

## **RENEWABLE ENERGY SMME GUIDE**

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## **Abstract**

The incorporation of renewable energy into the South African resource plan energy mix has brought opportunities in the development of new energy technologies in the country. This is evident through the adoption of renewable energy in the national grid. The formal renewable energy procurement programme known as the “Renewable Energy Independent Power Producer Procurement Programme” (REIPPPP) is coordinated through the Department of Energy. This programme carries opportunities for local businesses such as small, medium and micro-enterprises (SMMEs) who can offer professional and auxiliary services in the renewable energy value chain. Nonetheless, SMMEs have not optimally benefitted from the REIPPPP programme due to a number of reasons that this study identified. These include capacity building, inaccessible information and financial challenges among others.

For that reason, the compilation of a renewable energy SMME guide that shares information about the opportunities that are available in the sector has been developed. This guide contains information about the policy framework, technology development and opportunities in the value chain. This is aimed at empowering SMMEs and relevant stakeholders that can enable the participation of the SMMEs in the renewable energy sector. The study unpacked the SMME guide through discussing the policy landscape, renewable energy technologies and opportunities available in the value chain for each technology discussed.

## 1. INTRODUCTION

The increasing awareness globally about the negative impacts (such as greenhouse gas emission, global warming and climate change) of carbon-intensive energy from resources such as coal has resulted in the new economic revolution called the green economy. Governments around the world have realised that to lead sustainable economies that are not detrimental to the environment, there is a need to switch to more sustainable ways of doing things. Every economy is powered by energy and the more carbon-intensive the energy, the more unsustainable the economy. This resulted in the adoption of renewable energy sources such as solar, wind and bioenergy. For South Africa, this is more fitting because of the resources the country possess such as solar and wind resources.

What makes the renewable energy to be more competitive over the years is the fact that finance is becoming available for green energy projects, which provided the country with an opportunity to leapfrog and compete at a global scale. Moreover, the cost of renewable is becoming less of an issue as solar and wind, are fast reaching grid parity. So the companies who took a lead in developing the first South African Renewable energy projects were able to capture the first mover benefits and that has been their competitive advantage in developing further projects.

The introduction of renewable has triggered a structural change in the energy sector in South Africa. For decades the energy generation business was reserved as a state function, with Eskom, the national power utility, holding a monopolistic position in power generation and transmission. Today, through the Independent Power Producer procurement programmes which are facilitated by the Department of Energy, the energy generation has been opened to private businesses.

This has been an exciting period for renewable energy investors in South Africa. The massive inflows of investments have been seen. Foreign enterprises establishing their presence in SA to take advantage of one of the top 10 investment destinations for renewable energy, as South Africa was named by Bloomberg New Energy Finance in 2013. South Africa's REIPP won the Green Infrastructure project of the Year in 2013 at the 6th Global Infrastructure Leadership Conference in New York.

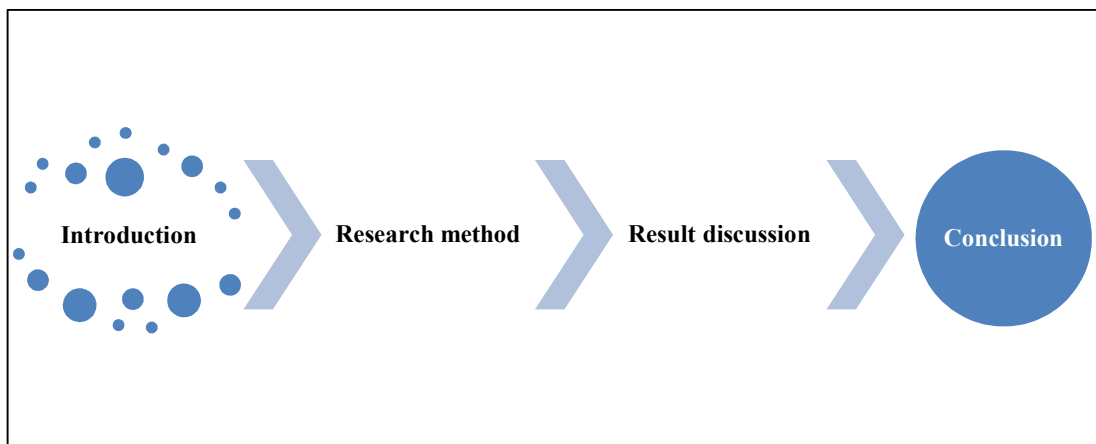
However, in the period of exciting development, entrepreneurs standing on the peripherals often struggle to make sense of it all. The information has become expensive for small businesses to access. The most recent updates on the industry are often obtainable at conferences, which usually charge exorbitant amounts, even accessing conference presentation slides costs money. Yet there is still a need to educate and empower emerging companies on how to enter the renewable energy market.

