

OUR ENERGY SHORTAGE.....
**Regulatory imperatives to stimulate competition and
market entry**

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Abstract

The paper is based on the hypothesis that more competition and market flexibility is necessary in the SA market to meet the country's energy needs till at least 2013.

The paper commences with a brief introduction to the current shortage as a deviation from the requirements and structure set in the Energy White Paper of 1998. It touches on the different options available to move towards market flexibility, like reference to the single buyer purchaser model, multi purchaser model with relation to their regulatory requirements.

Some practises, statistics and organisational arrangements in Sub Sahara Africa with regard to regulation is referred to and based on specific Tanzanian experience make reference to important elements in the energy value chain of generation mix, market entry, cost and risk.

The paper also gives some modelling examples to indicate how IPP's can share in supporting the available generation and what kind of recovery plans need to be in place to ensure long term sustainability.

The paper concludes with a list of imperatives drawn from experience elsewhere in Africa and compares the regulatory changes required to ensure market initiatives to stimulate the ESI in SA.

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1 Introduction

1.1 Background

South Africa has experienced strong economic growth over the past several years. This growth, measured in gross domestic product (GDP) terms, has averaged 4-5% per year. However, continued economic growth is dependent on reliable electrical infrastructure amongst other important requirements. South Africa has recently seen its electricity infrastructure stretched beyond its means in some areas. This threatens to derail the economic growth and South Africa needs to act quickly to avoid enduring negative impacts. The country is instituting a number of supply, demand and infrastructure initiatives to help sustain the integrity of its electricity infrastructure and the possible incorporation of a new market structure. Essential to these initiatives is to structure the regulatory environments in such a way to stimulate access and market entry for new participants.

1.2 Current structures

Eskom is vertically structured and responsible for generation, transmission and supplies to about 40 % by number and 60% of the energy, to end customers. The rest of the end customers in SA are supplied by some 187 licensed municipalities. Although in general it can be said that generation is an oligopoly, due to Eskom's strong dominance it is more a monopoly in both generation and transmission. These relationships are shown in figure 1 hereunder.

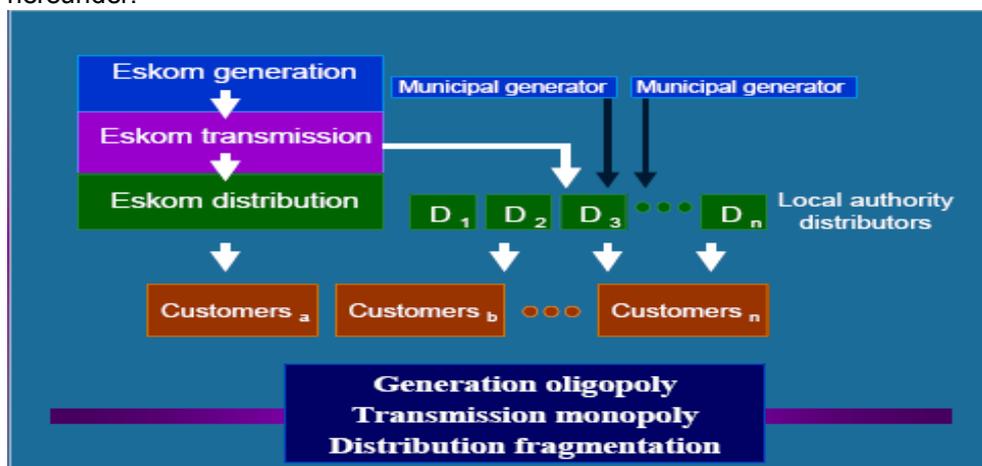


Figure 1: Current ESI in South Africa

1.3 Power shortage

Eskom envisage a shortage in capacity due to the fact that the generation reserve margin has been depleted. The graph hereunder illustrates this situation.

