Market Intelligence Report: Energy Efficiency

greencape

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Table of Acronyms

AC	Alternating Current
CFL	Compact Fluorescent Light
DC	Direct Current
DSWH	Domestic Solar Water Heater
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
MYPD	Multi Year Price Determination
NRCS	National Regulator for Compulsory Specifications
PV	Photo Voltaic
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 has been an exciting time for the clean energy sector in South Africa. We have seen the launch of the Independent Power Producer programmes and in the energy efficiency space there has been several developments to keep an eye on.

In particular the South African Bureau of Standards have been instrumental in the development and publications of several new standards that vary from new building codes to specifying maximum energy losses or specification of the use of Solar water heaters and non-electrical heating technologies. New standards for measuring and verification of energy efficiency schemes have been published and some previously voluntary standards have been mandated to regulation through the National Regulator for Compulsory Standards.

Concomitant with the focus and activities to make energy efficiency mainstream are some of the incentives & financing instruments provided by a number of institutional organisations with exposure to the industry. The Eskom Energy Efficiency Demand Side Management & Integrated Demand Management incentives have all been put on hold and whether they will return is unsure. It may even move to a different entity. At the same time the new Tax incentive for implementing energy efficiency was announced and plans by treasury to implement a carbon tax is still under development.

There have been some exciting new developments in the industry association space and particularly the foundation of the South African Solar Thermal Technology Platform that has set out to bring together a wide range of stakeholders to share knowledge and information, to promote awareness and to bring about market transformation of the solar thermal industry.

Some of the markets we are looking at have seen fantastic growth and some are not in a good space at all. The low pressure solar water heater 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 Solar Water Heater sector is in a contracting phase and undergoing rapid change. Sales have peaked in 2011 with a substantial fall off in 2012 and what appears to be levelling off in 2013. The sector is shedding active members which if the sales stay constant may mean better outlook for the remaining competitors.

The energy saving lights sector and specifically the Light Emitting Diode manufacturers appears to be in a growth phase. It is not sure what impact the cancellation of the Eskom Integrated Demand Management programs actually have 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 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

The standards authority in SA is the South African Bureau of Standards (SABS). The SABS, through the appropriate technical committees and stakeholders, have over the past few years assisted in the development of several new or improved standards, raising the requirements for energy efficiency in both the built environment and consumer products.

1.1. SANS 10400 - New building codes

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

Part XA1 specifies maximum energy consumption for specific buildings per square meter. This sets certain minimum and maximum specifications for fenestration, roof insulation, double cavity wall construction etc. It is foreseen that this will see a radical shift in design change especially towards a more energy efficient construction.

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. This will in future help stimulate the market for solar water heaters and heat pumps as the building industry recovers and the number of new house plans submitted for approval increase.

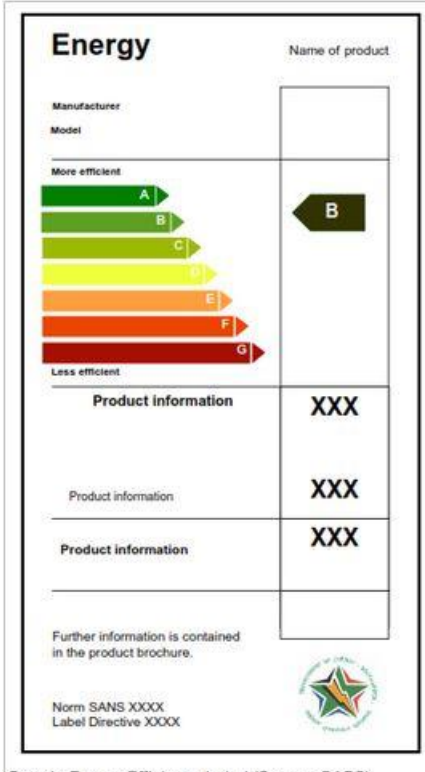
1.2. SANS 50010 – Measurement and verification of energy savings

The intention is to provide a standard that provides assurance that "actual savings should always be more than or equal to the reported savings". The standard has been 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 needed 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 apparatus being non-ducted air



Sample Energy Efficiency Label (Source: SABS)

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. This standard will become regulation through the NRCS compulsory specification programme and will be published under (NRCS VC 9008). This regulation will see all appliances listed above adhering to a minimum energy performance standard and all appliances in this category will be labelled with the national / international labels. At this time electric hot water storage tanks (Geysers) will not be included in this label as it is considered that the current SANS 151 that is also being reviewed sets maximum heat loss limits for geysers. The challenge however 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 mentioned 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 solar water heaters 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 has seen very steep growth up to 2011 and this is more than likely due to the large number of new entrants in the industry. Since 2011 there has been an attrition of companies offering solar products and concomitant decline in total sales. It is anticipated that future growth in installations due to growth in the housing market will help bring critical mass to the remaining players to support long term growth in installations.

1.5. Compulsory standards

Both Domestic Solar Water Heaters (DSWH) and Electrical or solar hot water storage tanks will in future 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 SWH or other DSM programs. The new 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 SA. This has far reaching implications for the current DSHW manufacturing industry in South Africa.

2. INCENTIVES & FINANCING INSTRUMENTS

2.1. Demand Side Management (EEDSM)

Eskom has been the implementation agency for demand side activities as a mitigation strategy to 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) as determined by NERSA, does not provide funding for any of the normal DSM activities that was funded by Eskom. To this extent all DSM funding has been cancelled or stopped till further notice. This includes Standard Product, Standard Offer, Heat pump subsidies, contracting model and ESCO model.

It is appears to be the signalling from NERSA that Eskom is not the best institution to house EEDSM activities. This is in essence counterproductive to their focus on generating and selling as much electricity as they can. It is expected that the EEDSM activities will in time be moved to the DOE or a similar organisation that has the 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 any person that is 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 will likely not be implemented in the next year. It is foreseen that when the Carbon Tax is implemented it will drive deeper energy conscious behaviour. Whether this will be at the expense of the consumer needs to be determined when the legislation is in final draft form.

2.4. Accelerated depreciation

The accelerated depreciation program allows a business to depreciate any qualifying asset over a three year period at a rate of 50:30:20 rather than the normal 5 years or longer. It is to be seen how the new 12L tax deduction and the depreciation will affect each other on the income sheet and viability of certain projects.

3. INDUSTRY BODIES AND ASSOCIATIONS

3.1.1. (SESSA) The Sustainable Energy Association of South Africa

SESSA has long been the industry association representing the thermal solar industry. While it attempted to represent PV and wind it was not able to make any inroads in those sectors. Both the Chairman and ombudsman of the SWH chapter have resigned during 2013 and to date in January 2014 no replacements have been appointed. SESSA membership is a requirement to participate in the HP SWH industry or rebate program. At the time of cancelling the programmes it was not a requirement for Heat Pump or Low Pressure SWH or SPP programmes.

