Renewable Energy
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2015
Market Intelligence Report
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GreenCape

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GreenCape would like to acknowledge and thank **Maloba G Tshehla** for the time and effort that went into compiling this Market Intelligence Report.

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Since it was established in 2011, the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has procured over 5 000 MW in 4 bidding rounds

List of acronyms

CAPEX	capital expenditure
COP	Conference of Parties
CPUT	Cape Peninsula University of Technology
CSIR	Council of Scientific and Industrial Research
CSP	concentrated solar power
DEA	Department of Environmental Affairs
DED&T	Department of Economic Development and Tourism
DoE	Department of Energy
DPE	Department of Public Enterprises
Dti	Department of Trade and Industry
EG	embedded generation
EIA	environment impact assessment
EPC	Engineering, Procurement and Construction
GIZ	Gesellschaft für Internationale Zusammenarbeit GmbH
GRI	Gestamp Renewable Industries
IPP	independent power producer
IRP	integrated resource plan
LV	low voltage
MV	medium voltage
MWp	megawatt peak
NEMA	National Environmental Management Act
NERSA	National Energy Regulator of South Africa
O&M	operation and maintenance
OEM	original equipment manufacturer
PPA	power purchase agreement
PV	photovoltaic
R/kWh	rand per kilowatt hour
RE	renewable energy
REIPPPP/REI4P	Renewable Energy Independent Power Producer Procurement Programme
SAPVIA	South African Photovoltaic Industry Association
SARETEC	South African Renewable Energy Technology Centre
SEZ	Special Economic Zone
SOP	standard offer programme
SPV	special purpose vehicle
SSEG	small-scale embedded generation
UN-SE4ALL	United Nations Sustainable Energy 4 All
WCADI	Western Cape Aquaculture Development Initiative
WWF	World Wildlife Fund for Nature

1 – Introduction and purpose

This market intelligence report was compiled by GreenCape's renewable energy sector desk. It is aimed at investors and businesses who are currently active or interested in entering the renewable energy sector in South Africa, and the Western Cape specifically. It provides an overview of the market, including the key players, legislation and regulation, opportunities and challenges, key developments and achievements.

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

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

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

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

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

Globally, renewable energy is gaining more momentum, with a rise in the development and adoption of RE technologies such as solar photo-voltaics, wind energy, biogas and other biofuels, hydroelectricity, landfill gas, geothermal energy and concentrated solar power

2– Executive summary

Globally, renewable energy (RE) is gaining more momentum, with a rise in the development and adoption of RE technologies such as solar photovoltaics (PV), wind energy, biogas and other biofuels, hydroelectricity, landfill gas, geothermal energy and concentrated solar power (CSP), among others. Government policy support, sustainability concerns, procurement programmes, reducing technology costs and increasing conventional electricity prices are key drivers of this shift, especially in the South African context.

In South Africa, the publication of the Integrated Resource Plan (IRP) 2010 – 2030 reflects the country's approach to addressing these issues. The document paved the way for the RE procurement programme that we see today. But this document has not been updated for a long time, creating uncertainty for investors.

The renewable energy independent power producer procurement programme (REIPPPP) is one of the primary pathways to entry into the RE market for utility-scale power generation. Since it was established in 2011, the REIPPPP has procured over 5 000 MW in four bidding rounds. At the time of writing, 77 projects covering solar PV, onshore wind, biomass, small hydro, CSP and landfill gas technologies were in various stages of development. 32 of the projects had reached commercial operation date and were already contributing some 1 500 MW of generation capacity to South Africa's generation mix.

While progress has been made through the REIPPPP, future projects will need to accommodate numerous factors as they are developed, including: proximity to load centres, proximity to available grid access points, and a compromise on the best resource.

With project lifespans of 25 years and beyond, having sufficient operation and maintenance skills is key to the longevity of the RE sector. To this end, the South African Renewable Energy Technology Centre (SARETEC) was established to provide training for technicians in the installation, operation and maintenance of solar PV and wind turbine facilities.

As the REIPPPP matures, project funding and ownership structures are beginning to change. These adjustments are being led by lower risk project profiles, increasing competition and economies of scale benefits. As the sector enters the fourth round of bidding, larger operators with balance sheet funding capabilities are beginning to dominate.

This is not to say that there is no market for smaller operators. Rising prices and supply insecurity have led to greater interest in the non-utility-scale markets. The commercial and industrial-scale RE market is dominated by rooftop solar PV, with typical capacity of less than 1 MWp, with the residential market showing similar trends.

While there has been progress in the sector, investors need certainty, which can only be achieved by a timely update of the IRP 2010 - 2030. Further delays will continue to cause anxiety and reduce market confidence.

2.1. Value chain

The RE market value chain perspective is fairly uniform, as represented in Table 1 below. The scale of projects being developed and financed, and company structures used to deliver projects have resulted in differentiation of the various market segments.