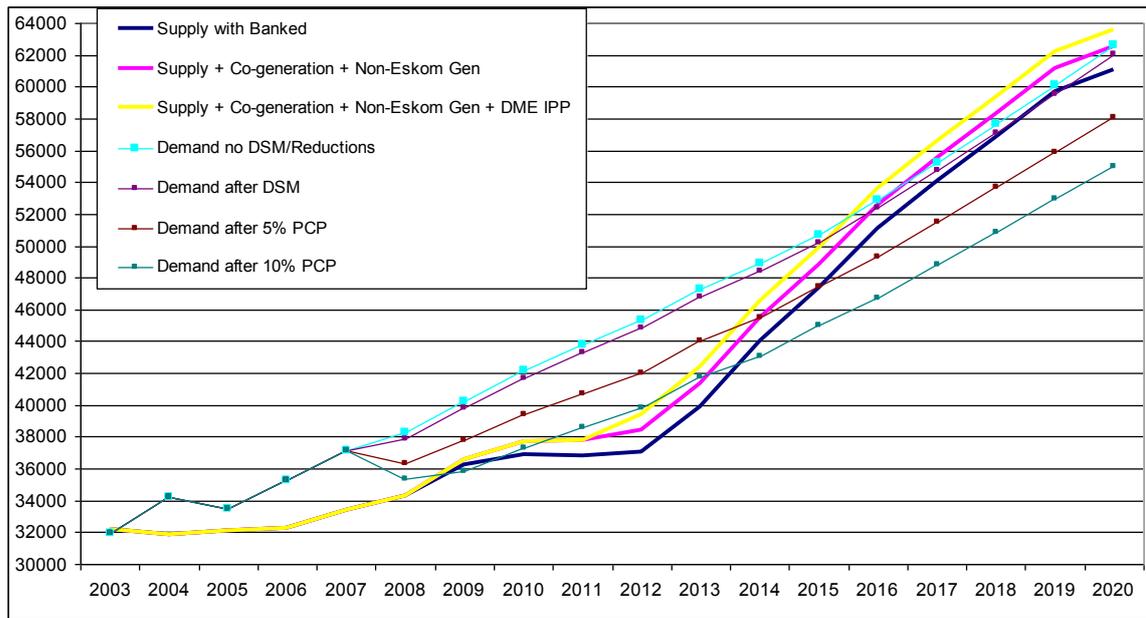


Figure 2: Supply/Demand Capacity Balance (MW)¹

The question then arises what kind of structure and regulatory initiatives will provide the necessary incentives to ensure adequate supplies for the economic growth targets envisaged by government?

¹ Graph courtesy of Eskom : Presentation Medium-term Outlook Metro and Eskom TTT; Michael Barry; 23 May 2008

2 Government's Energy sector policy's and approach on IPP's- governance issues

2.1 Background on Independent power producers

The Energy White Paper (EWP) of 1998 clearly stipulates Government's intention regarding the introduction of Independent Power Producers (IPP's) in the South African electricity market. The original idea was that Government will encourage competition within energy markets and will adjust electricity market structures to achieve effective forms of competition. Supplies would be secured through diversity by:

- Introducing competition into the industry, especially the generation sector;
- Permitting open, non-discriminatory access to the transmission system;
- Government will initiate a comprehensive study on future market structures for the South African electricity supply industry;
- The introduction of Independent Power Producers (IPP) will be allowed in the South African electricity market and
- Mechanisms will be put in place to ensure that equity and environmental goals are achieved, and possibly even accelerated, throughout the market restructuring process and thereafter.

Further to the above, Cabinet in 2003 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 IPP's (30 %). The Department of Minerals and Energy (DME) was mandated with the responsibility of ensuring private-sector participation in power generation through a competitive bidding process and that diversified primary energy sources are developed within the electricity sector without hindrance.

A power generation investment plan was drawn up to take into account this 30 % private-sector participation in power generation. The planning and development of transmission systems will be undertaken by the transmission company, subject to the government's policy guidelines.

During 2003, Eskom implemented a revised business model to prepare for capacity requirements and the impending restructuring by splitting its business into regulated and non-regulated divisions. Eskom's core business, its strategic support businesses, and target markets were reviewed and agreed on.

The approach was that the generation division of Eskom would continue to be part of Eskom. In 2003, the power stations in the division were paired together to form clusters to prepare the generation sector for flexibility to accommodate different options in a changing electricity supply industry (ESI).

The transmission division would then take responsibility for the electricity grid. Worldwide transmission is a natural monopoly. In South Africa, an efficient grid operator needs to be established that will grant all players access to the grid. For example, customers could buy from sources other than Eskom, such as the Southern African Development Community (SADC) electricity pool or IPP's, but still use the same transmission infrastructure to have power delivered to them (The principle of wheeling through the Eskom power network).

2.2 What has changed in terms of the governments approach?

Government decided to re-think its policy position regarding competitive electricity markets following events around the world affecting the electricity industry, the California Crisis(2001), the lack out in North America and Western Europe(2004), Enron (2002) etc. All of these events suggested that the state has to put security of supply above all and above competition.

In line with the government strategy to reduce the cost of doing business in South Africa, Government focused on improving the governance of the electricity sector.

This was done through the development of the electricity regulation regime and by modernising the existing Electricity Act. The vision is that the new legislation will create an enabling environment for new Independent Power Producers (IPP's) and improve governance of the electricity suppliers. The responsible department is the DME to take the initiative to drive the above processes.

The structure that was envisaged is depicted by the following diagram.

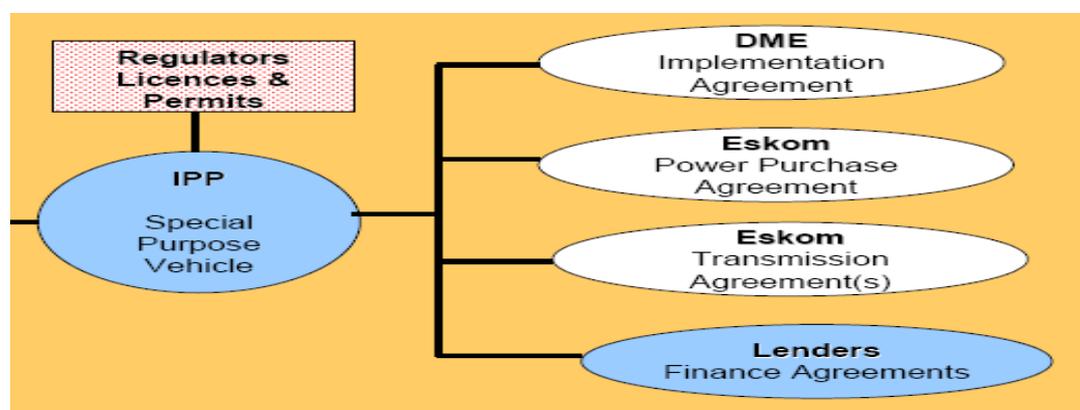


Figure 3: Current Governance Stance

2.3 Single Buyer Model for SA – current approach

The current stance of government as far as IPP's are concerned, can be summarised in the following points:

- Cabinet decided that Eskom will be the single buyer of all the power produced by IPP's. Eskom will buy the capacity from the IPP and the latter will be the seller. After the distribution restructuring and the formation of the 6 RED's the situation for trading in South Africa will be as depicted in figure 3.
- The terms and conditions of the PPA will be typical 15 years with an option for extension. Eskom has put out several tenders for co-generation, MTPPP, baseload and renewable energy is expected to follow in 2009 It is anticipated that Eskom will call on the IPP for plant availability and the IPP would have to make plant available to contribute into the ESKOM energy pool.

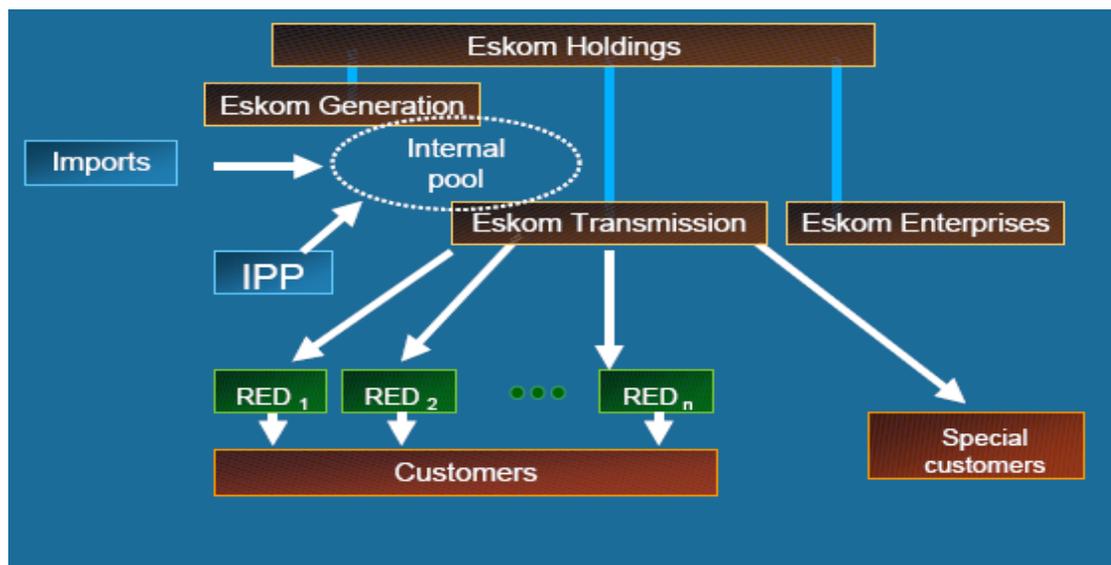


Figure 4: Limited energy trading in South Africa

- The parties to the transmission agreement will be ESKOM and the IPP and such a transmission agreement will comprise of the following:
 - *Connection agreement* dealing with Eskom's obligations to design and construct the interconnection of the IPP and the payment of the connection charges by the IPP;
 - *Operating agreement* dealing with the requirements of operation as set out in the Grid Code and
 - *System agreements* dealing with payments that will be impose on the IPP for the availability of the transmission system and the use thereof and rights of access.
- However, there is a general consensus that the single buyer model is only applicable to large scale IPP's. (How large was not stated as the mechanisms referred is not completed as yet) An example was quoted during presentations by the DME, that nothing would stop for instance a municipality to buy electricity directly from the Darling Wind Farm. This opens the possibility for selling to local communities, industries via the distribution system.
- The DME position is that the procuring entity for this energy must be separated from the other operations of Eskom. Currently the mechanisms has not been developed this far.

2.4 NER 2002 guidelines

NER produced in 2002 some guidelines to support the establishment of IPP's along the initial thinking. Amongst others the emphasis at the time was to bring benefits as per figure 4 hereunder. The main emphasis would have been to:

- Encourage the participation of the IPP in the power market
- Ensure that an open and non-discriminative access to the transmission and distribution networks is available to all industry participants;
- Provide fair and transparent pricing structures for access and use of the transmission and distribution network;
- Ensure market certainty and transparency required by private investors;

- Promote fair and transparent electricity prices for the customers;
- Promote high level of reliability and quality of the supply;
- Support renewable and environmentally friendly technologies and diversified resources
- Provide regulatory process that ensures commercial viability and economies of scale for the industry participants