3.1.2. (SA-STTP) South African Solar Thermal Technology Platform

The STTP was launched on 17 May 2013 in Pretoria as part of the SOLTRAIN 2 programme. This initiative brings together 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 South African Solar Thermal Technology Platform is a forum that brings together a wide range of stakeholders to share knowledge and information and discuss: awareness raising; market transformation; research & development and compile, through a consultative and inclusive process, a mutually agreed upon road map document, in order to have a unified voice to:

- promote solar thermal technologies;
- raise awareness of these technologies;
- and pool resources

3.1.3. (SAHSA) South African Heat Pump Suppliers Association.

The heat pump suppliers association is a new initiative formed by a collective body of suppliers of thermal heat pumps to promote their industry and provide a voice. These members were previously supported / represented by SESSA but have decided to form a new association that will better represent their needs.

4. MARKET UPDATES

4.1. DSWH Industry

The Domestic Solar Water Heating (DSWH) industry is in a consolidation phase with many companies deciding to either exit or change their markets. Several interviews with industry players in late 2013 has confirmed that many companies have either already exited 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 remains growth in the industry it is slow. At this time 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 near extinct with no clear policy or strategy from Eskom or the DOE.

4.1.1. Low Pressure Solar water heater market

The subsidy for low pressure solar water heaters has also been 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. The tender was subject to products being of local content per the designation of solar water heaters by the DTI and definition of local content in SATS 1286:2012. It was found that none of the systems proposed in the tender submissions were acceptable thus did not adhere to the stipulated requirement of 70% local content on collector or storage tank. This in itself is a problem as the current standard for solar water heaters 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. High Pressure Solar water heater market

As mentioned before, the high pressure solar water heater industry is in a state of flux and seeing slow but deliberate consolidation. The number of role players went from less than 50 in 2003 to over 700 in 2011 and rapidly declining to approximately 400 in 2013. SESSA as the official industry association is not able to confirm the number of paid up members are on the roll.

Till the end of the second quarter of 2013 a total of 52,013 units have been installed on the Eskom HP subsidy. Over time, this would represent approximately 90% of all installations of HPDSWH in SA during the peak of the Eskom rebate program. It must be noted that in ’08 / ’09 only some of the known players in the market was represented and thus a large number of the installations by non-participating solar installers were not included in the dataset. Some of the erstwhile manufacturers and installers have chosen not to participate in the Eskom program and one notable local manufacturer with national presence was blocked from participating. Prior to this programme the industry installed approximately 16,000 systems per year. At this time (prior to 2010) the LP market segment was near non-existent but for a few farm installations esp. in the Western Cape. In the sections below a discussion of the industry performance follows. 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 has successfully launched their solar water heating program towards the end of 2013. The program targets the installation of approximately 150,000 HP DSWH. It has been a long process working through a tight regulatory environment. It is reported by the City that the key barriers to uptake of HP SWH are identified as lack of financing, and lack of credibility of the installers. These are two aspects the city aims to address through this program.

4.1.2.1. Industry performance overall

The domestic SWH industry has seen substantial albeit erratic growth since 1975. In the following 2 graphs performance of the industry per square meter from 1975 to mid-2013 is depicted.

Total area of glazed SWHs supplied (m2) 1975 to 2008

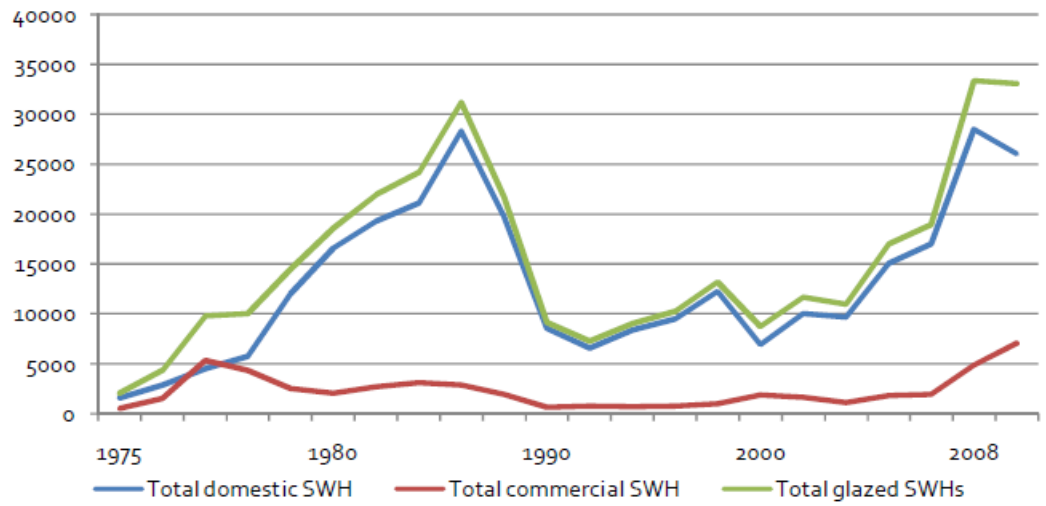


Figure 1: Historic installations per sqm; Source: Eskom industry survey 2009

The data in figure 1 represents estimated installations derived from an industry survey commissioned by Eskom in 2009.

