

Competition and Regulation in the Electricity Supply Industry in South Africa

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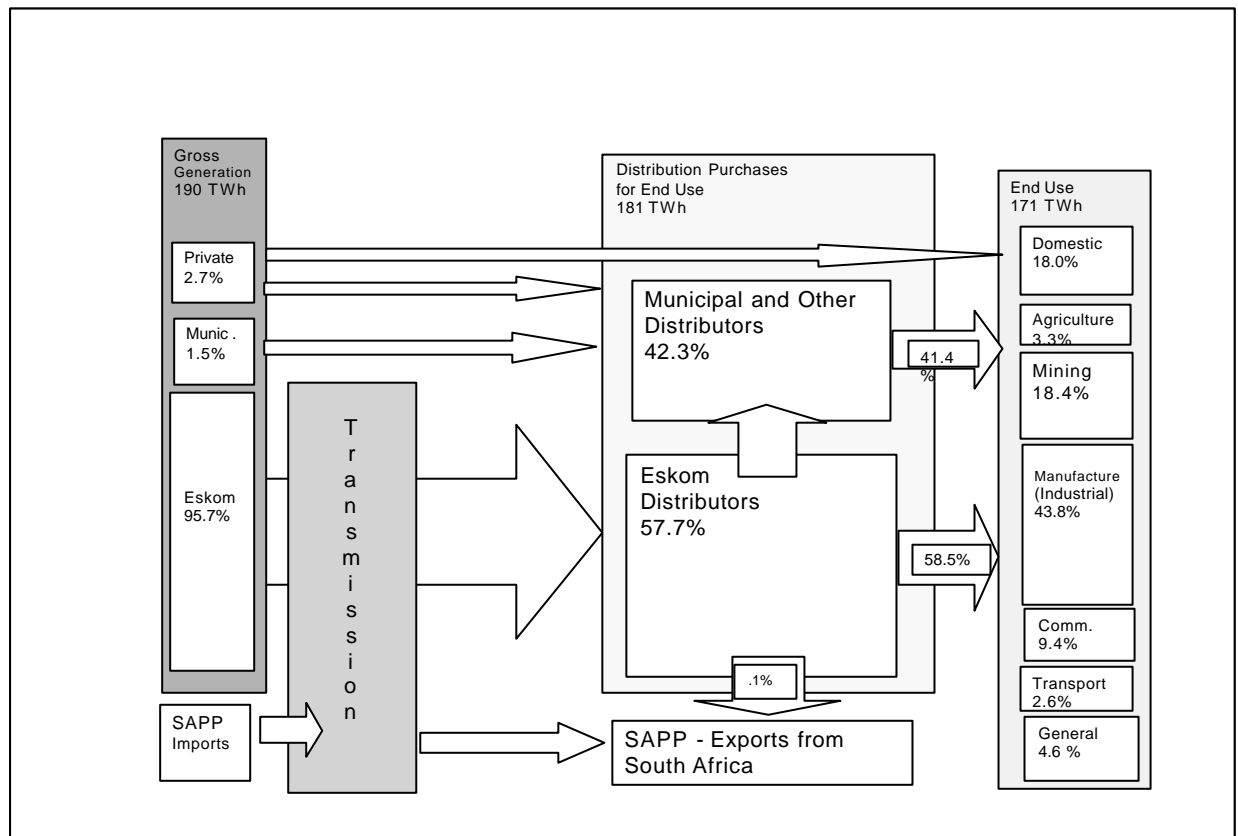
LIST OF ABBREVIATIONS

EDI	Electricity Distribution Industry
ESI	Electricity Supply Industry
GW	gigawatt (1 000 000 000 watts)
GWh	gigawatt hour
IPO	initial public offering
IPP	independent power producers
ISO	independent systems operator
kV	kilovolt
kWh	kilowatt hour
MW	megawatt (1 000 000 watts)
NER	National Electricity Regulator
PPA	power purchase agreement
RDP	Reconstruction and Development Programme
REDS	regional electricity distributors
TW	terawatt (1 000 gigawatts)
TWh	terawatt hour

1. THE SOUTH AFRICAN ELECTRICITY SUPPLY INDUSTRY

The South African electricity supply industry (ESI) is dominated by a state-owned and vertically integrated utility, Eskom, which ranks seventh in the world in terms of size and electricity sales. It supplies about 96% of South Africa's electricity requirements, which equals more than half of the electricity generated on the African continent. Eskom owns and controls the high voltage transmission grid¹ and it supplies about 60% of electricity directly to customers. About 240 recently amalgamated local authorities undertake the remainder of the electricity distribution. The municipal distributors buy bulk electricity from Eskom, with some also generating small amounts for sale in their areas of jurisdiction. A few industries have private generation facilities for their own use, accounting for 2.8% of total electricity produced.

Figure 1: The South African ESI



Source: NER, 1999

1.1 Generation

In South Africa, 92% of electricity is generated from coal; nuclear energy accounts for 7%; and hydro and emergency gas turbines make up the remaining 1%. Total licensed generating capacity in 1999 was 43.1GW² of which Eskom owned 39.9GW.

¹ The exception is the Motraco line to Mozambique which Eskom owns jointly with utilities in Swaziland and Mozambique.

² GW = gigawatts = 1 000 000 000 watts. MW = 1 000 000 watts.

Eskom has 24 power stations: 10 large coal-fired stations dominate, most of them situated on coalmines in the northeast of the country. Africa's only nuclear station is at Koeberg, 30 kilometres north of Cape Town. There is modest hydro capacity on the Orange River, located on two dams and at two pumped storage schemes, one in the Drakensberg and the other on the Palmiet River in the Western Cape. Municipalities own 22 small power stations and back-up gas turbines, but these total only 5% of national generation capacity and generally run at low-load factors. Private generators comprise the remaining 2% of capacity.

South Africa sells electricity to neighbouring countries (Botswana, Lesotho, Mozambique, Namibia, Swaziland and Zimbabwe), representing about 2% of total net energy produced. Contractually it is bound to take electricity from Mozambique's Cahora Bassa hydroelectric station on the Zambezi. Eskom also imports some power from the Democratic Republic of Congo and from Zambia, mainly for peak load management. In 2000 Eskom imported just slightly more electricity than it exported.

Eskom's Integrated Strategic Electricity Plan suggests that by 2025 total maximum demand could rise to between 40 and 70GW depending on electricity growth scenarios. A moderate growth scenario would imply a total system maximum demand of 52GW, almost double the current maximum, implying new investment of at least R60 billion and probably more, depending on technology choices. New capacity might be needed as soon as 2007, although other scenarios define 2011 as being critical. Important investment decisions will have to be made in the next few years because of long lead times on the design and construction of many generation options.

1.2 Transmission and distribution

In terms of transmission, the national integrated grid comprises 27 000 km of lines, the bulk of them at 400 and 275 kV, although 765 kV, 220 kV, and 132 kV lines also exist, as well as 533 kV DC. Peak demand on the grid in 2000 was 29 188MW. Energy losses are less than 5%.

On the demand side, in 1999, there were 6.5 million electricity customers. In terms of total electricity consumed, domestic consumers accounted for 18%; manufacturing for 44%; mining for 18%; and commercial, transport and agricultural users the remainder.

Eskom sells directly to about half of the final customers, while local governments supply the balance.

Table 1: Eskom distribution in 2000

Eskom customers	Number of customers	GWh sold	Net revenue R million	Avg net selling price SA¢/kWh
Redistributors	824	71 580	8 734	12.2
Residential	2 924 000	6 476	1 794	27.7
Commercial	29 992	817	185	22.64
Industrial	11 410	55 953	6 679	11.94
Mining	946	31 403	4 053	12.91
Rural	142 822	3 816	1 102	28.88
Traction	42	3 330	511	15.35
International	7	4 549	474	10.42
Own usage	307	268	37	13.81
Total	3 110 400	178 192	23 569	13.23

Source: Eskom Annual Report, 2000

Table 2: Electricity distribution industry 1999 indicators (Eskom plus Munics)

Distribution	Eskom	Municipal	Total
Customers	2.8 million ³	3.2 million	6.5 million
Energy sales (TWh ⁴)	103	71	174
Distribution lines (km)	255 691	76 236	331 927
Employees	14 250	15 700	29 950
Revenue (rands)	21 300 million*	15 043 million	27 685 million

* includes R 8 660 million in sales to Munics (redistributors)

Source: Eskom 1999, NER 1999

The cost of supply differs enormously between different customer categories, quantitatively and in the relative contribution of energy, wires and support costs. The cost of supply is lowest for large bulk users and comprises mostly energy costs. The cost of supply to small rural users, on the other hand, can be up to five times higher and the wires and support costs comprise a greater proportion of total costs.