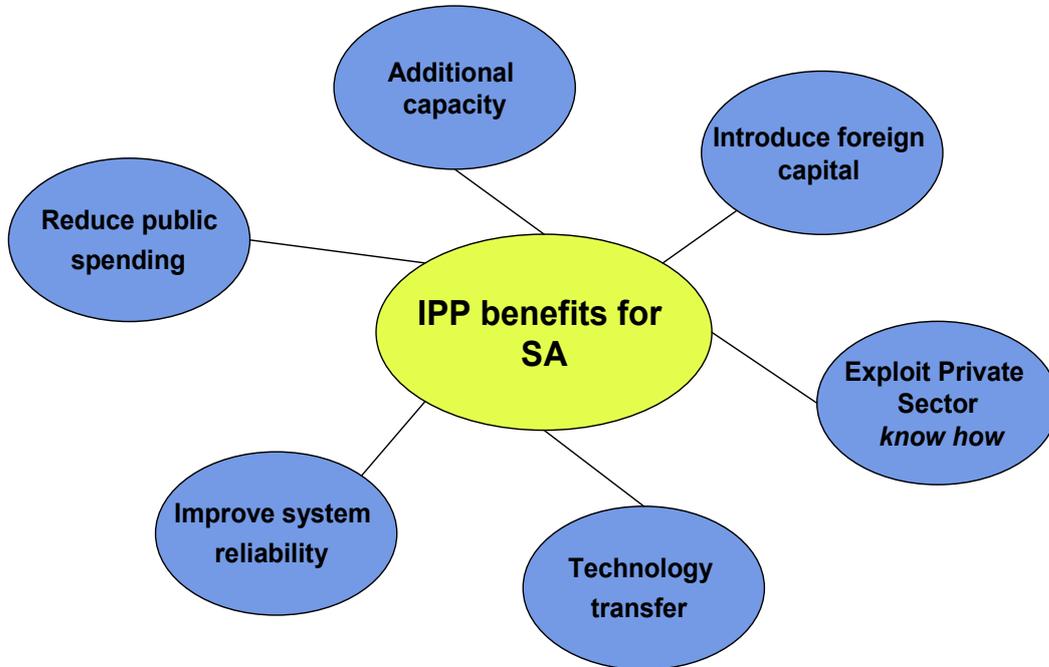


Figure 5: IPP benefits for South Africa

New guidelines have not yet been developed and published.

3 Lessons from Sub Sahara Africa (SSA)

3.1 Regulatory arrangements

As of 2006, more than 80 percent of SSA countries had enacted a power sector reform law, 75 percent had experienced private participation in power, about 66 percent had corporatized their state-owned utilities, more than half had established a regulator, and more than one-third had independent power producers. But few countries have adopted the full range of reform measures. Moreover, reform programs typically followed an orthodoxy that aimed at creating competition among private electricity suppliers, but few energy markets in SSA are large enough to support the multiple suppliers needed for a competitive environment. Power pools are the only option to introduce some competition

To redress its chronic power shortages and make reasonable progress on electrification, SSA needs to invest about 3 percent of GDP in the power sector, mainly to generation assets, and allocate a similar amount for operations and maintenance. Both would be a sharp increase from current levels. Public investment in the power sector in SSA currently averages no more than 0.7 percent of GDP, while 2 percent of GDP is allocated to operations and maintenance.²

The table³ hereunder provides a qualitative understanding of the status quo in some countries in SSA.

Country / Owner	Criteria						
	Economic outlook	Electricity Regulation	Political drive to expand energy sector	Energy growth potential	Potential for viable projects	Support for open market access	Govt Integrated Development Plans
	3	3	1	2	3	2	1
Rating per criteria per country (5-very good, 4-good, 3-average, 2-poor, 1-very poor)							
1	Angola	4	1	3	5	3	1
2	Burundi	1	1	1	3	1	2
3	Cote d'Ivoire	2	1	3	3	3	1
4	Ethiopia	2	3	5	4	4	2
5	Kenya	4	3	4	4	5	5
6	Lesotho	3	3	4	2	4	4
7	Malawi	3	3	3	4	2	3
8	Mozambique	4	3	4	4	4	4
9	Rwanda	2	2	3	4	3	3
10	Senegal	3	4	5	3	4	5
11	Swaziland	2	1	3	3	3	1
12	Tanzania	3	2	2	3	3	2
13	Uganda	3	4	5	4	5	5
14	Zambia	3	3	4	4	5	4

² IMF Survey: Africa Power supply Crisis; 2008

³ Study Conducted by NETGroup Solutions for the FMO; 2007

Table 1: Qualitative comparison between some SSA countries

It support the survey by the IMF that the total market in many of the countries are too small for proper competition and even if the prospects for new market entries(IPP's) are good merely by introducing such a market alone does not solve the power woes of the particular country.

In the own experience of the author in Tanzania during 2005/6 various imperatives can be identified as issues to be attended to in ensuring IPP's contributing successfully to the total need of the energy sector.

These issues will be highlighted in the following sections.

3.2 Tanzania and Eastern Africa

2005 was earmarked by one of the most crippling droughts in Eastern Africa. The cluster of countries namely Uganda, Tanzania and Kenya depending heavily on hydro as a generating source were all severely affected and had to revert to load shedding and expensive other thermal generation like diesel and rental plants. To further aggregate the situation global warming caused in general a higher than normal demand on available manufacturing resources causing sharp cost rises in energy outputs. The cost of IPP generation versus own generation funded differently became a real bone of contention as new entrees in the market became essential to prop up the demand requirements. It soon became clear that the cost of unserved energy and the detrimental effect on the economy had to be balanced against old generation investments often grant funded or supported by lower cost of capital arrangements.

