Electricity Supply Industry Restructuring: Options for the Organisation of Government Assets

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INTRODUCTION

From 2007 until August 2015, South Africa faced an unprecedented supply crunch in the electricity sector with Eskom, the state-owned vertically-integrated electricity company, at times unable to meet peak electricity demand resulting in recurrent load shedding. This situation has been precipitated by a number of causes, including delays in the construction and commissioning of coal-fired power stations Medupi and Kusile; Eskom’s strained financial position; unplanned outages; and maintenance requirements of ageing generation plants.

The Government of South Africa, in response to recurring electricity supply interruptions, established an Electricity War Room in late 2014 to facilitate a coordinated response between relevant Government departments and Eskom to restore electricity supply security. The War Room reports to the Deputy-President, who also established an Advisory Panel on Electricity, chaired by Prof. Anton Eberhard. Whilst the War Room has focused primarily on short-term measures, Government is also considering longer term measures to ensure sustainability of the electricity sector. In this context, a report was commissioned by Trade and Industrial Policy Strategies (“TIPS”) and Business Leadership South Africa (“BLSA”) for the Electricity War Room. It was guided by a steering committee comprising Malcolm Simpson, Dolly Mokgatle, Dr Laurain Lotter and Gaylor Montmasson-Clair, and chaired by Prof. Anton Eberhard.

This report provides an assessment of the various approaches that can be taken to re-organise state-owned electricity assets in order to address the challenges faced by the electricity supply industry (“ESI”). In particular, alternative approaches to the organisation of Eskom’s electricity assets will be reviewed, aimed at identifying ways to enable enhanced operational efficiencies and investment in the sector so that an adequate and reliable electricity service can be provided in a sustainable manner in the medium to long term.

The problem statement of this exercise is as follows:

“In order to secure an adequate, reliable and competitively-priced electricity supply,

through a financially-sustainable electricity sector with improved operational efficiencies; lower costs; and increased investment,

what are the optimal institutional arrangements for the sector, including possible restructuring of state-owned electricity assets, as well as the planning and procurement of new power infrastructure?”

The report is aimed at identifying and analysing appropriate organisational structures and the accompanying governance arrangements that would enable the State, Eskom and the private sector to provide sufficient, reliable and efficiently-priced electricity. Results from a parallel study on the impact of alternative industry reforms on Eskom’s costs, its creditworthiness and ultimately the long-term tariff path, provides empirical underpinning and is incorporated where appropriate.
The report begins with an evaluation of the current electricity sector landscape in South Africa (Section 2). This includes a discussion of previous reforms, the current structure of the industry, drivers for restructuring and a brief look at the reform agenda. In Section 3, the report examines reform drivers and international models that could be applied; providing an evaluation of alternative international approaches and case precedent. Section 4 considers possible restructuring alternatives for South Africa against a set of evaluation criteria to compare the alternatives in the South African context. The report concludes in Section 5.
2. THE SOUTH AFRICAN ELECTRICITY SECTOR LANDSCAPE

In the post-apartheid economic reform period, progress in restructuring of the South African electricity supply industry has been on-going, albeit slow-paced. On the one hand, some of the policy goals, such as the roll-out of infrastructure and electrifying millions of households, have largely been achieved. Whereas only 35% of households had access to electricity in 1990, by comparison, according to the Statistics South Africa census, 85% of households had access to electricity in 2011. On the other hand, many objectives have only partially been achieved; or not achieved at all. For the past eight years, there have been electricity supply concerns, arising either from generation or distribution failures, raising doubts regarding Eskom’s ability to consistently manage supply in order to meet demand. Since the advent of scheduled load-shedding in 2008, and its regular occurrence thereafter, consideration of reform of the electricity supply industry has resurfaced. This development has prompted a revisiting of the possibilities for restructuring of the electricity utility, as well as the sector as a whole.

2.1. ELECTRICITY SUPPLY INDUSTRY REFORMS IN SOUTH AFRICA

The need for reforms in the South African electricity sector was recognised as early as 1998 with the White Paper on Energy Policy proposing ways in which the structure of the sector, and Eskom, could be altered. Some of the key drivers of reform described in the White Paper include security of supply of energy and electricity; the ability to attract investment; managed environmental impact; improved access; reasonably priced electricity; the need for competition; the need for private sector participation; and the importance of financial sustainability.

The White Paper evaluated the structure of the electricity market and highlighted the benefits of introducing competition, which included greater variety of generation options; increased security of supply; efficiency improvements; and (potentially) lower prices. The White Paper envisioned restructuring both transmission and generation, noting: “In the long term Eskom will have to be restructured into separate generation and transmission companies.” This would include the introduction of competition into generation and new legislation ensuring open access to transmission, as well as the creation of a Southern African Power Pool.

The proposed reform of Eskom was to include the vertical unbundling of its generation and transmission businesses, a common trend across electricity reform programmes, due to the historically monopolistic nature of vertically integrated incumbents comprising transmission networks with natural monopoly characteristics. The introduction of competition, particularly in generation, in the form of private independent power producers with a choice of supplier for large, qualifying customers was given a strong recommendation. Subsequently, in 2003, the...
Horizontal unbundling of Eskom generation into competing generating units was proposed, with the aim of introducing competition at the generation level through a so-called Multi-Market Model.\(^7\) The introduction of regional electricity distributors was the final element of the proposed end-state model, to remedy what was then called the “fragmented” electricity distribution industry.

The first suite of reforms in the post-apartheid South African electricity industry saw Eskom undergo corporatisation and commercialisation, and included the establishment of the National Electricity Regulator (“NER”) in 1995. Several of the more sweeping proposed reforms did not come to fruition. The vertical unbundling of the industry, as outlined in the White Paper, and the subsequently mooted horizontal unbundling of the distribution part of the industry into six distinct Regional Electricity Distributors (REDs), designed to realise economies of scale and potentially increase investment in distribution, were not implemented as envisaged and the reform of the distribution industry into regional electricity distributors came to a halt in 2010.\(^8\)

The distribution industry reform could not be implemented given the lack of support for the necessary constitutional amendment that would loosen the hold of local government over electricity reticulation. The introduction of competition in generation via IPPs came about at a slow pace, and has only recently sped up with the implementation of the renewable energy IPP procurement programme (“REIPPPP”).

Many reforms to the electricity supply industry were mooted in the 1998 Energy White Paper, and the South African electricity sector reform experience to date is discussed below.

- **Corporatisation of Eskom (2001).** Eskom’s governance was reformed in the 1980s and Eskom was corporatised in 2001, with Government as its sole shareholder.\(^9\) Eskom was thus subject to pay taxes and dividends, although some of these obligations were deferred repeatedly.\(^10\)

- **Establishment of the National Electricity Regulator (1995).** Under the amended Electricity Act of 1995, the National Electricity Regulator (“NER”) was established.\(^11\) The NER’s mandate included licensing and monitoring of the industry as well as tariff determination.\(^12\) The NER was subsumed into a diversified energy regulator ‘NERSA’ (the National Energy Regulator of South Africa) in 2005 following implementation of the National Energy Regulator Act of 2004.\(^13\) Thus, while Eskom remained a single, vertically-integrated state-owned entity, it was subject to regulation and monitoring by NER, and later NERSA. The Electricity Regulation Act of 2006 provides NERSA with a wide-ranging mandate including licensing, registration, price and tariff regulation, monitoring and enforcement; dispute resolution; and mediation and arbitration powers.

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\(^10\) Ibid, pp. 21, 52

\(^11\) Lloyd, P., Restructuring South Africa’s Electricity Supply Industry, p. 7


\(^13\) Lloyd, P., Restructuring South Africa’s Electricity Supply Industry, p. 14
whilst entrusting the Minister of Energy with the responsibility of planning and the procurement of new generation capacity.\textsuperscript{14}

- **Introduction of IPPs.** The White Paper proposed the introduction of IPPs for additional generation; however, it did not provide a significant amount of clarity on the manner in which IPPs should be introduced, which, coupled with competing policy imperatives for Government, and a reluctance by the private sector to invest in merchant electricity generation plants in a relatively low price environment, resulted in insufficient impetus for its implementation. As electricity prices rose and the reserve margin dropped in the 2000s, attention shifted to large scale renewable energy projects that could increase supply relatively quickly. In 2009, NERSA developed Renewable Energy Feed-In Tariffs, replaced in 2011 by the Department of Energy with a competitive bidding process for renewable energy (REIPPPP) consisting of mostly solar and wind power generation technology. Independent Power Producers (IPPs) were therefore introduced into the ESI through the highly successful REIPPPP which, towards the end of 2015, had attracted R192 billion in private investment in 92 projects, contributing 6,327 MW of contracted capacity.\textsuperscript{15} The Department of Energy's (DoE) IPP unit is currently expanding the competitive procurement programme to include cogeneration, coal and gas-to-power generation projects.

- In addition to these initiatives, Eskom has entered into supply contracts with IPPs for additional generation capacity. It is estimated that as at March 2014, Eskom had contracted 253 MW of capacity through its Medium-term Power Purchase Programme (MTPPP), 585 MW of capacity through its municipal generation PPAs and 289 MW of capacity through its short term power purchase programme (STPPP).\textsuperscript{16}

- **Restructuring of distribution (2001).** In 2001, following the proposal in the White Paper, Cabinet approved a transition to distribution through six Regional Electricity Distributors (REDS), which would replace distribution by Eskom and local municipalities. The REDs were intended to rationalise distribution;\textsuperscript{17} separating it from Eskom. It was also hoped that they would improve consistency of distribution as well as standardise prices and improve tariff collection. Although the first RED was established in Cape Town in 2004, the process was halted due to constitutional challenges regarding the executive authority of local government, and the lack of support for the constitutional amendment which would have been required to remedy the situation.\textsuperscript{18}

- **Vertical unbundling of Eskom.** The White Paper indicated that separation of generation and transmission would be necessary to allow for the introduction of competition in generation.\textsuperscript{19} This requirement contributed to the introduction of the Independent Systems and market Operator (ISMO) Bill in 2011. The purpose of the ISMO Bill was to establish a system and market operator separate from Eskom. This entity would “operate or coordinate operation of the transmission system” and “trade in


\textsuperscript{16} Eskom, MYPD 3 Regulatory Clearing account Submission to NERSA (Year 2013/2015), November 2015, p.56

\textsuperscript{17} Clark, A., et al. (2005), Power sector reform in Africa: Assessing the impact on poor people, p. 21.

\textsuperscript{18} Clark, A., et al. (2005), Power sector reform in Africa: Assessing the impact on poor people, p. 21.

\textsuperscript{19} Lloyd, P., Restructuring South Africa's Electricity Supply Industry, pp. 8-9
electricity at wholesale level,” thus separating the generation and transmission functions of Eskom and placing the new generation procurement function at arm’s length to ensure access to the transmission network would be granted equitably, and IPPs would be able to participate in procurement programmes on a level playing field.\textsuperscript{20,21} However, as with the REDs, this reform was not implemented; the Bill was not enacted and is presently under review.

The figure below shows a timeline of the planned and implemented changes that have been made to the electricity sector in South Africa from 1995 to 2015 as discussed above.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Implemented and planned reforms in the South African electricity sector}
\end{figure}

\textit{Source: Genesis Analytics.}

The primary aims of most of these reforms have centred on: (i) the effective control of Eskom and thereby electricity prices; and (ii) the introduction of competition to the electricity sector through IPPs. While some of these reforms, such as the introduction of REDs, have been met with resistance, others have been introduced with varying degrees of success. In particular, while the introduction of IPPs has been protracted, the significant number of bidders indicates that some degree of competition, at least for the market,\textsuperscript{22} is possible in electricity generation. In contrast, competition in the market remains constrained by Eskom’s dominance in generation, despite the introduction of these IPPs.\textsuperscript{23}

\textsuperscript{20} Kolobe, T., Sithebe, T. (2014) Is vertical separation a prerequisite to enhancing competition in the South African energy industry, Journal of Economic and Financial Services, September 2014 7(5), pp. 533
\textsuperscript{21} Independent Market and System Operator Bill, 13 May 2011.
\textsuperscript{22} When many players can enter a market, they compete in the market for customers; on the other hand, when a market is not suitable for numerous competitors, (i.e. there is limited space for market participants, who are usually selected through an auction process), there is competition for the market.
\textsuperscript{23} Das Nair, R., Montmasson-Clair G., and Ryan, G. (2014), p. 38
2.2. CURRENT STRUCTURE OF THE ELECTRICITY INDUSTRY IN SOUTH AFRICA

The structure of the South African electricity sector most closely resembles the traditional electricity structure to be further discussed in the next section (and depicted in Figure 8). Eskom, a vertically integrated state-owned company, is responsible for most of the generation of electricity (approximately 95%), with municipalities and IPPs making up a small portion of generation capacity. Eskom also owns and operates the transmission infrastructure and a significant part of the country’s distribution industry.

Municipalities have the executive authority for electricity reticulation as per Schedule 4 of the Constitution; however, a large number of customers are supplied directly by Eskom as some municipalities do not provide electricity reticulation services and rely on Eskom as a distributor. In 2010/2011, 178 municipalities supplied approximately 40% of end-users.

Although both Eskom and municipalities are active at the distribution level, there is no competition for end-users. End-users are served by either of the distributors depending on various factors including location. The figure below shows the structure of the South African electricity sector.

Figure 2: Structure of the South African electricity sector

Source: Genesis Analytics.

Notes:
1) Although there is no direct prohibition in the legislation against IPPs being able to sell directly to customers such as distributors, there are currently significant impediments facing IPPs wishing to do so such as access to the transmission network of Eskom and the distribution networks of Eskom and municipalities at reasonable tariffs. Also, at least in the case of the existing renewable energy IPPs, they are prohibited from selling electricity to third parties in terms of the licence conditions. It is for these reasons that although IPPs can theoretically sell to customers, this does not occur in practice.
2) Although not depicted in the figure above, customers are able to generate power for their own consumption.
3) NPAs are Negotiated Pricing Agreements; that is, customers with NPAs are those who have special pricing arrangements with Eskom.
2.3. DRIVERS FOR THE RESTRUCTURING OF THE SOUTH AFRICAN ELECTRICITY INDUSTRY

In the 1970s and 1980s, the South African electricity sector experienced over-investment in capacity expansion, particularly from Eskom, which, combined with a low level of electrification of the South African population during the Apartheid regime, led to low utilisation rates of electricity generation capacity in the early 1990s. However, post-1994 South Africa soon found itself in need of reforms to address the typical electricity supply challenges in developing countries, dubbed ‘reform drivers’ in this report, including: (i) shortfalls in generation capacity; (ii) unreliable electricity supply; (iii) the need to provide affordable access to electricity for the poor; and (iv) challenges in ensuring the efficient operation of the state-owned electricity utility. Several of these problems persist and are the main influences behind the current consideration to implement some further restructuring of the electricity sector. The diagram below illustrates the four main drivers, as well as several secondary drivers, to consider. 

Figure 3: Drivers of reform in South Africa

Unreliability and inadequacy of supply

Against the background of considerable spare generation capacity in the mid-1990s, and a reserve margin of 40%, from 2007 onwards, South Africa found itself experiencing intermittent load shedding due to insufficient generation capacity. There are three major reasons for this. Firstly, for many years, there were restricted opportunities for private investment in power generation as South Africa “failed to create the conditions for adequate investment in major required energy infrastructure investments.” Secondly, the public sector itself (either through Eskom or otherwise) failed to make adequate and timely investments in

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the energy sector in the past 20 years to meet growing demand. At present Eskom’s investment in additional generation capacity is markedly behind schedule and significantly over budget. Thirdly, the availability of Eskom’s existing power stations has declined precipitously owing to a lack of adequate and appropriate maintenance and additional strain caused by the shortness of supply. The electricity sector thus faced a number of problems related to supply that would be at times inadequate and unreliable.

The Electricity War Room’s plan five point plan was designed to minimise strain on the electricity system in the short term and thus alleviate problems associated with the shortfall in supply and its lack of reliability. This includes: (i) improved maintenance and operational practices, (ii) extension of co-generation contracts with the private sector, (iii) acceleration of the gas-to-power programme, (iv) introduction of a coal IPP programme and (v) demand side management.

At the time of conclusion of this report in April 2016, no load shedding had occurred since August 2015. Unfortunately, this was largely due to demand side factors. Firstly, a slowdown in economic growth resulted in reduced demand for electricity. Secondly, many energy-intensive users continued to be encouraged to reduce their consumption to alleviate the supply crunch. Thus, although current supply is adequate to avoid load shedding, it is only adequate under these conditions of dampened demand, and the underlying causes for the unreliable and insufficient supply still need to be addressed.

**Inadequacy of supply / shortfall in generation capacity.** After an abundance of new generation investment in the 1970s and 1980s, there were long delays before further new investment was undertaken. A delayed start to Eskom’s investment in additional generation capacity, followed by significant construction delays resulted in the growth in demand for electricity far out-stripping the growth in generation capacity resulting in a supply shortfall, particularly during peak demand and at times unplanned outages in generation are higher than expected. Figure 4 illustrates the increase in unplanned outages between 2012 and 2014, based on the unplanned capacity loss factor (UCLF).

**Figure 4: Unplanned outages (2012-2014)**

![Unplanned outages chart](image)

*Source: NERSA System adequacy outlook, issue 6: 14 January 2015, table 2*

Where investment in generation has occurred, for example in the construction of Medupi and Kusile, it has been plagued by delays. The first unit of Medupi achieved its full load in May 2015, roughly three years late.\textsuperscript{33} Similarly, Kusile was originally expected to be commissioned in 2014, yet at the time of conclusion of this report, recent estimates expect the first unit only to be completed by mid-2017.\textsuperscript{34}

While investment has yielded some additional generation capacity, South Africa is still experiencing a shortfall in generation capacity.

- Prior to Medupi coming online, Eskom’s total installed generation capacity increased from 44 115MW to 44 281MW (only 166MW more) between 2010 and (March) 2015.\textsuperscript{35}

- The original Integrated Resource Plan 2010-2030 (IRP) anticipated that Medupi would have added 2,888MW to the grid between 2010 and 2015; however, due to delays, only 800 MW were commissioned.\textsuperscript{36}

- In addition, the Renewable Energy IPP Programme had procured 4 116MW as at April 2015 installed and further capacity will be added as projects are completed.\textsuperscript{37} Eskom’s financial statements indicate that as at 31 March 2015, 1 795 MW of renewable IPP capacity is online.\textsuperscript{38}

Despite this, there is a shortfall in the addition of generation capacity when one considers the estimates provided in the updated Integrated Resource Plan 2010-2030 of 2013 (‘updated IRP’), which indicated that between 2010 and 2015 an additional 11 115MW would be added to the grid.

At the same time, demand has been dampened by the global economic crisis and thus the shortfall in supply has had less severe consequences than would otherwise have been the case. The figure below reflects the decreasing peak demand since 2010.

\textsuperscript{33} Initial reports from Eskom (dated August 2007 expected the first unit to begin supplying the national grid within four to five years (i.e. at latest by 2012), \url{http://www.eskom.co.za/Whatweredoing/NewBuild/MedupiPowerStation/Pages/Medupi_Sod_Turning_Press_Release.aspx}.

\textsuperscript{34} Kusile Power Station Project, available from: \url{http://www.eskom.co.za/Whatweredoing/NewBuild/Pages/Kusile_Power_Station.aspx}.


\textsuperscript{37} ‘Department of Energy, 2015, Renewable energy IPP procurement program, Bid window 4: Preferred bidders’ announcement, 16 April 2015, Available: \url{file:///C:/Users/Tshekishik/Desktop/Renewables_IPP_ProcurementProgramme_WindowFourAnnouncement%20Apr%202015.pdf}.

\textsuperscript{38} Eskom’s Annual Financial Statements 2015, p.10
The downward shift in peak demand is further demonstrated by a comparison of weekly peak demand data of 2014 and 2015, which during the week of highest year-on-year reduction in peak demand is more than 3 000MW below the previous year’s weekly peak. Such a dramatic reduction in peak demand in a tight reserve situation will, regardless of the cause of the reduction, provide room for planned maintenance and postpone imminent supply crunches. It does not equate however, to improved supply capability or enhanced operational efficiencies.

