UNIVERSITY OF JOHANNESBURG

CCRED

**Centre for Competition, Regulation and Economic Development**

# Regulatory Entities Capacity Building Project

# Review of Regulators Orientation and Performance:

# Review of Regulation in Renewable Energy


**Trade and Industrial Policy Strategies (TIPS)**

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## Abbreviations and Acronyms

| | |
|---|---|
| AGP | Amatola Green Power |
| c/kWh | cents per kilowatt-hour |
| CCRED | Centre for Competition, Regulation and Economic Development |
| $CO_2$ | Carbon dioxide |
| COP | Conference of the Parties |
| CPI | Consumer price index |
| CSP | Concentrated Solar Power |
| DBSA | Development Bank of Southern Africa |
| DEA | Department of Environmental Affairs |
| DEAT | Department of Environmental Affairs and Tourism |
| DME | Department of Minerals and Energy |
| DMR | Department of Mineral Resources |
| DoE | Department of Energy |
| DPE | Department of Public Enterprises |
| DWA | Department of Water Affairs |
| EAT | Equivalent Annual Tariff |
| EDD | Economic Development Department |
| EIA | Environmental Impact Assessment |
| EIUG | Energy Intensive User Group of Southern Africa |
| EPC | Engineering, Procurement and Construction |
| GAU | Grid Access Unit |
| GWh | Gigawatt-hour |
| IDC | Industrial Development Corporation |
| INEP | Integrated Electrification Programme |
| IPAP | Industrial Policy Action Plan |
| IPP | Independent Power Producer |
| IRP | Integrated Resource Plan |

| | |
|---|---|
| ISMO | Independent Systems and Market Operator |
| JSE | Johannesburg Stock Exchange |
| kW | Kilowatt |
| kWh | Kilowatt-hour |
| LCOE | Levelised Cost of Electricity |
| MBIPPP | Multisite Base-load Independent Power Producer Programme) |
| MCEP | Manufacturing Competitiveness Enhancement Programme |
| MTPPP | Medium Term Power Purchase Programme |
| MW | Megawatt |
| MWh | Megawatt-hour |
| MYPD | Multi-Year Price Determination |
| NDP | National Development Plan |
| NER | National Energy Regulator |
| NERSA | National Energy Regulator of South Africa |
| NGP | New Growth Path |
| NPC | National Planning Commission |
| NT | National Treasury |
| OEM | Original Equipment Manufacturer |
| PIC | Public Investment Corporation |
| PNCP | Pilot National Cogeneration Programme |
| PPA | Power Purchase Agreement |
| PV | Photovoltaic |
| REFIT | Renewable Energy Feed-In Tariff |
| REFSO | Renewable Energy Finance and Subsidy Office |
| REIPP | Renewable Energy Independent Power Producer |
| REMT | Renewable Energy Market Transformation |
| REPA | Renewable Energy Purchasing Agency |
| RFP | Request for Proposals |

| | |
|---|---|
| SARi | South African Renewables Initiative |
| SBO | Single Buyer Officer |
| SoE | State-owned Enterprise |
| **the dti** | Department of Trade and Industry |
| TIPS | Trade and Industrial Policy Strategies |
| TWh | Terawatt-hour |
| UJ | University of Johannesburg |
| UNFCCC | United Nations Framework Convention on Climate Change |
| ZAR | South African rand |

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## Executive Summary

As the world grapples with multiple crises on economic, social and environmental fronts, sustainable development, notably through the transition to a green economy, has been internationally acknowledged as the way forward. South Africa is in a unique position to benefit from the shift to a greener development path, particularly owing to the country's abundance in renewable resources (solar and wind predominantly). Accordingly, the country has demonstrated an increased commitment to sustainable development in the last few years, notably in the field of renewable energy.

The development of renewable energy in South Africa, strongly intertwined with the introduction of independent power producers (IPPs) onto the electricity market, directly results from four grand dynamics.

First, the South African Government recognises that Eskom, the state-owned vertically integrated utility, does not have the financial and technical capacity to meet alone the country's electricity demand and ensure energy security. A hybrid model progressively introducing IPPs but maintaining the dominance of the state-owned enterprise has been implemented in the country, with the objective of deriving 30% of the new power generation capacity from private developers (from renewable energy but also coal, gas and hydropower).

Second, the development of renewable energy, along with the introduction of IPPs, aims to ultimately reduce the cost of electricity in South Africa. In the short term, the national utility could benefit from IPPs building new plants and generation capacity at their own cost and financial risk, and arguably faster and more cheaply for a given technology. In the medium to long term, the development of renewable energy-based electricity will contribute to reduce the cost of electricity in South Africa. Renewable energy technologies are becoming increasingly competitive and cost-effective alternatives to traditional fuels and technologies. The probable introduction of an economy-wide carbon tax in South Africa from 1 January 2015 will further build the business case for a substantial share of renewable energy in the country's electricity supply mix.

Third, the development of renewable energy is a clear priority of the South African Government's climate change mitigation and green economy strategies. The roll-out of renewable energy in the country, from large-scale grid-connected projects to small-scale rooftop systems, participates in the country's transition to a greener economy by changing the structure of the energy sector. Renewable energy-based electricity contributes not only to the reduction in the country's greenhouse gas emissions, but also to improving water availability and air quality. In addition, off-grid solar home systems, using photovoltaic (PV) panels, have been identified as the preferred electrification technology in rural areas.

Last but not least, the creation of a renewable energy industry in the country is meant to contribute to local economic development objectives. Particularly, the creation of sustainable employment, along with the development of a domestic manufacturing capacity, constitutes Government's priority. Community ownership and black economic empowerment also feature high on the governmental agenda, and constitute key characteristics of the existing renewable energy programme.

Building on the dynamics driving the growth of renewable energy in South Africa, Government has developed an extensive policy framework to shape and support renewable energy-based power generation. The 2003 White Paper on the Renewable Energy Policy of the Republic of South Africa first set a target of 4% (1 667 MW) of estimated electricity demand to be generated from renewable sources by 2013. This objective has been progressively increased over time and the installation of 17.8 GW of renewable energy from 2010-2030 is planned by the Integrated Resource Plan for Electricity 2010-2030 (IRP 2010), supported by the Renewable Energy Independent Power Producer (REIPP) procurement programme, which aims at procuring 6 725 MW of new large-scale capacity by 2020.

South Africa's journey in developing a sound regulatory procurement programme for IPPs and renewable energy has nevertheless involved a steep learning curve, particularly for Eskom, the Department of Energy (DoE) and the National Energy Regulator of South Africa (NERSA). Initial programmes to facilitate the entry of IPPs were conceptualised, designed and administered by Eskom in 2007-2008. Three procurement programmes, namely the Pilot National Cogeneration Programme (PNCP), the Medium Term Power Purchase Programme (MTPPP) and the Multisite Base-load Independent Power Producer Programme (MBIPPP) were notably developed with the primary objective of contributing to generation capacity expansion. No power purchase agreements (PPAs) between Eskom and IPPs were however signed under these programmes. Commercial banks were not ready to finance projects for which the revenue stream (electricity sales) could be compromised by inefficiencies in the hands of the utility. IPPs were expected to carry too many risks, notably the fuel supply and fuel price risks. Should Government not supply the necessary fuel to power IPP projects to generate electricity or should the price charged for this fuel change, the risk would fall on the IPP and not be carried by Government. Project developers were also hesitant to participate in the programmes owing to Eskom's role as an industry player and referee, i.e. as a generator, transmitter and distributor, as well as administrator of the programmes, with little oversight to ensure that the utility would not leverage its monopoly in the electricity supply industry to maintain its dominant position.

Following the failure of early procurement programmes, Government needed to create a credible IPP procurement programme. NERSA accordingly developed a Renewable Energy Feed-In Tariff (REFIT) mechanism to procure power output from qualifying renewable energy generators at predetermined prices. IPPs participating in the REFIT programme were required to sell renewable energy-based electricity to Eskom (as the exclusive buyer) under a PPA, and were entitled to receive regulated tariffs, based on the particular generation technology. NERSA was tasked with administering the REFIT programme. The initial allocation under the REFIT programme amounted to 1 025 MW, in line with the 2009 and 2010 versions of the IRP and would have run for three years until the end of 2013. Not a single megawatt of power was however signed under the programme as the feed-in tariff was effectively never implemented.

Following the publication in December 2008 of tariffs regarded as too low by the industry, NERSA revised tariffs in March 2009. This time, the regulator set tariffs higher than international levels to, not only ensure a return on investment for developers, but also to incentivise a small renewable energy market and the long-term commercial viability of the sector. In March 2011, NERSA however unexpectedly released lower feed-in tariffs. In line

with international trends in the cost of renewable energy technologies, which had decreased since 2009, these new tariffs did not raise concerns among developers. A larger allocation of renewable energy in the country's electricity plan also reassured the industry. The REFIT programme was set to be the national procurement framework for renewable energy and had largely resolved the flaws that characterised previous programmes. Accordingly, developers were ready to submit their projects to participate in the REFIT.

A set of issues however resulted in the shift from a feed-in tariff to an auction programme. The initial PPA was still criticised for allocating too much risk to IPPs, developers and financiers insisting on a PPA underwritten by Government. The National Treasury (NT) and the DoE were then concerned that the tariffs set by NERSA would result in a large oversubscription, notably in relation to Eskom's (financial and grid connection) capacity to procure power from IPPs. The DoE, supported by the NT, also considered that NERSA was acting beyond its mandate and did not have the budget and the expertise to efficiently run a REFIT programme. Feed-in tariffs were finally considered to be legally challengeable against public finance and procurement laws. The 'first come first serve' basis upon which bids were essentially chosen under the REFIT was considered not to be in line with the procurement regulation that stresses competitive bidding.

So began the policy processes to replace NERSA's REFIT by introducing a competitive bidding procurement process, the REIPP procurement Programme, run by the DoE and the NT. Ultimately, the change in regulation appeared more as a political issue. The shift to a DoE-led bidding process served to shrink NERSA's role, the initiator of the REFIT, reinforcing direct governmental control over the development of renewable energy in the country. Following a lengthy transition process, the DoE, with assistance from the NT's Public-Private Partnership Unit, launched the REIPP procurement programme in August 2011.

The REIPP procurement programme is organised around a number of complementary stages and processes. First, the Minister of Energy determines, with NERSA's agreement, the limit capacity for the whole programme as well as for each technology type under each bid window. A Request for Proposals (RFP) published by the DoE then details the type of technology and tariff caps for each technology, as well as the qualification criteria on which IPPs' bids are assessed. Second, developers submit renewable energy projects that are evaluated on their price competitiveness (for 70% of the total) and a set of economic development criteria (for the remaining 30%). Economic development criteria are designed to advance government policies on socio-economic development, such as the procurement of locally manufactured inputs, job creation, and community ownership of renewable energy project companies. Most notably, in order to secure local participation, the project company must comprise a 40% participation by a South African entity. Third, projects that meet a set of minimum requirements (in terms of environmental, land, commercial, legal, economic development, financial and technical criteria) and are competitive in their technology group in terms of price and economic development are selected as preferred bidders. Thereafter, the DoE, NERSA, Eskom, commercial banks, development finance institutions and IPPs work together to bring the project companies to financial close. Fourth, preferred bidders sign a PPA with Eskom, underwritten by the NT, detailing the terms on which the project company sells electricity to the utility. Lastly, the project company signs an Implementation Agreement

with the DoE ensuring that the agreed megawatt capacity of the renewable energy will be generated within a set timeframe and that the economic development criteria to which IPPs have committed in their bids will be met.

Overall, these decision-making processes position the DoE and the NT as the main drivers of the programme. The two institutions are central in drafting the RFP which largely determines the scale of megawatt capacity in each bid window and the methodology for project selection. Other government departments provide advisory inputs as per their areas of expertise, such as the Department of Trade and Industry (**the dti**) on local content and the Department of Environmental Affairs (DEA) on environmental consents. NERSA and Eskom, which were the architects of previous independent power procurement programmes, have now secondary decision-making functions in the process.

The first phase of the REIPP procurement programme has been designed with an allocation of 3 625 MW to be procured from large-scale IPPs over a maximum of five bid windows. In order to take advantage of the high learning rates and South Africa's geographical advantages, the allocation is predominantly taken up by solar PV and wind technologies. Over the first three bid windows, a total of 3 916 MW has been procured, i.e. more than the original allocation of 3 625 MW by 2016. In December 2012, the DoE published an additional determination of 3 100 MW for the 2017-2020 period, bringing the total determination for large-scale projects to 6 725 MW. *De facto*, a part of the third round as well as upcoming bidding windows for the 2014-2016 period are already carving up the determination for the 2017-2020 period.

The first three rounds of the programme have been largely oversubscribed, a testament to the interest for the programme, and resulted in committed investment of ZAR 150 billion. The number of bid responses has increased dramatically with each round, along with a decrease in the number of successful bidders, illustrating the increasingly competitive nature of the programme. The success story of the programme, which has been praised around the world for its success, and its advantage over a REFIT policy, lie in the increasingly competitive tariffs that developers have been able to offer in their bids. Tariff caps, determined by the DoE, were used to limit the risk of high prices linked to *inter alia* a lack of competitive behaviour. Tariffs have significantly dropped over the three rounds, well below the required price ceilings. For example, prices plummeted on average from ZAR 2.75/kWh to 88c/kWh for solar PV, and from ZAR 1.14/kWh to 66c/kWh for wind. This trend essentially resulted from project developers being more experienced and familiar with the programme, an increased maturity of technologies, heightened (price) competition, reduced price ceiling for some technologies, such as wind and solar, and the allocation of a capacity limit for each technology from the second round onwards.

Along with Government's efficiency in managing the programme (including bidding windows timelines, and transparent and extensive evaluation criteria), the private sector, and particularly financial institutions, regards the programme as a success largely thanks to the bankable PPA, which is underwritten by the NT and sees IPPs only carrying the risk of project construction and operation.

From a governmental perspective, the REIPP procurement programme has furthermore been designed to bring additional benefits to the country in terms of economic development, although this remains secondary to price. Government aims, through local content and job creation requirements, to stimulate employment generation and develop an industrial base for the local manufacturing of the inputs required in renewable energy projects. Targets have increased over each bid window to encourage further industrialisation and job creation. However, the industrialisation envisioned as part of the programme remains limited owing to the insufficiency of the megawatt capacity allocated per technology (to create sufficient aggregate demand for international companies to set up manufacturing sites in the country), the limited existing manufacturing base and the upward impact of localisation on electricity prices. Social development outcomes have also been included as part of the objectives of the programme. Community trusts are set up with the financial assistance of development finance institutions in order, for communities living near the projects, to buy shares in the project companies. Associated revenues, estimated at ZAR 9.5 billion collectively over the first three bid windows, are set aside for community-led projects. Concerns have nevertheless been raised over the concentration of the funds in a limited number of communities and the capacity of the DoE and development finance institutions to manage the funds and ensure IPPs meet their commitment.

Ultimately, the success of the REIPP procurement programme has enable significant changes in the electricity supply industry by facilitating the entry of IPPs in the generation market and the development of renewable energy in the country. The programme constitutes a cornerstone feature of the creation of a more competitive and efficient electricity supply industry and the transition to a clean and low-carbon energy mix in South Africa.

While the current electricity industry in South Africa and the REIPP procurement programme are structured around Eskom as the single buyer of electricity (as per the single buyer model prevailing in the country), a space for the development of a unique business model, trading in electricity facilitating a ‘willing-buyer, willing-seller’ model, has however emerged in the last decade. This alternative model, based on a small voluntary market for renewable energy outside of the REIPP procurement programme, has been made possible thanks to a partnership with municipal structures, allowing the connection of IPPs and industrial customers by a trading entity, Amatola Green Power (AGP). Key issues for the sustainability of AGP’s business model are the competitive pricing of the renewable energy (as IPPs remain unable to compete with Eskom’s special pricing agreements to large electricity users) and the partnerships with municipal institutions which make trading possible. Demand for renewables energy from industrial customers (i.e. outside of the REIPP procurement programme) and competitively priced supply have enabled the development of this market on a small scale. Even though this alternative model remains limited to a single company only at this stage, it does open up the opportunity for IPPs to sell to customers outside of Eskom and demonstrates the potential for a voluntary market, especially in partnership with local governments, to further develop renewable energy in South Africa.

Going forward, the development and success of renewable energy, and particularly of the REIPP procurement programme, carries important findings for other infrastructure programmes in the country. Both the private sector and government clusters working in infrastructure development, have expressed interest in using the model of the REIPP

procurement programme to procure other type of infrastructure projects beyond the energy sector. This may trigger a significant shift in how the South African Government approaches public-private partnerships and open for the door for more efficient, sustainable, job creating infrastructure procurement in the country.

## 1. Introduction

The world is currently grappling with multiple crises of sustainability on economic, social and environmental fronts. Socio-economic issues, ranging from economic recession to poverty, increasing inequality and failures in governance, are compounded by the threat of climate change and the unsustainable use of natural resources, notably fossil fuels.

Sustainable development, defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UNWCED, 1987), has been acknowledged as the way forward since the United Nations Conference on the Human Environment in 1972. Stemming from the concept of sustainable development, the transition to a green economy,[1] combining economic development, social welfare and environmental protection, constitute one of the mechanisms to reach sustainability.

South Africa is in a unique position to benefit from the shift to a greener development path, particularly owing to the country's abundance in renewable resources (solar and wind, predominantly). Accordingly, the country has demonstrated an increasing commitment to sustainable development in the last few years, notably in the field of renewable energy.

This report provides an analysis of how South Africa's renewable energy sector has been developing. It identifies the key players, policies and regulation that have shaped the development of the sector and the entry of private sector companies generating utility-scale renewable energy-based electricity.[2] The approach includes a desktop study and analysis of national policies, programmes and initiatives framing the development of a renewable energy sector in South Africa, supported by a stakeholder analysis of governmental departments, the energy regulator, the electricity utility, independent power producers (IPPs), financiers, and other relevant institutions involved in the sector. Key informant interviews, primarily with the aforementioned stakeholders, provide experiential insights on the successes and setbacks of renewable energy policy and regulation, as well as the capacity of regulatory entities.

The report centres on the path to, and the role of, the Renewable Energy Independent Power Producer (REIPP) procurement programme to facilitate the generation of renewable energy-based electricity by the private sector. It reviews the evolution of renewable energy policy and the role of the institutions that have shaped the development of the sector, conducting a detailed critical analysis of the performance of South Africa's programmes aimed at developing renewable energy, with a focus on the existing scheme. This builds on extensive knowledge and data collection on the various programmes and their key features,

[1] A green economy is "one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (UNEP, 2011). Practically speaking, in a green economy, growth in income and employment are driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services.

[2] The project was commissioned in recognition of the importance of effective performance of economic regulators for the growth and development of South Africa. It involves a review of the orientation and performance of various economic regulators, the identification of the constraints impacting their performance and the design and implementation of a knowledge capacity development programme in response to identified needs.

developed projects per technology, price trends, local economic development and manufacturing, and available finance.

**Section 2** contextualises the role of renewable energy in meeting South Africa's energy security needs, mainly the universal supply of low-cost, affordable, clean and reliable electricity.

**Section 3** discusses the institutional framework for renewable energy in South Africa. It investigates the capacity of the Department of Energy (DoE) in energy policy formulation, the National Energy Regulator of South Africa (NERSA) in energy regulation and Eskom, the state-owned vertically integrated utility, in electricity planning. The overlap of these key players' functions beyond their mandate, which has uniquely shaped the development of the renewable energy sector, is studied. While the DoE currently formulates and enforces the REIPP procurement programme, with Eskom and NERSA implementing the programme with little decision-making power, previous schemes had been designed and enforced by the utility and the regulator, despite the jurisdiction of the DoE.

**Section 4** describes the interplay of policy, regulation and enforcement in shaping the evolution of renewable energy deployment. It provides a description of the policies that have shaped renewable energy-based power generation in South Africa, highlighting the centrality of renewable energy in the country's transition to a low-carbon economy. This section also interrogates the drivers of the development of renewable energy in South Africa.

**Sections 5 and 6** respectively describe early independent power producer procurement programmes (such as the Pilot National Cogeneration Programme (PNCP), the Medium Term Power Purchase Programme (MTPPP) and the Multisite Base-load Independent Power Producer Programme (MBIPPP), and the Renewable Energy Feed-In Tariff (REFIT) that preceded the REIPP procurement programme. The section discusses the design and performance of these programmes in developing a path for a renewable energy industry as well as the lessons learned in designing the subsequent programmes. A central feature of improvement in each programme has been the risk allocation in the design of a 'bankable' power purchase agreement (PPA) that is commercially viable for developers and private banks.

**Section 7** discusses the structure and performance of the REIPP procurement programme over the first three bidding windows. The section aims to identify areas in which the programme has been successful, and areas of improvement. Notably, successes have been in the bankability of the PPA and how the auction encourages competitive pricing and local manufacturing. IPPs are primarily concerned with Eskom's monopoly in transmission assets and the need for improving the national grid infrastructure. This section also discusses the more strategic objectives of the programme and how the REIPP procurement programme contributes to employment creation, local economic development and domestic manufacturing. The interaction between IPPs, contractors, commercial banks and development finance institutions in ensuring that projects reach preferred bidder status and successfully come into operation is also discussed.

**Section 8** discusses the contribution of the REIPP procurement programme to developing a renewable energy industry in the country. The localisation requirements and the funding support that the Department of Trade and Industry (**the dti**) provides local manufacturers have encouraged an emerging industry. The Department has targeted solar photovoltaic (PV), concentrated solar power (CSP) and onshore wind as the main technologies in which South Africa could develop a competitive advantage. Mainly, South Africa has advantageous sites for wind energy in the Eastern and Western Cape, and solar energy in the Northern Cape. The section includes the trends in localisation costs over the three bid windows, illustrating that solar PV local manufacturing costs have consistently fallen, despite rising localisation targets over the bid windows.

**Section 9** discusses an alternative renewable energy deployment scheme to the REIPP procurement programme, led by Amatola Green Power (APG). The current programme is framed around Eskom as the single buyer of power, and thus depends on Eskom's financial commitment to procure power for its success. APG encourages a 'willing buyer, willing seller' model where the company trades electricity between generators and customers, mainly municipalities. As NERSA plans to expand this programme to include more traders similar to APG, this section discusses how this model has the potential to enable a competitive market for consumers to buy green electricity from traders outside of Eskom.

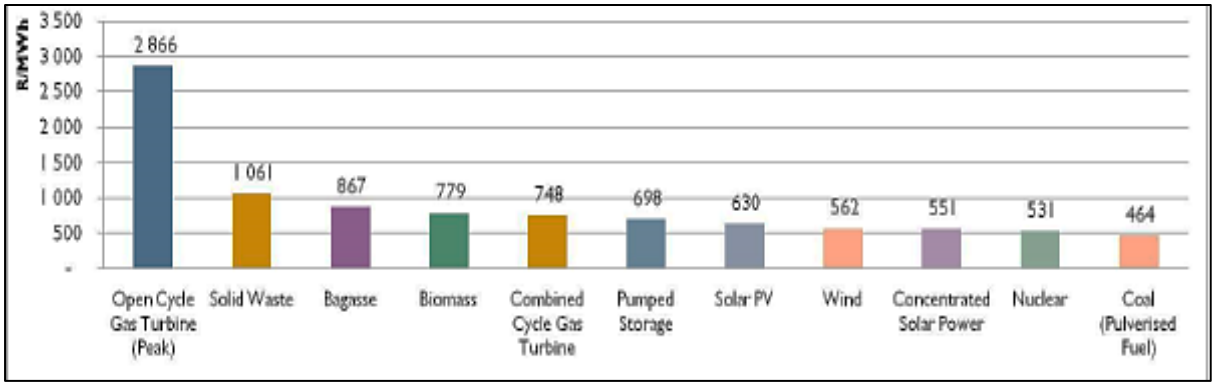
**Section 10** concludes the report. It identifies why the REIPP procurement programme has been successful over previous programmes, and the issues to overcome in developing a renewable energy industry. Within the REIPP procurement programme, IPPs can only sell to Eskom, by way of a PPA underwritten by the National Treasury (NT). This section discusses the sustainability of such a model given the NT and Eskom's financial constraints. As is the intention of the programme, the section asks how the REIPP procurement programme can serve as a stepping stone for a fully-fledged renewable energy industry.

## 2. Where Does Renewable Energy Fit in the Strategic Objectives of South Africa's Electricity Supply Industry?

Renewable energy-based electricity presents an opportunity for South Africa to address the country's energy security needs. The DoE identifies eight strategic objectives of energy policy that broadly promote securing consistent, low-carbon and affordable electricity supply for all South Africans (DoE, 2010). This section discusses the role of renewable energy as it relates to meeting the strategic objectives of South Africa's energy policy.

Globally, the rapid deployment of renewable sources of energy, in association with high learning rates (i.e. the percentage reduction in costs for a technology that occurs with every doubling of cumulative installed capacity) has started a virtuous circle characterised by a continual decrease in cost. Hydropower and geothermal technologies have been producing the most economical electricity for some time already and the levelised cost of electricity (LCOE)[3] for wind, solar PV, CSP and some biomass technologies has been continuously declining. Renewable technologies now represent the most cost-effective solution for new capacity in an increasing number of countries and regions, and South Africa is no exception (IRENA, 2013a).

**Figure 1: South Africa's projected levelised cost of electricity in 2020 for various utility-scale generation sources (in ZAR/MWh)[4]**




*Source: DoE, 2011a*

While coal remains on average the cheapest source of electricity, as illustrated by Figure 1, utility-scale renewable generation sources will be competitive with most conventional generation sources by 2020, with solar PV, wind and CSP leading in renewable technologies. In addition, the low levelised cost of coal reflected in Figure 1 ignores the social and environmental costs associated with coal-based electricity generation. These are namely water scarcity and contamination, air pollution and the consequential respiratory health costs born to surrounding residents of coal power plants (Musana and Schulz, 2012),

[3] The LCOE of a given technology is the ratio of lifetime costs to lifetime electricity generation, both of which are discounted back to a common year using a discount rate that reflects the average cost of capital.

[4] Against recent price increases, essentially driven by new coal-fired power plants, the DoE forecasted future electricity costs in order to develop a balanced and affordable mix of electricity resources.

and carbon dioxide ($CO_2$) emissions which may significantly impact the price of coal with the introduction of a carbon tax in the country as of 1 January 2015.

