South Africa and represent the emerging market. The technology was introduced a few years ago and is chiefly geared towards the residential market.**

ROOFING SYSTEMS

Roofing systems in new buildings (both residential and non-residential) are generally designed to accommodate the applicable climate constraints. Houses in the low-income and informal residential sectors are generally not designed or constructed at the same level of sophistication as middle and high-income houses; thus, in many cases they do not comply with any standards and therefore would not create a significant demand for green building products including roofing systems. The National Housing Code applicable to the National Housing Programmes (i.e. subsidised housing) calls for the application of energy efficient principles (including roof and wall insulation). However, these principles are prescriptive in nature and it is unclear whether energy efficient regulations for low-cost and subsidised housing will be enforced in the near future, which means that the demand for roof insulation in this market segment is insignificant at this stage.

Roofing in the South African residential sector typically consists of cement tiles, galvanized iron sheets, or thatch and occasionally clay roof tiles. Roofing in the commercial and industrial sector is mainly in the form of concrete slabs, iron sheets, or occasionally cement tiles. Due to the introduction of SANS 10400 XA regulations that increased the requirement for r-value and subsequently the level of insulation, there has been an increase in the development and introduction of new technologies into the South African market that assist with interfacing of the roof system and the insulation. New roof construction methods and technology solutions are being gradually introduced, albeit by a small number of companies. This is particularly applicable to buildings with exposed rafters that now require a different construction method that would allow sufficient space for insulation (i.e. current method involves putting insulation between 76mm purlins, where an equivalent of at least 150mm of a typical cellulose fibre insulation is now required).

3.5.2 Opportunities

- **Introduction of efficient and effective systems which are cost effective and have an attractive payback period.**
- **Introduction of the design methods for complete roofing systems in line with SANS 10400 XA regulations, due to the limited number of participants on the market and the expected increase in demand for such services and products in the near future.**
- **"Green" mechanical insulation products and systems.**

3.6 Building Intelligence

3.6.1 State of Development

FACTORS CONSTRAINING THE DEPLOYMENT OF BMS INTO GREEN BUILDING DESIGNS:

- **The inclusion of a BMS in large buildings with multiple rental tenants is deemed as potentially problematic in that a system cannot always proficiently manage individual businesses on various floor levels.**
- **There is a lack of programming and technical skills within management of the buildings.**
- **Due to advances in technologies installed in buildings, BMSs often get restricted to perform the function of a high-tech metering system. For example, lighting does not require the management of a BMS as movement and natural light sensors are increasingly utilised in new buildings in the country.**
- **The main focus in South Africa for BMSs is to manage the high energy consumption of HVAC systems. However, most air-conditioning systems currently available on the market have a "mini management system" incorporated into their design and may thus be managed individually.**

The application of building intelligence technologies in South Africa is only emerging as illustrated further in the section. The industry primarily comprises of distributors of building intelligence software and hardware that is imported and installers that have been trained to perform these tasks. The average profitability of this industry is around 20-30% with a payback period of commercial-scale systems of approximately three years. System costs are cited as one of the key challenges in increasing uptake of the market, and particularly the residential market.

NON-RESIDENTIAL MARKET

The application of building intelligence technology in non-residential (commercial) buildings in South Africa is done in the form of a Building Management System (BMS) which integrates and manages all facets of building control. The key area for such systems is in the control of HVAC systems. Improvements can be made on these systems by optimising chillers to increase their Coefficient of Performance (COP), utilising heat pumps for water heating and installing variable speed drives to control the HVAC units.

A vast proportion of recently built large non-residential buildings are managed by some form of BMS, although the range of their functions differs from one building to another. Despite an apparent growing demand for the inclusion of a BMS into Green Building designs, the deployment of this technology is constrained by a number of factors.

Despite the individual capabilities of the different facets of a building, the inclusion of BMSs into buildings for the purpose of management and energy reduction is increasing, chiefly as a result of the incentives offered by Eskom. At varying degrees, new large non-residential buildings are the main adopters of this technology.

RESIDENTIAL MARKET

Building intelligence within the residential market in South Africa, in most cases, is not applied for the purpose of controlling energy usage and improving efficiencies, but rather as an automation system chiefly for controlling entertainment and security equipment. The control of lighting, HVAC and all mechanical devices which may be connected to the system are considered by the market as add-ons and optional. However, this technology is increasingly used towards the effective management of energy usage by residents or tenants of buildings.

In South Africa, automation and building intelligence systems for residences is offered by 10 to 15 leading entities which serve as distributors of foreign imported automation systems and which focus on the residential market. The automation systems provided are sourced from the USA, Germany, Taiwan and the UK and include among others such brands as AMX, Control4, Elan, and Crestron. Dealers and installers provide the product to the end-users. There are approximately 70 operating installations companies in the country. Some of these firms though are "fly-by-night"[4] companies and do not have the expertise to programme and manage these systems.

The target market may be defined as up-market residential with homes valued at R5 million and above. This is due to the fact that the installation of a basic complete automation building intelligence system ranges between R50 000 to R1 million for the high-end market. The majority of this market falls within new developments (70%), followed by renovations (30%). It is noted by industry players that there is an increasing demand for automation systems within houses, and more so for managing and controlling entertainment equipment and security functions of the building. The residential market is very competitive and fast-growing, offering opportunities for new entrants. Entering the market as a supplier of these systems could be relatively challenging due to the unfamiliarity of the systems by installers and end-users and the lack of skills to maintain these systems.