Eskom makes most of its profits from the sale of electricity to its large mining and industrial customers and in bulk sales to municipalities. These three customer categories account for 83% of its revenue and 89% of its electricity sales. It currently incurs losses in its sales to rural and residential customers (including newly-electrified low-income households). The total annual cross-subsidy to these categories exceeds R1 billion and might even approach R2 billion. The large municipalities, in turn, derive handsome profits (at least R2.5 billion *per annum*) from reselling Eskom electricity, which enable them to subsidise property rates and to finance other municipal services.

³ Eskom data differs slightly from NER data.

⁴ Terawatt hour = 1 000 GWh.

1.3 ESI performance

It is beyond the scope of this paper to provide a detailed financial analysis of the historical performance of either Eskom or the municipal electricity distributors. The data below provide a snapshot of the current situation.

Table 3: Eskom (excluding Eskom Enterprises) operating performance in 2000

Average price of electricity sold	13.2 c/kWh
Average cost ⁵ of electricity supplied	11.44 c/kWh
Revenue	R 23 569 million
Income tax	R 1 454 million
Net profit (after tax)	R 1 759 million
Return on assets	10.6%
Inflation adjusted return on assets	2.5%
Debt equity ratio	0.63
Interest cover	2.1
Employees	32 800

Source: Eskom Annual Report, 2000

Eskom values its generation, transmission, distribution and other assets as follows:

Table 4: Eskom's assets (R millions)

	Historical cost	Accumulated depreciation	Book Value	Current value
Generation	41 737	16 844	24 893	
Transmission	9 009	3 602	5 497	
Distribution	20 593	6 724	13 869	
Land, buildings, equipment, mothballed & under construction	9 496	4 112	5 294	
<i>Sub-total</i>	80 835	31 282	49 553	101 554
Long term investments and other non-recurrent and current assets			23 649	26 363
Total			73 202	127 917

Source: Eskom Annual Report, 2000

At first glance the South African ESI has performed well. Eskom supplies electricity at among the lowest prices in the world. Reliability and quality of supply are good.

⁵ Average total cost of electricity supplied is calculated as operating expenditure and net interest and based on external sales.

Average energy availability⁶ from its power stations has increased from 76% in 1991 to 92% in 2000, although overall generation load factors (after excess capacity management)⁷ improved modestly from 50% to 55% over the same period. Overall thermal efficiency has remained constant over the past 10 years. Employee numbers have dropped from over 60 000 in the mid-1980s to 46 600 in 1991, and to 32 800 in 2000. Labour productivity has almost doubled in that period. The national electricity utility is commercially run with no recourse to the national fiscus. It raises all of its finance through debt, mostly through issuing bonds, which are well-supported by local and international capital markets. Eskom has driven an unprecedented national electrification programme, connecting 2.4 million additional households between 1991 and 2000. Local government has added another 1.3 million connections with the result that the proportion of the South African population with access to electricity has increased from about one-third to about two-thirds.

Eskom's recent low prices and exemplary electrification performance has left the impression that it is highly efficient and that there is no need for reform. Many would simply equate low prices with high efficiency. This is not necessarily the case. There may be specific factors that account for low Eskom prices compared to other international utilities and there may be little hard evidence of superior efficiency (Steyn, 1999).

A close examination of the South African ESI will show that low prices and the ability to fund electrification have emanated from, *inter alia*: very low coal prices (by international standards); until recently, exemption from taxation and dividends; and financing subsidies in the past, which included subsidised South African Reserve Bank forward cover (Steyn, 1999). Another contributing factor has been the fact that consumers have largely amortised the loans required to fund the large investment programme of the 1980s, which resulted in significant over-capacity in generation plants that will only be fully utilised after 2007 (van Horen, 1996). Eskom has not had to invest significantly in new generation capacity for some years and one of the largest contributors to lower overall costs (and prices) has been a lower debt and financing cost. Eskom's debt-to-equity ratio has fallen from 2.93 in 1986 to 0.63 in 2000. Questions have also been asked about the efficiency of investment decisions – particularly with regard to the recent Majuba and Tutuka generation plants. The current structure of the electricity industry has allowed costs of poor investment decisions simply to be passed through to consumers.

There have been few independent studies on productivity and efficiency improvements in Eskom. The above questions still need to be fully answered.

The municipal distribution sector is also experiencing problems. Many of the smaller municipal distributors are poorly managed, have poor financial controls, cannot raise finance and have poor operational efficiencies (PriceWaterhouseCoopers, 2000).

The following section looks in more detail at the rationale for reform and restructuring of the South African ESI.

⁶ Defined as capacity hours available x 100/total capacity hours in year.

⁷ Defined as kWh produced x 100/(average net maximum capacity x hours in year).

2. RATIONALE FOR THE REFORM OF THE ESI IN SOUTH AFRICA

2.1 What does government hope to achieve through the ESI?

The ESI has helped the South African government deliver in some key social and economic domains. For example, the Reconstruction and Development Programme goal of electrifying an additional 2.5 million homes has been met and exceeded. The ESI has, in addition, generally delivered low prices that can assist the competitiveness of our industry, particularly in the energy-intensive sectors.

National government acts as the custodian (on behalf of the majority of the people of this country) of huge assets in the electricity sector that are an important instrument in pursuing future social and economic goals, such as:⁸

- achieving universal access to electricity;
- promoting integrated rural development with the aid of appropriate energy provision, especially electricity provision;
- promoting industrial development through competitive electricity prices;
- reducing government debt, and meeting other public purpose objectives, through unlocking value in state assets;
- widening the participation and ownership of black South Africans in the economy through well-designed economic empowerment initiatives around state assets;
- attracting foreign direct investment;
- promoting the African Renaissance and the Millennium African Plan through active involvement of South African infrastructure providers; and
- ensuring security of electricity supply.

The question is, however: Can the current ESI structure assist government in meeting these objectives?

The first two objectives above – universal access to electricity and rural development – could arguably be met in any electricity supply industry structure. Electrification is essentially a question of funding and a task for distribution, or the regional electricity distributors (REDs), not the supply-side or the generation part of the business. Nevertheless, it could be argued that you need an efficient ESI for a sustainable electrification effort and ESI reform could unlock economic value from the industry to fund electrification.

Meeting the last objective, that of security of supply, is a little more complex. Monopoly-planned investments often lead to over-investment and we have seen this happen with Eskom in the past. Market-driven investments should lead to optimal investment efficiencies. The ability of commodity markets to provide security of supply is not that well-proven, however. Other commodity markets tend to exhibit

⁸ These goals have been distilled from: the Energy Policy White Paper; the Ministry of Public Enterprises' *Accelerated agenda towards the restructuring of state-owned enterprises*; speeches by the Minister of Minerals and Energy; and briefings to the NER.

investment cycles of over- and under-investment that are evident in commodity price cycles. In the case of electricity, the situation could be worse because it cannot be stored or stockpiled. Under-investment would result in price volatility, as well as the risk of brown- or black-outs in extreme cases. A national capacity in integrated resource planning can provide early warning signals to government about the risks of under-investment, and governments can always intervene in the market to ensure capacity enhancements.

There is a strong argument that the other economic objectives listed above cannot adequately be achieved in the current structure of the industry and, as shall be argued below, are best achieved through ESI reform.

2.2 Why does the South African ESI need reform?

In a sense this is a redundant question because the government has already initiated reform of the ESI. The government's response to the problems of poor management, technical capacity, operational efficiencies and financial controls, in the distribution side of the industry, is to rationalise and create financially viable distribution utilities. Distribution will be taken out of Eskom and will be combined with local authority electricity distributors into six REDs. In addition, the Eskom Conversion Bill consolidates the corporatisation of Eskom and converts Eskom into a public company with share capital held by the state. Eskom is now liable for the payment of taxes and dividends. Eskom can also create subsidiary companies: for example, for its Generation, Transmission and Eskom Enterprises divisions.

There are, however, a number of further important reasons why the government has decided to continue this reform process:

- **Future electricity prices as low as possible – but economically sustainable:** I.e. the government wishes to ensure that investment (allocative) and operational efficiencies result in prices that are as low as possible, but are not so low so as to prejudice the financial viability of utilities.

Allocative efficiency: After many years of over-capacity, decisions have to be made soon around investments in the power generation plants. It is important that those decisions are made within the context of an industry structure that encourages efficient allocation of capital. Within the current industry structure, the costs of poor investment decisions are simply passed on to the consumer. Many argue that price increases⁹ in the future could be held to a minimum when investors bear a more equitable share of the risk and hence are incentivised to make least-cost investments.

Productive efficiencies: International experience has demonstrated that the introduction of competition in generation has, in many cases, resulted in improved productivity and lower costs. If regulatory regimes ensure that these benefits also reach consumers (and not just investors) then lower prices will result.