Electricity affordability, against the backdrop of significant price increases since 2007, has become an energy policy priority. The electricity supply industry has been characterised by historically low and not cost-reflective prices, which have contributed to under-investment in expanding electricity generation and distribution infrastructure (DoE, 2013a). In order to remedy the situation, Eskom's started a ZAR 340-billion new build programme in 2005 (Eskom, 2013a). This led to steep tariff increases in order to serve the cost of capital expansion, such as averages of 28% in 2008 and 31% in 2009 (DoE, 2013a).

Ultimately, the development of renewable energy in South Africa has also been intimately linked to the entry of private companies onto the energy market. In line with international trends, South Africa has been mulling over the introduction of IPPs, partially for the production of renewable energy-based electricity, since the 1998 White Paper on Energy Policy. The White Paper reflects some principles of the standard textbook model[5] (such as the liberalisation of distribution and the open access to the transmission system), although it was never implemented. A hybrid model progressively introducing IPPs but maintaining the dominance of the state-owned enterprise (SoE) has instead prevailed in the country.

A blueprint for a competitive electricity supply industry including a power exchange, the unbundling of distribution and transmission and a partial unbundling of generation was produced for Cabinet in May 2001 but was eventually discarded in May 2004. Only the gradual introduction of IPPs resulted from the 2001 blueprint, Cabinet approving in 2003 the participation of the private sector in the electricity industry and resolving that future power generation capacity would be divided between Eskom (70%) and IPPs (30%) (Steyn, 2013), while Eskom retained its assets and its ability to invest in new capacity. In a statement on 5 September 2007, Cabinet designated Eskom as the single buyer of power from public and private producers, mandating the SoE to ensure that "*adequate generation capacity is made available and that 30% of the new power generation capacity is derived from IPPs*" (GCIS, 2007). Cabinet further specified that over the 2007-2027 period, "*Eskom will build all nuclear power plants in South Africa and the IPPs will build more than 50% of all non-nuclear power plants*" (GCIS, 2007).

This eventually resulted in the introduction of IPPs onto the market with the launch of the REIPP procurement programme in 2011. Following the publication of the determination in 2012 (DoE, 2012a), a similar IPP procurement programme for base-load electricity from coal, natural gas and hydropower is currently being designed by Government. While the opening of the generation market to the private sector constitutes a positive development, it has had no real impact on competition *on* the market (only introducing competition *for* the

[5] Paul Joskow (2006) summarises the standard sequential seven-step model as follows: (1) corporatise the SoE; (2) commercialise activities in the value chain; (3) design and implement a regulatory system; (4) unbundle activities in the vertically and horizontally integrated value chain to facilitate competition; (5) manage the divesture of state assets; (6) promote private sector participation; and (7) implement wholesale and then introduce retail competition, at least for industrial customers. Gratwick and Eberhard (2008) provide a historical analysis of the development of standard model.

market) owing to the sustained control of Eskom over the electricity supply industry through the holding of most of the generation capacity (Pickering, 2010) and the limitation of the role of IPPs to government-run procurement programmes.

Recognising the cost trends of energy sources, particularly the decrease in the levelised costs of renewable energy technologies, and the increasing role to be played by IPPs in the country's energy market, renewable energy has been exponentially featuring in energy planning.

The Integrated Resource Plan (IRP), promulgated in its first version (IRP 1) on 31 December 2009 and revised on 29 January 2010, covered the 2009-2013 period and planned for the development of an IRP for the 2010-2030 period. It was meant to give effect to the policy objective of generating 10 000 gigawatt-hour (GWh) of renewable energy by 2013 (approximately 4% of the energy mix)[6] and constitutes the first energy planning document to meaningfully consider renewable energy technologies in South Africa.[7] The IRP 1 planned on 100 megawatt (MW) from the CSP-based Sere project to be commissioned in 2010 as well as 1 445 MW from the MTPPP and REFIT programmes.[8]

After a first round of consultation in June 2010, the first version of the Integrated Resource Plan for Electricity 2010-2030 (IRP 2010) was published for further comments in October 2010. Based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then 'balanced' in accordance with qualitative measures such as reducing carbon emissions, new technology uncertainties, water usage, localisation and job creation, regional development and integration, and security of supply. It planned for 11.4 GW of new build renewable energy over the 2010-2030 period, in addition to 1.1 GW of already committed capacity. In this initial scenario, renewable energy would account for 30% of the country's additional new capacity to reach 7.5% of electricity production in 2030. The plan included:

- the construction of the 100 MW Sere wind farm in 2012;
- the Phase 1 of the renewable energy power purchase programme linked to the NERSA's REFIT programme amounting to 1 025 MW (from wind, CSP, landfill and small hydropower options);
- a wind programme in addition to the REFIT wind capacity of a minimum of 3,8 GW from 2014-2019;
- a solar programme in addition to the REFIT solar capacity of a minimum of 400 MW from 2016-2019 (in addition to solar water heating, which is included in the demand side management programme to the extent of 1 617 MW); and

[6] The IRP 1 also speaks to the implementation of energy efficiency and demand side management and the installation of one million solar water heaters.

[7] The allocation for renewable energy in previous energy planning documents, namely the Department of Minerals and Energy's (DME) National Integrated Energy Plan, NERSA's National Integrated Resource Plan and Eskom's Integrated Strategic Electricity Planning, were negligible and limited to demonstration plants.

[8] The first version published on 31 December 2009 only included 1 145 MW from the MTPPP and REFIT programmes. The 29 January 2010 version added 300 MW from the two programmes in 2013.

- a renewable energy programme from 2020-2027 of an additional 7,2 GW, incorporating all renewable options, such as wind, CSP, solar PV, landfill and hydropower.

After a second public consultation process in November and December 2010, the IRP 2010 was revised and promulgated in May 2011. Two of the main changes were the disaggregation of renewable energy technologies to explicitly display solar PV, CSP, and wind options, and the inclusion of learning rates, which mainly affected renewable energy technologies.[9] This resulted in the procurement of additional new renewable energy technologies (solar PV, CSP and wind) being brought forward and extended to 17.8 GW, notably to accelerate the development of a local industry. It maintains the construction of the Sere wind farm as well as the Phase 1 of NERSA's REFIT programme and caters for wind, solar PV and CSP programmes respectively of 8.4 GW from 2014-2027, 8.4 GW from 2012-2030 and 1.0 GW from 2016-2025. The revised IRP 2010 intends for renewable energy technologies (solar and wind) to supply 42% of the new additional capacity over the 2010-2030 period or 9% of the total electrical energy in 2030 (DoE, 2011a).

Promulgated in March 2011, the IRP is considered a 'living plan' to be revised every two years, i.e. March 2013. In order to conduct such already delayed review by March 2014, the DoE published in November 2013 an update to the IRP for public comments. The updated version of the IRP relies on revised assumptions in terms of economic growth, future demand, technology options and costs, the performance of Eskom's generation fleet and the potential for extending the economic life of the existing fleet. Most notably, the update assumes an ambitious average growth rate of 5.4% per annum until 2030, in line with the aspirational target of the National Development Plan (NDP), as well as a shift in economic development away from energy-intensive industries which is assumed to dramatically reduce the electricity intensity of the economy. In turn, the demand in 2030 is projected to be in the range of 345-416 terawatt-hour (TWh) as opposed to 454 TWh expected in the existing IRP, resulting in a reduction of the required installed capacity in 2030 from 89.5 GW to 81.4 GW. The 2013 update also considers new developments in terms of technology and fuel options (locally and globally, particularly with regards to nuclear energy, renewable energy and gas), scenarios for carbon mitigation strategies and the impact on electricity supply beyond 2030, and the affordability of electricity and its impact on demand and supply beyond 2030.

In terms of renewable energy, the updated IRP advocates that the current renewable energy programme should be continued, with additional annual rounds (of 1 000 MW capacity for solar PV, 1 000 MW for wind and 200 MW for CSP), with the potential for hydropower at competitive rates. Overall, the update slightly reduces the allocation to renewable energy from 18.8 GW to 17.4 GW and suggests a shift from wind to solar energy in the coming years, by cutting the total generation capacity allocated to wind energy in 2030 (from 9.2 GW

[9] The last major change was the adjustment of investment costs for nuclear units, which until then represented the costs of a traditional technology reactor and were too low for a newer technology reactor (a possible increase of 40%).

in the current IRP to 4.4 GW in the 2013 update)[10] and increasing the share of solar PV (from 8.4 GW to 9.8 GW) and CSP (from 1.2 GW to 3.3 GW).

Revisions to the mix of renewable energy technologies, which put greater emphasis on solar over wind, have engendered mixed reactions, partly due to aggressive learning curves for solar technologies. While solar energy is becoming increasingly competitive, wind technologies are mature and economical. At an average cost of ZAR 0.74/kWh in the third round of the REIPP procurement programme, wind energy currently offers the lowest price per kilowatt-hour (kWh) among renewable energy technologies and is almost 30% below the likely cost of electricity to be supplied by the Medupi coal-fired power station. Additionally, according to the South African Wind Energy Association, "[t]he modelling proceeds implicitly as if all energy plants will be built on the country's balance sheet. The enormous risk and opportunity costs of Eskom building are disregarded for modelling purposes," discarding the success of IPPs in delivering projects (Creamer, 2014).

Increasing renewable energy in South Africa's power mix enables the country to reduce its reliance on coal-fired power stations, and opens the opportunity for these to be refurbished, in turn, reducing the risk of power outages. In this way, while renewable energy, particularly wind and solar, cannot meet base-load requirements, they allow for other energy sources to do so. Furthermore, using renewable energy is in line with the country's low-carbon development path as the power sector accounts for 70% of the country's emissions (NPC, 2011). Coal-fired power stations in South Africa have been compromising water availability and quality as well as contributing to air pollution (Musana and Schulz, 2012). Thus, the objective of clean energy is not solely a matter of reducing emissions, but also contributing to minimise the risk of contaminating water sources and the air quality of surrounding communities, who often bear the cost of power generation, yet receive little to no benefit as they continue to live without electricity.

By increasing electricity supply, through a mixture of grid-connected and off-grid solutions, South Africa can close the electrification gap which in 2013 sees 15% of the population (3.4 million households) without electricity (DoE, 2013a). The 2007 iteration of the Integrated National Electrification Programme (INEP) aims to close this gap by 2025, having increased household electrification from 30% to 85% from 1994-2011. The backlog can essentially be explained by the demand for electricity having outpaced the electrification rate of the Programme. Other explaining factors are the difficulty in electrifying informal settlement household structures and the remoteness and scattered nature of households, particularly in the rural parts of the country (DoE, 2013a). In order to address these two challenges, off-grid solar home systems, using PV panels, have been identified as the preferred electrification technology (DoE, 2012b). While the INEP has failed to recover the operational cost of supplying grid-connected electricity to rural households, solar home systems are more affordable, costing less than fixed costs associated with grid extensions, particularly in comparison to the low load demand in these areas.

[10] The reduced wind capacity results from incorporating new wind data into the model and the application of annual limits (1 600 MW per year).

As grid-connected options, renewable energy technologies do not, however, constitute a complete solution to energy issues. Despite competitive LCOEs, IPPs remain in a difficult position to compete with Eskom in the current settings. For REIPPs, Eskom remains the single buyer of electricity (with the exception of off-grid installation). The possibility for IPPs to sell electricity directly to third parties, particularly energy-intensive industries which seek to secure low-cost and consistent supply, is currently limited, although the Independent Market and Systems Operator (ISMO) Bill may change the situation in the months to come (see Section 4.2 for a more detailed discussion about the ISMO Bill) (Das Nair *et al*., 2014). However, IPPs highlight that the opportunity to sell directly to customers would only be competitive and viable in some cases.[11] As such, IPPs maintain that they would not be able to compete with the pricing in Eskom's special and negotiated pricing agreements[12] with energy-intensive firms,[13] even in a situation where they would not have to incur the additional costs associated with meeting the REIPP procurement programme's criteria (see Section 7.6 for a discussion of the programme's economic development criteria). Equally, IPPs admit that it would not be commercially viable to supply grid-connected electricity to low-income and rural households that continue to live without electricity,[14] for similar reasons to those experienced in the Integrated National Electrification Programme.[15]

Concomitantly, a strategic objective associated with the development of renewable energy in the country is to facilitate the entry of IPPs in the generation market so as to enable a much-needed refurbishment and expansion of Eskom's generation fleet. This has shaped the partial liberalisation of the generation market and the persistence of Eskom's dominance in transmission and distribution, which is reinforced by regulations deeming Eskom as the single buyer of power from IPPs. Additionally, taking advantage of the high learning rates of renewable energy technologies, particularly solar PV, enables the deployment of low-cost energy. This is significant as the expansion of coal-based power on the country's balance sheet, is becoming increasingly costly. Notably, South Africa has been closing the electrification gap through off-grid solar home systems. While the programme remains hindered by its inability to recover cost and slow deployment (which is outpaced by a growing number of non-electrified households), the off-grid technology is the country's best bet in achieving universal electrification. Additionally, renewable energy can contribute to supporting consistent energy supply, and importantly, clean and low-carbon electrical

[11] Interview with IPPs.

[12] Eskom's top 140 energy-intensive users are mostly mining and large mineral processing industrial giants. The Energy Intensive Users Group of Southern Africa (EIUG), which comprises 32 companies, consumes about 45% of the country's electricity. Certain energy-intensive industries, such as BHP Billiton, historically paid, and continue to pay in some instances, lower prices for electricity than general industrial users, owing to long-term Special or Negotiated Pricing Agreements with Eskom struck in the 1990's (TIPS, 2013).

[13] Interview with IPPs.

[14] South African households spend 14% of their total monthly income on energy needs, above the international benchmark of 10%. Households spending more than 10% on energy are classified as energy poor. In 2013, close to half of South African households were energy poor, three-quarters of which fall within the poorest quintile (20%) of households (DoE, 2013a). Thus, poorer households spend more of their income on energy as in other developing countries. Those without access to electricity spend even more than grid-connected households, depending on their energy source, and rely on candles, firewood, paraffin, coal, gas and batteries (for appliances) to meet their energy needs.

[15] Interview with IPPs.

energy. By creating low-carbon industries, and thus contributing to a less energy-intensive economy, renewable energy technologies also contribute to reducing the scale of required new installed generation capacity. In this way, it becomes imperative that the REIPP procurement programme encourages local manufacturing and meaningful job creation.

## 3. Key Players in the Regulation of Renewable Energy

Following on the understanding of the role that renewable energy technologies play in South Africa, this section introduces the institutions responsible for the regulation of the sector, most notably the DoE, Eskom and NERSA, and their central role in energy policy formulation, electricity planning and regulation. The purpose is to better understand the political context that has shaped South Africa's emerging renewable energy industry.

### *3.1. The Department of Energy*

The DoE is the line department responsible for South Africa's energy policy (DoE, 2010) and notably for establishing a national framework to enable the generation of renewable energy-based electricity in the country. The DoE is now spearheading the REIPP procurement programme. The Department has, however, not always been a strong promoter of renewable energy and previously resisted the introduction of renewable energy-based electricity, considering it a financial risk to the country. This perception represented a political bias and mistaken understanding of the low-cost and abundant supply of coal-based electricity that has characterised the electricity supply industry for the past 20 years, and has largely shaped South Africa's industrial policy (Baker, 2012, 2011). Historically, South Africa's energy policy has been focussed on providing low-cost electricity to sustain and attract energy-intensive industries to invest in the country (Fine and Rustomjee, 1996). In a context of overcapacity and high reserve margin, the then-DME prioritised mineral exploration to grow and create employment in resource- and energy-intensive mining and manufacturing sectors (Baker *et al.*, 2013).

In 2009, the DME was split between the DoE and the Department of Mineral Resources (DMR). Having formerly been a department focussed on mineral resources, the newly-formed DoE was left weak in the split, suffering from a chronic skills shortage in formulating and implementing energy policy. Consequently, the DoE's personnel were unfamiliar with renewable energy technologies, best practice policies and regulatory frameworks to enable the commercial viability of the sector, and generally received renewable energy with scepticism and mistrust (Baker, 2012). The DoE recognised the need to improve its skills pool in order to enhance its role in formulating energy policy (DoE, 2010). In the interim, it relies on external expertise to support its functions, which is not uncommon for government departments in South Africa.

For example, external advisors influence the project evaluation criteria of the REIPP procurement programme that span across knowledge areas beyond the DoE's mandate. These are detailed in Section 7.6 of this report. The DoE's collaboration with external experts has been stressed as a success of the programme.[16] However, the reliance on external expertise has compromised the schemes preceding the REIPP procurement programme. Section 5 thus shows how procurement programmes designed and administered by Eskom, have failed to take off, essentially due to their inherent bias in Eskom being a player (generator and distributor) and referee. Equally, disagreements

[16] Interviews with South African banks and IPPs.

between the DoE and NERSA over the latter's role in designing and enforcing REFIT, which is further discussed in Section 6, influenced the abandonment of the programme.

Last but not least, the DoE is spearheading the transformation of the electricity supply industry through the ISMO Bill. The ISMO is intended to be a state entity that would be independent from generators and distributors of electricity, and serve as a buyer of electricity from generators and seller of power to customers at wholesale level (PMG, 2013). The task team in the Parliamentary Energy Portfolio Committee has been deliberating on how to establish the entity. The logic put forward by the DoE is to launch ISMO as an institution ring-fenced within Eskom and gradually take steps to establish the operator as a fully independent state entity. The task team is also deliberating whether to establish the ISMO with ownership over Eskom's transmission assets or to retain Eskom's ownership. The discussion on the transmission network centres on how to ensure that Eskom would be financially compensated in the sale of the network and the corresponding legality over transferring ownership to ISMO (PMG, 2013).

### *3.2. Eskom, South Africa's state-owned electricity utility*

Eskom's mandate is to balance electricity supply and demand, manage the grid and system stability, monitor and manage power system risks and provide real-time information on the status of the power system (Eskom, 2012a). Eskom provides services in electricity generation, transmission and distribution. Eskom is responsible for 95% of electricity generation, virtually all of high voltage transmission assets and 60% of electricity distribution, the remainder of which is distributed by municipalities. Eskom's primary customers are industries, primarily energy-intensive firms, and municipalities (Das Nair *et al*., 2014; TIPS, 2013).

The problems in electricity generation are a consequence of historical underinvestment in capacity expansion and a backlog in maintaining the current generation fleet. This is a result of poor planning, on the part of Eskom, and of misleading directions from the South African Government. South African policymakers had long been aware that the country was facing impending power shortages. The 1998 White Paper on Energy Policy warned that power shortages would become evident by 2007 and that, in order to avoid demand exceeding supply, investment in generation infrastructure expansion and improvement would need to be made by the end of 1999 (Kohler, 2008). Governmental indecision then led to delays in investment decisions. Between 1998 and 2004, Government deliberated on the future structure of South Africa's electricity generation sector, specifically on whether to sell a portion of Eskom's generation assets to the private sector. Government eventually settled on Eskom retaining its generation assets and pursuing an expansion programme, while facilitating the entry of IPPs who would construct and own new generation capacity (Kohler, 2008). This option was favoured because it transfers the risk and cost associated with the construction, operation and maintenance of power projects to IPPs.

The country experienced an electricity crisis in 2008, and the utility has since administered scheduled power outages as part of its demand side management strategy. The utility finds itself in a situation where it cannot solely plan for, and supply, the country's electricity generation needs. The thinking behind ISMO and the introduction of IPPs is to ease this

burden on Eskom. The ISMO would be tasked with creating a fair playing field by unbundling Eskom's monopoly in generation, possibly transmission, and distribution, in order to facilitate the entry of private generators. The DoE also argues for the ISMO to assist in developing the generation resource planning, a function contained in the IRP. This means that the responsibility of procuring energy would shift from the DoE to the ISMO, and that trading in electricity at wholesale level as well as managing the systems operations would shift from Eskom to the ISMO (PMG, 2013).

Beyond the mandate of electricity planning, the utility has also formulated and administered energy procurement regulation. To facilitate the entry of IPPs, Eskom was heavily involved in designing and enforcing two of the early renewable energy-based electricity procurement programmes, discussed in Section 5. As the sole buyer of electricity, the concentration of Eskom's power in these programmes, without rigorous independent oversight, contributed to their failure. IPPs and their financiers consider of paramount importance that Eskom guarantees generators' connection to Eskom's national grid, and incurs penalties for not doing so. In order to remedy this under the REIPP procurement programme, the energy regulator, the DoE and the NT ensure that Eskom does not leverage its transmission and distribution monopoly to default on their grid connection and PPAs.

Acknowledging the finite nature of coal, gas and oil as well as the potential of renewable sources of energy, Eskom embarked in the 2000s upon a research programme, managed by the research department of its Resources and Strategy Division, to investigate South Africa's sources of renewable energy. In 2002/2003, Eskom erected three wind turbines at an experimental wind energy farm at Klipheuwel on the West Coast near Cape Town in order to investigate the potential of wind energy as an electricity generating option and evaluate different wind-based technologies and their economic viability (Eskom, 2013b).[17] Eskom similarly built in 2011 the 575-kilowatt (kW) Lethabo PV Plant, a demonstration plant for solar PV near Vereeniging in the Gauteng province (Eskom, 2013c). Building on this experience, Eskom is currently building its first large-scale renewable energy project, the 100-MW Sere wind farm in Koekenaap on the West Coast, which is expected to be commissioned by the end of 2014 (Yeld, 2013). Eskom is also planning for the construction of a 100-MW CSP demonstration plant in Upington in the Northern Cape Province (Eskom, 2013d). Construction, which should last for three years, is expected to begin at the end of 2014 (Creamer, 2013a).

### *3.3. The National Energy Regulator of South Africa*

The electricity sector was one of the first infrastructure sectors to be subjected to independent economic regulation with the establishment of the National Electricity Regulator (NER) in 1995 as the successor of the Electricity Control Board (Steyn, 2012). The NER was primarily responsible for regulating market entry (licensing), conduct, and tariffs for electricity sector participants. NERSA was established in 2005 following the National Energy Regulator Act No. 40 of 2004. The act established the entity as a multi-sector regulator with the

[17] In 2006, the ownership of the Klipheuwel Wind Facility was transferred to Peaking Generation (Eskom Generation Division) for ongoing operation and maintenance. The electricity generated by the wind facility is fed directly into the regional distribution network (Eskom, 2013b).

mandate to cover the regulation of electricity, gas and petroleum pipelines. The act enables NERSA to determine tariff level increases. In the case of Eskom, the electricity utility applies for a multi-year price determination (MYPD), which upon NERSA's approval, determines the levels at which Eskom can increase its tariffs over a five-year period. In the MYPD application, Eskom needs to show how its proposed tariff increases cover the core costs of supplying electricity to its customers, including the modelling and forecasting informing the cost and demand projections. NERSA evaluates the application in the interest of Eskom's consumers who have little influence on the tariffs charged. In the MYPD 3 covering the period from 2014-2018, Eskom requested a 16% annual tariff increase, to which NERSA awarded an 8% annual increase (NERSA, 2013a). In this role, NERSA has, however, identified that it lacks the capacity to rigorously evaluate Eskom's modelling in the MYPD application and finds itself strongly relying on Eskom's data and knowledge.[18]

The Electricity Regulation Act No. 4 of 2006 enables the regulator to award licensing in generation, transmission and distribution. In relation to the main planners of the electricity supply industry, NERSA enforces energy policy as formulated by the DoE and regulates the generation, transmission and distribution markets, in which Eskom is the dominant player. The REIPP procurement programme adds a new layer of regulation for NERSA, in a previously monopolistic generation market. NERSA is responsible for ensuring a fair playing field in electricity generation, particularly in managing agreements between IPPs and Eskom. However, under the REIPP procurement programme, this relationship is largely determined in the Request for Proposals (RFP) compiled by the DoE and the NT (DoE, 2013b). The RFP determines the evaluation criteria of renewable energy projects as well as grid connection and PPAs. Once successful projects have been granted preferred bidder status, they are to apply for a generation license, and where applicable, a distribution license from NERSA. While obtaining a generation licence is a requirement for preferred bidders and NERSA's decision to award licenses is based on its own evaluation methodology,[19] this process appears mostly ceremonial, NERSA having granted generation licenses to all preferred bidders so far.[20] Furthermore, the PPA, administered by the DoE and Eskom, determines the tariff and limits generation capacity to be supplied to Eskom over the PPA's 20-year period (Campbell, 2012). NERSA's role of regulating the tariff is limited. The role of NERSA specific to the REIPP procurement programme is detailed further in Section 7.2.

Following the first 20 years, the DoE intends to renegotiate and extend the PPA in order to allow renewable projects continuing to feed into the grid.[21] IPPs' options beyond the REIPP procurement programme would be then influenced by the evolution of the ISMO Bill. In the case where IPPs sell directly to wholesale customers, NERSA seems the appropriate body to regulate the requisite agreements. The task team in the Parliamentary Energy Portfolio Committee, particularly the Energy Intensive User Group of Southern Africa (EIUG) and the DoE, agrees that NERSA would approve the tariffs between the ISMO and IPPs, and the ISMO and customers (PMG, 2013)

[18] Interview with NERSA.
[19] Interview with the DoE.
[20] Interview with IPPs.
[21] Interview with the DoE.

### *3.4. The Department of Trade and Industry*

**the dti** plays an instrumental role in the development of renewable energy in the country by assisting the emergence of a domestic manufacturing base to support renewable technology development and deployment. Accordingly, **the dti** seeks to develop a skills base as well as stimulate job creation in renewable energy technologies, particularly in economically depressed areas. The Industrial Policy Action Plan (IPAP), which is an annually-updated three-year rolling action plan for industrial policy implementation, has since 2011 identified green industries, and more specifically the energy sector (solar and wind energy, solar water heating, energy efficiency), as a priority for the country's industrial policy (**the dti**, 2012a, 2011, 2010).

In response to the inclusion of wind and solar energy sectors in the IPAP for the 2011/2012-2013/2014 period (known as IPAP2), **the dti**'s Green Industries Unit developed, in collaboration with Trade and Industrial Policy Strategies (TIPS), a Sector Development Strategy for these industries. Released in August 2012, this Strategy contains information regarding the potential for wind and solar energy generation in South Africa, the global wind and solar energy industry and the potential for local supply.

In this regard, Section 9 of the revised regulations to the Preferential Procurement Policy Framework Act No. 5 of 2000 empower **the dti** to designate certain industries that are of 'critical importance' for local manufacture by organs of state and public entities. Critically, any such designation would mean that firms are obliged to locally source any such products as they form part of the contract. Localisation is a key component of South Africa's pursuit of higher levels of industrialisation. A sustainable localisation programme is dependent on Original Equipment Manufacturers' (OEMs) investments (i.e. foreign direct investment) and the likelihood of continued preferential treatment for the OEMs. Economies of scale constitute a key requirement for the localisation of new manufacturing or production processes. Given the extent of potential expenditure by the state and public institutions and entities, a large scope for leveraging this spending exists whereby the state could potentially (by virtue of the magnitude of investments) promote the inclusion of locally based, or locally producing firms in large procurement packages.