### **1.1 Problem Statement**

The renewable energy industry is slowly growing, with big establishments acquired through the REIPPPP. The REIPPPP offers the private sector an opportunity to construct, operate and do maintenance of the renewable energy facilities. The process offers opportunities for several players to participate, however, it has been noted that the participation of the SMME is found predominantly in the non-core value chain (providing services such as catering, security etc.), which is quite limiting to their growth and impact on the industry. The aim is to prepare a guide that will equip and empower the SMME with the relevant knowledge that will encourage their participation in the core value chain.

### **1.2 Research Questions**

- Why are SMMEs not accessing the RE market?
- What can be done to assist SMMES to access the RE market?
  - Value Chain analysis per technology.
  - Highlight potential for SMME opportunities in the RE value chain.



**Figure 1: Graphic research approach**

## **2. METHODOLOGY**

The research method for this study was based on the qualitative methodology, which was aimed at better understanding the status quo to forge the way forward. The combination of a desktop study as well as interviews with the industry role players was the approach that was used for this study. This study explored a qualitative research method to investigate why there is a minimum participation of SMMEs in the REIPPPP. The research method was deployed to collect and analyse data. This technique allowed the study to understand weaknesses and limitations of the REIPPPP with regards to creating an enabling environment for SMMEs to participate.

Research on various aspects of the industry was done through a desktop study where relevant information was gathered and analysed for the renewable energy sector. Furthermore, to gain more insight on the industry and the current status of the participation of the SMMEs in the formal procurement programme- REIPPPP, interviews were conducted with various role players in this sector. The information sourced was consolidated into various chapters.

### **3. RESULTS**

The information for the SMME Guide to Renewable Energy was structured into various chapters that deals with different topics. There were nine chapters that were developed, that contained relevant information. The topics are as follows:

- Policy supporting renewable energy incorporation to energy mix
- Technologies
- Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)
- Project Development Value Chain Analysis
- Opportunities for SMMEs Positioning in the RE Value Chain
- Potential Challenges for SMMEs in RE
- Alternative Platform for SMME participation Outside REIPPPP
- Skills requirements in RE industry
- Support available for SMME development (financial and non-financial)

The chapters outlined above seeks to equip and empower the SMMEs with relevant information that will allow them to make informed decisions and will encourage their participation in the core value chain.

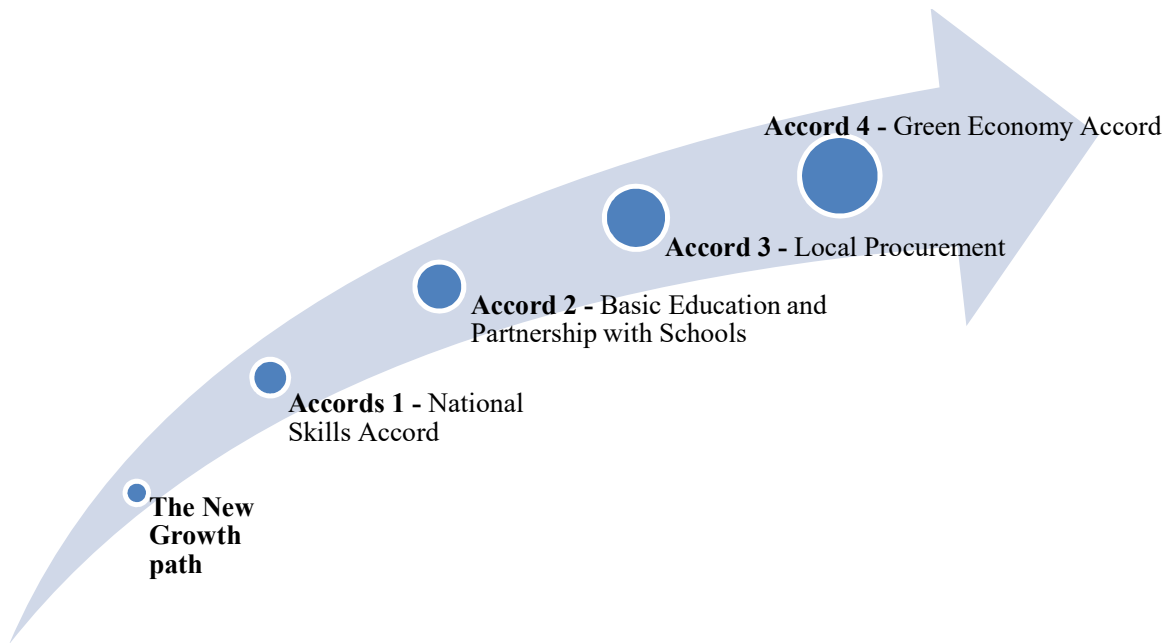
A synopsis of some of the chapters is given below, as key findings, on opportunities identified for SMMEs.

