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The Impact of Private Sector Participation in the South African Electricity Supply Industry

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ABSTRACT

The South African economy was hit hard by the electricity crisis of 2008 where increasing demand for electricity outstripped the available supply that led to load shedding. Many jobs were lost, industries could not keep up with international competition and as a result jobs were lost in the process affecting many households in the country.

This is the context within the debate around the introduction of private sector participation in the electricity industry to assist Eskom to meet the demand and stimulate economic growth. This paper examines the introduction of the Independent Power Producers and its impact on the industry. The objective of this paper is to assess the impact of the Independed Power Producers can assist the country and Eskom to reduce the problem of electricity shortage in South Africa. It has been found that to level the playing field in the industry, the horizontal structure of the electricity industry will have to disaggregate.

Keywords: Electrification, Independent Power Producers.

1. INTRODUCTION

The South African electricity supply industry is dominated by a state-owned and vertically integrated company called Eskom. Eskom, which generates about 96% of the electricity in South Africa, transmits and distributes to either end users or the municipalities who buys in bulk (and to those with a few generating small amounts for sale in their areas of jurisdiction) then distribute to end users in their licensed area of supply.

South Africa is rich in mineral resources with an extensive mining industry. It is ranked first for platinum production, second for gold production and fifth for coal production in the world. In 2007 247,7 million

tonnes of coal was mined and it was estimated that there are a further 31 billion tonnes of recoverable coal resources remaining. (GCIS, 2008). It is the abundance of coal that has resulted in the picture in South Africa shown in Figure 1 below.

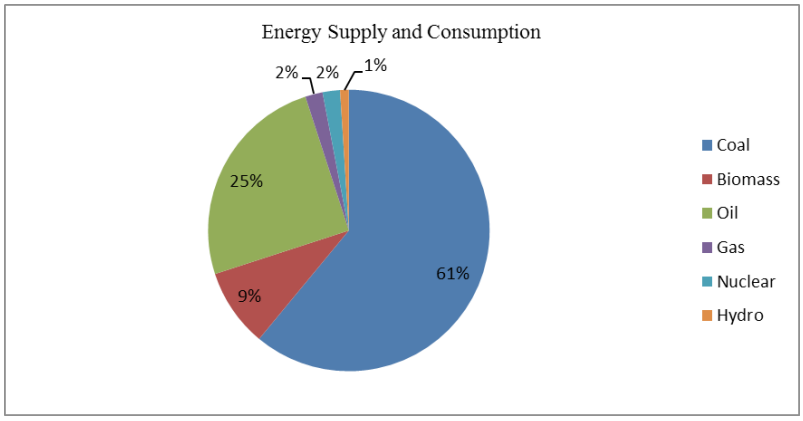

Figure 1: Energy Supply and Consumption

2. BACKGROUND STATEMENT

In South Africa, electricity is generated from coal; nuclear and hydro and emergency gas. South Africa sells electricity to neighbouring countries e.g. Botswana, Lesotho, Mozambique, Swaziland, Zimbabwe, etc. while on the other hand, contractually, South Africa is bound to take electricity from Mozambique's Cahorra Bassa hydro-electric station on the station on the Zambezi. Eskom also imports some power from the Democratic Republic of Congo and from Zambia, mainly for peak load management.

In 2003, Cabinet approved private-sector participation in the electricity industry and decided that future power generation capacity will be divided between Eskom (70 %) and independent power producers, or IPPs (30 %). The Department of Minerals and Energy (the departments has now split into two separate departments, namely Department of Minerals and the other one is Department of Energy) was mandated with the responsibility of ensuring private-sector participation in power generation through a competitive bidding process and that diversified primary energy sources be developed within the electricity sector without hindrance.

3. RESEARCH DESIGN/METHODOLOGY

Theoretical Framework

In the development of this paper, a number of theories were considered and they are as follows Eskom's corporate plan: 2011-2016, Department of Energy's Integrated Resource Plan (IRP) 2010,Power System Economics, Designing Markets for electricity, Power system Restructuring , Engineering and Economics, theories of Economic development, and theories of demand and supply.

Data Collection

On data collection, Eskom's national control system reports which measures the frequency (50Hz) by balancing generation of electricity and its demand, was used to collect data that indicates the need for

additional generation capacity from the IPPs due to demand exceeding supply. Ekom's annual reports were also considered for capacity generated per annum and sales thereof.

Data regarding the IPPs introduction was collected from Department of Energy and National Energy Regulator of South Africa.