**the dti** also makes recommendations to the DoE for targets related to local content and employment creation for all projects participating in the REIPP procurement programme. As informed by research and the pace of development within each industrial sector, **the dti** has progressively increased local content targets to optimum levels, in order to further stimulate the development of local manufacturing capacity.

In line with these localisation objectives, **the dti** provides incentives, such as the Manufacturing Competitiveness Enhancement Programme (MCEP), detailed later in Section 4.2, for manufacturers to supply inputs and equipment for the construction of renewable energy power plants and address gaps where local manufacturing cannot meet these needs.

### *3.5. The Departments of Environmental and Water Affairs*

In addition to spearheading South Africa's transition to sustainable development, environmental ministries, namely the Department of Environmental Affairs (DEA) and the Department of Water Affairs (DWA), play a role in the regulation of the renewable energy sector. The former Department of Environmental Affairs and Tourism (DEAT), preceding the DEA, was one of the first departments to identify the need to reduce emissions from the power sector by introducing renewable energy (Baker, 2012).

Both departments, the DEA and the DWA, actively monitor and regulate the environmental impacts (such as greenhouse gas emissions, ecosystems degradation, waste management, water use) of Eskom's and IPPs' operations through environmental impact assessments (EIAs). Developers must be granted the appropriate environmental authorisations and licenses/permits to build power stations, major power lines and substations.

Concern however exists about the political weight of the DEA and the DWA to monitor that EIAs are conducted accurately, and that the recommendations for the project assessed under the EIA are enforced. This concern is raised in the relaxed enforcement of Eskom to meet World Health Organisation standards on water use and air pollution in its power plants (Musana and Schulz, 2012). This lenient enforcement is reinforced by the non-inclusion of environmental and health costs of coal-based electricity in the LCOE comparison with other energy sources.

## 4. The South African Framework for Renewable Energy

South Africa's path to introducing renewable energy has largely been led by the country's need to expand generation capacity, while easing Eskom's role as the sole generator. Government also aims to diversify the country's industrial base with the development of renewable energy technology, and in turn, create a new stream for employment. From an environmental perspective, Government identified reducing greenhouse gas emissions from the power sector as a decisive strategy towards sustainable development. This section details the factors that have strongly influenced restructuring the electricity supply industry from solely relying on Eskom-generated coal-based electricity, towards a low-carbon multi-generator supply market. This discussion serves as the context to the policy framework that has facilitated increasing renewable energy in the country's supply mix. A policy matrix, including mechanisms that have supported IPPs and the deployment of renewable energy technologies, is then drawn out.

### *4.1. The Drivers of the Development of Renewable Energy in South Africa*

The development of renewable energy in South Africa, strongly intertwined with the introduction of IPPs, directly results from four key dynamics.

First, the South African Government recognises that Eskom alone does not have the capacity to meet the country's electricity demand and ensure energy security. Between December 2005 and May 2006, a number of power outages were experienced in the Western Cape, following damage to one of the reactors at the province's only power station (Kohler, 2008). In early 2007, outages were experienced across the country, when unanticipated higher summer demand coincided with unplanned outages and the closure of several power stations for maintenance. From October 2007 until the year end, the country was hit by repeated load shedding, and in January 2008, the crisis reached the level of 'national electricity emergency', with daily load-shedding events. The country's surplus capacity had been depleted. Eskom's reserve margin – the spare power plant capacity available when the highest demand of the year is recorded – had fallen to between 5% and 10% by 2008. A more acceptable margin of between 15% and 20% would have allowed time for maintenance throughout the year (Kohler, 2008).

Eskom responded to the situation with a generation capacity expansion programme of ZAR 385 billion (which is expected to grow to more than a trillion rand by 2026) in order to double the utility's capacity to 80 000 MW (Eskom, 2013a). The massive Kusile and Medupi coal-fired power stations, of a capacity of 4 800 MW and 4 764 MW respectively, are thus meant to ensure the country's energy security. They have however been delayed by technical and labour trouble (Blaine, 2013), and given Eskom's financial constraints and the urgency to meet electricity demand, Government has welcomed the entry of the private sector on the generation market. While IPPs are currently limited to the production of renewable energy-based electricity, an IPP programme targeted at base-load capacity from coal, gas and hydropower is being conceptualised by Government.

Second, the development of renewable energy, along with the introduction of IPPs, aims to reduce the cost of electricity in South Africa in the medium to long term. In the short term, the national utility could benefit from IPPs building new plants and generation capacity at

their own cost and financial risk. In addition, IPPs argue that their entry to the generation market means that plants are built faster and electricity is generated more cheaply for a given technology (Yelland, 2009). While Eskom committed to large projects which have compromised its financial standing, IPPs invest in small incremental, more affordable and flexible projects. Additionally, IPPs rely on sound analysis of their financial risks to sustain their commercial viability and are in turn held accountable by risk-averse financiers. This makes IPPs adept to cutting costs and mitigating risk. The construction of both Medupi and Kusile mega-plants by the utility illustrates the risk associated with such large-scale projects. Eskom locked itself into high prices (linked to the suppliers market prior to the credit crisis of 2008) and long supply lead times for both Medupi and Kusile power stations. In addition, the construction of both plants has been tarnished by significant delays and cost overruns, further emphasising a flaw in Eskom's procurement and generation building strategy at the time.

In the medium to long term, the development of renewable energy-based electricity will contribute to reduce the cost of electricity in South Africa. While renewable energy remains a nascent industry in South Africa, and as such requires some governmental support in the short term, the sector is expanding very rapidly. As illustrated in Section 7.3, renewable energy technologies are becoming increasingly competitive and cost-effective alternatives to traditional fuels and technologies. The probable introduction of an economy-wide carbon tax in South Africa from 1 January 2015, aimed at internalising environmental externalities linked to economic activities, will further build the business case for a substantial share of renewable energy in the country's electricity supply mix.

Third, as detailed in the next section, the development of renewable energy is a clear priority of the South African Government's climate change mitigation and green economy strategies. South Africa has pledged to peak its greenhouse gas (GHG) emissions between 2020 and 2025 at respectively 34% and 42% below a business-as-usual trajectory, plateau for approximately a decade and decline in absolute terms thereafter, subject to the adequate provision of financial resources, technology transfer and capacity building support provided by developed countries (UNFCCC, 2011). The energy sector, through both renewable energy and energy efficiency improvements, constitutes a cornerstone of this mitigation effort. The roll-out of renewable energy in the country, from large-scale grid-connected projects to small-scale rooftop systems, participates in the country's transition to a greener low-carbon economy by changing the structure of the energy sector (TIPS and GGGI, *forthcoming*).

Last but not least, the creation of a renewable energy industry in the country is meant to contribute to local economic development objectives, as detailed in Section 7.6 on the evaluation criteria for bids in the REIPP procurement programme and Section 8 on the linkages between the current programme and economic development. Particularly, the creation of sustainable employment, along with the development of a domestic manufacturing capacity, constitutes Government's priority. The South African Government aims to create 400 000 new direct jobs by 2030 in green economy sectors, as heralded in the New Growth Path (NGP) of the Economic Development Department (EDD). The procurement of renewable energy and the roll-out of specific projects (such as in solar water heaters, recycling, public transportation and natural resource management) constitute the

main driver of green employment in the country. Community ownership and black economic empowerment also feature high on the governmental agenda, and constitute key characteristics of the existing renewable energy programme.

### *4.2. South Africa's Renewable Energy Policy*

Building on the dynamics driving the growth of renewable energy in South Africa, Government has developed an extensive policy framework to shape and support renewable energy-based power generation. Table 1 below illustrates the mix of policies and Departments which have formulated them.

**Table 1: Policy Matrix Facilitating Renewable Energy Power Generation**

| Leading Department | Policy Document |
|---|---|
| **Department of Minerals and Energy (DME) / Department of Energy (DoE)** | The 2003 White Paper on the Renewable Energy Policy of the Republic of South Africa (DME, 2003) sets a target of 4% (1 667 MW) of estimated electricity demand (41 539 MW), or 10 000 GWh, to be generated from renewable sources by 2013. The White Paper recommends to meet the target largely from biomass, landfill gas, hydro-electricity and solar water heaters (and only 1% for wind). Power generation and non-electric technologies, such as solar water heating and bio-fuels, should constitute the main usages of renewable energy. |
| | The National Integrated Energy Plan (2003) outlines the direction and steps to be taken by South Africa to meet its energy needs. It is a requirement to develop an Integrated Energy Plan as per the National Energy Act No. 34 of 2008. The Plan advocates for a diversity of energy sources that include renewable energy as well as fuel switching to improve energy efficiency. Recognising the continued dominance of coal in the energy mix, the Plan's modelling forecasts the most effective use of South Africa's diverse energy sources. |
| | The Electricity Regulations on New Generation Capacity (DoE, 2009a) outline procurement processes and guidelines for electricity generated by IPPs. The Regulations resolved much contention over Eskom's role in IPP procurement processes by transferring this responsibility from Eskom to the DoE. However, the document made reference to an ISMO which might only be introduced in the next few years by the ISMO Bill currently being discussed in Parliament. |
| | The IRP 2010, finalised in 2011, outlines the view of the South African Government on the country's electricity landscape for the 2010-2030 period, in terms of generation capacity and technology mix. It plans for a substantial share of renewable energy in the country, allocating 42% of new generation to solar PV (8.4 GW), wind (8.4 GW) and CSP (1 GW) for a total of 17.8 GW (DoE, 2011a). |

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| **Department of Environmental Affairs and Tourism (DEAT), now Department of Environmental Affairs (DEA)** | The Long-Term Mitigation Scenarios (DEAT, 2007) argue for the introduction of renewable energy in the energy supply mix in order to reduce the country's greenhouse gas emissions by 34% by 2020 and 42% by 2025 compared to a business-as-usual scenario (and conditional to adequate finance and technology transfer). Accordingly, renewable energy should provide 15% of electricity by 2020, about 27% by 2030 and 50% by 2050. However, these targets are not legally binding but advisory only. |
| | The National Climate Change Response Policy (DEA, 2011), which builds on the Long-Term Mitigation Scenarios exercise carried out in 2007, presents the South African Government's vision for an effective climate change response, and the long-term and just transition to a climate-resilient and lower-carbon economy and society. It introduces a carbon budget approach for significant greenhouse gas emitting sectors and identifies a set of eight flagship programmes to be implemented. The Renewable Energy Flagship Programme encompasses the rollout of renewable energy in the country, the development of domestic manufacturing potential and the implementation of energy efficiency and renewable energy plans by local government. The DoE's solar water heating programme is also meant to be expanded notably through the promotion of the domestic supply of products for solar heating. |
| **Department of Trade and Industry (the dti)** | The Industrial Policy Action Plan (IPAP), which the first version was published in 2007, is a three-year rolling action plan for industrial policy implementation. It is updated on an annual basis since 2010. It represents a noteworthy step forward in scaling up South Africa's efforts to promote long-term industrialisation and industrial diversification. Green industries were first identifies as an area of focus in the 2011/2012 – 2013/2014 IPAP (IPAP 2) but in a highly generalised form (**the dti**, 2011). The IPAP 3 further emphasises the importance of the green economy and targets specifically the energy sector (solar and wind energy, solar water heating, energy efficiency) (**the dti**, 2012a). |
| **Economic Development Department (EDD)** | The New Growth Path (NGP) acknowledges the need to consider trade-offs between "the present costs and future benefits of a green economy" (EDD, 2010). It targets the creation of 300 000 new additional direct jobs in green economy sectors (natural resource management, waste management and recycling, renewable energy and energy efficiency) by 2020, and more than 400 000 by 2030, including 80 000 in manufacturing and the rest in construction, operations and maintenance. The NGP was complemented by a Green Economy Accord signed in November 2011 by Government, business, labour and civil society. The Accord identifies points of agreement as well as specific tasks to be carried out by each constituency for every commitment. |

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| **National Planning Commission (NPC)** | The National Development Plan (NDP), developed by the NPC in 2011, defines the long-term trajectory for South Africa's and, as such, envisions the country's "transition to a low-carbon, resilient economy and just society" (NPC, 2011). The Plan, adopted as the official government blueprint in 2012, represents the first real conceptualisation of an economy-wide pathway for a sustainable South Africa and introduces the necessity of "de-linking economic activity from environmental degradation and carbon-intensive energy, while remaining competitive and reducing unemployment, poverty and inequality" (NPC, 2011). As the most recent and holistic document, the NDP attempts to improve coherence and consistency among all relevant policies. The NDP endorses the greenhouse gas emissions targets and the propositions of carbon price and carbon budgets. It reiterates the goals of five million solar water heaters, vehicle emission standards and zero-emission building by 2030. It also targets the simplification of the regulatory regime for contracting about 20 000 MW of renewable energy by 2030. The NDP also recommends the decommissioning of 11 000 MW of ageing coal-fired power stations. |

*Source: TIPS*

While there may be inconsistencies with the targets set out for renewable energy across these policies, the policy matrix signifies a shift towards a low-carbon economy, with the industrial development of renewable energy being central to breaking the country's historical heavy reliance on coal-fired power plants.

The development of renewable energy is one of the two key focuses of the South African Government's green growth policy (with the improvement of energy efficiency) (TIPS and GGGI, *forthcoming*). The installation of 17.8 GW of renewable energy (solar and wind) from 2010-2030 is planned by the IRP (DoE, 2011a) and supported by the REIPP procurement programme, which aims at procuring 6 725 MW of new large-scale capacity by 2020.

This is supported by various financial and fiscal instruments, such as funding options from the Industrial Development Corporation (IDC), one the country's leading development finance institutions, and an accelerated depreciation allowance at the rate of 50%-30%-20% over three years for capital equipment used for renewable energy generation (wind, solar, small-scale hydro and biomass) under Section 12(b) of the Income Tax Act No. 58 of 1962, as amended by the Taxation Laws Amendment Act No. 22 of 2012. Under Section 11(a) of the Income Tax Act, renewable energy projects, which are required to incur significant start-up costs prior to commencing their trade and generating revenue, are also allowed to a tax deduction, on a special basis, for the so-called start-up costs or 'pre-production' expenditures. **the dti** is also investigating the possibility of imposing import tariffs to protect the domestic manufacturing capacity as well as introducing an export incentive that would count towards local content requirements.[22]

[22] Interview with **the dti**.

Additionally, **the dti** introduced the MCEP, an action programme of the IPAP. The MCEP provides enhanced manufacturing support via production incentives (80% of the programme in value) and loans (20%) to encourage local manufacturers to upgrade their production facilities to sustain employment and maximise value-addition in the short term[23] (de Vries, 2013). The programme focusses on the upgrade of manufacturing facilities by investing in new machinery and processes.

The DoE also ran a couple of programmes to support the development of renewable energy in the country. From 2007-2013, the Renewable Energy Market Transformation (REMT) project, funded by the World Bank's Global Environmental Facility and hosted by the Development Bank of Southern Africa (DBSA), aimed to build capacity within the DoE to develop regulatory and policy frameworks for renewable energy, including for the REIPP procurement programme. This also included reviewing the initial PPA under the REFIT policy, providing research support for the IRP 2010, the development of the National Solar Water Heating Framework and inputs to the ISMO Bill. In addition, the REMT provided matching grants from July 2010, for feasibility and pre-feasibility studies for renewable energy projects including solar, wind, biomass and solar water heating. Over five rounds, the REMT awarded contracts collectively worth ZAR 19.6 million (Capoor, 2013).

The Department has also established the Renewable Energy Finance Subsidy Office (REFSO), whose mandate includes managing renewable energy subsidies and offering advice to developers and other stakeholders on renewable energy finance and subsidies. This includes information on the size of awards, eligibility, procedural requirements, and opportunities for accessing finance from other sources. Financing options proposed by the REFSO include grants for feasibility studies, short- and long-term financing, export credits and soft loans, equity or loans, and the purchase of carbon emission reduction credits.

In order to bridge the financing gap and mobilise increasing amount of funds, the South African Government designed the South African Renewables initiative (SARi). On the side-lines of the 17th Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) in Durban, South Africa in 2011, the SARi was launched as part of the country's IPAP and in support of the IRP. Due to internal coordination problems within the South African Government, the SARi has, however, never materialised, although it might be revised in the near future. The SARi aimed at providing "a means for mobilising and channelling international public finance into the development of renewables capacity and the delivery of green energy. The overall vision was for a strategic, large-scale, and competitive procurement of renewable energy, enabled by domestic institutional de-risking, and the provision of low cost loans and risk guarantee instruments from international sources, to be combined with modest amounts of domestic funds and international public grants, to cover the remaining incremental costs" (**the dti** and DoE, 2011). Four European countries (namely the United Kingdom, Norway, Germany and Denmark) and the European Investment Bank joined the South African Government to initiate a SARi international partnership, which targeted the development of arrangements to provide financial instruments and resources to secure long-term funding for the development

[23] Interview with **the dti.**

of the country's renewable energy industry, as well as a technical assistance and experience sharing.

The objective of the SARi is strongly aligned with the Renewable Energy Fund, which may see this Fund delivering on what the SARi had planned. The NT[24] has been developing a Renewable Energy Fund that would combine fiscal, concessional and commercial funding to provide cheaper finance and project preparation technical assistance to IPPs. The facility intends to lower the cost and impact of renewable energy on the economy by leveraging private sector investment with more affordable climate change donor and concessionary funding under the supervision of the NT and other relevant departments (DoE *et al.*, 2012; Hemraj, 2012). The NT is engaging in consultations with the DBSA on the establishment of the fund which will support the IPP procurement process overseen by the DoE (Hemraj, 2012).

Going forward, the introduction of an unbundled (i.e. outside of Eskom) ISMO to invest, operate and maintain the country's high voltage transmission grid, may further accelerate the development of renewable energy in the country, empowering IPPs to sell electricity directly to third party consumers, such as mining and industrial complexes.

While the 2009 Electricity Regulations on New Generation Capacity split the six functions of a system operator (planning, allocation, procurement, buyer, system operator, transmission) between Eskom, the Minister of Energy and the Minister of Finance, they do not, however, identify the entity responsible for the buyer function. This function is currently carried out by a fully ring-fenced ISMO within Eskom's System Operations and Planning Division. On 6 September 2009, Cabinet designated Eskom as the single buyer from IPPs, but no policy explaining the market architecture of the ESI in detail has been published as yet, leaving unclear the role and function of the ISMO. Some policy statements indicate that an ISMO will be created separately from Eskom to act as a single buyer of electricity, removing potential conflict of interest as both a buyer and seller of electricity. Other policy statements indicate that an ISMO will also be responsible for planning, procurement and scheduling of generation.

The ISMO Bill is meant to consolidate policy and address discrepancies by establishing the ISMO as a national public entity, responsible for: (a) generation resource planning in accordance with the IRP; (b) transmission service and implementation; (c) buyer of power from generators, including Eskom, co-generators and IPPs; (d) system operations and expansion planning; and (e) electricity trading at a wholesale level.

The ISMO Bill was published by the DoE on 13 May 2011 for public comments (DoE, 2011b), approved by Cabinet on 16 March 2011 (GCIS, 2011) and tabled for Parliament in the same month. The Bill was revised and re-submitted in Parliament in March 2012 (DoE,

[24] Given the NT's mandate to oversee national public finance arrangements, including those related to official development assistance through the International Development Cooperation Chief Directorate, the department is best placed to coordinate the establishment of a conduit to channel possible foreign donor assistance and concessionary finance contributions into a central facility capable of disbursing funds at concessional rates as well as to ensure the optimisation of such funds (DoE *et al.*, 2012).

2012c). While the ISMO Bill has been discussed and agreed on by the Portfolio Committee on Energy at two occasions, it has been stalled in Parliament, being removed from the National Assembly Order Paper twice in June and November 2013 (Pressly, 2013). In March 2014, the motion to revive the ISMO Bill was once again dismissed.

The introduction of an ISMO would open the door for customers to choose their suppliers, i.e. Eskom or an IPP, and potentially avoid carbon taxation by preferring renewable energy producers (Abrahams *et al.*, 2013). The creation of an ISMO outside Eskom, although remaining fully-owned by Government, would also contribute to level the playing field by eliminating the potential bias created by the current structure in which the DoE procures energy and trading occurs within Eskom (Unlimited Energy, 2013). However, the current version of the Bill does not cater for the transfer of transmission assets from Eskom to the ISMO, which is essential to avoid conflicts with Eskom.

In the proposed structure, on the one hand, the ISMO would be tasked with procuring sufficient electricity from a variety of generators, but would rely on a high voltage transmission grid owned and maintained by Eskom. On the other hand, Eskom would maintain its monopolistic position on generation while retaining ownership and competency over the maintenance of the high voltage and distribution grids under its control. This setting does not enable the ISMO to be truly independent from Eskom, which would be in a position to maintain its control over the electricity supply industry. NERSA would then be responsible for setting tariffs for the electricity purchased by the ISMO from Eskom, the transmission charges that Eskom would levy against the ISMO for the electricity transmitted, and Eskom's charges for connecting IPPs to the grid, as well as establishing rules for the maintenance and extension of the grids owned by Eskom but operated by the ISMO. This situation could open the door for numerous conflicts of interest between the ISMO and Eskom, which would have to be settled by the regulator, and limit the ability for IPPs to play a stronger role on the South African electricity market outside of government-run programmes (Davie, 2013).

## 5. Early Independent Power Producer Procurement Programmes

South Africa's journey in developing a sound regulatory procurement programme for IPPs has involved a steep learning curve for Eskom, the DoE and NERSA. This section discusses the design and enforcement of renewable energy procurement programmes that have preceded the REIPP procurement programme, which include the PNCP, the MTPPP, the MBIPPP and other related projects. It provides a brief history of the establishment and key characteristics of these programmes with a critical review of the development and transition to the procurement programmes (the REFIT policy and the REIPP procurement programme) that followed.

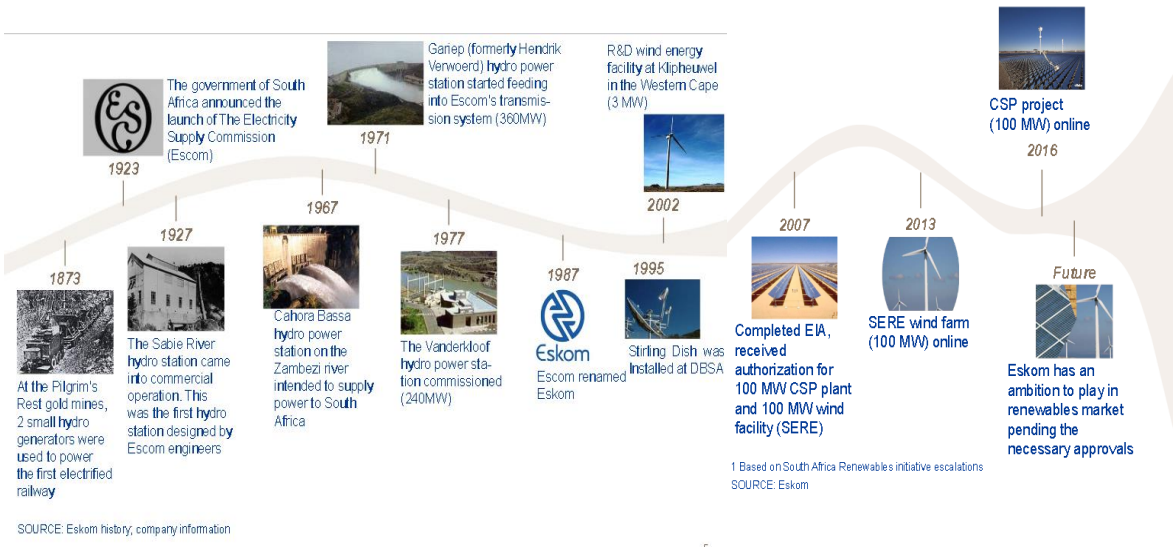
The historical context of the development of these early programmes is marked by the severe shortfall in electricity generation capacity and load shedding scheme of 2008. Eskom's decision to embark on a large coal-based expansion programme is also a significant feature of the electricity generation history of the last decade. These early procurement programmes took place at a time of policy and institutional uncertainty, as the 2003 White Paper on Renewable Energy was to be eclipsed by the IRP and the DME split between the DoE and the DMR. Designed and implemented by Eskom, these procurement programmes were aimed at encouraging the participation of the private sector in electricity generation while, in the short to medium term, providing a solution for the shortage of generation capacity. At the same time, Eskom was also calling for separate expressions of interest (i.e. outside of these procurement programmes) for the development of renewable energy projects by the private sector (Kohler, 2009). While these programmes were abandoned by 2009, they overcame the initial stumbling blocks in introducing IPPs and renewable energy in the country, and provided valuable lessons in the design of the REIPP procurement programme. In addition, these initial attempts to encourage the participation pf IPPs in the electricity supply industry sparked interest from developers in the potential of a renewable energy market in South Africa.

One of the first IPPs established in South Africa, prior to official Eskom's programmes, was a cogeneration project[25] undertaken in 2005 by IPSA Group PLC[26] at Karbochem, a synthetic rubber manufacturer site in Newcastle. As a generator, IPSA Group PLC was licensed by NERSA and held a temporary PPA with Eskom. The PPA was however put on hold due to two issues, namely Eskom's funding difficulties and the absence of NERSA's formal approval to allow purchasing energy from IPPs. The project was revived under the MTPPP programme discussed later (Kuni, 2014). Prior to the development of IPP programmes, Eskom's involvement in the renewable energy sector had been limited to a few projects, as illustrated in Figure 2 below.

[25] Cogeneration is the supply of electricity generated from the use of waste heat and energy from industrial processes either generating or using electricity. It is also described as 'the combined production of electrical (or mechanical) and useful thermal energy from the same primary energy source'.

[26] IPSA Group PLC is a company incorporated in England and Wales, which has been established to develop, own and manage power generation plants in southern Africa. The company has been quoted at the London Stock Exchange since September 2005 and at the Johannesburg Stock Exchange since October 2006.

**Figure 2: Eskom's history in renewable energy**




*Source: Greyling, 2012*

### *5.1 The Pilot National Cogeneration Programme*

Eskom launched the PNCP in 2007 to test the market for independent power generation, as generation capacity shortages were a key concern. Eskom aimed to procure 900 MW of commercial cogeneration supply during 2007 (Prakash, 2009). The project was primarily aimed at gauging the cogeneration market in South Africa, looking at the size of market offering, the cogeneration mix, pricing options, the timing of potential projects and designing an appropriate PPA, with the purpose of carrying the lessons learnt into a longer-term model (Viljoen, 2008).

