



Market Intelligence Report

# Energy Efficiency 2014

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## List of acronyms

AC	alternating current
CFL	compact fluorescent light
DC	direct current
DoE	Department of Energy
DSWH	domestic solar water heater
DTI	Department of Trade and Industry
EEDSM	Energy Efficiency Demand-Side Management
ESCO	energy service company
HP SWH	high-pressure solar water heater
IDM	Integrated Demand-Side Management
IPP	independent power producer
LED	light emitting diode
LP SWH	low-pressure solar water heater
LSM	Living Standards Measure
MYPD	multi-year price determination
NERSA	National Energy Regulator of South Africa
NRCS	National Regulator for Compulsory Specifications
PV	photovoltaic
SA- STTP	South African Solar Thermal Technical Platform
SABS	South African Bureau of Standards
SAHSA	South African Heat Pump Suppliers Association
SESSA	Sustainable Energy Association of South Africa
SWH	solar water heater

## Executive summary

The last two to three years have been an exciting time for the clean energy sector in South Africa. We have seen the launch of the Independent Power Producer (IPP) Programmes and, as far as energy efficiency is concerned, there have been several significant developments.

In particular, the South African Bureau of Standards (SABS) has been instrumental in developing and publishing several new standards that vary from new building codes and specifying maximum energy losses to the use of solar water heaters (SWH) and non-electrical heating technologies. New standards for measuring and verifying energy efficiency schemes have been published, and some previously voluntary standards have been mandated to regulation through the National Regulator for Compulsory Standards (NRCS).

In parallel with the focus on making energy efficiency mainstream are some of the incentives and financing instruments provided by a number of institutional organisations with exposure to the industry. Eskom's Energy Efficiency Demand-Side Management (EEDSM) and Integrated Demand Management (IDM) incentives have been put on hold, and it is not certain that they will return. They may even be moved to a different entity. At the same time, the new tax incentive for implementing energy efficiency has been announced and plans by Treasury to implement a carbon tax are under development.

There have been some exciting new developments when it comes to industry association, particularly the foundation of the South African Solar Thermal Technology Platform (SA-STTP). This has set out to bring together a wide range of stakeholders

to share knowledge and information, promote awareness and bring about market transformation of the solar thermal industry.

Some of the markets under consideration have seen extraordinary growth, and some are not in good shape at all. The low-pressure solar water heater (LP SWH) sector is in dire straits after a failed attempt to change from a rebate model to a contracting or least cost tendering model. The high-pressure domestic SWH (HP DSWH) sector is in a contracting phase and undergoing rapid change. Sales peaked in 2011 with a substantial fall-off in 2012 and what appears to be a levelling-off in 2013. The sector is shedding active members which, if the sales stay constant, may mean a better outlook for the remaining competitors.

The energy saving lights sector, specifically the light emitting diode (LED) manufacturers, appear to be in a growth phase. It is not certain what impact the cancellation of the Eskom Integrated Demand Management programmes actually has on this sector. But it does seem that the local manufacturing sector has largely been excluded from these markets.

The embedded generation space is definitely looking up, with solar photovoltaics (PV) approaching price parity with Eskom retail pricing. Several large installations are underway or even complete, and these are not dependent on any subsidies or rebates. This is an indication of a sector that shows signs of promising growth.

# 1. Standards and legislation

Over the past few years, the South African Bureau of Standards (SABS), South Africa's standards authority, has helped to develop several new or improved South African National Standards (SANS) through the appropriate technical committees and stakeholders. These standards have raised the requirements for energy efficiency in the built environment and consumer products, as follows:

## 1.1. SANS 10400 – New building codes

The new SANS 10400 was published and promulgated as a national building code effective from September 2012. In particular, this standard has far reaching effects on building design as far as energy efficiency and maximum energy consumption per square metre for different types of buildings are concerned.

Part XA1 specifies maximum energy consumption for specific buildings per square metre. This sets certain minimum and maximum specifications for fenestration, roof insulation, double cavity wall construction and so on. A radical shift in design change, especially towards a more energy-efficient construction, is foreseen.

Part XA2 specifies that at least 50% by volume of the annual average hot water heating requirement shall be provided by means other than electrical resistance heating, including – but not limited to – solar heating, heat pumps, heat recovery from other systems or processes and renewable combustible fuel. In future, this will help to stimulate the market for SWH and heat pumps as the building industry recovers and the number of new house plans submitted for approval increases.

## 1.2. SANS 50010 – Measurement and verification of energy savings

The intention here is to provide a standard that offers assurance that 'actual savings should always be more than or equal to the reported savings'. The standard is designed to be used for regulatory purposes as well as by organisations that, on a voluntary basis, want to use a standardised approach to reporting their energy savings. This standard is related to the SANS 50001 energy management standard and is a voluntary standard that guides measurement and verification (M&V) processes.

## 1.3. SANS 941 – Energy efficiency for electrical and electronic apparatus

Energy efficiency refers to the volume of output produced by a unit of energy. Several areas such as heating; cooling; building design; compressor, motor, pump and lighting efficiency; improved industrial process; fuel switching and vehicle fuel efficiency present good opportunities for implementing energy efficiency. The International Energy Agency (IEA) estimates that every dollar invested in energy efficiency reduces the amount that needs to be invested in new generation capacity by two dollars.