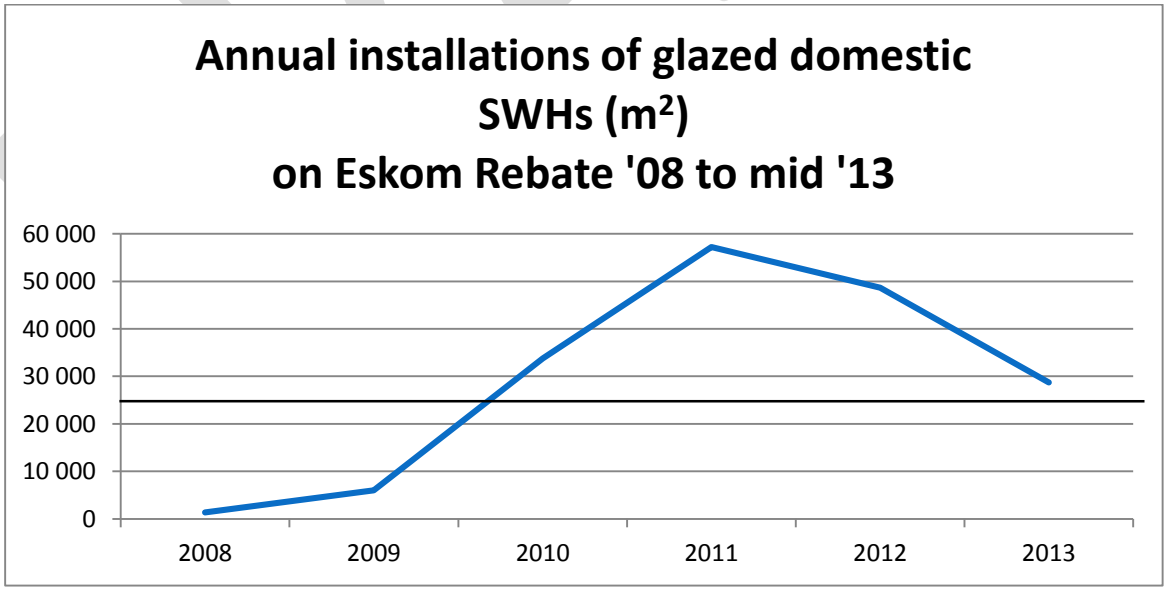


Figure 2: Collector surface area installed on Eskom rebate

The data in figure 2 represents annual installations by sqm of High pressure DSWH on the Eskom rebate scheme which accounts for the bulk of DSWH installations since 2009. There is a substantial discrepancy between the 2008 / 2009 figures for the 2 data sets, which is more than likely because the data in figure 1 is extrapolated from a survey with estimated future installation and the data in figure 2 is from actual recorded installations on the subsidy program. 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 1m^2 per 60L of geyser capacity. Not all collectors are flat plate and not all systems are sized at 1m^2 per 60L. It is of interest to note that for the majority of the rebate programme installations has surpassed historic levels but installations are tapering off from 2012 showing a definite contraction in the industry to a point where the annual installations for 2013 is almost the same as that of 2005.

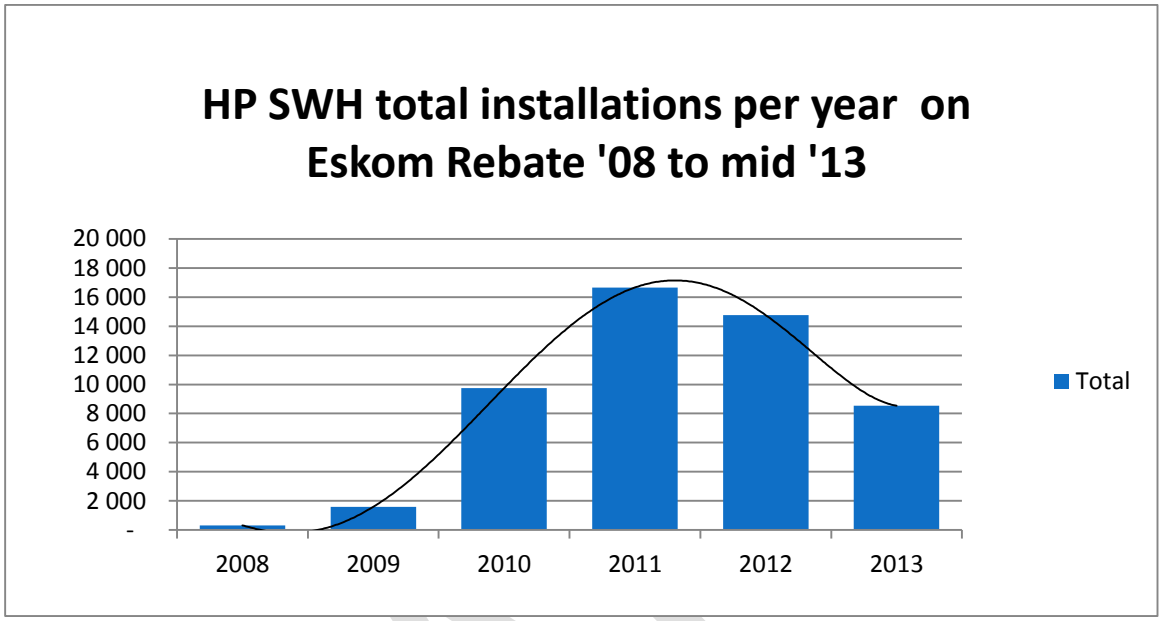


Figure 3: Total installations per year on Eskom rebate

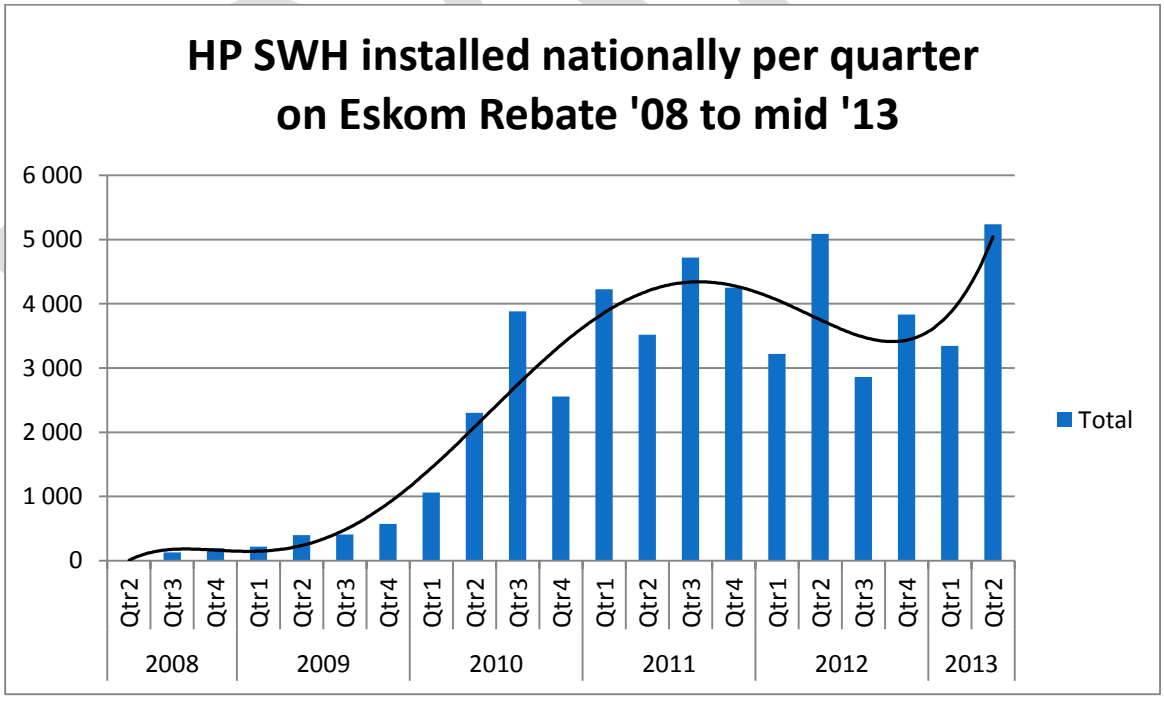


Figure 4: Total installations per quarter on Eskom rebate

The rebate program kicked off in Feb ’08. Performance of the rebate and uptake by consumers has been slack until mid ’10 when the value of the subsidies was nearly doubled. Clear indication of the near 100% growth in installations at the start of the second quarter of 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 un-sustained increase in installations. Installations on the program peaked in the first half of 2011 and have since dropped off till a late rise in 2013. This rise could be the result of several factors, amongst others sustained increase in electricity prices. It should be noted that this data only runs till June '13 when the general expectation was that of another double digit electricity price increase. Total installation for 2012 was just over 14 500 units and the first two quarters of 2013 represent 8 500 units. It would be of interest to see whether the second 2 quarters sustained the increase to show a total industry recovery.