Three types of cogeneration were considered, namely: (1) projects using energy from processes which would otherwise be wasted; (2) primary fuel-based generation projects which produced other energy (in addition to electricity) as part of their core design; and (3) renewable fuel-based projects where renewable fuel source were a primary source of energy used for generation or a co-product of an industrial process.

The PNCP encompassed both new build projects and re-commissioned plants of a size capacity greater than 1 MW. A ceiling price for bidders was used in this process. Furthermore, the bidding process focused on obtaining the cheapest bids, based on both technical and commercial criteria. The length of PPA for the PNCP ranged from a minimum of seven years to a maximum of 25 years, the latest commercial operation date being 2012. The operation of these agreements was based on 'self-dispatch' and on time-of-use differentiated payment profiles. Network costs that producers incurred included connection costs for generators and use-of-system costs passed through to the buyer (Prakash, 2009).

During the initial expression of interest phase of the PNCP, Eskom received 15 bids by 31 May 2008, totalling around 5 000 MW. The utility then offered PPAs to a handful of generators totalling less than 50 MW (DoE, 2009b). The low number of offered PPAs can be explained by the lack of readiness of both Eskom and IPPs for such a programme.

Developers found the bidding process complex and were hesitant to incur high upfront capital costs with little certainty on whether the programme would ultimately be successful. Developers also found the PPA to be burdensome and allocating too much risk to generators. Bidders cited the lack of a 'fuel risk pass through mechanism' in the PPA to be problematic (DoE, 2009b).[27] These imposed reliability requirements, although realistic for normal IPP plants, were not acceptable to cogeneration developers, which are dependent on a primary industrial process for fuel. Upon the review of received bids, it emerged that a number of developers registered ideas that were not ready for development into projects. Ultimately, no PPA was signed under the PNCP (Yelland, 2009). Nevertheless, a number of developers found the MTPPP that was launched the following year to be more attractive and chose to participate in that programme (DoE, 2009b).

### *5.2 The Medium Term Power Purchase Programme*

The MTPPP was established shortly after the PNCP with proposals to be submitted by December 2008 and limited to plants that would be in commercial operation by June 2012. One of the main reasons for the establishment of the MTPPP was not as much the testing of private sector participation in electricity generation, but more Eskom's desire to change its short- and medium-term power supply, also catering for generator that could not participate in PNCP (Viljoen, 2008). The MTPPP envisioned a total maximum capacity to be contracted of 30 000 MW.

Under the MTPPP, submissions for proposals were due in December 2008 and contracts, labelled in South African rands, were of a maximum of 10 years (ending in December 2018). The programme was limited to projects from 5-10 000 MW but was open to all technologies and project types (new build, refurbishment or increased capacity of existing projects). Interestingly, the programme allowed for bidders to either sign a PPA or to look at participating through Eskom's Power Conservation Programme (Viljoen, 2008).

As illustrated in Table 2 below, a time-of-use weighted price band was used for selecting projects, with Eskom guaranteeing a floor price for successful projects. According to the model calculated by Eskom, the effective price over the period of a plant coming online in 2009 was 0.57 ZAR/kwh and 0.51 ZAR/kwh if it came online in 2012.

**Table 2: Price levels under the medium term power purchase programme at real 2008 prices (in ZAR/kWh)**

| Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Guaranteed Price** | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 | 0.60 | 0.50 | 0.40 | 0.35 | 0.35 |
| **Maximum Price** | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 0.85 | 0.75 | 0.60 | 0.40 | 0.35 |

*Source: Viljoen, 2008*

[27] In the absence of fuel risk pass through mechanism in the PPA, the onus remains solely on the generator to control input cost and tariff reviews based on fuel price fluctuation are not possible. This exposes co-generators to risks that they cannot control and circumstances where they could not reasonably be expected to control cost.

Although PPAs under the MTPPP were much shorter than under the PNCP, negatively impacting on the risk profile and viability of projects, the programme was investigating the construction of the first greenfield coal-fired power station in the country. However, in the meantime, Eskom announced the suspension of the MTPPP, citing the uncertainty over whether the cost recovery mechanism for the cash flows associated with the PPAs could be recovered through the tariff granted by NERSA (Van der Merwe, 2009). While Eskom had applied for a 34% increase in May 2009 for the 2009/2010 financial year, NERSA only granted a 31% tariff increase. In addition, Eskom's tariff increase application did not account for significant cost operation and regulatory costs. The application excluded the cost of non-Eskom generation, demand-side management, the 2 c/kWh environmental levy introduced by Government, and the road maintenance for coal transport estimated at around ZAR 2 billion per year (Van der Merwe, 2009; Yelland, 2009). These external costs, which the MYPD did not cover, along with the reduced tariff increase that NERSA awarded, led Eskom to realise that it was not in the financial position to commit to the PPAs under the MTPPP. In the end, as with the PNCP, not a single PPA was signed under the MTPPP (Yelland, 2009).

Despite the abandonment of the programme, the feedback from bidders was more positive than their experience in the PNCP. Positive features of the MTPPP included the publication of a price band, which allowed potential generators to evaluate their ability to participate and their chances of success at an early stage without having to incur large capital costs. Eskom's commitment to cater for larger generation capacity at the agreed price increased chances of success, enabling developers to justify spending high costs on project development (DoE, 2009b). Members of the EIUG were disappointed with the suspension of the programme as large investments had been committed in the process.

Some of the drawbacks of the programme were the heavily decreasing price over time, as reflected in Table 2 above, down to a level not sustainable for most projects. Most developers understood the reasoning for sculpting the price from a high starting point down to a lower tariff more reflective of the long-term price of electricity. However, the general view was that the price level towards the end of the contract term was set at a level that was not reflective of the cost of new capacity. In addition, the short PPA term put serious constraints on the project's ability to raise and pay back debt funding. This would have resulted in a sub-optimal capital structure and a negative impact on the price of the power produced. Lastly, the lack of a fuel pass through mechanism remained a concern to many developers (DoE, 2009b). and the perception that the PPA allocated too much risk to the generator persisted (Yelland, 2009).

### *5.3 The Multisite Base-load Independent Power Producer Programme*

The longer-term MBIPPP was established in 2008 to procure between 2 100 and 4 500 MW of base-load power. In 2008, Eskom called for letters of interest and received 76 submissions from private companies. Eskom then pre-qualified 27 national and international developers. One of the features of the programme was a pre-qualification process, essentially based on a 25% black shareholding requirement.

Pre-qualified companies were issued with RFPs and bids closed in May 2009, with delivery of the power planned for 2012-2017. Most of the bids in this programme were for the construction of coal-fired stations.

Successful IPPs would sign long-term PPAs (up to 40 years) with Eskom and development would occur on a 'build-own-operate' basis, with a maximum plant capacity for a single supplier fixed at 2 000 MW. A key feature of the MBIPPP was that companies had to ensure an equivalent-term agreement with fuel supplier. Eskom indicated that it would be willing to pursue a hybrid type of agreement where it would conduct much of the upfront planning and engineering design. This included securing manufacturing slots for long-lead items such as turbines and boilers. IPPs were however responsible for the site selection.

This programme was suspended by Eskom in 2009 and has recently been replaced by a base-load procurement programme designed by the DBSA.

### *5.4 Review of Early Independent Power Producer Procurement Programmes*

While Eskom initiated the first programmes aimed at private sector involvement in electricity generation (namely the PNCP, the MTPPP and the MBIPPP), South Africa's early independent power procurement programmes were characterised by non-performance and failure to take off.

The aim of these programmes was to encourage the participation of the private sector in electricity generation and meet supply needs, particularly on a short-term basis. The lessons learnt from the successes and largely failures of these early IPP programmes have involved a ten-year journey of policy and programme design and development.

First, early programmes identified the need for a strong policy and regulatory environment for IPPs, in order to give developers a clearer sense of their attributed role in the electricity supply industry and their likelihood of their success as bidders in the various programmes.

Second, early programmes were designed and administered by Eskom, which developers saw as inherently biased in the utility's favour (Yelland, 2009). The need for the procurement programmes to be driven by the DoE and NERSA, so as to avoid Eskom playing both participant and referee, and independent price setting, along with clear cost recovery rules not solely dependent on the financial standing of Eskom, arisen.

Third, the slow uptake, and the failures and discontinuation of the early programmes can be largely attributed to problems around financing and risk allocation as well as the policy and planning environment at the time. The regulatory framework should re-assess the allocation of risk among parties in the PPA and offer an appropriate term (suggested between 15 to 20 years) for relevant technologies. Eskom's bias in the programme design resulted in developers being expected to take on risks that their lenders regarded as conditions to withhold financing.[28] Under the PNCP, developers were to take on the fuel supply risk of relying on government to supply them with fuel necessary to provide electrical energy to their power plants and bear the cost should government default on consistently supplying the agreed fuel amount (DoE,

[28] Interview with international consulting company.

2009b; Yelland, 2009). IPPs were also asked to shoulder the fuel price risk as NERSA could not guarantee the tariffs would change in relation to the price of fuel charged to IPPs (Exxaro, 2011). In the cases of the PNCP and the MTPPP, PPAs allocated no risk to Eskom should the utility default on purchasing the agreed amount of power from generators or fail to connect power plants to Eskom's grid. The risks posed to IPPs to generate power and receive payment for that power was negatively received by financiers which would not support a PPA under these conditions.

## 6. The Renewable Energy Feed-In Tariff

Following the failure of early procurement programmes, Government understood that it needed to create a credible IPP procurement programme. By developing the REFIT scheme, Government sought to remove the risks associated with the PPA and previous governance structures. The REFIT programme introduced a shift in procurement away from the responsibility of Eskom and was largely designed and administered by NERSA. Altogether, the REFIT policy addressed many of the problems encountered with early procurement programme and was considerably more attractive for developers. Additionally, NERSA initially set at a level higher than international trends to gain the confidence of developers and their financiers, and ensure that they would make a return on their investment. Along with the timing of the design of the REFIT, which followed the financial crisis and South Africa's power outages of 2008, it contributed to stabilising conditions to invest in the energy sector.

### *6.1. The Development of the Renewable Energy Feed-In Tariff*

The REFIT policy was conceptualised within NERSA's Electricity Regulatory Division in 2006/2007, following study tours to Germany and Denmark by representatives of the regulator, the NT, the Department of Public Enterprises (DPE) and the DEA. Despite some opposition within NERSA itself as well as reluctance from the DME and Eskom, the development of a REFIT policy gained traction at NERSA's board level in June 2007 (Baker, 2012).

The REFIT mechanism sought to procure power output from qualifying renewable energy generators (i.e. IPPs) at predetermined prices. Eskom's Single Buyer Office (SBO) was appointed as the Renewable Energy Purchasing Agency (REPA), the exclusive buyer of power under the REFIT. Generators participating in the REFIT were required to sell power generated by renewable technologies to Eskom (as the REPA) under a PPA, and were entitled to receive regulated tariffs, based on the particular generation technology. NERSA was tasked with administering the REFIT programme, which included setting the tariffs and verifying that generation was genuinely sourced from renewable energy (NERSA, 2009a).

The initial allocation under the REFIT programme amounted to 1 025 MW, in line with the 2009 and 2010 versions of the IRP and would have run for three years until the end of 2013, contributing to the 1 667 MW target set in the 2003 White Paper on the Renewable Energy Policy of the Republic of South Africa.

In 2009, NERSA developed the REFIT in two phases. In Phase 1 in March 2009, NERSA published regulatory guidelines for wind, small hydro (less than 10 MW), landfill gas methane and CSP parabolic trough with storage (NERSA, 2009b). In Phase 2 in July 2009, the regulator published guidelines for CSP trough without storage, large scale grid-connected solar PV systems, solid biomass, biogas and CSP towers with storage of six hours per day (NERSA, 2009a).

The draft criteria for evaluating renewable energy projects were published by NERSA in February 2010, but were never finalised under the REFIT, but instead integrated into the REIPP procurement programme.[29]

### *6.2. The Power Purchase Agreement under the Renewable Energy Feed-In Tariff*

NERSA's (2009c) initial draft of a PPA for the REFIT programme in July 2009 was criticised by developers and investors for allocating too much risk to IPPs (Baker, 2012). Developers identified that there was no stabilisation clause for law changes, which did pose a realistic risk since previous procurement programmes were abandoned without compensation to IPPs (Brodsky, 2010). The PPA did not adequately deal with the possibility of a restructuring of the electricity supply industry, given Government's clear intention to introduce an ISMO. In addition, the REPA was not clearly defined. While NERSA's guidelines and the PPA referred to Eskom's SBO as the REPA, the 2009 Electricity Regulations on New Generation Capacity define a buyer as "any person or entity designated by the Minister in terms of Section 34(1)(c) and (d) of the [Electricity Regulation] Act and authorised under a licence." Consequently, no PPA was signed with Eskom at this stage, as developers and banks insisted on a PPA that would be underwritten by Government.

The inability of different stakeholders to agree on how to apportion risk was a key reason for the halt in the signature of PPAs. On the one hand, although general principles emerged, there was no consensus among private lenders on what constituted a bankable PPA as each bank had a different risk appetite.[30] The PPA is the primary agreement that secures the revenue of renewable energy projects, which in turn, ensures that IPPs and their financiers will make a return on their debt.[31] In other words, the availability of money and the risk appetite determine the extent of the risk that each ban is willing to accept. On the other hand, the NT was sceptical to provide a PPA that would be underwritten by Government, as this would threaten the country's balance sheet. At the same time, the NT recognised that developers were unwilling to enter into a PPA underwritten by Eskom alone (Baker, 2012; Eberhard, 2013).

NERSA attempted to redraft the PPA following public comments from the private sector. This process was overtaken by the private legal firm, Webber Wentzel, as responsibilities for REFIT began to shift from NERSA, to the DoE and the NT. This shift is described in greater detail in Section 6.4.

### *6.3. Tariffs and Pricing Structure*

In December 2008, NERSA released a consultation paper in which it proposed a set of tariffs regarded as close to international standards. At the public hearings on the consultation paper, stakeholders stressed that tariffs were too low to make any renewable energy project

[29] Further discussion on the political and policy processes that facilitated the transition from REFIT to REIPPP Programme features in Section 6.4.

[30] Banks determine their appetite for risk by the availability of money – when money is freely available, banks are less risk averse, compared to when money is tighter and banks place much more stringent conditions on offering lines of credit.

[31] Interview with South African banks.

viable and called for NERSA to review them in order to create a bankable renewable energy market (Baker, 2012). These tariffs and their successive revisions in 2009 and 2011 are presented in Table 3.

**Table 3: Renewable energy feed-in tariffs as published in 2008, 2009 and 2011 (in ZAR/kWh)**

| Technology | December 2008 | March 2009 | March 2011 |
|---|---|---|---|
| **Wind** | 0.66 | 1.25 | 0.94 |
| **Concentrated Solar Power** | 0.61 | 2.10 | 1.84 |
| **Solar Photovoltaic** | -- | 3.94 | 2.31 |
| **Small Hydro (≤ 10MW)** | 0.74 | 0.94 | 0.67 |
| **Landfill Gas** | 0.43 | 0.90 | 0.54 |

*Sources: NERSA, 2011*

In March 2009, NERSA released revised tariffs fully indexed on inflation designed to cover generation costs plus a real return on equity of 17% (NERSA, 2009d). Unlike original tariffs, these were generally regarded as generous by developers (Eberhard, 2013). The private sector played an influential role in their calculation. Input on the tariffs was provided by an informal advisory committee which included representatives from leading South African banks, namely Absa Bank, Nedbank, Standard Bank, FirstRand Bank and Investec. The March 2009 tariffs were calculated on the assumption of a high interest rate and a high dollar exchange rate, and input from developers who were hoping for a higher return. NERSA stated that the 2009 tariffs were set at these higher than international levels to, not only ensure a return on investment for developers, but also to incentivise a small renewable energy market and the long-term commercial viability of the sector (NERSA, 2009a).

Nevertheless, developers expressed apprehension around the financial capacity of the South African Government to sustain tariffs at these levels over the 20-year lifetime of the PPA (Eberhard, 2013; NERSA, 2011). Such high tariffs would create excessive profits for IPPs and not make electricity more affordable for consumers. In turn, this could hold back innovation among developers for more cost-cutting, efficient and better quality technologies and result in inefficient operations (Eberhard, 2013). More broadly, there remained considerable uncertainty on the legality of feed-in tariffs, specifically their (in)consistency with South Africa's public procurement framework, as well as delays in finalising PPAs and interconnection agreements with Eskom. Section 6.4 discusses in further detail the legality of the feed-in tariffs and how this contributed to the transition from the REFIT to the REIPP procurement programme.

In March 2011, NERSA unexpectedly released a consultation paper with lower feed-in tariffs, arguing that a number of parameters used in 2009, such as exchange rates and the cost of debt, had changed (NERSA, 2011). New tariffs were in line with international trends in the cost of renewable energy technologies, which had decreased since 2009. There was speculation that the cut may have also been an attempt to trade lower prices for a larger allocation of renewable energy to be included in the IRP 2010. The lower tariffs did not raise concerns among developers, who were reassured by the larger allocation of independent

generation capacity (Eberhard, 2013). The March 2011 tariff revisions also signalled a shift in the tariff structure. Notably, the capital component of the tariffs would no longer be fully indexed on inflation. However, NERSA maintained the required real return for equity investors of 17% in its final revision (NERSA, 2011).

### *6.4. The Transition from the Renewable Energy Feed-In Tariff to the Renewable Energy Independent Power Producer Procurement Programme*

The REFIT programme was set to be the national procurement framework for renewable energy and had largely resolved the flaws that characterised previous programmes. Developers had already selected sites, concluded EIAs and resource measurements in preparation to submit their projects to participate in the REFIT. In order to develop a sustainable renewable energy industry in the country, Government needed to build confidence among developers and the investment community, and did not want the failure of another independent power procurement programme. As concerns and challenges arose in 2009/2009, the rationale underpinning the shift from a feed-in tariff to an auction programme took prominence.

First, the NT and the DoE were concerned that the generous tariffs set in the REFIT programme would result in a large oversubscription, notably in relation to Eskom's capacity (financial and grid connection) to procure power from IPPs (Baker, 2012). This was particularly concerning as the cost of the utility's new build programme was increasing beyond the original budget (Yelland, 2009). The NT was concerned that Eskom, underwritten by Government, would default on PPAs with developers. The NT and the DoE raised concern over the financial implications of the REFIT policy, particularly whether there were sufficient cost-recovery mechanisms to prevent the programme from raising governmental debt (Baker, 2012).

Second, the DoE, supported by the NT, identified that by developing the REFIT, NERSA was acting beyond its mandate stipulated in the Electricity Regulation Act No. 4 of 2006. According to the Electricity Regulation Act, the function of developing energy policy belongs to the DoE, while NERSA acts as an implementer. While NERSA understood at the time that a programme such as the REFIT was meant to be developed by the DoE, the regulator explains that, owing to administrative issues that caused delays, NERSA ended up initiating the process all within the legislative framework in place at the time (Baker, 2012).

Third, the DoE states that NERSA did not have the budget nor the expertise to efficiently run a REFIT, and the relatively high prices set by NERSA did not enable the financial feasibility of the programme.[32] So began the policy processes to replace NERSA's REFIT by eventually introducing a competitive bidding procurement process, the REIPP procurement Programme.

In January 2009, the then-DME put forward a consultation paper on electricity regulation. The paper did not mention a REFIT policy but instead proposed a bidding system. Importantly, the document shifted the strategic and planning responsibilities from NERSA to

[32] Interview with South African banks.

Eskom, and gave the Minister of Energy wide discretion regarding NERSA's REFIT process (IDASA, 2010).

In response, at the Renewable Energy Summit in March 2009 where the DME proposed a tender system as the preferred model, the Danish Embassy, the South African Wind Energy Programme, some private sector companies and NERSA argued in favour of the feed-in tariff. NERSA also published in March 2009 its approved REFIT guidelines with minimal reference to DME's Electricity Regulations document (NERSA, 2009c).

In August 2009, the DoE's Electricity Regulations on New Generation Capacity were approved and included a section on procurement of renewable energy and cogeneration (DoE, 2009a). This followed the DoE receiving legal advice that feed-in tariffs could be challenged against public finance and procurement laws. The 'first come first serve' basis upon which bids were essentially chosen under the REFIT was considered not to be in line with the procurement regulation that stresses competitive bidding. Within this legal framework, an auction system does more to encourage price competitiveness among developers than the feed-in tariff.[33] Thus, in November 2010, the DoE, supported by the NT, published the New Generation Regulations. The regulation effectively removed NERSA and Eskom's functions to implement a REFIT, and replaced the REFIT with a competitive bidding process under the governance of the DoE and the NT. Additionally, the New Generation Regulations separated the procurement process from Eskom and heeded IPPs' calls to have a PPA underwritten by Government (DoE, 2009a).

Subsequently, the regulator abandoned feed-in tariffs. Not a single megawatt of power was signed in the two years since the launch of the REFIT programme, because the feed-in tariff was effectively never implemented. There also remained unfinished items in the regulation, including the project selection criteria, which were still in draft form and incomplete (Baker, 2012).

The political play between NERSA and the DoE over procurement programmes also appeared to become a dispute over turf.[34] What is certain in the shift from the REFIT to the REIPP procurement programme is that NERSA's role has been significantly diminished. The regulator was largely responsible for designing and administering the REFIT. Under the REIPP procurement programme, NERSA is given a somewhat ceremonial task of awarding generation and distribution licenses to successful IPPs (in order for them to reach financial close), and less an autonomous decision on the part of NERSA.

While developers did not have a strong preference for either the feed-in tariff or the tender system,[35] the change in the procurement system came as a surprise and was not particularly welcomed by developers, which were already prepared to submit projects under the REFIT programme. Developers incurred additional costs from the delays caused by changing regulatory frameworks. Many renewable energy project developers had already secured sites and had initiated energy resource measurements and EIAs as per the REFIT

[33] Interview with the DoE.

[34] Interviews with IPPs, South African banks, consulting companies and experts.

[35] Interview with international consulting company.

guidelines (Eberhard, 2013). The unexpected change in procurement frameworks also raises concerns over whether there would be further changes, without notice or consultation going forward, i.e. would this remain Government's *modus operandi* to deal with IPPs?

In May 2011, a third iteration of the Electricity Regulations was published with all references to a REFIT removed under the legal advice of Webber Wentzel. In August 2011, the NT declared the REFIT illegal, following an audit carried out by Webber Wentzel, citing that "the predetermined tariff would fall foul of South Africa's procurement rules" (Creamer, 2011). As raised earlier, evidence suggests that a REFIT would have been inconsistent with the Public Finance Management Act No. 1 of 1999 (as amended) due to the absence of price competition. This analysis can however be on the basis that, although price would not have been a differentiating factor, competition would have occurred based on other criteria, most likely local economic development, domestic manufacturing, black economic empowerment, employment creation and social development (Creamer, 2011).

Similarly, the DoE affirmed that a REFIT was illegal because the feed-tariff prescribed that NERSA determine the tariff, beyond the legal mandate of the regulator. NERSA differed on this point and explained that its role in designing a REFIT was in line with government policy and national legislation at the time. Furthermore, the new procurement framework was only introduced in May 2011, two years following the launch of the REFIT, through the New Regulations on New Generation Capacity. In July 2011, recognising that the new regulations made the REFIT inconsistent with the law, NERSA concurred with Government's bidding process (Creamer, 2011).

Other explanations for the shift from the REFIT to an auction system have been raised from technical considerations (the large number of wind farms generating fluctuating electricity could have posed challenges to grid stability), to administrative limits (understaffed authorities would have been unable to deal with a large number of applications in a timely manner, generating long delays) to financial risk issues (the REFIT's guarantee to buy all renewable electricity, combined with falling prices for solar PV, could have raised NT's fears about an unchecked growth of expenses and poor value for money) (Renewable Energy Ventures (K) Ltd and Meister Consultants Group Inc., 2013).

Ultimately, the change in regulation appeared more as a political issue. While facilitating the entry of IPPs into the electricity generation market, and importantly, ushering in renewable energy in the energy supply mix, the shift to a DoE-led bidding process served to shrink NERSA's role, the initiator of the REFIT, reinforcing direct governmental control over the development of renewable energy in the country.

# 7. The Renewable Energy Independent Power Producer Procurement Programme

Following a lengthy transition process, the DoE, with assistance from the NT's Public-Private Partnership Unit, launched the REIPP procurement programme in August 2011.

South Africa's programme is based on a system of auctions, also known as 'demand auctions' or 'procurement auctions', following a standard set of four high-level stages: 1) issuance by government of a call for tenders to procure a given generation capacity of renewable energy-based electricity; 2) definition by the government of the requirements for project developers to participate in the bid, such as proof of financial capability, secured land and environmental license; 3) bid submission by project developers, specifying a price per unit of electricity at which they commit to realising the project; 4) evaluation of the offers by the government on the basis of the price and other criteria, such as local content; and 5) signature of a PPA with the successful bidders. Auction systems have become increasingly widespread in the last few years, with 44 countries in 2013 (compared to 9 in 2009), including 30 developing economies, using renewable energy auctions (IRENA, 2013b).

South Africa follows a sealed-bid auction,[36] where project developers simultaneously submit their bids with an initially disclosed offer of the price at which the electricity would be sold under a PPA (IRENA, 2013b). Government thereafter ranks and awards projects based on the auctioned volume of generation capacity.

## *7.1. High-Level Overview of the Renewable Energy Independent Power Producer Procurement Programme*

The REIPP procurement programme is organised around a number of complementary stages and processes. Figure 3 below illustrates how the programme is designed and details the administrative processes from the RFPs to the selection of projects that will feed into the national grid.