Source: NERSA, System Adequacy Outlook, Issue 6, 14 January 2015
Unreliability of supply. Another factor that has exacerbated the shortfall in generation capacity is the lack of reliability of Eskom’s aging generation fleet, often resulting in unplanned outages and load shedding. There are a number of reasons for this:

- With tight reserve margins, sometimes bordering on a “zero” reserve margin because of the stress under which the system is placed, the majority of the current generating fleet at times runs above optimal capacity, and baseload plants are used for load-following. In June 2013, for instance, the average available operating reserve over the peak period was below 3%, while a reserve margin of 15% is considered normal. This, coupled with deferred maintenance, has resulted in overstressed assets and unplanned outages;

- The majority of the power stations are more than 30 years old, therefore requiring significant maintenance at an ever-increasing rate. The age and the utilisation of the power stations means that more timely maintenance is required, and generation assets are typically not able to generate electricity during maintenance. Even plants that have been returned to service require significant maintenance due to their age and a lack of maintenance while these plants were out of service. Thus, the lack of spare capacity puts further stress on the system, which can result in unplanned outages that, in turn, can lead to load shedding. In a vicious cycle, additional causes of load shedding, such as a shortage of supply, force Eskom to postpone much of the required maintenance resulting in increased unplanned outages.

- Electricity outages have negatively affected the economy, although the extent of the impact is difficult to quantify. Electricity outages seriously hinder manufacturing as well as many other sectors, and the unreliable supply of electricity has adversely affected output in manufacturing and mining in particular. Due to a number of factors including the unreliable supply of electricity, growth forecasts have been revised downwards for 2015.

The critical challenge for the power sector is thus to restore security of electricity supply and ensure sufficient electricity is generated to meet demand. In order to achieve this, Eskom’s investment in additional generation capacity must be (more) carefully managed so as to avoid further delays and cost overruns, and so that appropriate maintenance can be carried out on existing facilities. Furthermore, the reserve margin should be maintained at the efficient and appropriate level to avoid problems with system stability and to minimise the need for load shedding. The promotion of private funding of new generation capacity would assist in several ways, as it would reduce the pressure on Eskom to raise (debt and equity) funding for 70% or more of the entire new build programme as contained in the updated IRP 2010; and would delay tariff increases due to the fact that IPPs are only compensated after commissioning of the capacity and would not put upward pressure on average tariffs during their construction.

39 Eskom, MYPD 3 Regulatory Clearing account Submission to NERSA (Year 2013/2015), November 2015, pp.128
45 National Treasury (2015), Budget review 2015.
Further, private funding of generation capacity allows for strict enforcement of PPAs by the regulator, minimising the scope for cost overruns and ‘re-openers,’ and would allow competition for the market, reducing costs to their efficient and competitive levels.

Concerns about long-term financial sustainability of Eskom and the sector

A significant factor in the debate regarding the optimal design and functioning of the ESI is the extent to which the current funding arrangements are sustainable. The financial sustainability of Eskom and the sector as a whole have been dramatically affected by the current cycle of generation and transmission capacity investment, resulting from an ageing fleet of plants and delays in investment in new generation capacity during the early 2000s.

Historically, Eskom funded its investments entirely from current cash flows and private debt, mostly bonds. However, in recent years Eskom has lost its investment grade rating (seemingly due to concerns surrounding the funding of capital expansion) thereby facing an increase in its cost of debt. Despite the stringent minimum equity requirements placed on IPPs in the REIPPPP, only minimal equity has been provided to Eskom by its shareholder in comparison. In 2008 Government provided an equity injection of R60 billion (initially as a subordinated loan, later converted to equity) in order to ensure Eskom’s financial sustainability. In 2015, Government provided a second equity injection amounting to R22 billion to bolster Eskom’s balance sheet, particularly to enhance its ability to borrow the required funds for the outsized new build programme.

Eskom has also recently experienced significant liquidity challenges. While these have been temporarily alleviated by the 2015 equity injection and may be further ameliorated by the 9.4% price increase granted in March 2016, Eskom’s long term financial sustainability remains a challenge. Eskom’s revenue is under pressure from declining electricity sales and Eskom’s reserves are insufficient to fund the significant investment in new generation capacity that is required in terms of the IRP 2010. Cost increases (and capital expenditure cost overruns) also impact Eskom’s profitability. Moreover, in order to fund the required generation capacity expansion, Eskom requires significant additional debt, at increasing costs.

In its MYPD3 application of 2012, Eskom indicated a R300 billion funding requirement to fund its expansion in generation capacity. However, there have already been cost overruns and, moreover, delays to the completion of several units. For example, there have been significant cost overruns in the construction of Medupi, and delays in commissioning both Medupi and Kusile will result in further overruns. These delays have forced Eskom to rely on diesel-fired Open Cycle Gas Turbines (“OCGTs”) for supply, thus incurring additional costs. When Eskom in 2015 applied for a so-called ‘selective reopener’ of the tariff determination for the period 2013-2018, inter alia in order to pass through these additional costs, NERSA did not approve the re-opener, instructing the utility to apply for a reconciliation of the balances on its Regulatory Clearing Account (“RCA”) in line with its regulatory methodology instead.

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50 Eskom, MYPD 3 Re-opener for selective items (2015/16 – 2017/18) OCGTs and STPPP including the impact of the environmental levy changes, 30 April 2015, pp. 3-4
51 Eskom, MYPD 3 Revenue application (2013/14 – 2017/18), October 2012, p. 79
52 Eskom, MYPD 3 Regulatory Clearing account Submission to NERSA (2013/2015), November 2015, pp.139-144
53 NERSA’s Reasons for Decision regarding Eskom’s Selective Re-opener of the MYPD3 application for OCGTs and STPPP and impact of increase in Environmental Levy.
regulatory lags and the running of costly peak generation options for much longer than intended, add a significant toll on Eskom’s liquidity.

Eskom claims its current prices are not cost-reflective, thereby affecting its ability to raise capital to finance its expansion. "If electricity pricing does not reflect the cost of producing and supplying electricity, the resulting poor financial performance and probable downgrade in Eskom’s credit rating will make it difficult to raise capital to finance this expansion." Although it is incorrect to state that prices are not cost-reflective, as NERSA’s MYPD2 and MYPD3 decisions clearly indicate that all Eskom’s prudently incurred costs as well as a return on investment are incorporated in the approved average tariff, it is true that it would not be sustainable for Eskom to fund its investment in new generation capacity out of current cash flows. It is also undesirable to hike electricity prices to the high levels applied for by Eskom in an effort to enhance its balance sheet to appease ratings agencies, as this would lead to inter-generational equity concerns (current users of electricity would pay upfront for capacity for the benefit of future users) and would be tantamount to a regressive tax, in an unfavourable economic climate.

These mounting sustainability challenges are cause for considering structural changes to the electricity industry, such as separating Eskom’s businesses and the introduction of competition in generation through an increased role for IPPs.

Rising costs resulting in higher electricity prices

As a result of the overinvestment in generation capacity during the 1970s and 1980s, and abundant inexpensive local coal supplies, electricity prices in the 1990s were relatively low and declining in real terms between 1990 and 2000. By the time these planning errors and the inevitable inefficiencies of the vertically integrated utility model were recognised and IPPs were sought, investment in generation facilities had halted, whilst demand had increased drastically and disproportionately compared to capacity. This, combined with a change in the methodology for determining the value of the regulatory asset base from historical cost to replacement cost, resulted in sustained and significant year-on-year price increases from 2007 onwards, with nominal prices increasing by 277% between 2006/2007 and 2014/2015. Prices are expected to continue to rise over the next few years in order to:

- Fund new investment/new generation requirements;
- Fund current generation capacity – such as maintenance costs and capital cost overruns (Medupi and Kusile, for example);
- To address rising primary energy costs - coal is Eskom’s single largest cost component, and Eskom projects cost increases of 10% per annum; additionally, in

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54 Eskom, MYPD 3 Revenue application (2013/14 – 2017/18), October 2012, p. 50
55 NERSA’s MYPD Methodology is intended to determine revenues using “a cost-of-service-based methodology with incentives for cost savings and efficient and prudent procurement by the licensee (Eskom)”. Thus NERSA calculates tariffs based on expected costs, which may differ from actual costs. However, there is the Regulatory Clearing Account that reconciles the expected costs with the actual costs incurred. Depending on whether actual costs were higher or lower than expected, Eskom is either allowed to recover the additional costs incurred through higher tariffs or consumers are compensated through lower tariffs.
56 Deloitte, The economic impact of electricity price increases on various sectors of the South African economy: A consolidated view based on findings of existing research, p.38
59 Eskom, MYPD 3 Revenue application (2013/14 – 2017/18), October 2012, pp. 13-14
order to manage the supply shortfall, the use of the OCGTs has been necessary, resulting in increased diesel costs estimated to amount to R12.5 billion per annum.

- To compensate for lower demand, resulting from load-shedding, subdued economic growth and some consumers migrating to alternate energy sources, that reduce the revenues recovered by Eskom, thereby reducing the reserves available for funding capital expansion plans; and

- To cover increased debt repayments due to a higher cost of debt.

Eskom has been unable to effectively control its primary energy costs and construction cost overruns in its endeavours to increase generation capacity and this is a significant driver for considering a different industry model with stronger incentives for cost efficiencies.

The figure below shows the past and planned price increases from 2006/07 to 2017/18. The nominal average prices are represented by the blue bars and are measured on the left-hand side y-axis. The annual percentage price increase is represented by the green line and measured on the right-hand side y-axis.

**Figure 6: Eskom nominal electricity prices (2006/07-2017/18)**

*Sources: Eskom MYPD3 selective re-opener submission, 30 April 2015  
NERSA MYPD3 decision, 28 February 2013.  
Eskom’s history of average price increases, available: [http://www.eskom.co.za/CustomerCare/TariffsAndCharges/Pages/Tariff_History.aspx](http://www.eskom.co.za/CustomerCare/TariffsAndCharges/Pages/Tariff_History.aspx)*

In addition to its approved tariff increases for the period 2013/4-2017/8, Eskom applied for a ‘selective reopener’ for additional cost recovery. The reopener consisted of funds for additional future costs, involving OCGTs and STPPPs, requiring an additional R32.9bn for OCGTs and

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60 Eskom, MYPD 3 Re-opener for selective items (2015/16 – 2017/18) OCGTs and STPPP including the impact of the environmental levy changes, 30 April 2015, p.11
R19.9bn for STPPP for the period 2015/16 - 2017/18.\textsuperscript{61} NERSA denied the request, as the Multi-Year Price Determination provides for ex-post re-openers, not ex-ante increases in prices in anticipation of higher future costs and as the re-opener did not include all of Eskom’s cost categories but rather a selected few. Toward the end of 2015 Eskom applied for the recovery of higher than expected costs incurred through a reconciliation of the regulatory clearing account mechanism. Thus, Eskom clearly faces increased costs and furthermore, is likely to require increased funding (either from electricity sales or through equity and debt) in order to manage its balance sheet.

In order to increase efficiencies in the construction and operation of additional generation capacity, competition for the market in generation is highly recommended, and in order to reduce the burden of Eskom on the fiscus, private funding of generation capacity is desired. These changes will need to yield significant efficiencies to counteract rising costs associated with inflation, primary energy costs and maintenance costs. A significant positive outcome of allowing private sector generation companies to compete for the market, is that the need for immediate price increases to buttress Eskom’s balance sheet is reduced, allowing consolidation of its balance sheet and a focus on its core functions.

Secondary factors to consider

Although the issues raised above may be the main drivers behind the current need to reform the sector, the reform drivers that assist in determining the appropriate reform model for the sector need not be limited to these issues. Ideally, the reform model should be more ambitious and identify a vision for the sector based on Government’s various energy policy goals more broadly, including affordability, access for the poor and reduced environmental impact. It is also important to note that prioritising one driver will have implications for the ability to achieve other drivers and a careful balancing of priorities is required.\textsuperscript{62} Furthermore, while addressing energy priorities is critical, other economic priories must also be considered as they too will be affected. Ultimately, trade-offs are inevitable.\textsuperscript{63} Therefore, a careful balancing act is required between the different drivers/priorities with the knowledge that all objectives may not be achieved simultaneously.

Other drivers or priorities for South Africa include:

- \textit{Environmental sustainability} – Decisions regarding the energy mix of South Africa’s ESI should take into account the potential environmental impact. The South African Government has made several commitments relating to minimising the environmental impact of South Africa’s energy mix which must be considered. These include, for example, a 34\% reduction in greenhouse gas emissions by 2020.\textsuperscript{64}

- \textit{Lack of energy access for the poor} – There are two elements to ensuring access for the poor. Firstly, new connections are essential to ensure physical access; this requires investment in and maintenance of transmission and distribution infrastructure. Currently, All Media and Products Survey (AMPS) 2015 Household data indicates a 94\% penetration rate in South Africa. Secondly, affordability must be addressed in order to ensure that the poor can utilise electricity via the connections made available.

\textsuperscript{61} Eskom, MYPD 3 Re-opener for selective items (2015/16 – 2017/18) OCGTs and STPPP including the impact of the environmental levy changes, 30 April 2015.
\textsuperscript{62} Das Nair, R., Montmasson-Clair G., and Ryan, G. (2014), p. 45
\textsuperscript{63} Das Nair, R., Montmasson-Clair G., and Ryan, G. (2014), p. 46
\textsuperscript{64} Media statement regarding the publication of the Draft Carbon Tax Bill for public comment issued on 2 November 2015 by National Treasury, p. 1
Inability to attract private investment in generation – The current structure provides incentives, whether real or perceived, for Eskom, as generator and system operator, to exclude competing generators. Therefore, following from the goal of ensuring long term financial sustainability, the model must also be designed to provide assurances that generation capacity will be fairly dispatched in order to attract (long term) investment in generation. This requires appropriate policy; as well as legislative and regulatory frameworks. Investors also require policy and regulatory certainty and, to some extent, predictability.

Therefore, in order to achieve the desired outcomes of adequate and reliable supply that is competitively priced, and to ensure a financially sustainable sector, these drivers for reform must be addressed. In order to do so, certain requirements, as illustrated in

Figure 7: Summary of reform agenda for the South African electricity supply industry below, must be met.

Constraints to consider

Potential changes to the electricity supply industry are constrained by two factors:

- Firstly, there is limited availability of government funding for equity investment, particularly given the extent of funding required for investment in additional generation capacity.

- Secondly, given the financial challenges facing the industry, there is a significant need for a practical and cost-effective intervention. If an intervention is particularly onerous, or costly, it will simply hinder the development of the industry further.

2.4. SUMMARY OF REFORM AGENDA FOR THE SOUTH AFRICAN ELECTRICITY SUPPLY INDUSTRY

Given the current challenges facing the industry, it is clear that some changes are necessary. It is in this context that we consider possible changes to the structure of the industry to determine whether there are more feasible and sustainable options. The analysis is organised with a view to determining the best structure to achieve the desired outcomes: (i) sufficient and reliable electricity supply; (ii) financial sustainability for Eskom and the industry; and (iii) efficient and reasonable electricity prices. These outcomes are primarily driven by four factors (insufficient electricity supply; unreliable electricity supply; Eskom’s lack of financial sustainability; and rising electricity prices) and constrained by limited availability of government funding for equity investment and the need for a practical and cost-effective intervention.

There are a number of other factors that may be considered as highlighted in Figure 3 above. However, we focus on these four as we understand that these are the primary concerns regarding the electricity sector. These concerns have such a fundamental impact on the performance of the industry that it is only by firstly addressing these issues that can South Africa attempt to address the secondary concerns.
Figure 7: Summary of reform agenda for the South African electricity supply industry

- Insufficient electricity supply
- Unreliable electricity supply
- Eskom’s lack of financial sustainability
- Rising electricity prices
- Limited government funding available for equity investment
- Practical and cost effective intervention

Desired industry outcomes:
- Sufficient and reliable electricity supply
- Financial sustainability for Eskom and the industry
- Efficient and reasonable electricity prices
3. REFORM DRIVERS AND MODELS OF REFORM

The need for ESI reform is not unique to South Africa and neither are the drivers of the reforms. Many jurisdictions have tackled the reform of their ESI in the past. An analysis of these reforms highlights many similarities between nations in the drivers of reform, as well as the reforms undertaken.

The importance of electricity in the production of almost all goods and many services in an economy has made it an indispensable requirement for social welfare and economic development. Electricity has to be adequate, reliable and competitively priced in order for the economy to be productive and competitive.

The impact of inadequate or unreliable supply can be observed from the recent periods of load shedding in South Africa. Despite cumulative price increases, demand responses have been muted, whilst the supply constraints and interruptions have affected businesses negatively to the extent that they have been identified - by the National Treasury and the International Monetary Fund for example – as one of the immediate hindrances of economic growth for the country.65

The effect of these challenges (including the unreliable electricity supply, reduced household consumption and a slowing world economy) has been that economic growth has stalled and growth forecasts have been revised downwards by the National Treasury.66 South Africa has become as less attractive investment destination as some rating agencies have downgraded the country’s credit rating.67

These issues are by no means unique to South Africa, and many countries have embarked on processes to change the manner in which their ESI is structured in order to increase competitiveness, attract investment and ensure adequate supply. Similarities between these reform drivers in different countries are apparent, despite different ESI structure and outcomes, and the level of economic development of the country in question. The common reform drivers are identified in the section below.

3.1. DRIVERS OF REFORMS IN INTERNATIONAL JURISDICTIONS

In different parts of the world, reforms and restructuring of the electricity sector first began in the early 1980s. At this point the electricity sectors in almost all countries were characterised by the traditional electricity sector structure, which consisted of one (often state-owned) vertically-integrated entity owning all generation and transmission capacity as well as performing all systems operations. In some instances, the vertically-integrated entity also owned the distribution system, as is partly the case in South Africa where either municipalities or Eskom own the distribution network.

This traditional structure emerged in many countries due to the complementarities that exist (or existed) between generation and transmission that bring about economies of scale and

66 National Treasury (2015), Budget review 2015, p. 19
In addition, the traditional structure helps to achieve the simultaneous optimisation of generator dispatch and transmission capacity that is needed for low cost production. It also facilitates the coordination of investment decisions at all links in the supply chain that is required for long-run efficiency. Transmission and distribution networks exhibit typical network characteristics, in particular natural monopoly aspects as the networks consist of high sunk costs that cannot be duplicated at a reasonable cost, thereby resulting in a situation where the lowest per unit cost is achieved by a single supplier. Traditionally, potential competitors face significant barriers in such industries. The figure below shows the traditional electricity sector structure.

**Figure 8: Traditional electricity sector structure**

Over time, several disadvantages of this structure became apparent. In the case of a state-owned vertically-integrated utility, fiscal constraints typically limit the utility’s investment capacity whilst socio-economic policy objectives tend to constrain prices, thereby creating challenges for utilities, particularly in developing countries where infrastructure roll-out may be required. The ESIs would suffer from typical monopoly outcomes such as an absence of competitive pressures on prices and service offerings, a lack of innovation and poor investment decisions (or even no investment at all). Increasingly therefore, reforms became necessary across many countries.

The particular ingredients of the reform programmes varied across countries as these tended to be driven by the level of development and performance of the electricity sector in a specific country. Furthermore, the reforms would be informed by the economic and energy policies of each country and take the economic circumstances into consideration.

Most developing countries did not have abundant affordable generation capacity or highly developed transmission and distribution networks, resulting in inadequate electricity supply.