⁹ Present average wholesale electricity prices are well below sustainable prices to pay for new generation investments

- **Unlocking economic value:** The government wishes to increase financial and economic returns from its state-owned enterprises. To date, it has received little financial return from the vast publicly-owned resources that are invested in Eskom, and it has received no taxation income from Eskom.¹⁰ The government can restructure the ESI in order to optimise the value of the industry and the financial returns it will receive, either in the form of annual cash flows or eventual lump sum proceeds from privatisation. This income could be earmarked for more transparent funding of the electrification programme, as well as funding other public objectives such as the reduction of state debt. There will be an important trade-off between maximising returns from privatisation, and ensuring that electricity assets are not valued at too high a level that could result in high electricity prices for consumers because of the required revenue streams for investors to meet targeted rates of return.
- **Broadening economic ownership:** South Africa needs to widen the participation of the majority of its people in the economy. Eskom is one of the largest and best performing of the state's assets. Eskom generation assets provide extraordinary opportunities for promoting black economic empowerment through a discounted equity offering, with re-payment in dividends and earnings. An initial public offering (IPO) could enable broader public participation.
- **Foreign direct investment:** South Africa has inadequate domestic savings and needs to attract international capital into fixed domestic investment to support economic growth. International experience indicates that there is a great deal of interest in investing in new and existing electricity generation assets, particularly where the rules of the market are clear.
- **New African Initiative:** There is a strong argument that, in its current form, Eskom is not optimally positioned to contribute to the Millennium African Plan and the New African Initiative. Although it has some technical cooperation agreements on the continent, it has not made any large investments. Eskom will be able to compete much more effectively in a global electricity market if it has already experienced competitive forces in the local market. The creation of an open, competitive market would also encourage investments in the region, particularly in hydro-electricity and natural gas-fired plants, with significant impacts for economic growth and stability in the region. In addition, there are important opportunities for transmission investments to relieve system constraints and provide new transmission capacity. If transmission is separated from Eskom generation, then the new South African transmission company could make important inroads into the region independent of Eskom's generation ambitions.

¹⁰ It should be noted, however, that – Eskom has, in the past, financed and cross-subsidised the huge national electrification programme

3. GOVERNMENT ELECTRICITY SECTOR POLICY

3.1 Electricity distribution industry policy decisions

The initiative to reform the electricity industry in South Africa dates back to at least 1992, when the ANC hosted a workshop at the Energy and Development Research Centre at the University of Cape Town. A decision was made soon after to establish the National Electrification Forum, which involved an extended interaction between industry players, unions and civic representatives, and the recommendation to set up the National Electricity Regulator (NER). The NER then convened the Electricity Working Group to further develop proposals to restructure the electricity distribution industry. The government then set up the Electricity Restructuring Interdepartmental Committee, which took recommendations through to the Cabinet to combine Eskom and municipal electricity utilities into REDs.

The government then appointed a consortium led by PriceWaterhouseCoopers to undertake detailed modelling to determine the number and boundaries of the REDs and also the detailed planning to undertake the rationalisation. Six REDs have been proposed, despite objections from some of the stakeholders. It is hoped that the REDs will be operational before 2004. Full retail competition is not being proposed at this stage, although it is possible later. Thus the REDs will have franchised customers within their geographic boundaries and will undertake both the distribution and selling of electricity. The Electricity Distribution Industry Restructuring Committee comprising relevant government departments, Eskom, local government and the NER, oversaw the work of the consultants, and in May 2001, the government accepted the main conclusions.

3.2 Electricity supply industry policy decisions

In addition to electricity distribution, the government has begun the reform of the ESI. The foundation for ESI reform was laid down in the Cabinet-approved White Paper on Energy Policy released in December 1998. The electricity sector's objectives are stated as:

- improving social equity by specifically addressing the energy requirements of the poor;
- enhancing the efficiency and competitiveness of the South African economy by providing low-cost and high quality electricity inputs to industrial, mining and other sectors; and
- achieving environmental sustainability in both the short and the long-term usage of natural resources.

The White Paper also emphasises objectives of improving energy sector governance and achieving energy security through diversity of supply. It is further stated that in order to ensure the successes of the electricity supply industry as a whole, various developments will have to be considered by the government over time, namely:

- giving customers the right to choose their electricity supplier;
- introducing competition into the industry, especially the generation sector;

- permitting open, non-discriminatory access to the transmission system; and
- encouraging private sector participation in the industry.

The White Paper also states that the government believes Eskom will have to be restructured into separate generation and transmission companies and that the government intends separating power stations into a number of companies.

At a Ministerial Workshop on Electricity Supply Industry Reform held from 3-5 April 2000 in Midrand, the Minister of Minerals and Energy stated further that the government's main objectives of reform are to:

- increase economic efficiency in investment decisions and operation so that costs and prices are as low as possible;
- maximise financial and economic returns to government from the ESI;
- increase the opportunity for black economic empowerment; and
- protect public benefits such as widened access to the poor, energy efficiency ongoing research and development and environmental sustainability.

A media release by the Minister of Public Enterprises, Jeff Radebe (dated 10 August 2000) describes the benefits of restructuring state-owned enterprises as follows:

The economic growth and employment benefits of restructuring will be direct. It will result in increased investment, higher capital inflows and a reduction in public sector debt, with a significant longer term impact on South Africa's GDP growth and substantial net proceeds accruing to the fiscus.

In August 2000, the Ministry of Public Enterprises published "A Policy Framework: An Accelerated Agenda Towards the Restructuring of State Owned Enterprises," which states:

- Eskom will be corporatised, with transmission, distribution and generation, each forming a separate corporate entity;
- different generating companies will be formed to promote internal competition prior to the introduction of private sector participation in generation, in conjunction with new power requirements; and
- strategic equity partners will be introduced into different Eskom Enterprises business units.

The report stated further that transmission would probably remain in the hands of the state and that it is likely to take the form of a separate independent company.

The Eskom Conversion Bill of 2001 replaces the old Eskom Act of 1987 and subsequent amendments. It converts Eskom into a public company (named Eskom Holdings Limited) with its share capital held by the state. This is the first step in restructuring Eskom. Eskom now pays taxes and dividends to the state. A memorandum to the Conversion Bill describes its purpose as: bringing about more

efficiency and competitiveness in the running of Eskom; exposing Eskom to global trends; and ensuring that Eskom is run in terms of a protocol on cooperative governance. It further states that:

The benefit to the country of the unbundling of Eskom is that in the long run Eskom might decide to draw on the benefits of listing on a stock exchange and, in that event, citizens and foreigners alike will be in a position to acquire shares in Eskom. Eskom can only be listed on a stock exchange if it is a company and Government is preparing for that eventuality, should it arise.

In considering the consolidated electricity industry reform proposals in May 2001, the Cabinet approved the proposals for the reform of the ESI that would ensure the introduction of managed liberalisation of the energy sector and that:¹¹

- (i) in order to meet Government's developmental and social objectives, Eskom maintain a dominant role in the existing electricity generating market sector;
- (ii) a limited private sector participation within existing electricity generating market sector will be introduced;
- (iii) the involvement of Black Economic Empowerment (BEE) within the generation sector be about 10% of the existing generation capacity by no later than 2004;
- (iv) in order to ensure non-discriminatory and open access to the transmission lines, a separate state-owned transmission company will be established, independent of generation and retail businesses, with ring-fenced transmission system operation and market operation functions. Initially this transmission company would be a subsidiary of Eskom holdings and would be established as a separate, state-owned transmission company before any investments are made in generation capacity;
- (v) over time a multi-market model of electricity generators, traders and power purchasers may take place on a variety of platforms, including bilateral deals, future markets and day-ahead markets;
- (vi) a regulatory framework was in place that would ensure the participation of Independent Power Producers and that diversified primary energy sources were developed within the electricity sector without hindrance;
- (vii) the planning and development of the transmission systems was undertaken by the transmission company subject to government policy guidelines;
- (viii) over time, and taking cognisance of the strategic objectives of the region, the Southern African Power Pool must develop into an independent system operator for the southern African regional grid system, where public and private generating companies could participate in the pool; and
- (ix) by adapting the role of the regulatory system, which would include the reform of the legal framework defining the role of the NER, the development of a new framework for licensing, the adaptation of a price-

¹¹ Media briefing by Minister Phumzile Mlambo-Ngcuka, 3 July 2001, Pretoria

setting routine and the creation of capacity in order to monitor the effectiveness of the reformed ESI and to ensure the security of supply.

4. INTERNATIONAL TRENDS IN ELECTRICITY MARKET REFORM

Electricity market reforms have generally involved the following elements:

- commercialisation and corporatisation of public utilities;
- changes in the structure of the industry to increase competition;
- the creation of a set of electricity market trading mechanisms;
- increased private sector participation; and
- changes in regulatory oversight.

4.1 Commercialisation and corporatisation

Often the first step in reform has been to transform publicly-owned utilities into commercial corporations subject to performance contracts and the payment of taxes and dividends. The challenge has been to convert indebted, poorly performing utilities, reliant on government funding and subsidies, to public corporations that are able to raise capital on private markets, meet performance objectives and provide fiscal revenue streams. Governments may start treating them like any other commercial enterprise and the emphasis turns to maximising shareholder value. Corporatisation involves defining shareholding and share capital – often, in the beginning, still owned by the state. Commercialisation and corporatisation initiatives assist in creating a level playing field with private operators through a degree of convergence in the cost of capital and acceptable rates of return on assets. Restructuring and privatisation often follow.