4. METHODOLOGY

The data used is from the Integrated Resource Plan (IRP2010) issued by the Department of Energy (DoE), phase 1 and 2 of the bidding window for 'Potential developers of renewable energy projects under the REFIT programme in South Africa. (on-shore wind, solar, biomass, biogas, small hydropower and landfill gas) and potential developers of co-generation projects.

5. LITERATURE REVIEW

Theoretical Review

Several studies have been conducted to better understand the concept of electricity consumption. Bekhet and Othman (2011) point out that as by economics theory, electricity consumption has and inverse relationship with tariffs or prices. This further contributes to the point that an increase in tariffs or price might have a negative impact towards the consumption of electricity, whereas a decrease in prices will result to an increase in the consumption of electricity. The process of demand involves consumers utilizing commodities to their maximum capabilities. Demand is influenced by factors such as price changes, taste and level of scarcity or availability which is relative to supply. Taking supply and demand into account with respect to energy or electricity consumption, the study at hand looks into the theory of infrastructure Development.

Infrastructure Development Theory

Infrastructure development contributes positively towards the economic activities of a country. Lack of infrastructure and its development have a direct impact towards economic growth and development. Public Investment can help reduce or deal with issues that contribute negatively towards growth. Agenor(2006) argues that infrastructure services promote growth through various factors that contribute towards the rate productivity. Agenor (2006) further states that, reducing the use of woods and charcoal as a substitute to electricity will help improve hygiene and health, thus the importance of electricity infrastructure development.

The theory of Infrastructure development indicates that infrastructure plays a vital role towards the growth of the economy in the sense of its impact in advancing health services which take into account the livelihoods and health of workers, as healthy workers leads to an increase in economic activity. Infrastructure resources can be classified as public goods, the user of infrastructure resources in the end impacts the lives of the public at large. With infrastructure resources being classified as public goods, government intervention is essential with respect to the role played by the government towards its communities. The intervention by the state is with respect to infrastructure development, as it ensures that there is sufficient allocation of resources and making sure that public demands are met (Frischmann, 2006)

Infrastructure development ensures that economic activities are not interrupted. With development taking place there is sufficient productivity taking place without any difficulties. Taking load shedding into account, infrastructure development for electricity generation will result to sufficient supply of electricity, which will bridge the gap of demand and supply.

Development of IPP in South Africa

During the period November 2007 to January 2008, South Africa's electricity supply came under intense pressure with Eskom having to institute power supply interruption, popularly known as 'Load shedding' as a result of inadequate electricity generation capacity to meet the country's demand.

NERSA's Enquiry on Capacity Shortage

On 30 January 2008, the National Energy Regulator of South Africa (NERSA), prompted by the national electricity supply shortage and the subsequent load shedding, decided to commission an inquiry in terms of the Electricity Regulation Act of 2006. The purpose of the inquiry was to inform the Energy Regulator of the reasons for the electricity supply shortage resulting in the national load shedding and recommend measures to be adopted in mitigation against the electricity supply shortage and to reduce the adverse impact thereof.

1. **The following are the main findings and conclusions of the report:**
    - High unplanned maintenance and load losses combined with the usual high planned maintenance of generating units during the period resulted in reduced generating capacity being available from 1 November 2007 to 31 January 2008. Poor coal quality, wet coal and low stockpile levels contributed to the unplanned generation plant outages and load losses in the period.
    - In previous load forecasts, Eskom had anticipated the current growth rate. However, the implementation of measures to provide for the growth has been inadequate and slow. In particular, there have been delays in returning the mothballed generation plant to service and the implementation of energy efficiency and demand management initiatives remain behind target. Eskom's new build programme is experiencing delays.
    - Inadequate primary energy procurement and power station production planning impacted on coal stockpile levels in the period. Coal stockpiles were allowed to decline to unacceptably low levels and there was a reluctance to obtain supplementary coal due to its high cost and its impact on Eskom's financial position.
    - Eskom was correct in declaring a force majeure on 24 January 2008. Prior to load shedding, Eskom did use other emergency options such as demand market participation (DMP) and interruptible loads extensively prior to load shedding.
2. **The Energy Regulator made the following key policy recommendations:**
    - The Government's national electricity emergency programme (GNEEP), including the power conservation programme (PCP), should be coordinated and led by a centralised high-level government unit with authority to take action.

- The procurement of new private generation capacity, independent power producers (IPPs) and co-generation should be managed and coordinated centrally by a professional entity independent from Eskom.
- There is a need for a national strategy by Government for the acquisition and management of coal to ensure security of supply.
- National Government should consider formulating a policy that will balance Eskom's commercial decisions and the national security of electricity supply in order to avoid national crises.
- The role of Eskom in the Government's national electricity emergency programme should be clarified, considering that Eskom has to focus, among others, on returning the system to normality and on its new generation build programme.