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outcomes for economic development. The main drivers for reform in these countries included the following:71

- **Energy shortages due to insufficient generation capacity** – Due to their particular stage of economic development, many developing countries have a rapidly increasing demand for electricity. Global net electricity consumption was projected to grow by only 112% per annum between 1999 and 2020, but by as much as 302% in developing countries.72 In some instances the inability of the public sector to raise funds, and the inefficiency of vertically-integrated utilities with monopoly positions, whether state owned or otherwise, meant that generation capacity did not grow as quickly as demand. The rapid increase in demand also placed a greater burden on the existing infrastructure leading to greater wear and tear resulting in higher maintenance costs. This is the case in South Africa as well as in Tanzania. In Tanzania, this has prompted the development of a detailed roadmap of reform by the Ministry of Energy and Minerals, published in 2014.73

- **Poor operational and economic efficiency of state-owned vertically-integrated utilities** – State dominated energy sectors tended to operate with poor supervision as well as so-called soft budget constraints. This often led to the sector employing too many staff, inefficiencies and political interference.74 Soft budget constraints allow the state-owned entities greater access to financing, at times at preferential rates, lowering their financing costs. Similarly the lack of competition and threat of entry faced by monopolistic utilities reduced the incentives to cut costs, enhance service offerings or innovate.

  o State-owned enterprises may be spared the same profitability requirements that are faced by private companies, especially from shareholders. As a result, these enterprises may suffer from low productivity and inefficiency with regards to cost minimisation.

  o Finally, state-owned entities may be required to bring about socio-economic policy outcomes that are at odds with profit maximisation. For example, in order to provide universal access to electricity, significant investment in transmission and distribution infrastructure may be required. However, in order for the electricity to be affordable, the electricity utility may need to charge a price that is less than cost reflective. In the long term, this affects the sustainability of the utility and also prevents it from undertaking further investment in order to increase generation and transmission capacity.

- **Inability of the public sector to raise sufficient capital** – Rising electricity demand in developing countries often means there is a lack of spare capacity, be it in generation, transmission or distribution infrastructure. Substantial investment is often needed, yet the traditional structure is not well suited to providing the strong balance sheets that are required for making costly and lumpy long-term investments in infrastructure that

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are required. In the long-run as inflation and budget pressures increase, the margins of the vertically integrated entities are squeezed. This means there may be insufficient funds available for the maintenance of existing facilities or for investing in new facilities.\textsuperscript{75}

- **Low access rates to electricity and affordability concerns** – In addition to the problem of insufficient generating capacity, transmission and distribution networks are often not sufficiently developed and well maintained to service the entire population.\textsuperscript{76} Dubash notes:

> “The rural poor, in particular, are often costly to serve because of remote locations and low population density, high transmission line losses, poor credit and minimal collateral, and a lack of purchasing and political power.”\textsuperscript{77}

High costs of extending the networks and insufficient generation capacity result in low incentives to expand access; whilst profit is not always a strong enough driver. Thus, vertical unbundling, which allows competition in parts of the ESI, may assist with expanding access to electricity supply. Furthermore, without competition and/or regulation, prices are likely to remain elevated. This affects affordability, particularly in areas that are difficult to reach.

The drivers for reform in electricity sectors in developed countries were mainly around seeking cost reductions, improved efficiencies and lower prices. The emphasis was on introducing competition and increased private participation. Advances in generation options with lower investment costs – such as gas turbines – meant that competition was possible in the generation sector and also in retail supply.\textsuperscript{78} New industry models began to emerge that unbundled the potentially competitive elements of the electricity supply industry – such as generation – from the natural monopoly wires part – transmission and distribution.

### 3.2. SEQUENCING OF REFORMS AND MODELS OF ELECTRICITY SECTOR REFORM

Among the first to enact reforms in their electricity sectors were Chile, the USA, England, Wales and Norway. These ‘pioneers’ tackled the need for reforms based mostly on untested theory.\textsuperscript{79} Each country had its own approach but common elements included the introduction of competition and the shift towards a private sector model of operation, which they regarded as being more efficient.\textsuperscript{80} It was through the experiences of these countries, that an understanding of the required elements of reform was gained. In addition, the sequence in which these elements had to progress in order to derive the optimal outcome was determined. This sequence came to be known as the standard model for electricity sector reform.\textsuperscript{81}

The key steps are depicted in the figure below and ordered as follows: corporatisation, which entails separating the power utility from the state; commercialisation; passing requisite

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\textsuperscript{75} Kessides, I. N. (2004), pg. 136-137.
\textsuperscript{77} Dubash, N., Equity and environment in electricity reform, World Resources Institute, p.20.
legislation; establishing an independent regulator; sector restructuring, typically through unbundling; introducing independent power producers; divesting state ownership of both generation and distribution assets, either in part or in full; and finally, introducing competition in wholesale and/or retail markets.

**Figure 9: The sequencing of electricity sector reform**

- **Corporatisation**
  - Separating the power utility (from the ministry or government) into its own legal entity, with all corresponding rights and obligations

- **Commercialisation**
  - Introducing cost-recovery pricing along with improvements in metering, billing, and revenue collection
  - Adopting internationally accepted accounting practices

- **Requisite legislation**
  - Passing legislation to provide a legal mandate for restructuring which also allows private and foreign participation and ownership in the sector

- **Independent regulator/s**
  - Establishing regulatory bodies to ensure efficiency, transparency, and fairness; including: preventing anti-competitive behaviour; incentivising investment; and protecting customers

- **Sector restructuring**
  - Unbundling the state-owned utility vertically and/or horizontally into separate generation, transmission and distribution companies to prepare to privatise assets and introduce competition

*Source: Genesis*

Though it is referred to as a ‘model,’ the key contribution of the figure above to electricity sector reform is not the steps themselves but rather the sequence of the steps. On the one hand, empirical evidence suggests that when reforms are well designed and implemented in the proper sequence, the operating performance of the electricity sector can be greatly improved. On the other hand, failure to adhere to the sequence can have costly consequences.\(^{82}\)

An example of the consequences of following the ‘incorrect’ sequence is provided by Brazil. Privatisation of the distribution segment of the ESI took place prior to the passing of requisite legislation and the establishment of an adequate regulatory framework to govern the wholesale electricity market. The Brazilian government decided to suspend its electricity sector investment program after privatisation, anticipating higher private investment. At the same time, the lack of certainty deterred private companies from investing in greenfield projects. The result was a sharp fall in investment in generation capacity.\(^{83}\)

Experience with the implementation of this standard sequence for sector reform has also raised concerns regarding its applicability to electricity sectors in all countries. In particular, implementing the steps in the sequence prescribed in developing countries has proven problematic. Very few developing countries (none in Africa) have fully adopted the standard

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\(^{83}\) E. L. F. de Almeida and H. Q. Pinto Junior (2004), Reform in the Brazilian electricity industry: The search for a new model, pg. 9-11.
model.\textsuperscript{84} Some countries lacked certain requirements for the standard reform model to be successful. As noted by Kessides:

“Full implementation of the standard reform model—especially effective regulation, vertical or horizontal unbundling, and wholesale and retail competition—has several institutional prerequisites that most developing countries lack, including issues relating to commitment to reform, scale of the industry, and legal and financial infrastructure.”\textsuperscript{85}

Another issue that emerged was that small countries, countries with low demand or countries with inadequate transmission systems were perhaps better suited to having the electricity sector operate under a monopoly utility.\textsuperscript{86} The result was that in many parts of the world, the entire sequence of reforms that comprise the standard ‘model’ were not implemented (or not implemented in the correct order) and the sectors evolved into a hybrid market structure where the sector is not completely unbundled, privatised or competitive and public and private investment coexist.\textsuperscript{87}

The South African electricity sector has undergone the first four steps of the standard sequence: (i) Eskom was corporatised and (ii) commercialised; (iii) legislation was enacted and (iv) a regulator (NER later NERSA) was established to regulate the sector. However, minimal progress has been made with regards to vertical unbundling and there has been no divestiture of state assets nor any implementation of wholesale or retail competition.\textsuperscript{88}

3.2.1. The eras of electricity sector reform

Many countries around the world have reformed their electricity sectors from being dominated by a state-owned vertically-integrated utility company to a sector where there are several companies competing at some of the different levels of the supply chain.

The approach adopted in different countries generally depends on the country’s stage of economic development; the state and structure of the electricity sector; and the objectives of the reforms. This often results in hybrid electricity markets in developing countries in which independent power producers complement state-owned utilities. This is in contrast to the models of ownership seen more commonly in developed countries, where unbundled transmission and independent transmission system operators coupled with competitive generation are more commonplace.

Despite the differences in the reforms themselves, developing countries’ reasons for reform appear to emanate from drivers that are common across this group of countries, whereas the same is true for developed countries that displayed their own distinct set of drivers. As a result, depending on whether the countries are developing or developed, similar steps were taken in the reforms. Most countries analysed for this report have experienced eras or ‘waves’ of reforms. The waves represent an approach to reforms and occurred on a per-country-basis. That is to say, not all countries experienced the first and second waves of reform in the same period.

\textsuperscript{85}Kessides, I. N., (2012), p. 3.
Generally, the first wave of reforms incorporated the introduction of or additional economic regulation – usually through an independent regulatory body – as well as preliminary structural changes.

A key reform driver involves regulatory challenges or an absence of regulation. These issues included the appropriate regulation for the introduction and oversight of IPPs (Kenya),

inconsistent and excessive regulation (China),

inappropriate tariff regimes (Brazil),

and the need for regulatory bodies to give oversight and implement policy (the EU and Brazil). In order to address these types of challenges, regulatory bodies were established fairly early in the first wave of reforms, as was seen in Kenya in 1997 and Brazil in 1996.

The establishment of regulatory bodies was recommended in the first European Directive of 1996 (“1996 Directive”). In China, regulatory responsibilities were allocated to different bodies. However, the establishment of regulators, even independent ones, did not always resolve all regulatory issues. In Brazil, for example, there was a change in the manner in which reforms were pursued in the second wave of reform in order to address unintended outcomes arising from the first wave.

Countries addressed affordability through different means or in conjunction with other drivers. For example, in Kenya, low penetration and lack of access were addressed, together with high prices, through unbundling and the creation of new transmission and distribution companies.

Several measures were undertaken in various countries to increase competition with the intention of stimulating investment (typically private sector investment) and ensuring adequate and reliable supply:

- **Independent system operator.** In Brazil, an independent system operator was established in the first wave in 1998 to manage transmission services equitably. Similarly, the EU recommended an independent system operator in its 1996 first Directive.

- **Unbundling.** Some degree of unbundling took place within the first wave of reform for Kenya and Brazil, and unbundling was recommended in the EU Directive of 1996 in the form of separate internal accounts for the generation, transmission and distribution activities of utilities.

  - In Kenya, the unbundling resulted in several independent structures, including Kenya Electricity Generating Company (“KenGen”), a state-owned company solely responsible for generation; Kenyan Power and Lighting Company (“KPLC”), responsible for

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distribution and transmission networks; and the Electricity Regulatory Board, the regulator.99

- In Brazil, the first wave of reform included a limited variant of unbundling, in the form of account separation for generation, transmission and distribution functions.100

- **Private investment.** Private investment in various sectors of the industry was encouraged at different stages. In China, private investment was introduced early in the reforms in 1985 to compensate for limited domestic public funding. The reforms were part of China’s move to a market economy as well as a means to tackle the inefficiencies associated with having a power utility that was a monopoly.101 However, as state-owned enterprises gained access to stock markets and thus increased funding, and benefited from low-interest government loans, private capital became less necessary, and state support (in the form of prescribed benefits, terms and conditions) diminished, resulting in the departure of private investment from the market.102 In Brazil, IPPs were introduced at the start of the first wave of reforms, whilst privatisation of distribution occurred towards the end of the first wave.103

Despite initiating the reform of the electricity sectors in many countries, the first wave of reforms fell short in addressing some of the key drivers that motivated the reforms. Many countries found that the implemented reforms did not send adequate signals to investors and as a result, the amount of investment attracted was below the anticipated level and in some instances insufficient.104 Also, in implementing reforms, some countries did not pay enough attention to the foundations of the traditional electricity supply industry that ensured the proper function of the industry, regardless of the market structure that prevails. For instance, leaving the functioning of the ESI to market forces may not be appropriate to address certain challenges facing the ESI.

Some countries entered into second and third waves of reform. In most cases, the second and third waves shared similar characteristics. The second and third waves of reforms saw a retreat from the standard model and reliance on market forces. The main aspects of the second and third waves of reforms included:

- Increased emphasis on planning for the building of new capacity to ensure that sufficient future capacity is planned for in order to meet demand. This done through forecasting demand for the coming years.
- Moving to a more centralised system of procurement through long term contracts that would provide certainty for potential investors.105
- A move towards competition *for* as opposed to competition *in* the market. This supported the system of long term contracts.
- More state involvement in ESI functions (such as planning and procurement relative to under the first wave of reform. This was largely because it was found that allowing market forces to dictate the functioning of the ESI entirely did not lead to optimal

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100 E. L. F. de Almeida and H. O. Pinto Junior (2004), pg. 9.
104 For example in Brazil. See E. L. F. de Almeida and H. O. Pinto Junior (2004), pg. 9-11.
outcomes in terms of ensuring adequate private investment or ensuring security of supply.106

- Stricter forms of unbundling. In the second and third waves wave legal unbundling and full ownership separation were recommended instead of mere accounting separation.

Figure 10: Different waves of electricity supply industry reform

3.2.2. Models of reform

A key element of the standard sequence or any other reform process undertaken in the electricity sector is the choice of the model of reform and the envisaged end state. Different reform models have been used in different countries to alter the structure of the electricity sector. The choice of models is informed by a number of factors including: i) the industry structure prior to reform; ii) the regulatory framework; and iii) the aims and objectives of the reform.

The typical models of reform move away from the traditional structure of the sector discussed above by shifting some components of the sector out of the exclusive ownership of the vertically integrated monopoly in order to allow competition in that part of the value chain. In addition to these structural changes, institutional changes can also be undertaken. In some instances, due to the specific characters of a country, the model implemented may be an altered version of the standard models. There are 3 market structures that typically emerge following the implementation of reforms in a sector which had the traditional market structure discussed in section 3.1: the single buyer model, the wholesale competition model and the retail model. These models are discussed below.

The single buyer model

In the standard single buyer model, there is a single agency that buys electricity from competing generators. This single buyer is usually the vertically integrated utility that was previously the monopoly. The single buyer continues to own all existing generation, transmission and distribution and competes with independent power producers (“IPP”) at the generation stage.107 The figure below shows the typical single buyer model following a change from the traditional monopoly structure.

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107 I.N Kessides (2004), pg. 147.
Figure 11: The single buyer model

A variation of the single-buyer model is the acceptance of limited wholesale competition through allowing generators to enter into bilateral contracts with qualifying (generally large) customers. Most electricity would still be sold to a central purchasing utility that supplies captive customers, but direct agreements between large customers and generators are also permitted. This creates a central purchasing model with direct sales. The figure below illustrates this variation of the single buyer model.

Figure 12: Central purchasing model with direct sales

The single buyer model has been implemented as the initial step in changing the structure of the electricity sector in many countries. The advantages of the single buyer model include the following:

- Allowing for the incremental introduction of competition at the generation phase. With more options of generating companies for the single buyer entity, the competing generators will need to set prices at a competitive level in order to secure supply contracts with the single buyer.
• Introducing more predictable and stable prices if prices were previously volatile.
• The model can attract private capital that can be used for meeting the increasing demand for electricity especially in countries where there is insufficient generating capacity.\textsuperscript{108} In addition, the single buyer model promotes investment and expansion as financiers of generation projects can be shielded from market risk and regulatory risk at the retail level.\textsuperscript{109}

The model also has some disadvantages which include the following:\textsuperscript{110}

• If the government is expected to intervene in cases where the transmission company is unable to honour its obligations to generators, PPAs may create a contingent liability for the government. This may put an extra burden on the fiscus.
• Under the single buyer model, prices react contrary to what can be expected when actual electricity demand is below projected demand. A reduction in demand means take or pay quotas need to be spread over a smaller volume of electricity purchases, leading to higher unit prices.

Most developing countries and emerging markets have a version of the single-buyer or central purchasing model where the incumbent state-owned utility is still present, whilst IPPs are introduced to deal with the challenges of bringing private investment into new generation capacity. The South African sector is an example of this. Although Eskom remains vertically integrated - being active in generation, transmission and distribution – it generates approximately 95% of the electricity supplied in South Africa.\textsuperscript{111} The rest of the demand is met by IPPs, imports and municipalities which generate electricity. In addition, IPPs are (in theory) able to supply customers directly, as illustrated in the figure above. The Tanzanian electricity sector also currently makes use of this single buyer model whilst a vertically integrated state-owned utility remains active in the sector.\textsuperscript{112}

Some countries have also unbundled the state-owned generator to separate out state-owned generation from transmission to ensure non-discriminatory access to the transmission network for all generating companies. This also provides certainty for potential investors. Kenya is an example of this where the vertically integrated utility was unbundled into the Kenya Electricity Generation company (a generation company) and a distribution and transmission company called the Kenyan Power and Lighting Company.\textsuperscript{113} In 2008, the Kenya Electricity Transmission Company was formed to take on all new transmission projects. It is also responsible for the planning, design, building and maintenance of transmission lines and the relevant substations.\textsuperscript{114}

\textsuperscript{109} I.N Kessides (2004), pg. 151.
\textsuperscript{112} Tanzania Ministry of Energy and Minerals (2014), pg. 28.
\textsuperscript{113} Kapika, J and Eberhard, A, 2013, Power-Sector Reform and Regulation in Africa, HRSC Press.
Example

An example of a jurisdiction that has introduced a single buyer model is Ontario in Canada. The single buyer model was put in place after the implementation of wholesale competition failed.\textsuperscript{115} The Ontario electricity sector used to be characterized by a vertically integrated provincially owned company named Ontario Hydro which owned 90% of generation capacity and was responsible for transmission. Ontario Hydro was also active in distribution.\textsuperscript{116}

Problems with Ontario Hydro which lead to large and unsustainable debt resulted in the decision to introduce a competitive market framework for electricity and unbundle Ontario Hydro in 1998 into two companies, a generation company called Ontario Power Generation a (“OPG”) and a transmission and distribution company called Hydro One. The aim was to open a competitive market in 2002. In order to prepare for the opening, various tasks were undertaken including creating systems to settle accounts, the redesigning of billing systems and the implementation of the Ontario Energy Board market readiness system.\textsuperscript{117} The Independent Electricity System Operator (“IESO”) was also created to determine rules of operation of the electricity market.

The summer of 2002 following the opening of the competitive market on 1 May 2002 was the hottest in 50 years. Electricity demand increased to record highs. This along with a reduction in domestic generation capacity, (in part due to a lack of rain required for hydroelectricity) and limited capacity to import from neighbouring states, lead to sharp price increases.\textsuperscript{118} Following concerns raised, the wholesale market was closed within 6 months of opening and a retail price freeze was put in place.\textsuperscript{119}

In 2004, the single buyer model was implemented, signalling a shift back to a more centrally controlled electricity supply. The Electricity Restructuring Act of 2004 (Bill 100) created the Ontario Power Authority (“OPA”). The OPA became the single buyer and carries out all forecasting and planning in order to ensure adequate long term supply of electricity through contracting arrangements with electricity generators.\textsuperscript{120} These contracts aim to provide stable, predictable prices as well as provide investors with the required stability to build new generation plants. This would avoid the sharp price increases that occurred in 2002. The IESO remained in its capacity as the systems operator while the duties of the Ontario Electricity Board were amended to include the identification of market abuses and structural market inefficiencies.\textsuperscript{121}

The wholesale competition model

In contrast to the single buyer model, the wholesale competition model is characterised by competition in generation (new and existing). Generation, transmission and possibly distribution that were previously carried out by the vertically integrated utility are separated and the utility becomes a transmission company (or transmission and distribution company if these

\textsuperscript{115} Castalia Strategic Advisors (2013), International experience with single buyer models for electricity, pg. 22.
\textsuperscript{116} Castalia Strategic Advisors (2013), pg. 22. and Electricity Distributors Association (2006), Ontario electricity market primer, pg. 21.
\textsuperscript{117} Electricity Distributors Association (2006), pg. 23.
\textsuperscript{118} Electricity Distributors Association (2006), pg. 23.
\textsuperscript{119} Castalia Strategic Advisors (2013), pg. 22.
\textsuperscript{120} Castalia Strategic Advisors (2013), pg. 23 and Electricity Distributors Association (2006), pg. 25.
\textsuperscript{121} Electricity Distributors Association (2006), pg. 26.
The key characteristic of the wholesale competition model is the fact that the transmission company is not active in generation.