4. Untrustworthy businesses that open up shops, operate for a temporary period, and close down before or upon the request from the customer for repair and/or maintenance services

3.6.2 Opportunities

- **Skills shortage is the biggest challenge faced by the industry players. Training and knowledge transfer are thus in great demand.**
- **Concerning the residential market, there is scope to target the fast-growing middle-income market with properties ranging from R1.5 million to R5 million in values. Technology solutions offered to these markets segments need to be affordable; thus, any products that can create price competition for the products that are currently on the market could see significant uptake in the future.**

3.7 Smart Systems

3.7.1 State of Development

DESPITE THE EXISTING LIMITED APPLICATION, THE POTENTIAL FOR THE DEPLOYMENT OF SMART SYSTEMS IN THE SOUTH AFRICAN CONTEXT IS SIGNIFICANT:

- **More than 400 vendors in 35 emerging markets (South Africa being one of these) are competing for what is anticipated to be a US$66 billion-plus smart-grid market opportunity ten years from now, of which a quarter is already actively involved in smart-grid projects throughout the globe (28).**
- **The accelerated deployment of smart meters is indicative of a growing trend towards the formation of smart-grids as a sector of the economy.**
- **Smart-grids are noted by the South African Government as holding a potential to enhance rural electrification in the country, particularly in areas that are currently not electrified.**

Compared to the USA and Europe, smart-grid applications in South Africa are very limited. Currently, it is predominantly in the form of collaborative research and development projects between the private and public sector and on an independent scale for each sector (27).

A few examples of the smart-grid related projects currently underway in South Africa are described below. The extent to which the application of a concrete smart-grid is applied differs for each project. Most of these refer to the application of smart metering (which is a fundamental technology integrated in smart-grids) that is not a "new" technology or concept in South Africa. The extent of the development of smart-grids though is only at the pilot project phase and is limited to micro or mini-grids.

CITY OF JOHANNESBURG, GAUTENG	• **The City of Johannesburg has commissioned Edison Power Group (the largest energy contracting company in South Africa) who has identified Itron Measurement and Systems (Pty) Ltd as a partner to supply its latest generation smart meters and associated smart metering system to selected residential areas (29).**
ETHEKWINI MUNICIPALITY, KWAZULU NATAL	• **In 2011, the United States Trade and Development Agency provided a grant to eThekwini Municipality Electricity Department to evaluate and assess the feasibility of Smart Metering for the eThekwini Municipality.** • **The implementation of a smart metering system in the selected area was determined as feasible; however, its assessment is still on-going.**
HLULEKA NATURE RESERVE, EASTERN CAPE	• **The installation and development of the mini-grid system in the Hluleka Nature Reserve in the Eastern Cape forms a part of a study on the potential to implement the modular smart-grid approach for the use of electrification of rural communities.**
LUCINGWENI VILLAGE, EASTERN CAPE	• **Supplementary to the Hluleka mini-grid project, the Lucingweni village (110 households) was chosen as another site for a hybrid mini-grid system (27). Power generation (86kW installed capacity) in this village is achieved through the use of a combination of solar photovoltaic panels and wind generators, as well as their associated control, accumulation and distribution equipment. (27).**

Based on the two mini-grid pilot projects undertaken in the Eastern Cape, it was concluded that smart-grid technology in South Africa is not yet at a stage where it is developed enough to initiate a demonstration project (27). Nevertheless, there is an increased recognition of the growing potential for smart-grid communities signifying an emerging market, and with the support of the public sector, the application of smart-grids is anticipated to develop. This is indicated by a growing focus of the public sector on smart-grids and more specifically the establishment of the South African Smart Grid Initiative (SASGI) in 2012.
More information about SASGI can be viewed here: www.sasgi.org.za

The need for the development of smart grid systems is also facilitated by the prospects of the impacts that the REIPPPP will have on the grid system. Utility-scale grid connected solar and wind energy projects that will be built in the next few years are expected to have a negative impact on the grid as far as harmonics and availability are concerned; hence the need for the deployment of smart grids (30). Furthermore, with the implementation of carbon tax from 2015 and the acceleration of the green movement in the country, large corporations and companies in the country might decide to employ renewable energy technologies to reduce their carbon footprints. This could further stimulate the need for sustainable solutions including smart grids.

3.7.2 Opportunities

There is a lack of expertise concerning the functioning and implementation of smart-grid systems; however, the interest in developing smart self-sufficient communities within low-income areas is growing. Government's mandate is to facilitate the implementation of pilot hybrid mini-grid energy systems with a view to use these pilot projects to gain experience and understanding of such energy systems so that a national roll-out plan can be developed. Expertise in this field would most definitely be sought in the country in the short to medium-term as the policy environment develops and pilot projects are being implemented. This creates an opportunity for Dutch companies with related engineering and project management experience to collaborate and form partnerships with local vendors in such projects.

3.8 Sustainable Lighting

3.8.1 State of Development

Globally, electricity for lighting is estimated to consume approximately 20% of the output of the world's power stations (31). The residential and commercial sectors consume 23.5% of the national electricity output (20). Of this percentage, 12% is used for lighting (31). It is recognised that one of the most cost effective and efficient methods of reducing this consumption in South Africa is through the use of energy efficient lighting (31). Thus, increasingly, the adoption of sustainable or energy efficient lighting is one of the most common initiatives undertaken in the building industry, especially in buildings that undergo "green" retrofits.