It was soon clear that complex sustainability analysis was required to match growing (and suppressed) demand with the changing generation mix- many now from both permanent and temporary IPP's. In normal utility practise revenue became severely affected during load shedding whilst operational expenses often increases sharply with detrimental affect to the GDP. In order to combat these complex phenomena utility scenario modelling was performed to ensure utility sustainability by focussing on the right issues. The model consisted of various modules modelling utility requirements as reflected in figure 6.

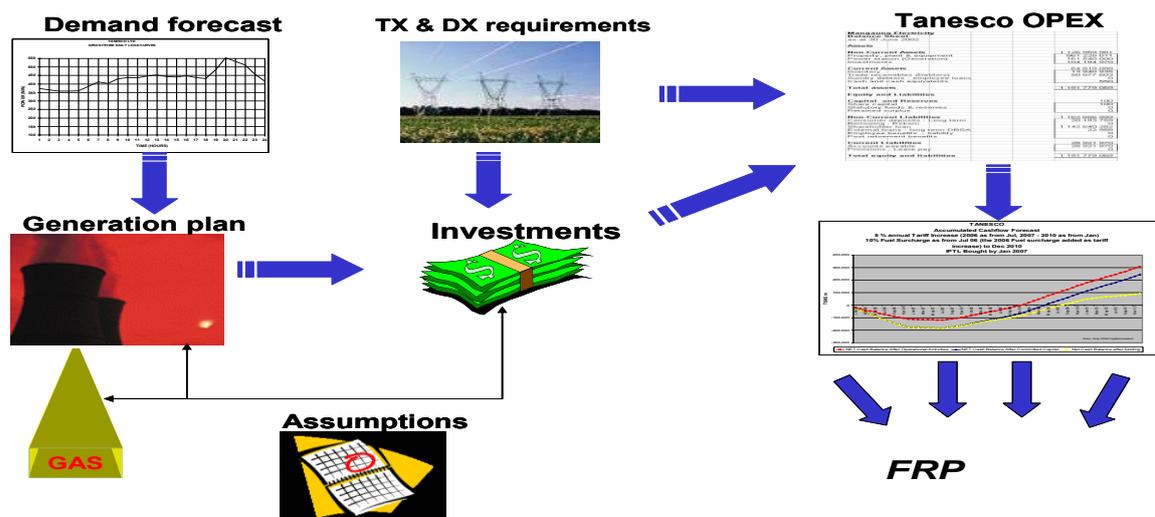


Figure 6: Structure of business economic modelling for financial recovery

3.3 Investment options

The Tanzania example was based on borrowing working (and some investment) capital to pay short term operating debt and expand the utility business. A delicate balance between equity and debt were constructed based on a Capex master plan for generation, transmission and distribution. This eventually was modeled in several tariff scenarios for the regulator.

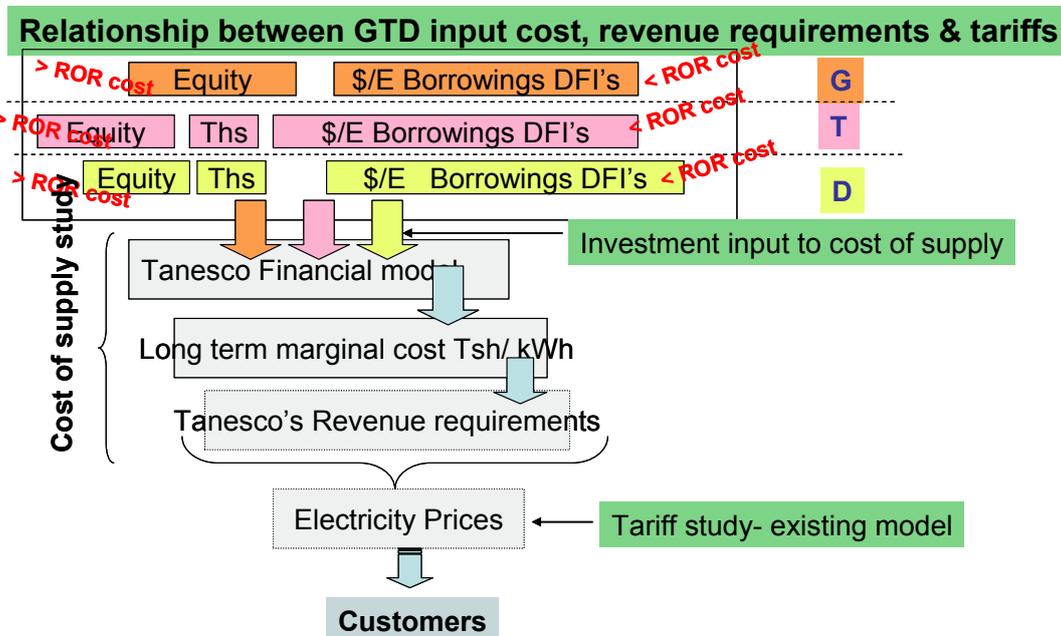


Figure 7: Investment structure

However to understand the funding requirements against the utility's needs to ensure sustainability various scenarios for the generation options were built and long term marginal cost of generation was calculated after the improvements of the financial recovery and sustainability master plan has kicked in. The generation mix is shown in the table and graph, with the resulting LRMC shown in figure xxx These are illustrated in figure 8.