There are a number of variations of this model. In a first variant of the wholesale competition model, distribution companies purchase electricity from generating companies through a power pool exchange. Thus in this model, there are multiple buyers. The power pool may consist of a spot market and a forward market. The forward market acts to lessen the risk associated with volatile spot prices and encourages generators to bid aggressively in the spot market. The role of the transmission company in this case is to maintain the transmission services between generation companies and distribution companies.

In the second model, customers that consume above a pre-determined volume of electricity, ‘eligible’ customers, are able to purchase electricity directly from generation companies in long-term contracts, as opposed to purchasing from the power exchange or from distribution companies. This provides more customers for IPPs and results in increased competition in generation relative to the single buyer case of the wholesale competition model or the traditional single buyer model. The figure below graphically depicts this second instance of the wholesale competition model.

**Figure 13: The wholesale competition model (multiple buyers)**

There are various advantages to adopting this model:

- There are strong incentives for the efficient operation of electricity generating facilities. The power pool exchange acts as a market for generating companies to sell their output and they compete on price. Thus more efficient generating companies stand to make more sales. This can lead to lower electricity prices.
- This model encourages entry by IPPs. The transmission company has no incentive to discriminate against any generators with regards to access to the grid as it is not involved in generation itself in any way.
- In markets where there is a need for additional generation capacity, generating companies can invest, theoretically at least, with the assurance that the market

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122 The regulatory assistance project (2000), pg. 3.
123 I.N Kessides (2004), pg. 150.
124 I.N Kessides (2004), pg. 150.
125 The regulatory assistance project (2000), pg. 4.
mechanism will determine sales. Investment is likely to be efficient as there is no incentive to 'gold plate' infrastructure (build excessively large or expensive facilities). The ability to raise capital means funds raised by the public sector can be used for the upgrading and expansion of the transmission and distribution networks.\textsuperscript{126} This can assist in increasing the population’s access to electricity.

Although the wholesale competition model encourages generators to operate efficiently while encouraging investment and entry, it does have some drawbacks:

- The liberalisation of supply may lead to shortened contract lengths. This increases the risk associated with financing investments. In addition, competitive markets make it more difficult for investors to recover the high fixed costs of generation.\textsuperscript{127} This may deter investment in additional generation capacity.
- As in the Ontario electricity sector discussed above (which reverted back to a single buyer model after the implementation of a wholesale competition model), competitive markets can lead to volatile prices as contracts are shorter and competitive markets may include spot markets for immediate delivery of purchases. This volatility can be problematic in sectors where the supply of electricity can be affected by factors that are outside of the control of any of the parties involved. For instance, in jurisdictions where electricity is generated from water, rainfall can influence the price of electricity.
- As indicated in the points above, the implementation of the wholesale model can be complex and may have the effect of exacerbating some problems (shortfall in generation capacity and high prices) if not executed properly.

The successful implementation of the wholesale competition model is dependent on the following pre-requisites being satisfied:\textsuperscript{128}

- Firstly, a power pool or exchange where electricity is bought and sold would need to be in place. There would need to be active market where buying and selling occurs for immediate delivery as well as a forward market for delivery of electricity in a longer period of time such as a year in advance. Typically this would be complemented by bilateral or over the counter (OTC) trading;
- Secondly, an appropriate number of independent electricity suppliers need to be active in the market to ensure that there are sufficient alternative suppliers that distributors can negotiate with to ensure efficient and competitive pricing. If a single supplier is able to dominate either the spot or forward market, this will reduce competition and act as a barrier to entry;
- Thirdly, a significant proportion of customers need to be active in both the long term and short term markets. In the long term market, a large volume available for contracting will enable suppliers to finance investments in capacity;
- Fourth, the transmission network needs to be reliable and have sufficient capacity. Power stations may be located far away from each other and the transmission network needs to ensure that these distant power stations are not isolated and other power stations are able to compete for customers close to the power station. Transmission costs also need to reflect the total cost imposed by the generator on the system to ensure efficient use of both generating and transmission resources; and

\textsuperscript{126} The regulatory assistance project (2000), pg. 4.
\textsuperscript{128} Kessides, I.N., 2004, pg 150-151.
Lastly, the regulatory mechanism needs to be effective, predictable and efficient to ensure the markets operate effectively and competitively.

Example

Brazil is an example of a country that implemented the wholesale competition model. Following the first wave of reforms that culminated in a delay in the expansion of generation capacity (due to a failure to attract private investment), sharp increases in electricity prices and the rationing of electricity usage, Brazil instituted a second wave of reforms that introduced a wholesale market in 2004.

The reforms included the creation of a power pool through which distributors could purchase electricity from generators by entering into contracts that were concluded following an auction process. There were contracts for new yet to be constructed capacity and for existing capacity. For new capacity, the contracts are concluded for capacity that is to be built 3 and 5 years later. This would allow the winners of the auctions time to build plants as well as arrange the required finances. The contracts for new capacity would have duration of 15 years, giving the investors in new capacity certainty of electricity sales for a given period following completion of their project.\textsuperscript{129}

A “free” non-regulated market was also created to run parallel to the regulated power pool. In this market, consumers would be able to enter into direct long term bilateral contracts without going through the power pool. The price agreed upon would not be allowed to be below the pool’s price for hydro-based generation. The free market would not be the main platform for the purchase of electricity but rather it would be a residual market in that it would act as a balance for the regulated market in cases distribution companies are too conservative or optimistic with their demand forecasts.\textsuperscript{130}

The retail competition model

Retail competition extends competition to all retail customers. That is, all customers are able to choose their own suppliers. They may purchase from these suppliers directly or through retailers of their choice. Retailers purchase electricity upstream and sell it to end-users. Retailers act as intermediaries and as such are able to operate without owning any infrastructure. They supply electricity by paying a tariff for the use of infrastructure that is put in place by distributors. Distributors also compete with retailers by offering retail services. As in the wholesale competition model, the market for generation is competitive. The utility does not participate at all in generation but provides the transmission (and possibly distribution) system.\textsuperscript{131} The figure below shows an example of the retail competition model.

\begin{itemize}
\item \textsuperscript{129} Reform of the electricity sector in Latin American countries: Main characteristics and emerging lessons, pg. 8.
\item \textsuperscript{130} E. L. F. de Almeida and H. Q. Pinto Junior (2004), pg. 17.
\item \textsuperscript{131} The regulatory assistance project (2000), pg. 4.
\end{itemize}
One of the main advantages of retail competition is that companies that sell electricity to end-users (distribution and retail companies) are subject to competition. This should increase the incentive to operate efficiently and this would in turn ensure that end-users are charged competitive prices. It also allows end-users choice in with respect to suppliers.\textsuperscript{132}

A drawback however is the level of the complexity of the model. To begin with, retail competition requires its own set of trading arrangements. Additionally, prices need to be determined for distribution network access.\textsuperscript{133} The experience of the State of California with retail competition discussed below highlights the complexity associated with the design and implementation of the model, the adverse consequences of failing to correct the market design properly and how market structure can be manipulated by dominant players.\textsuperscript{134} The spot markets that need to be put in place when implementing retail competition may also be problematic as they perform poorly when there are supply shortages as prices rise sharply and may not correct fully or fast enough.\textsuperscript{135} Finally, due to the reduced regulation, distribution companies may have incentive to discriminate against competing retail companies that make use of their infrastructure.

\textit{Examples}

The United Kingdom, which was one of the first jurisdictions to reform its electricity sector, did so by implementing retail competition. Competition at the retail level was done in 3 phases over 8 years with the load requirement for choosing suppliers (the threshold for eligibility) declining with each subsequent phase.\textsuperscript{136}

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{132} Tanzania Ministry of Energy and Minerals (2014), pg. 22.
\item \textsuperscript{133} Tanzania Ministry of Energy and Minerals (2014), pg. 22.
\item \textsuperscript{134} Price Waterhouse Coopers (2013), Introducing competition in retail electricity supply in India, Forum of regulators pg. 23.
\item \textsuperscript{135} Bussing-Burks (2015), California’s failed electric power industry reforms, available: http://www.nber.org/digest/dec01/w8442.html
\item \textsuperscript{136} Price Waterhouse Coopers (2013), pg. 10-11.
\end{itemize}
\end{footnotesize}
The Electricity Act of 1989 provided for privatisation, the introduction of competitive markets and independent regulation. The state-owned vertically-integrated utility was unbundled into 3 generating companies and one transmission company. Distribution was organised into 12 regional electricity companies which were later sold by the state. The notable innovation introduced as part of the reforms was the establishment of an electricity pool for England and Wales that allowed a competitive bidding process for generators to sell electricity.137

The first phase of introducing competition in electricity retailing began in 1990 when customers with peak loads of more than 1MW were allowed to choose their own suppliers. The second saw the load required to be eligible to have a choice in supplier decline to between 100kW and 1MW. The third phase started in 1998 with the requirement set at 100kW. By 2004, all customers could choose their own suppliers.138

The United Kingdom went a step further in ensuring retail completion by mandating the separation of distribution and retail supply so that distributors would not discriminate against consumers that were supplied by competitors.139

California also implemented retail competition in its electricity sector in 1994. Prior to reforms, 3 vertically integrated investor-owned utilities ("IOUs") operated in the electricity supply industry. The reforms created new competitive wholesale markets and allowed consumers to choose to obtain direct access to the wholesale markets or to receive power from their local utilities regulated default service rates.140

In 1998, all retail customers were allowed to choose between a competitive electricity service provider for generation services or continue making use of their local utility distribution company, which would charge the fixed default service rates. The IOUs were required to divest out of all their fossil-fuelled plants (in order to allow the entry of competitors in the form of electricity service providers), but were able to retain ownership in other forms of generation plants.141

However the reforms in California encountered several difficulties. First, the IOUs remained obligated to meet their default service obligations towards remaining customers, by making up for generation capacity lost in the divestures through purchases made on the wholesale market. As a result, the difference between the default service demand of the IOUs and the energy from their remaining generating assets was larger than expected. The IOUs were required to sell to customers at the regulated fixed retail prices (agreed upon when before IOUs were required to divest from their fossil fuel plants) while having to purchase this electricity at a higher price on the wholesale market.

Second, it was observed that prices were higher than marginal cost in high demand periods. Prices would also not decline as expected following these high demand periods, with some generation capacity being removed from service. Government officials suspected that this was done for strategic reasons. These events highlighted the vulnerability of the system to gaming by some generators.

Third, due to uncertainty about the rules under which new capacity would be built, generation capacity grew slowly while demand increased at a faster rate. Fourth, market design

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137 Price Waterhouse Coopers (2013), pg. 10.
138 Price Waterhouse Coopers (2013), pg. 11.
140 Price Waterhouse Coopers (2013), pg. 20.
141 Price Waterhouse Coopers (2013), pg. 20.
deficiencies resulted in slowed investment in new plants, increase price volatility in the spot market and higher wholesale prices overall,

Lastly, there was slow reaction to problems by the California Public Utilities Commission and the Federal Energy Regulatory Commission, which further fuelled the crisis. This included a failure to add generation capacity, denying IOUs to hedge their short positions and refusing to adjust the regulated fixed retail rates in the face of rising wholesale market prices.\textsuperscript{142}

The California experience highlighted the complexity of the retail competition model and also illustrated the dire consequences when this complexity is not appreciated during the market design stage.

\textbf{SUMMARY}

The models described above show differing degrees of choice that are given to retailers (distributors) and customers. The table below summarises these options.

\textbf{Table 1: Options for different market structures}

<table>
<thead>
<tr>
<th>Feature</th>
<th>Monopoly</th>
<th>Single buyer</th>
<th>Wholesale competition</th>
<th>Retail competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competing generators</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Choice for retailers</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Choice for customers</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>


Also depicted in the summary is an indication of the level of competition implied within each structure or model. In the above table, having a monopoly offers no choices to distributors or customers or even competition between generating companies. In contrast, at the other end of the spectrum, retail competition which is considered as the model with the highest level of competition, allows customers choice in suppliers while including competition between generation, distribution and retail companies.

The table below provides a summary of the pros and cons of each reform model, specifically single buyer, wholesale competition and retail competition.

\textsuperscript{142} Price Waterhouse Coopers (2013), pg.20-21.
### Table 2: Summary of pros and cons of reform models

<table>
<thead>
<tr>
<th>Model</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single buyer</td>
<td>Competition in generation.</td>
<td>Government involvement may impose a burden on the fiscus.</td>
</tr>
<tr>
<td></td>
<td>Predictable and stable prices.</td>
<td>Under take or pay agreements, prices rise when demand decreases.</td>
</tr>
<tr>
<td></td>
<td>Attracts private capital and investment.</td>
<td></td>
</tr>
<tr>
<td>Wholesale competition</td>
<td>Strong incentives for efficiency in generation.</td>
<td>Contract lengths may be short, increasing risk for investors, deterring investment.</td>
</tr>
<tr>
<td></td>
<td>Price competition can reduce prices for consumers.</td>
<td>Prices may be volatile, affected by uncontrollable factors.</td>
</tr>
<tr>
<td></td>
<td>Investors assured that sales are determined by a market mechanism.</td>
<td>Implementation can be complex and costly.</td>
</tr>
<tr>
<td>Retail competition</td>
<td>All electricity suppliers are subject to competition, which can lead to lower prices.</td>
<td>Implementation can be complex and costly if done incorrectly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor track record of successful implementation.</td>
</tr>
</tbody>
</table>

It should be noted that the structures above represent standard market structures based on theory. In practice, sectors in many countries take on structures that are some variation of the 3 models discussed above. This is mainly due to the fact that the full reform process happens over an extensive period of time and the structure changes gradually towards its end state. The competition structures discussed above are usually the market structures in place when the reform process has run its full course or reached a milestone.

### 3.2.3. Utility restructuring

In addition to altering the market structure, the structure of the utility itself is often changed when reforms are implemented. During sector reform, the vertically integrated utility is normally unbundled or separated into different entities or activities. Generally, generation is separated from transmission and distribution in order to facilitate the introduction of competition. Part of the rationale for this approach is that some parts of the value chain such as generation and retail are no longer natural monopolies and can be opened up to competition whereas others such as transmission and distribution retain natural monopoly characteristics.\(^{143}\)

The restructuring of the utility can range from requiring the entity to keep separate accounts for the different activities to separating the different activities into different independent companies. There are four different levels of restructuring each with increasing intensity:

- **Accounting separation** – The firm remains integrated but its bookkeeping is reorganised so that the costs of the network services it supplies can be identified.\(^{144}\)

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\(^{143}\) Kessides, I.N., 2004, Table 1.2

\(^{144}\) Bolle, F. and Breitmoser (2006), On the allocative efficiency of ownership unbundling, Department of Business Administration and Economics European univestiy Viadrina Frankfurt (Oder), Discussion paper No. 255, p. 3.
the EU this is done in order to prevent cross-subsidisation between activities and is generally applied to the network and generation activities. Accounting separation was recommended in the 1996 Directive. It was also the initial approach in Brazil. In terms of the regulatory requirements implemented by NERSA, Eskom is required to have and report separate accounts for the different activities of generation, transmission and distribution.

**Figure 15: Accounting separation**

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Source: Genesis Analytics.
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- **Functional separation** – In addition to requiring separate accounts as above, there is a separation of operational and management activities. In the EU this is usually applied to transmission/distribution and generation.

**Figure 16: Functional separation**

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Source: Genesis Analytics.
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- **Legal separation** – The network services are provided by a firm that is legally separate from the vertically integrated utility. The network service provider is still connected with the production and trade (generation and distribution for electricity) of the firm through a holding structure. In the EU electricity sector, legal unbundling was put forward in the 2003 Directive as a means to ensure independent decisions so as to allow for a non-discriminatory decision making process by separating transmission/distribution

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and generation.\textsuperscript{146} The requirement for legal separation was also imposed on vertically integrated players in Britain.\textsuperscript{147}

**Figure 17: Legal separation**

\begin{center}
\includegraphics[width=0.8\textwidth]{legal_separation_diagram}
\end{center}

*Source: Genesis Analytics.*

- **Ownership unbundling** – Ownership unbundling goes beyond legal unbundling and requires the vertically integrated firm to not only separate its network from generation and retail businesses but also to sell either of the network or generation and retail activities. Shareholders may not hold shares in the network as well as generation and retail businesses.\textsuperscript{148} Ownership unbundling was required in the EU as per the 2009 Directive. Ownership unbundling was intended to reduce the risk of network operators discriminating against rival firms and to reduce the risk of inadequate investment in the network that results from network operators that are vertically integrated.\textsuperscript{149}

**Figure 18: Ownership unbundling**

\begin{center}
\includegraphics[width=0.8\textwidth]{ownership_unbundling_diagram}
\end{center}

*Source: Genesis Analytics.*


\textsuperscript{148}Bolle, F. and Breitmoser (2006), p. 3.

Planning and procurement during and after reforms

Traditionally, the vertically integrated utility in an electricity sector would be tasked with the planning and building of new capacity. However as reforms are implemented and the utility is unbundled, the planning function may have to be reassigned in order to achieve the desired outcome with regards to increasing the level of competition or ensuring that firms that compete with the utility are not discriminated against in activities where the utility remains a monopolist.

In addition, electricity supply industry structures that take on a single buyer model have a sole procurer. If this procurer is also active in generation, other generators may be discriminated against in the procurement process. Thus the positioning of the procurement and planning functions are very important considerations when planning and implementing reforms.

The EU Directives on energy do not specifically assign the planning and procurement functions to a specific organisation within a member state. The 1996 Directive states that each member state is to appoint an authority or public or private body that will be responsible for the organisation, monitoring and a controlling of the tendering process that member states are allowed to use for the construction of new generation capacity. This authority will not be able to participate in any electricity generation, transmission or distribution activities. The 2009 Directive only provides instructions on how the authorisation and tender procedures for the procurement of new generation capacity are to be carried out, without specifying which entity will be responsible for carrying these out.

In Brazil the planning function was ceded with Empresa de Planejamento Energetico (“EPE”) which does not participate in the electricity sector except in this role. Planning for new capacity is based on the demand forecasts provided by the distribution companies which would purchase the electricity from newly built plants. The distribution companies provide demand forecasts 3 and 5 years ahead. The EPE also advises the Ministry on the best technology option for capacity that is to be offered in the bidding process. From this, the Ministry can identify strategic projects that take priority in the pool and whose capacity cannot be replaced by capacity from other projects. In terms of procurement, bilateral contracts would be concluded between generation companies and distribution companies.

In Kenya, the Energy Regulatory Commission (“ERC”) took over the role of power-sector planning from the Ministry of Energy in 2006. The ERC was tasked with the regulation of all energy sectors in Kenya including electricity. Procurement on the other hand is dealt with by the government through its appointed agent, KenGen (the state-owned electricity generation company), with ERC “planning at the front-end (building of new capacity) and licensing at the back-end” of the procurement.

These examples illustrate that there are different institutional organisation options with regard to procurement and planning in the electricity sector. However due to the separation of vertically-integrated utilities with the aim of facilitating competition and efficiency, it is imperative that the company responsible for procuring generation capacity in a single buyer market structure should not be involved in generation itself (except in the presence of strong regulatory conditions) as this may distort competition for the market. Similarly, it is important to consider the impact of not separating the planning function, which determines the new capacity that should be built as well as the party responsible for construction, from a participant in the market.

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151 Kapika, J and Eberhard, A, p. 112.
generation market who is also capable of building new generation plants. This could provide incentives for the planner to choose its affiliated generation company as the preferred bidder.