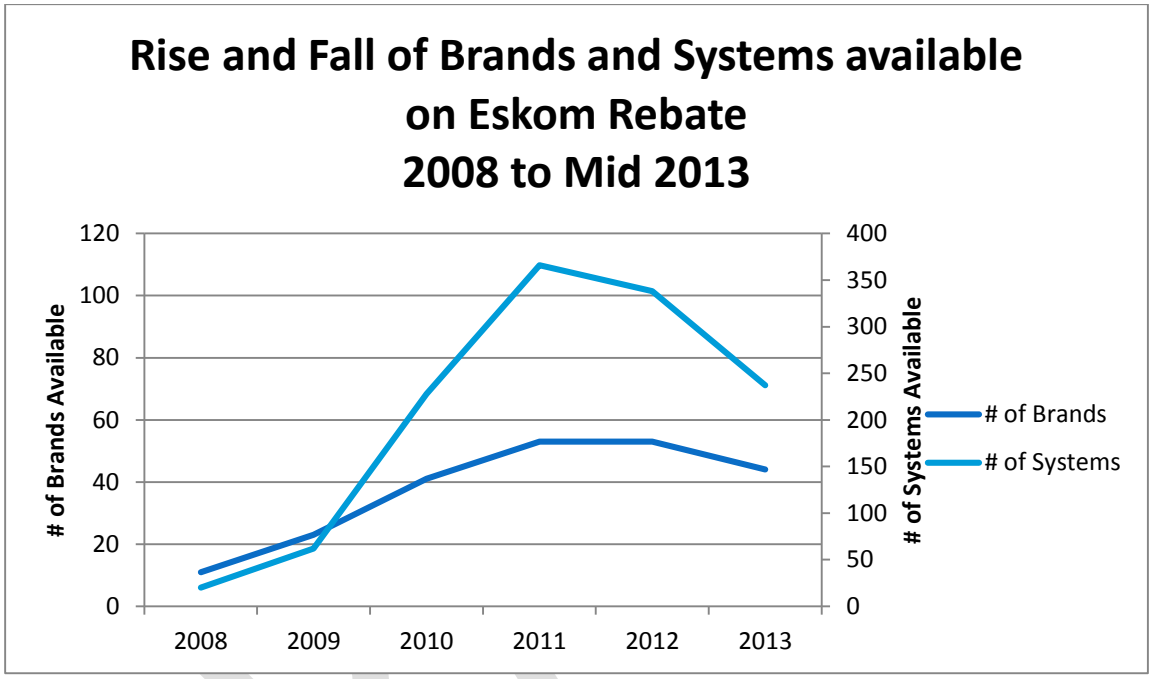


Figure 5: Rise and Fall of systems Registered on Eskom Rebate

A notable change in the industry since inception of the subsidy program is the sudden increase in number of companies importing systems, numbers of brands on offer, and the number of resellers that became active in the industry since 2008, especially in the period 2008 to 2011. Of particular interest is the near 80% increase in suppliers of different systems and near 200% increase of the number of different systems available in three years. This compared to a 71% increase in sales from 2010 to 2011. It serves to indicate that the number of competitors and systems grew at a faster pace than the number of installations and could serve as an explanation for the sudden drop of in sales and systems from 2011.

4.1.2.2. Industry performance by province

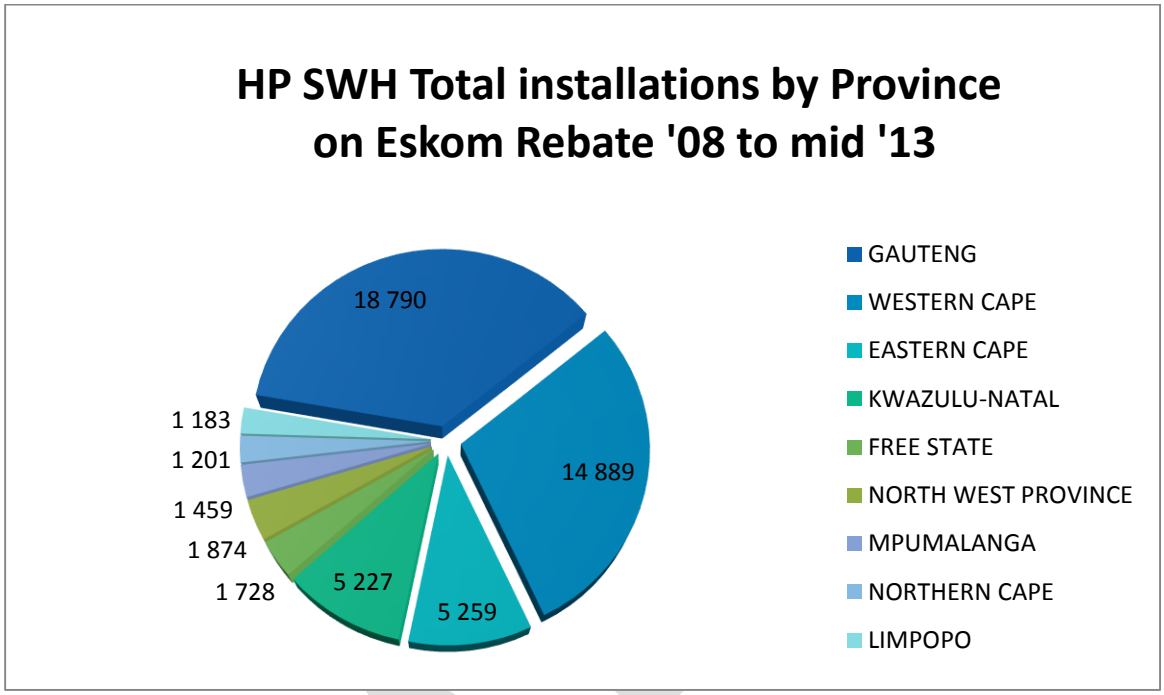


Figure 6: Installations by province on Eskom rebate

Gauteng leads the Western Caope in installations by aproximately 26% with a total of just under 19,000 installations since 2008.