The new energy efficiency labelling standard was published in 2013 and will be implemented in 2014. This standard applies to a wide range of electrical apparatuses, as follows: non-ducted air conditioners, heat pumps, audio and video equipment, dishwashers, electric lamps, electric ovens, refrigerators, freezers, tumble dryers, washer-dryer combinations and washing machines.

It is currently a voluntary standard, but will become regulation through the National Regulator for Compulsory Standards (NRCS) compulsory specification programme and will be published under NRCS VC 9008. This regulation will see all the appliances listed above adhering to a minimum energy performance standard. All appliances in this category will be labelled with the national/international labels.

For now, electric hot water storage tanks (geysers) will not be included in this label as the current SANS 151, which is also under review, is considered to set maximum heat loss limits for geysers. However, the challenge is that these limits are very low (D) and not in line with the minimum requirement for solar or combi geysers.

#### **1.4. Mandatory use of non-resistive electrical heating for water**

As we explain above, Part XA2 of SANS 10400 specifies a maximum level of water to be heated by electrical resistive heaters. It is foreseen that the market for SWH and heat pumps will grow substantially, in line with growth in the new housing industry as a result of the new building regulations.

This industry saw very steep growth up to 2011. More than likely, this was due to the large number of new entrants into the industry. Since 2011, there has been a steep reduction in the number of companies offering solar products, which has led to a decline in total sales. Future growth in installations because of growth in the housing market is anticipated. This will help to create a critical mass of business among the remaining players and support long-term growth in installations.

#### **1.5. Compulsory standards**

In future, domestic solar water heaters (DSWH) and electrical or solar hot water storage tanks will be subject to mandatory quality testing by the SABS. Until now, testing by the SABS was voluntary except for companies that wanted to participate in the Eskom Solar Water Heater Rebate Programme or other Demand-Side Management (DSM) Programmes. The new National Regulator for Compulsory Specifications (NRCS) regulations for SWH and geysers, NRCS VC9004 and NRCS VC9006, will make testing to the respective standards compulsory for all systems manufactured, sold or imported in South Africa. This has far reaching implications for the country's current DSHW manufacturing industry.

## 2. Incentives and financing instruments

### 2.1. Energy Efficiency Demand-Side Management (EEDSM)

Eskom has been the implementation agency for demand-side activities as a strategy to mitigate the acute shortage of generation capacity. In particular, Eskom provided subsidies or rebates to a variety of technologies and markets to reduce peak demand at specific times. The 2013 multi-year price determination (MYPD), determined by the National Energy Regulator of South Africa (NERSA), does not provide funding for any of the normal Demand-Side Management (DSM) activities that were funded by Eskom. To this extent, all DSM funding has been cancelled or stopped until further notice. This applies to Standard Product, Standard Offer, Heat Pump Subsidies, Contracting Model and ESCO Model, all sub-programmes of the energy efficiency and DSM.

NERSA appears to be signalling that Eskom is not the best institution to carry out EEDSM activities. Essentially, these activities distract Eskom from its core activities, which involve generating and selling as much electricity as it can. It is expected that in time, EEDSM activities will be moved to the Department of Energy (DOE) or a similar organisation with the right capacity and strategic focus.

### 2.2. Section 12L tax concessions

On 8 November 2013, National Treasury published Section 12L putting into operation deductions of energy efficiency savings in terms of the Income Tax Act. Section 12L provides a tax deduction calculated at 45 cents per kilowatt hour or kilowatt hour equivalent of energy efficiency savings for anyone carrying on a trade during any year of assessment ending before 1 January 2020. The DOE will be hosting a road show in 2014 to provide clarity on how this will work.

### 2.3. Carbon tax on emissions

The proposed carbon tax legislation is still under development and is unlikely to be implemented in the next year. It is foreseen that when the carbon tax is implemented, it will encourage more energy conscious behaviour. Whether this will happen at the consumer's expense needs to be determined when the legislation is in final draft form.

### 2.4. Accelerated depreciation

The Accelerated Depreciation Programme allows a business to depreciate any qualifying asset over a three-year period at a rate of 50:30:20 rather than the normal five years or longer. How the new 12L tax deduction and the depreciation will affect each other on the income sheet and the viability of certain projects remains to be seen.

## **3. Industry bodies and associations**

### **3.1. The Sustainable Energy Association of South Africa (SESSA)**

SESSA is a long-established industry association representing the thermal solar industry. Although it attempted to represent the photovoltaic (PV) and wind sectors, it was not able to make any inroads here.

The chairman and ombudsman of the SWH chapter resigned during 2013 and no replacements had been appointed by January 2014.

SESSA membership is a requirement for participation in the HP SWH industry or rebate programme. SESSA membership was not a requirement for the Heat Pump or LP SWH or Standard Product Programme (SPP) when these schemes were cancelled.