Table 3: Summary of planning and procurement

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Planning</th>
<th>Procurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Union</td>
<td>Member state appointed authority of public/private body</td>
<td>Member state appointed authority of public/private body</td>
</tr>
<tr>
<td>Brazil</td>
<td>Empresa de Planejamento Energetico (Energy Planning Company)</td>
<td>Bilateral contract between generation and distribution companies (overseen by the Ministry of Mines and Energy)</td>
</tr>
<tr>
<td>Kenya</td>
<td>Energy Regulatory Commission</td>
<td>Kenya government through KenGen</td>
</tr>
</tbody>
</table>
4. THE POSSIBLE INDUSTRY RESTRUCTURING ALTERNATIVES FOR THE SOUTH AFRICAN ELECTRICITY SUPPLY SECTOR

Based on an analysis of the current issues in the South African electricity supply industry and the drivers for reform in other countries, it is clear that some degree of change to the electricity supply industry is necessary. The four key drivers for reform of the South African electricity supply industry are (i) insufficient electricity supply, (ii) unreliable electricity supply, (iii) the lack of sustainability of Eskom and the industry and (iv) rising electricity prices. Any reform approach to be implemented should therefore aim to address these issues to achieve the desired sector outcomes of sufficient and reliable electricity supply, financial sustainability for Eskom and the industry and efficient and reasonable prices. In order to achieve these outcomes, three key requirements are necessary (summarised in the figure below):

- Firstly, timeous and cost-efficient investment in generation capacity is required to ensure there is sufficient electricity supply to meet demand, to ensure Eskom and the industry as a whole are financially sustainable and that electricity prices are not inflated due to cost overruns related to the building of new generation capacity.

- Secondly, efficient maintenance of Eskom’s generation assets is required to avoid further periods of load shedding. Although there have been sustained periods without load shedding, this is due to reduced demand, slowing GDP growth and load management by energy intensive users. It is expected that should GDP growth start to increase with a concomitant rise in electricity demand, supply may once again come under pressure. Efficient maintenance is also important as interventions regarding the increased generation capacity will take time to come into effect. This will have the possible impact of lowering electricity prices as better management of the assets will not require Eskom to utilise relatively more expensive generation options in order to keep the lights on.

- Thirdly, the improved financial sustainability of Eskom is critical to ensuring the financial sustainability of the entire industry as well as efficient, reasonable prices. As Eskom is the single buyer (and supplier of last resort), if it is unable to meet its obligations to the IPPs and municipalities then it places the entire industry and South African economy in jeopardy.

Importantly, the achievement of the desired industry outcomes are constrained by two factors, namely: the fact that government funding available for investment in generation assets (and Eskom) is limited; and the corollary requirement that any intervention needs to be both practical and cost effective.

Based on the interventions applied in other countries, a combination of both restructuring of Eskom’s assets and changes to the electricity supply market structure may be necessary to achieve the desired industry outcomes. Any intervention of this nature should also be supported and underpinned by an enabling and conducive policy, legislative and regulatory environment. These considerations are summarised in the figure below.

In this section, we assess the possible models of reform that the sector could move towards that could possibly alleviate the current issues facing the industry. Before assessing the different alternatives, we will first lay out the criteria by which we will evaluate the different alternatives.
Figure 19: Summary of desired industry outcomes

Desired industry outcomes

- Insufficient electricity supply
- Unreliable electricity supply
- Eskom’s financial unsustainability
- Rising electricity prices
- Limited government funding available for equity investment
- Practical and cost effective intervention

Requirements to achieve outcomes

- Sufficient and reliable electricity supply
- Financial sustainability for Eskom and the industry
- Fair and reasonable electricity prices
- Improve Eskom and the industry’s financial sustainability
- Timeous and cost efficient investment in generation capacity
- Ensure maintenance and operating efficiency of Eskom’s generation assets

Drivers of reform

Possible levers to achieve outcomes

A possible restructuring of the industry involving a combination of:

- Restructuring of Eskom’s assets
- Changes to market structure

Supported and underpinned by:

- An enabling and conducive policy, legislative and regulatory environment
4.1. POSSIBLE INDUSTRY RESTRUCTURING ALTERNATIVES

International experience and economic theory suggest that reforms involving various restructuring configurations of electricity industries and previously vertically integrated monopolies can be implemented to address reform drivers. For instance, promoting competition in generation can result in lower prices. Other examples have shown that allowing fair, reasonable and non-discriminatory access to the national grid (perhaps through unbundling) and implementing power purchasing agreements that reduce risk can incentivise investment in generation, thereby ensuring sufficient and reliable supply.

The current structure of the South African electricity supply industry can be described as a single buyer model with a vertically integrated utility. By considering various configurations these two key characteristics, alternatives to the existing structures of the industry and Eskom can be developed in such a way that the alternatives address the reform drivers shown in the figure above.

- Alternatives to the single buyer model include significant changes to the structure of the market such as the introduction of wholesale or retail competition. A less drastic alternative would be the strengthening of the provisions concerning the ability of IPPs to sell directly to customers such as distributors;

- Changing the vertically integrated nature of Eskom also provides a multitude of alternatives ranging from the separation of system operations to the sale of specific assets such as transmission or generation.

Figure 20: Two key characteristic alternatives to the existing structure of the industry

<table>
<thead>
<tr>
<th>Alternatives to the single buyer model:</th>
<th>Changing the vertically integrated nature of Eskom:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• IPPs being able to sell directly to select customers (direct contracts)</td>
<td>• Legal separation of Eskom</td>
</tr>
<tr>
<td>• Wholesale competition</td>
<td>• Separate systems operations</td>
</tr>
<tr>
<td>• Retail competition</td>
<td>• Separate transmission</td>
</tr>
<tr>
<td></td>
<td>• Separate generation</td>
</tr>
</tbody>
</table>

Based on this, the following alternatives to the existing South African electricity supply industry are identified:

A.: Status quo and two possible variations:

  A. 1: Status quo,
  A.2: Status quo with IPPs being able to sell directly to eligible customers (direct contracts),
  A.3: Status quo with legal separation of Eskom's generation and network components;

B: Restructuring of Eskom assets and/or operations with the following variations:
B.1: Introduction of Independent System and Market Operator (ISMO) (as per ISMO Bill) (separating out system operations),
B.2: Introduction of Transmission System Operator (TSO) (separating out transmission and system operations),
B.3: Unbundling of generation from the wires business. State-owned generation companies and private sector companies participate in generation;

C. Wholesale competition with power exchange pool (multiple buyers); and
D. Retail competition.

Each of these alternatives has different implications for the scope and effectiveness of competition, market structure and ownership of assets which is summarised in the table below.

A.1: Status quo – Eskom is vertically integrated and owns generation, transmission and distribution assets and undertakes system operations. Private participation is limited to a small proportion of generation capacity. There is a single buyer of electricity with no competition in generation and distribution.

A.2: Status quo with IPPs being able to sell directly to eligible customers (direct contracts) – The ownership and operation of assets remains the same except that there are multiple buyers of electricity and competition in generation.

A.3: Status quo with legal separation of Eskom – The ownership and operation of assets remains the same except that the internal structure of Eskom has changed to separate subsidiaries to undertake generation on the one hand and transmission/distribution on the other.

B.1: Introduction of Independent System and Market Operator – Eskom is vertically integrated and owns generation, transmission and distribution assets. There is an Independent System and Market Operator (an ISMO). Private participation is limited to a proportion of generation capacity. There is a single buyer with competition in generation but not in retail/distribution.

B.2: Introduction of Transmission system operator (TSO) (separating out transmission and system operations) - Eskom owns generation and distribution assets. Private participation is limited to a small proportion of generation capacity and transmission. There is a single buyer of electricity with no competition in generation and distribution.

B.3: State generation companies and private sector companies in generation – Eskom divests from generation, owns transmission and distribution assets and undertakes a role as systems and market operator. The state maintains ownership of generation assets through a separate state-owned entity. Private sector participants and state-owned generation companies acquire the generation assets from Eskom and are responsible for generation. There is a single buyer of electricity (Eskom) with competition in generation but not distribution.

C. Wholesale competition with power exchange pool (multiple buyers) – There is no state involvement in generation; IPPs are responsible for all generation. Eskom owns transmission and distribution assets and undertakes system operations. As a result of the power exchange pool there are multiple buyers of electricity. There is competition in generation but not in distribution.

D. Retail competition – There is no state involvement in generation; IPPs are responsible for all generation. Eskom owns transmission and distribution assets and undertakes system operations.
operations. There may be a single buyer or multiple buyers. There is state and private participation in distribution and therefore there is competition in both generation and distribution.

Under each alternative (where relevant), we will also assess the potential additional impact of strengthening of the provisions concerning the ability of IPPs to sell directly to customers such as distributors.
Figure 21: Different industry restructuring alternatives for the South African electricity supply industry

<table>
<thead>
<tr>
<th>Reform Model</th>
<th>Competition in generation</th>
<th>Buying of electricity generated</th>
<th>Competition in distribution/retailing</th>
<th>Generation</th>
<th>Transmission</th>
<th>Distribution</th>
<th>System operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Status quo</td>
<td>(\times)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>(\times)</td>
<td>State (Eskom) and private sector</td>
<td>State (Eskom)</td>
<td>State (Eskom)</td>
</tr>
<tr>
<td>A.1: Status quo</td>
<td>(\times)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>(\times)</td>
<td>State (Eskom) and private sector</td>
<td>State (Eskom)</td>
<td>State (Eskom)</td>
</tr>
<tr>
<td>A.2: Status quo with IPPs being able to sell directly to select customers (direct contracts)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>State (Eskom) and private sector</td>
<td>State (Eskom)</td>
<td>State (Eskom)</td>
</tr>
<tr>
<td>A.3: Status quo with legal separation of Eskom</td>
<td>(\times)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>(\times)</td>
<td>State (Eskom) and private sector</td>
<td>State (Eskom)</td>
<td>State (Eskom)</td>
</tr>
<tr>
<td>B. Restructuring of Eskom assets with the following variations:</td>
<td>(\checkmark)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>(\times)</td>
<td>State (Eskom) and private sector</td>
<td>State (Eskom)</td>
<td>State (Eskom)</td>
</tr>
<tr>
<td>B.1: Introduction of Independent system and market operator (ISMO) (as per ISMO Bill)</td>
<td>(\checkmark)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>(\times)</td>
<td>State (Eskom) and private sector</td>
<td>State (Eskom)</td>
<td>State (ESMO)</td>
</tr>
<tr>
<td>B.2: Introduction of Transmission system operator (TSO)</td>
<td>(\checkmark)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>(\times)</td>
<td>State (Eskom) and private sector</td>
<td>Private sector (TSO)</td>
<td>State (Eskom)</td>
</tr>
<tr>
<td>B.3: State generation companies and private sector in generation</td>
<td>(\checkmark)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>(\times)</td>
<td>State generation companies and private sector</td>
<td>State (Eskom)</td>
<td>State (Eskom)</td>
</tr>
<tr>
<td>C. Wholesale competition</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>Private sector</td>
<td>State (Eskom)</td>
<td>State (Eskom)</td>
</tr>
<tr>
<td>C. Wholesale competition with power exchange pool (multiple buyers)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>Private sector</td>
<td>State (Eskom)</td>
<td>State (Eskom)</td>
</tr>
<tr>
<td>D. Retail competition</td>
<td>(\checkmark)</td>
<td>(\checkmark)</td>
<td>(\times)</td>
<td>(\checkmark)</td>
<td>Private sector</td>
<td>State (Eskom)</td>
<td>State (Eskom)</td>
</tr>
</tbody>
</table>
4.2. THE EVALUATION CRITERIA

The evaluation criteria are based on the drivers for reform previously identified and the desired outcomes for the industry. They are aimed at providing a consistent framework to assess the different alternatives in respect of their achievement of the desired industry outcomes and alleviating the issues currently facing the industry. This will assist in comparing the different alternatives and identifying the appropriate approach or approaches for the South African electricity sector.

According to the literature on the effects of restructuring in the electricity supply industry, there are a number of universal effects that can be identified, viz. the competition effect, the efficiency effect and the loss of economies of scope. The strength and direction of these effects will differ based on the restructuring model as well as the industry structure and characteristics that existed prior to reform. The analysis of the strength and direction of these effects under each of the alternatives will assist in comparing the alternatives.

- **Competition effect** – Certain restructuring alternatives will result in an increase in competition in specific parts of the market due to the entry of new providers or creating a more conducive environment for entry. For example, if IPPs are allowed to sell directly to specific customers, this opens up generation to competition as providers are able to compete for customers. The cost implication of this effect is that “competitive pressure leads to stronger pressure to reduce costs” (particularly marginal costs).\(^{152}\) This is exemplified across market reform models in general and is primarily observed in generation rather than the transmission and distribution. The pressure to match private sector practices that make IPPs more competitive would also result in Eskom operating more efficiently. Therefore, where a restructuring alternative introduces competition in a market, one would expect that the existing provider/s in that market are incentivised to become more efficient and reduce their costs in response to competition pressure from other providers.

- **Efficiency effect** – The efficiency effect is distinguished from the competition effect in that the improved efficiency of the firm is driven by the restructuring of the firm. As the separated business operations as a result of the restructuring of the firm may develop a specialisation advantage due to a “better management focus on specific tasks in comparison to a multi-product company”.\(^{153}\) This improved focus is expected to result in “clearer incentives to improve business”.\(^{154}\) The potential for improved business under restructuring may also have a quality effect as separation is “posed to have positive effects on the investment levels and subsequent quality of the network”.\(^{155}\) It is also likely that “the separation will increase scrutiny, this [is] likely to have a downward impact on costs, in jurisdictions where regulators are effective”.\(^{156}\) Therefore, in restructuring alternatives where Eskom’s operations will be separated or unbundled, it is likely that there

\(^{152}\) Brunekreef, 2008, Ownership unbundling in electricity markets – a social cost benefit analysis of the German TSOs, EPRG Working Paper 0816, University of Cambridge.


\(^{156}\) Nillesen and Pollitt, 2008, p. 10.
will be some decreases in costs due to management being more focussed on a specific business activity.

- Loss of economies of scope – Although there are efficiency gains from separation it is also anticipated that vertical synergies will be lost. These losses are a result of both coordination economies and market risk economies existing in an integrated firm. Restructuring creates a coordination cost by requiring the duplication of tasks such as general management, human resources, information and communications technology, finance, and support. Transaction costs of using a market (such as contracts or spot market transactions) rather than firm-internal mechanisms result in market risks. Notably it is likely that under either legal separation or ownership unbundling there will only be coordination losses and not market risks. This is because independent planning and procurement, together with regulation, will facilitate competition for the market rather than in the market, with Eskom’s transmission branch not having a choice of supplier. Additionally there is no asymmetric information in the market and competitors are unlikely to have misaligned incentives as there is transparency with total generation and its purchasing. However, in addition to these increases there are once-off transaction costs of restructuring a utility that need to be accounted for, but the impact of this on tariffs is not persistent.

In order to perform an objective and logical assessment of the different alternatives against these evaluation criteria, specific aspects that should be considered under each alternative have been identified. Further, for ease of comparison, a rating system has also been identified for each criterion.

- **Impact on efficiency** – The extent to which the approach will impact on the incentives for firms in the industry particularly Eskom to become more efficient. This can occur through two avenues. Firstly, changes to the internal structure of Eskom may force it to become more focused on specific activities without distractions from issues in other activities. Secondly, competition (particularly in generation) may force Eskom to become more efficient as competitors are able to impose a competitive constraint on the utility. In assessing the impact on efficiency under the different alternatives, we will aim to answer the following questions:

  o Does the alternative introduce competition in generation of electricity? Will these changes impact on Eskom’s incentives to become more efficient?
  o Does the alternative change the internal structure of Eskom? Will these changes impact Eskom’s incentives to become more efficient?

The impact of the different restructuring alternatives will be characterised based on the effect on generating companies’ (Eskom and/or IPPs) incentive to be more efficient. This effect will be characterised as either no incentive, weak or strong incentive to be efficient.

- **Conducive environment for private investment** – Given the financial situation of Eskom and the constraints on available funding from government, private investment in generation assets will be required in order to meet the shortfall in generation capacity. Therefore, the industry structure and the policy, legislation and regulatory framework need to be conducive to such investment. Particularly, it should lower the perceived risk of making such investments by creating a stable industry, a certain regulatory environment and level playing field that enables investors to compete effectively and earn the required returns. In the South African context this might mean the following:

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Ensuring a place for IPPs in the industry by allocating new generation capacity in relevant plans and policies,

Creating a certain regulatory environment by timeously and appropriately adjusting the regulatory framework as may be required (for example, changes to licensing provisions or tariff regulations may be required);

Ensuring the regulatory mechanisms are in place to enable fair and non-discriminatory access to infrastructure at reasonable tariffs as may be required; and

Resolving supply and other issues in the industry to create a more stable industry.

In assessing whether the different alternatives create a conducive environment for private investment, we will aim to answer the following questions:

- Does the alternative introduce competition in generation?
- Does the alternative alter the vertically integrated structure of Eskom?
- Do the changes introduced by the alternative reduce the incentive or ability of Eskom to potentially abuse its dominant position to the detriment of its competitors?
- Will changes to the regulatory environment be necessary to implement this alternative and how will this impact on regulatory certainty?
- Will the alternative increase the stability of the industry thereby reducing the perceived risk of investment in generation?

The impact of the different restructuring alternatives on this criterion will be characterised as either not conducive, weakly conducive, neutral or strongly conducive.

- Reliance on government funding – Government committed R 20 billion in equity funding to Eskom in 2015. However any further equity investment by government in the short to medium term is unlikely. It is essential that any intervention in the electricity supply industry needs to reduce Eskom’s reliance on government funding by primarily improving its financial position. In assessing whether the different alternatives reduce Eskom’s reliance on government funding, we will aim to answer the following questions:

  - Will the alternative have a positive impact on Eskom’s financial position?

  The impact of the different restructuring alternatives on this criterion will be characterised as either increased reliance, reduced reliance or no reliance.

- Ease and cost of implementation – As the issues facing the sector are severe, causing significant uncertainty, the intervention needs to be easy to implement and be implementable within a short period of time. Further, the cost of implementation should not be too high as this may result in higher electricity prices. In assessing how easily and costly it will be to implement the different alternatives, we will aim to answer the following questions:

  - How easily can the alternative be implemented? Will it require any changes to the policy, legislative and/or regulatory framework?
  - Will the implementation of this alternative require administrative or other industry wide costs to be incurred?

  The impact of the different restructuring alternatives on this criterion will be characterised in respect ease of implementation as easy, difficult or most difficult and in respect of cost of implementation as no cost, low cost, high cost or highest cost.

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158 Eskom’s selective reopener application, pg. 3.
Impact on electricity prices – One of the desired sector outcomes is fair and reasonable prices. There will be number of conflicting impacts on prices some of which may imply an increase in prices and others suggesting a decrease in prices. It is thus extremely difficult to estimate the precise impact of a particular intervention on electricity prices. However, we may be able to provide a broad indication of whether prices are overall likely to be higher or lower under each of the different alternatives. In assessing the impact on electricity prices, we will aim to answer the following questions:

- What is the impact of the alternative on Eskom’s efficiency?
- What is the cost of implementation of the alternative?

The impact of the different restructuring alternatives will be characterised based on an indication of the direction of the effect – increase or decrease and magnitude of the effect – small or large. The impact can also be characterised as uncertain.