Until recently, initial costs associated for the use of energy efficient or sustainable lighting was deemed unfeasible with considerably long pay-back periods. However, in the past few years costs have decreased. For example, the payback period for a typical Compact Fluorescent Light (CFL) replacement in commercial retrofits now ranges from a few months to 2.5 years (31). Incentives, massive roll-out programmes and energy efficiency campaigns by Eskom have similarly been influential in this regard (31). As a result, the amplified awareness of the benefits and business case of energy efficient lighting have all contributed to the greater uptake of efficient lighting technologies.

THERE ARE A VARIETY OF LIGHTING PRODUCTS AND TECHNOLOGIES AVAILABLE IN SOUTH AFRICA. THESE INCLUDE BOTH ENERGY EFFICIENT AND LESS EFFICIENT LIGHTING PRODUCTS:

- **Incandescent Lights.**
- **Mercury Vapour Lights (MV).**
- **Metal Halides.**
- **High Pressure Sodium Lights (HPS).**
- **Compact Fluorescent Lights (CFL).**
- **Electronic Ballasts Over Magnetic Ballasts.**
- **Induction Lights.**
- **Light Emitting Diodes (Leds).**
- **Lighting Control Systems.**

PRODUCTS AND TECHNOLOGIES
CFL's, induction lights, and LEDs, as the most energy efficient with the least number of adverse features products, are endorsed by Eskom through its IDM programme. Therefore, these technologies are increasingly being used to substitute less efficient lighting products.

Solar powered LEDs are increasingly used in street lighting by the public sector. Additionally, many South African cities have introduced programmes to make street lighting more energy efficient by replacing MV lights with HPS lights (32). The use of solar powered street lights is still an emerging market though, offering significant growth opportunities.

INDUSTRY COMPOSITION
The majority of lighting products available on the local market are world-class in standard, advancement, and application as they primarily include products of global leaders in this industry, such as Philips, NTL-Lemnis, and Osram.

Products from China and other parts of the world can also be found on the market; however, in many cases they are often inferior technologies specifically with regard to LEDs. As far as domestic manufacturers are concerned, there are approximately five companies that manufacture and distribute LEDs and Luminaires, LEDwise and LEDSA being two of them.


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MARKET SEGMENTS
The deployment of lighting products in South Africa differs depending on the target market.

RESIDENTIAL BUILDINGS MARKET:

- The massive roll-outs of CFLs in the residential sector by Eskom in collaboration with Philips Lighting have significantly contributed to the uptake of energy efficient lighting. Since 2004, over 47 million CFLs were exchanged for incandescent bulbs (33). For CFLs, the residential market is thus noted as dominated by Eskom and Philips Lighting. Phillips has opened a CFL manufacturing facility in Lesotho in 2009 to supply the Southern African market.
- LEDs are used in the middle and high-income residential market segments.
- Among the lower income electrified households, there is still a perception that the initial cost of LEDs does not warrant the feasibility of purchasing this technology. This perception is however changing, specifically due to Eskom's IDM programmes.
- Lighting controls systems are employed within the higher income residential market segments, although to a limited degree.

NON-RESIDENTIAL BUILDINGS MARKET:

- Aside from general energy efficient lighting products, this market segment creates demand for lighting automation systems, occupancy sensors, day light sensors, and day light harvesting.
- The majority of these lighting technologies are used in office buildings. The uptake of these technologies in retail centres, specifically existing buildings is slower, but the inclusion of the "Green Lease" and occupational toolkits will stimulate growth in this sector.
- Street lighting accounts for around 24% of energy consumed by South African municipalities, which in turn contributes 28% to the carbon emitted by municipalities in the delivery of local services. Many South African cities have effectively introduced programmes to make street lighting more efficient through replacing traditional MV lights with HPS lights.

3.8.2 Opportunities

- There is an increasing drive for the expansion of ESCOs within the residential and commercial sectors, which is promoted by the government-driven Working for Energy and Expanded Public Works (EPWP) programmes that are looking to partner with cities in driving ESCO development (31). This creates opportunities for new market entrants that can provide the following range of professional services that are generally offered by ESCOs:
  - Preliminary energy use analysis and audits.
  - Investment grade energy audits.
  - Project design.
  - Providing and installing specific energy efficient technologies.
  - Setting up financing mechanisms.
  - Providing staff training for equipment maintenance and operation, or perform this function themselves.
  - Providing measurement and evaluation of savings.
- Replacement of incandescent light bulbs with CFLs or LEDs in the residential market segment offers enormous opportunities in South Africa. A limited range of CFLs and more so of LEDs is available in the market offering opportunities for new market entrants especially if they can be price-competitive.
- Within the non-residential market segment, the following improvements in lighting efficiencies could be implemented:
  - Replacing old fluorescent tubes with efficient fluorescent tubes in local government and commercial buildings.
  - Replacing magnetic ballasts with electronic ballasts in fluorescent tube systems.
  - Installing lighting control systems (people and lux level sensors).
  - Using LED technology wherever possible.