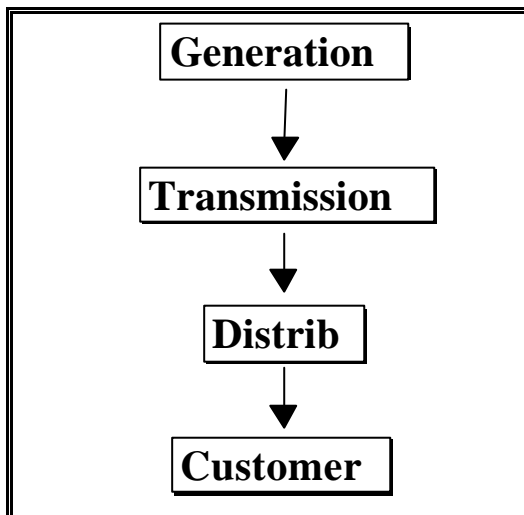
4.2 Restructuring for competition

If new entrants and technologies are to compete effectively then open, non-discriminatory access to the transmission and distribution system must be guaranteed, and no one generator or supplier should enjoy market power.

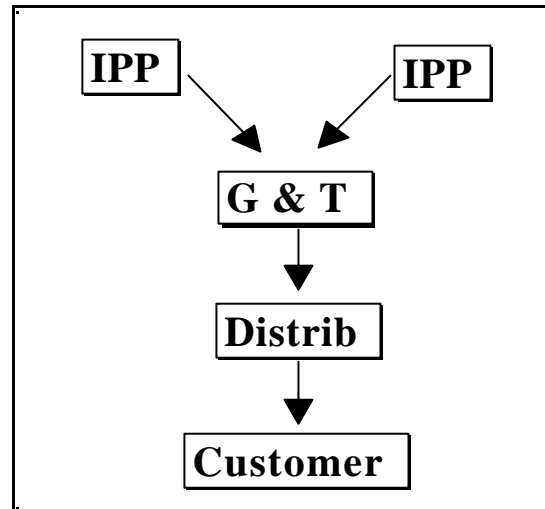
The simplest way of achieving these objectives is to restructure the industry and this has often been an early step in the reform process. The old vertically integrated monopoly industries are vertically unbundled, i.e. generation (G) is separated from transmission (T) and distribution (D), which are then operated as separate, independent entities. Secondly, there is horizontal unbundling, where generation is split into a number of competing companies (none big enough to exert market power) and/or the introduction of new generators is permitted. Any generator may then send their electricity through the transmission and distribution system to customers. This is termed *wholesale competition*, which first emerged in Chile and the UK and is now being followed by the majority of countries undergoing reform. This process has not always been successful, and care needs to be taken that one or a few generators do not regularly control the price setting area in the market.

In some cases, for example, California, generators have been permitted to retain ownership of their transmission wires and non-discriminatory access to transmission is then overseen by an independent systems operator (ISO). In practice this has often proven costly, expensive and difficult to regulate.

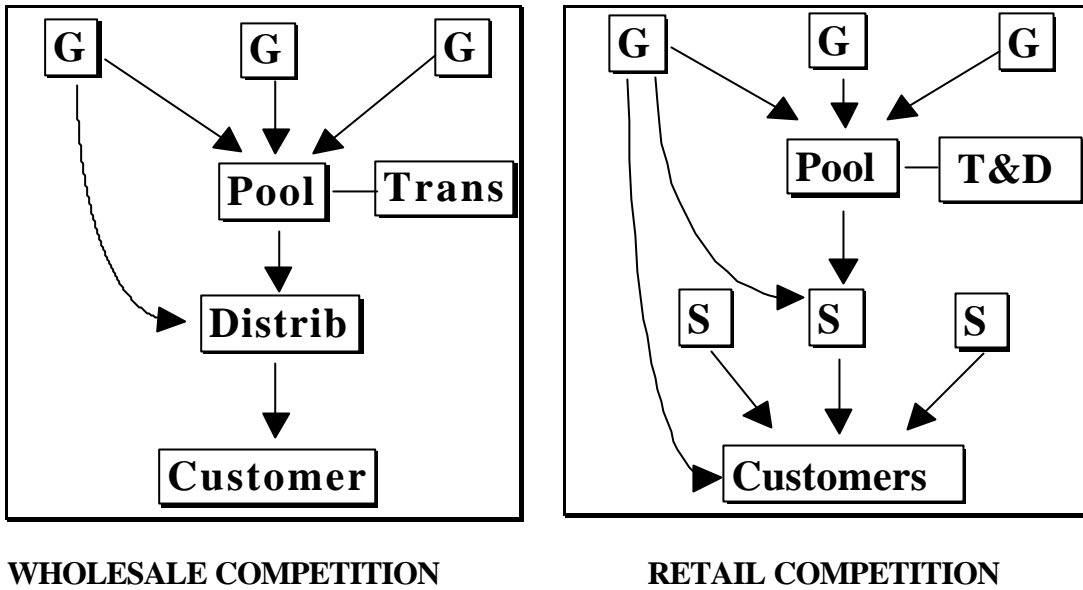
Governments have sometimes introduced competition in phases by first allowing independent power producers (IPPs) and/or importers to enter the market. These IPPs often have to secure future electricity sales through a power purchase agreement (PPA) with the dominant utility (sometimes referred to as the single-buyer model). Private finance houses mostly insist on these PPAs in order to secure a predictable debt-servicing income stream. This approach has been followed in many Southeast Asian and other developing countries. This model involves a number of compromises as full wholesale competition is denied (as the old utility has a dominant market position through controlling most of the generating capacity and the transmission system) and there is a real danger that governments and utilities might be stranded with costly PPAs that are uncompetitive in the future, i.e. power purchase agreements might dictate a fixed price over a long period. However, if full competition were to be introduced prices might fall.



MONOPOLY MODEL



SINGLE-BUYER MODEL



There is growing consensus that it is preferable to introduce full wholesale competition from the beginning by separating generation from transmission (i.e. guaranteeing non-discriminatory access to transmission of electricity to customers) and through also breaking up generation into a number of competing companies, none large enough to exert market power.

At a mature stage in the reform process, supply of electricity is often separated from the operation and ownership of the distribution wires and a number of suppliers or retailers compete to sell electricity to customers, or put the other way around, customers can choose their suppliers. This is termed *retail competition*. Choice of supply for large customers is often introduced at the same stage as wholesale competition, and then extended to smaller consumers at a later stage. Suppliers buy their electricity from the wholesale market and then pay the transmission and distribution companies a *regulated price* to transport their electricity to customers. Customers thus often see their electricity bill split into an energy component (the price of electricity bought from a generator) and a transport cost (the wires charges).

Customers may also elect to purchase their electricity directly from generators. The UK, Norway, New Zealand, Australia and many other countries have moved to retail competition; first allowing large customer choice and then eventually extending competition to all electricity customers.

4.3 Electricity trading market

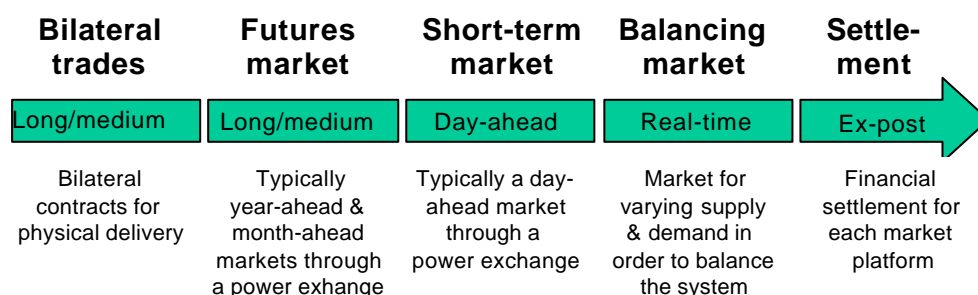
A key element necessary for competition is the creation of an electricity market or set of trading mechanisms and instruments. There are two broad market models that describe the way in which sellers and buyers of electricity interact.

The *power pool model* has been widely implemented, initially in countries such as the UK and South America. In this model generators bid their power into a pool (i.e. a block of power at a particular price for a particular period – usually an hour or half hour a day ahead). The bids are stacked from the lowest to the highest and the pool

operator prepares commitment and dispatch schedules a day ahead on the basis of a demand forecast and merit-order of power bids from the pool based on the lowest price bids. Power is dispatched to meet demand and hence surplus generators (i.e. those with the higher prices) are not dispatched. Purchasers buy their power from the pool at a price that is based on the bid of the last dispatched plant, i.e. the system marginal price, plus any capacity payments. The system operator handles constraints; largely by adjusting the dispatch schedule, and ancillary services (e.g. reactive power and voltage regulation) are procured by the system operator. System balancing is managed by the system operator, based on separate price schedules for increases or decreases in actual generation output or consumption (balancing market). The costs of the system operation and balancing are added to the pool price as an uplift payment. In this model all generators and purchasers are required to make their physical purchases or sales of electricity through the pool, although they might hedge their risks with financial contracts for differences. Demand-side participation tends to be weak in many of these power pools.