1. Introduction of Independent Power Producers

Excess capacity is long-past, and South Africa's current electricity generation environment has an extremely tight supply-demand balance. The return-to-service projects form just one element of a massive investment programme being undertaken by Eskom to meet rising demand. As far back as the 1998 Energy White Paper, government demonstrated an awareness of the need to bring additional electricity generation capacity on stream. However, the required investment in new capacity was slow in getting off the ground.

The vision for the generation sector is one in which Eskom will remain dominant, although its pre-eminence will be somewhat moderated through a long-term objective of having 30% of the country's power produced by independent operators. It is expected that South Africa will need to add over 50 000 MW of new generation capacity to the supply system by 2025, based on an economic growth trajectory of 4,5% a year. In an attempt to streamline and clarify the planning for this new capacity, government has produced an integrated resource plan (IRP).

Following the release of the draft IRP2010, a public participation process (through invitation to submit written comments and public hearings processes) was followed allowing all stakeholders to submit their concerns or support for the proposal. Following this public participation process, IRP 2010 was approved and from the plan is it clear that it is tied to a medium-term risk mitigation (MTRM) strategy aimed at dealing with the tight reserve margin period that will prevail until 2016. It takes cognisance of a major infrastructure investment programme currently being undertaken by Eskom as well as the potential for future developments. This is in line with Department of Energy's objectives and in support of ensuring security of supply"

2. IPP Participation in the South African ESI

In 2009, Ms. Dipuo Peters, Minister of Energy, under section 35(4) of the Electricity Regulation Act, 2006 (Act No 4 of 2006), introduced the Electricity Regulations on New Generation Capacity (Government No. R.721 Notice No. 32378). The objectives of the regulations are as follows:

- the regulation of entry by a buyer and an IPP into a power purchase agreement;
- the facilitation of fair treatment and the non-discrimination between IPP generators and the buyer;

- the facilitation of the full recovery by the buyer of all costs incurred by it under or in connection with the power purchase agreement and an appropriate return based on the risks assumed by the buyer thereunder and, for this purpose, to ensure the transparency and cost reflectivity in the determination of electricity tariffs;
- the establishment of rules and guidelines that are applicable in the undertaking of an IPP bid programme and the procurement of an IPP for purposes of new generation capacity;
- the provision of a framework for the reimbursement by the regulator, of costs incurred by the buyer and the system operator in the power purchase agreement; and
- the regulation of the framework of approving the IPP bid programme, the procurement process, the REFIT programme, and the relevant agreements to be concluded.

Furthermore, Section 8 of these regulations pronounced that The Regulator shall prepare and pass rules for purposes of cost recovery by the system operator and the buyer. The regulations were followed by the NERSA's approval of the Regulatory Rules on Power Purchase Cost Recovery normally referred to as ***"Cost Recovery Mechanism"***. These rules started to create "appetite" amongst IPPs. Previously, the IPPs saw a lack of regulatory mechanisms that ensured recovery of costs as a barrier to entry and the approval of these rules somehow gave comfort and confidence to the IPPs.

During the NERSA's public participation process (public hearings held on the 22 January 2010 at Gallagher Estate, Midrand, Johannesburg) on Eskom's MYPD 2 applications, Mr Doug Kuni – Managing Director of South African Independent Power Producers Association (SAIPPA) made a presentation to the Energy Regulator and with regards to the IPPs and he raised the following points:

- "IPPs saw opportunities and have been queuing to get into SA market.
- Low tariffs (unrealistic) and regulatory environment have kept them out.
- Eskom control of the market has dampened appetite & frustrated IPPs.
- If structure does not change, IPPs will be cautious to engage SA" (SAIPPA) presentation on Eskom's Multi Year Price Determination (MYPD) 2 NERSA Public Hearings, Fri 22 Jan 2010)

The questions that comes up at this stage are (i) does the structure of the ESI allow for IPPs to take part in the sector; and (ii) Are the prices at the levels that can allow for entrants.

3. Barriers to IPPs Entrance

It is clear that with a shortage of capacity (electricity) in South Africa to meet the demand, an immediate feasible solution is the introduction of the IPPs to come with the shortfall. However, from Mr Doug Kuni's comments at the NERSA public hearings, there are still barriers preventing the entrants.