This section details the three main segments of renewables in South Africa, namely: the utility-scale REIPPPP, the commercial- and industrial-scale market, and the residential-scale market. Later sections delve into the regulatory frameworks, followed by highlights of each of the market segments.

Table 1: Value chains within various renewable energy markets

Market Segments	Manufacturing	Project development	Engineering, Procurement and Construction	Operation and maintenance
	Financing			
Utility-scale REIPPPP	✓	✓	✓	✓
Commercial- and industrial-scale renewable energy	✓	✓	✓	✓
Residential-scale renewable energy	✓	✓	✓	✓

The white dotted rings highlight services which are typically bundled into a single offering or company in the various RE segments. Typically, this is an attempt to secure a larger market opportunity by expanding a company's value chain reach. These are typical trends and vary from project to project.

2.2. Regulatory frameworks

Electricity in South Africa is a regulated sector primarily overseen by the National Energy Regulator of South Africa (NERSA) and the DoE. Through the IRP, the DoE is responsible for planning the source and quantity of electricity to be generated for the country in the future. NERSA is responsible for licensing and adjudicating the price setting for these generation sourcesMany other government departments also play a role in executing these plans, including:

- National Treasury (value for money, affordability, sovereign guarantees)
- Department of Environmental Affairs (DEA) (environmental authorisations)
- Department of Trade and Industry (dti) (industrial policy, local content, import control)
- Department of Public Enterprises (DPE) (shareholder in Eskom, local procurement)

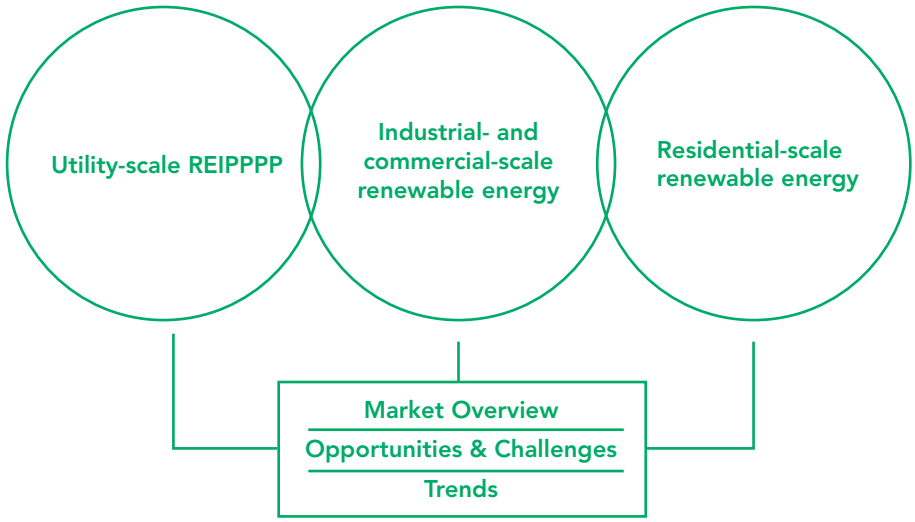
These departments have the largest influence, but there are several additional permits and agreements required before a project can be bid or constructed.

GreenCape's Renewable Energy Market Intelligence Report 2014 (GreenCape, 2014) outlines this topic in more detail.

3–
Market Overview

The market is segmented into three distinct opportunities, reflected in the figure below. This section will outline the various opportunities and give an in depth look into the associated challenges, developments, trends and successes of each.

Figure 1: Outline of the Renewable Energy Market



3.1. Utility-scale renewable energy

3.1.1. Market composition

In effect, the utility-scale RE market in South Africa is made almost exclusively of the REIPPPP. Since it commenced in 2011, the programme has procured over 5 000 MW in four bidding rounds, through a total of 77 selected projects. Preferred bidders for the latest round of projects (bid window 4) were announced in April 2015 and projects are expected to reach financial close by the fourth quarter of 2015.

At the time of writing, 32 projects had been built and are connected to the national grid, supplying over 1500 MWp of renewable energy to South Africa. Capacity allocations over the past four rounds are summarised in Table 2.

Table 2: REIPPPP allocation progress to date

Technology	1st bid window allocation (MW)	2nd bid window allocation (MW)	3rd bid window allocation (MW)	4th bid window allocation (MW)	Remaining MW capacity
Solar photovoltaic	632	417	435	415	626
Wind	634	563	787	676	660
Concentrated solar	150	50	200	0	-
Small hydro (≤40 MW)	0	14	0	4.7	116
Landfill gas	0	0	18	0	7
Biomass	0	0	16	25	19
Biogas	0	0	0	0	60
Total	**1 416 MW**	**1 044 MW**	**1 456 MW**	**1 121 MW**	**1 488 MW**

After several completed rounds, numerous companies have been involved in multiple successful projects.