**Figure 22: Evaluation criteria of the different restructuring alternatives**

<table>
<thead>
<tr>
<th>Evaluation criteria of the different restructuring alternatives</th>
<th>Conducive environment for private funding:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Impact on efficiency:</strong></td>
<td>- Does the alternative introduce competition in generation of electricity?</td>
</tr>
<tr>
<td>- Does the alternative change the internal structure of Eskom?</td>
<td>- Does the alternative alter the structure of Eskom?</td>
</tr>
<tr>
<td>Will these changes impact Eskom’s incentives to become more efficient?</td>
<td>- Do the changes reduce the incentive of Eskom to potentially abuse its dominant position?</td>
</tr>
<tr>
<td><em>Impact can be characterised as no incentive, weak incentive, strong incentive or strongest incentive to be more efficient.</em></td>
<td>- Will changes to the regulatory environment be necessary and how will this impact on regulatory certainty?</td>
</tr>
<tr>
<td><strong>Reliance on government funding:</strong></td>
<td>- Will the alternative increase the stability of the industry thereby reducing the perceived risk of investment?</td>
</tr>
<tr>
<td>- Will the alternative have a positive impact on Eskom’s financial position?</td>
<td><em>Impact can be characterised as either not conducive, weakly conducive, neutral and strongly conducive.</em></td>
</tr>
<tr>
<td><em>Impact can be characterised as continued reliance, increased reliance, reduced reliance and no reliance.</em></td>
<td><strong>Ease and cost of implementation:</strong></td>
</tr>
<tr>
<td><strong>Impact on electricity prices:</strong></td>
<td>- How easily can the alternative be implemented? Will it require any changes to the policy, legislative and/or regulatory framework?</td>
</tr>
<tr>
<td>- Will the alternative have a positive impact on Eskom’s financial position?</td>
<td>- Will the implementation of this alternative require administrative or other industry wide costs to be incurred?</td>
</tr>
<tr>
<td>- Does the alternative introduce competition in generation?</td>
<td><em>Impact can be characterised in respect of:</em></td>
</tr>
<tr>
<td>- Does the alternative alter the vertically integrated structure of Eskom?</td>
<td><em>Ease of implementation as easy, difficult, very difficult or extremely difficult and</em></td>
</tr>
<tr>
<td><em>Impact can be characterised as (i) an increase or decrease, (ii) small or large and (iii) uncertain.</em></td>
<td><em>Cost of implementation as no cost, low cost, high cost and highest cost.</em></td>
</tr>
</tbody>
</table>
4.3. ASSESSMENT OF RESTRUCTURING ALTERNATIVES AGAINST THE EVALUATION CRITERIA

4.3.1. A.1 Status quo

The current model in South Africa is essentially a vertically integrated single buyer model. Eskom is the dominant generator and is responsible for transmission and a large portion of distribution. The balance of distribution is undertaken by local municipalities. Several small IPPs provide additional generation capacity. Eskom is the single buyer of electricity generated by IPPs. Although, IPPs can theoretically supply electricity directly to distributors, there are many hurdles to this which have been discussed earlier (see note to Figure 2: Structure of the South African electricity sector). Planning and procurement currently resides with the Minister of Energy and the IPP office (DoE and NT).

If the status quo were to remain in place it may have drastic consequences for the industry as well as Eskom. All the challenges currently facing the industry including insufficient electricity supply, unreliable electricity supply, unsustainability of Eskom and the industry and rising electricity prices as a result of these challenges would remain and likely worsen over time. This alternative as a result does not perform well against the identified evaluation criteria:

**Impact on efficiency** – It is clear that there are significant concerns regarding the manner in which Eskom is managing its generation assets. At the end of 2014, the availability of its coal fired plants were at 74%. This resulted in load shedding and an increased reliance on more expensive generation assets such as the OCGTs which were not intended to be used for providing more than peak capacity. These issues were the result of a multitude of factors including poor generation plant performance, unexpected incidents at different plants, poor coal quality and delays in the commissioning of new build capacity. In response to the supply interruptions, the Electricity War Room was established and developed a five point plan to address the problem. One of the points involved various interventions at Eskom to improve the supply situation. However, these interventions focused on immediate and short term solutions designed to stabilise the utility. It did not address the long term problems faced by the utility.

Unless changes are made that would incentivise or force Eskom to become more efficient in the manner in which it manages its generation assets in the long term, these problems are likely to continue into foreseeable future with a consequent increase in the lack of sustainability and stability of the industry and electricity prices.

- **Characterisation of impact: Weak incentive to be more efficient**

**Conducive environment for private funding** – Although, the REIPPPP has seen success in attracting private investment in renewable electricity generation, this has been at a relatively small scale – 6 327MW have been procured, which is around 1.5% of the total generating capacity installed and R 192 billion spread across 92 individual projects. Eskom’s financial statements indicate that as at 31 March 2015, 1 795 MW of renewable IPP capacity is online.\(^{159}\) The procurement of additional generating capacity relating to base load, mid-merit and peaking capacity is likely to be significantly larger than this. For example, the DoE intends to procure 2 500 MW of coal fired generating capacity from a maximum of 4 IPPs. These projects are substantially larger than any of the renewable energy projects and carry greater

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\(^{159}\) Eskom’s Annual Financial Statements 2015, p.10
risk and contractual issues as the cost of the fuel (such as coal or gas) would need to be factored into the PPAs and pricing.

Renewable energy sources such as solar and wind prices mostly depend on the cost of the capital investment (operational expenditure is limited), and do not utilise fuel that is subject to commodity price and exchange rate volatility. The risk associated with such projects is exacerbated by current state of the industry and Eskom’s financial situation. IPPs bidding for new generation capacity might therefore require higher rates of return and more significant guarantees from government in order for them to invest. Therefore, the current environment is not conducive to private funding of large scale electricity generation capacity.

Further, Eskom remains a vertically-integrated single buyer with little incentive to treat IPPs fairly. To illustrate this point, anecdotal evidence from late 2015 suggests there was uncertainty regarding whether Eskom would issue budget quotes for the connection of new renewable energy IPPs to the grid.\textsuperscript{160} Budget quotes from Eskom are a prerequisite for IPPs to achieve financial close of their bids. Thus far Eskom’s ability to discriminate against IPPs has been addressed by provisions in the PPAs which stipulate that the electricity generated by IPPs must be purchased by Eskom and dispatched first. However, there are no guarantees that will apply for all future IPPs. Also, given Eskom’s current financial position and its status as the single buyer, it must be able to pay all IPPs for the electricity generated under PPAs that it has entered into. In future, 30% of planned additional generation capacity will be procured from IPPs, if this occurs it will increase the amount that Eskom has to pay out to and should be unable to do so – this would have dire consequences for the IPPs and the industry.

- **Characterisation of impact:** Not conducive to private investment

  **Reliance on government funding** – Government has indicated that there is no further equity funding available for Eskom. However, this does not mean that Eskom may not rely on government to provide funding in future. Given the importance of electricity to the functioning of the country should Eskom find itself again in a precarious financial position, government may have to step in to provide equity funding. Therefore, without significant changes to the existing situation to resolve Eskom’s financial situation, government may still be called upon by Eskom to provide funding in future. The same applies to state guarantees for loans and debt that Eskom may incur.

- **Characterisation of impact:** Continued reliance on government funding

  **Ease and cost of implementation.** As there are no changes in this alternative, no implementation is required.

- **Characterisation of impact:** Neutral and no cost

  **Impact on electricity prices** – Recently, we have seen significant increases in electricity prices with Eskom applying to NERSA for increases over and above the approved tariffs in its denied selective reopener application and the recently assessed RCA application. Eskom will likely face similar issues in future, necessitating higher tariffs in order to recover costs. Further, as Eskom will also be relied upon to build additional new generating capacity it is also possible

that it will experience cost overruns and construction delays. Therefore, it is likely that if there are no changes to the status quo prices are likely to continue to increase significantly into the future.

- **Characterisation of impact: Large increase in prices**

**Figure 23: Current South African electricity supply industry structure**

![Diagram of current South African electricity supply industry structure]

4.3.2. **A.2 Status quo with IPPs able to sell directly to distributors**

In this alternative, there are no changes to the structure of the market or Eskom. The only change is that the arrangements regarding IPPs ability to sell directly to distributors and in some instances large customers. Eskom will therefore remain the single buyer of electricity however IPPs will be able to supply a portion of the electricity generated directly to municipalities or large customers. The effect that will result from this change is the introduction of competition in generation with Eskom and IPPs competing to supply customers. The assessment of this variation against the evaluation criteria is as follows:

**Impact of efficiency** – The increased competition will provide Eskom with an incentive to become more efficient in its management of its generation assets. As customers will have an alternative supplier should Eskom be unable to meet customers' demand. This will incentivise Eskom to better manage its assets or risk losing revenue to competitors. However, this is contingent upon IPPs being allocated a sufficiently large proportion of total generating capacity to enable the market to be contestable.

- **Characterisation of the impact: Strong incentive to be more efficient**

**Conducive environment for private funding** – As IPPs will be able to sell directly to some customers, this provides an alternative to only supplying Eskom and may enable IPPs to charge high prices for electricity. This therefore reduces the perceived risk of investing in generation capacity. However, in order for this to be effective, the correct regulatory framework needs to be in place. In particular, the framework needs to ensure that IPPs are able to get fair and reasonable access to the transmission network and that Eskom is not able to favour its own generation at the expense of IPPs.
• Characterisation of the impact: Weakly conducive, however reliant on appropriate regulatory framework

Reliance on government funding – The discipline introduced by competition which will incentivise Eskom to be more efficient is likely to improve its financial position and thereby reduce its reliance on or need for government funding. However, to the extent that there is still the possibility of government providing Eskom with funding, this would be unfair to IPPs.

• Characterisation of the impact: Reduced reliance

Ease and cost of implementation – As there is currently no explicit provision against IPPs selling directly to customers, it may be relatively easy and cost effective to implement. Firstly, it may require regulations related to access to the transmission network (in addition to the existing grid code) and methodology and framework for determining transmission tariffs will need to be developed. Secondly, government (through the procurer, currently the DoE) would need to make the necessary policy adjustments to allow IPPs to sell customers through stipulating such provisions in contracts with IPPs. This would need to be mirrored in the licences issued by NERSA which currently stipulates particularly in relation to the REIPPs that they can only sell electricity to Eskom.

• Characterisation of the impact: Easy and low cost

Impact on electricity prices – This will likely have a lowering effect on prices due to improved efficiency of Eskom and possible lower cost of electricity generated by IPPs.

• Characterisation of the impact: Small decrease in prices

On its own this variation will not achieve the desired outcomes for the industry, however coupled with any of the other single buyer model variations, it may strike the right balance between improving Eskom’s financial position through restructuring of its assets and the discipline introduced by greater competition. Therefore, under each alternative, we will also assess the potential additional impact of strengthening of the provisions concerning the ability of IPPs to sell directly to customers such as distributors.

4.3.3. A.3 Status quo with legal separation

In this alternative, we consider the situation where Eskom would be separated into two subsidiaries, an Eskom generation subsidiary and an Eskom transmission and distribution subsidiary (Eskom transmission for short), as illustrated in the figure below. The shareholding of these subsidiaries would remain the same under the holding company – Eskom Holdings. Legal separation would entail separating the different activities legally into two subsidiaries with autonomy in relation to operations and corporate governance. Specifically, the following administrative tasks within the two subsidiaries would be separate:

• Functions: This includes brands and operational support systems and strategies;

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161 Eskom could be separated into three subsidiaries – one each for generation, transmission and distribution. However, as we are focussing on addressing issues primarily in generation we only consider the option of separating Eskom into two subsidiaries – one for generation and another for transmission and distribution.

- Employees: This entails not permitting employees to work back and forth between both subsidiaries and restricting the movement of the management of the transmission subsidiary to other subsidiaries within Eskom holdings;
- Information: This requires separate information systems to ensure no sharing of information between the subsidiaries; and
- Finances: Each subsidiary will have financial autonomy and separate accounts and budgets.

Legal separation applies operational rules that create a Chinese wall between the generation and transmission subsidiaries. These operational rules are aimed at controlling the flow of information between the two subsidiaries as well as the management and mode of corporate governance of the transmission subsidiary.\(^\text{163}\) The figure below illustrates the structure of Eskom following legal separation.

**Figure 24: Structure of Eskom after legal separation**

Source: Genesis.

The implementation of this alternative will necessitate changes to the regulatory framework as each subsidiary may be required to submit tariff and pricing applications independently. These changes would be relatively minor. Frameworks may need to be developed for fair and reasonable access to transmission infrastructure as there is still an incentive for Eskom Transmission subsidiary to favour the Eskom generation subsidiary. Further, it may also be necessary for the regulator to monitor the transactions and relationship between the two subsidiaries to ensure they are fair and at arm’s length.

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Figure 25: Industry structure under A.3 – Single buyer model with legal separation

The adoption of this alternative will result in a subsidiary with a narrowed focus only on the generation activities allowing it to address issues without the distraction and issues of other activities. As there will be separate finances and reporting arrangements, each subsidiary will have to account for its own performance which will foster greater discipline regarding efficiency. In addition, as there is an arm’s length relationship between the two subsidiaries, it will reduce the incentive for the Eskom transmission subsidiary to favour the Eskom generation subsidiary as there is no longer a link between the performances of both activities. These effects are likely to result in this alternative addressing some of the challenges currently facing the industry as well as achieving the desired industry outcomes. The assessment of this alternative against the evaluation criteria is as follows:

**Impact on efficiency** – Legal separation would establish separate management and staff, accounts and budgets for each subsidiary resulting in the two subsidiaries operating autonomously. The separated business operations formed from separation may develop a specialisation advantage due to a “better management focus on specific tasks in comparison to a multi-product company”. Effectively, each subsidiary may have a more narrowed focus on its own business operations without the distractions of other activities. Further, as the subsidiary will be assessed on its own performance. This will further enhance its incentive to manage its operations better and become more efficient.

For the Eskom generation subsidiary this may result in significant gains in terms of improved maintenance of the generation plants and better management of new build projects (and contracts) resulting in increased financial stability and sustainability. In addition, the legal separation may allow flexibility and innovation that was not possible under a vertically integrated structure because of the synergies created by the vertically integrated structure and contracted budget decisions. There could also be a loss of synergies that existed under the fully vertically integrated structure of Eskom. However this is likely to be outweighed by the increased efficiency as a result of separation.

- **Characterisation of impact: Strong incentive to be efficient**

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**Conducive environment for private investment** – Legal separation increases the transparency of the relationship between the Eskom-owned generation and transmission subsidiaries, making discriminatory behaviour easier to detect and punish.\(^{165}\) Thus, the separation of generation and transmission creates less incentive for the Eskom transmission subsidiary to discriminate against IPPs (the competitors of Eskom’s generation subsidiary), to their detriment. This provides more certainty for potential investors in generation in terms of the ability to gain fair and reasonable access to the grid and compete on a level playing field. This should reduce the perceive risk associated with investing in generation capacity. This is precipitated on the necessary changes to the regulatory framework (as discussed above) being implemented.

- **Characterisation of impact: Strongly conducive**

**Reliance on government funding** – The greater efficiency implied by the separation of the generation and transmission activities should improve Eskom’s financial situation and thereby assist in their ability to raise funds.

- **Characterisation of impact: Reduced reliance**

**Ease and cost of implementation**: It is expected that this alternative would not be difficult to implement. The company structure required to enable the split of Eskom into separate subsidiaries already exists. There is an existing holding company – Eskom Holdings – under which the different subsidiaries can be held. There are costs associated with implementation including the duplication of staff as well as the costs associated with separating activities which created cost saving synergies for the vertically integrated utility. However these are likely to be outweighed by the efficiency gains accruing from specialisation.

- **Characterisation of impact: Easy and low cost**

**Impact on electricity prices** – The greater efficiency through the separation of Eskom into a generation and transmission/distribution subsidiaries may result in lower electricity prices than that which occur if there were no changes to the industry structure. Further, as there is a more conducive environment for private funding, the associated risk with such investment may be lower which will reduce the returns demanded by private investors. Therefore, this alternative may have a lower electricity price path compared to the status quo.

- **Characterisation of impact: Small decrease in prices**

**Additional impact of strengthening of the provisions concerning the ability of IPPs to sell directly to customers**

By enabling IPPs to sell directly to customers (such as distributors) this will open up generation to competition as generators would have to compete for some customers. However, this is contingent upon two factors. Firstly, a sufficient proportion of generating capacity would need to be allocated to IPPs to enable effective competition and a contestable market. Secondly, IPPs would also require fair and reasonable access to the transmission network to facilitate supply to customers. If these requirements are implemented then it is expected that the benefits of competition in generation will be achieved. Effectively, the positive effects on the following aspects will be enhanced:

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\(^{165}\) Autorité de Régulation des Communications Electroniques et des Postes (2007).
Impact on efficiency – Eskom will have a greater incentive to be more efficient due to the competition for customers.

- **Characterisation of impact: Stronger incentive to be more efficient**

Conducive environment for private investment – The environment will be more conducive to private investment as IPPs will have an additional potential source of revenue and sales.

- **Characterisation of impact: Strongly conducive**

Impact on electricity prices – As generators will be competing for certain customers, this may result in a further decrease in prices.

- **Characterisation of impact: Small decrease in prices**

4.3.4. B.1: Introduction of Independent system and market operator (ISMO) (as per ISMO Bill)

This alternative is characterised by Eskom maintaining ownership of all generation, transmission and distribution assets with system and market operations being undertaken by a separate state owned entity. It will be established as separate independent systems and market operator (“ISMO”). This entity would be responsible for the operation of the integrated power system and the trading of electricity at the wholesale level. Eskom would compete with other generators, albeit still retaining the majority of the generation capacity in the short run.

The implementation of this model would require amendment to policy, legislation and regulation for the creation of the ISMO and its mandate and possibly for the functioning of the generation market as well. This is analogous to the proposed introduction of an Independent Systems and Market Operator with the ISMO Bill issued in 2010. Discussions on the ISMO Bill have been on hold and concerns over the impact of the implementation of the Bill on Eskom have been raised.\(^{166}\) The figure below shows the structure of Eskom following the implementation of this model.

**Figure 26: Eskom structure under B.1 Introduction of ISMO**

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The assessment of this alternative in relation to the evaluation criteria is analogous to that for the alternative with legal separation except that its effect on the incentive to discriminate against IPPs is reduced even further as the ISMO is separate from Eskom. However, the biggest issue with this alternative is that it may not be easy to implement and is likely to be costly to implement. In summary, the assessment of this alternative is as follows:

**Impact on efficiency** – As Eskom would no longer be the single buyer of electricity and would have to compete with IPPs to supply electricity to the ISMO, there would be a strong incentive for it to be more efficient. However, this is contingent on IPPs being able to effectively compete for customers. As discussed earlier, this requires IPPs to have a sufficient share of generating capacity to effectively compete for customers and fair and reasonable access to transmission infrastructure.

- **Characterisation of impact:** Strong incentive to be efficient

**Conducive environment for private funding** – As Eskom is no longer the single buyer, it removes the potential for Eskom to use this position to favour its own generation over that of IPPs. This is likely to create a more conducive environment for private investment with investors requiring lower returns for the perceived lower risk of investment.

- **Characterisation of impact:** Strongly conducive

**Reliance on government funding** – As Eskom will be incentivised to be more efficient and manage its generation assets more effectively, this may reduce its reliance on government for funding. However, to the extent that Eskom may still require funding from government, this would be unfair to IPPs. Further, as an independent new company will need to be formed, funding from government for this new entity may be required.

- **Characterisation of impact:** Reduced reliance for Eskom, however funding for ISMO may be required

**Ease and cost of implementation** – This would be a significant shift from the current structure of Eskom and the industry and may require significant planning and resources to be implemented. The creation of the ISMO is pivotal and this would require drawing up the relevant policies, legislation and regulations that would govern the ISMO. This is both a costly and time-consuming process. Further, given that such a model has been previously proposed and unsuccessfully attempted, it is unlikely that this will be a viable alternative.

- **Characterisation of impact:** Difficult and high cost

**Impact on electricity prices** – There will be a number of impacts on electricity prices in particular the additional costs in setting up the independent company, the tariffs that may be charged by the ISMO may increase prices and the loss of synergies from vertical integration. However this may be balanced by improved efficiency at Eskom.

- **Characterisation of impact:** Uncertain
Additional impact of strengthening of the provisions concerning the ability of IPPs to sell directly to customers

In this context, it may not be necessary to allow IPPs to sell directly to customers as the ISMO will perform this function. The primary rationale for allowing IPPs to sell directly to customers is to enable competition at the generation level. However, as there is an ISMO that all generators must compete to supply to, this creates competition at the generation level. Further, an independent system operator would ensure that all generators are treated fairly creating a conducive environment for private investment. Where the systems operator is vertically integrated at the generation level, enabling IPPs to sell directly to customers limits (at least to some extent) the potential for the vertically integrated utility to discriminate against its competitors. With an ISMO, this is no longer a concern. Therefore, it is not recommended that this option should be implemented in this alternative.