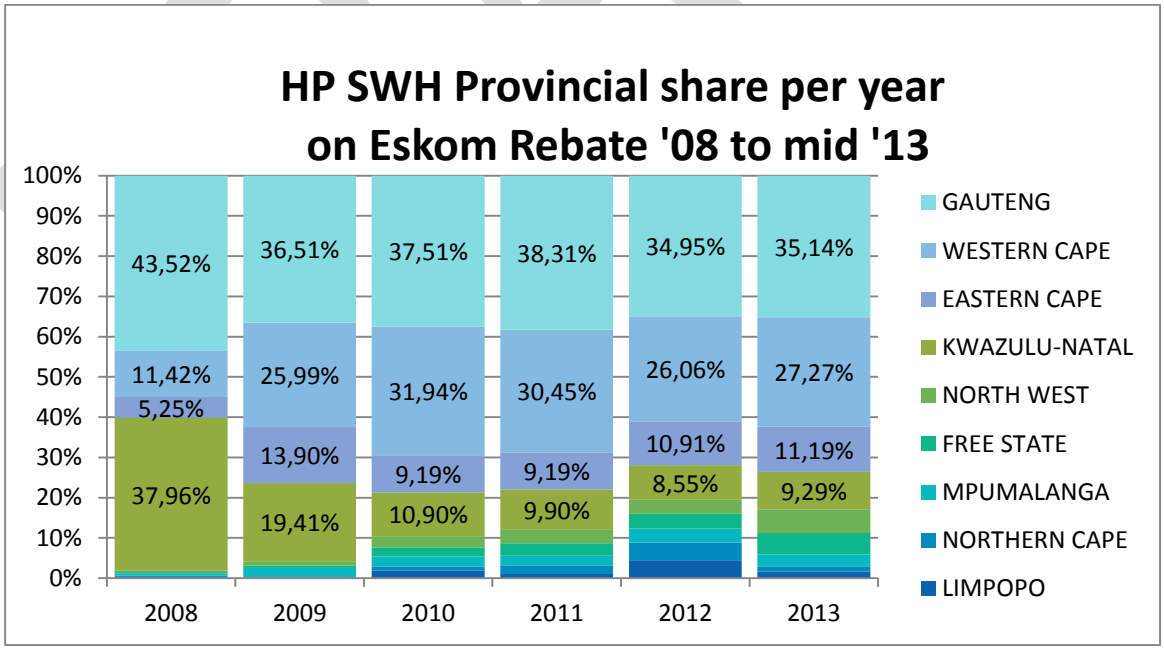


Figure 7: Regional market share over time on Eskom rebate

It is interesting to note that Installations in Kwazulu Natal has tapered off substantially since 2008 but it must also be noted that the 2008 base was very small. It does remain in the top 4 installing provinces. The Western Cape has seen substantial growth in 2009 and 2010 with a notable drop off since 2011. While the

Eastern Cape; Northwest 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.