Table 3 presents the breakdown of project development phases and examples of associated companies. This list is by no means exhaustive.

Table 3: Breakdown of players in the utility scale REIPPPP

	Type of company involved	Examples of successful companies
Development phase	• Independent Power Producer (IPP)/project developers • Environment Impact Assessment (EIA) firms • Original Equipment Manufacturers (OEMs) and suppliers • Project financiers • Other professional services – engineering, legal, tax services etc.	• Red Cap, Mainstream, AE-AMD, Mulilo, ACWA, ACED • Savannah, Aurecon, Doug Jeffries • Jinko, Sunpower, SMA, GRI, Nordex • Globaleq, AIIM, IDC, Standard Bank, Enel • PwC, Mazars, Cliffe Dekker, ENS, ARUP, Willis Group • RES-SA • G7 Renewables
Construction phase	• IPP • Engineering Procurement and Construction (EPC) • Original Equipment Manufacturers (OEMs) and suppliers • Logistics • Other professional services – engineering, legal, tax services etc.	• Ring-fenced, standalone, special purpose vehicles (SPVs) • Juwi, SolaireDirect, SunPower • Vestas, • Powertech, Actom, DCD • Vanguard, ALE-Heavy lift • Conco, Solethu, Adenco
Operation phase	• Operation and Maintenance (O&M) • Other professional services – engineering, legal, tax services etc.	• O&M is typically built into the OEM contracts.

3.1.2. Successes of the REIPPPP

Figure2: Spotlight on successes in the REIPPPP

The table below depicts the price decreases achieved in the first three bidding rounds. There is speculation among members of the RE community that some round four projects are offering tariffs of around 60c/kWh.

Table 4: RE tariff decreases over the course of the REIPPPP

	Average bid prices (RSA c/kWh)			
	Round 1	Round 2	Round 3	Round 4
Wind	114.3	89.7	65.6	62.0
Reduction from previous round (%)	-	-21.50%	-26.90%	-5.56%
Total reduction from round 1	-	-	-42.60%	- 45.8%
Solar PV	275.8	164.5	88.1	78.6
Reduction from previous round (%)	-	-40.40%	-46.40%	-10.78%
Total reduction from round 1	-	-	-68.10%	1.1.1.1.-71.5%
Concentrated solar power	268.6	251.2	146.0*	-
Reduction from previous round (%)	-	-6.50%	-41.90%	-
Total reduction from round 1	-	-	-45.60%	-

(Source: Eberhard et al., 2014, DoE, 2015)

Over and above the significant decreases in prices offered by the REIPPPP, the rapid procurement of over 5 000 MW has been indicator of the programme's success. Furthermore, the Minister's announcement of an effective 'doubling' of the allocation made in round four, a further allocation of 1 800 MW by June/ July 2015 and a request to NERSA for a further 6.3 GW of renewable capacity have set a solid base and great certainty for the programme's longevity.

A recent study conducted in collaboration with the system operator in 2014 by the Council of Scientific and Industrial Research (CSIR) has quantified the value for money for and cost to South Africa of the RE programme The study found that despite bid window one projects being on average 70% more expensive than bid window three projects, these were able to contribute a net benefit of R800 million to the South African economy (CSIR, 2015). This benefit was assessed by calculating the fuel offsets from saving coal and diesel, and decreased curtailment. The total amount paid for the energy was then subtracted. This remarkable finding sets a positive trend for projects yet to come online that have offered significantly lower tariffs – and consequently that they will offer greater net benefits.