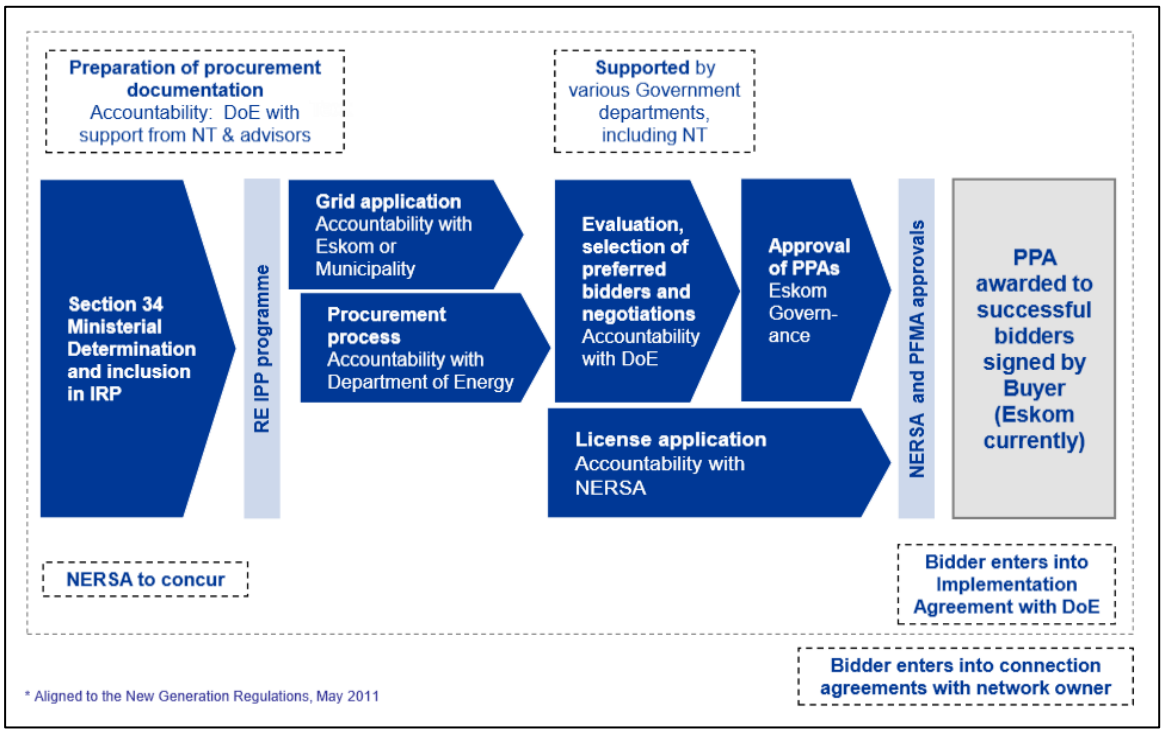
First, the Minister of Energy determines the limit capacity for the whole programme as well as for each technology type under each bid window, as illustrated in Section 7.3. NERSA concurs with the Minister's determination ensuring that the megawatt capacity for each bid window is in line with the IRP. The ministerial determination is included in the RFP provided by the DoE, which details the type of technology and tariff cap for a specified technology, as well as the qualification criteria on which IPPs' bids are assessed.

The RFP, which is divided into three parts, prescribes the operational mechanisms governing the REIPP procurement programme:

[36] Another type of auction is the multi-round descending-clock auction, where in an initial round, the government offers a price, and developers bid with offers of the quantity they would be willing to provide at that price. The government then progressively lowers the offered price in successive rounds until the quantity in a bid matches the quantity to be procured. Hybrid models are possible, using both the descending clock auction in a first phase and the sealed-bid auction in a second phase (IRENA, 2013b).

- Part A provides a description of the REIPP procurement programme, its key objectives and the terms and conditions for participating in the programme;
- Part B details the minimum qualification criteria which bidders must meet in terms of legal matters, land rights and use, environmental consents, financial matters, economic development, technical matters, and value for money; and
- Part C sets out the methodology (including specific weighting for each criterion) for the final evaluation and ranking of projects.

**Figure 3: High-level processes and procedures of the renewable energy independent power producer procurement programme**




*Source: Haffejee, 2013*

Second, guided by the RFP, developers submit renewable energy projects that are evaluated on their price competitiveness (for 70% of the total) and a set of economic development criteria (for the remaining 30%), as detailed in Section 7.6. Economic development criteria are designed to advance government policies on socio-economic development (DoE, 2013b), such as the procurement of locally manufactured inputs, job creation, and community ownership of renewable energy project companies. The DoE consults widely with other government departments (such as **the dti**) and external consultants on the qualification criteria and evaluation methodology.

Third, projects that meet the minimum requirements and are competitive in their technology group in terms of price and economic development are selected as preferred bidders. Thereafter, the DoE, NERSA, Eskom, commercial banks, development finance institutions and IPPs work together to bring the project companies to financial close within a timeframe specified in the RFP. This process includes applying for generation and distribution licenses from NERSA. Particularly, NERSA reviews projects and ensures that they will be able to

generate the capacity of power proposed in their bid application. NERSA holds a series of public hearings in the provinces where the renewable energy projects have received preferred bidder status. During these public hearings, license conditions can be altered to cater to the parties included in the project company (NERSA, 2013b).

Fourth, preferred bidders sign a PPA with Eskom, underwritten by the NT, detailing the terms on which the project company sells electricity to Eskom's SBO. The PPA details the conditions under which IPPs and Eskom would be held accountable should either default on their contractual obligations, as detailed in Section 7.4 below.[37] Essentially, this refers to the actions that would be taken should the IPP fail to generate power or Eskom fail to connect power to the grid. The PPA is accompanied by connection agreements with Eskom's SBO to facilitate connecting renewable energy projects to feed into the national grid (Smit, 2011). NERSA would be responsible for settling a dispute between the two parties.[38] However, it is also conceivable that should IPPs not receive a favourable judgement and risk losing payment for the generated power, their lenders would take legal action against Eskom.

Lastly, the project company signs an Implementation Agreement with the DoE ensuring that the agreed megawatt capacity of the renewable energy will be generated within the set timeframe and that the economic development criteria to which IPPs have committed in their bids will be met. The Implementation Agreement, which also specify the terms under which the contract will be terminated for non-compliance, includes an obligation for quarterly reporting to ensure that all stakeholders have a sustained commitment to the terms of the contract (DoE, 2013b).

Overall, these decision-making processes position the DoE and the NT as the main drivers of the programme. The two institutions are central in drafting the RFP which largely determines the scale of megawatt capacity in each bid window and the methodology for project selection. Other government departments provide advisory inputs as per their areas of expertise, such as **the dti** on local content and the DEA on environmental consents.[39] NERSA and Eskom, which were the architects of previous independent power procurement programmes, have now secondary decision-making functions in the process.

### *7.2. Institutional Coordination*

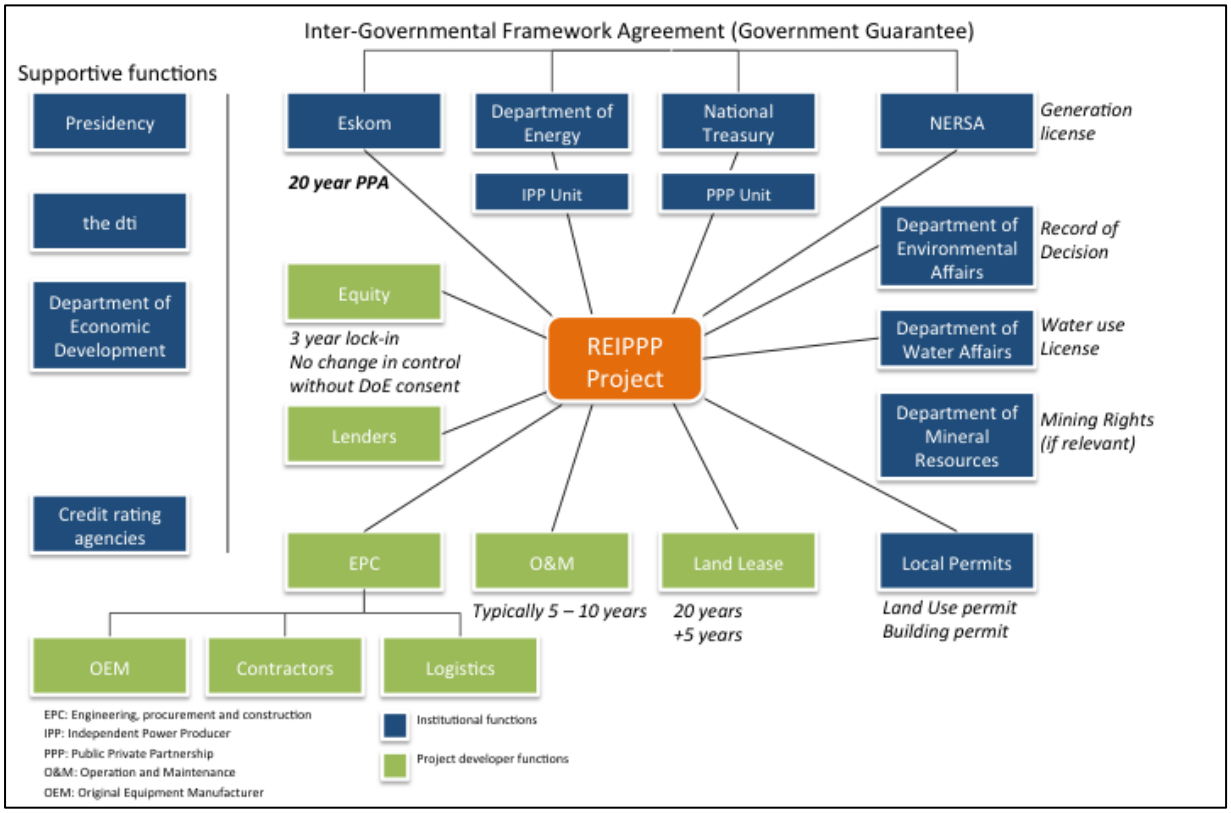
This section discusses the multiple institutions and their functions in the REIPP procurement programme. Figure 4 below illustrates the specific institutions which play a role in the bidding process and their main responsibilities are detailed thereafter.

First, the DoE's IPP Unit is the designated entity for administering the REIPP procurement programme. Foremost, the DoE, with support from the NT, developed the regulatory framework for the current auction programme. The IPP Unit is responsible for the high-level processes described Section 7.1. This involves preparing the RFP documents, ensuring that the Minister's determination is in line with the IRP, deciding on the evaluation criteria and

[37] Interview with South African banks.
[38] Interview with NERSA.
[39] Interview with **the dti**.

evaluation methodology, as well as overseeing and finalising the agreements between project companies, Eskom's SBO and the Department. The DoE's responsibilities are extensive and central to the programme, requiring the Department to resort to the expertise of external consultants and designated departments in their field of expertise.

**Figure 4: Stakeholders' functions under the renewable energy independent power producer procurement programme**




*Sources: Pickering, 2013 and Haffejee, 2013*

Second, the NT serves as the transactional advisor to the programme. The NT underwrites the PPA, advises on the modelling for the financial criteria and evaluation. This involves assessing the financial standing of the project companies and their financiers. More technically, the NT evaluates the robustness of financial modelling that underpins the price offering of each bid and the funding model of the project company.

Third, NERSA is then responsible for awarding generation and distribution licenses to successful project companies for the period and megawatt capacity in line with the PPA. As mentioned before, this is not a decision that NERSA makes, but more an instruction that the regulator carries out as stipulated by the RFP. Under amendments to the Electricity Regulation Act No. 4 of 2006, the Minister of Energy can give instruction to NERSA to award generation and distribution licenses (Steyn, 2012). Should NERSA decide not to award the requisite licensing to an IPP, the regulator must substantiate its analysis to the DoE, as to why the price offering is unsatisfactory or the IPP would default on the contracted capacity.[40]

[40] Interview with the DoE.

NERSA's role involves ensuring that the resource measurements and the modelling underpinning the generation forecast reviews conclude that the projects will be able to generate the proposed megawatt capacity. To date, following three successful bid windows, NERSA has issued generation licenses to all preferred bidders. NERSA is also responsible for managing the relationship between Eskom and project companies, particularly in situations of disagreement.

Fourth, Eskom's System Operator is responsible for designing and ensuring that the grid infrastructure can equitably accommodate renewable energy projects to feed into the national grid. The Grid Access Unit (GAU) provides technical analysis on the connection of projects to the grid and supplies IPPs with budget quotes on these options. The SBO enters into a PPA with the project company and manages the contractual relationship, under which it has the obligation to purchase and distribute the power generated by the project company.

Fifth, the DEA ensures that all aspects of renewable energy projects from generation to distribution uphold environmental protection regulations. The Department stipulates whether a project requires an EIA or a Basic Assessment. Projects that satisfy these environmental assessments are granted a Record of Decision by the Department. Environmental consent from the DEA is one of the minimum requirements in the bidding process. Preferred bidders must also receive a water usage authorisation from the Department of Water Affairs (EE Publishers, 2012).

Sixth, **the dti** advises on the local content criteria and evaluation methodology as part of the economic development component. This involves stipulating which inputs are regarded as South African products and imports. The Department also provides incentives to manufacturers through the MCEP to supply inputs required in renewable energy technologies, as explained in Section 4.2.

Seventh, the community of financiers in the REIPP procurement programme consist mainly of commercial banks (essentially Standard Bank, FirstRand Bank, Nedbank, Absa Group and Investec) and development financial institutions (such as the DBSA and the IDC) that provide debt and equity financing.

Last but not least, project developers own and manage the project company and are primarily responsible for preparing the tender documents in the REIPP procurement programme. They interact with all the above-mentioned stakeholders to secure financing and ensure that their projects meet the criteria set in the RFP. While some developers intend to own and operate the project for the entire length of the PPA, others aim to sell down their stake in the project company following the three-year threshold set in the RFP.[41] The RFP requires that 40% of the project company be owned by South African players. At the same time, IPPs have found that having experienced international partners in renewable energy project deployment adds to the credibility and fundability of the project company. It remains to be seen whether project companies will retain their 40% threshold as the REIPP procurement programme progresses, or whether the sector will become dominated by

[41] Interview with South African banks.

international players with the experience and financing to generate renewable energy electricity.

### *7.3. Bid Windows and Tariffs*

On 3 August 2011, tender documents compiled by the legal firm Webber Wentzel, including the PPA and the RFP for the first bid window, were made available by the DoE at a non-refundable fee of ZAR 15 000 (Baker, 2012). The first phase of the REIPP procurement programme, detailed in the RFP 1, has been designed with an allocation of 3 625 MW to be procured from IPPs over a maximum of five bid windows. Additionally, 100 MW have been set aside for small-scale renewable energy projects to enable new entrants, which may not have the support of international partners, to participate. Table 4 illustrates the breakdown of energy sources to meet this target as specified in the RFP 1 and reveals the significant targets set for onshore wind and solar photovoltaic technologies, in line with the IRP.

**Table 4: Allocation and capacity awarded (in MW) under the first three rounds of the renewable energy independent power producer procurement programme**

| Technology | Initial target | Round 1 Allocation | Round 2 Allocation | Round 3 Allocation | Total Allocation |
|---|---|---|---|---|---|
| **Onshore Wind** | 1 850 | 634 | 563 | 787 | 1 984 |
| **Solar Photovoltaic** | 1 450 | 632 | 417 | 450 | 1 499 |
| **Concentrated Solar Power** | 200 | 150 | 50 | 200 | 400 |
| **Small Hydro (≤40 MW)** | 75 | 0 | 14.3 | 0 | 14.3 |
| **Landfill Gas** | 25 | 0 | 0 | 18 | 18 |
| **Biomass** | 12.5 | 0 | 0 | 16.5 | 16.5 |
| **Biogas** | 12.5 | 0 | 0 | 0 | 0 |
| **Total** | **3 625** | **1 416** | **1 044.3** | **1 456** | **3 916** |
| **Bid Responses Received** | N/A | 53 | 79 | 93 | 225 |
| **Preferred bidders** | N/A | 28 | 19 | 17 | 64 |

*Source: TIPS, based on DoE, 2013c*

In order to take advantage of the high learning rates and South Africa's geographical advantages, the allocation is predominantly taken up by solar PV and wind technologies. The DoE was cognisant that developers had already incurred significant costs in preparing bid documents to submit projects for the REFIT, and thus the allocation was to accommodate these projects.[42] Preferred bidders from the first round of the REIPP procurement programme were predominantly developers which prepared to submit projects under the REFIT programme as they were the most ready to compete (Eberhard, 2013). While no capacity cap (other than the total allocation of the programme) was set in the first round, the allocation for subsequent rounds has been determined based on market

[42] Interview with the DoE.

dynamics so as to stimulate competition. Within a specific technology allocation, the DoE sets a limit on the megawatt capacity of each project, based on international trends on the generation capacity of the average project in that particular technology.

The final allocation per round is quite flexible and mostly determined by market dynamics. The first three rounds of the programme have been largely oversubscribed, a testament to the interest for the programme, and resulted in committed investment of ZAR 150 billion. In the first bid window, no capacity limit was determined (other than the total target for the programme and by technology), which resulted in the selection of all projects meeting the minimum requirements. Twenty-eight bidders (out of 53 submissions) were awarded preferred bidders status for a total of 1 416 MW, the breakdown of which is reflected in the Table 4. Their projects have to begin commercial operation before the end of June 2014 except for CSP projects which have until end of June 2015 (DoE, 2013c).

The number of bid responses has increased dramatically with each round, along with a decrease in the number of successful bidders, illustrating the increasingly competitive nature of the programme.

In order to stimulate competition and drive prices down, the maximum generation capacity was lowered to 1 044 MW for the second bidding window and the price ceiling per technology was reduced. Of the 79 projects received in the second bid window that amounted to a generation capacity of 3 233 MW, i.e. three times the allocated generation capacity, 19 were selected. By the first two rounds, the available capacity for CSP had been fully allocated. In the third bid window, an additional allocation of 1 473 MW was made available, including 200 MW of additional generation capacity for CSP (bringing the total allocation of the technology to 400 MW against 200 MW initially). The third bid window received 93 bids amounting to 6 023 MW, about four times the available capacity of 1 473 MW. In round 1, 53% of received bid responses were selected as preferred bidders. This proportion decreased to 24% in the second window and further to 18% in the third bid window. This has contributed to improving the quality of received bids in terms of competitive pricing as well as satisfying the economic development criteria. In addition, the DoE provides valuable feedback on the evaluation of unsuccessful bids, allowing project developers to improve the quality of their bids and often resubmit unsuccessful projects in subsequent windows.

Over the first three bid windows, a total of 3 916 MW has been procured, i.e. more than the original allocation of 3 625 MW by 2016,[43] as determined by the Minister of Energy under Section 34(1) of the Electricity Regulation Act No. 4 of 2006. In December 2012, the DoE published an additional determination of 3 100 MW for the 2017-2020 period,[44] as detailed in Table 5 below, bringing the total determination to 6 725 MW (as well as 200 MW for small-scale project). Of this additional determination, 307.5 MW were be made available for the third bid window, specifically 200 MW for CSP, 47.5 MW for biomass and 60 MW for small

[43] Looking at the difference between the actual ministerial determination and the procurement process, the allocation for onshore wind, solar PV and CSP have been already exceeded for the 2012-2016 period.
[44] The 2012 ministerial determination also includes 100 MW for small-scale projects.

hydro (DoE, 2013b). *De facto*, a part of the third round as well as upcoming bidding windows for the 2014-2016 period are already carving up the determination for the 2017-2020 period.

In addition to these first three rounds, the DoE is considering the appointment of additional preferred bidders for onshore wind and solar PV as part of an extension of the third round (Creamer, 2013b). A special round for 200 MW of CSP capacity, dubbed 'Round 3.5', with the submission date of 31 March 2014, is currently being implemented and a fourth round, which would close on 18 August 2014, is being considered (DoE, 2013d). Going forward, yearly targets of 1 000 MW have been established by the DoE in line with the IRP, although the allocation might be revised with the update of the plan in March 2014 (Creamer, 2013c).

**Table 5: 2012 ministerial determination (in MW) for the renewable energy independent power producer procurement programme for the 2017-2020 period**

| Technology | Determination |
|---|---|
| **Onshore Wind** | 1 470 |
| **Concentrated Solar Power** | 400 |
| **Solar Photovoltaic** | 1 075 |
| **Small Hydro (≤40 MW)** | 60 |
| **Biomass** | 47.5 |
| **Biogas** | 47.5 |
| **Total** | **3 100** |

*Source: DoE, 2012d*

While the allocation is essentially based on market response, the sustainability of the programme relies on Eskom's ability to procure the contracted power from preferred bidders. As mentioned in earlier sections, the budget for Eskom's core electricity supply activities is determined by NERSA through the MYPD. Within the MYPD submission, Eskom includes the budget for power procurement from IPPs, compiled in consultation with the DoE. NERSA's approval of Eskom's price determination takes into account that its IPP procurement budget sustains the renewable energy programme.[45]

The success story of the programme lies in the increasingly competitive tariffs that developers have been able to offer in their bids, as reflected in Table 6 below.

In order to encourage low prices, a tariff cap was implemented. While initially the 2009 REFIT tariffs were thought to constitute the upper limit, new price ceiling were published, as summarised in Table 7 below. Tariff caps, determined by the DoE, were used to limit the risk of high prices linked to *inter alia* a lack of competitive behaviour, particularly for the first bidding window. Many developers were not yet ready to put forward competitive bids in the first window, which was utilised in many ways as a round of observation. In addition, the uncapped allocation per technology, as explained earlier, resulted in a lack of competition, failing to create pressure on the bidders to reduce their price offering. As a result, prices in the first round ended up very close to the prescribed ceilings. In addition, price caps set too

[45] *Ibid*.

low have played a part in the absence of successful projects in the first two rounds for some technologies, such as landfill gas and biomass.

**Table 6: Tariffs over the first three bidding rounds of the renewable energy independent power producer procurement programme (in ZAR per kWh)**

| Technology | Round 1 | Round 2 | Variation | Round 3 | Variation |
|---|---|---|---|---|---|
| **Onshore Wind** | 1.14 | 0.89 | -22% | 0.66 | -26% |
| **Concentrated Solar Power** | 2.68 | 2.51 | -6% | 1.46 | -42% |
| **Solar Photovoltaic** | 2.75 | 1.65 | -40% | 0.88 | -47% |
| **Biomass** | N/A | N/A | N/A | 1.24 | N/A |
| **Landfill Gas** | N/A | N/A | N/A | 0.84 | N/A |
| **Small Hydro (≤10 MW)** | N/A | 1.03 | N/A | N/A | N/A |

*Source: TIPS, based on DoE, 2013c*

**Table 7: Original price ceiling (in ZAR/kWh) for the renewable energy independent power producer procurement programme by technology**

| Technology | Price Cap |
|---|---|
| **Onshore Wind** | 1.15 |
| **Concentrated Solar Power** | 2.85 |
| **Solar Photovoltaic** | 2.85 |
| **Small Hydro (≤ 10MW)** | 1.03 |
| **Landfill gas** | 0.84 |
| **Biomass** | 1.07 |

*Source: Greyling, 2012*

While renewable energy remains more expensive per kilowatt-hour than Eskom's average 65c/kWh, tariffs have significantly dropped over the three rounds, well below the required price ceilings. This trend essentially resulted from project developers being more experienced and familiar with the programme, an increased maturity of technologies, heightened (price) competition, reduced price ceiling for some technologies, such as wind and solar, and the allocation of a capacity limit for each technology from the second round onwards. As a result, prices received for the second and third auction rounds were very competitive and even lower than expected (IRENA, 2013b). For example, prices plummeted on average from ZAR 2.75/kWh to 88c/kWh for solar PV, and from ZAR 1.14/kWh to 66c/kWh for wind. It may be expected that the fourth bidding round will see wind generate below Eskom's 65c/kWh. In addition, following NERSA's price determination over the next five years, Eskom's tariff will increase on average to 89c/kWh by 2018, while the rates for renewable are fixed (Blaine, 2013).

These significant price drops have raised some concerns, particularly from Eskom's SBO, that winning bidders may not be economically viable.[46] Nevertheless, recent trends revealed that, in the near future, most renewable energy technologies, such as onshore wind, solar PV, CSP and landfill gas, will become price competitive in their own right (i.e. without factoring environmental and social benefits). This is particularly the case compared to mega-projects such as the coal-fired Medupi power stations which, in the best case, will ultimately generate electricity at an estimated ZAR 1.05/kWh.

Across the first three bid windows, 64 projects have been approved, including 47 which have already achieved financial close, representing a combined investment of around ZAR 150 billion. Government, essentially through its development finance institutions, and the private sector have positively responded to the programme and provided extensive finance to project developers.

Reacting positively to the government programme and growing business opportunities in the market place, financial institutions, including banks, insurers, venture capital, private equity, hedge funds, and development finance institutions have been increasingly active in renewable energy project and company development in South Africa. The emergence and development of renewable energy technologies, coupled with the introduction of appropriate incentive and support governmental schemes, has recently increased investment opportunities. The favourable investment market, associated with positive risk/return profiles, has paved the way for commercial opportunities (Montmasson-Clair, 2013). Equity returns range primarily in the late teens to mid-twenties, which are considerably greater than the returns obtained on the projects built in developed countries and which makes the current market so attractive to the investors (EScience Associates *et al.*, 2013).

South African banks have provided about 60% of the financing for the programme, development finance institutions and foreign financiers providing the balance, and are ready to finance further rounds (Odendaal, 2014). Leading South African banks are well positioned to finance long-term, large-scale projects and are maintaining their appetite for the renewable energy sector. For example, Standard Bank has underwritten ZAR 15.8 billion in debt funding in the three rounds for 15 projects. Standard Bank is also a shareholder in five of these renewable energy projects with a total equity investment of ZAR 330 million. Absa has funded 14 projects over the three bid windows, while Future Growth of Old Mutual has provided ZAR 3.9 billion towards 16 projects in the three bid windows. Nedbank has been involved in the financing 22 projects, which make up 36% of the total allocated capacity awarded in the first two rounds.

South Africa's main development finance institutions, the IDC and the DBSA, have also both committed to providing significant finance to green projects over the next few years. The IDC, as part of its commitment to finance 'green industries' for a total of ZAR 25 billion over the 2011/2012-2014/2015 period (IDC, 2012), has played an active role, as a development partner and financier, in the country's REIPP procurement programme. Through the first two phases in 2011 and 2012, the IDC has committed a total of ZAR 7.5 billion towards selected

[46] Defaulting bidders would lose their right to a PPA and the defaulted generation capacity would then be added to the next auction round (IRENA, 2013b).

projects (IDC, 2012). Like the IDC, the DBSA has committed to unlock around ZAR 20-30 billion for green energy projects over the 2011-2015 period (Creamer, 2010) and granted loan facilities for projects under the REIPP Procurement Programme for a total of ZAR 6.2 billion in the first bid window (Anine Vermeulen, 2012).