As more experience develops with competitive electricity markets, a *multiple electricity trading market model* is evolving (i.e. not all power is traded through a single pool). The pool is voluntary and not mandatory, as in the previous model. A market develops for long or medium-term bilateral contracts between generators and suppliers and/or customers. A single system, marginal price is replaced by a system where supply and demand market participants are paid, and pay, as bid or agreed. Market risk is hedged through trading in futures or forward contracts. A power pool is used as a day-ahead market (which usually becomes the reference price) and because electricity is generally not stored, and supply and demand has to be matched on a real-time basis, a balancing market becomes critical. All market participants who are out of balance from their contracted positions will be exposed to the price in the balancing market. These various market platforms have clearly delineated rules and settlement procedures. Essential elements of this model are the freedom for participants to choose their trading platform(s) and the fact that demand-side participation is stronger.

Figure 2: Market platforms under the multi-market model



Source: Econ Report 43/2000

4.4 Increased private sector participation

The ESI can be restructured and competition introduced while keeping the bulk of the sector in public ownership and without privatising. This is the case in Norway and

was the initial phase in the reform process in the Netherlands. Other countries such as the UK, Chile and Argentina restructured and privatised at the same time.

The private sector can enter the ESI, either through investments in new IPPs or through the privatisation of publicly-owned ESI assets. Governments can privatise through inviting strategic equity partners, targeted equity sales, auctioning assets or an IPO.

Many argue that the full benefits of competition have only been realised when the competitive elements in the industry (viz. generation and supply) are fully privatised.

4.5 Modernising the regulatory framework

As public utilities have been commercialised and corporatised, and taken further from direct government management and control, it has been necessary to put in place a clear regulatory framework to protect consumers through tariff approval and to provide incentives for utilities to improve efficiencies and drive costs down. As the ESI has been restructured to introduce competition, it has become important to distinguish between those elements of the business that are competitive (and which could be overseen by existing competition authorities) and those elements that remain natural monopolies and where sector regulation is essential.

The generation and supply (retail) elements of the electricity business lend themselves to competition – while the transmission and distribution wires operations are natural monopolies. (There could also be competition for services – such as metering, market operation, settlements, etc – that can go out periodically on competitive tender or where parallel trading mechanisms develop).

As electricity sectors have been reformed, the international tendency has been for sectoral electricity regulators to focus mainly on transmission and distribution. There has been a movement away from the old “command and control” price setting – which characterised government and cabinet price approvals – to either a cost of service (for example, rate of return) regulation, common in the USA, or a range of conduct or incentive-based regulatory mechanisms such as price capping with an efficiency factor (RPI or inflation minus X in the UK), revenue capping (e.g. Norway) or, yard-stick or franchising regulation.

Electricity regulators have also generally been responsible for technical regulation, including quality of supply and safety issues.

In the past electricity regulators tended to license not only transmission and distribution companies but also all electricity generators and retail suppliers. While there is a tendency now for the regulation and oversight of the generators and suppliers to come under the jurisdiction of the competition authorities, sector regulators still often monitor the electricity market for signs of market power and market abuse. In some instances, regulators have played an activist role in forcing structural change in the industry. For example, OFFER in the UK forced divestiture of generation assets to reduce market power.

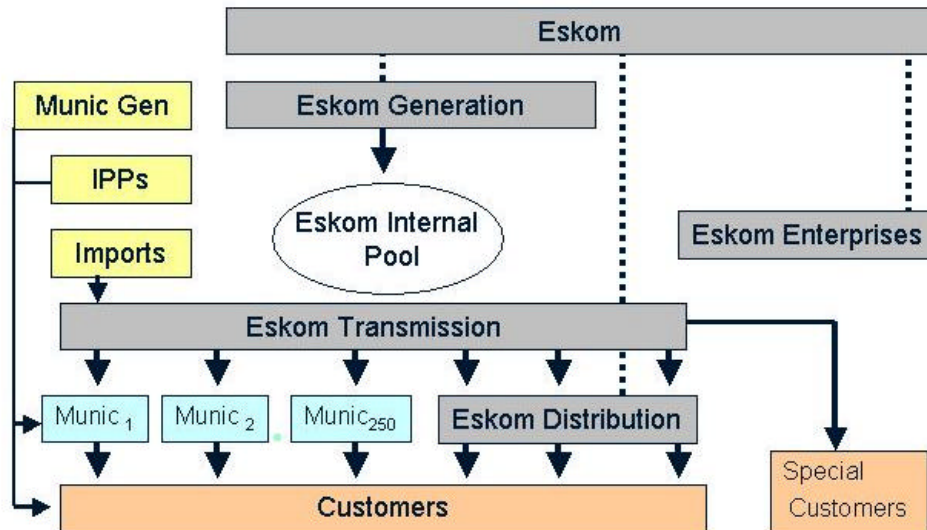
5. POSSIBLE ESI MODELS FOR SOUTH AFRICA

The policy pronouncements on the ESI by the government imply a range of different industry structures or models. The government has stated that it is in favour of a managed liberalisation process and it is thus possible that some of the models outlined below might emerge sequentially. The differences in the models relate primarily to the varying extent of Eskom (i.e. state) versus private ownership and the different degrees of asset separation and hence different levels of competition and regulation. The models are likely to result in different price outcomes. There are also different implications for unlocking economic value for the state, broadening economic ownership and increasing foreign direct investment. The following models are considered:

- **Integrated monopoly:** This is where Eskom stays more or less as it is. A strategic equity partner could be invited in. Variations on this model relate to whether Eskom retains ownership of distribution and transmission, or whether it is restricted to a generation monopoly. Eskom would remain subject to regulation.
- **Dominant supplier:** This is where Eskom retains ownership of 70% of generation under an integrated company (although with distribution transferred to the REDs). The remaining 30% is sold to an independent. Under this type of scenario, Eskom as the dominant supplier would remain subject to regulatory scrutiny. Choices are as to which 30% gets sold off: one option could be that Eskom retains the high cost generators, while another option could be for Eskom to retain the lowest cost stations.
- **Subsidiary generation companies:** This is where Eskom retains ownership of 70% of generation but places clusters of stations into competing subsidiary companies. Transmission is put in a separate state-owned company to guarantee open non-discriminatory access and external trading mechanisms are established.
- **Majority of generation assets divested:** This is where Eskom retains ownership of 35% of the generation market. Divested generators are placed in at least four private companies, i.e. a set of five competing clusters of assets is created. Under this arrangement competition would occur, although the clusters with strategic asset configurations would be able to lift prices above “perfect competition” levels.
- **Maximum separation of generators:** This is where each power station is put in a separate company and is sold to the private sector. Here competition would be expected to be fierce, driving prices to their lowest possible level. This model has not been seriously considered by the government, but serves as a useful reference case.

5.1 Integrated monopoly

(Existing industry structure)



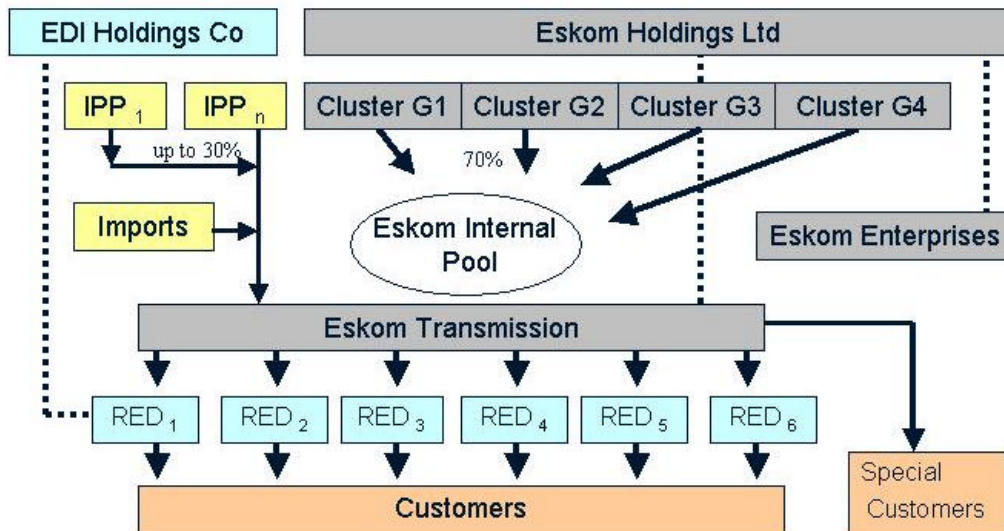
Existing industry structure

This is the current situation. Eskom dominates generation and transmission, and half of distribution. Small IPPs and modest imports are permitted at the margin. These either sell directly to a customer (e.g. City Power to Johannesburg) or, in principle, could sell directly to Eskom. Prices are regulated. Some of the problems with the current industry structure have already been discussed previously.