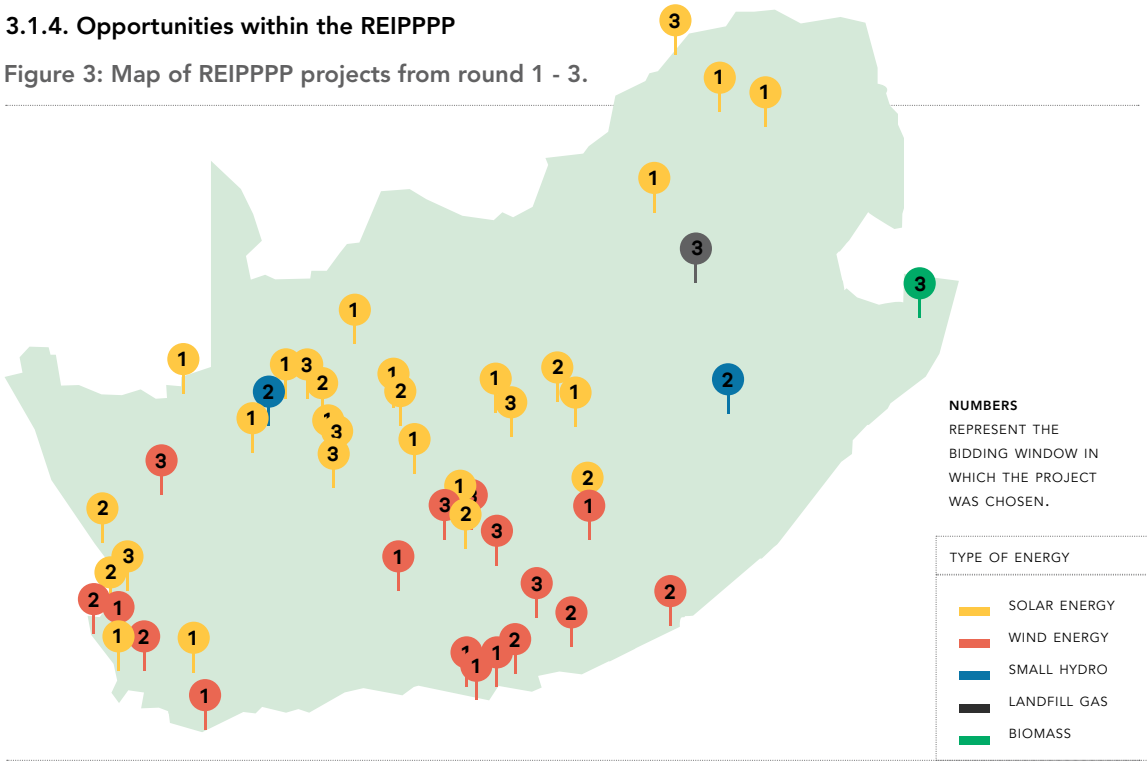
3.1.3. Geographic distribution

The map below shows the geographic distribution of the successful projects in the REIPPPP. It is immediately apparent that the Northern Cape dominates the solar resource and that the East coast has strong wind resources. Even so, the Western Cape has its own share of both wind and solar projects. It is also apparent that there are limited hydro, biomass and landfill gas opportunities.

What the map does not show is that all the easy-to-access grid connection points have largely been allocated. Future projects will need to take into consideration numerous factors as they are developed, including: proximity to load centres, proximity to available grid access points, and a compromise on the best resource.

3.1.4. Opportunities within the REIPPPP

Figure 3: Map of REIPPPP projects from round 1 - 3.



(Source: Energyblog, 2014)

3.1.4.1. Job creation and socio-economic development

South Africa is a country with high levels of inequality. As a result, the REIPPPP was used as an instrument to increase the level of social and economic development in areas within a 50km radius of the project sites. There are significant socio-economic development opportunities within the RE sector, with competitive projects bidding with a 70:30 price to economic development weighting. Work is already underway to assess the numbers and benefits accruing to communities. Early estimates put the value of the built projects well into the tens of billions of rands over their 20-25 year lifespans.

[1]http://www.saretec.co.za/about.html

3.1.4.2. Skills development success

In conjunction with various government departments, academic institutions, the private sector and GreenCape, the German Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and the Cape Peninsula University of Technology (CPUT), have set up the South African Renewable Energy Technology Centre (SARETEC)[1]. The centre was set up in response to the need to develop technical installation, operation and maintenance skills to ensure the longevity of projects coming out of the REIPPPP. The institution provides training for solar PV and wind turbine service technicians. These skills will be crucial for the country as more RE facilities come online, especially as the plants are set to operate for up to and beyond 25 years.

3.1.4.3. Localisation opportunities: manufacturing at the Atlantis Special Economic Zone (SEZ)

The majority of renewable energy project developers have based themselves in the Western Cape. In addition, the province has also been able to attract significant interest and investment into the RE manufacturing sub-sector (GreenCape, 2015). In 2014 alone, several large companies made the decision to establish themselves in the province. Some of these are listed here:

- Jinko Solar (solar PV panel manufacturing facility)
- Gestamp Renewable Industries (GRI) (wind tower manufacturing facility)
- SMA Solar Technology South Africa (Sunny Central inverter manufacturing facility)

There is a confluence of policy and opportunity in the RE manufacturing sub-sector. While legislative requirements for local content increase from round to round, manufacturers can also access a suite of set-up incentives. One of these is the proposed SEZ in Atlantis, where the focus will be on greentech manufacturing, including RE components. The zone is earmarked to enjoy tax rebates among a host of other incentives.

The industries targeted in the RE sector will include those identified in the dti's wind and solar localisation strategies:

- In conjunction with the World Wildlife Fund for Nature (WWF), the South African Photovoltaic Industry Association (SAPVIA) commissioned a localisation strategy for PV in South Africa, titled The Localisation Potential of Photovoltaics (PV) and a Strategy to Support Large-Scale Roll-out in South Africa (SAPVIA, 2013)
- The dti's wind localisation strategy was launched at the Windaba event in 2014. After taking industry comment, the final version is anticipated in early 2015
- A strategy for CSP is still under development

Figure 4: Further opportunities resulting from the REIPPPP

Collateral opportunities – Beyond the REIPPPP

The REIPPPP has opened the door to independent power producers in the South African electricity system, which has led to cascading opportunities for additional independent power procurement. It is anticipated that similar procurement programmes will be run for gas, co-generation and coal in 2015. Significant opportunities also exist for associated sectors supporting the REIPPPP, including professional services firms, contractors and suppliers.