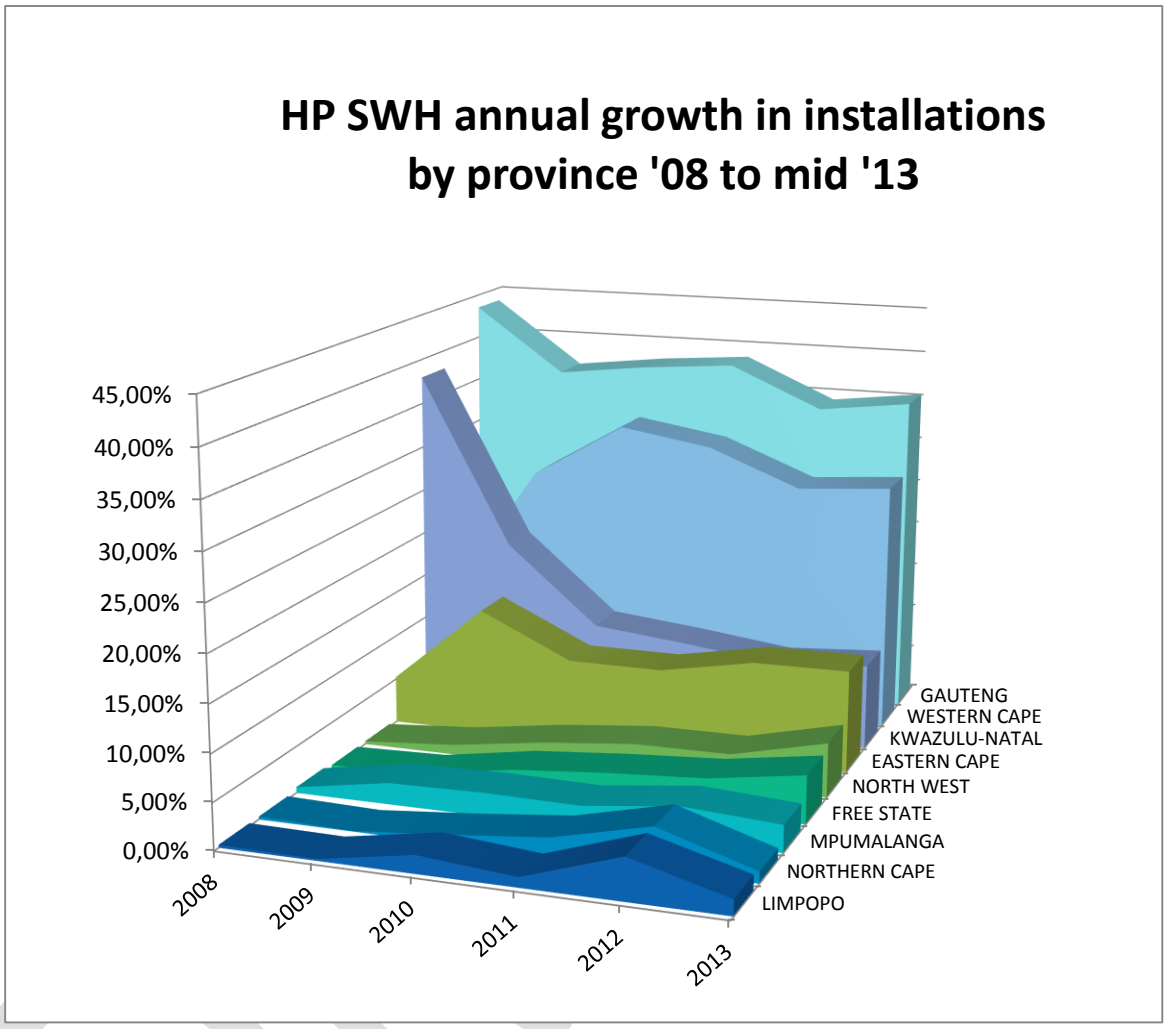


Figure 8: Individual provincial growth in installations on Eskom rebate

Figure 7 represents the growth or decline in installations per province over the rebate period. Limpopo; Northern Cape and Mpumalanga have seen slow uptake and growth initially and then a fall off after 2012. The first 2 more so than Mpumalanga, which showed a more gradual decline after 2012. **Of note is the fact that the Free State and North West had a slow start but has shown continuous growth in the last 5 years.** By contrast, these two showed a marked increase in installations after 2012. The Eastern Cape, while representing a substantially bigger share, follows the trend with a fall off after 2012 albeit at very gradual rate. Kwazulu Natal has seen a constant decline in installations since the beginning, now being trumped by the Eastern Cape. Both Nelson Mandela Bay and Ethikweni municipalities has had a swh programme running for at least 2 years, the effect of which is not visible in the regional performance. The Western Cape had a steep growth till 2010 with a marked drop off since then, only to see a very slight recovery in 2013. Gauteng by contrast sees 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 grows till 2011 with a steep decline till 2012 and a slight recovery in 2013.

4.1.2.3. Industry performance by System size

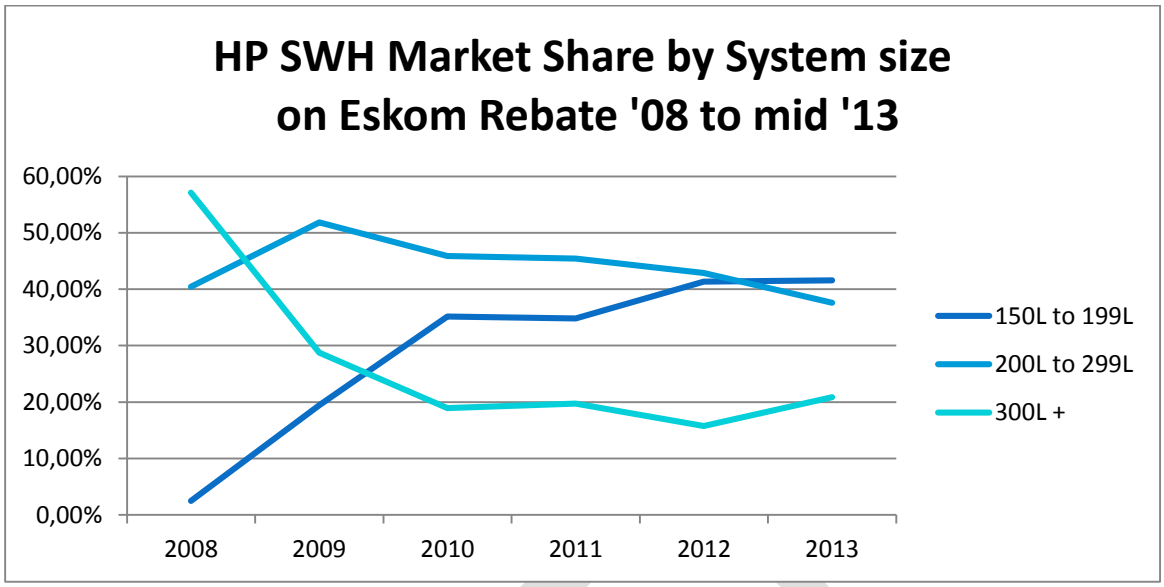


Figure 9: Installations by tank size on Eskom rebate

When looking at the relative market share of different system sizes installed it is clear that at the outset of the subsidy program 300L systems were far more popular than the smaller sizes especially the 150l. This changed substantially in the second year with 150L systems continually growing in popularity. It appears that people from higher LSM'S who were ready to install at the beginning held back for the announcement of the subsidy. This in itself means that they would probably have installed without a subsidy but with a subsidy looming they held back to that time, thus distorting the market on the hope of a future subsidy. The fact that installations of 150L systems kept growing without a decline at any period is indication that the market for SWH is shifting from a previously affluent to a middle class market. This could be a positive signal for the industry as it shows a more stabilised continuous demand for abatement in the cost of household energy compared to high LSM individuals targeting high subsidies.

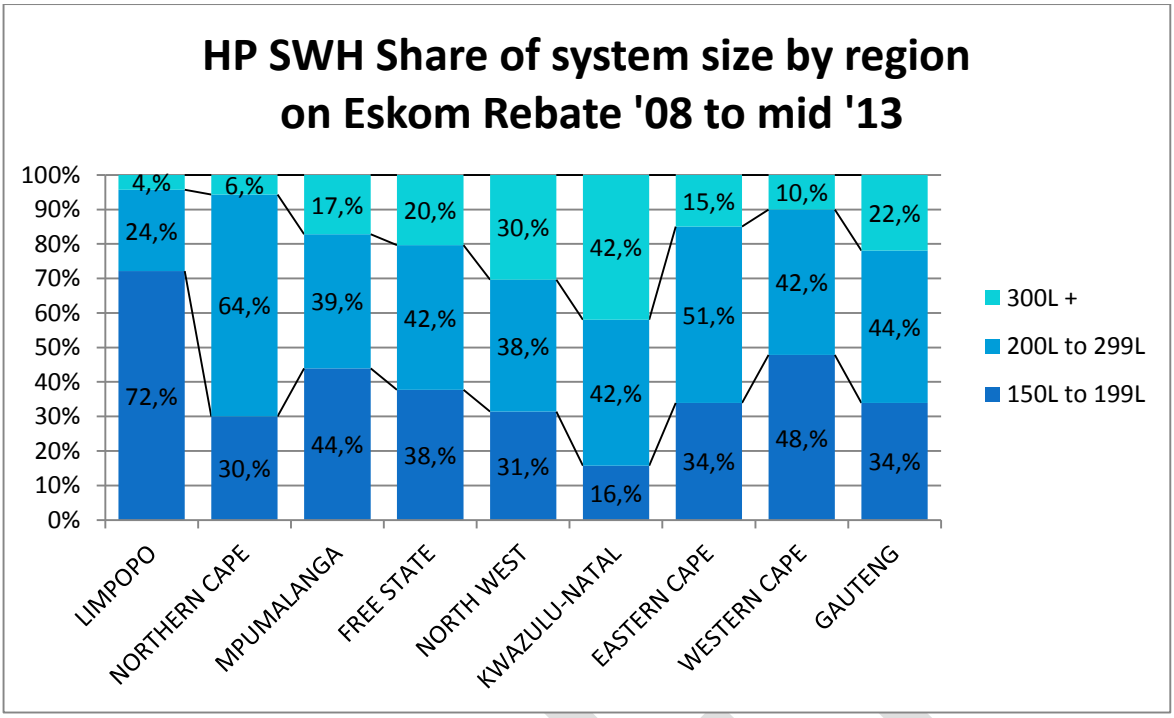


Figure 10: Installations by tank size per province on Eskom rebate

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 region. The Western Cape by contrast, while being the region with the second highest amount of installations and a region with a fairly high average LSM has a very small penetration of 300L systems.