  Introduction of these products would create a greater competition in the market and would contribute to cost reduction is an opportunity.
- CFLs contain 3-50 mg of mercury, and are thus not environmentally friendly when disposed of. There are currently sustainable disposal initiatives, yet these are not significant to serve the market in the short to medium-terms. Therefore, the provision of a waste disposal service or technologies which will facilitate environmentally friendly and safe disposal of CFLs is an opportunity.
- There is an apparent increase and trend for municipalities to replace all MV streetlights with HPS streetlights. This is considered to become the norm due to the huge energy and financial savings that are achievable.

3.9 Energy Metering for Energy Use Awareness and Education

3.9.1 State of Development

Advanced or smart metering has not yet significantly penetrated the South African market. Nevertheless, it encompasses enormous business development opportunities as the South African market for smart meters amounted for more than $14.7 million in 2008 (34). It was further estimated that by 2014 the replacement and conversion of existing meter technology could grow to $50.5 million (34).

Despite the fact that application of advanced metering is still in the stage of market development, the concept is not new in South Africa. The first form of advanced online metering was developed in 1998 and implemented in Boksburg, Gauteng. The software was developed by local technicians and subsequently managed by the collaborating entity. This metering system was one of the first established on a global scale.

According to industry players, a greater interest in metering services has been observed in the past few years from both residential and non-residential markets. The reason for greater adoption may be split into equal parts between social commitments and financial benefits, as outlined in Table 9.

TABLE 8: SOCIAL AND FINANCIAL MOTIVATIONS FOR ADOPTING ADVANCED METERING IN SOUTH AFRICA

SOCIAL REASONS	FINANCIAL REASONS
Energy saving initiatives and social responsibility (specifically concerning listed companies)	• **The return on investment is approximately 1 – 1.5 years.** • **“Money-saver” as able to track usage and thus reduce operating costs.**
Energy in South Africa has become a scarce commodity	• **Can compare “actual” costs and meter reading to billed costs.** • **Assess the correct tariff category.**

PRODUCTS AND TECHNOLOGIES

Metering products used in South Africa include measurement devices, billing software and electronic communication. Most of the hardware used is imported from the UK, USA, Europe (i.e. Switzerland, Germany), and Taiwan. ‘Alster Kent Meters’ from the UK are said to dominate the hardware marketplace in South Africa. All imported meters need to meet standards and requirements established by the South African Bureau of Standards (SABS); therefore some imported products have been excluded from trading in the past (for example, from China) due to their failure to meet these standards. Local products can also be found in the market; however, they do not create a strong competition for imported products due to pricing and quality.

INDUSTRY COMPOSITION

The industry comprises of consultants, installers, software developers, and systems managers. Utility management companies are playing a larger role in consulting clients and using advances in technology. There are less than 20 established designers of software, installers and metering management companies in South Africa, most of which are small and medium size firms. Although the number is relatively small, considering the current market the industry is very competitive. There are also a number of entrepreneurs that have entered the market in the past.

The extent of service offerings varies across market participants. Some firms offer a single consultancy service, whilst others participate in the software development, installation, and continual consulting and management thereafter. Some companies also offer metering services to customers in the UK, Malaysia and Africa.

Currently, the average profitability in the metering of energy use in South Africa falls between 25 – 40%. Advanced metering is very short on expertise, and this is often the difference between the established companies and those Small, Medium and Micro Enterprises (SMMEs) that are new to the market.

MARKET SEGMENTS

The commercial sector uses metering to manage their use of energy and to enable them to assess how to minimise their usage. Similarly, it enables them to assess whether they are overcharged as well as a form of CSR. Examples of retail and commercial groups that make use of metering services in the country include Woolworths, Shoprite, and Edcon.

There are partnerships with municipalities for the provision of metering services and monitoring consumption on behalf of the public sector. Generally, municipalities are concerned that they will not have sufficient funds to widely deploy the technology and to maintain the supporting infrastructure.

In the residential sector, metering is gaining greater adoption, specifically in gated or closed communities. This provides the opportunity for individual residences to be metered and enables individual billing instead of grouped billing. The use of energy is monitored and recommendations to reduce this use are provided. These projects are also seen as the means to develop smart grids in the country.

3.9.2 Opportunities

- **Introduction of products that allow for advanced metering of both water and electricity consumption.**
- **There is a potential for growth in the market for advanced metering for middle to high-income gated complexes and estates. This opportunity is coupled with the recently introduced potential for smart grids. There is similarly the potential for communities to sell electricity back to the grid, although this is subject to the introduction of self-consumption and net metering policies in municipalities that is currently being practiced only in Cape Town.**
- **On-going data collection and monitoring process of energy for municipalities.**

3.10 Building with Nature

3.10.1 State of Development

GUIDELINES FOR ENERGY EFFICIENT BUILDINGS CAN BE FOUND, AMONG OTHERS, IN GUIDELINES FOR JOHANNESBURG AND CAPE TOWN:

- **The guide for Johannesburg has a focus on design for energy efficiency and therefore emphasises strategies that minimise energy consumption through integrated design processes. There is a strong emphasis on passive environmental control, day lighting, and the use of renewable energy such as solar power. It does not detail though how to make mechanical systems such as air conditioning and vertical transportation plant energy efficient (35).**
- **The handbook for Cape Town gives a comprehensive and practical overview of green building principles, implementation guidelines and sustainable resource management applicable to buildings (36).**

In the context of the Dutch National Building with Nature Programme, "Building with Nature" as a tool and guideline for construction is not currently apparent within any building and construction projects in South Africa. Nevertheless, this does not mean that the design ideas, approaches, and solutions which are presented by the Dutch National Programme have not been incorporated into local entities' practices or are influencing factors towards the design of buildings and other construction projects.