- Policy Barriers
- Economic Barriers
- Institutional Barriers

4. Bid Programme

South Africa has a high level of renewable energy potential, with the target of 10 000 Gigawatt hours (GWh) of renewable energy in 2013. To contribute towards achieving this target and towards the socio-economic and environmentally friendly sustainable growth, a need to stimulate the renewable energy in South African was identified and in 2009, NERSA announced the South African Renewable Energy Feed-in-Tariffs (REFIT) programme phase 1 and 2. It further published Regulatory Guidelines, a draft Power Purchase Agreement (PPA) and Rules on selection criteria for renewable energy projects under REFIT programme.

The Minister of Energy, in consultation with NERSA, identified the need for new generation capacity. The determination provided for the procurement of 3 725 Megawatt hours (MW) from independent producers.

The procurement documents were released for phase 1 and phase 2 of the bidding window. The total of selected projects from the two windows amounted to 2 459.52MW

5. IPP Participation

IPPs will assist Eskom to meet the country's increasing demand for electricity. However, these are private businesses, unlike Eskom and they are not regulated, but to sell power they will have to enter into Power Purchase Agreements with Eskom. The structure of the industry only allows these IPPs to sell to Eskom or for own use.

The IPPs, as private sector, sets high rate of returns (higher than Eskom's approved rate of return) on their assets and as a result that will push electricity prices up.

In its application for the third round of the Multi-Year Price Determination (MYPD 3), Eskom applied for an average of 16% (13% for Eskom's need and 3% for introduction of IPPs). This would see the average of electricity prices increase from 61c/kWh in 2012/13 to 84c/kWh in real terms by 2017/18 for Eskom's needs only. With the introduction of the IPPs, this will increase to 96c/kWh.

The introduction of the IPPs, though it increases the price of electricity significantly, provides the necessary infrastructure to grow the economy by creating jobs (during construction and operations), skills and stimulating the development of the local supplier content. 7 059 jobs will be created as a result of the introduction of the IPPs in the industry and this addresses one of the three economic problems which is "unemployment". The investments into the economy from the four provinces will in turn improve the lives of the communities in the respective provinces; demand for electricity will be met, creating a bigger appetite from both local and foreign direct investment into the South African economy.

An exercise which this project didn't cover is the assessment of the impact on the economy as the result of the introduction of the IPPs at the rates at which they are coming versus the impact of not having the IPPs and Eskom not being able to meet the demand for electricity.

6. Is the Structure of the Industry Appropriate?

The IPPs are required to enter into PPAs with Eskom that will see them generating power which they sell to Eskom. Though the procurement programme and the requirements are set out by DoE in consultation

with NERSA, there's nothing that forces Eskom to enter into a PPA with these IPPs and this is open to manipulation or Eskom deciding which IPPs to consider or not.

The value chain of the industry as depicted in figure 1 states that Eskom is the monopoly in the industry from Generation to Distribution at the households. Looking at this value chain, one can conclude that the structure doesn't allow for IPP participation, but there are ways in which a playing field can be levelled by opening up the structure so there can be competition that might reduce the impact on the prices to consumers.

7. ESI Structural Change Approach

The Energy Paper of 1998 proposed that the transmission sector would become a separate state-owned entity. In 2001 the South African cabinet instructed government to implement this policy. The objectives of the policy are to increase access to affordable energy services, improve governance, stimulate economic development, manage energy-related environmental impacts and secure energy supplies through diversity.

On the 16th March 2011, the Independent System Market Operator (ISMO) bill was approved by Cabinet for publication for comments by all interested stakeholders. Comments were received and considered and this led to the revised bill being published in August 2011. The purpose of this bill is to provide for the establishment of an Independent System and Market Operator as a state-owned entity which will provide an independent system operation to ensure safe, secure and efficient operation of the integrated power system, trading of electricity at wholesale level.

What the bill attempts to achieve is to disaggregate the current electricity supply industry, pulling out transmission of the electricity from the Eskom, to be operated by ISMO. The idea is to create competition at generation and sell to transmission and then distribution will buy from transmission for sales to final consumers. Countries like United State of America (USA), Norway and United Kingdom (UK), China, Turkey, Thailand and Brazil have the similar model.

The unbundling of the structure at generation level will create competition among the different generators and it will allow for bilateral agreements between the generators. At Transmission and System Operation, the transmission is independent from generation and distribution and this will open access to the transmission lines. It will allow for separation between the network cost and the energy cost and the owner of the transmission line will be one. At distribution, the network will be privately owned by distributors but these distributors will not be allowed to sell electricity. The sales of electricity will be done by the retailers purchasing electricity from the market and selling it to end users but they do not own the distribution network.