According to the wind localisation study, higher and stricter definitions of local content will encourage more local procurement, local manufacturing and local job creation, with minimal increases in capital expenditure (CAPEX) for projects. This means that there would be minimal increases in the rand per kilowatt-hour tariffs that projects are able to offer. For this to happen, however, to boost industry confidence in the programme, revisions to the IRP need to offer more certainty and greater capacity allocation to RE generation. More localisation opportunities can be found in the RE mapping exercise report (GreenCape, 2015).

3.1.5. Challenges in the REIPPPP

The REIPPPP hinges on a few large moving parts, including:

- Guaranteed off-take agreements
- Long-term allocation of appropriate capacity to various technologies
- Availability of suitable grid connections

Eskom's financial constraints have caused some anxiety within industry about the longevity of the REIPPPP after round three, due to uncertainty about the signing of future power purchase agreements (PPA). There have even been suggestions to privatise some of Eskom's assets. The counter-argument to those suggestions is that the state owned entity is a developmental asset for national government, which prevents it from being removed from state control (Engineering News, 2014e). That said, the economic development (ED) component of the REIPPPP, with its requirements for socio economic development, local procurement and community development, can potentially achieve developmental goals. This aspect of the REIPPPP merits further investigation.

The small IPP bids programme has also been stalled due to numerous challenges, most notably the ability to source sufficient funding to make the programme work.

The pending revision of the definition of local content for locally laminated solar PV panels also contributes to uncertainty in the market. Additionally, with no clear, certain plans for future bidding rounds, decisions by investors, developers and manufacturers have hinged on the initial IRP 2010-2030, which has allocated over 17GW of renewables. The revisions to this document are still pending.

With all the 'easy connection points' taken up by projects in the first two rounds, it is becoming increasingly difficult to connect projects to the transmission grid. Developers are now faced with the costly options of building their own connection infrastructure or being exposed to delays from Eskom's side. Developers must now look at sites that are less rich in resources, but with better grid capacity to evacuate the power generated.

3.1.6. REIPPPP trends

3.1.6.1. Project financing structures

The major shifts in the REIPPPP are related to project financing. While in round one most of the financing was sourced from project finance, projects bidding in round three featured more balance sheet financing, driving R/kWh bid prices down. As a result, a few financially strong players have been more dominant in the market. To reinforce that point, industry speculation of a potential fourth round of successful bids suggests that BioTherm, Enel Green Power, Sky Power, Mainstream Renewable Power and Mulilo will be among the main contenders (Engineering News, 2014b).

3.1.6.2. Bid selection criteria loopholes

Industry members have raised concerns about the manipulation of the weighting criteria used in the selection of preferred bidders. Bids are evaluated on a 70:30 weighting of price to economic development, respectively. These concerns relate to the submission of spurious projects with artificially high economic development points. This practice is designed to tip the weighting criteria across the remaining projects towards the pricing component, effectively discounting the economic development commitments in the score.

3.1.6.3. Refinancing

As the REIPPPP matures, the financial structuring of projects has changed. This has been driven by several factors including lower risk project profiles, increasing competition and economies of scale benefits.
A three-year moratorium has been imposed on changes to the ownership structure of projects.

Despite this, the DoE has indicated that it will consider allowing changes to the capital structure of projects before the three year lock-in period expires. To emphasise this, the DoE has already allowed for isolated restructuring to take place, and will be publishing guidelines about this in due course.

Financial services companies have developed several innovative solutions to take advantage of these secondary markets in the REIPPPP. We expect this will increase activity in this area in the short to medium term.