Additionally, the endorsement of a Green Infrastructure Council by government, stakeholders, consulting engineers, and the Development Bank of Southern Africa (DBSA) in 2012 has been viewed as a move towards the potential for an adoption of the "Building with Nature" approach and design principles currently practiced in the Netherlands. It is estimated that as with the introduction of the Green Building Council in South Africa and the corresponding shift in construction trends and practices that ensued, the development of a Green Infrastructure Council will similarly facilitate sustainable practices in infrastructure projects. Therefore, the South African "Building with Nature" market is still at an emerging stage with a potential for future growth.

In the context of the above, the extent of "Building with Nature" relates to specific "green" design principles, which are slowly being adopted as the normative approach to building. This has been influenced by the GBCSA's tools for building green which have invariably set current standards. Most of these principles and standards are similarly being incorporated into applicable legislation and as design guidelines. The Department of Housing (DoH), in collaboration with the Department of Minerals and Resources (DMR) and the Department of Energy (DoE) developed appropriate principles and guidelines for the construction of buildings (specifically housing).

Table 10 outlines the core principles and guidelines followed in building construction in the country. Although, these principles are overarching, they may be slightly modified to the conditions of different South African regions.

TABLE 9: DESIGN PRINCIPLES AND GUIDELINES TO BUILDING IN SOUTH AFRICA

PRINCIPLE	COMMENT
Economic Impact	Local procurement of products and services, use reused or recycled materials, modular and standard dimensions to minimise wastage.
Design For Climate	Taking cognisance of the region and climate zone.
Appropriate Siting	Site which accommodates the building design and requirements, taking into consideration microclimate, orientation, local topography and local ecology, natural drainage flow paths and water courses, stormwater management, green corridors and ecological buffers.
Orientation	Daytime living areas with large north/north-east facing windows to receive unobstructed winter sun.
Efficient Internal Planning	Create zones which reduce the amount of energy required for heating and cooling.
Applicable Use Of Windows	Appropriately orientated and sized windows with protection from winter heat loss and summer heat gain.
Adequate Thermal Mass	(Building materials) to stabilise indoor temperatures.
Adequate Thermal Insulation	Roofs, ceilings, walls and floors.
Draft Proofing	To limit the loss of heat. Air leakage can result in 40% of the energy lost from an existing building (31).
Cross Ventilation	For summer cooling and indoor air quality.
Energy Efficient Hot Water System	Located close to user station and thus use less water and heat generation.
Efficient Lighting	To maximise electricity efficiency.
Landscape Design	Assists in modifying the microclimate for more comfortable conditions.

DEVELOPMENT OF GREEN BUILDING MATERIALS IN SOUTH AFRICA IS FOUND MOSTLY IN THE FOLLOWING:

- **Insulation materials in response to energy efficiency building regulations.**
- **In a shift away from ceramic products.**
- **In a shift away from zinc and copper use in piping toward PVC and other plastics.**
- **In an uptake in recycled materials most notably in concrete (aggregate substitution), steel and aluminium.**

The essential and fundamental approach to Green Building in South Africa is an integrated design methodology to building with a focus on passive solar design. Passive solar design is adopted to reduce energy consumption while ensuring comfortable interiors (31). Design for comfort and energy efficiency is influenced by climatic considerations (sun's movements, the prevailing wind direction, changing temperatures and humidity levels); therefore, to achieve the best results, building design and construction materials must be suitable to the climate of a region (31).

Six climate zones exist in South Africa that influence the application of technologies and the design of buildings and that should subsequently be considered (refer to SANS 10400-XA:2011). Supplementary to passive solar design, technologies used inside a building to facilitate heating, cooling, or control contribute to the efficiency of a building (31). The effective design of a building will lead to a smaller adoption of mechanical technologies applied in buildings, and thus in most cases, financial gains.

3.10.2 Opportunities

The combination of endorsement of a Green Infrastructural Council and the huge emphasis placed by government on infrastructure spending over the next few years creates opportunities for Dutch experts of "Building with Nature" to initiate and unite with the local public sector in pilot projects. These pilot projects will provide a stimulus for the formulation of wider programmes, incentives, and regulations for the development of "Building with Nature" as a standard in South Africa. Further to the above, there are opportunities for Passive House experts particularly those who focus on the middle to high income residential market segment.

4 TENDERING FOR PROJECTS

4.1 Private Sector Tendering Process

4.2 Public Sector Procurement Process

4.3 Broad-Based Black Economic Empowerment

A tender is an offer to do work or supply goods at a fixed price. The tender or bid process in both public and private sectors is designed to ensure that future projects are directed to entities in an impartial manner. Although price is a very important factor in the decision with respect to which tender or bid to accept, it is not the only aspect taken into account. This particularly concerns the South African tender environment whereby political rapport has a vast influence.

In the construction industry, two types of tenders are generally considered, i.e. tenders by open invitation and restricted tenders either by selective invitation or pre-qualification in terms of set criteria. Prior to submitting the tender, a so-called Bidders Conference is set up which includes a site visit and tender meeting (on site). Parties involved walk through the site and point out where the work must be done, restrictions on access to and movement on site, position of on-site stores if any.