The following table gives a summary of the generation mix since 2002.

Generation Contribution	2002	2003	2004	2005	2006	2007	2008	2009	2010
Hydro	93.39%	80.08%	59.05%	48.73%	30.11%	31.43%	24.13%	21.15%	19.52%
Thermal Fuel	6.61%	19.92%	30.30%	19.73%	23.49%	10.96%	3.01%	2.52%	2.46%
Thermal Gas	0.00%	0.00%	10.65%	31.54%	46.40%	57.62%	53.45%	53.67%	57.11%
Thermal Coal	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	19.40%	22.67%	20.91%

The following graphs shows the same results.

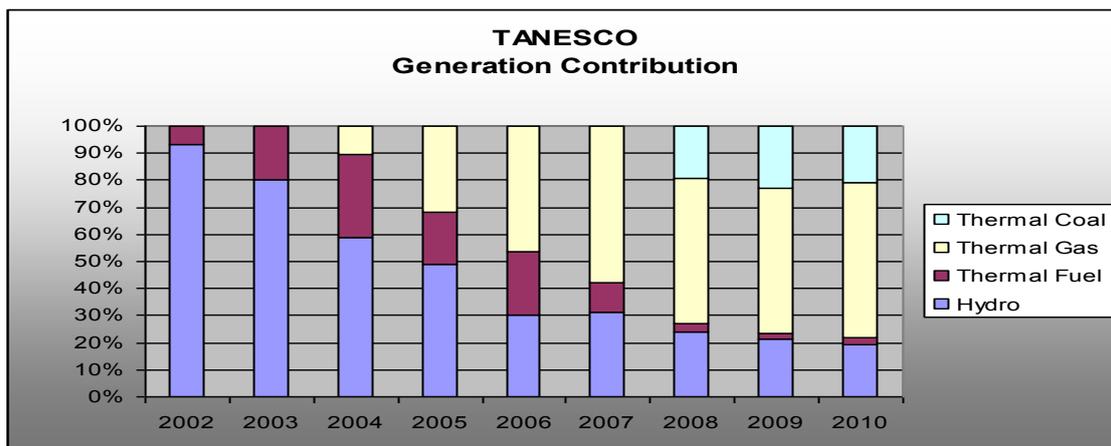


Figure 8: Tanesco generation mix 2006

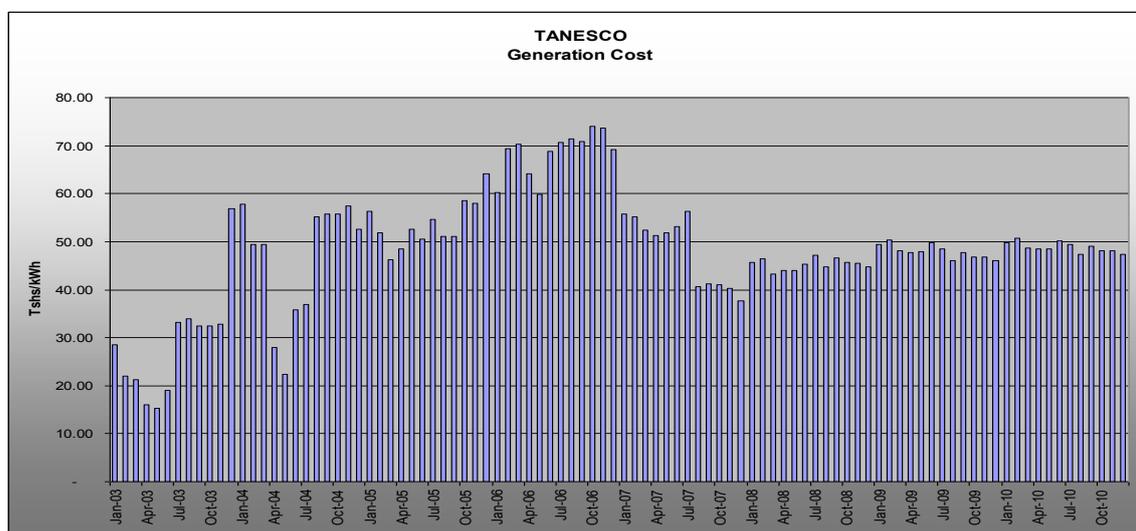


Figure 9: Tanesco Long run marginal cost predictions

3.4 Summary

Many African countries endeavours to structure their regulation and markets in a way to encourage IPP participation. Having a market and regulation alone does not guarantee adequate power supplies. From the Tanesco experience several lessons came to the fore:

- A **well planned generation mix** is essential to hedge against droughts, rising oil prices and coal supplies(and other thermal fuel sources),
- **Long term capacity planning** and supporting revenues,
- **Market transparency** of long run marginal cost for IPP's,
- **Non discriminatory market entry** rules for IPP's and
- **Ringfenced costs between national system requirement** and those of IPP's

4 Imperatives for SA's Power future

4.1 Current status

As described in this paper, the current model in SA is that of a single buyer and as such do not provide readily open access to independent participants in the market. If the model is to be fully utilised it implies that the principle of willing seller and willing buyer is applicable and if the generation is structured this way should provide no real impediment to sell the energy generated. However if the regulatory rules are not set clear to be enablers, one would not readily expect investments in the SA market. To make matters worse if the single buyer is not independent but a direct competitor in a market where cost transparencies are not shown the willingness of buyer and seller becomes a conundrum. (Some of these cost issues are depicted in table 1 and 2 and require careful consideration)