4.1.2.4. Imports of Solar water heaters

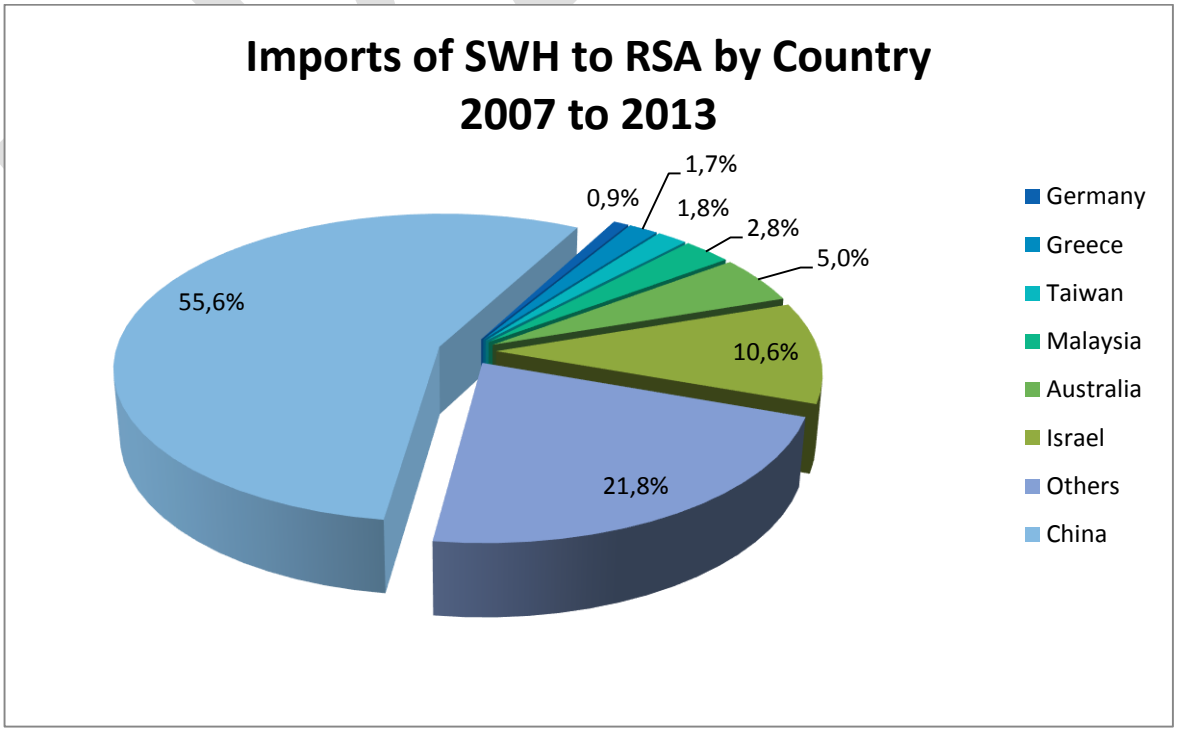


Figure 11: Imports of SWH 2007 to 2013

The Department of Trade and Industry provided data on the import and export of swh for the period 2007 to 2013. Figure 11 represents a graphic depiction of the different countries of origin of different systems. These are however high and low pressure mixed. From their data it is clear that the bulk of all swh imported are from China. The data does not specify system size or numbers of units. The data reports rand value of import or export and container mass and from this a system count is derived based on a guestimate of weight. It is reported that the total imports of swh for the period amounts to R91.1 million with a guestimate of 77,510 units, a number that seems very low, considering that more than 200,000 Low Pressure units were installed during this time. There are only three local manufacturers of LP systems with a very small share of the market.

4.1.2.5. Exports of Solar Water Heaters

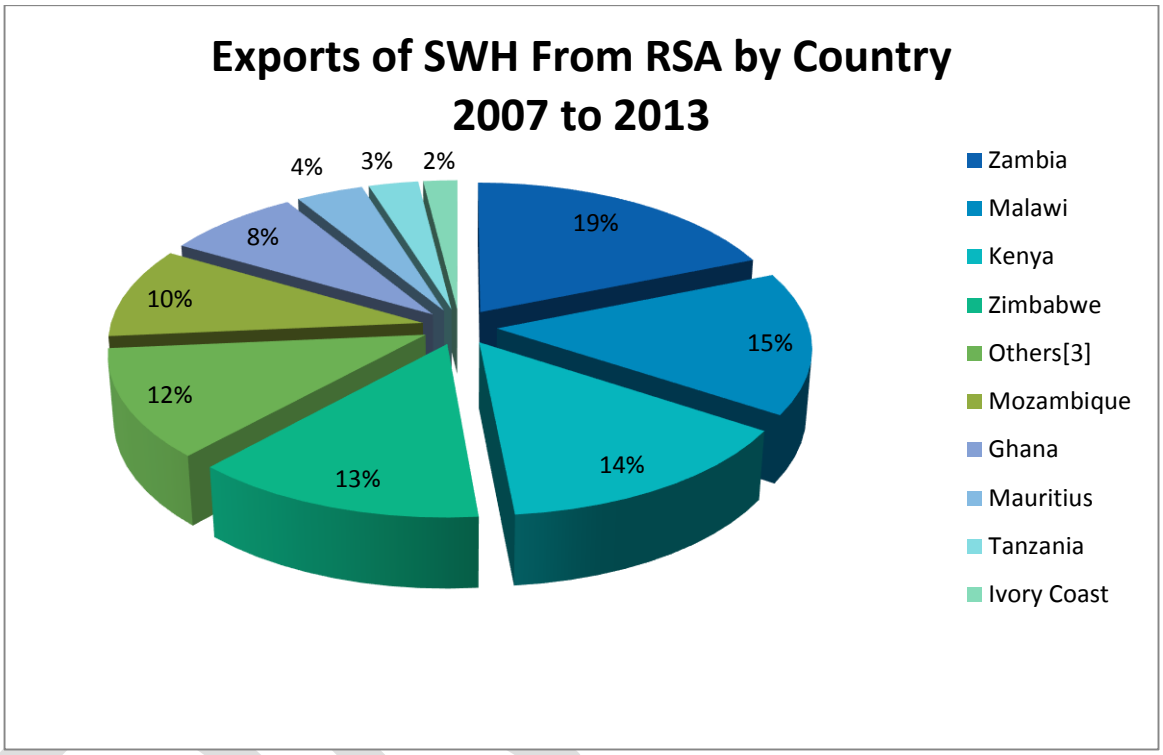


Figure 12: Exports of SWH 2007 to 2013

Exports of SWH is very small (only R4.25 Million) and mostly to SADEC or African destinations. In this data there is a 12% "other" category, which the DTI reports to include destinations such as Algeria, Antilles, Congo, Ivory Coast, Kenya, Madagascar, Mali, Reunion, Seychelles, Somalia, Nigeria and Uganda.