ITEMS DEALT WITH IN THE SUBSEQUENT MEETING MAY INCLUDE:

- **Explain scope of work.**
- **Alterations to documents - if any.**
- **Enquiries – questions and answers in case of alterations.**
- **Any aspect which may influence price/tender.**
- **Confirm/ highlight main aspects of tender.**

The cidb provides a number of “Best Practice Guidelines” on procurement and construction contracts (37). The website of the Master Builders Association (38) contains a very helpful section on “Contractual and Legal Frequently Asked Questions”. In addition, it should be noted that the construction industry (more so than any other) is governed by a series of comprehensive contracts. Besides the (FIDIC) Fédération Internationale des Ingénieurs Conseils and the (NEC) New Engineering Contract contracts, the principal building agreement for construction in South Africa is the so-called JBCC prepared by the Joint Building Contracts Committee Inc. that can be found on JBCC website www.jbcc.co.za

The following sections outline the tender process followed in the private and public sectors. They also provide background to the Broad-Based Black Economic Empowerment (B-BBEE) policy and Code of Good Practice that firms need to adhere to if they want to participate in the public sector procurement process. The private sector is also increasingly demanding the B-BBEE compliance from their sub-contractors as it directly affects their B-BBEE scorecards.

4.1 Private Sector Tendering Process

The private sector in South Africa is not obliged to follow a tendering procedure; therefore, the process is relatively flexible. The tender procedures for private entities may differ slightly from one to the other as they are not governed by any legislation and are subject to the tendering processes approved by businesses themselves. The private sector rarely advertises tenders in the media. In most scenarios, either specific companies are invited to tender for a certain project/study/service, or an individual company is selected disregarding a tendering process. In this instance, the companies seeking to tender for projects advertised by the private sector should directly communicate with the local engineering and consulting companies, as well as property developers and management companies or check their respective websites (see www.gbcsa.org.za/membership/member_list.php for the list of GBCSA members and industry participants).

4.2 Public Sector Procurement Process

Government in South Africa uses the public procurement process as one of the instruments to achieve its socio-economic objectives. As such, this process is governed by the legislative environment primarily through the promulgated Preferential Procurement Regulations (39) in terms of section 5 of the Preferential Procurement Policy Framework Act (PPPFA) 200 (40). These Regulations are applicable to public entities listed in Section 2 and 3 of the Public Finance Management Act (PFMA) 1999 (41), which include major public entities, national public entities, national government business enterprises, provincial public entities, and provincial government business enterprises. Government has also released detailed guidelines that outlined the approach followed in the evaluation of tenders (42).

On local government level, public procurement is government by the Local Government: Municipal Finance Management Act No. 56 of 2003 (MFMA) (43). Each municipality needs to formulate and implement the supply chain management policy, which prescribes among others the process of tendering and other competitive type bidding.

The outline of the tender procedures provided in Table 10 is applicable to tender applications for the public sector. Importantly, these processes will be similar within the private sector tendering procedure whereby entities are progressively emulating government processes.

GENERALLY, THE FOLLOWING SHOULD BE CONSIDERED:

- **Goods and services between R10 000 and R200 000 (VAT included) can be procured by municipalities through formal written quotations from a list of prospective providers of goods and qualities maintained by municipalities.**
- **Goods and services for over R200 000 (VAT included) and long-term contracts must follow a competitive bidding process.**

TABLE 10: TENDER PROCEDURES WITHIN THE SOUTH AFRICAN BUSINESS ENVIRONMENT

INVITATION TO TENDER

An invitation for tenders is made to the public by means of an advertisement in local and/or national newspapers. Public sector contracts can be identified by the following sources:

- **Follow-up contract notices published in newspapers and trade magazines.**
- **Receiving the government tender bulletin.**
- **Searching department websites.**
- **Other online tender notification systems.**

A number of websites provide information on construction tender opportunities. These include:
www.12b.co.za
www.sa-tenders.co.za
www.tendertree.co.za
sa.ask.com/Sa+Tenders+Construction
and www.cwctenders.com/construction_tenders_south_africa.htm.

REQUIREMENTS FOR THE SUBMISSION OF TENDERS

- **The tender must include applicable information substantiating the requirements as set out in the advertisement.**
- **Tender documents must be typed, printed and/ or completed in black ink.**
- **All tender documents with annexes must be signed by a properly authorised signatory of the tenderer.**
- **The tenderer must confirm that its signatory has the authority of the legal entity to sign the applicable documents by attaching a certified copy of the relevant resolution of the legal entity. Completion of the Supplier Application Form is compulsory. Failure to complete this form will disqualify a bid.**

SPECIFICATIONS AND PRICES

- **No tender will be considered unless it is accompanied by adequate or certified documentation indicating that the goods/ services offered comply with the specifications.**
- **Tenderer must indicate clearly whether prices are firm, subject to escalation or subject to a particular rate of exchange. In the absence of such information, prices will be regarded as fixed for the full duration of the contract.**
- **All prices must be quoted in South African currency and must be in accordance with VAT legislation.**

DELIVERING A TENDER

- **Completed tender documents must be submitted in a sealed envelope.**
- **Tender documents must be posted in the tender box as stipulated in the advertisement, on or before the stipulated cut-off time and date.**
- **At the delivery point, tenders are opened and respondents are allowed to join the tender opening process. All business tenders in South Africa are opened in public where the name of the company is announced with the tender prices and associated costs.**