### **3.2. South African Solar Thermal Technology Platform (SA-STTP)**

SA-STTP was launched on 17 May 2013 in Pretoria as part of the SOLTRAIN 2 programme. This initiative brings together a wide range of stakeholders including academia, research institutions, industry, government and all other interested parties to work towards knowledge sharing and promotion of all aspects of the solar thermal industry in South Africa. It provides a neutral platform for discussion and transparent decision making that includes all stakeholders and is open to anyone who is interested.

The platform was also formed to compile, through a consultative and inclusive process, a mutually agreed upon road map document that would help to give a unified voice to promoting solar thermal technologies, raising awareness of these technologies and pooling resources.

### **3.3. South African Heat Pump Suppliers Association (SAHSA)**

SAHSA is a new initiative formed by a collective body of thermal heat pump suppliers to promote their industry and give it a voice. Its members were previously supported and/or represented by SESSA, but they decided to form a new association that will better represent their needs.

## 4. Market updates

### 4.1. DSWH industry

The DSWH industry is in a consolidation phase, with many companies deciding either to exit or change their markets. Several interviews with industry players in late 2013 have confirmed that many companies have either exited already or are considering other more lucrative areas of the renewable energy sector. This is supported by an analysis of the number of brands and systems on offer over the period of review. Figure 5 shows the growth and decline of different brands and systems.

The industry has seen dramatic changes in the competitive landscape and while there is still growth in the industry, it is slow. At present, the solar water heating rebate is still in place for high-pressure installations but heat pumps are no longer subsidised for either domestic or industrial applications. The low-pressure market is virtually extinct with no clear policy or strategy from Eskom or the DoE.

#### 4.1.1. LP SWH market

The subsidy for LP SWHs was also cancelled at the beginning of 2013 in favour of a contracting or least cost tender approach. This tender was originally issued in March 2013 and had to be re-issued due to problems in the wording of the first version. The submission deadline for the second tender was 14 June 2013. The tender was officially cancelled in November 2013. It was subject to products having local content in line with the designation of SWH by the DTI and definition of local content in SATS 1286:2012. None of the systems proposed in the tender submissions were found to be acceptable as they did not comply with the stipulated requirement of 70% local content on the collector or storage tank.

This presents a problem because the current standard for SWH (SANS1307:2012) is a system testing standard and the designation is a component-based definition. Considering that most low-pressure systems are integrated systems, a new approach for low-pressure solar system localisation tests will have to be found.

#### 4.1.2. HP SWH market

As mentioned, the HP SWH industry is in a state of flux and seeing slow but deliberate consolidation. The number of players rose from less than 50 in 2003 to over 700 in 2011, rapidly declining to approximately 400 in 2013. As the official industry association, SESSA is not able to confirm the number of paid-up members on its roll.

By the end of the second quarter of 2013, a total of 52 013 HP SWH units had been installed on the Eskom Solar Water Heater Rebate Programme. Over time, this would represent approximately 90% of all installations of high-pressure domestic solar water heaters (HP DSWH) in South Africa during the peak of the Eskom rebate programme.

It must be noted that in 2008-2009, only some of the known players in the market were represented. Therefore, a large number of the installations by non-participating solar installers were not included in the data. Some manufacturers and installers have chosen not to participate in the Eskom programme and one notable local manufacturer with national presence was blocked from participating.

Before Eskom Solar Water Heater Rebate Programme, the industry installed approximately 16 000 systems per year. During this time, before 2010, the low-pressure market segment was virtually non-existent except for a few farm installations, especially in the Western Cape.

A discussion of the industry performance follows below. These statistics are derived from the official Eskom rebate payment statistics that have been carefully cleaned up to reveal as much industry knowledge as possible without revealing any sensitive or personal data.

The City of Cape Town successfully launched its solar water heating programme towards the end of 2013. The programme targets the installation of approximately 150 000 HP DSWH. Launching the programme has been a long process working through a tight regulatory environment. The City has identified the key barriers to uptake of HP SWH as lack of financing and lack of credibility among the installers. These are two issues the City aims to address through this programme.

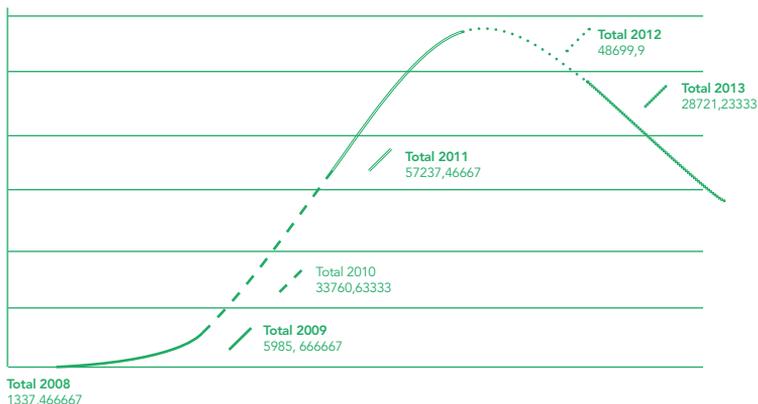
### 4.1.2.1. Industry performance overall

The domestic SWH industry has seen substantial if erratic growth since 1975. These two graphs show the industry's performance per square metre:

**Figure 1: Total aread of glazed SWHs supplied (m<sup>2</sup>) per year**



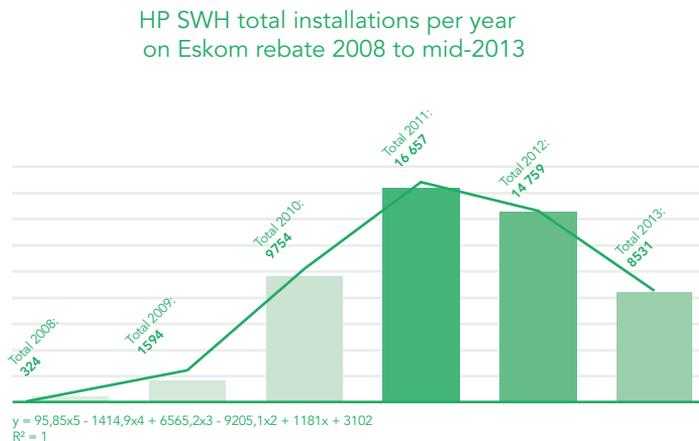
**Figure 2: Annual Installations of glazed domestic SWHs (m<sup>2</sup>) on Eskom Rebate: 2008 – mid 2013**



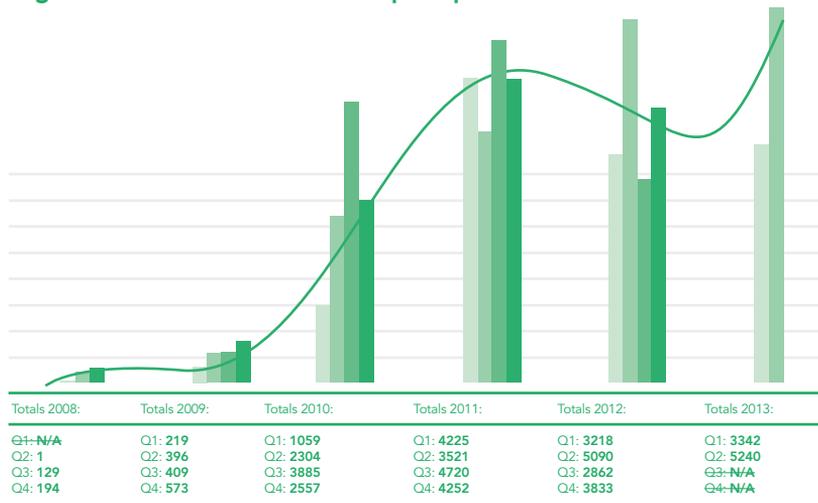
The data in Figure 2 represent annual installations by square metre of HP DSWH on the Eskom rebate scheme, which has accounted for most DSWH installations since 2009. There is a substantial discrepancy between the 2008/2009 figures for the two data sets. More than likely, this is because the data in Figure 1 are extrapolated from a survey with estimated future installations while the data in Figure 2 are from actual recorded installations on the subsidy programme.

It must also be noted that in 2008, not all SWH companies were participating in the Eskom rebate and the surface area in Figure 2 is derived from a deemed size of 1 m<sup>2</sup> per 60 ℓ of geyser capacity. Not all collectors are flat plate and not all systems are sized at 1 m<sup>2</sup> per 60 ℓ. It is interesting to note that for the majority of the rebate programme, installations surpassed historic levels, but installations tapered off from 2012, showing a definite contraction in the industry to a point where the annual installations for 2013 are almost the same as 2005.

**Figure 3: Total installations per year on Eskom rebate**



**Figure 4: Total installations per quarter on Eskom rebate**

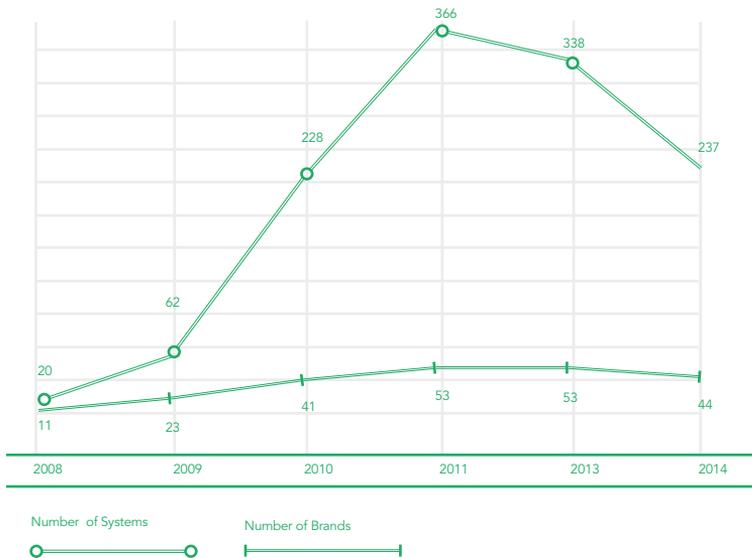


The Eskom Solar Water Heater Rebate Programme started in February 2008. The rebate's performance and uptake by consumers was slack until mid-2010, when the value of the subsidies was nearly doubled. The near-100% growth in installations at the start of the second quarter 2010 is evidence that the consumers who did install SWH made use of the sudden increase in the subsidy value.