As far as embedded generation is concerned the principle was adopted in the EDI Restructuring Blueprint that embedded generation of municipalities will remain with the distribution companies up to a certain size. Several generators that are generally known as co-generation (like Sasol) are also in operation in the energy market, primarily as dedicated generation sources. The advantage of embedded generation in the SA context is that no grid access and wheeling arrangements are required and the IPP can make direct arrangements with the off-taker. The purchaser should not be Eskom, but an independent mine, industry or community. Such possibilities become attractive when PPA(s) are entered into between the IPP and specific off takers- especially if the wheeling does take place via the distribution network and not via the transmission system. Feasibility only depends on the price levels in the PPA arrangements with the off taker.

4.2 IPP's in SA

It is evident that IPP's are needed in the South African power generation sector to augment Eskom's capacity in meeting the growing energy demand. Eskom is currently embarking on a R150 billion infrastructure roll-out programme. However given the fact that the current ESKOM cost is in the order of 13 c/ kWh and new participants will be in the order of 25 c/ kWh (2007 figures by DME), true commercial basis for entry will probably not be introduced in the market in the immediate future and according to the ESKOM roll out programme not before 2009/10. However the latest results from NERSA Eskom price application indicated a price of 25,5c/kWh for 2008/9 an increase of 27,2% on the already 14,2 % granted in 2007/8. With this drastic increase in tariff levels IPP's will become more competitive in future.

It will be possible for a generator (IPP) to apply for a license from NERSA and under the conditions of the license generate. A PPA needs to be entered into with an off-taker and if this power is injected into the national grid, ESKOM would be the buyer and an agreement with transmission will have to be found to wheel the power. If it is an embedded generation (per definition directly coupled to the distribution system) with a dedicated off taker, it appears that such requirements would not be necessary.

With the participation of IPP's in the power generation sector, Eskom will have an opportunity to pass some of its risks to the private sector (IPP's) and especially now with the generation shortage that will most probably increase over time to yield even a lesser reserve margin (only 13% in 2012 is expected) pressure will rise and the generation cost of ESKOM will rise dramatically producing exceptional opportunities to become competitive in the market. It also

have to be borne in mind that the current cost of unserved energy is much higher than the cost of served energy and a case could be made out of why entry in the market or utilising other means is essential.

The IPP's are the only vehicles at the disposal of Government to ensure meaningful BEE participation with regard to equity ownership in the power generation sector. It can be expected that government will favourably consider such approaches.

4.3 Regulatory Requirements

Due to the vertical monopolistic nature of the market with generation overwhelming the responsibility of Eskom, several cost issues require to a lesser or bigger extent some ring fencing to allow non discriminatory market entry for IPP's. It is argued that these issues would give an unfair advantage to Eskom and could hinder market participation.

Item	ESKOM	IPP
1	Eskom is allowed to pass through the cost of power purchases & power construction costs	Normally not in the ambient of new IPP's to have this luxury
2	Eskom is afforded a return on work under construction (WUC) to ensure smoother price increases. Have a supply base of 95% of SA customers	This is not possible for independent power producers who do not have a customer base in South Africa. <ul style="list-style-type: none"> ➤ This implies that the selling price of an IPP plant will be higher than the selling price of an Eskom plant. ➤ IPP plant carries a greater up front risk which would demand a greater return than an Eskom plant (see Darling Windfarm & City Power Kelvin agreements)
3	Eskom is allowed to recover a certain amount of research and development cost and the cost of feasibility studies through its tariffs	A new entrant does not have this source of funding. A small developer may not have the cash flow to develop a proposal up to financial closure
4	The networks where Eskom generators connect are invariably owned by Eskom Transmission or Eskom Distribution	Non Eskom Generator is required to enter into power wheeling agreements with network owners. Terms and conditions may be different
5	If connection is not to a local municipality network, Eskom owns network and determines cost of connection of entry	The generator has to negotiate a network connection agreement. The Eskom cost of entry is absorbed between the 95% customer base in SA.

Table 2: Regulatory issues to be addresses to ensure transparency

The above serves as an example of the requirements why the single purchaser needs to be independent from the market role players to ensure cost transparency and non discriminatory access. The possibility of unserved energy and the cost thereof is too important a factor for growth to not to do so.

Further cost issues where Eskom as the single purchaser may enjoy advantages against IPP's are reflected in table 2.

Item	COST REQUIREMENTS AND OTHER ADVANTAGES FOR FAIR ACCESS
1	DUOS cost is currently covered 100% from end loads and should not be payable by the IPP
2	Tx of system cost(fixed amount per annum) is recovered 50/50 between generation and end loads as per the WEPS- should not again be payable by IPP's.
3	The embedded generator's output reduces the power input to the local load area. Would reduce the Tx and some Dx local network losses when generating.
4	Embedded generation gives advantage to add same energy requirement instead of loading total system supplies
5	Transaction between the embedded generator and its customer is merely a financial transaction – local supplier will still charges for metering and billing cost and QOS and wires if not included in current DUOS.