Most of the projects have been financed through conventional project finance bank debt with some deals receiving finance from export credit agencies (Gecelter, 2013). Sponsors are also using more sophisticated products like credit wrapped bonds, the securitisation of future cash flows and political risk insurance to provide a portion of the necessary finance. For example, Soitec issued on the Johannesburg Stock Exchange (JSE) a ZAR 1-billion bond to South African institutional investors. One South African Bank also marketed a conduit structure where bank loans under the REIPP procurement programme will be packages into JSE-listed securities (Gecelter, 2013).

### *7.4. The Power Purchase Agreement under the Renewable Energy Independent Power Producer Procurement Programme*

The PPA, which is the only source of revenue for developers and for the commercial banks financing IPPs to ensure debt repayment and adequate return on investment, is the cornerstone of the success of any IPP programme. Most notably, the PPA is used to divide and allocate risk between all involved parties.

A multitude of risks can be associated with the construction and profitable operation of a power plant, from fuel price and supply,[47] foreign exchange, environmental assessments and authorisations, the connection to the transmission and distribution networks, revenue collection, to timely and on-budget plant construction and plant operation. From the point of view of IPPs, and financial institutions backing their projects, the only acceptable risks that project developers can shoulder are linked to building and operating the power plant. All other risks must be mitigated by the state, between the utility, the NT and the DoE.[48]

While commercial banks and developers considered that the PPA was not bankable under the previous procurement processes as it allocated too much risk to developers, the PPA under the REIPP procurement programme has been positively received.[49] Under the REIPP procurement programme, the PPA is held for a period of 20 years and in local currency, and allocates risk between the parties based on an investment-friendly pattern. It guarantees payment of an agreed tariff for power generated on a take or pay basis (Stemple, 2013). Essentially this means that irrespective of power demand by the grid, if the power is generated by the renewable project, the tariff will be paid by Eskom for each kilowatt of energy produced. The tariff is agreed upon the award of the preferred bid status and is indexed to the rate of inflation over the duration of the contract with Eskom.

Along with Government's efficiency in managing the programme (including bidding windows timelines, and transparent and extensive evaluation criteria), the private sector, and

[47] This risk is by definition not applicable to renewable energy-based plants.
[48] Interview with international consulting company.
[49] Interviews with IPPs, South African banks and development finance institutions.

particularly financial institutions, regards the programme as a success largely thanks to the bankable PPA.[50]

On the one hand, the agreement is underwritten by the NT should Eskom default on the terms of the agreement. This includes if Eskom fails to connect renewable energy projects to the grid and if the utility fails to pay for the generated electricity.[51] Under this PPA, Eskom is accountable to the NT and has a vested interest to ensure grid connection. The DoE has also separately contracted with the project companies in order to offer recourse for project investors in the event that Eskom fails to meet its obligations under the PPA. Under the Direct Agreement between the DoE and the lenders of the project, the DoE, underwritten by the NT, commits to taking on payments due to the project company should Eskom default on payments.[52] This government backstop of the PPA has earned the REIPP procurement programme significant credibility with international investors (Stemple, 2013).

On the other hand, should the project company fail to generate the contracted energy, the lenders are asked to step in and find a replacement project company, if feasible.[53] If not, the allocation for that project could be put up for bid in subsequent rounds. In the case of IPPs defaulting on supplying the agreed amount of electricity due to weather instability or plant degradation or destruction, the liability falls on the IPP and the renewable project's financiers. In this case, commercial lenders include comprehensive insurance to cover the loss and protect the developer, as part of the project finance.[54] Should there be an inability to generate electricity caused by a fault in the construction of the plant, the liability falls on the contractor as agreed in the Engineering, Procurement and Construction (EPC) contract, the predominant form of construction contract used on large-scale infrastructure projects.[55] In other cases, the developer, such as Pele Green Energy, takes on the responsibility of construction and operation. Lenders normally require the EPC contracts to provide as an integrated package: a fixed completion date; a fixed completion price; no or limited technology risk; output guarantees; liquidated damages for both delay and performance; security from the contractor and/or its parent; large caps on liability (ideally, there would be no caps on liability, however, given the nature of EPC contracting and the risks to the contractors involved there are almost always caps on liability); and restrictions on the ability of the contractor to claim extensions of time and additional costs (DLA Piper and Hofmeyr, 2012). Should there be a dispute between IPPs and Eskom over terms not being met in the PPA, the responsibility of mediating the conflict falls squarely on NERSA.[56]

The significance of the PPA is regarded as a crucial factor in the success of the REIPP procurement programme by commercial banks and IPPs. Notably, the allocation of risk between all stakeholders has contributed to a bankable PPA.[57] The upward trend of bids

[50] Interviews with South African banks.
[51] *Ibid*.
[52] Interview with the DoE.
[53] *Ibid*.
[54] Interviews with South African banks.
[55] *Ibid*.
[56] Interview with NERSA.
[57] Interviews with South African banks and IPPs.

received as the rounds have progressed indicates the success of the programme to attract significant interest from developers in the sector.

### *7.5. Grid Connection*

Ensuring grid connection represents a significant cross-road in the success of the REIPP procurement programme. Delays in grid connection constitute a cost to developers and their financiers as this can effectively delay the project. Successful projects from the first bid window reached financial close in October 2012, and some of these projects[58] had already been connected to the grid by December 2013, three months ahead of schedule (Odendaal, 2013).

The process for IPPs to connect their projects to the grid begins when they are preparing their projects for bid. As required in the RFP, the EIA that developers carry out must include all aspects of their project, including the distribution and transmission infrastructure linked to it (Smit, 2011).

For IPPs to connect their projects to Eskom's grid, they must first complete a grid connection application form which is forwarded to Eskom's GAU. Second, the GAU facilitates the technical meetings between IPP representatives, consultants and Eskom's engineering staff to clearly define the requirements and discuss potential limitations and solutions in establishing the connection to the grid (Smit, 2011).

In the case where an IPP needs to connect to a municipal network, the GAU considers the overall capacity in the larger area and impact on the grid, while the IPP liaises with the municipal officers and follows their procedures for grid connection. If the developer intends to connect to the transmission system, the grid provider will be the National Transmission Company, a subsidiary of Eskom Holdings separated from the generation and retail businesses of Eskom (NERSA, 2008). If the developer intends to connect to a distribution system, the grid provider will either be Eskom's distribution business unit or a municipality, depending on the location of the point of connection (Campbell, 2012).

Distribution networks planners at Eskom conduct an initial technical analysis. The planners interact with the substation and line design engineers to inform suitable solutions for the developer's facility (Smit, 2011). The EIA that IPPs are required to complete, at their own cost and risk, must include aspects of their projects that is related to Eskom's lines route(s), substation site(s), own facility layout, road access, etc. (Eskom, 2012b).

Following the technical analysis and the EIA, the IPP requests a cost estimate letter that forms part of the documents which are submitted in the bidding process. The letter details several options to establish the grid infrastructure that are all in line with the RFP. Three options are essentially possible. First, IPPs can decide to have Eskom build, own and operate the grid at the cost of the project company (Campbell, 2012). IPPs do not prefer this option because of the risk of relying on Eskom to build the grid may result in increased costs incurred from construction risks, such as delays and industrial action. Second, IPPs can own

[58] Interviews with IPPs.

and self-build the grid and have Eskom responsible for operations and management. This option is the preferred option by IPPs as it eliminates the risks linked to construction and transfers any operational malfunctions and maintenance responsibilities to Eskom. Third, IPPs can own, build and manage the grid, although this option is not favoured due to high operational and maintenance risks for IPPs.[59]

Eskom does not participate in evaluating bids, but provides technical and feasibility advice as it pertains to its grid infrastructure. However, Eskom has an influence in terms of connection to substations. Developers which intend for their facility to be connected to a substation risk their projects not being awarded preferred bidder status if the available substation has insufficient capacity to accommodate all the projects intended for connection. In such a case, the DoE will comparatively rank these bids against each other, then awarding preferred bidder status to the best bid (Campbell, 2012).

Once projects have been awarded preferred bidder status and companies are bringing their projects to financial close, they are to apply for generation, transmission and distribution licenses (depending on the project) from NERSA. IPPs need to accept the cost estimate letter and pay the commitment fee to obtain a budget quote from Eskom. Eskom will prepare the budget quote for preferred bidders and check the technical solutions against the budget quote. The technical solutions are checked against the self-build agreement, should IPPs decide to own, build but not operate the grid, and against the customer use of system agreement, which details the costs incurred by the project company for accessing Eskom's transmission or distribution systems (Smit, 2011).

These connection agreements along with the PPA conclude all agreements that each IPP signs with Eskom's SBO. Attached processes create some uncertainty for IPPs, which rely on Eskom to obtain a cost estimate letter and budget quotes in a timely fashion. In addition, the lack of accuracy of the budget quotes provided by the utility has raised some financial risk for IPPs, which need to factor connection cost in the business model. While the REIPP procurement programme mitigates the uncertainty associated with the actual grid connection, processes to determinate the costs of such connection, which are dependent on Eskom, still could be improved to provide more certainty to IPPs.

### *7.6. The Evaluation Process for Bids*

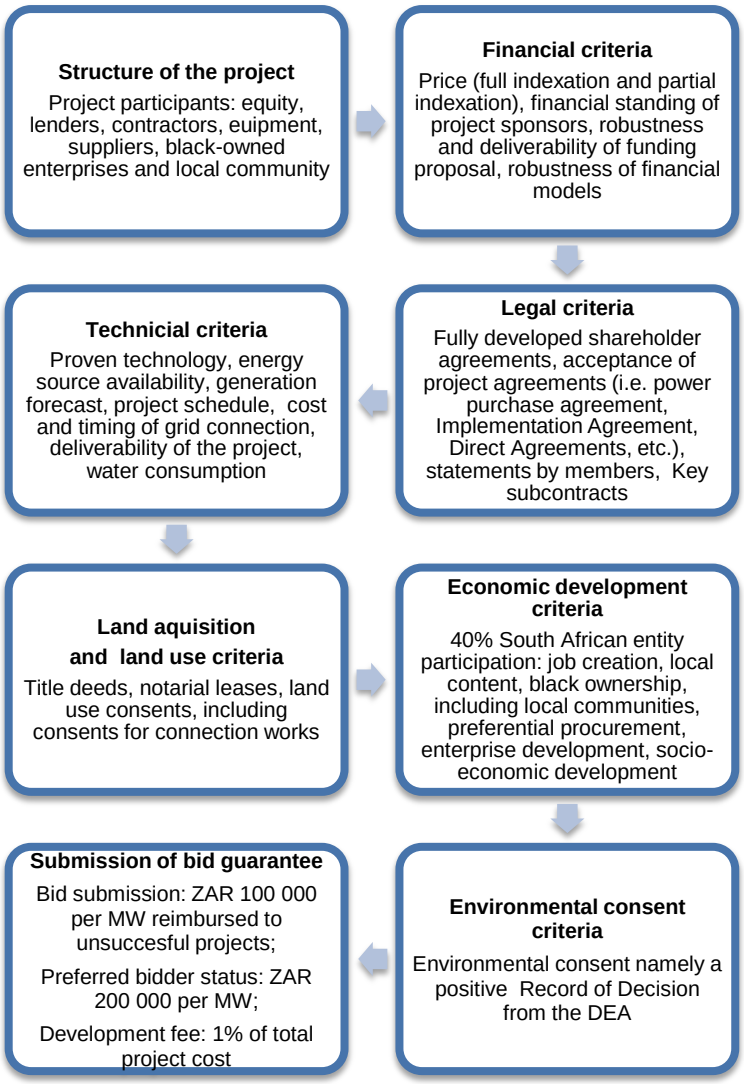
The evaluation process of the REIPP procurement programme is composed of two clear-cut phases.

In a first pre-qualification stage, bidders must meet a set of minimum criteria. As illustrated in Figure 5 below, a comprehensive evaluation matrix, which has been positively received by financiers for the extensive due diligence required of developers in their bids, has been established (Campbell, 2012). Bidders have to first satisfy certain minimum threshold requirements in six areas: environment; land; commercial and legal; economic development; financial; and technical. They must *inter alia* demonstrate the readiness of the project (land acquisition, funding, technologies, suppliers, ability to meet deadlines, environmental

[59] *Ibid*.

consent, etc.), its financial viability and the arrangements to meet minimum requirements in terms of economic development. The DoE requires a detailed and fully responsive bid that includes all the requisite information and documents. Failure to include all required information, and not have this information available on request during the evaluation period, is ground for elimination.

**Figure 5: Pre-qualification criteria of the renewable energy independent power producer procurement programme**




*Source: TIPS, adapted from Campbell, 2012*

This initial assessment is conducted by teams of independent reviewers who are experts in their field. Table 8 below summarises the institutions which have been part of the evaluation team since the beginning of the programme. The transaction advisor team is responsible for reviewing legal (on a commercial, land use and environmental basis), financial, economic development and technical criteria. In addition, an independent review team also assesses legal, technical and financial terms. Finally, an independent governance review is conducted.

**Table 8: Evaluation teams for the renewable energy independent power producer procurement programme**

| Transaction Advisor Team | |
|---|---|
| **Legal (Commercial, Land Use and Environmental)** | Bowman Gilfillan, Edward Nathan Sonnenbergs, Ledwaba Mazwai and Webber Wentzel, BKS (Round 1 only) |
| **Financial** | Ernst & Young and PricewaterhouseCoopers |
| **Economic Development** | Ledwaba Mazwai |
| **Technical** | Mott MacDonald |
| **Independent Review Team** | |
| **Legal** | Linklaters (United Kingdom) |
| **Technical** | Blueprint Consult, Tony Wheeler (Round 3) |
| **Financial** | Cross-moderation between the two Financial Advisory firms (Rounds 1 and 2), Pieter van Huyssteen (Round 3) |
| **Governance** | Ernst & Young |

*Sources: DoE, 2013c, 2012e, 2012f*

The legal review assesses the project company's readiness to enter into power purchase and grid connection agreements with Eskom and an Implementation Agreement with the DoE, as well as the terms of subcontracts with the companies which will carry out the construction and operation of the renewable energy facility, and thus impact other elements of the evaluation (Campbell, 2012).

The environmental criteria include the completion of an EIA for each project, in order to receive environmental consent, including a Record of Decision from the DEA. This ensures that the environmental impacts of the project are recorded and approved by appropriate government departments. For example, if the EIA identifies wetland areas but the bidder does not believe a water use license will be require, this should be explained with the necessary specialist support.

Then, project developers have to satisfy requirements in terms of land acquisition and land use. Bidders must provide title deed(s) for the whole of the project site, whatever the land use arrangements (ownership, lease, etc.). Developers need to provide proof of submission of all land use change applications, such as zoning, building plans, removal of restrictive conditions. All relevant documents must be in the name of the project company, and if not, a written consent to the transfer should be provided by the holder. Any terms and conditions in the title deed or lease which may impact the project should be explained fully in the bid response. Additionally, bidders must provide explanation on how they shall address factors impacting the project, and the timing for steps to be taken (DoE, 2013c).

The technical review assesses the quality, efficiency and deliverability of the renewable energy technology to generate the required capacity of electricity. Bid responses need to meet the criteria for a proven technology by submitting a completed design certification as approved by the recognised authorities (and not developers' consultants, which are considered biased opinions). Bidders must also show examples of the technology in

operation for 24 months and demonstrate energy resource certainty by providing a Generation Forecast Independent Review with a robust set of assumptions, methodology and accurate results. Bidders need to ensure that the Generation Forecast Independent Review concludes with a statement that supports the assumptions, methodology and results from the Generation Forecast Report (and explains any differences between the two documents). Both documents need to be signed and accompanied by the resume of the authors, so that reviewers can assess the capacity of those compiling both documents.

The technical evaluation also assesses the construction and operation of the grid. Bidders can fail to meet the grid connection assessment because of unclear contractual arrangements and incomplete information. For this reason, reviewers advise that bidders include the cost estimate letter and budget quote submitted by the Eskom's SBO, which provides detailed information regarding grid construction and connection. The grid connection assessment ensures that the cost estimate letter and budget quote align with the technical aspects of the technology and environmental aspects of the project. Reviewers also advise that bidders provide a statement that clarifies the responsibilities for construction and operation of the grid, and how these responsibilities are assigned.

For successful projects which have reached financial close, once the renewable energy project is constructed, Eskom is to test whether the project can generate the contracted capacity. If the plants generates less than the awarded capacity, the IPP is given a grace period of about one month to address the technical faults. If the faults persist, the plant is downgraded to the measured capacity, and the agreements with Eskom and the DoE accordingly amended.[60]

Lastly, the financial review evaluates the financial standing of the developer and their funding partners (debt and equity providers)[61] as well as the robustness of the financial modelling used in their price offering and the capacity of project companies to deliver on their funding proposal (Campbell, 2012; DoE, 2013c). For new entrants with very little experience, this weakens their credibility as they do not have a substantial track record. Given that the REIPP procurement programme is the first programme of its kind in South Africa, new entrants often partner with experienced international firms, particularly as equity sponsors, to bolster their financial standing and credibility.

The financial evaluation needs to include both partially and fully-indexed price offerings. The proportion of partially-indexed price must directly reflect underlying costs subject to inflation and clearly demonstrate how these costs have been calculated, and the basis for this calculation. The DoE's transaction advisors suggest that the consumer price index (CPI) be modelled at 5.7% per annum, as bidders often use their own inflation assumptions (DoE, 2013b). An Equivalent Annual Tariff (EAT) is calculated to enable scoring and ranking bidders' price. The EAT is calculated for both fully-indexed and partially-indexed prices. It represents the net present value of price over the life of the 20-year PPA in nominal terms.

[60] Interview with the DoE.

[61] Renewable energy projects are essentially funded through conventional project financing, which means that financing is secured only by the assets of the project itself. The revenue generated by the project must therefore be sufficient to support the funding model.

The net present value is annualised to generate the EAT. The EAT is then discounted at a rate of 5.7% to give the real EAT. The bidder's price score is determined by the EAT and the formula allows EATs to be compared in real terms. The DoE does not have a preference for either the partially or fully indexed price, and reserves the right to select either price offered by a bidder.

**Table 9: Economic development criteria and targets set for the third bid window of the renewable energy independent power producer procurement programme**

| Economic Development Element | Description | Qualification Threshold | Target |
|---|---|---|---|
| **Job Creation** | Jobs for citizens | 50% | 80% |
| | Jobs for black citizens | 30% | 50% |
| | Jobs for skilled black citizens | 18% | 30% |
| | Jobs for local communities | 12% | 20% |
| **Local Content** | Value of local content as a percentage of total project value | 40% or 45% depending on technology | 65% |
| **Ownership** | Shareholding by black people in the project company | 12% | 30% |
| | Shareholding by local communities in the project company | 2.5% | 5% |
| | Shareholding by black people in the EPC contractor | 8% | 20% |
| | Shareholding by black people in the operations contractor | 8% | 20% |
| **Management Control** | Black top management | N/A | 40% |
| **Preferential Procurement** | Broad-based black economic empowerment procurement | N/A | 60% |
| | QSE and EME Procurement (up to ZAR 35 million in turnover) | N/A | 10% |
| | Women-owned vendor procurement (businesses +50% owned by women) | N/A | 5% |
| **Enterprise Development** | Enterprise development contributions | N/A | 0.6% |
| | Adjusted enterprise development contributions (local communities) | N/A | 0.6% |
| **Socio-Economic Development** | Socio-economic development contributions | 1% | 1.5% |
| | Adjusted socio-economic development contributions (local communities) | 1% | 1.5% |

*Source: DoE, 2013b*

Projects developers must additionally fulfil minimum economic development objectives to enter the auction system. Qualification thresholds for the third bid window are summarised in Table 9 above.

As a rule, and in order to secure local participation, the project company must comprise a 40% participation by a South African entity. Then, project companies must fulfil additional ownership criteria, as summarised in Table 10 for solar PV and onshore wind. For example, in order to encourage social development in the neighbourhoods that surround the renewable energy project, community trusts need to be made up of members that live within a 50km radius of the project site (Van den Berg, 2013). This is to prevent nepotism over how community beneficiaries are selected,[62] as well as to ensure that the surrounding communities which often bear the unaccounted ecological, social and economic costs of the project, also benefit from the developments. Most communities will be holding a stake of up to 5% on average per project through community trusts.

**Table 10: Key ownership criteria for onshore wind and solar photovoltaic in the renewable energy independent power producer procurement programme**

| Key Ownership Criteria | Onshore Wind | | Solar PV | |
|---|---|---|---|---|
| | Threshold | Target | Threshold | Target |
| **Shareholding by black people in the project company** | 12% | 30% | 20% | 40% |
| **Shareholding by local community in the project company** | 2.5% | 5% | 2.5% | 5% |
| **Shareholding by black people in contractor responsible for construction** | 8% | 20% | 8% | 20% |
| **Shareholding by black people in operations contractor** | 8% | 30% | 8% | 40% |

*Source: TIPS, based on Campbell, 2012*

These community trusts will be 100% funded by the DBSA, the IDC and/or the Public Investment Corporation (PIC) whilst some will be classified as free carry. For example, the DBSA provides low-interest financing to community trust to buy shares into the project company. The shares are managed by the DBSA and the community trust leadership, and these two parties decide on how the revenue is to be spent. The concern is that many community trusts have been established to serve the requirements of the RFP. Project developers and the DBSA have little experience working with communities and municipalities in these areas, to ensure that development programmes are aligned with community interest and municipality plans. Community participation and ownership aspects of the project can indeed promote perverse development by concentrating large funds in community trusts, without having well thought through developmental objectives. The risk is that such the community trust will receive excessive financial flows, an estimated ZAR 9.5

[62] Interview with the DoE.

billion collectively over the first three rounds of the programme,[63] with little knowledge of the communities in which they are working. The Implementation Agreement signed with the DoE is to ensure that preferred bidders adhere to their commitments. Each bidder is required to report to the DoE on a quarterly basis with regards to these commitments (EE Publishers, 2012). The REIPP procurement programme awards more points to communities located closer to the renewable energy project and does not place a limit on multiple community trusts for one community. This results in a small number of communities having multiple community trusts assigned to them. The developmental aspects of the community trust projects come second to concentrating community trusts in lucrative areas. This can promote perverse development that is not focussed on the outcomes of the community trust projects, but on renewable energy projects receiving high points in their bid applications.[64]

In addition, local content requirements aim to promote South Africa-based manufacturing. Local content represents the portion of a tender price that is not included in the imported content, provided that local manufacturing takes place and is calculated with the local content formula (**the dti**, 2013). Local content is calculated based on the following formula: Local content = (1-x/y) * 100, where 'x' is the imported content and 'y' is the total tender price. Imported content is defined as the portion of a tender price made of: (a) the cost of imported components; (b) the cost of parts or materials which have been or are still to be imported; and (c) other costs incurred abroad, plus freight and other indirect importation costs (landing costs, import duty, dock duties, etc.) excluding VAT. Local content calculation excludes land costs and finance costs.

When bidders calculate their local content, all stages of the value chain should be considered, and where declarations cannot be obtained from suppliers, such components should be considered as imported content. All domestic expenditure qualify as 'local', including civil works, engineering, project management, the assembly of imported parts, the manufacturing of some or all components, local technology development through innovation and research and development carried out by a domestic firm often in combination with domestic research organisations, and technology transfer from overseas firms via licensing agreement which may or may not include technology know-how. As local content targets are aimed at stimulating the local manufacturing of renewable energy products, project developers are advised to procure locally-manufactured products/components as much as practically possible. Nevertheless, due to limited domestic capacity, all raw (unprocessed) steel, regardless of origin, is considered to be 100% local. It is further recommended that all raw (unprocessed) aluminium, regardless of origin, be considered to be 100% local. In the case of aluminium, **the dti** also prescribes the formula to determine the price of aluminium based on the London Metal Exchange. **the dti** reserves the right to revoke the local deeming of aluminium should price irregularities be observed (**the dti**, 2013).

Bids meeting all these initial requirements are admitted to the second stage of the auction, where they are assessed on a competitive basis.

[63] *Ibid*.
[64] Interviews with IPPs.

In the second stage of the evaluation process, bids are reviewed based on weighted criteria, namely 70% for their price offer and 30% for their additional contribution to economic development (i.e. over and above minimum requirements). Within the 30 points (out of 100) which are awarded for economic development, different components are weighted as follows: job creation (25%), local content (25%), ownership (15%), management control (5%), preferential procurement (10%), enterprise development (5%), and socio-economic development (15%) (DoE, 2013b). The economic development criteria aims to stimulate a renewable energy industry in South Africa through local content requirements, by rewarding certain equipment sourced from local manufacturing (Norton Rose Fulbright, 2011). Projects that meet these targets at a competitive price offering are eligible to be considered for preferred bidder status. The DoE consults with a variety of stakeholders to determine how targets are weighted and the criteria measures whether targets have been met.[65]

A minimum requirement and a desired target have been set for every category and for every bidding round, as illustrated below in Table 10 for ownership and Table 11 for local content. The measurement of points awarded per category ranges from zero if the threshold level is met, to ten for meeting the target level. A linear interpolation is used to determine the score per category for bidder responses that are between the threshold and target level (Campbell, 2012).

**Table 11: Local content requirements across the first three bidding rounds of the renewable energy independent power producer procurement programme**

| Bidding Rounds/ Technology | Bidding Round 1 | | Bidding Round 2 | | Bidding Round 3 | |
|---|---|---|---|---|---|---|
| **Criteria** | **Threshold** | **Target** | **Threshold** | **Target** | **Threshold** | **Target** |
| **Onshore Wind** | 25% | 45% | 25% | 60% | 40% | 65% |
| **Solar Photovoltaic** | 35% | 50% | 35% | 60% | 45% | 65% |
| **Concentrated Solar Power Without Storage** | 35% | 50% | 35% | 60% | 45% | 65% |
| **Concentrated Solar Power With Storage** | 25% | 45% | 25% | 60% | 40% | 65% |
| **Biomass** | 25% | 45% | 25% | 60% | 40% | 65% |
| **Biogas** | 25% | 45% | 25% | 60% | 40% | 65% |
| **Landfill Gas** | 25% | 45% | 25% | 60% | 40% | 65% |
| **Small Hydro** | 25% | 45% | 25% | 60% | 40% | 65% |

*Source: TIPS, based on Campbell, 2012*

[65] Interview with **the dti**.

The DoE works closely with **the dti** to develop these weightings across each bidding round. For the REIPP procurement programme to create skilled and sustainable jobs, developing the country's manufacturing base secures such a viable employment stream. As discussed in Section 8, direct job creation as part of the project construction and operation is limited, which further emphasises the importance of local content requirements to stimulate employment generation from the programme. While **the dti**'s argues in favour of higher local content requirements in order to encourage component suppliers abroad to set up manufacturing sites in South Africa,[66] the DoE, recommends lower targets and thresholds, based on its consultation with developers. Project developers argue that the country's manufacturing base cannot support ambitious targets, and thus result in higher project costs, due to too few and not competitive suppliers.