#### **3.1 Policy supporting renewable energy incorporation to energy mix**

There are policies that have been identified that are supportive of the incorporation of the renewable energy, which in turn supports the participation of the SMMEs in this sector. These policies commits to the pursuit of the development of the renewable energy initiatives, and relevant areas that can be considered for the participation by SMMEs. Below is a summary of some of the policies.

## ■ *Green Economy Accord*

The South African government and various partners endorsed a Green Economy Accord in 2011 as part of the New Growth Path public discussions. The New Growth Path framework sets out four accord illustrated in Figure 2.



**Figure 2 The New Growth Path Accords**

The Green Economy Accord contains twelve (12) commitments that can enable SMMEs to start partaking in the renewable energy value chain. The twelve commitments have the potential to unlock market access for SMMEs in the renewable energy sector. Nonetheless, coordinating and showcasing SMME opportunities in the renewable energy sector is often omitted and regarded as insignificant. This indirect disregard has been instrumental in the unpublicised SMME opportunities in the renewable energy sector.

- The Green Economy Accord Commitment 1 – Rollout of SWHs
- The Green Economy Accord Commitment 2 – Accelerating investment in the Green Economy
- The Green Economy Accord Commitment 3 – Rollout of Renewable Energy
- The Green Economy Accord Commitment 4 – Energy Efficiency
- The Green Economy Accord Commitment 5 – Waste Recycling, Re-Use And Recovery
- The Green Economy Accord Commitment 6 – Biofuels

- The Green Economy Accord Commitment 7 – Clean-coal Initiatives
- The Green Economy Accord Commitment 8 – Retrofitting
- The Green Economy Accord Commitment 9 – Reducing Carbon-Emission on our Roads
- The Green Economy Accord Commitment 10 – Electrification of Poor Communities and Reduction of Fossil-Fuel Open Fire Cooking and Heating
- The Green Economy Accord Commitment 11 – Economic Development in the Green Economy: Promotion of Localisation, Youth Employment, Cooperatives and Skills Development
- The Green Economy Accord Commitment 12- Cooperation around the United Nations Cop 17 and its Follow-up

A number of these commitments can translate to areas that SMMEs can participate in.

### **3.2 Technologies**

There are various renewable energy technologies and for this assessment, few technologies were selected for assessment that is aligned with the formal programme introduced in South Africa for procuring renewable energy, the REIPPPP.

The various technologies are unpacked for better understanding of how they work, the resource they use, technology mechanism, the limitations or challenges of the technology and identified suitable areas of development. Below is an outline of these technologies.

#### **■ Wind**

Wind power can be defined as the mechanical power that is generated by the flow of air through the wind turbines, by the generator to derive electric power. According to Ofualagba (2008) it can be defined as the energy conversion in which the turbine converts the kinetic energy of the wind, into electrical energy, through an an electrical generator . The transformation of the speed of the wind turbine, through the gearbox, in high speeds on the electrical generator. The wind turbine generates electricity by the rotation of the electrical generator's shaft.

The suitability of an area to generate electricity from the wind turbines is determined by the wind resources. The wind resources are calculated by the wind speed and the wind speed values that are occurring in the particular area. South Africa has fair winds, with more suitable areas



in the country that have a higher wind potential, along the coastal areas in the Western and Eastern Cape.

### ■ *Solar Photovoltaic (PV)*

Solar energy refers to the energy from the sun, as visible light or other forms of radiation. This is based on the conversion of the sun energy (sunlight, including sun ultraviolet radiation) into electrical energy, through photovoltaic effect (which is the creation of voltage and electric current on a material upon exposure to light).

During the initial stages of project development, the solar irradiation data is sourced to make a call on a particular project. Such data is sourced from the calculation of the Global Horizontal Irradiation (GHI) and the Direct Normal Irradiation (DNI), which are sourced from the satellite cloud cover data (Mahtta, Joshi and Jindal, 2014). This information can be used to calculate the annual average power output from a theoretical photovoltaic (PV) plant (called PVO<sub>UT</sub>); however taking into consideration the efficiency of the equipment to be used, the tilt and the temperature.

The DNI of South Africa is regarded as high, especially in the Northern Cape region around Upington, with an annual sum reaching 2800Wh/m<sup>2</sup>, making this location more appealing for such technology.

### ■ *Concentrated Solar Power*

Concentrated Solar Power (CSP) refers to the technology that traps the sun by concentrating solar energy onto a small area with the help of mirrors, to produce heat that can be converted into electricity (Mordor Intelligence, 2017). This thermal energy concentrated can be stored or used when needed (Thermal Energy Storage system); this makes the CSP technology superior to the Solar PV technology due to high levels of lasting energy storage which allows electricity accessibility overnight and on rainy days.