EVALUATION PROCEDURE

- **The tender evaluation criteria and point allocation process is approved by the Tender Committee prior to advertising of the tender.**

CONTRACT AWARDED

- **If awarded the tender, the business is required to respond to the client by confirming their letter of appointment.**
- **If not awarded the project, the entity can query the reasons against their selection.**

WITHDRAWAL OF A TENDER

- **Tenders must be valid for 60 calendar days, calculated from the closing date of the tender. During this period, a tender may not be withdrawn by the applicant.**
- **If a tender accepted by the Tender Committee is withdrawn, the tenderer will be liable for the difference between his/her tender price and the price of the tender that must then be accepted.**
- **Any contract awarded on account of false information furnished by the tenderer in order to secure a tender may be cancelled at the sole discretion of the company, without prejudice to other remedies the company may have.**

4.3 Broad-Based Black Economic Empowerment

In dealing with the public sector and in often cases with the private sector, companies tendering for projects need to comply with the Broad-Based Black Economic Empowerment (B-BBEE) policy. B-BBEE is an important policy instrument aimed at broadening the economic base of the country and subsequently at stimulating further economic growth and creating employment. The Code of Good Practice that emerged in 2007 provides a standard framework for measuring Black Economic Empowerment (BEE) and requires all entities operating in South Africa to make a contribution towards BEE objectives. In 2009, the Minister of Trade and Industry also published the Construction Sector Charter as a sector code on B-BBEE that applies to contractors and enterprises in the Built Environment Professional field that include but are not limited to consulting engineering, architecture, and quantity surveying services.

In general, private companies wishing to do business with any government enterprise or organ of state (i.e. tender for business, apply for licences and concessions, enter into public-private partnerships, or buy state-owned assets) are required to apply the codes and thus obtain a B-BBEE certification. The areas which are measureable for the scorecard of the Codes of Good Practice are ownership, management, employment equity, skills development, preferential procurement, enterprise development and socio-economic development. Each of these is assigned a set of points which are used to determine the B-BEE rating. The higher number of points assures a higher B-BBEE rating.

The Broad-Based Black Economic Empowerment Act No. 53, 2003 does not contain any specific exemptions for foreign companies doing business in South Africa. Foreign companies that plan to do business with South African government will need to do so through a registered branch office or through a subsidiary. In such a case, the local branch or subsidiary will be subject to B-BBEE legislative and regulatory requirements. When dealing with South African private firms, foreign companies might also experience an increasing pressure to be B-BBEE accredited.

More information: www.bee.thedti.gov.za/ and www.cscc.org.za/index.php/documents

ALTHOUGH NO SPECIFIC EXEMPTIONS ARE AVAILABLE FOR FOREIGN COMPANIES, THE FOLLOWING SHOULD BE NOTED:

- **Enterprises with annual revenues of less than R5 million automatically count at Level 4 B-BBEE contributor.**
- **Enterprises that earn between R5 and R35 million may rate themselves using only four out of seven scorecard criteria. This means that foreign companies can still score high in B-BBEE by focusing on human resource development and employment equity, affirmative procurement and social development.**
- **Companies with annual revenue of more than R35 million per annum will be subject to all seven criteria. However, some flexibility is allowed for foreign multinational companies that do business in the country. The Codes of Good Practice acknowledges that global practices of some foreign multinational companies might prevent them from complying with the ownership element of the scorecard through the traditional sale of shares to black South Africa citizens[5]. In this case, the codes allow for "equity equivalent" contributions that then count towards the ownership element of B-BBEE. Equity equivalents are approved public programs or schemes initiated and implemented by the multinational companies, which have been approved by the Minister of Trade and Industry as entitling the multinational companies to indicative points under the ownership segment of the balanced scorecard.**