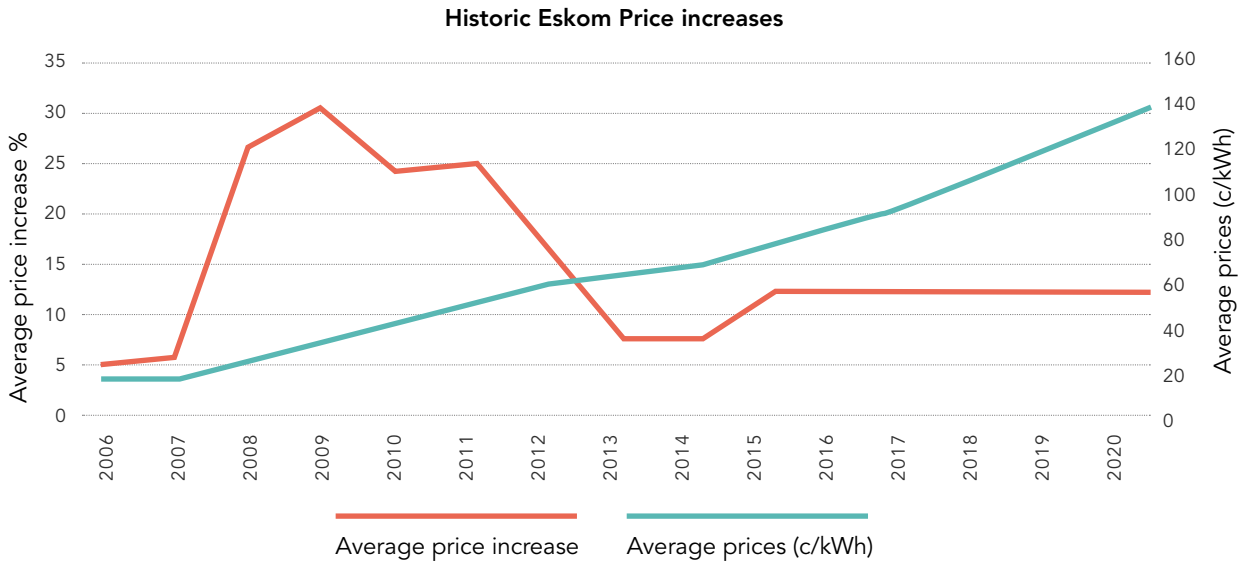
3.2. Commercial- and industrial-scale renewable energy sector: the rooftop PV market

This sector typically consists of installations with capacity less than 1 MWp, and is dominated by the solar PV rooftop market. The commercial- and industrial-scale RE market has been active for longer than the utility-scale REIPPPP. Some solar PV panel manufacturers and suppliers, and small-scale project developers were established before the REIPPPP was developed. However, in the context of current electricity supply constraints and price trends, there has been a significant move towards own-generation using more sustainable alternative technologies.

The primary motive has been to ensure security of supply and to mitigate increasing electricity costs, which have risen from an average of 30c/kWh in 2008 to around 70c/kWh in 2014 (UrbanEarth, 2013). This is reflected in NERSA's own reporting, presented in Figure 5.

The impact of the dramatic Eskom price increases and the clear price signals given by the utility-scale programme have led to a huge amount of interest in the non-utility-scale markets. These markets are not well regulated in South Africa and over the last few years there has been an urgent need for regulatory reform to allow this market to develop. The regulator and the utility are reviewing pricing, safety, grid code and the impact on municipal revenues, some of which are highlighted in the following sections.

Figure 5 - History of Eskom price increases



(Source: NERSA, 2014)[2]

[2]It must be noted that the five years beyond 2015 are estimates based on Eskom's request for a similar yearly increase to the 12.69% granted for 2014/2015.

3.2.1. Regulations for small-scale embedded generation (SSEG)

3.2.1.1. NERSA discussion paper

NERSA is working on consultation papers that address three pertinent issues:

- SSEG below 1 MWp in size
- Electricity wheeling
- Electricity re-selling

A consultation paper on electricity re-selling was issued for comment on 9 February 2015. The papers for SSEG and electricity wheeling are set to be issued for public comment in early 2015 and should be ready for full publication within the second quarter of the year. The papers add to the development of the industrial, commercial and residential energy markets.

3.2.1.2. Eskom

Eskom is revising its framework for the connection of embedded generation (EG)[3] units to its low voltage (LV) and medium voltage (MV) networks. The main focus appears to be increasing safety mechanisms required to ensure grid safety when power outages occur (Eskom Holdings, 2015). In this regard, industry has raised concerns about the costs that the additional safety measures add to projects, making installations within Eskom's grid less attractive – especially small scale installations.

3.2.1.3. City of Cape Town's SSEG regulations

The City of Cape Town has produced regulations and applications for SSEG. Under these regulations, users must meet two main conditions:

- 1) The embedded generator must be a net-consumer of City-supplied electricity over the course of a year
- 2) Excess electricity fed into the City's grid will be credited at the same price that the City purchases from Eskom – which, at the time of writing, is currently around 49.72c/kWh for the residential generator. Application forms for the connection of embedded generation[4] and a contract for embedded generation[5] (City of Cape Town, 2015) can be found on the City's electricity department website.

Figure 6 - Spotlight on commercial and industrial scale renewable energy

Spotlight on commercial and industrial-scale renewable energy prices in REIPPPP

From the N1 highway leading into Cape Town, it is impossible to ignore the massive rooftop solar PV installation sitting majestically on Vodacom's office block rooftop at Century City. This was a pioneering move to adopt renewable energy. Aware of the need for regulations to manage the imminent onset of own-generation within its customer base, the City began to prepare itself.