There are various CSP systems: Parabolic Trough, Compact Linear Fresnel Reflector (CLFR), Power Tower, and Dish Engine. This technology I known to be expensive, which becomes a limiting factor.

### ■ *Bioenergy*

- a) Biogas

Biogas production refers to the production of a mixture from a breakdown of organic matter in the absence of oxygen. Thus, organic matter such as municipal waste, sewage, agricultural waste, manure, plant material/waste, food waste etc. The material contains carbon, which is transformed or biodegrades to methane and carbon dioxide (SEIA, 2017).

The technology that is well established and common in producing biogas from waste material is the Anaerobic Digestion (AD), with anaerobic organisms which digest material inside the closed system. The alternative is via fermentation of the biodegradable material (which is a metabolic process that consumes sugars in the absence of oxygen).

The technology attractiveness is as a result of its triple function, which refers to waste removal, management of the environment and energy production.

#### b) Biomass

Biomass refers to plant material, that is organic that can easily be converted to other forms of energy, such as the agricultural residue- bagasse, forestry residues- wood waste etc. According to (Evans, 2010), biomass is the only fuel available for renewable combustion-based electricity generation; and thus has gained a lot of interest as a substitute of the conventional fuel- the fossil fuels.

Three types of technologies are applied:

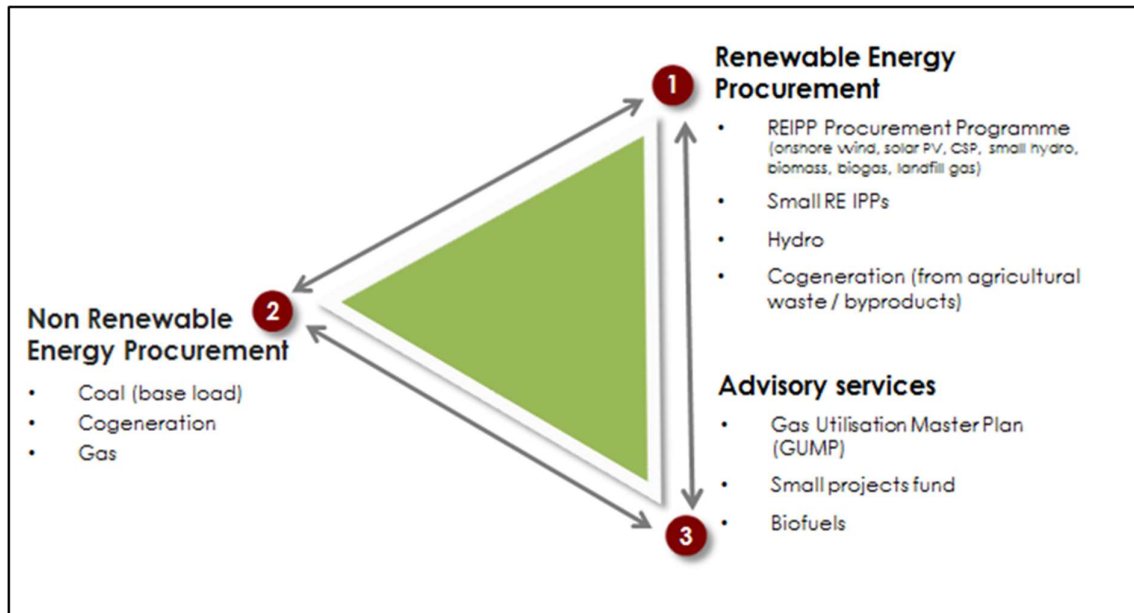
- Direct combustion
- Pyrolysis
- Combustion

### **3.3 Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)**

The REIPPPP, is a programme established by the Department of Energy (DOE) together with National Treasury (NT) and the Development Bank of Southern Africa (DBSA), to facilitate procuring energy from the renewable energy sector (IPP Office). This was implemented through the Independent Power Producer (IPP) Office which was established by the DOE to coordinate the programme, where the key mandate was to ensure security and provision of sustainable energy (amongst other roles such as professional advisory services, monitoring,

evaluation and contract management services). This programme was mandated to ensure electricity capacity from renewable and non-renewable sources from the private sector.