5. According to the B-BBEE Act of 2003, "black people" is a generic term which means Africans, Coloureds and Indians.

5 FUNDING SUPPORT

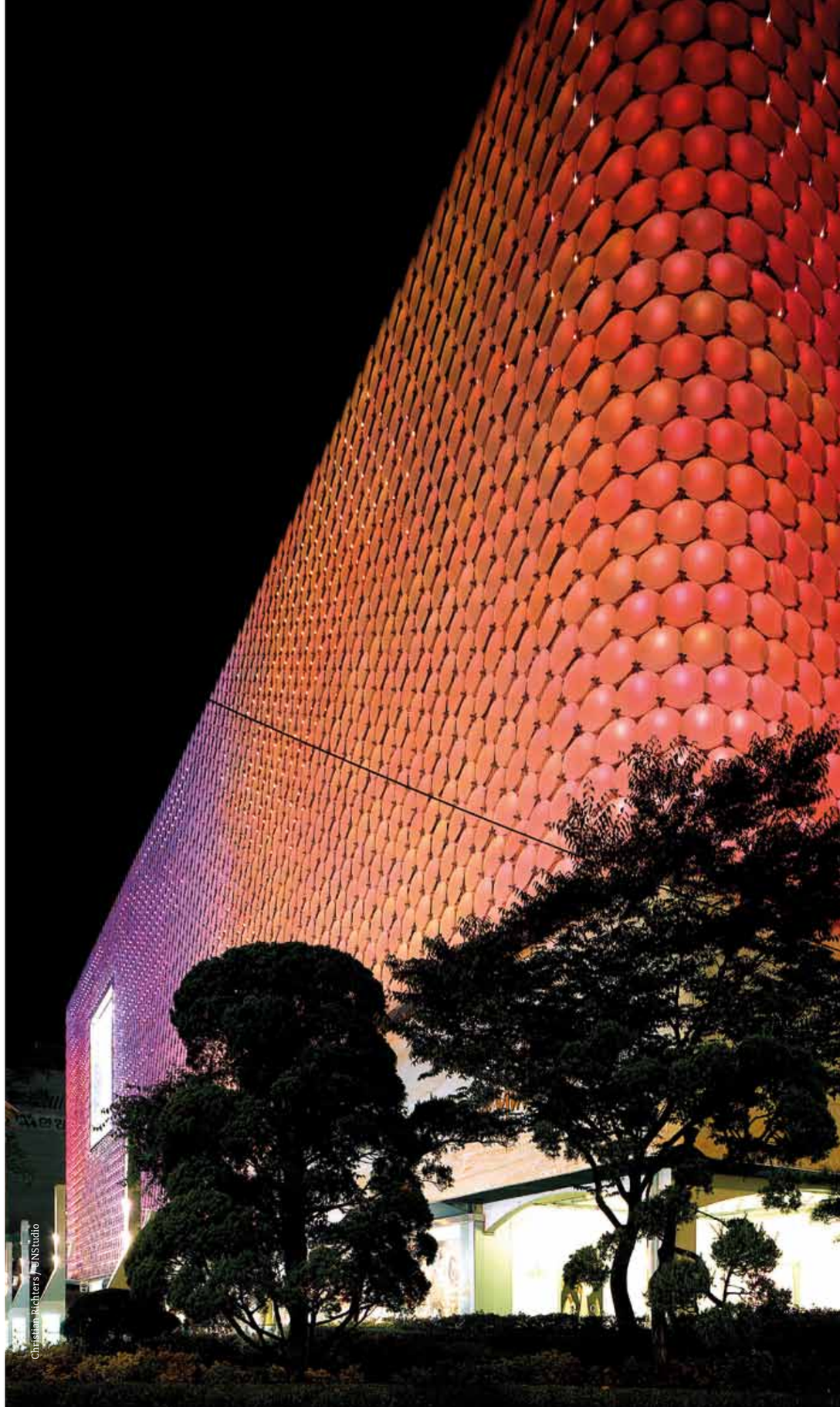
A number of funding and support programmes are provided by the South African government and various organisations. A range of these can be viewed on www.investmentincentives.co.za. The ones that are most applicable to the Green Building industry are outlined below. It should be noted though, that in most cases only South African-based entities can apply for the funds and businesses are strongly advised to check the qualifying criteria before application.

The Dutch Government also offers support to Dutch businesses interested in exploring the South African market. Detailed information can be found on the website of the Embassy in Pretoria (44) or AgencyNL in the Hague.

GREEN TECHNOLOGY AND RESOURCE EFFICIENCY IMPROVEMENT	
One of the production incentive grants offered under the Manufacturing Competitiveness Enhancement Programme (MCEP). The incentive offers a cost-sharing grant of 30%, 40% and 50% of the investment to be payable at production up to a maximum of R50-million.	T: +27 12 394 1644 TMakgothi@thedti.gov.za www.investmentincentives.co.za
KWAZULU-NATAL (KZN) GROWTH FUND	
A debt-fund, structured as a unique public-private partnership between the provincial government, and DBSA, Standard Bank and the Infrastructure Fund of South Africa.	T: +27 31 372 3720 info@kzngrowthfund.co.za www.kzngrowthfund.co.za
SA GREEN FUND	
This is a fund that seeks to support green initiatives to assist South Africa's transition to a low carbon, resource efficient and climate resilient development path delivering high impact economic, environmental and social benefits.	T: +27 11 313 5050 enquiries@sagreenfund.org.za www.sagreenfund.org.za
GREEN ENERGY EFFICIENCY FUND	
The Green Energy Efficiency Fund (GEEF) supports the introduction of energy efficiency and self-use renewable energy technologies and will ultimately continue contributing to global climate protection while supporting South Africa's economic development and growth.	T: +27 11 313 5050 geef@idc.co.za www.idc.co.za/development-funds/geef
PUBLIC PRIVATE PARTNERSHIPS	
A contract between a public sector institution/ municipality and a private party, in which the private party assumes substantial financial, technical and operational risk in the design, financing, building and operation of a project.	T: +27 12 315 5176 Bridget.Morake@treasury.gov.za www.ppp.gov.za
CENTRAL ENERGY FUND (CEF)	
The Central Energy Fund (CEF) includes financing for appropriate energy solutions to meet the future energy needs of South Africa.	T: +27 10 201 4700 Web: www.cef.org.za

6 CONCLUSION

This report provided an overview of the green building sector covering legislative environment that governs the industry and affects its growth; the current status of the industry and its expected trends; the opportunities that can be explored by Dutch companies; and the approach to tender for projects.
The key concluding remark that can be drawn from the information provided in the report is that South Africa is a ripe market for green technologies and green building practices, despite the exiting gaps in the support environment and constraining socio-economic factors. Although the industry in South Africa clearly has an established expertise in specific areas such as Green Building, greater knowledge, capabilities, and capacities will be required to support its development in the next few years. Companies that decide to capitalise on these opportunities will need to take cognisance of the local climatic conditions that are quite different to those observed in Europe, socio-economic environment, governance, and procurement practices.



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