Table 3: Cost requirements and other advantages for fair access

Unless ringfenced properly and operated as an independent authority the current arrangement of Eskom as the single purchaser of IPP energy appear to hamper IPP market entrance and thus the availability of adequate supplies in South Africa.

5 Way forward

5.1 New Market structure

Much has been said about a possible market structure for SA. In essence it means that the vertically integrated structure would first allow the entrance of a single buyer to source and purchase IPP capacity. Eskom is filling this role currently, but learning from lessons elsewhere this paper is advocating that the division within Eskom doing this should be separated from Eskom to be independent and transparent in operation especially with regard to ring fenced costs. The fragmented distribution system would evolve to six REDs, each including both Eskom distribution companies and municipalities. An independent system operator could take (over time) charge of administering the competitive wholesale market and setting real-time prices for power and ancillary services.

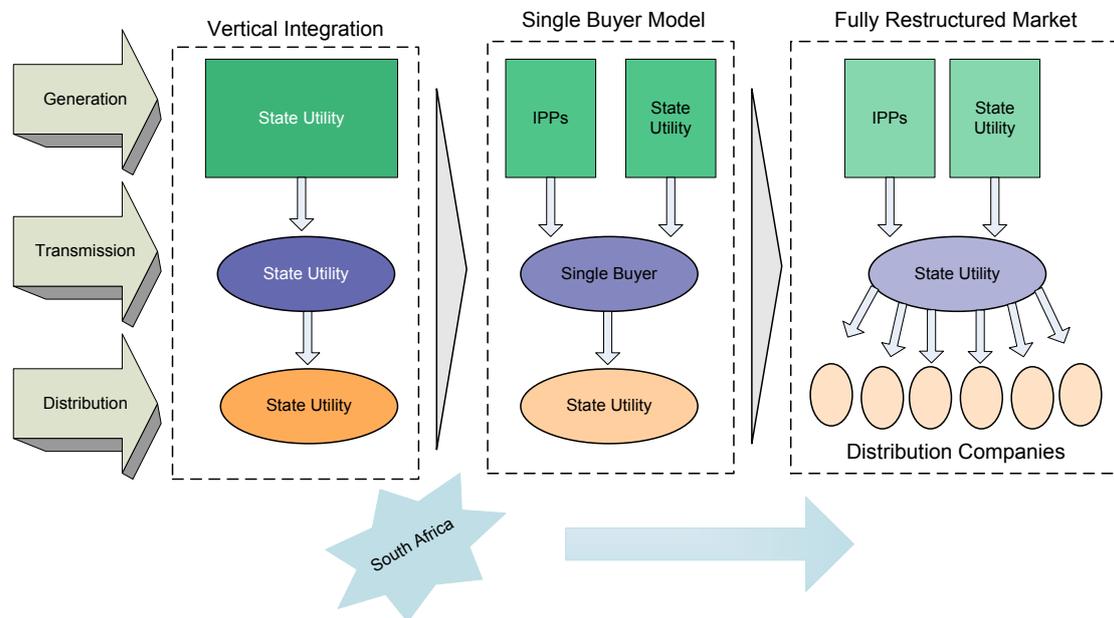


Figure 10: Possible evolution of the Electricity Market in SA

6 Conclusions

South Africa needs to quickly institute the steps of market restructuring above. By doing so, it will help restore the integrity and reliability of its electrical infrastructure and get itself back on track to record the strong economic growth it has enjoyed in the recent past. Any time a country embarks on electricity market restructuring, it must weigh the costs and benefits of the process. In the case of South Africa, the country has already experienced costs relating to continuing with the status quo; the costs of market restructuring pale in comparison. One needs to only look at the figures regarding lost output from the commodity sector during the electricity shortages of late 2007 and early 2008 to be convinced that the status quo is unsustainable. Given the status quo the sector needs to muster all support available – especially that of the private sector, this does not mean that the private sector must dominate and dictate

The benefits of market restructuring are numerous. A restructured market will provide increased incentives for generation development and will make it appear attractive and secure to invest capital in adequate generation capacity to drive economic growth. Multiple large power buyers who have alternative supply sources will enforce operational efficiencies on power generation. South Africa's specific goals of expanding opportunity and Black Economic Empowerment are supported by a policy that allows for the creation of a greater number of independent economic entities. Finally, a less centralized and controlled generation sector will attract additional expertise and innovation into the sector.

7 Bibliography

1. Presentation Medium-term Outlook Metro and Eskom TTT; Michael Barry; 23 May 2008
2. IMF Survey: Africa Power supply Crisis; 2008
3. Study Conducted by NETGroup Solutions for the FMO; 2007
4. NER. Independent Power Producers Regulatory Framework; Policy Ner 01 – 2002 IPP Rev I Draft 01
5. Meeting the required conditions for successful participation in the SADC: Nelishiwe Magubane: DME ; Sept 2005
6. Electricity capacity planning and Independent Power Producers; Koena Moholola; SAWEP WORKSHOP; 12 March 2007
7. NETGroup Solutions; TANESCO Financial Recovery report as report to the World Bank and IMF: November 2006
8. Electricity market liberalisation; Anton Eberhard, UCT; June 2002
9. NERSA ; Eskom tariff applications 2008; Report published on NERSA website
10. AEF Single buyer article overview: PA Consulting; May 2008