By mid-2014, the City announced its SSEG Tariffs and Regulations (City of Cape Town, 2014). These regulations mean that for the first time, the City's users are permitted to connect EG and to feed excess power back onto the grid. The Black River Parkway rooftop solar PV installation was the first to sign an agreement with the City, which plans to retrospectively sign other such agreements with existing installations (Engineering News, 2014).

[3] http://www.eskom.co.za/Whatweredoing/Pages/SmallMicroGeneration-.aspx

[4] http://www.capetown.gov.za/en/electricity/Application%20Forms/Application-for-connection-of-embedded-generation-%2816-Jan-2015%29.pdf

[5] http://www.capetown.gov.za/en/electricity/Application%20Forms/SSEGsupplementalContract_31_Oct_2014.pdf

Figure 7 - Spotlight on RE in the deep blue economy

Spotlight on RE in the deep blue economy

GreenCape and the Western Cape Aquaculture Development Initiative (WCADI) have been investigating the potential for RE generation within the aquaculture sector. In response to the presidential Operation Phakisa (Operation Phakisa, 2014), which seeks to stimulate growth within the country's ocean economy and health sectors, WCADI identified the need to investigate the energy issue with the aquaculture sector.

Aquaculture's load profile is highly suited to the incorporation of RE generation, due to a constant, high load from the pumping large volumes of sea water onto land-based facilities. A prime example of the aquaculture sector at work is South Africa's abalone industry, which serves a niche in the global market. By embarking on more sustainable production, the sector has the opportunity to further consolidate its position in the global market.

3.2.2. Market opportunities for small-scale embedded generation

3.2.2.1. Agriculture

Beyond the sprawling metropolis of Cape Town, farmers in the Western Cape winelands have long recognised the need for energy autonomy, either through a simple windmill, or pumped storage from small dams. This has now advanced to 500 kWp and even 1 MWp solar rooftop PV installations within various agricultural activities. Under the now discontinued Eskom standard offer programme (SOP) (Eskom, 2014), Ceres Cold Storage was able to install a 500 kWp solar PV array to supplement their electricity consumption (Blue North, 2012). Other installations within agriculture include:

- 1 MWp at a Ceres pack house facility
- 1 MWp at a Grabouw pack house facility
- 200 KWp at a Paarl pack house facility
- 250kWp at the Vrede en Lust 250kW solar PV installation (CCC, 2014)

3.2.2.2. Potential within the industrial and commercial renewable energy markets

Given Eskom's rising electricity prices, depicted in Figure 5, financial constraints, imminent power cuts and rising electricity costs, more large consumers are looking to increase their energy autonomy. This increasing demand, combined with reducing technology prices, improves the business case for finding other energy efficiency techniques and other RE solutions.

In the long term, provinces will be able to generate their own power and even be net-exporters into the national grid, provided that developers are sufficiently prepared to deliver viable projects and providing that conducive regulations and policy are in place. Engineering News Online (2014c) published findings from an Eskom transmission grid study which hypothesised that by 2030 the greater Cape area – incorporating Northern, Western and Eastern Cape – could become a net energy exporter.

3.3. Residential-scale renewable energy market

The residential sector is the smallest of the three segments of the RE market, both in terms of the installed capacity and the size of typical installations. At the moment most renewable energy EG consists of rooftop solar PV installations.

The EG regulations of larger municipalities such as City of Cape Town, Nelson Mandela Bay and eThekwini have set a precedent for many other municipalities. These regulations enable municipalities to respond to customers whose interests in self-generation are rising. This is an indication of the system's attempt to adapt to the increased uptake in renewables. In addition, the GreenCape Smart Grids team is working to better understand the impact of energy efficiency and EG on municipal finances . Together, this contributes to the creation of more market opportunities at the residential scale. GreenCape speculates that by 2020 this market will increase to around 100 MW of installations per year.

3.4. Small-scale EG trends

While starting from a low base, the small-scale market is showing some very positive trends. The combination of Eskom load-shedding, higher prices charged by the utility and decreasing PV costs has led to significant interest in the small-scale EG market.

At the time of writing, the opportunity was largely limited to larger commercial, agricultural and industrial customers whose consumption is high during daylight hours. Equally, these opportunities extend to municipalities with a load profile that matches PV. One example is Matzikama municipality, where GreenCape is undertaking a study investigating the possibility of using solar PV to alleviate supply constraints. This would be an alternative to more traditional options such as upgrading a substation. The municipality has a summer, daytime peak due to extensive use of air conditioning.

Currently, the standards, grid requirements and metering costs make these investments prohibitively expensive at a residential level. However, this is set to change within the next few years, with the introduction of a smart metering standard, and NERSA's publication of the EG guidelines.