4.3.5. B.2: Introduction of Transmission system operator (TSO)

Eskom, in this alternative, would continue to be active in generation and distribution. However transmission would be sold off to a separate entity which would also take on the role of trading electricity at the wholesale level and operation of the integrated power system. This entity would be responsible for the transmission of electricity from all generators, the investment in and maintenance of the transmission network as well as the sourcing of electricity from generators. Unlike in B.1, Eskom now has no role in any transmission, market or system operations. Eskom would now compete with other generators, albeit still retaining the majority of the generation capacity in the short run. The implementation of this alternative would require policy, legislation and regulation for the creation of the TSO and its mandate.
In respect of its impact on the dynamics of the market, as transmission and system operations will be undertaken by a separate company this would enable IPPs to have fair and reasonable access to the transmission network. As Eskom is no longer active in system operations, the incentive to favour its own generation over that of IPPs is removed. In summary, the assessment of this alternative is as follows:

**Impact on efficiency** – As Eskom would no longer be the single buyer of electricity and would have to compete with IPPs to supply electricity to the TSO, there would be a strong incentive for it to be more efficient. However, this is contingent on IPPs being able to effectively compete for customers. As discussed earlier, this requires IPPs to have a sufficient share of generating capacity to effectively compete for customers and fair and reasonable access to transmission infrastructure. Further, the significant changes to the structure of the Eskom may result in the utility being able to more narrowly focus on the individual activities of generation and distribution thereby improving its efficiency.

- **Characterisation of impact: Strong incentive to be efficient.**

**Conducive environment for private investment** – A more conducive environment for private investment in created as a separate transmission and systems operations company (i.e. separate from Eskom) would be incentivised to provide fair and reasonable access to the network for all generators. Additionally, non-discriminatory treatment of all generators would be optimal as it would be in its interest to maximise the utilisation of the network.

- **Characterisation of impact: Strongly conducive environment for private investment**

**Reliance on government funding** – As Eskom will be incentivised to be more efficient and manage its generation assets more effectively, this may reduce its reliance on government for funding. However, to the extent that Eskom may still require funding from government for its generation operations and this could disadvantage IPPs. Further, funding from government may be required for the establishment of the TSO.
• **Characterisation of impact: Reduced reliance for Eskom, however funding for TSO may be required**

*Ease and cost of implementation* – This restructuring would be a shift from the current structure of Eskom and the industry and will require extensive planning and resources in order to be implemented. This is especially true of the TSO as additional policy, legislation and regulation will be required in order for it to operate optimally. Given the experience with the ISMO, there may be difficulty in establishing the TSO. Again, there would possibly be a cost to unbundling due to the loss of synergies that existed under the vertically integrated structure of Eskom.

• **Characterisation of impact: Difficult and high cost of implementation**

*Impact on electricity prices* – The impact on prices depends on two factors. Firstly, as there is an incentive for Eskom to be efficient in the management of its generation assets and there is competition in generation this should exert downward pressure on prices. Secondly, there might be upward pressure on prices depending on the tariff charged by the TSO and the cost of establishing the TSO. Additional costs imposed by unbundling as well as the loss of synergies that were present under Eskom’s vertically integrated structure. As a result, it is not clear which direction final consumer prices will move in.

• **Characterisation of impact: Uncertain**

**Figure 29: Industry structure under B.2 Introduction of a TSO**

![Diagram of Industry Structure](Image)

*Source: Genesis.*

**Additional impact of strengthening of the provisions concerning the ability of IPPs to sell directly to customers**

The implementation of provisions to enable IPPs to sell directly to customers will introduce additional competition at the generation level. This will enhance the impacts of this alternative on Eskom’s efficiency and creating a more conducive environment for private investment. However, these effects are highly dependent on IPPs being able to effectively compete with Eskom for customers.

*Impact on efficiency* – Eskom will have an incentive to be more efficient due to the competition for customers.

• **Characterisation of impact: Strong incentive to be more efficient**
Conducive environment for private investment – The environment will be more conducive to private investment as IPPs will have an additional potential source of revenue and sales.

- Characterisation of impact: Strongly conducive

Impact on electricity prices – As generators will be competing for certain customers, this may result in a further decrease in prices.

- Characterisation of impact: Uncertain

4.3.6. B.3: State generation companies and private sector in generation

In this model, Eskom divests from generation and is only active in transmission and distribution. Eskom would take on the role of the transmission systems operator (TSO) which is not affiliated with any of the generators. The TSO would also act as the single buyer of electricity from the generators. The generation assets that were formerly part of Eskom, would be acquired by state-owned generation companies and private sector participants. As a TSO would have to be established, new policies, regulations and legislation would be required to set out the mandate of the TSO and govern its behaviour.

The effect of this alternative in relation to the different criteria is largely the same as that for the Introduction of an ISMO (B.1.). The only key difference is that due to Eskom having no role in generation, there is a much stronger impact on the efficiency of the management of the generation assets and a much more conducive environment for private funding. This means that the impact on many other criteria including the reliance on government funding for generation assets and electricity prices is also stronger relative to B.1.

Impact on efficiency – The independent generation companies have a much stronger incentive to improve the efficiency of their management of the generation assets.

- Characterisation of impact: Strongly positive

Conducive environment for private funding – Private companies would be able to purchase some of Eskom’s generation assets, allowing them to be able to supply larger volumes of electricity. This may incentivise entry via purchase of these assets.

- Characterisation of impact: Strongly conducive

Reliance on government funding – With a mixture of state and private involvement in generation, there will be some need for government funding of generation. As the TSO may be required to expand and maintain all transmission infrastructure, additional government funding may be necessary. The establishment of the TSO may also come at a cost.

- Characterisation of impact: Reduced reliance

Ease and cost of implementation: This would be a significant shift from the current structure of Eskom and the industry and may require significant planning and resources to be implemented. This is especially true of the TSO as it will also require additional policy, legislation and regulation in order to operate optimally. It also carries a significant level of risk for the industry as it depends on attracting the required and appropriate private investors to purchase the electricity generation assets to be sold. Again, there would possibly be a cost to unbundling due to the loss of synergies that existed under the vertically integrated structure of Eskom.
• **Characterisation of impact: Difficult and high cost to implement**

*Impact on electricity prices*: Due to the separation of transmission and generation, this model could lead to lower prices as private investors are likely to have a lower cost of debt and little to no cost overruns compared to Eskom. However, prices would also be impacted by the tariffs that are charged by the TSO depending on its level of efficiency.

• **Characterisation of impact: Small decrease in prices**

**Figure 30: Industry structure under B.3 State generation companies and private sector in generation**

Additional impact of strengthening of the provisions concerning the ability of IPPs to sell directly to customers

If the generation assets are split amongst a number of separate IPPs, this will stimulate greater competition at the generation level. However there may be no need to enable direct sales from IPPs to customers as Eskom will no longer be active in generation.

4.3.7. **C. Wholesale competition with power exchange pool (multiple buyers)**

Under the wholesale competition model, generation is competitive and is separated from transmission and distribution. Eskom would become the transmission, or transmission and distribution, company (which is not active in generation). There are two possible variants of the wholesale competition model: (i) a model in which there is a single buyer, namely Eskom; and (ii) a multi-buyer model in which distribution companies purchase from generators through a power pool exchange.

The first variant is essentially the single buyer model where the utility has no involvement in generation and is the TSO (i.e. B.3 above). This has therefore been discussed above (in section 4.3.6). In summary, Eskom would divest from generation and remain active in transmission only or transmission and distribution. The Eskom transmission company would be a single buyer purchasing from numerous independent generators. This model thereby creates...
a much more conducive environment for private funding and greater efficiency in the management of the generation assets. However, it will not be easy to implement as it will require significant changes to existing policies, legislation and regulations. The effectiveness of this approach is also dependent on finding the appropriate private investors for the generation assets. The second variant is discussed below.

Wholesale competition with power exchange pool (multiple buyers)

This variant of wholesale competition is a multi-buyer model in which there is a power pool exchange through which distribution companies (the buyers) purchase electricity from generating companies. The power pool would probably be managed by Eskom, and could consist of a spot market and a forward market, designed to reduce the risk associated with volatile spot prices. Eskom would remain the transmission company and its role would be to maintain the transmission services between generation companies and distribution companies.

Implementation of this model would require that Eskom divests from generation. Eskom would become a transmission company (or transmission and distribution) company and may also need to manage the power pool/exchange. The transmission network would need to have sufficient capacity and be able to deal with generators located in geographically separate areas. Transmission tariffs and costs would need careful management.

Additional independent generators would need to enter the market; a power pool would be required with both spot and forward markets; and distributors/customers active in both the short and long term markets would be necessary to sustain these markets.

Additional regulations would be required to manage the power pool and both the spot and forward markets. It would also be necessary to ensure that no single supplier is able to dominate the market as this would inhibit competition. The regulatory mechanism would need to be effective, predictable and efficient.

Impact on efficiency – The power pool creates strong incentives for efficient operation of generation assets as different generators would be competing against each other for contracts with distributors as well as within the power pool. This is enhanced further by generation which is separate to other activities and is undertaken by independent producers.

- Characterisation of impact: Strongest incentive to be efficient

Conducive environment for private funding – The competitive nature of generation combined with the use of a power pool is likely to enable IPPs to compete in generation, particularly because they are able to sell directly to distributors. The model provides new entrants with the assurance that the market mechanism will determine sales as it is fair and transparent. Because the transmission operator is independent, its incentives are to maximise electricity transmission and these incentives are aligned with ensuring fair and equitable access for generators. This provides a highly conducive environment for private funding however this will need to be supported by an effective regulatory framework that enables the power pool to work efficiently.

- Characterisation of impact: Strongly conducive

Reliance on government funding – As generation companies are independent, there would be no reliance on government funding for generation assets. Some funding may still be needed for transmission.
• **Characterisation of impact: Reduced reliance (limited to transmission only)**

*Ease and cost of implementation.* Implementation of this model is likely to be fairly complex, time consuming and costly as it requires changes to the utility structure, the market structure and regulations. In particular it will require the following:

  o There is currently no power pool or exchange in South Africa. The mechanisms, protocols and procedures for this arrangement would need to be developed and implemented, requiring significant resources and expertise. For some types of power exchanges such as ‘bid-based dispatch,’ significant investment in specialised equipment such as real time metering and information technology is required. In the case of California, the cost for establishing the spot market was USD 250 million;\textsuperscript{167} and

  o In order to provide oversight and to ensure the effective functioning of the power exchange, the regulator’s existing mandate would need to be expanded to include the required enabling provisions. These new powers would need to include the adjudication and resolution of issues and complaints regarding market participant’s behaviour to ensure the market operates effectively and competitively. Inevitably, this would require increased capacity of the regulator to effectively undertake these tasks.

• **Characterisation of impact: Extremely difficult and highest cost to implement**

*Impact on electricity prices* – The increased efficiency and competition may result in lower prices for electricity. However, the high cost involved in implementing this model may counteract these decreases. Further, the introduction of a power pool and its associated arrangements may lead to volatility in prices particularly in the short term. The design of the system will also be critical to ensuring that prices are set efficiently.

• **Characterisation of impact: Uncertain, possible increase in prices**

**Figure 31: Industry structure under C. Wholesale competition with power exchange pool**

Wholesale competition has been implemented successfully in several developed countries including Australia, the UK, Sweden, Norway and Finland. The primary reasons for its relative success have been the existence of excess generation capacity; stable growth in demand; and the availability of natural gas which enabled the entry of numerous small suppliers at a

\textsuperscript{167} Kessides, I.N., 2004, page 153
relatively low cost (in Western Europe and the US). These countries were also characterised by high penetration of electricity services with infrastructure that had largely been amortised. However, developing countries such as South Africa will face greater challenges in implementing wholesale competition in the electricity sector. Many of the pre-requisites required to implement the model and some of the factors leading to the successful implementation of the model do not exist in developing countries, including South Africa. In Brazil, the implementation of wholesale competition proved to be quite problematic and time consuming.

4.3.8. D. Retail competition

Retail competition is an extension of the wholesale competition model which extends competition to all retail customers, allowing customers to choose their suppliers. Electricity may be purchased from these suppliers directly or through retailers/distributors. As in the wholesale competition model, the market for generation is competitive. Eskom would not participate in generation but would provide the transmission (and possibly distribution). Retailers would pay Eskom a tariff for the use of Eskom’s infrastructure.

However, this model would require significant changes to Eskom’s structure and that of the industry as a whole. It would require that Eskom be vertically unbundled and cease operations in generation, and possibly distribution. New, independent generators would be required to enter the market and new retailers (and possibly distributors) would also need to enter the market.

Significant changes to the policy, legislation and regulations of the industry would be required. Regulations would need to be adapted to better manage the new structure. New trading arrangements would also be required between Eskom, the generation companies and retailers. Methodologies for the determination and regulation of tariffs for use of transmission and distribution networks would also need be developed and implemented. Restructuring of the distribution segment of the electricity supply industry through the REDs was attempted in South Africa and there were significant hurdles to the implementation of such an arrangement. It is highly likely that these hurdles still remain and it will be difficult to implement the retail competition model in the current context. Based on the assessment of this model against the evaluation criteria, although there are some benefits to retail competition, the difficulties involved in implementing such a model more than outweigh these benefits.

Impact on efficiency – While the competitive nature of this model encourages both retailers and generators to maximise efficiency in order to maximise profit, there may be some duplication of services (such as administrative staff).

- **Characterisation of impact: Strong incentive to be efficient**

Conducive environment for private funding – The competitive nature of this model is likely to encourage private funding; however, this is dependent on the extent and thoroughness of regulation and the ability of regulation to provide distributors with incentives to treat retailers fairly.

- **Characterisation of impact: Strongly conducive**

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Reliance on government funding – Eskom’s lack of involvement in generation would remove a reliance on government funding for generation assets. Some funding may still be needed for transmission.

- **Characterisation of impact: Reduced reliance (limited to transmission only)**

*Ease and cost of implementation.* This model is complex and challenging to implement. It would also be an extensive, lengthy process to implement due to the need for a significant degree of restructuring of the industry. The need for new regulations is likely to further extend the implementation period, as is the need for the establishment of new generators and retailers. Furthermore, given the objections to REDS, it is unlikely that there would be sufficient support for a retail competition model owing to the need to remove Eskom, and most likely also municipalities, from distribution/retail. Further, very few countries (Norway, Australia, Canada and parts of the USA)\(^{170}\) have adopted this model and in most instances where this model has been adopted significant hurdles have been encountered in its implementation.

- **Characterisation of impact: Most difficult and highest cost to implement**

*Impact on electricity prices* – It is unclear what the precise impact on prices might be given the extent of changes that would be introduced by this model. Although, there is greater competition which may result in greater efficiency, the substantial changes to the market structure and introduction of new players can result in increased costs associated with implementation with a consequent increase in prices.

- **Characterisation of impact: Uncertain**

**Figure 32: Industry structure under D. Retail competition**

4.4. THE ALLOCATION OF THE PLANNING AND PROCUREMENT FUNCTIONS

At present the planning function is vested in the Minister of Energy in South Africa, whereas the procurement is performed through the Department of Energy’s ad hoc structure known as the Independent Power Producer Procurement Programme unit.\textsuperscript{171} There are some challenges with the status quo as the planning and procurement activities are not undertaken in a coherent and consistent manner. Firstly, energy supply infrastructure planning requires continuous adjustment for changing circumstances and this is not typically the policy department’s core business. Hence, plans are not updated sufficiently regularly to ensure the plan responds to changes in circumstances. Secondly, procurement is done through the IPP office which is an ad hoc structure that is not formally embedded in the ESI governance framework. Therefore, any ESI reform needs to address these challenges.

Although there is a decided lack of academic literature on the appropriate placement and institutional arrangements of the planning and procurement functions in a reformed ESI, an overview of the practice of several countries suggests the following:

- The planning function which determines the type and nature of new generation capacity that should be built and by whom should not be determined by a participant active in generation. This could provide incentives for the planner to choose the specific type and nature of generation capacity most suited to its affiliated generation company, thereby showing a preference to its own generation company at the expense of its competitors.

- Similarly, the procurement of new generating capacity should not be the responsibility of any company that is also active generation as this may distort competition for the market. Again, the company would have an incentive to prefer its own generation activities to the detriment of its competitors.

This therefore begs the question of who should be responsible for these functions. There are a number of options that may be applicable under different circumstances.

- The examples cited in section 3.2.4 suggest that the planning function can be undertaken by an independent entity such as a separate body created specifically for the purpose of undertaking these functions as the Brazilian case or the independent regulator. In these circumstances, procurement of new generation capacity is undertaken by the government department or its appointed agent as in the Kenyan example.

- However, experience from other energy sub-sectors suggest that the procurement function in particular can be performed by an independent system operator. In fact, in some energy sub-sectors, such as the piped-gas industry, the transmission system operator can be mandated to assess the need for additional infrastructure, as well as the procurement thereof, typically through ‘open seasons.’\textsuperscript{172} As a result the infrastructure will be optimised

\textsuperscript{171} The IPPPP unit was established by the Department of Energy, National Treasury and the Development Bank of South Africa for the purpose of implementation of IPP procurement. Source: www.ipp-projects.co.za.

\textsuperscript{172} An open season is a period during which an infrastructure provider requests shippers or traders to commit to long-term capacity reservation to determine market requirements. Source: http://www.energinet.dk/EN/GAS/Det-danske-gasmarked/Sider/Open-Season.aspx.
for all current and prospective users, rather than serving the incumbent alone.\textsuperscript{172} This is the practice in the piped-gas sector in several EU countries, including Denmark and Spain.

- In a situation in which the system operator is not (fully) independent, there may be concerns regarding the independence and objectivity of a combined planning and procurement function housed in a vertically integrated incumbent.

Based on the above, the following allocation of the planning and procurement functions in the various identified ESI alternatives may be appropriate:

- In alternatives where Eskom will continue to be involved in generation and there is no independent systems operator, it will be appropriate to maintain the planning function with the DoE or allocate it to NERSA (the sector regulator) with clearly demarcated policy guidelines. This would be applicable in the following alternatives: A.3 Status quo with legal separation, and B.2: Introduction of Transmission system operator.

- The procurement function on the other hand can be allocated to Eskom, if sufficient safeguards are in place. This is because it is possible to place and enforce arm’s length procurement requirements on the procurement division of the transmission and distribution subsidiary, when the desired generation or transmission capacity is established by an independent body. When the entity is also tasked with planning, it means that the transmission and distribution subsidiary would face a strong incentive to overestimate demand in order to over-design or gold-plate the required infrastructure or to favour its sister company’s assets as this would be a means to growing revenues (the Averch-Johnson effect, similar to the incentives under rate of return regulation).

- Where there is an independent system operator that is either Eskom (with no involvement in generation) or as a separate state owned company, it would be appropriate to allocate both planning and procurement to the system operator. This would apply to the more intensive and onerous alternatives including B.3. State generation companies and private sector in generation, C. Wholesale competition with power exchange pool and D. Retail competition as well as B.1: Introduction of Independent system and market operator. As Eskom will be system operator and would no longer be active in generation or there is an independent system operator (separate to Eskom), in both circumstances the entity would have no incentive to discriminate against other IPPs in undertaking the planning and procurement functions.

Table 4: Allocation of planning and procurement functions under the different alternatives

<table>
<thead>
<tr>
<th>ESI alternative</th>
<th>Planning</th>
<th>Procurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1 Status quo</td>
<td>DoE</td>
<td>IPPPP Office (of the DoE)</td>
</tr>
<tr>
<td>A.2 Status quo with IPPs able to sell directly to distributors</td>
<td>DoE</td>
<td>IPPPP Office (of the DoE)</td>
</tr>
<tr>
<td>A.3 Status quo with legal separation</td>
<td>DoE or NERSA (with demarcated policy guidelines)</td>
<td>Eskom Transmission and Distribution subsidiary (with significant safeguards)</td>
</tr>
<tr>
<td>B.1: Introduction of Independent system and market operator (ISMO)</td>
<td>ISMO</td>
<td></td>
</tr>
</tbody>
</table>

4.5. CONSIDERATIONS FOR IMPLEMENTATION OF REFORMS

In many of the alternatives discussed above, the role of competition and IPPs is of critical importance to the achievement of many of the benefits arising from the different models. In particular, the threat of competition provides incentive for the incumbent to become more efficient and reduce the reliance on government funding. However, these benefits will only be realised if competition is enabled and IPPs are able to effectively compete in generation. It is therefore critical that the approach to the implementation of any of the alternatives take this into account. The importance of this is demonstrated by the example of the implementation of sector reform in the South African telecommunications industry.