The evaluation criteria of the programme are extensive and serve as a built-in quality assurance mechanism for the projects that reach preferred bidder status. Preparing to meet these criteria is exhaustive and financially taxing for developers which have to bear the costs at their own risk and without certainty of success of their application. According to Campbell (2012) and the DoE (2013c), bidders fail to progress past the early stages of the evaluation owing to their documentation being often incomplete, late or inconsistent. For example, there have been cases where multiple developers secure mineral and land rights for the same entity.[67] Such an issue indicates the lack of due diligence on the part of the developer and the error is generally rectified when the project fails to reach preferred bidder status. Fortunately, the rubric of the evaluation allows for targeted feedback on how bids can be improved upon[68] and developers often bid the same project in subsequent rounds.

[66] Interviews with **the dti** and the DoE.
[67] Interview with international expert.
[68] Interviews with IPPs.

## 8. The Renewable Energy Independent Power Producer Procurement Programme and Economic Development

As explained in the previous section, economic development criteria are a key component of the REIPP procurement programme, accounting for 30% of the evaluation process of bids. Over the three bidding windows, minimum requirements and optimal targets have also become increasingly aggressive, mechanically leading to projects achieving higher economic development objectives.

Local content targets and thresholds have increased progressively over the bid windows, most significantly in the third bid window, as illustrated in Table 10 in the previous section. The ability of developers to meet local content requirements largely depends on whether the local industry can manufacture the components of equipment required for their facilities.

**Table 12: Trend in local content for selected technologies over the first three rounds of the renewable energy independent power producer procurement programme**

| Round | Technology | Solar Photovoltaic | Onshore Wind | Concentrated Solar Power |
|---|---|---|---|---|
| Round 1 | Local content value (in million ZAR) | 6 261 | 2 766 | 2 391 |
| | Local content cost (in proportion of total project cost) | 29% | 22% | 21% |
| Round 2 | Local content value (in million ZAR) | 5 727 | 4 001 | 1 638 |
| | Local content cost (in proportion of total project cost) | 48% | 37% | 37% |
| Round 3 | Local content value (in million ZAR) | 3 968 | 6 283 | 5 627 |
| | Local content cost (in proportion of total project cost) | 54% | 47% | 44% |

*Source: TIPS, based on DoE, 2013c*

Table 12 above illustrates the progressive increase in local content costs as a proportion of total project cost for solar PV, onshore wind and CSP from the first to the third round. Altogether, solar PV, onshore wind and CSP technologies have brought up local content of ZAR 38.6 billion over the first three rounds of the programme. With local content thresholds increasing progressively for all three technologies, the local content costs as a share of total project costs have increased accordingly over the three bid windows, although total amounts remain limited, creating challenges to the development of a large manufacturing capacity in the country. While the initial allocations of 6 725 MW represent a substantial volume, the overall capacity is spread across several technologies as well as numerous competing

developers and suppliers, thus failing to create enough aggregate demand to encourage large investments in local manufacturing.[69]

For example, the rand value for local content inputs and processes for onshore wind have increased by 33% from the first to the second round and by 37% from the second to the third round. Accordingly, these costs as a share of total project costs have risen from around one-fifth to close to half. The first bidding round had set a 25% local content target for onshore wind (DoE, 2012e). A wind farm typically comprises a series of wind turbines, a substation along with an inverter, cabling to connect the wind turbines and the substation to the electricity grid, wind monitoring equipment and temporary and permanent access tracks. Most developers found the 25% target easy to meet as the majority of civil and electrical activities are undertaken by local companies and a large percentage of local transport is used to achieve this target. However, local content requirements have increased to 40% in Round 3. Turbines, which are generally imported, make up between 60% and 70 % of project costs (A. Vermeulen, 2012), rendering the local content requirements difficult to achieve for developers, due to the absence of the requisite local manufacturing base.[70] In the absence of critical mass, manufacturing wind turbines in South Africa remains challenging as every wind turbine model requires a different blade, which means a different mould will be needed for each blade. The wind turbines used in commercial operations are generally large slowly rotating, three-bladed machines that typically produce between 1.5 MW and 3 MW of output (DLA Piper and Hofmeyr, 2012). South African companies are nevertheless well-place to supply blades, gearboxes, generators and controllers for main wind turbines although they still source some parts from external companies (Baker, 2012). Manufacturing plants for wind turbines are moreover being set up in the country. Multi-sector company Corporación Gestamp's wind industrial division, GRI Renewable Industries, will start manufacturing wind towers at its new EUR 22-million manufacturing facility in Cape Town during the second half of this year. The plants should have the capacity to create 150 towers a year and create more than 200 jobs (Kolver, 2014). Engineering group DCD Wind Towers is also on track to complete this year the construction of its ZAR 300-million wind tower manufacturing facility in the Coega industrial development zone in the Eastern Cape. The factory will have the capacity to produce 110 wind towers a year, with the intention to increase production to 200 wind towers a year. DCD Wind Towers already has fixed contracts for the manufacturing of wind towers with wind energy company Vestas, German wind turbine maker Nordex and global engineering company Siemens (Moodley, 2014).

Looking at solar PV, the local content costs have increased to over half of total projects costs, while the rand value of these inputs and processes is falling, in line with smaller allocation and decreasing local content costs due to heightened competition across the entire value chain from module manufacturers to developers (DoE, 2013b). Suntech, Hanwha and JinkoSolar are some of the solar specialists that regard South Africa and wider African markets as potentially rewarding, particularly following the United States and

[69] Interview with international consulting company.

[70] Additionally, wind farms need to be located on sites that have strong, steady winds throughout the year, good road access and proximity to the electricity grid (DLA Piper and Hofmeyr, 2012). Many of the ideal wind project sites have been secured over the three bidding windows.

European Union authorities investigating the competitive nature of the Chinese PV panel industry (Cassell, 2013).[71] Most of the locally manufactured PV systems are destined for export. The units are only assembled in South Africa, while the solar cells are imported, resulting in very little value addition. The South African automotive and military component suppliers have nevertheless identified opportunities for supplying the solar industry with many of the components of heliostats and tracking PV systems, such as motors, gearboxes, space-frames, coatings, curved glass and control systems (**the dti**, 2012b).

In addition to local content requirements, job creation accounts for 25% of the economic development criteria (DoE, 2013b). Three main areas which create direct jobs are equipment manufacturing, project construction and installation, operation and maintenance, covering the standard division of project life. With the 28 projects bid in the first round already under construction, the DoE has reported a considerable number of jobs having been created from these projects.

**Table 13: Committed job creation for selected technologies over the first three bidding rounds of the renewable energy independent power producer procurement programme**

| | Job Creation (in 12 person-months; in 12 person-months per MW capacity) | Solar Photovoltaic | | Onshore Wind | | Concentrated Solar Power | |
|---|---|---|---|---|---|---|---|
| Round 1 | Over the construction period | 6 117 | 9.7 | 1 810 | 2.9 | 1 164 | 7.8 |
| | Over the operational period | 2 381 | 3.8 | 2 461 | 3.9 | 1 180 | 7.9 |
| | Over the total project lifespan | 8 498 | 13.4 | 4 271 | 6.7 | 2 344 | 15.6 |
| Round 2 | Over the construction period | 3 809 | 9.1 | 1 787 | 3.2 | 1 883 | 37.7 |
| | Over the operational period | 2 270 | 5.4 | 2 238 | 4.0 | 1 382 | 27.6 |
| | Over the total project lifespan | 6 079 | 14.6 | 4 025 | 7.1 | 3 265 | 65.3 |
| Round 3 | Over the construction period | 7 513 | 16.7 | 2 612 | 3.3 | 3 082 | 15.4 |
| | Over the operational period | 2 119 | 4.7 | 8 506 | 10.8 | 1 730 | 8.7 |
| | Over the total project lifespan | 9 632 | 21.4 | 11 118 | 14.1 | 4 812 | 24.1 |

*Source: TIPS, based on DoE, 2013c*

[71] In November 2012, European regulators accused the Chinese Government of unfairly subsidising production. The European Commission is investigating whether Chinese panel producers are selling equipment for less than the cost of production. Additionally, the United States of America has decided to impose duties on billions of dollars of solar products from China in an attempt to shield American producers against low-priced imports (Cassell, 2013).

As shown in Table 13 above, project developers have committed to noteworthy job creation. Solar PV is set to be the technology generating the largest number of jobs from the successful projects from the first three rounds. Solar PV projects should create a total of 24 209 employment opportunities,[72] followed by onshore wind and CSP with respectively 19 414 and 10 421 direct job creation. Trade unions have however raised concerns about the quality and precarious nature[73] of the jobs created by the projects, most employment created in the communities surrounding projects being low-skilled security guards.[74]

The economic development objectives of the REIPP procurement programme have focussed on ensuring that South Africans participate, own and benefit from renewable energy activities in the country. The structure of the programme has been explicit in facilitating this, although economic development criteria remain secondary to price. In the current auction scheme, the emphasis is put on the price offering (accounting for 70% of the selection process) while developmental outcomes are auxiliary. As price remains the primary selection criteria, developers tend to meet the minimum requirements in terms of local content, favouring the price component of their bid. In a system based on a feed-in tariff, the price is pre-determined and fixed. Provided that the REFIT scheme is not run on a 'first come first serve' basis, developers will tend to compete on other aspects of their projects, such as local content, industrial development, job creation and social development outcomes, to increase their chance of success, and potentially resulting in higher economic development benefits than in the auction system. The logics underlying an auction system and a feed-in tariff are inversed and will tend to bring different benefits, particularly in the short term.

While Government aims to retain a 40% South African ownership of renewable energy projects, some local developers intend to sell down their share of the project company.[75] Similarly, the perverse development that the community trusts may encourage has been highlighted earlier. With technology and component suppliers responding positively to meeting the manufacturing needs of the programme, localisation provides an avenue for enterprise development and skilled employment. An opportunity exists for the DoE and **the dti** to look beyond using localisation solely as a tool to encourage local manufacturing and move towards creating conditions for international suppliers to set up operations in South Africa.

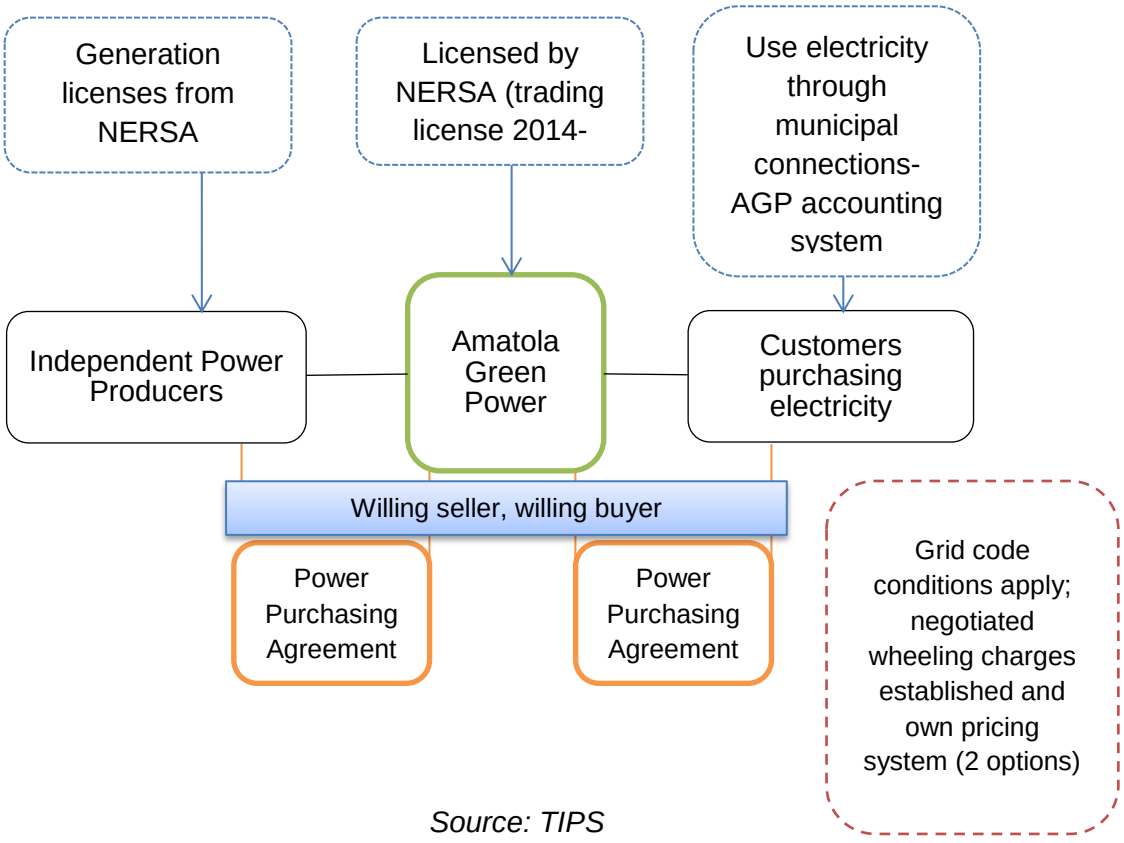
[72] One job or employment opportunity is defined as 12 person-months, i.e. one person employed full-time for a period of one year.
[73] Interview with international expert.
[74] Interview with **the dti**.
[75] Interviews with South African banks.

## 9. An Alternative Approach: Amatola Green Power's Willing-Buyer, Willing-Seller Model[76]

The current electricity industry in South Africa and the REIPP procurement programme are structured around Eskom as the single buyer of electricity (as per the single buyer model prevailing in the country). A space for the development of a unique business model, trading in electricity facilitating a 'willing-buyer, willing-seller' model, has however emerged in the last decade.

This alternative model, based on a small voluntary market for renewable energy outside of the REIPP procurement programme, has been made possible thanks to a partnership with municipal structures, allowing the connection of IPPs and industrial customers by the trading entity, Amatola Green Power (AGP). While the electricity trading entity is still regulated by the Electricity Regulation Act No. 4 of 2006 and NERSA, it operates independently of Eskom as one of the first Independent Market Operators. Exploring this model, its development and the associated key issues, such as the need to negotiate appropriate wheeling charges, partnerships with municipalities, competitive and sustainable pricing and PPAs, sheds lights on the existence of another renewable energy market outside of the REIPP procurement programme.

**Table 14: Amatola Green Energy's operating model**




*Source: TIPS*

[76] This case study is based on information from Amatola Green Power's website and an interview with the company.

AGP is licensed by NERSA to trade in green electricity. It was developed as a pilot programme in 2006 by the DoE in partnership with agricultural and agri-processing business Tongaat Hullet. Its license for trading in electricity was issued by NERSA in 2009 and renewed at the beginning of 2014 for a further 15 years. At present, AGP is the only entity licensed by NERSA to trade in (green) electricity. The company purchases electricity from IPPs with generation licenses outside of the REIPP procurement programme. . Figure below illustrates the business model and principles behind Amatola Green Power in South Africa.

Partnerships with municipal structures have enabled the development of this unique business, as municipalities can use AGP to achieve their target for renewable energy consumption.

Initially, the Tshwane municipality was part of the pilot programme. Renewable energy generated from biogas was purchased from Tongaat Hullet in KwaZulu-Natal and sold to a Mercedez-Benz factory in the Tshwane municipality in Gauteng through AGP.

Operationally, conditions for generators are outlined by the grid code and AGP negotiates preferential wheeling rates with Eskom and municipalities on behalf of its customers. This has been a vital aspect of the viability of the business model. Wheeling rates, which are the charges paid by customers to Eskom for the electricity to be transferred (or 'wheeled') across the country, were initially too expensive for AGP's business model to be economically viable. Under the new Nelson Mandela Bay Municipality programme, AGP has negotiated wheeling rates with Eskom that were signed in 2012 and allow for the purchasing price of their green electricity to remain competitive.

The purchasing price options for customers are another unique feature of AGP's business model. AGP offers very negotiable tariffs and escalation clauses (such as 1% below the municipal tariff or the CPI) to generators. Customers pay between ZAR 0.80 and ZAR 1.40 per kWh while generators are remunerated between ZAR 0.62 and ZAR 1.05 per kWh supplied.

PPAs negotiated by AGP are for periods of 5, 10 or 20 years, on a 'take-or-pay basis' (i.e. customers are required to purchase a certain amount of green energy and pay for the supplied electricity that they use or not). Binding PPAs offer to the generators a guarantee of purchase of up to 50% of the contracted amount.

AGP currently holds their main operational relationship with the Nelson Mandela Bay Municipality in the Eastern Cape, which targets using 10% of green energy (i.e. 800 MW) and signed a 20-year PPA with the electricity trader. The municipality signed wheeling agreements in 2012 and had bidding agreements in place from 2013. For example, AGP is providing renewable energy-based electricity to some blue-chip companies for 20 years at ZAR 0.83/kWh.

A double billing system has been developed by AGP through the municipal electricity distribution network and billing system to account for both the green energy produced and the electricity consumed by its customers. Powertech, a company supplying electrical and electronic equipment, has been contracted to install a dedicated live (i.e. updated on a half hourly basis) metering system accounting for the green power used. Furthermore, AGP has

developed an accreditation system based on international standards in partnership with zaRECs[77] (as part of the initial DoE programme) to account for, and verify, reduced greenhouse gas emissions resulting from the produced electricity. Going forward, this will allow companies to prove and account for their emissions reductions linked to electricity consumption. Industrial customers located in the Nelson Mandela Bay Municipality, such as Bridgestone, are through AGP in a position to consume 100% of green energy and obtain internationally-tradable certificates.

AGP is currently not government-funded and operates outside of the IRP and the REIPP procurement programme. AGP's electricity trading is facilitated by the municipal targets for renewable energy consumption and by special agreements and partnerships with municipalities. AGP is not responsible for any electricity infrastructure and relies on municipal and Eskom networks to trade and wheel electricity. A total of 15 projects spread across various sources of energy are currently in AGP's pipeline, specifically 10 MW from bagasse, 10 MW from hydropower, 20 MW from biomass, 80 MW from wind energy and 100 MW from solar energy. A single 300-MW project is also being considered.

Key issues for the sustainability of AGP's business model are the competitive pricing of the renewable energy and the partnerships with municipal institutions which make trading possible. Demand for renewables energy from industrial customers (i.e. outside of the REIPP procurement programme) and competitively priced supply have enabled the development of this market on a small scale. The success of the business model has been based on the positive relationship between AGP and the Nelson Mandela Bay Municipality, as well as the efficient and effective billing and accounting system set up by AGP. Competitive wheeling rates have also contributed to the selling price remaining completive. Even though this alternative model remains limited to a company only at this stage, more trading companies are set to enter the market in the near future. This demonstrates the potential for a voluntary market, especially in partnership with local governments, to further develop renewable energy in South Africa.

[77] zaRECs (Pty) Ltd. administers the South African voluntary renewable energy certificates market on behalf of members of the voluntary Renewable Energy Certificate South Africa market participant's association.

## 10. Conclusions: Critical Success, Challenges and Way Forward

This review traced and analysed the regulatory journey that has led to South Africa's successful renewable energy procurement programme.

First, the transition, from the REFIT to the REIPP procurement programme, and its rationale, at the critical stage before the launch of the feed-in tariff, particularly bears about the regulation and performance of the sector. It raises the question of the efficacy of the REIPP procurement programme, in comparison to the REFIT policy, would it have been implemented.

On the one hand, the one clear advantage of the auction system over the feed-in tariff is the ability of the programme to drive pricing down through competition. A REFIT programme, in which tariffs are pre-determined, carries more risk for Government to get to prices wrong (thus offering very high returns to investors in the case of too high tariffs or preventing the development of the sector in the case of too low tariffs). In addition, the DoE, constitutionally the procurer of power, did not have the budget to run the REFIT.[78] While the feed-in tariff carries a high financial risk to the country's balance sheet, should Eskom default, the competitive pricing introduced by the auction system lessens this risk.

On the other hand, price is the largest determinant in the evaluation of bids under the auction system, which has made bids less competitive in terms of economic development. The strength of the feed-in tariff (not run on a 'first come first serve' basis) is that bidders primarily compete in areas outside of price. The performance of the REIPP procurement programme in economic development does face substantial risk in skilled employment generation, social development and manufacturing development.

Second, the analysis of the role of the single-buyer model in relation to the development of a renewable energy industry outside of the REIPP procurement programmes raises important conclusions. Eskom being the only buyer of power, consumers are not in a position to neither contribute to, nor benefit from, competition on the generation market. Private producers would still not be able to compete on the price against Eskom's special purchase agreements with energy-intensive firms. IPPs' competitive advantage is however in supplying clean and/or consistent energy supply. This advantage would benefit energy-intensive industries, should Eskom resort to load shedding or should Eskom's electricity tariffs reach unbearable levels (particularly due to the introduction of a carbon tax in the country).

The ISMO Bill is crucial to such a development. In the current structure (i.e. without an independent transmission system operator), Eskom could leverage its monopoly over the transmission grid to push competitor generators out of the market. The establishment of an unbundled (i.e. outside of Eskom) ISMO to invest, operate and maintain the country's high voltage transmission grid would further accelerate the development of renewable energy in the country, empowering IPPs to sell electricity directly to third party consumers, such as mining and industrial complexes. Although remaining fully-owned by Government, an ISMO

[78] Interview with the DoE.

would contribute to levelling the playing field by eliminating the potential bias created by the current structure in which the DoE procures energy and trading occurs within Eskom.

This would also pave the way for an extension of the 'willing buyer, willing seller' model developed by AGP. While this model proposes other generators than Eskom to industrial consumers, IPPs need a more secure stream of buyers than the existing model provides. More certainty will also facilitate the financing of IPPs in the model. Commercial banks are less likely to finance an IPP based on a PPA not guaranteeing that all the power generated will be purchased. AGP's PPA binds the consumer to consumed power (only guarantying 50%), whereas the PPA under the REIPP procurement programme forces Eskom to buy the totally of the power generated.[79]

The introduction of an ISMO would then open the door for customers to choose their suppliers, i.e. Eskom or an IPP, and potentially contributing to sustainable development by preferring renewable energy producers. From a policy perspective, recent developments around a voluntary market call for the South African Government to elaborate strategies to broaden consumer choice in electricity consumption and allow multiple electricity buyers.

In addition, under the REIPP procurement programme, the NT made much-needed improvements to the risk allocation in the PPA, which ultimately enabled lenders to provide financing on agreeable terms. Financiers have been in a position to commit billions of project finance as they only carry manageable risks (i.e. the building and operation of the renewable energy project). Financiers would neither carry the faults of Eskom on its transmission and distribution networks, nor a default from the utility. The PPA has been a large determinant in the failure of the programmes preceding the current procurement framework and in the success of the current programmes. In the current programme, commercial banks provide the large majority of funding to project companies, and the success of the scheme is evidenced in the response from developers, investors as well as local and international manufacturers, which have contributed to an emerging renewable energy industry.

Furthermore, the efficient and transparent management of the programme continues to improve the quality of bids. The extensive evaluation criteria and thorough methodology have also contributed to the continual improvement of the technical and financial aspects of the projects. For example, IPPs receive comprehensive feedback on unsuccessful projects and often rebid the same project in following rounds The DoE, recognising its limited institutional capacity to run all aspects of the programme, has relied on external expertise to complement the Department's skills gap.[80] Private consultants and other government departments have notably supported the DoE in developing the PPA and economic development criteria. The intervals in the bid rounds have allowed the DoE the flexibility to respond to challenges, such as lowering the bidding caps and adjusting the allocated generation capacity in the second round to incentivise more competitive pricing.[81]

[79] Interview with AGP.
[80] Interview with **the dti**.
[81] Interviews with South African banks.

The size and complexity of the REIPP procurement programme has however stretched available legal and financial advisory services to the limit. While the DoE's collaboration with external private reviewers and advisors has significantly strengthened the capacity of the programme, the limited skills in these areas sees firms providing services for both Government and IPPs, leading to a conflict of interest (Baker, 2012). Similarly, the technical aspects linked to project implementation rely on Eskom's analysis and expertise. Thus, grid connection costs as well as the construction and operation of the transmission network are wholly determined by Eskom, with little input from developers and their advisors. Concerns have also been raised by developers on Eskom's capacity to manage and plan connecting numerous projects to the grid.

In addition, the programme could strengthen its impact on local manufacturing in the country. Setting the appropriate instruments to create aggregate demand will contribute largely to enable the type of economic development and skilled employment envisioned for this programme.

Going forward, the development and success of the REIPP procurement programme carries important findings for other infrastructure programmes in the country. Both the private sector[82] and government clusters working in infrastructure development,[83] have expressed interest in using the model of the REIPP procurement programme to procure other type of infrastructure projects beyond the energy sector (Munshi, 2013). This may trigger a significant shift in how the South African Government approaches public-private partnerships and open for the door for more efficient, sustainable, job creating infrastructure procurement in the country.

[82] *Ibid*.

[83] The NT's task team responsible for private sector financing of infrastructure, which includes personnel from the DPE, the Presidential Infrastructure Co-ordinating Commission, business and labour unions, have particularly investigated this possibility.

## References


Abrahams, Y., Fischer, R., Martin, B., McDaid, L., 2013. Smart Electricity Planning: Fast-Tracking Our Transition to Smart Electricity Supply for All. Electricity Governance Initiative of South Africa.

Baker, L., 2011. Governing Electricity in South Africa: Wind, Coal and Power Struggles (Working Paper No. 015), The Governance of Clean Development Working Paper Series. School of International Development at the University of East Anglia, Norwich.

Baker, L., 2012. Power Shifts? The Political Economy of Socio-Technical Transitions in South Africa's Electricity Sector. School of International Development at the University of East Anglia, Norwich.

Baker, L., Newell, P., Phillips, J., 2013. The Political Economy of Energy Transitions: The Case of South Africa. New Polit. Econ.

Blaine, S., 2013. Energy Price War Looms. Bus. Day.

Brodsky, S., 2010. South Africa's REFIT Programme – Latest Developments and the Way Forward: Presentation to SENEA.

Campbell, A., 2012. Funding Projects in REIPP - Lessons Learnt From BD1.

Capoor, K., 2013. South Africa - Renewable Energy Market Transformation : P073322 - Implementation Status Results Report : Sequence 11 (English). World Bank, Washington, D.C.

Cassell, M., 2013. African Renewable Energy Review. Nedbank Capital, Johannesburg.

Creamer, T., 2010. R15bn DBSA loan another key step in closing Eskom's funding gap. Polity.org.za.