In principle, it is possible to introduce significant private participation in the form of a strategic equity partner. Consumers would probably be prejudiced if a monopoly were to be privatised now, however. Effective regulation would be difficult and consumers could be victims of private monopoly rents and profits. In general, there is a growing consensus that it would be unwise to allow private equity participation without first introducing competition: this is a point that appears to be accepted by the Department of Public Enterprises and the Department of Minerals and Energy.

5.2 Dominant supplier model

(Eskom retains control of most of G and all of T and E; not more than 30% of generation is divested)



Eskom dominant supplier with up to 30% generation divested

This is effectively the model that the government has chosen as the next step in the reform process. Eskom is corporatised and its generation and transmission businesses will be either ring-fenced divisions or separate subsidiaries. Eskom Distribution will be incorporated into a national EDI Holdings company and then into the REDs, as indicated previously. The first divestiture of generation assets could be the sale of the mothballed plant to a black economic empowerment consortium. Various options arise as to which generation assets are further divested. The government has stated that:

In order to meet Government’s developmental and social objectives, Eskom [should] maintain a dominant role in the existing electricity generating market sector and that limited private sector participation, within existing electricity generating market sector, will be introduced.

If the developmental and social objectives refer to electrification, then it is not clear why Eskom should retain market dominance in generation, as the REDs will be the agencies that undertake electrification, including in rural areas.

Eskom's internal pool might continue, whereby individual generators and clusters “bid” a “price” and quantity of electricity to be produced for each hour for the day ahead. Eskom system control dispatches power stations in merit order according to the lowest prices until demand is met. The ring-fencing of the commercial operation of individual power stations can begin, and internal competitive conditions simulated.

Effectively this is a single-buyer model, as any private generator is likely to have to sell to Eskom. An alternative would be an external “cost” based pool in which IPPs would participate. A further alternative would be a government decision that allows IPPs to negotiate separate purchase agreements with large customers.

Eskom has argued that it wishes to retain ownership of transmission assets. It aims to build on its linked telecommunications infrastructure in order to bid for a new fixed line telecommunications licence. However, various alternative arrangements are possible. For example, Eskom Enterprises might take over the fibre optic assets in a subsidiary telecommunications company and a new independent transmission company could sign stringent Service Level Agreements for its own telecommunications needs. There are good international precedents for this.

Eskom argues further that its credit rating will be seriously prejudiced if it is forced to divest its transmission assets. This seems unlikely. The asset base of transmission is much smaller than for generation (with a book value of R5.5 billion versus R49.5 billion for generation, transmission and distribution combined). It argues further that it wishes to be a major player in building and operating transmission grids in Africa. This could also be an option for an independent South African Transmission Company and might be a preferred option from the perspective of African countries who might be wary of a large powerful Eskom being involved in both generation and transmission investments in their countries.

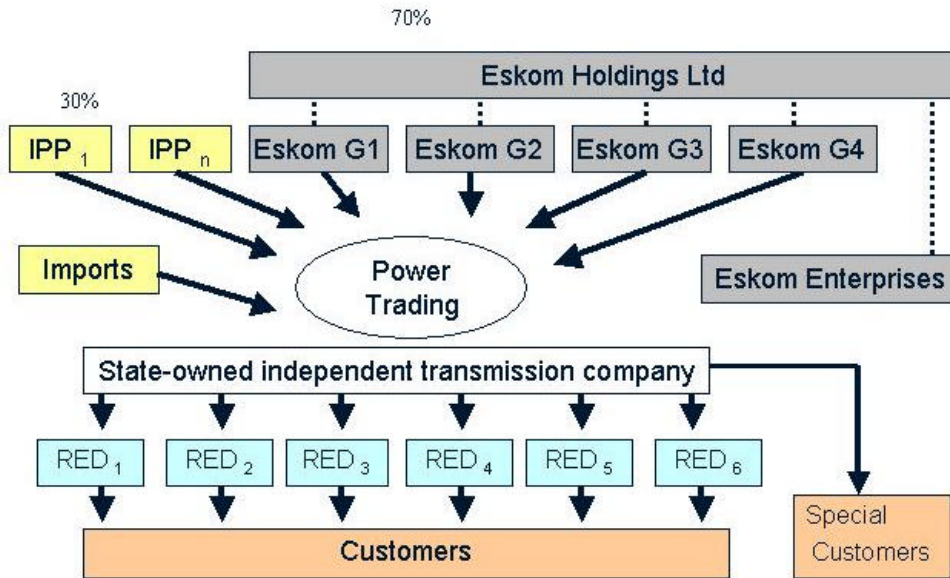
If the transmission system were not placed under independent ownership then an alternative option for securing non-discriminatory access would be the creation of an ISO. The introduction of an ISO could be expensive and difficult to regulate and monitor. The simplest way to guarantee non-discriminatory access to the transmission grid is to place the assets and operations in a separate independent company.

In this model, the government might struggle to attract new investment into the industry as investors will not be comfortable with the inherent conflict of interest of Eskom, as the owner of transmission, potentially favouring its own generation plant at the expense of new-comers. IPPs are likely to demand long-term PPAs, which could result in consumers being tied to non-competitive prices for decades to come.

Eskom is able to exercise significant market power in this scenario and some form of regulation of wholesale electricity prices will be necessary.

5.3 Subsidiary generation model

(Eskom's remaining 70% of generation is placed in competing subsidiary companies. Transmission becomes a separate company. External trading mechanisms are instituted)



Eskom generation subsidiaries with open access and trading

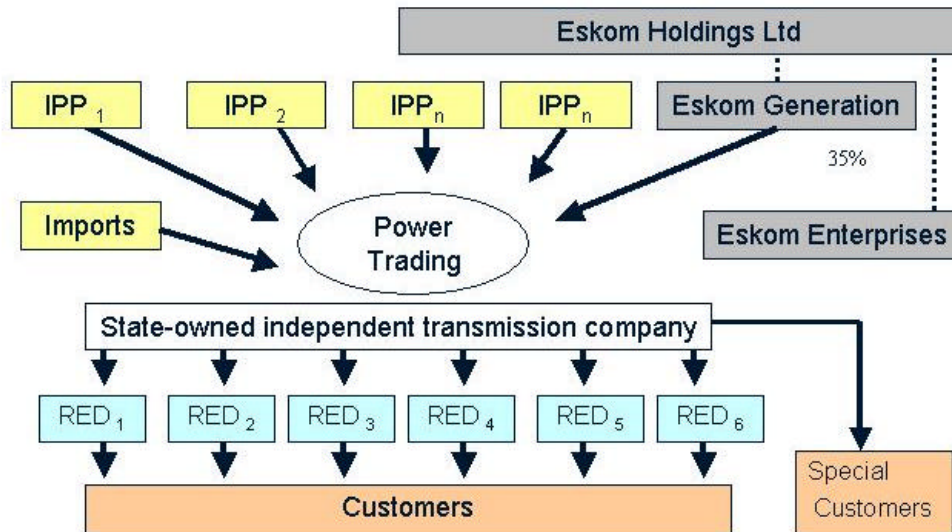
The difference between this and the previous model is that Eskom's generation clusters are placed in subsidiary competing companies. Transmission is established as a separate state-owned company and non-discriminatory access to the grid is guaranteed. This model also involves the establishment of an external transparent power exchange and a set of trading arrangements. The NER is arguing that the government should allow the previous model to evolve into this model sooner rather than later.

An independent transmission company and power exchange with transparent market rules plus parallel trading mechanisms will give potential investors greater confidence. This model does not require an independent system operator and system operation, and a balancing market can be combined cost effectively with the transmission company. There will, however, still be concern that Eskom Ltd will be able to exert undue market power through its subsidiaries, and will be able to manipulate prices. The Competition Commission may not be happy with the continuation of such a structure.

The above models involve limited privatisation and hence reduced opportunities for the state in terms of economic empowerment and fiscal receipts.

5.4 Majority of generation assets divested

(Eskom retains ownership of 35% of the generation market. Divested generators are placed in at least 4 competing private companies)



Eskom divests to 35% of generation in competing market

This model accepts that competition requires a dilution of Eskom’s market power and significant entry of new players. Divested assets could be privatised through black economic empowerment provisions, an IPO or private equity participation.

An electricity market is created through the participation of a number of industry players in a variety of trading arrangements, including a short-term power exchange and balancing market, as well as longer term bilateral and futures contracts. This multi-market model represents a growing international consensus on the way forward in the electricity supply industry. Proponents of this model argue that competition is likely to result in improved efficiency and lower prices than the previous models.