At the time, rumour was rife that the subsidy, and particularly the increased subsidy, would be short-lived. This resulted in a steep and unsustainable increase in installations. Installations on the programme peaked in the first half of 2011 and subsequently dropped-off until a late rise in 2013. This rise could be the result of several factors including, among others, sustained electricity price increases.

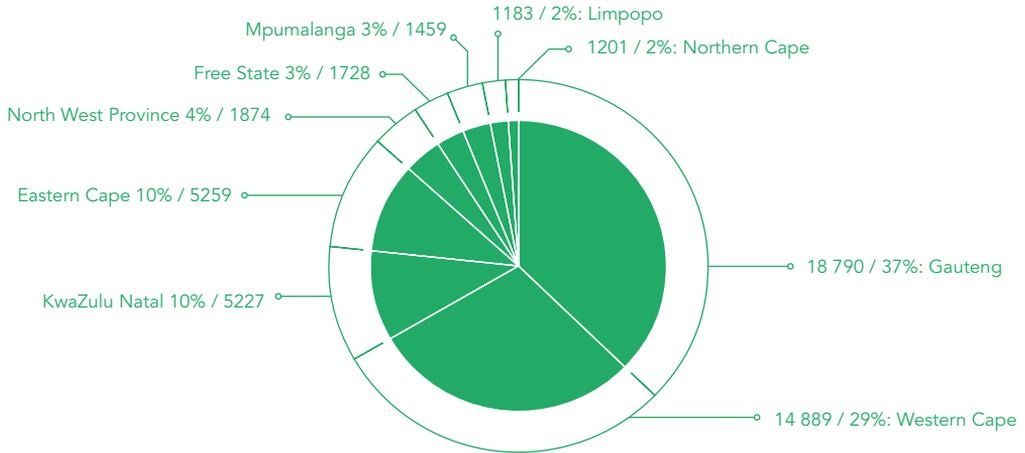
It should be noted that these data only run until June 2013, when there was a general expectation of another double-digit electricity price increase. The total number of installations in 2012 was just over 14 500 units with 8 500 units in the first two quarters of 2013. It would be interesting to see whether the second two quarters sustained this increase to show a total industry recovery.

**Figure 5: Rise and fall of brands and systems available on the Eskom rebate: 2008 – Mid-2013**



Notable changes in the industry since the launch of the Eskom Solar Water Heater Rebate Programme include the sudden increase in the number of companies importing systems, the number of brands on offer; and the number of resellers that have become active in the industry since 2008, especially between 2008 and 2011. Of particular interest is the near-80% increase in suppliers of different systems and the near-200% increase of the number of different systems available in these three years. This rise compared to a 71% increase in sales from 2010 to 2011. It indicates that the number of competitors and systems grew at a faster pace than the number of installations and could help to explain the sudden drop-off in sales and systems from 2011.

**Figure 6: Installations by province on Eskom rebate**



Gauteng leads the Western Cape in installations by approximately **26%** with a total of just under **19 000** installations since **2008**.

**Figure 7: Regional market share over time on Eskom rebate by percentage**



It is interesting to note that installations in KwaZulu-Natal have tapered off significantly since 2008. But it must also be noted that the 2008 base was very small. KwaZulu-Natal remains in the top four installing provinces. The Western Cape saw substantial growth in 2009 and 2010, with a notable drop-off since 2011. While the Eastern Cape, North West and Free State's share of the market is quite small, these three regions did not see such a steep drop in installations as the two big provinces.

Figure 7 represents the growth or decline in installations per province over the rebate period. Initially, Limpopo, Northern Cape and Mpumalanga saw slow uptake and growth and then a fall-off after 2012. This was more evident in Limpopo and Northern Cape than Mpumalanga, which showed a more gradual decline after 2012.

The fact that the Free State and North West had a slow start but have shown continuous growth in the last five years is significant. Both provinces picked up significantly after 2012. The Eastern Cape, while representing a substantially bigger share, follows the trend with a fall-off after 2012, although at a very gradual rate. KwaZulu-Natal, which has seen a constant decline in installations since the beginning, is now being trumped by the Eastern Cape. Both Nelson Mandela Bay and Ethikweni municipalities have had a SWH programme running for at least two years, although their impact is not visible in the regional performance.

The Western Cape had steep growth till 2010 with a marked drop-off since then and a very slight recovery in 2013. Gauteng, by contrast, recorded a sharp drop-off from 2008. This would indicate that a large number of the installations in 2008 were due to consumers holding off on installing SWH till the implementation of the rebate programme. The region then grew until 2011, with a steep decline until 2012 and a slight recovery in 2013.