African and SADEC destinations are the only countries that do not require compliance to international standards. Other international markets such as The BRICS countries Ex SA, Europe and the USA are closed markets for local manufacturers who seek to export, as 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 are not in line with international standards and not acceptable to international clients. This is an issue that could in future be addressed through adoption of acceptable international standards.

4.2. Energy saving lights

Up to 95% of the energy emitted by incandescent lamps is in the form of heat and only 5% light, making their efficiency inherently low. They also only last around 1 000 hours, which is significantly shorter than energy-saving lamps, such as Compact Fluorescent Lights (CFL) which can last up to 12 000 hours or Light emitting diodes (LED), which can last up to 50,000 hours. The Department of Energy reported at COP 17 that incandescent bulbs will be phased out in SA as of 2016. To date there is no clarity about the status of this initiative.

Eskom reported that they have replaced 56.8 Million Compact fluorescent lights (CFL) in their domestic mass roll out 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 seven million globes per annum. Of note is the sharp drop off 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.

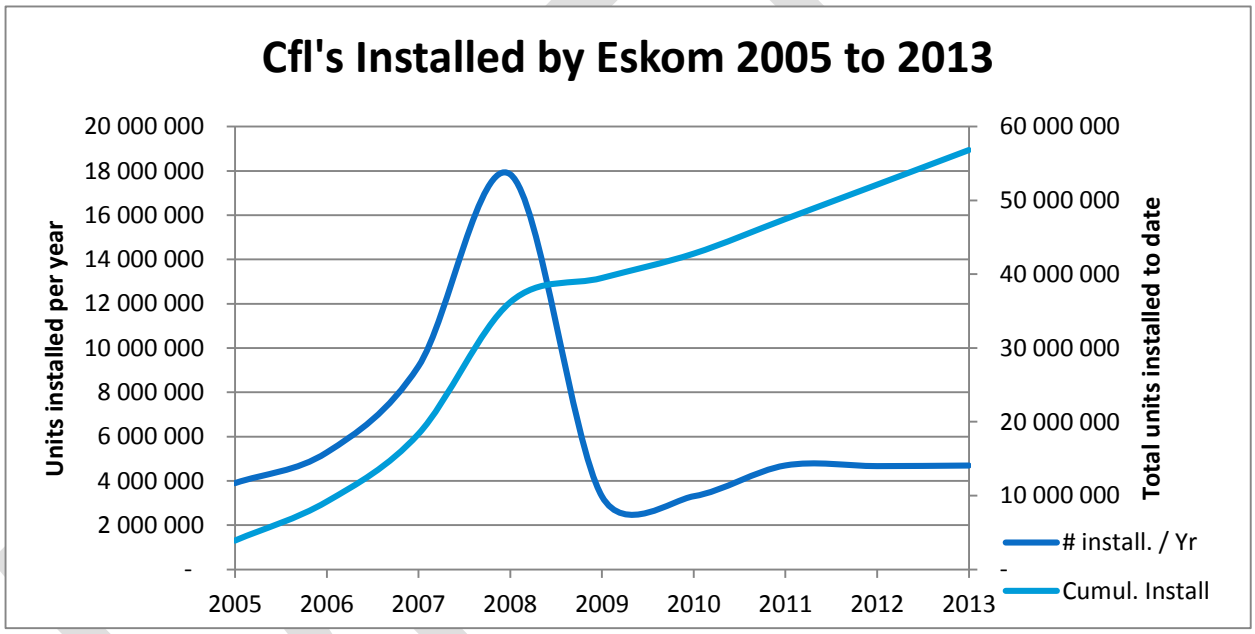


Figure 13: installations of CFL lights since 2005

Light Emitting Diode (LED) technology is described as a disruptive technology, in that it completely changes the nature of competition in its markets. The traditional luminaire manufacturing industry value-chain-model is no longer valid. A Small LED manufacturer is now able to take over functions that was previously the exclusive domain of large heavily capitalised industries and this leaves some of the erstwhile leaders in the industry wondering what their role is or how their business model needs to adapt.

The Western Cape has a rich and diverse LED manufacturing sector with more than 8 manufacturing entities that currently produce a variety of components from controllers to luminaires and complete fittings. To date and to the best of our research the Western Cape has the highest number of manufacturing concerns that manufacture complete or partial luminaires for a variety of applications and industries. These include: SixtLED, LED Lighting SA, LedZshine, Ledwise & Marula LED, Caelus.

4.3. Embedded Generation

Embedded or distributed generation is any form of generation which is intended to operate whilst electrically connected to the distribution network for extended periods. Generation sources such as fuel cells and photovoltaic installations generate DC (direct current) electricity and are therefore required 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 with exciting action in embedded or self-generation and specifically PV (Photo Voltaic) technology. There is currently 6.75Mw of installations approved in progress or recently completed in the Western Cape. One of these projects is the 600Kw installation at Blackriver Park which will soon be upgraded to over 1.2Mw. Another is Ceres fruit juice with an intended capacity of over 1Mw. There is a substantial base of Esco's that specialize in the development and design of medium size non IPP scale solar systems in the Western Cape attributing to the large 51% share of private installations. Green Cape has initiated the Smart Grids work group that is specifically looking at ways to unblock the legislative and institutional barriers to developing a private self-generation sector.

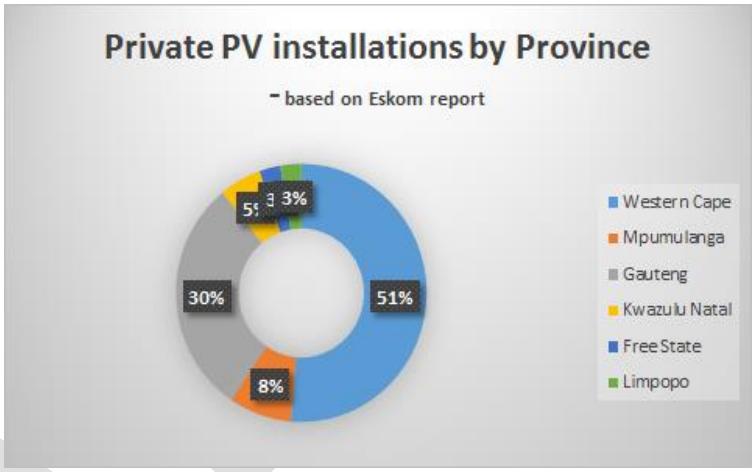


Figure 14: Regional distribution of private PV installations