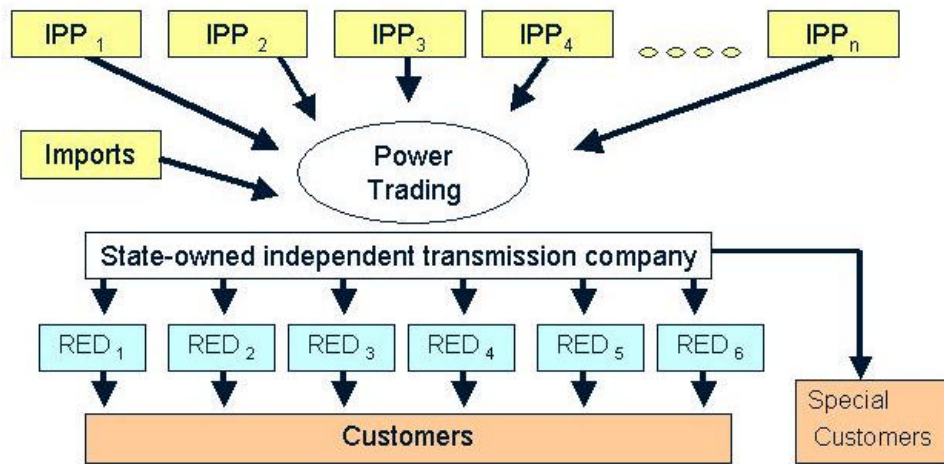
Significant black economic empowerment could be achieved, as well as fiscal revenue for debt reduction. Significant inward investment could also result. Financial and economic returns are significantly greater than in the previous models. Eskom would be forced to compete, and a management culture and practice might be established that could place Eskom in a better position to invest abroad and contribute to Millennium African Recovery Programme. Southern African regional economic development could be significantly enhanced as generation projects in the region could have access to the South African market and would operate with greater market certainty.

The fact that the state retains ownership of a portion of generation would enable it to intervene more easily in new generation investments, should this be necessary, if the market fails to respond to growing demand.

This model gives practical expression to government policy as laid out in the Energy Policy White Paper of 1998. The Energy White Paper committed the government to “introduce competition to the industry, especially the generation sector;” “permit open, non discriminatory access to the transmission system,” and “encourage private sector participation in the industry.”

5.5 Maximum separation of generators

In this scenario each power station is privatised and owned separately. Each power station trades independently and competition is maximised.



Maximum separation of generators in competing market

This model has all of the advantages of the previous model, with the possible exception of security of supply, which might be compromised if investors fail to respond to growing demand. In addition, there is the potential problem of stranded assets where high cost stations may not be able to survive. They would only be able to be sold if the state discounted their asset value.

The government has not considered full privatisation of Eskom seriously. This model is included in our analysis as a useful reference case in the modelling of competition, prices and potential valuations.

6. IMPLICATION FOR COMPETITION AND REGULATORY OVERSIGHT

6.1 Basic principles

The objective of competition regulation and sector specific regulation is to address market failures such as abuse of market power, natural monopolies, externalities and information asymmetries, as well as to distribute outputs more equitably. It is useful to delineate different categories of regulation (Lewis 2000):

- Competition regulation looks at the structure of markets, controls anti-competitive behaviour and reviews mergers;
- Economic regulation adopts and implements measures to control monopoly pricing and to ensure appropriate levels of consumer protection through regulatory mechanisms such as cost-of-service regulation (e.g. rate of return) or incentive regulation that could involve price or revenue caps, or yardstick or performance based franchising regulation;
- Technical regulation sets and monitors standards so as to assure compatibility and to address safety and environmental protection and similar concerns; and
- Public interest regulation addresses distribution and equity imbalances.

The introduction of competition should diminish the scope of regulation. A well-functioning competitive market should provide better incentives and outcomes than a regulated market, although in practice a degree of oversight and monitoring is still necessary to ensure competitive behaviour.

The previous analysis points to a general framework for arranging competition and regulatory oversight in the electricity industry. Firstly, some parts of the electricity business are not easily placed within a competitive environment; viz. the transmission and distribution wires sectors tend to remain natural monopolies and therefore need to be regulated to protect consumers against potential monopolistic abuse.

On the other hand, the generation and retail of electricity (and certain aspects of market and system operation) are potentially competitive and should be subject to the country's competition policy, legislation and oversight.

Thus, in principle, the ESI sector regulator, the NER, should oversee the transmission and distribution part of the business, and the Competition Commission should oversee the generation and retail of electricity. In practice, however, there will be considerable overlap of responsibilities – certainly during the transition to a competitive market – but also later when the NER can play a professional support role to the Competition Commission in electricity sector competition related matters.

6.2 The respective jurisdictions and roles of the Competition Commission and the NER

With the agreement to scrap the exemption clause, Section 3(1)(d) of the Competition Act (89/1998), the Competition Commission clearly has jurisdiction over competition matters within other regulated industries, including the ESI.

Section 21(1) of the Competition Act provides that the Competition Commission is responsible for:

- (h) negotiating agreements with any regulatory authority to co-ordinate and harmonise the exercise of jurisdiction over competition matters within the relevant industry or sector, and to ensure the consistent application of this Act;
- (i) participating in the proceedings of any regulatory authority;
- (j) advising, and receiving advice from any regulatory authority; and
- (k) over time, reviewing legislation and public regulations, and reporting to the Minister concerning any provision that permits uncompetitive behaviour.

On the other hand, the Electricity Act of 1987 (amended in 1994) gives the NER statutory responsibility to regulate market access to electricity suppliers (through licensing) and to approve all electricity prices.

A formal agreement between the Competition Commission and the NER does not yet exist. A common understanding would need to be developed, between the two regulatory bodies and government, on the scope and pace of restructuring to achieve competition in the electricity industry, and the respective roles in overseeing competition.

Accepting that the generation and sale of electricity are potentially competitive operations, and that they are currently under monopolistic control, it would seem appropriate that the Competition Commission play a more pro-active role in requiring a move to competition. The Competition Commission would have a responsibility to ensure that a competitive electricity market would be maintained if: generation is broken into competing entities; open-access is granted to transmission; electricity trading mechanisms are instituted; and retail competition is introduced. Any instances of market power abuse, or proposed mergers that undermined competition, would need to be referred to the Competition Commission and Tribunal.

It would be practical for any agreement between the NER and the Competition Commission to assign a role to the NER to monitor issues of market power and then refer instances of market abuse to the Commission for action.¹² Given the complexity of the market and trading mechanisms, the NER would be more professionally equipped to detect anti-competitive behaviour.

¹² In the UK the Competition Act of 1998 gives industry specific regulators such as the Office of Gas and Electricity Markets (Ofgem) powers to enforce general competition law in their sectors. Ofgem is bale to undertake investigation at is own initiative and to levy fines

6.3 Role of the NER in monitoring and ensuring competition

As previously suggested, the NER has the potential to play an important professional support role to the Competition Commission in monitoring and ensuring competition in the electricity industry. It has a further role in encouraging greater efficiency in operation of the market:

- The first, and perhaps most important factor affecting competition, is to get the structure of the industry right. The NER has commissioned a number of market scenarios and modelling studies that point to the optimum configuration of generation clusters, the importance of open access to the transmission grid (through an independent transmission company) and the institution of multiple electricity trading mechanisms. Agreement should be forged with the Competition Commission and government, and Eskom and municipal distributors should be encouraged to institute the necessary restructuring.
- Entry to the competitive elements of the industry should largely be unrestrained (although licences should still be required to ensure compliance with technical standards and environmental and local planning requirements).
- Price in the competitive elements of the industry should also be unregulated, except where market power and abuse is demonstrated.
- The NER also has an important governance role in ensuring that market codes and rules are constructed in a way that encourages efficiency. This would include:
 - A grid code with clear rules that determine standards for connection and system operational rules;
 - Market membership rules for the day-ahead market, futures market, bilateral contracts, etc - including bid, clearing and settlement procedures;
 - Balancing market agreement with rules and procedures for information flow to the system operator and for real-time adjustments to balance supply and demand;
 - Ancillary services agreements for reactive power, voltage control and spinning and backup reserve capacity;
 - Metering codes for the standards, format and timing of metered data to be provided for final settlement.

The NER would not be involved in the day-to-day governance of all these functions but would play an important initial role in helping to design an optimal set of market arrangements and would also have a periodic review responsibility. It is important for these markets to evolve flexibly and responsively, and so the overall governance arrangements should preferably involve all relevant stakeholders who can periodically provide their input to improve the systems.