**Figure 8: Individual provincial growth in installations on Eskom rebate by percentage**



### 4.1.2.3. Industry performance by system size



**Figure 9: Installations by tank size on Eskom rebate**

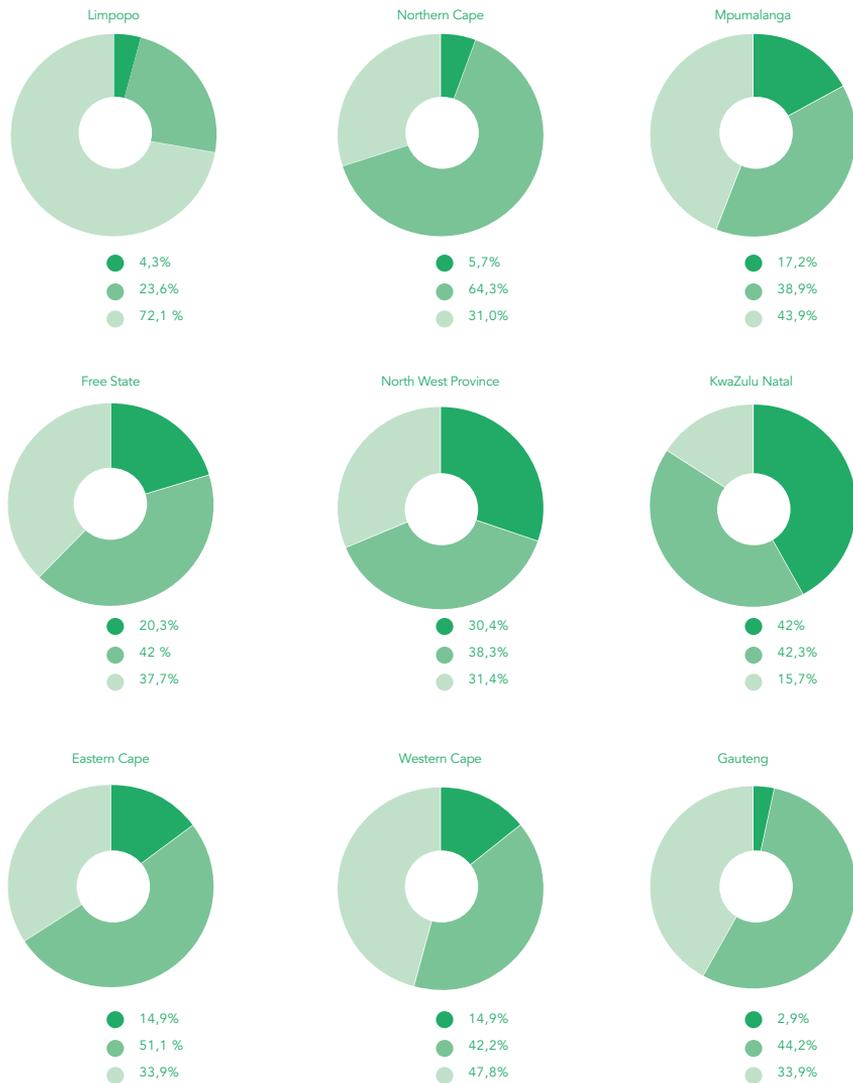
When it comes to the relative market share of different system sizes, it is clear that at the start of the subsidy programme, 300 l systems were far more popular than the smaller sizes, especially 150 l systems. This changed significantly in year two with 150 l systems continuously growing in popularity. It appears that people with a higher Living Standards Measure (LSM) who were ready to install at the beginning held back for the subsidy announcement. This means that they would probably have installed without a subsidy but with a subsidy looming, they held back until it was introduced, effectively distorting the market in the hope of a future subsidy.

The fact that installations of 150 l systems kept growing without a decline at any point indicates that the market for SWH is shifting from an affluent market to a middle-class market. This could be a positive signal for the industry as it shows a more stable, continuous demand for a reduction in the cost of household energy compared to high LSM individuals targeting high subsidies