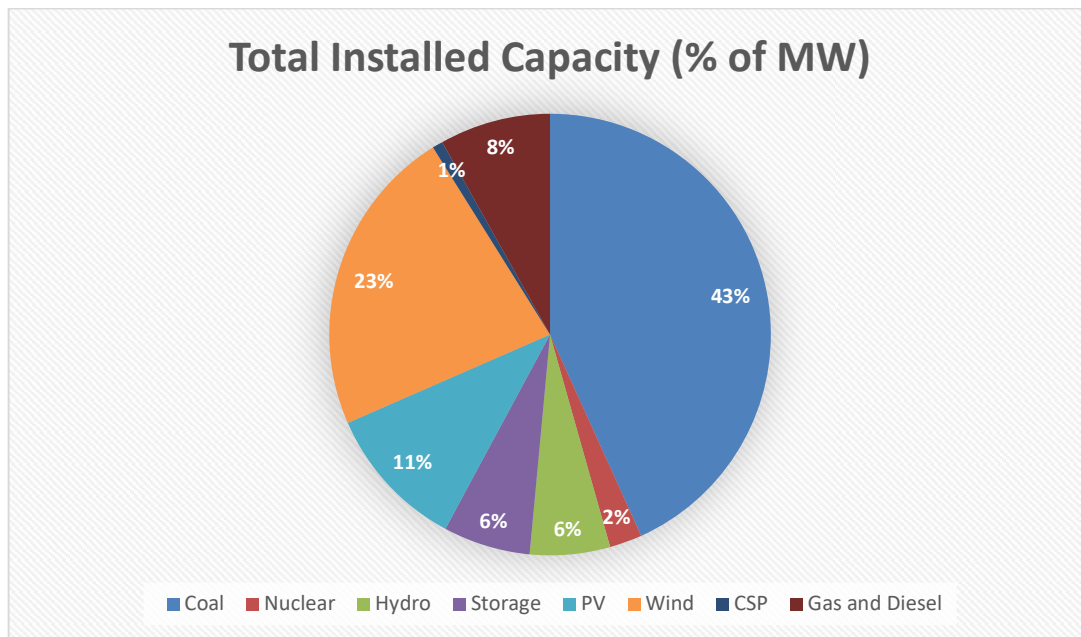
Therefore, the national government uses the REIPPPP as a competitive bidding process in procuring renewable energy from the energy producers. Below are the roles played by the Independent Power Producer Procurement Programme (IPPPP) Office:



**Figure 3 IPPPP Office Services (Image source: IPPP Office)**

The Independent Resource Plan 2010 outlined the energy mix for South Africa to meet energy needs, for the 20-year timeframe, from the year 2010 to 2030. The targets were set in-line with the commitment made nationally, to make a transition for low carbon economy, where the renewable energy target was set initially at 17 800MW, with 5 000MW targeted to be operational by 2019, and additional 2 000MW in 2020 to make a total of 7 000MW by 2020 (IPP Office). These goals set the programme in motion, which saw the establishment of operational plants that supply renewable energy to the grid.

However, this has culminated to a revised resource plan, IRP 2019. Below is an indication of the energy determinations by the department.



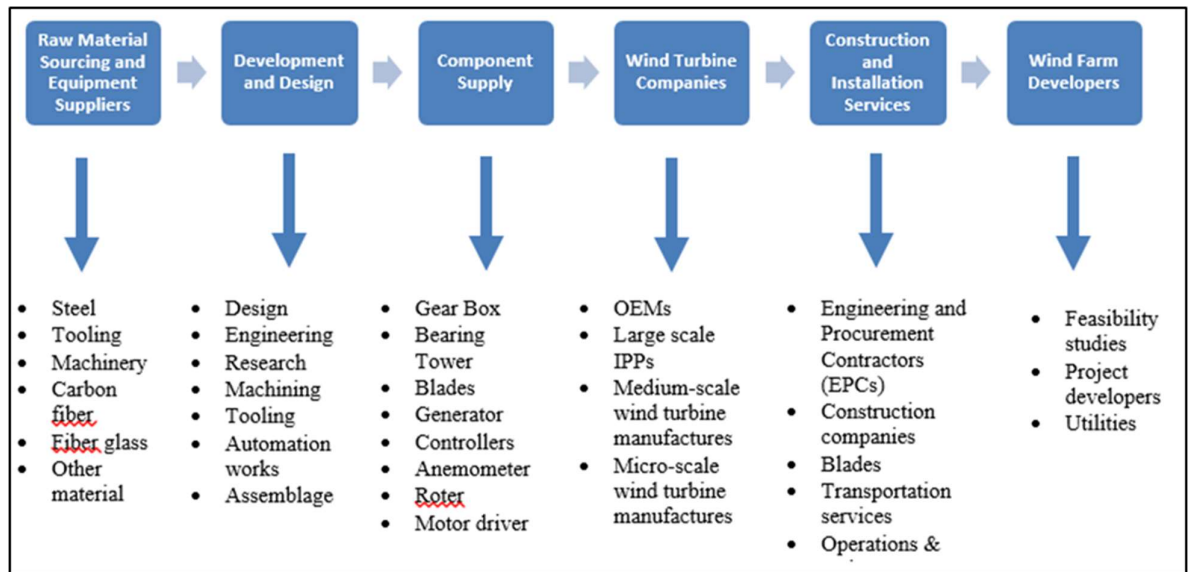
**Figure 4 South African energy mix as per the IRP 2019**

Such pronouncements give confidence in the industry to pursue further new development in the country. This formal programme is a platform that can be seen to present opportunities for SMMEs as well, to participate in, in the value chain when relevant projects are established, however, certain opportunities are inaccessible for the small business owners due to various barriers they encounter.