- The NER would have a role (in conjunction with the market operator) in monitoring pool prices, the balancing market and bilateral contracts and referring anti-competitive behaviour to the Competitions Commission. Electricity systems have a number of characteristics that make them vulnerable to gaming behaviour by generators:
 - Electricity is not easily or economically stored and supply has to match demand. This means that only those units already running, or those that are flexible enough to run instantaneously (e.g. hydro or gas turbines), would be able to meet fluctuations in demand. These units are thus potentially in a position to “capture” the balancing market at the expense of available, non-operating, generating plant.
 - Electricity demand is relatively inelastic: electricity is still a necessity, even when prices are high, and generators can exploit this fact. Short-term inelasticity is often exacerbated by limited demand-side participation, thus limiting demand response to price changes.
 - Wholesale demand is relatively predictable: the market operator often forecasts aggregate demand and this information is freely available to generators.
 - Variable costs of generating plants do not vary continuously and thus generators can anticipate the supply curve shape by “tracking,” i.e. by varying bids in the early stages to discover the shape. The predictability of these issues raised above, combined with the knowledge of competitors bidding patterns and maintenance schedules, makes it possible theoretically for generators to bid strategically to game the system. One method would be to withhold capacity. This would have the effect of shifting the supply curve to the left and pushing prices up. This works best at the steep part of the supply curve, not where it is relatively flat.
 - The pool is not one market but several that vary temporally and geographically, i.e. peak demand is very different from off-peak, and regional demand, location of generation plants and transmission constraints can create load pockets that are effectively sub-markets. It is possible to game the market by using a plant that sets the price in one market to influence prices in another. This is called leveraging.
 - Constraints caused by transmission and ancillary services call for some plants to run simply because of their location and technical characteristics. Over time, it becomes evident that plants are critical and generation owners could seek a premium by bidding above their marginal cost.
 - Finally, if the generation market and pool is not carefully designed from the start, then certain plants could become regular and predictable price setters, again with the potential to push prices up above marginal costs. Equally, a distributor may fail to act cost-efficiently in the wholesale market, motivated by an anti-competitive agreement with a generator, or because the regulatory environment does not force cost savings to be

passed on to consumers, or simply because of incompetence in electricity trading.

These are not arguments against introducing competition, rather they are reminders that the sectoral regulator needs to monitor potential market power and abuse on a regular basis. Sustained price manipulation will be observable and could result in severe regulatory sanction, including further forced restructuring of the market.

6.4 Economic regulation of transmission

The natural monopoly components of the ESI provide the essential backbone of the system and it is important for the sector regulator (the NER) to ensure that the transmission entity provides electricity transport services at least cost for customers, while still maintaining its core functions that include:

- network operation and maintenance;
- minimisation of system losses;
- system dispatch and balancing in real time;
- management of ancillary services such as reactive power, voltage control, reserve and black start services;
- long-term planning of generation and transmission requirements (e.g. integrated resource planning); and
- investment in network expansion.

For the regulator to regulate the costs of transmission and distribution effectively, a thorough understanding is needed of existing assets, new investment requirements, system operation overheads, constraint costs, connection costs and costs of ancillary services.

International experience indicates that economic regulation should be incentive-based, allowing investors to capture a portion of the benefits of efficiency gains, and passing some of these gains to customers.

In the transition to a competitive market, the NER is instituting a new wholesale electricity pricing system that makes transparent the energy and transport components of the tariff.

6.5 Regulation of distribution

The government's restructuring proposals for the electricity distribution sector imply the rationalisation of Eskom's and local governments' distribution assets into six REDs. Only large customers (above 100 GWh) will be able to choose their electricity supplier. Thus full retail competition is not envisaged in the short term. The costs of providing retail services (energy purchases, metering, billing, customer services, etc.) for all other consumers can be bundled together with costs of the distribution network and will be subject to combined price control by the NER.

The NER currently regulates retail tariffs through a kind of yardstick regulation: distributors are compared and prices are forced into a narrower band that is closer to the most efficient distributor. In the future, price cap or revenue cap incentive

regulation, which incorporates a specified efficiency gain, is likely to be used. Determining what this efficiency gain should be could require benchmarking between distributors.

The NER is concerned not only with the level of prices but also the *structure* of available tariffs. Pricing policy determines the degree of cost-reflectivity in recovering income from the different customer groups at different periods of the day and season.

Unless there is retail competition, retailers will have little incentive to pass through their energy savings (from the wholesale/generation market) to consumers.

If full retail competition is introduced in the future, then the NER will regulate only the natural monopoly (wires) part of distribution and competitive retail, or selling services, will be subject to Competition Commission oversight, with the NER playing a supportive monitoring function and referring any instances of market power or abuse to the Competition Commission. There would need to be some restrictions on horizontal integration of retailers. They should be separate from the transmission companies and preferably also from distribution companies, and if not, there should be clear ring-fencing of distribution and retail operations. The government still needs to declare its policy over whether generation companies could own retailers or vice versa.

The implementation of retail competition will require significant investment in information technology. Competition for end-use customers typically requires half-hourly or hourly meters to be installed. The cost of this metering could be significant and could constitute a barrier to switching suppliers. The NER might wish to institute a load-profiling system (as in Norway), which could significantly reduce these costs.

The NER would continue to licence all transmission and distribution operators, as well as retail companies in the future.

6.6 Technical regulation

The NER would continue to fulfil its statutory mandate to regulate technical standards in the industry. It is responsible for ensuring compliance with the Quality of Supply Standard (NRS 048) and the Quality of Service Standard (NRS 047).

6.7 Regulation of public benefits

As reforms are introduced into power sectors around the world, the provision of some important 'public benefit' programmes is being threatened and new programmes are not being considered. Examples of such public benefits include energy efficiency and environmental protection programmes, public-interest research and development activities, as well as programmes enabling greater access to energy by the urban and rural poor. Even though these programmes bring about substantial welfare improvements, they are often costly to implement and generally require some degree of public sector involvement. As benefits accrue to society as a whole, consumers generally do not consider investing in these goods themselves because they are also able to 'free ride' off others' investments in this same product and/or service.

Power sector reform adds new barriers inhibiting investment in these public benefits. Initiatives to commercialise state-owned utilities and introduce competition, for instance, tend to bring about even greater cost pressures. Unbundling activities remove utilities' ability to 'spread' the costs of public benefit programmes, while privatisation initiatives put pressure on enterprises to 'internalise' programme benefits, which is often not possible. New regulations to support these new contexts can also indirectly discourage the provision of various public benefits. The result is that some public benefits are being stranded by power sector reform initiatives.

On the other hand, market restructuring can allow the introduction of renewable energy technologies in ways that were simply not possible within the old vertically integrated monopolies that tended to favour large investments in fossil fuel and nuclear energy. It is always possible to put in place schemes that promote public benefits. There are many examples of countries (including the UK) where energy efficiency, combined heat and power, and renewable options are promoted within a competitive market structure.

Eskom has played a major role in financing electrification and South Africa has achieved a unique record in doubling the proportion of the population with access to electricity from one-third to two-thirds in a period of six years. Eskom has also initiated investments in demand-side management and energy efficiency measures. The government has begun to consider ways of continuing the electrification programme through a more transparent funding system linked to a National Electrification Fund and resourced from tax and dividend income and grant sources, and supported by a National Electrification Planning System. No specific provisions have been made to continue programmes in energy efficiency, renewable energy and research and development once Eskom is restructured and it divests distribution assets and operations.

The NER could develop regulatory instruments, such as a public benefits charge, to ensure that investments are made in public benefits.

6.8 Security of supply

In the past, Eskom has been the supplier of last resort and has ensured security of supply (although with some economic cost because of the huge over-investments in the 1980s and 1990s).

In a competitive market, security of supply in the short term is governed by the system operator, who is responsible for balancing supply and demand on a real-time basis. In the long term, an efficient market should send the correct signals for investors to respond to new generation (or demand-side) opportunities. Further, the use of capacity payments, linked to loss-of-load probability, can act as an additional price signal to investors as reserve margins decrease. This does not always work, however. In the UK, for example, it was simply exploited by large generators for short-term price advantage.

In the transition to a fully competitive market, it is important that the system operator undertake integrated resource planning to produce an indicative generation and demand-side plan. Regular publication of these plans assists investors in

understanding future needs of the market. The NER could play a role in ensuring that the current integrated resource planning capability in Eskom is transferred to the transmission group and becomes a public resource, rather than an exclusive strategic resource for Eskom Generation.

6.9 Combining gas and electricity regulation

The essential structure and nature of the electricity and gas industries is not dissimilar. They are both network infrastructure industries with potentially competitive sources of supply, extensive transmission and distribution systems, which tend to be natural monopolies, and retail that could be competitive. The regulatory principles for both industries are similar. In addition, gas is increasingly becoming an attractive and competitive source for electricity generation. Markets are currently being developed in South Africa for natural gas fields in Namibia and Mozambique. It makes sense, thus, for electricity and gas regulation to be undertaken by the same regulator. Many countries have gone this route, including the UK, which has recently combined its gas and electricity regulators. The South African government is considering such an option.

7. CONCLUSION

The South African electricity industry is on the brink of fundamental restructuring that is aimed at increasing competition in the sector. This paper has shown that there are profound implications for regulation and the respective roles of the Competition Commission and the National Electricity Regulator. Many of the issues are highly technical and it will be important that both these organisations play a lead role in advising the government on the way forward.

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