**Figure 10: Installations by tank size per province on Eskom rebate**

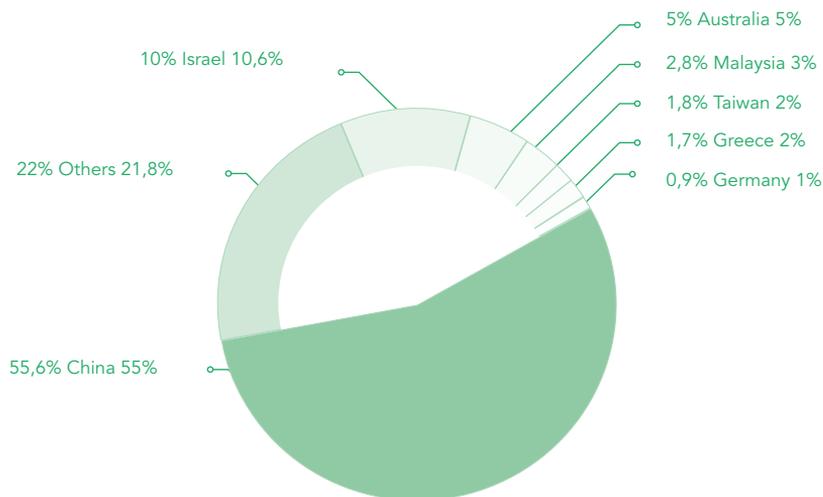
Key to Tank Sizes

● 300ℓ + ● 200 – 299ℓ ● 150 – 199ℓ



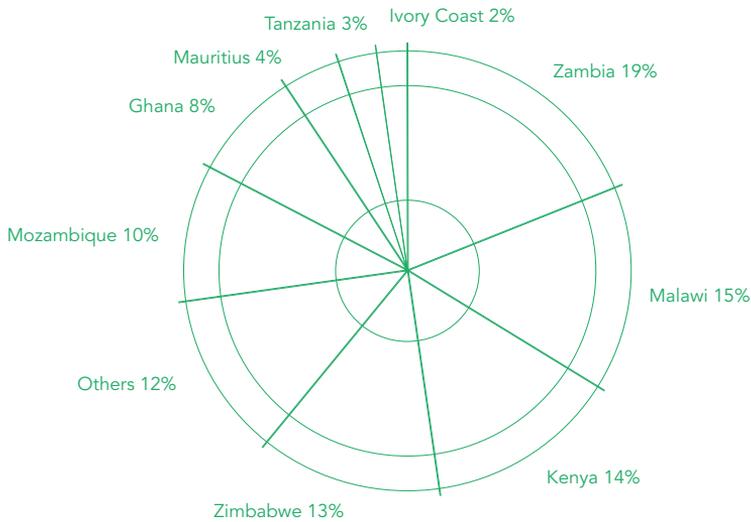
When considering tank size per province, it is interesting to note that 300ℓ systems are considerably more popular in KwaZulu-Natal and the North West than any other regions. By contrast, the Western Cape – the region with the second highest number of installations and a fairly high average LSM – has a very small penetration of 300 ℓ systems.

**Figure 11: Imports of SWH 2007 to 2013**  
**Imports of SWH to South Africa by Country 2007 – 2013**



The Department of Trade and Industry (DTI) provided data on the import and export of SWH for the period 2007 to 2013. Figure 11 shows the countries of origin of different systems. These are, however, a mix of high- and low-pressure systems. From the DTI data, it is clear that most imported SWH come from China. The data do not specify system size or unit numbers. They report the value of imports or exports in rand and container mass. From this, a system count is derived based on a weight estimate. The total SWH imports for the period are reported to be valued at R91,1 million, with an estimate of 77 510 units. This number seems very low considering that more than 200 000 low-pressure units were installed during this time. There are only three local manufacturers of low-pressure systems with a very small share of the market.

**Figure 12: Exports of SWH 2007 to 2013**



With a value of just R4,2 million, SWH exports from South Africa are very low and go primarily to destinations in the Southern African Development Community (SADC) or elsewhere in Africa. In this data, there is a 12% 'other' category, which according to the DTI includes destinations such as Algeria, Antilles, Congo, Ivory Coast, Kenya, Madagascar, Mali, Reunion, Seychelles, Somalia, Nigeria and Uganda.

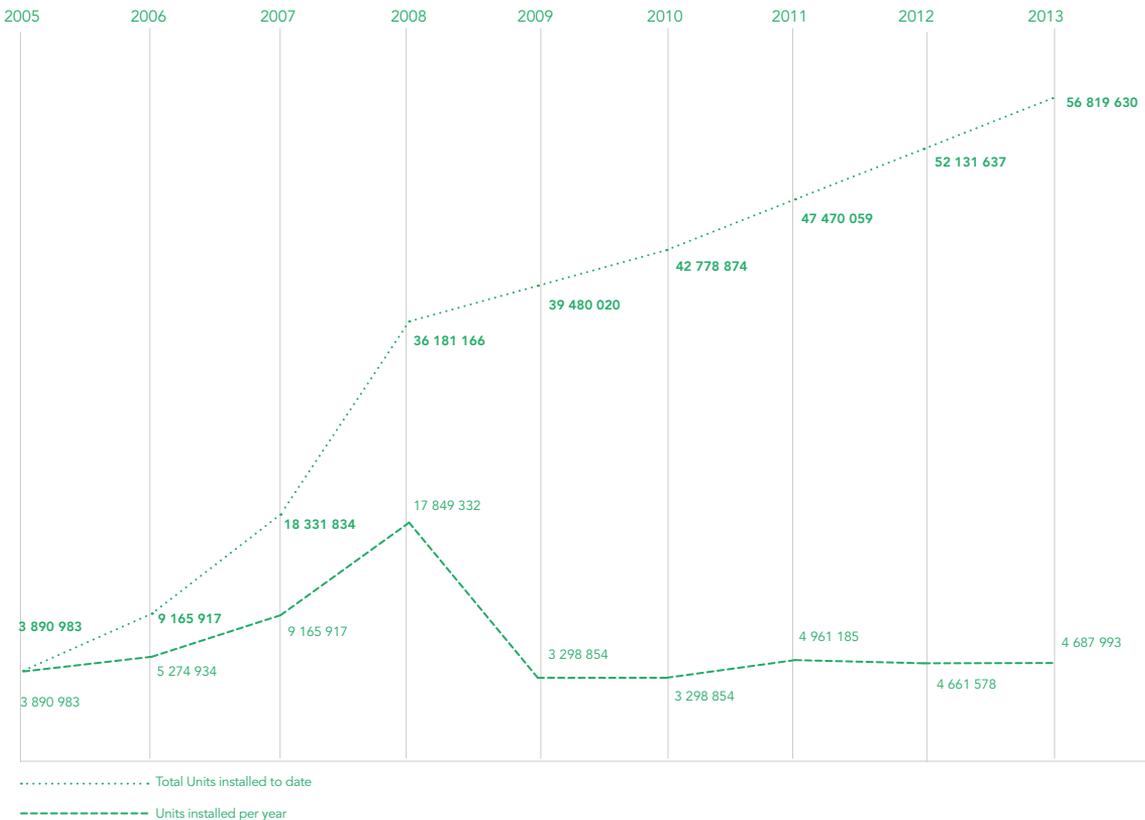
SADC and other African destinations are the only countries that do not require compliance to international standards. Other potential export markets – such as South Africa's BRICS partners, Europe and the USA – are closed to local manufacturers. This is because these markets require testing to the Solar Keymark or ISO standards and no local manufacturers have the required international test certificates. The local standards for testing SWH do not align with international standards and they are not acceptable to international customers. This is an issue that could be addressed in future by adopting acceptable international standards.