### 3.4 Project Development Value Chain Analysis

#### ■ *Wind technology value chain*

The wind sector value chain comprises of various diverse phases. These phases emanate from raw material sourcing, equipment supply to the distribution of electricity. The wind energy value chain phases with the necessary auxiliary product and services are illustrated below in Figure 5:

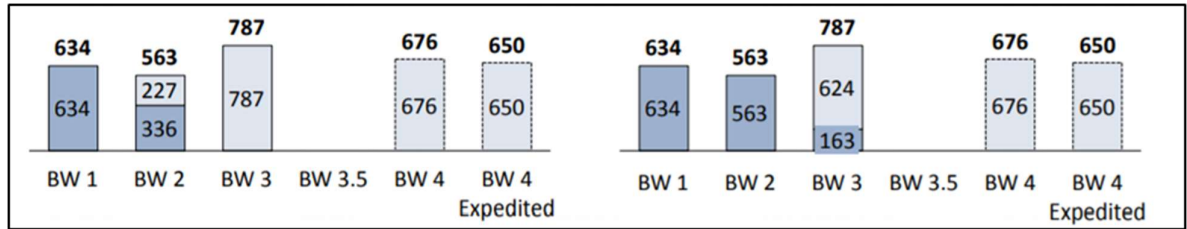


**Figure 5 Wind energy value chain stages (Source: EAI, 2010)**

A comprehensive breakdown of several steps illustrated in Figure 5 exhibit potential opportunities for entrepreneur in the wind energy value chain. Opportunities existing within the wind energy market, would in this regard exclude wind turbine companies segment as a result of OEMs contracts that are in place already in the context of South African energy market. The other stages illustrated in Figure 5 offers abundant opportunities for potential black industrialists and various entrepreneurs keen on playing in the wind energy field.

It is important for potential entrepreneurs that want to enter the wind energy domain to be cognisant of official transitioning towards a vertical integration within this sector. Vertical integration allows entrepreneurs to cluster the good and services value chain thus able to offer comprehensive services. While the wind energy sector has been growing significantly in the South African market as shown in Figure 6. However, auxiliary services that could be delivered by entrepreneurs have not proportionally grown for a number of reasons, such as:

- Lack of awareness on entrepreneur opportunities in the wind energy market;
- Technical expertise and skills shortages;
- A poor balance sheet of small and medium enterprises



**Figure 6 Wind Power MW allocated from Bid Window 1 – 4 expedited (CSIR EC, 2017)**

Uncertainty in the South African energy policy has also instigated stagnation in the growth of the wind energy market. Successively, the expertise, capacities and facilities that were being built in the wind technology sectors have struggled to exponentially develop, thus affecting the technical capabilities of entrepreneurs. The South African supply chain bottlenecks have created a discretion for large scale wind energy developers to source components such as generators, gearboxes and blades outside South Africa, as a result, South African entrepreneurs have failed to take advantage of business opportunities that are deriving from the wind energy subdivision.

This phenomenon has led to the importing of wind energy component suppliers into South Africa. Importing these service guarantees a constant supply of spares and other needed products at an economical cost. This is a possible gap that entrepreneurs can exploit within this market. Original Equipment Manufacturers (OEMs) such as Siemens, Vestas and Nordex have taken advantage of the vertical integration practice through supplying wind energy components such as generators and controllers. This approach has allowed the OEMs to lock access to this market.

### **3.5 Opportunities and challenges identified by the industry**

To better understand the level of participation of the SMMEs in the renewable energy sector, a questionnaire was compiled to gain insight from the industry role players in the REIPPPP. These stakeholders included some Independent Power Producers (IPPs), OEMs, Engineering Procurement and Construction (EPC) and some SMMEs. Through the interviews, challenges that SMMEs encounter were identified as well as the opportunities that can be accessible to them.

#### **■ Opportunities**

Below is a summary of some of the opportunities that were identified that SMMEs can access.

- Professional services
  - Project management
  - Design
  - Typographical surveys
- Manufacturing
  - Steel components
  - Transformers
  - Tower internals
- Construction
  - Equipment installation
  - Civil works
  - Road construction
- Transport and logistics
  - Equipment transportation
  - Transportation of tools and spare parts
  - Raw material transportation
- Maintenance
  - Instrumentation maintenance
  - Electrical maintenance
  - Motor and gearbox servicing
- Auxiliary services
  - IT services
  - Grid connection
  - Bird/bat monitoring

These opportunities are apply to most technologies, however, some prospects that apply to certain technologies only. An example will be wind measurements, which will apply to wind technology and not others.