Creamer, T., 2011. Fresh Concern that SA Will Abandon REFIT in Favour of Competitive Bids [WWW Document]. Eng. News. URL http://www.engineeringnews.co.za/article/fresh-concern-that-sa-is-poised-to-abandon-refit-in-favour-of-competitive-bidding-2011-06-23 (accessed 1.30.14).

Creamer, T., 2013a. Eskom's Power-Tower Project Moving Steadily Towards Implementation [WWW Document]. Eng. News. URL http://www.engineeringnews.co.za/article/tender-for-eskoms-big-solar-project-expected-later-this-year-2013-06-07 (accessed 1.16.14).

Creamer, T., 2013b. DoE Postpones Decision on Enlarged Window-Three Renewables Allocation [WWW Document]. Eng. News. URL http://www.engineeringnews.co.za/article/doe-postpones-decision-on-enlarged-window-three-renewables-allocation-2013-11-22/searchString:round+3+renewable (accessed 1.23.14).

Creamer, T., 2013c. South Africa Gears Up for Third Renewables Bid Round [WWW Document]. Eng. News. URL http://www.engineeringnews.co.za/article/sa-gears-up-for-third-renewables-bid-round-sets-1-000-mw-yearly-target-2013-05-24 (accessed 1.30.14).

Creamer, T., 2014. From the Role of Nuclear to the Position of Gas, IRP Debate is Heating Up [WWW Document]. Eng. News. URL http://www.engineeringnews.co.za/article/from-the-role-of-nuclear-to-the-position-of-gas-irp-debate-heats-up-2014-01-20 (accessed 1.21.14).

Das Nair, R., Montmasson-Clair, G., Ryan, G., 2014. Regulatory Entities Capacity Building Project Review of Regulators Orientation and Performance: Review of Regulation in the Electricity Supply Industry. University of Johannesburg and Trade and Industrial Policy Strategies, Johannesburg and Pretoria.

Davie, E., 2013. What Has Happened to the ISMO Bill? [WWW Document]. Free Mark. Found. URL http://www.freemarketfoundation.com/issues/feature-article-what-has-happened-to-the-ismo-bill (accessed 1.30.14).

De Vries, J., 2013. Review of the Renewable Energy Sector Regulatory Framework in South Africa, Prepared for the University of Johannesburg Regulatory Entities Capacity Building Project. Centre for Competition Regulation and Economic Development (CCRED), Johannesburg.

DEA, 2011. National Climate Change Response White Paper. Department of Environmental Affairs, Pretoria.

DEAT, 2007. Long Term Mitigation Scenarios. Department of Environmental Affairs and Tourism of the Republic of South Africa, Pretoria.

DLA Piper, Hofmeyr, C.D., 2012. EPC Contracts in the Renewable Energy Sector - South African RE IPP Programme - Lessons learned from Phases 1 and 2.

DME, 2003. White Paper on the Renewable Energy Policy of the Republic of South Africa. Department of Minerals and Energy, Pretoria.

DoE, 2009a. Electricity Regulation Act: Electricity Regulations on New Generation Capacity, Government Gazette.

DoE, 2009b. Creating an Enabling Environment for Distributed Power Generation in the South African Electricity Supply Industry. Department of Energy, Pretoria.

DoE, 2010. Strategic Plan 2010/11-2012/13. Department of Energy, Pretoria.

DoE, 2011a. Integrated Resource Plan for Electricity 2010-2030. Department of Energy, Pretoria.

DoE, 2011b. Independent System and Market Operator Draft Bill, Government Gazette.

DoE, 2012a. Baseload IPP Procurement Programme. Determination under Section 34(1) of the Electricity Regulation Act 4 of 2006, Government Gazette.

DoE, 2012b. Non-Grid Electrification Policy Guidelines. Department of Energy, Pretoria.

DoE, 2012c. Independent System and Market Operator Bill.

DoE, 2012d. IPP Procurement Programme 2012. Determination under section 34(1) of the Electricity Regulation Act 4 of 2006, Government Gazette.

DoE, 2012e. PPC-Energy: Update on Window 1 RE-IPP Procurement Programme.

DoE, 2012f. Renewable Energy IPP Procurement Programme: Window two Preferred Bidders' announcement.

DoE, 2013a. A Survey of the Energy Related Behaviour and Perceptions in South Africa: Residential Sector. Department of Energy.

DoE, 2013b. Background Information on the REIPP Programme and the RFP.

DoE, 2013c. Renewable Energy IPP Procurement Programme: Bid Window 3 Preferred Bidders' Announcement.

DoE, 2013d. IPP Renewables [WWW Document]. Renew. Energy Indep. Power Prod. Procure. Programme. URL http://www.ipprenewables.co.za/ (accessed 1.23.14).

DoE, Eskom, NERSA, 2012. Renewable Energy Fund [WWW Document]. Renew. Energy Indep. Power Prod. Procure. Programme. URL http://www.ipprenewables.co.za/#page/1125 (accessed 2.16.13).

the dti, 2010. 2010/11 – 2012/13 Industrial Policy Action Plan. Department of Trade and Industry, Pretoria.

the dti, 2011. Industrial Policy Action Plan 2011/12 - 2013/14. Department of Trade and Industry, Pretoria.

the dti, 2012a. Industrial Policy Action Plan (IPAP) 2012/13 - 2014/15. Department of Trade and Industry, Pretoria.

the dti, 2012b. Draft: Sector Development Strategy: Solar and Wind Energy. Department of Trade and Industry, Pretoria.

the dti, 2013. REIPPP Bidders Conference.

the dti, DoE, 2011. The South African Renewables Initiative. Partnering for Green Growth. Department of Trade and Industry and Department of Energy, Pretoria.

Eberhard, A., 2013. Feed-In Tariffs or Auctions? Procuring Renewable Energy Supply in South Africa ( No. 338), Viewpoint. World Bank, Washington, D.C.

EDD, 2010. the New Growth Path: The Framework. Economic Development Department, Pretoria.

EE Publishers, 2012. Postponement of 3rd Bid Submission Date for the REIPPP. EE Publishers.

EScience Associates, Urban-Econ Development Economists, Ahlfeldt, C., 2013. Photovoltaic Electricity: The Localisation Potential of Photovoltaics and a Strategy to Support the Large Scale Roll-Out in South Africa. South African Photovoltaic Industry Association, Department of Trade and Industry and World Wildlife Fund, Cape Town, Pretoria and Johannesburg.

Eskom, 2012a. Schedule of Standard Prices: Distribution Use-of-Systems Charges for Embedded Generators – 1 April 2012 to 31 March 2013. Eskom.

Eskom, 2012b. Process and Pricing for the Third Party Transportation of Energy (Wheeling) Over Eskom's Networks Due to Bilateral Trade (Information Brochure).

Eskom, 2013a. New Build Programme". Eskom Holdings SOC Limited.

Eskom, 2013b. Klipheuwel Wind Energy Facility (Factsheet). Eskom, Johannesburg.

Eskom, 2013c. Solar Energy – Photovoltaic Solar Power Generation (Factsheet). Eskom, Johannesburg.

Eskom, 2013d. Concentrating Solar Power (CSP) (Factsheet). Eskom, Johannesburg.

Exxaro, 2011. Comments on the: NERSA Cogeneration Regulatory Rules and Feed-In Tariffs (Consultation Paper). Exxaro.

Fine, B., Rustomjee, Z., 1996. The Political Economy of South Africa: From Minerals-Energy Complex to Industrialisation. C. Hurst & Co. Publishers, London.

GCIS, 2007. Statement on Cabinet meeting of 5 September 2007. Government Communication and Information System.

GCIS, 2011. Statement on the Cabinet meeting held on 16 March 2011. Government Communication and Information System, Pretoria.

Gecelter, R., 2013. Are Bonds a Viable Source of Funding for REIPPP Deals in South Africa, The Forward Curve. Investec Specialist Bank, Johannesburg.

Gratwick, K.N., Eberhard, A., 2008. Demise of the Standard Model for Power Sector Reform and the Emergence of Hybrid Power Markets. Energy Policy 36, 3948–3960.

Greyling, A., 2012. Renewable Energy Independent Power Producer (RE IPP) Procurement Programme – An Eskom perspective.

Haffejee, Y., 2013. Renewable Energy IPP Programme (Presentation for the IRENA Renewable Energy Policies). Eskom, Abu Dhabi.

Hemraj, S., 2012. Implementation of the National Climate Change Response White Paper: Resource Mobilisation and Tracking.

IDASA, 2010. Electricity Governance Initiative of South Africa: The Governance of Power, Shedding a Light on the Electricity Sector in South Africa. Institute for Democracy in Africa, Pretoria.

IDC, 2012. Integrated Annual Report 2012. IDC, Johannesburg.

IRENA, 2013a. Renewable Power Generation Costs in 2012: An Overview. International Renewable Energy Agency, Abu Dhabi.

IRENA, 2013b. Renewable Energy Auctions in Developing Countries. International Renewable Energy Agency, Abu Dhabi.

Joskow, P., 2006. Introduction to Electricity Sector Liberalization: Lessons Learned from Cross-Country Studies, in: Sioshansi, F.P., Pfaffenberger, W. (Eds.), Electricity Market Reform. Elsevier Ltd., Oxford.

Kohler, M., 2008. The Sustainability of South Africa's Energy Resources: The Impact of International Trade.

Kohler, S., 2009. IPPs to Relieve Pressure on Eskom [WWW Document]. Eng. News. URL http://www.engineeringnews.co.za/article/ipps-to-relieve-pressure-on-eskom-2009-05-15 (accessed 1.17.14).

Kolver, L., 2014. GRI to Start Manufacturing Wind Towers in Cape Town in H2 2014 [WWW Document]. Eng. News. URL http://www.engineeringnews.co.za/article/gri-to-start-manufacturing-wind-towers-in-cape-town-in-h2-2014-2014-01-20/searchString:wind%20manufacturing (accessed 2.17.14).

Kuni, D., 2014. Independent power porducers in South Africa.

Montmasson-Clair, G., 2013. Tracking Climate Finance Inflows to South Africa (Prepared for the Climate Change Expert Group (CCXG) Global Forum). Organisation for Economic Co-operation and Development, Paris.

Moodley, S., 2014. Manufacturing Facility on Track for 2014 Completion [WWW Document]. Eng. News. URL http://www.engineeringnews.co.za/article/manufacturing-facility-on-track-for-2014-completion-2013-12-20/searchString:wind%20manufacturing (accessed 2.17.14).

Munshi, R., 2013. Vital Lessons for Infrastructure Projects. Bus. Day.

Musana, F., Schulz, N., 2012. Water Hungry Coal: Burning South Africa's Water to Produce Electricity. Greenpeace Africa.

NERSA, 2008. South African Grid Code – Preamble: Version 7.0. National Energy Regulator of South Africa, Pretoria.

NERSA, 2009a. NERSA Consultation Paper: Renewable Energy Feed-In Tariff Phase 2 July 2009 (Consultation Paper). National Energy Regulator of South Africa, Pretoria.

NERSA, 2009b. Reasons for Decision on the Renewable Energy Feed-In Tariff (REFIT). National Energy Regulator of South Africa, Pretoria.

NERSA, 2009c. South Africa Renewable Energy Feed-In Tariff (REFIT) (Regulatory Guidelines). National Energy Regulator of South Africa, Pretoria.

NERSA, 2009d. Renewable Energy Regulatory Feed-In (Tariff Guidelines). National Energy Regulator of South Africa, Pretoria.

NERSA, 2011. Review of Renewable Energy Feed-In Tariffs (Consultation Paper). National Energy Regulator of South Africa, Pretoria.

NERSA, 2013a. NERSA's Decision on Eskom's Revenue Application for the Third Multi-Year Price Determination Period 2013/14 to 2017/18. National Energy Regulator of South Africa, Pretoria.

NERSA, 2013b. Licensing of IPP Preferred Bidders.

Norton Rose Fulbright, 2011. South Africa Renewable Energy IPP Request for Proposals. Norton Rose Fulbright, Johannesburg.

NPC, 2011. National Development Plan - Vision 2030. National Planning Commission, Pretoria.

Odendaal, N., 2013. REIPPPP First-window Project Connected to Grid. Eng. News.

Odendaal, N., 2014. SA Banks Maintain Appetite for Renewable Energy Projects [WWW Document]. Eng. News. URL http://www.engineeringnews.co.za/article/sa-banks-maintain-appetite-for-renewable-energy-projects-2014-02-11/rep_id:3182 (accessed 2.12.14).

Pickering, M., 2010. Towards an Independent System Operation for South Africa. Energy Research Centre at the University of Cape Town, Cape Town.

Pickering, M., 2013. Renewable Energy: Assessing the Experience of South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).

PMG, 2013. Independent System Market Operator (ISMO) Bill and Public Comments: Overview. Parliamentary Monitoring Group, PRe.

Prakash, A., 2009. Cogeneration.

Pressly, D., 2013. ANC Mum on Stalled ISMO Bill [WWW Document]. IOL. URL http://www.iol.co.za/business/news/anc-mum-on-stalled-ismo-bill-1.1607395#.UqgZ3uLpytw (accessed 12.11.13).

Renewable Energy Ventures (K) Ltd, Meister Consultants Group Inc., 2013. Powering Africa through Feed-in Tariffs: Advancing Renewable Energy to Meet the Continent's Electricity Needs. World Future Council, Heinrich Böll Foundation and Friends of the Earth England, Wales & Northern Ireland, Johannesburg, Cape Town and London.

Smit, R., 2011. Process for Eskom IPP Renewable Energy Grid Integration. Eskom, Johannesburg.

Stemple, R., 2013. Sustainable Growth from a Renewable Source. Futuregrowth Asset Management.

Steyn, E., 2013. Dawn of a Competitive Electricity Sector for South Africa: The Independent System and Market Operator Bill B 9-2012 – Context, Content and Comment. Jure 2, 539–556.

Steyn, G., 2012. The Impact of Economic Regulation on the Management and Performance of South Africa State Owned Enterprises. Presented at the South African Economic Regulators Conference, National Energy Regulator of South Africa, Johannesburg.

TIPS, 2013. Options for Managing Electricity Supply to Aluminium Plants (Commissioned for the Economic Development Department (EDD) by the Employment Promotion Programme (EPP) Phase III of the Development Policy Research Unit (DPRU) at the University of Cape Town (UCT)). Economic Development Department, Pretoria.

TIPS, GGGI, forthcoming. Impact of Electricity Price Increases on the Competitiveness of Selected Mining Sector and Smelting Value Chains. Global Green Growth Institute, Economic Development Department, Department of Trade and Industry, Seoul and Pretoria.

UNEP, 2011. Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication. United Nations Environmental Program, Paris.

UNFCCC, 2011. Report of the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010. Addendum. Part Two: Action taken by the Conference of the Parties at its sixteenth session. United Nations Framework Convention on Climate Change, Bonn.

Unlimited Energy, 2013. Renewable Energy Policy Mapping Study of the Republic of South Africa. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and Department of Energy, Pretoria.

UNWCED, 1987. Our Common Future (Brundtland Report). United Nations World Commission on Environment and Development.

Van den Berg, J., 2013. Submission to NERSA: Eskom MYPD 3 Application. SAREC.

Van der Merwe, C., 2009. Eskom Suspense MTPPP Procurement Process. Eng. News.

Van Tonder, R., 2013. Industrial Development Corporation's approach in Developing Green Industries: Focussing on Renewable Energy Especially CSP.

Vermeulen, A., 2012. Bank provides funding for REIPPP projects. Eng. News.

Vermeulen, A., 2012. Localisation Might be a Challenge in Future REIPPP Bidding Rounds. Eng. News.

Viljoen, F., 2008. The Pilot National Cogeneration Programme & Medium Term Power Purchase Programme.

Yeld, J., 2013. Eskom Wind Farm Takes Shape [WWW Document]. IOL. URL http://www.iol.co.za/scitech/science/environment/eskom-wind-farm-takes-shape-1.1587352#.UtfjDbRuRCI (accessed 1.16.14).

Yelland, C., 2009. Independent Power Producers (IPPs) Organise Collectively to Take on Eskom. EE Publishers.

**Appendix 1: Preferred bidders by technology for the first three bidding windows of the renewable energy independent power producer procurement programme**

| Project Name (Location) | Technology (Supplier) | Contracted Capacity (in MW) | Fully indexed Price (in ZAR/MWh) | Partially indexed Price (in ZAR/MWh) | Economic Development Score (out of 30) | Developer |
|---|---|---|---|---|---|---|
| **Bid Window 1** | | | | | | |
| Dassiesklip Wind Energy Facility (Western Cape) | Onshore Wind (Sinovel, China) | 27 | | | | Biotherm Energy Ltd. Denham Capital is Equity Partner |
| MetroWind Van Stadens Wind Farm (Eastern Cape) | Onshore Wind (Vestas, Denmark) | 27 | | | | MetroWind (Basel Read Energy has a 35% stake). OMIGSA (30%), AfriCoast SA (20%), BEE Community Trust (5%) |
| Hopeville Wind Farm (Western Cape) | Onshore Wind (Vestas, Denmark) | 67 | | | | Umoya Energy |
| Noblesfontein (Northern Cape and Western Cape) | Onshore Wind (Vestas, Denmark) | 75 | | | | Gestamp Wind in JV with SARGE and BEE company Shanduka. Debt, empowerment and carbon credit financing provided by Standard Bank. |
| Red Cap Kouga Wind Farm â | Onshore Wind (Nordex, | 80 | | | | Red Cap Investments. Financiers: Standard Bank, IDC, Inspired |

| | | | | | | |
|---|---|---|---|---|---|---|
| Oyster Bay (Eastern Cape) | Germany) | | | | | Evolution Investment Management, Afri-Coast Engineers (possibly EPC)) |
| Dorper Wind Farm (Eastern Cape) | Onshore Wind (Nordex, Germany) | 100 | | | | Rainmaker Energy Projects (Pty) Ltd. Equity: Sumitomo Corporation (60%), DorperWind Development (Pty) Ltd of Rainmaker Energy Company (15%), and BEE Consortium (25%) |
| Jeffreys Bay (Eastern Cape) | Onshore Wind (Siemens, Germany) | 138 | | | | Mainstream Renewable Power/ Genesis Eco-Energy. Debt Financing: Fully underwritten Senior debt by Absa Capital. Equity: Globeleq Holdings, Luxembourg Mainstream Renewable Power SARL, Old Mutual Insurance, BEE Partner (20%) including Thebe Investment Corporation |
| Cookhouse Wind Farm (Eastern Cape) | Onshore Wind (Suzlon, India) | 138 | | | | African Clean Energy Development Ltd is the project company. The company's sponsors are AFPOC (Maurania) with 50% ownership; Macquire Capital (Australia) and Old Mututal Investment Group each with 25% ownership.<br>Terra Wind Energy-Golden Valley |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | (Pty) Ltd.<br>Debt Financing: NedBank, Standard Bank, IDC. Equity Financing: Globeleq (39%) and BEE company (25%) |
| **Subtotal Onshore Wind** | | **634** | | | | |
| KaXu Solar One (Northern Cape) | Concentrated Solar Power | 100 | | | | Abengoa. Financiers: IDC (29%), !KaXu community trust (20% funded by IDC) |
| Khi Solar One (Northern Cape) | Concentrated Solar Power | 50 | | | | Abengoa. Financiers: IDC (29%), !Khi community trust (20% funded by IDC) |
| **Subtotal Concentrated Solar Power** | | **150** | | | | |
| Greefspan PV Power Plant (Northern Cape) | Solar Photovoltaic | 10 | | | | Developer is AE-AMD Independent Power Producer 1 (Pty) Ltd |
| Mulilo Renewable Energy Solar PV Prieska (Northern Cape) | Solar Photovoltaic | 20 | | | | Developer is Gestamp Mulilo Consortium |
| RustMo1 Solar Farm | Solar Photovoltaic | | | | | |
| Herbert PV Power Plant | Solar Photovoltaic | | | | | |
| Konkoonsies Solar | Solar Photovoltaic | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Aries Solar | Solar Photovoltaic | | | | | |
| Herbert PV Power Plant | Solar Photovoltaic | | | | | |
| Mulilo Renewable Energy Solar PV De Aar (Northern Cape) | Solar Photovoltaic | | | | | |
| Soutpan Solar Park | Solar Photovoltaic | | | | | |
| Witkop Solar Park | Solar Photovoltaic | | | | | |
| Touwsrivier Project | Solar Photovoltaic | | | | | |
| De Aar Solar PV (Northern Cape) | Solar Photovoltaic | | | | | ZAR 2-billion investment |
| SA Mainstream Renewable Power Droogfontein | Solar Photovoltaic | | | | | |
| Letsatsi Power Company | Solar Photovoltaic | | | | | |
| Lesedi Power Company | Solar Photovoltaic | | | | | |
| Kalkbult | Solar Photovoltaic | | | | | |
| Kathy Solar Energy Facility | Solar Photovoltaic | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Solar Capital De Aar (Pty) Ltd (Northern Cape) | Solar Photovoltaic | | | | | |
| **Subtotal Solar Photovoltaic** | | **632** | | | | |
| **Total Bid Window 1 Allocation** | | **1 416** | | | | |
| **Bid Window 2** | | | | | | |
| Gouda Wind Facility (Western Cape) | Onshore Wind (Acciona, Spain) | 135 | | | | Acciona Energy (51% stake) and Aveng (29%), Soul City (BBEE partner with 10% stake). ACCIONA Energy and Aveng are EPC partners (construction, operation and management) |
| West Coast 1 (Western Cape) | Onshore Wind (Vestas, Denmark) | 91 | | | | Moyeng Energy (Pty) Ltd (a partnership with GDF Suez and Investec supported by Windlab). |
| Amakhala Emoyeni (Phase 1) (Eastern Cape) | Onshore Wind (Suzlon, India) | 138 | | | | Cennergi (Pty) Ltd (Windlab initiated) |
| Tsitsikamma Community Wind Farm (Eastern Cape) | Onshore Wind (Vestas, Denmark) | 95 | | | | Cennergi (Pty) Ltd |
| Waainek (Eastern Cape) | Onshore Wind (Vestas, Denmark) | 23 | | | | EDF in partnership with Innowind |

| | | | | | | |
|---|---|---|---|---|---|---|
| Grassridge (Eastern Cape) | Onshore Wind (Vestas, Denmark) | 60 | | | | EDF |
| Chaba (Eastern Cape) | Onshore Wind (Vestas, Denmark) | 21 | | | | EDF |
| **Subtotal Onshore Wind** | | **563** | | | | |
| Sol Africa (Northern Cape) | Concentrated Solar Power | 50 | | | | Financiers: IDC only a development partners (25%), and community trust (5% funded by IDC) |
| **Subtotal Concentrated Solar Power** | | **50** | | | | |
| Solar Capital De Aar 3 | Solar Photovoltaic | 75 | | | | |
| Sishen Solar Facility | Solar Photovoltaic | 74 | | | | |
| Aurora | Solar Photovoltaic | 9 | | | | |
| Vredendal | Solar Photovoltaic | 9 | | | | |
| Linde | Solar Photovoltaic | 37 | | | | |
| Dreunberg | Solar Photovoltaic | 70 | | | | |
| Jasper Power | Solar | 75 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Company | Photovoltaic | | | | | |
| Boshoff Solar Park | Solar Photovoltaic | 60 | | | | |
| Upington Solar PV | Solar Photovoltaic | 9 | | | | |
| **Subtotal Solar Photovoltaic** | | **417** | | | | |
| Stortemelk Hydro (Pty) Ltd | Small Hydro | 4 | | | | |
| Neusberg Hydro Electric Project A | Small Hydro | 10 | | | | |
| **Subtotal Small Hydro** | | **14** | | | | |
| Bokpoort CSP Project | Concentrated Solar Power | 50 | | | | |
| **Subtotal Concentrated Solar Power** | | **50** | | | | |
| **Total Bid Window 2 Allocation** | | **1 044** | | | | |
| **Bid Window 3** | | | | | | |
| Red Cap - Gibson Bay | Onshore Wind | 110 | 664 | 970 | 18.03 | |
| Longyuan Mulilo De Aar 2 North Wind Energy Facility | Onshore Wind | 139 | 740 | 1 078 | 20.67 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Nojoli Wind Farm | Onshore Wind | 87 | 682 | 999 | 13.79 | |
| Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility | Onshore Wind | 96 | 795 | 1 157 | 21.48 | |
| Khobab Wind Farm | Onshore Wind | 138 | 746.4 | 1 108.1 | 8.80 | |
| Noupoort Mainstream Wind | Onshore Wind | 79 | 771 | 1 022 | 8.80 | |
| Loeriesfontein 2 Wind Farm | Onshore Wind | 138 | 759.6 | 1 127 | 7.79 | |
| **Subtotal Onshore Wind** | | **787** | | | | |
| Xina CSP South Africa (Northern Cape) | Concentrated Solar Power | 100 | 1 650 | 1 860 | 8.39 | Abengoa. Financiers: IDC (20%), Community Trust, !Xina (20% funded by IDC) |
| iLangalethu (Northern Cape) | Concentrated Solar Power | 100 | 1 629.5 | 2 098.8 | 17.87 | Karoshoek Consortium. Financiers: IDC (20%), Community Trust (5% funded by IDC) |
| **Subtotal Concentrated Solar Power** | | **200** | | | | |
| Adams Solar PV 2 | Solar Photovoltaic | 75 | 864.1 | 1 239.3 | 12.58 | |
| Tom Burke Solar Park | Solar Photovoltaic | 60 | 952.2 | 1329.8 | 13.68 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Mulilo Sonnedix Prieska PV | Solar PV | 75 | 1 100 | 1 440 | 18.01 | |
| Electra Capital | Solar Photovoltaic | 75 | 1 069 | 1324.6 | 11.68 | |
| Pulida Solar Park | Solar Photovoltaic | 75 | 992.2 | 1415.5 | 12.61 | |
| Mulilo Prieska PV | Solar Photovoltaic | 75 | 985 | 1 473.1 | 17.16 | |
| **Subtotal Solar Photovoltaic** | | **435** | | | | |
| Johannesburg Landfill Gas to Electricity | Landfill Gas | 18 | 940 | 1 108 | 13.69 | |
| **Subtotal Landfill Gas** | | **18** | | | | |
| Mkuze | Biomass | 16 | 1 399.99 | 1 850.51 | 7.19 | |
| **Subtotal Biomass** | | **16** | | | | |
| **Total Bid Window 3 Allocation** | | **1 456** | | | | |

*Source: TIPS, based on Baker, 2012; DoE, 2013c, 2012e, 2012f; Van Tonder, 2013*