South Africa can no longer afford this situation. The demand for power now exceeds the ability of Eskom to supply reliably. The growth of the country's economy needs additional investment in power generation. It is already government policy that IPPs should be allowed to enter the market and contribute to supply security through greater diversification in power generation sources.

In order to create a level playing field for Eskom and IPPs, the electricity buying or market function needs to be separated from Eskom. There are a number of associated functions which are closely linked to that of buying or market operation: they include planning (short, medium and long term) for power

generation capacity, the procurement of new generation capacity, the contracting and purchase of electricity from generations, system operation including dispatch of electricity and ancillary services (such as back-up and voltage support), and finally the sale of electricity to customers. These are the main motivations for establishing the ISMO. However, the Bill focuses mainly on system operation and on market operation (buying and selling of electricity).

However, there are challenges that will be faced due to the industry restructuring and they are as follows:

- *Financial Sustainability:* Once ISMO is required to enter into long-term PPAs with Eskom generators and IPPs as an independent entity, if it has a limited balance sheet and is not properly capitalised, there will be a requirement for long-term state guarantees to ensure the credibility and viability of the procurement process from the independent generators. Similarly, Eskom's long term credit rating would depend on solid support for its generator sales to ISMO. The state would need to provide liquidity support to the ISMO in the eventuality of a payment default by a customer.

  Furthermore, loss of key customers and large municipalities will cause a significant revenue loss and change in money flows for Eskom's balance sheet, which must be assessed as part of the comprehensive due-diligence prior to the transfer of such customers, as it will affect Eskom's credit ratings. For any re-organisation of Eskom, a detailed implementation plan will have to be presented to Eskom's current creditors for consent before implementation. This may be managed by necessary transfer provisions encapsulated in the legislation, as was done in the Eskom Conversion Act, 13 of 2001;

- *Asset Values*: Transmission has assets that forms part of Eskom's balance sheet. The issue of asset values is very critical in the perspective of lenders and credit agencies and it will require serious scrutiny before the decision is taken;

- *Transfer of employees:* The effect of formation of the ISMO will result in the automatic application of section 197 of the Labour Relations Act of 1995. This transition will need to be managed carefully and after intense consultation with organised labour movements as well affected employees. This process might be very costly and might take too long to conclude;

- *Governance:* In the establishment of ISMO, the issues of governance, more specific to the Public Finance Management Act (1999) and Companies Act (2008), should be adhered to and closely monitored in terms of compliance;

6. Conclusion

Acknowledging the challenges faced by the country, there's a question of meeting the electricity demand and establishment of ISMO is a critical step towards ensuring a stable and effective electricity supply system for the country. The load shedding incidents of recent years clearly demonstrated how critical the performance of the electricity sector is for the health of the country's economy. This performance depends on how the well the sector is governed and in particular on the long-term processes which will facilitate the investment in the new generation capacity.

9. Recommendations

It is therefore recommended that with the introduction of the IPPs in the electricity industry, the structure of the supply industry be unbundled and the ISMO be established as a state-owned company to address the country's power sector challenges. The transmission function, its assets as well as employees should be allocated to ISMO to:

- *Ensure access to the grid*: A generation project is only viable if it has access to the grid. The national grid is a natural monopoly. IPPs have no option but to deal with the entity that owns and operates this infrastructure. Eskom's inherent conflict of interest will always compromise its ability to respond to IPP interests; therefore ISMO should take the responsibility of planning, ownership and operation of the transmission system. This will ensure that the one body has integrated responsibility for planning and for delivering the transmission infrastructure necessary to execute the national generation capacity expansion plan;
- *Strengthen the ISMO balance sheet:* ISMO will enter into PPAs with Eskom and IPPs. The credit worthiness of the ISMO will therefore be a critical factor to lenders who stand behind both Eskom and IPPs. Government guarantees can be provided, but in the long run ISMO will be able to stand on its own. Adding of transmission to ISMO's functions would substantially increase its asset base, thereby improving its credit ratings and reducing its drag on government's balance sheet;
- *Balance approach to supply and demand side solutions:* ISMO as an independent player with no commercial interest in either supply or demand-side solutions, is less likely to demonstrate its bias and more likely to facilitate innovation on the demand side. Transmission system operators and independent system operators, the world over are increasingly realizing the value of demand-side initiatives to achieve security of supply rather than focusing on investment in inflexible and expensive supply side solutions.
- Transparent criteria needs to be developed for allocation of new construction opportunities between the IPPs and Eskom;
- Large customers need to be able to build or contract their own generation capacity, including wheeling across the grid, irrespective of whether it's in the plan or not. They need to notify the ISMO and NERSA of their intentions so that the overall impacts on the grid and system operation can be factored in.

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