3.5. Markets beyond South Africa

A developing African energy landscape offers further RE market opportunities beyond the South African borders. With several years of experience in the RE market, maturing procurement rules, technical regulations and financial mechanisms, South Africa and companies located here have a unique platform from which to launch into and contribute to the rest of Africa. Initiatives such as the United Nations Sustainable Energy 4 All (SE4ALL) – in which 14 African countries had planned to develop energy action plans and investment prospectuses by the end of 2014 – present vast opportunities for investments into the rest of Africa (Engineering News, 2014d).

4 – Conclusions & Key Insights

At the national level, the REIPPPP has been a success, with almost 4 000 MW of renewable generation capacity contracted in a little under three years, and impressive economic and social dividends accruing to communities adjacent to those projects. Inevitably, there are lessons to be learned and areas for improvement.

At the national level, the REIPPPP has been a success, with almost 4 000 MW of renewable generation capacity contracted in a little under three years, and impressive economic and social dividends accruing to communities adjacent to those projects. Inevitably, there are lessons to be learned and areas for improvement. These areas include timeframe certainty; allocations; localisation requirements; bid structures; and optimising the economic development contributions from these projects. These topics reflect conversations being held at various levels within government circles, academia and the private sector. The multiplicity of national policies and efforts that focus on renewable energy are certainly an encouraging sign for the market. However, the single most important document used for planning in the electricity sector in South Africa is still not published: the long overdue IRP2010 update.

The most crucial criteria for investors looking to make long term commitments are certainty and confidence in the REIPPPP's longevity. This is especially the case for the manufacturing subsector. There have been repeated calls for the IRP update to be published. Ceteris paribas, GreenCape identifies this as the single largest impediment to unlocking the full value of job creation and manufacturing in the renewable energy sector in South Africa.
Focusing on the Western Cape, there are challenges facing growth of the EG market. The City of Cape Town has set a precedent by formulating its regulations to enhance and promote the sustainable uptake of EG within municipalities. This gives the province the opportunity to contribute to the national need to address supply constraints.

In addition, increased security of supply will assist in promoting the Western Cape as a premier business and tourism destination. To achieve this, there is a need to resolve issues relating to appropriate municipal tariffs, connection regulations, demand-side management and energy efficiency interventions. Financing for smaller projects (less than 1 MW) also needs to be resolved. GreenCape asserts that, once these legal, technical and bureaucratic challenges have been resolved, the Western Cape will further assert its position as the green economic hub of the continent.

5 – Investment incentives

There are a number of investment incentive programmes open to greentech manufacturing and service companies planning to set up in Cape Town and the Western Cape. They include:

Atlantis GreenTech Special Economic Zone (SEZ)

GreenCape is the project management office tasked with the preparation of an application for designation of the greentech Manufacturing Special Economic Zone (SEZ) in Atlantis, Cape Town (dti, 2015). As part of the national SEZ programme, the Atlantis SEZ will provide incentives for investments into greentech manufacturing (dti, 2015), which includes the manufacturing of energy efficiency, renewable energy and related technologies. These regulations are yet to be ratified by the dti. Some of the proposed incentives include a 15% company tax and building allowance.

Department of Trade & Industry (DTI) Incentives

The Department of Trade and Industry (dti) also offers a wide range of incentives across industries and sectors for businesses located anywhere in South Africa. Please refer to www.investmentincentives.co.za for more information on incentives that apply to your business.

6– Overview of GreenCape's activities in this sector

The Renewable Energy sector desk, which wrote this report, is part of GreenCape's Energy Programme. The programme aims to encourage economic development and job creation through the transformation of the energy sector – both by increasing energy efficiency and increasing the supply of cleaner energy. These two paths towards a lower carbon energy economy form the basis of GreenCape's work in this space.

The focus of our renewable energy work includes energy efficient buildings – both new build and retrofit – energy efficiency standards, smart grids, demand side management and energy efficiency financing.

GreenCape's support for increasing the supply of cleaner energy comes through our renewable energy work – both in the large-scale utility and small-scale (embedded generation) renewable energy sectors.

- We work with project developers and investors on the promotion of large-scale renewable energy projects within the province, and to position the Western Cape as a preferred location for the manufacturing of renewable energy components.
- We are also actively driving the enabling and uptake of small scale embedded generation by helping address the barriers to market growth. This work looks primarily at policies and tariffs, and aims to allow legal connection of embedded generation and feed-in of energy in Western Cape municipalities. Linked to this, GreenCape is involved in developing a national prepaid smart metering standard, which will help enable both demand reduction and the connection of embedded generation.

To ensure that local skills are available to meet the needs of this exciting and growing industry, GreenCape has a major focus on skills development in the renewable energy space. The South African Renewable Energy Technology Centre (SARETEC) at CPUT is already training wind turbine technicians, and our next major focus is on rooftop solar PV mounting skills training.

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