## 4.2. Energy-saving lights

Up to 95% of the energy emitted by incandescent bulbs is in the form of heat while only 5% is light, making these bulbs inherently inefficient. In addition, incandescent lights only last around 1 000 hours. This means they have a significantly shorter lifespan than energy-saving lamps such as compact fluorescent lights (CFL), which can last up to 12 000 hours; or LEDs, which can last up to 50 000 hours. The DOE reported at COP 17 that incandescent bulbs will be phased out in South Africa from 2016. To date, there is no clarity about the status of this initiative.

Eskom reported that it has replaced 56,8 million CFLs since 2005. This number only represents the domestic mass roll out, excluding any retail sales or other programmes. It indicates a rough estimate of a minimum replacement market of approximately 7 million globes per annum. Of note is the sharp drop in installations in 2008-2009 and the slow recovery after that. This actually indicates a real market minimum of closer to 4,5 million lights per year.

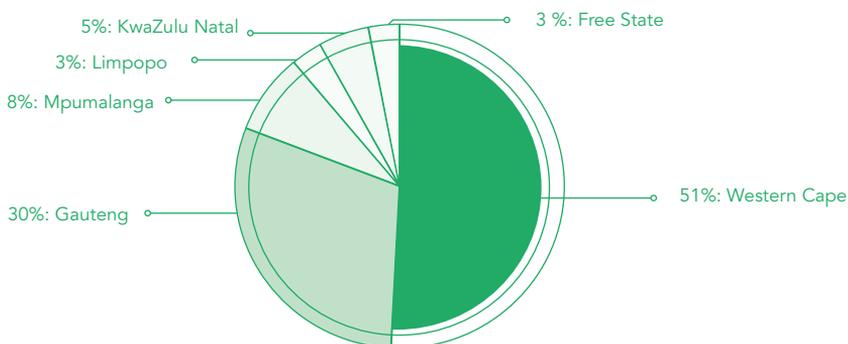
**Figure 13: installations of CFL lights since 2005**



LED technology is known as a disruptive technology because it has completely changed the nature of competition in its markets. The traditional luminaire manufacturing industry value-chain-model is no longer valid. A small light emitting diode (LED) manufacturer is now able to take over functions that were previously the exclusive domain of large, heavily capitalised industries. This leaves some former industry leaders wondering what their role is now or how their business model needs to adapt.

The Western Cape has a rich and diverse LED manufacturing sector with more than eight manufacturing entities that currently produce a variety of components – from controllers and luminaires to complete fittings. To date, and to the best of our knowledge, the Western Cape has the highest number of businesses manufacturing complete or partial luminaires for a variety of applications and industries. These businesses include SixtLED, LED Lighting SA, LedZshine, Caelus, and Ledwise and MarulaLED.

**Figure 14: Regional distribution of private PV installations**



### 4.3. Embedded generation

Embedded or distributed generation is any form of generation which is intended to operate while electrically connected to the distribution network for extended periods. Generation sources, such as fuel cells and photovoltaics (PV) installations, generate direct current (DC) electricity. Therefore, they need to be connected to the distribution network via an inverter. The inverter converts the DC-generated output to alternating current (AC) so that the generated energy can be exported into the network.

2013 was a year of exciting developments in embedded or self-generation, specifically PV technology. There are currently 6,75 Mw-worth of installations approved, in progress or recently completed in the Western Cape. One of these projects is the 600 Kw installation at Black River Park, Cape Town, which will soon be upgraded to over 1,2 Mw. Another, at the Ceres Fruit Growers facility, has an intended capacity of over 1 Mw.

There is a significant number of energy service companies (ESCO) that specialise in the development and design of medium-sized, non-independent power producer (IPP)-scale solar systems in the Western Cape accounting for the large 51% share of private installations.

GreenCape has launched the Smart Grids Work Group that is specifically looking at ways to unblock the legislative and institutional bottlenecks to developing a private self-generation sector.