### ■ *Challenges*

The industry indicated that most SMMEs were seen to be providing services in the REIPPPP mostly in the non-core value chain. The non-core value chain includes services such as

catering, accommodation, security services etc. and not necessarily in the main value chain. This was as a result of some challenges that they encounter in the industry that is hindering their participation. The most prevalent challenges (identified by most stakeholders) were as follows:

**Table 1 Challenges identified by the survey participants**

<b>Identified challenge</b>	<b>Implications and impact</b>
Lack of technical skills, most SMMEs do not have a specialized skill. They offer generic services.	In this case, an indication is made that the SMMEs are not given an opportunity to provide services, as they lack relevant skillset. No skills transfer is offered by most industry players.
Lack of equipment- high capital investment	Some technologies require a high upfront cost to access certain equipment, which limits SMME participation due to lack of financial resources. An example is equipment to transport wind components.
Advertisement of the available opportunities is not standardized, SMMEs are unable to access them	SMMEs are not alerted of available opportunities, as the opportunities are not advertised in a standardized manner. Some opportunities are shared amongst small and intimate networks.
Lack of financial resources for working capital.	The SMMEs lack funding to cover for their costs when delivering on a certain job (the working capital). This leads to lost opportunities.
Local content is not enforced (some companies are reluctant to work with SMMEs).	An indication is that the local content requirements are not enforced, hence some participants don't acquire services from locals, and instead they bring their own resources.
Lack of financial resources for upfront compliance.	There are certain expectations that every service provider need to comply with, which are costly that includes medicals, training on first aid, working at heights, firefighting etc. This leads to their exclusion.
Lack of experience and track record.	Some stakeholders require working experience from SMMEs who are still looking for opportunities to gain experience.
The services are kept in-house or sourced from trusted partners (example for O&M).	This aspect relates to some OEMs keeping the opportunities in-house, which denies SMMEs an opportunity to offer Operations and Maintenance services.
Opportunity loss for SMME due to procurement policy – 3 quotations, where the cheapest is chosen.	The procurement policy requires that the cheapest quotation be awarded, however, this eliminates SMMEs as their prices are higher than competition due to economies of scale.
Lack of SMME development. ED initiatives are generic and not focused on the development of renewable energy businesses.	The Enterprise Development (ED) initiatives are generic and offered to any business or individual. Whereas the SMMEs in this sector are in need of such developmental support.



The challenges identified by the industry are broad and touch on various issues in the sector. Some are linked to the incompetence of the SMMEs to offer service, whilst on the other hand, some indicate that the industry is reluctant to work with SMMEs and deciding to limit opportunities to them. Other challenges indicate that the policies introduced by the government, are not enforced and hence the loopholes- such as in the case of local content. Also that the policies are not conducive for SMMEs to gain a chance, this is evident in the case of the policy on procurement. All these challenges (and more) stifle the entry of SMMEs into the renewable energy industry and as a result some resort to offering non-core services.

### 3.6 Industry support available for SMMEs

Support for SMME development and business commercialization in South Africa is broad, with a number of organizations providing various support. Below is the summary of some of the initiatives that supports the SMMEs.

**Table 2 Summary of relevant programmes supporting the SMMEs**

Initiative/organization	Support
Energy and Environment Partnership Trust Fund (EEP Africa) Email address: <a href="mailto:info@eepafrica.org">info@eepafrica.org</a> Website: <a href="https://eepafrica.org/">https://eepafrica.org/</a>	A multi-donor funding focusing on Southern and East Africa to provide grant at an early stage of development that serves as a catalytic finance for clean energy project, technologies and businesses that are innovative.
Development Bank of South Africa (DBSA) Telephone: +27(0) 11 313 3911 Email address: <a href="mailto:webmaster@dbsa.org">webmaster@dbsa.org</a> Website: <a href="https://www.dbsa.org/EN/Pages/default.aspx">https://www.dbsa.org/EN/Pages/default.aspx</a>	DBSA has various funding programmes for various sectors. Of interest in the Renewable Energy Industry, are the following support programmes: 1. DBSA Project Preparation Fund 2. Infrastructure Investment Programme for South Africa (IIPSA) 3. SADC Project Preparation and Development Facility (PPDF)
Green Fund Telephone: +27(0)11 313 3611 Email address: <a href="mailto:enquiries@sagreenfund.org.za">enquiries@sagreenfund.org.za</a> Website: <a href="https://www.sagreenfund.org.za/wordpress/">https://www.sagreenfund.org.za/wordpress/</a>	Is the national fund established by the Department of Environmental Affairs (DEA) to support the green initiatives that encourage the transition of the country to a lower carbon energy sources, to be more resource efficient and ultimately to be more resilient to climate change.

<p>AFD Green Energy Fund</p> <p>Telephone: +27(0)11 269 3000</p> <p>Email address: <a href="mailto:callcentre@idc.co.za">callcentre@idc.co.za</a></p> <p>Website: <a href="https://www.idc.co.za/afd-green-energy-fund/">https://www.idc.co.za/afd-green-energy-fund/</a></p>	<p>The main objectives of the fund, is to provide finance to projects in the renewable energy and energy efficiency, that are of smaller scale and manufacturing of green products in South Africa. This includes renewable energy looking at: solar, biomass or other technologies that are considered case-by-case basis.</p>
<p>South African Renewable Energy Business Incubation (SAREBI)</p> <p>Telephone: +27 (0)21 577 2719</p> <p>Website: <a href="http://www.sarebi.co.za/">http://www.sarebi.co.za/</a></p>	<p>An incubation centre, located within Cape Town focusing on providing support (in the Western Cape region) for individuals with business concept that are focused in energy efficiency and renewable energy. The incubation program is split into four stages: Master Class, Pre-Incubation, Incubation and Post Incubation.</p>
<p>South African Renewable Energy Technology Centre (SARETEC)</p> <p>Telephone: +27 (0)21 959 4320</p> <p>Website: <a href="https://www.saretec.org.za/">https://www.saretec.org.za/</a></p>	<p>A South African Renewable Energy Technology Centre located within the Cape Peninsula University of Technology (CPUT), with the aim of upskilling the individuals in the renewable industry. Thus, with the provision of formal training and short courses.</p>
<p>National Cleaner Production Centre (NCPC)</p> <p>Telephone: +27 12 841 3772</p> <p>Email address: <a href="mailto:ncpc@csir.co.za">ncpc@csir.co.za</a></p> <p>Website: <a href="http://ncpc.co.za/">http://ncpc.co.za/</a></p>	<p>A national programme by government, hosted by the CSIR with the main focus on resource efficiency and cleaner production, in an attempt to help the industry to reduce costs associated with the resource usage and lowering the carbon footprint. The programme also focuses on up skilling individuals.</p>
<p>Innovation Hub Climate Innovation Centre</p> <p>Telephine: +27 12 844 0000</p> <p>Email address: <a href="mailto:info@theinnovationhub.com">info@theinnovationhub.com</a></p> <p>Website: <a href="http://www.theinnovationhub.com/business-incubators/climate-innovation-centre-south-africa-6">http://www.theinnovationhub.com/business-incubators/climate-innovation-centre-south-africa-6</a></p>	<p>It is a Green Economy initiative of the Innovation Hub, a subsidiary of Gauteng Growth and Development Agency; that promotes socio-economic development and competitiveness of the province. The centre operates as a technology and business incubator dedicated to supporting the start-ups and small businesses operating in South Africa, operating in the green economy, in collaboration with InfoDev.</p>

## 4. CONCLUSION

The renewable energy industry in South Africa is maturing, with several established and operational projects that supply energy to the national grid. The platform created (i.e. REIPPPP), is a step in the right direction for SMMEs, however, a lot still needs to be done to address the barriers of entry that SMMEs encounter and subsequently discourages their participation.

The policies that enable the use and introduction of clean energy and conservation or responsible use of energy (though energy efficiency programmes) have been established. For example, the 12 commitments on the policy Green Economic Accord have areas that can be accessed by SMMEs.

Moreover, through the assessment of various renewable energy technologies and their respective value chain, a number of opportunities were identified that can be accessed by the SMMEs. Most technologies include the following areas in their value chain:

- Professional services
- Manufacturing
- Construction
- Transport and logistics
- Operations and maintenance
- Auxiliary services

The opportunities shown presents various areas that SMMEs can participate in, however, the lack of technical skill and resources, platforms that advertises the available opportunities in this sector and poor policy enforcement were identified inter alia as leading barriers for SMME to participate the renewable energy sector.

### 4.1 Recommendations

The analysis of the policy framework, the renewable energy technologies in the REIPPPP and the opportunities available in various technology value chains. The formal platform created for procuring renewable energy and the insight gathered from the industry show that SMMEs have a role to play in the sector. However, the challenges that were identified by the industry participants in the study indicated that opportunities for SMMEs were not leveraged due to the

barriers such as capacity building, inaccessible information and financial challenges among others.

It is for this reason that the CSIR through the Energy Centre developed an SMME Guide to Renewable Energy that seeks to alleviate some of the challenges identified. Equipping and empowering the SMMEs with the relevant knowledge through the development of a renewable energy SMME guide is likely to increase the participation of SMMEs in the REIPPPP. Possible solutions to the identified challenges were developed for each stakeholder involved in the value chain, these included government, IPPs, EPCs and OEMs). Lastly, support is needed to disseminate the renewable energy SMMEs guide for the relevant stakeholders.

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