The approach to reform in the South African telecommunications sector followed the sequencing discussed above with the corporatisation, commercialisation and partial privatisation (a 30% stake was sold to a strategic equity partner) of the incumbent utility with new policy and legislation being implemented and the establishment of an independent regulator. A detailed discussion of the experience of reform in the South African telecommunications sector is included in Appendix B. One of the key tenets of the approach was the introduction of competition in the market through the SNO after a period of 5 years. During that time, Telkom was allowed to operate as a monopoly to enable it to prepare for competition and roll out services to underserved areas. Regulation imposed on Telkom was meant to curtail its ability to exercise its monopoly power.

However, various issues and challenges in the implementation of the approach led to very different outcomes in the sector than that aimed for when the approach was formulated. Telkom was able to exercise its monopoly power over a much longer period of time and abuse its position to the detriment of its competitors. There are thus several key lessons from the implementation of sector reform in the South African telecommunications sector relevant to the electricity sector (and any other utility industry):

1. Strategic equity partnerships should be carefully considered as the selected partners may have a significant impact on the outcome of the industry. For instance, incentives may not align with social objectives (for example, as seen with Telkom, profit-maximising incentives derailed effective increases in coverage).

2. When reform is contemplated in an industry where the state still owns or partially owns the incumbent utility, the incentives for government to ensure that the introduction of competition happens timeously and effectively may be conflicted. This was potentially a contributing factor to the delay in the introduction of competition (and the SNO) in the
telecommunications industry. Therefore, safeguards should be put in place to ensure reforms are implemented timeously and effectively and mitigate the potential for interference from government.

3. Stringent price regulation is necessary to prevent abuse and charging of high prices. In Telkom’s case, although price cap regulation was imposed, it was ineffective in ensuring low prices to end customers and preventing it from using its position to hinder competition.

4. The requirement for downstream competitors (e.g. VANS) to rely on a single upstream competitor, if not stringently regulated, can also result in abuse of dominance. In such circumstances, effective regulation, access to the required infrastructure – and at fair and reasonable prices – would be required to ensure that the incumbent utility is not able to abuse its dominant position.

5. Telkom’s dominant position coupled with its focus on profit maximisation led to significant delays in investment in upgrading its telecommunications network. This led to a decline in fixed line telecommunications services, and to these services being replaced by mobile services. Although, similar alternatives do not exist in the electricity sector, the risk is that customers that are able to move off-grid by installing fossil fuel or small-scale renewable energy generators will do so. This could impact on Eskom’s (as well as municipalities) ability to generate the revenue required to recover the cost of electricity supply with a consequent impact on prices and its ability to fund its operations and investment requirements.

Thus it is imperative to create mechanisms for competition to avoid delaying the benefits of competition. These issues must be avoided and should be considered prior to implementation of any reform in order to avoid inadvertently creating a climate conducive to abuse of dominance. In the case of electricity sector reform, possible considerations to avoid such a situation may entail:

- Ensuring a place for IPPs in the industry by allocating new generation capacity in relevant plans and policies and following through with implementation;

- Creating a certain regulatory environment by timeously and appropriately adjusting the regulatory framework as may be required (for example, changes to licensing provisions or tariff regulations may be required); and

- Ensuring the regulatory mechanisms are in place to enable fair and non-discriminatory access to infrastructure at reasonable tariffs as may be required. This may require the imposition of a different tariff structure and price regulation on Eskom.

4.6. SUMMARY

The current structure of the South African electricity supply industry can be described as a single buyer model with a vertically integrated utility. By flexing these two key characteristics alternatives to the existing structure of the industry can be developed. The report identifies the following alternatives that may be implemented in South Africa:

A: Status quo and two possible variations:

A.1: Status quo
A.2: Status quo with IPPs being able to sell directly to eligible customers (direct contracts);
A.3: Status quo with legal separation of Eskom;

B: Restructuring of Eskom assets and/or operations with the following variations:

B.1: Introduction of Independent system and market operator (ISMO) (as per ISMO Bill) (separate out system operations);
B.2: Introduction of Transmission system operator (TSO) (separate out transmission);
B.3: Unbundling of generation; both State-owned and private sector generation companies participate in generation;

C. Wholesale competition with power exchange pool (multiple buyers); and

D. Retail competition.

Each of these alternatives has different implications for the extent of competition, market structure and ownership of assets. Under each alternative (where relevant), we have also assessed the potential additional impact of strengthening of the provisions concerning the ability of IPPs to sell directly to customers such as distributors.

In order to compare and assess each alternative a set of evaluation criteria is identified. These criteria are based on the drivers for reform previously identified as well as the desired outcomes for the industry and can be used to compare the alternatives. In order to perform an objective and logical assessment of the different alternatives against these evaluation criteria, specific issues, which will guide the assessment and should be considered under each alternative, have been identified. Further, in order to more easily compare the alternatives, a rating system has also been identified for each criterion. The criteria, as depicted in Figure 22: Evaluation criteria of the different restructuring alternatives, are: the impact on efficiency; whether the environment is conducive to private funding; reliance on government funding; ease and cost of implementation; and the impact on electricity prices.

Each alternative is then assessed against the evaluation criteria. The findings, as indicated in table 5 below, are as follows:

A.1: Status quo. Under the status quo there is a weak incentive to increase efficiency and continued reliance on government funding. This alternative is not conducive to private investment. As this alternative is already in place, no implementation is required. However, as noted earlier, the status quo does not sufficiently address the reform drivers.

A.2: Status quo with IPPs being able to sell directly to eligible customers (direct contracts). Under this alternative, there is a strong incentive to become more efficient; however, this alternative is only weakly conducive to private investment – and this is reliant on the appropriate regulatory framework being put in place. There is a reduced reliance on government funding compared with the status quo. The changes can be implemented easily and with little cost. Small changes to policy, legislation and regulation are required.

A.3: Status quo with legal separation of Eskom. As with A.2, this alternative provides a stronger incentive to increase efficiency and will result in a reduced reliance on government funding compared with the status quo. Also, the changes can be implemented easily and with little cost, and some changes to policy, legislation and regulation are required. Unlike A.2, this alternative is strongly conducive to private investment as discrimination against other power producers by Eskom would be easier to detect and punish relative to A.2. In addition, if IPPs
are permitted to sell directly to customers, the incentive to increase efficiency strengthens and the environment becomes even more conducive to private investment.

**B: Restructuring of Eskom assets and/or operations with the following variations:**

**B.1: Introduction of Independent system and market operator (ISMO) (as per ISMO Bill).** Compared with the status quo, this alternative creates a strong incentive to be efficient and is strongly conducive to private investment. There is also likely to be a reduced reliance on government funding from Eskom, although funding may be required for the ISMO. However, this alternative is difficult and costly to implement, and will require significant changes to legislation and the regulatory framework, as well as the development of new regulations. Also, as noted in section 2.1, this option was considered in South Africa but never implemented. The practical ramifications of establishing new institutions in terms of a reform programme became a stumbling block and should not be underestimated in any future reforms.

**B.2: Introduction of Transmission system operator (TSO).** This alternative creates a strong incentive to be efficient and is strongly conducive to private funding. Furthermore, permitting IPPs to sell directly to customers would create an even stronger incentive to increase efficiency and a more conducive environment for private investment. There would be a continued reliance on government funding for Eskom generation – with possible further funding requirements for the TSO. This is also difficult and costly to implement, and will require significant changes to legislation and the regulatory framework, as well as the development of new regulations.

**B.3: State generation companies and private sector in generation.** This alternative creates a strong incentive to be efficient, largely because of the share of generation that would be privately owned, thus creating competition for the state generation companies. It is also strongly conducive to private investment and has a reduced reliance on government funding as funding is only required for the state generation companies and transmission. However, this alternative is difficult and costly to implement, and will require significant changes to legislation and the regulatory framework, as well as the development of new regulations in order to establish Eskom as the TSO and establish the state generation companies. It is therefore unlikely to receive the support required.

**C. Wholesale competition with power exchange pool (multiple buyers).** This alternative provides the strongest incentive to be efficient (equal to that of alternative D) because generation is privately owned. It is also strongly conducive to private investment and has a reduced reliance on government funding as funding is only required for transmission. However, this alternative is difficult and is the most costly alternative to implement (equal to alternative D) given the prevailing conditions. It will also require extensive changes to legislation and the regulatory framework, as well as the development of new regulations, particularly related to the development of the power pool. It is therefore unlikely to receive the support required.

**D. Retail competition.** The impact of this alternative is very similar to that of scenario C (Wholesale competition with power exchange pool (multiple buyers)). However, this alternative would require that the policy, legislative and regulatory framework be completely overhauled. It is therefore unlikely to receive the support required.

Thus each alternative has advantages and disadvantages which must carefully be weighed against each other. Furthermore, as discussed previously, the positioning of the procurement and planning functions are very important considerations and depend on the alternative chosen.
The planning function determines the type and nature of new generation capacity required and the associated details. The procurement of new generating capacity should be independent of any company active in generation to prevent distortion of competition for the market. At present, the planning function is vested in the Minister of Energy and the procurement is performed through the Department of Energy’s ad hoc structure known as the Independent Power Producer Procurement Programme unit. The report discusses some of the challenges resulting from the status quo, before presenting an analysis based on the practices of several other countries. Various options are available, depending on the circumstances.

The report suggests the following possible allocations of the planning and procurement functions:

- Where Eskom is involved in generation and there is no independent systems operator, it will be appropriate to maintain the planning function with the DoE or allocate it to the sector regulator with clearly demarcated policy guidelines. The procurement function could be allocated to Eskom, if sufficient safeguards are in place.

- Where there is an independent system operator that is either Eskom (with no involvement in generation) or as a separate state owned company, it would be appropriate to allocate both planning and procurement to the system operator.

Finally, the report provides considerations for the implementation of any of the identified alternatives. The role of competition and IPPs is incredibly important to the achievement of many of the benefits arising from many of the different options. These are therefore critical considerations in designing implementation of any of the alternatives, as illustrated with the example of the South African telecommunications sector. The example highlighted key lessons for reform in the electricity sector particularly regarding the choice of strategic equity partner and the need to implement required regulation timeously and effectively.

Mechanisms for competition are therefore vital to avoid delaying the benefits of competition. Potential issues should be considered prior to implementation of any reform in order to avoid inadvertently creating a climate conducive to abuse of dominance. In particular, the report highlighted three possible considerations to avoid such a situation in electricity: (i) IPPs must be supported by through the allocation of new generation capacity in relevant plans and policies, which must be implemented; (ii) a certain regulatory environment is essential and must be timeously implemented; and (iii) regulatory mechanisms ensuring fair and non-discriminatory access to infrastructure at reasonable tariffs are required.

Thus selection of the optimal industry structure requires consideration of numerous essential factors, as well as a careful comparison of the advantages and disadvantages of each of the possible industry restructuring alternatives for the South African electricity supply sector.

The table below summarises the assessment of the different restructuring alternatives against the evaluation criteria.
Table 5: Summary of different restructuring alternatives against the evaluation criteria

<table>
<thead>
<tr>
<th>ESI alternative</th>
<th>Impact on efficiency</th>
<th>Conducive environment for private investment</th>
<th>Reliance on government funding</th>
<th>Ease and cost of implementation</th>
<th>Impact on electricity prices</th>
<th>Policy, legislative and regulatory changes required</th>
<th>Impact of allowing IPPs to sell directly to customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1 Status quo</td>
<td>Weak incentive to be efficient</td>
<td>Not conducive to private investment</td>
<td>Continued reliance on government funding</td>
<td>Neutral and no cost of implementation</td>
<td>Large increase in prices</td>
<td>None</td>
<td>N/A</td>
</tr>
<tr>
<td>A.2 Status quo with IPPs able to sell directly to distributors</td>
<td>Strong incentive to be more efficient</td>
<td>Weakly conducive, however reliant on appropriate regulatory framework</td>
<td>Reduced reliance</td>
<td>Easy and low cost of implementation</td>
<td>Small decrease in prices</td>
<td>Small changes to enable IPPs to sell directly to customers</td>
<td>N/A</td>
</tr>
<tr>
<td>A.3 Status quo with legal separation</td>
<td>Strong incentive to be efficient</td>
<td>Strongly conducive</td>
<td>Reduced reliance</td>
<td>Easy and low cost of implementation</td>
<td>Small decrease in prices</td>
<td>Some changes required however Eskom legal structure conducive to these changes</td>
<td>Stronger incentive to be efficient, strongly conducive environment for private investment and small decrease in prices</td>
</tr>
<tr>
<td>B.1: Introduction of Independent system and market operator (ISMO) (as per ISMO Bill)</td>
<td>Strong incentive to be efficient</td>
<td>Strongly conducive</td>
<td>Reduced reliance for Eskom, however funding for ISO may be required</td>
<td>Difficult and high cost of implementation</td>
<td>Uncertain</td>
<td>Significant changes to legislation and regulatory framework as well as new regulations need to be developed</td>
<td>May not be necessary as ISMO results in competition in generation</td>
</tr>
<tr>
<td>B.2: Introduction of Transmission system operator (TSO)</td>
<td>Weak incentive to be efficient</td>
<td>Weakly conducive</td>
<td>Continued reliance for Eskom generation and funding for TSO may be required</td>
<td>Difficult and high cost of implementation</td>
<td>Small increase in prices</td>
<td>Significant changes to legislation and regulatory framework as well as new regulations need to be developed</td>
<td>Stronger incentive to be more efficient, strongly conducive environment for private investment and small decrease in prices</td>
</tr>
<tr>
<td>B.3: State generation companies and private sector in generation</td>
<td>Strong incentive to be efficient (private ownership of large share of generation)</td>
<td>Strongly conducive</td>
<td>Reduced reliance for Eskom (limited to state generation companies and transmission only)</td>
<td>Difficult and high cost of implementation</td>
<td>Difficult and high cost to implement</td>
<td>Significant changes to legislation and regulatory framework as well as new regulations need to be</td>
<td>May not be necessary as unbundling of generation stimulates competition in</td>
</tr>
<tr>
<td>ESI alternative</td>
<td>Impact on efficiency</td>
<td>Conducive environment for private investment</td>
<td>Reliance on government funding</td>
<td>Ease and cost of implementation</td>
<td>Impact on electricity prices</td>
<td>Policy, legislative and regulatory changes required</td>
<td>Impact of allowing IPPs to sell directly to customers</td>
</tr>
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<td>------------------------------------------------</td>
</tr>
<tr>
<td>C. Wholesale competition with power exchange pool (multiple buyers)</td>
<td>Strongest incentive to be efficient (private ownership of generation)</td>
<td>Strongly conducive</td>
<td>Reduced reliance for Eskom (limited to transmission only)</td>
<td>Extremely difficult and highest cost of implementation</td>
<td>Uncertain, possible increase in prices</td>
<td>Extensive changes to legislation and regulatory framework as well as new regulations related to the power pool need to be developed</td>
<td>N/A</td>
</tr>
<tr>
<td>D. Retail competition</td>
<td>Strongest incentive to be efficient (private ownership of generation)</td>
<td>Strongly conducive</td>
<td>Reduced reliance for Eskom (limited to transmission only)</td>
<td>Extremely difficult and highest cost implementation</td>
<td>Uncertain</td>
<td>An overhaul of the entire policy, legislative and regulatory framework would be required</td>
<td>N/A</td>
</tr>
</tbody>
</table>
SUMMARY AND CONCLUSIONS

This report has identified and analysed potential organisational structures and the accompanying governance arrangements which would enable the State, Eskom and the private sector to provide sufficient, reliable and efficiently priced electricity. In essence, it has identified a range of institutional arrangements for the sector which will create a financially sustainable environment in which adequate, reliable and competitively-priced electricity supply is secure.

Section 1 provided context for the report, highlighting the need for security of (adequate and reliable) electricity supply, enhanced operational efficiencies and improved financial sustainability in the ESI.

Electricity is an indispensable resource for social welfare as well as economic development. Therefore it is imperative that electricity is adequate, reliable and competitively priced in order for the economy to be productive and competitive.

An analysis of the current ESI landscape in South Africa was provided in Section 2. Reform of the sector in the post-apartheid era was carefully assessed. While some of the policy goals, such as roll-out of infrastructure and electrifying millions of households, have largely been achieved, many objectives have only partially been achieved; or not achieved at all. In recent years there have been electricity supply concerns. These concerns have been heightened since the advent of scheduled load-shedding in 2008 and thus consideration of reform of the electricity supply industry has resurfaced. This development has prompted revisiting of the possibilities for restructuring of the electricity utility, as well as the sector as a whole.

As early as 1998, the need for reforms to the sector was recognised, as evidenced by the White Paper on Energy Policy. Key drivers identified in the White Paper include security of supply of energy and electricity; ability to attract investment; managed environmental impact; improved access; reasonably priced electricity; the need for competition; the need for private sector participation; and the importance of financial sustainability.174

While some changes to the industry have been successful, others have failed. Initial reforms, specifically the corporatisation and commercialisation of Eskom and the establishment of the NER were successful. More recently, competition in generation was introduced through IPPs. However, other reforms, including restructuring of distribution and vertical unbundling of Eskom, did not come to fruition.

These reforms, both successful and unsuccessful, have been aimed at:

i. Effective control of Eskom and electricity prices; and

ii. The introduction of competition to the electricity sector.

The current structure of the South African electricity sector most closely resembles the traditional electricity structure. Eskom is a vertically integrated state-owned company which is responsible for most electricity generation. Municipalities and IPPs contribute only a small portion of generation capacity. Transmission and a significant portion of South Africa’s distribution industry is also owned by Eskom. While municipalities have the executive

responsibility for electricity reticulation and indeed provide electricity to many of their residents, some also rely on Eskom as a distributor to varying extents. Although both Eskom and municipalities are active at the distribution level, there is no competition for end-users.

Based on the current structure and persistent problems, four main drivers and three secondary drivers which influence the current consideration of further restructuring of the electricity sector have been identified. The four main drivers identified are: i) inadequacy of supply (shortfall in generation capacity); ii) unreliability of supply; iii) concerns about long term financial sustainability of Eskom and the electricity industry; and iv) rising costs of electricity.

Secondary drivers, which are also important, are lack of access for the poor; environmental sustainability; and the ability to attract investment.

However, these seven drivers are constrained by limited availability of government funding and financial challenges facing the industry, which drive a need for a practical and cost-effective intervention.

Given the current challenges facing the industry, it is clear that changes to the industry are necessary. Within this context we consider possible changes to the structure of the industry to determine whether there is a more feasible option. The analysis is structured with a view to determining the best structure to achieve the desired outcomes: (i) sufficient and reliable electricity supply; (ii) financial sustainability for Eskom and the industry; and (iii) fair and reasonable electricity prices. The four primary factors and two constraints are the key concerns facing the industry and have such a significant impact on the performance of the industry that they must be addressed first before we attempt to address the secondary concerns.

Following from this analysis of the current South African ESI landscape, Section 3 provides an overview of reform drivers and models of reform based on international experiences. The issues facing South Africa are by no means unique, and many countries have changed the manner in which their ESIs are structured in order to address these issues. An analysis of international reforms highlights many similarities between nations in the drivers of reform, the reforms undertaken, and the models utilised, despite different ESI structures and outcomes, and the level of economic development of the country in question.

While the ESI in many countries prior to the 1980s was based on a traditional structure consisting of one vertically integrated entity which owned all generation and transmission capacity, performed all systems operations and in some cases also distribution services, countries soon recognised disadvantages to this model. Four key disadvantages particularly prevalent in developing countries were:

i. Energy shortages due to insufficient generation capacity;

ii. Poor operational and economic efficiency of state-owned vertically integrated utilities;

iii. Inability of the public sector to raise sufficient capital/need for investment; and

iv. Low access rates to electricity and affordability concerns.

As a result, countries around the world embarked upon various efforts to change this structure. The first countries to enact these reforms included Chile, the USA, England, Wales and Norway.

Based on the experiences of these countries, an understanding of the required elements of reform was developed, as was the optimal sequencing of these elements – i.e. the standard
model for electricity sector reform. The key steps are ordered as follows: corporatisation (separation of the power utility from the state); commercialisation; requisite legislation; establishment of an independent legislator; sector restructuring; introduction of independent power producers; divestiture of state ownership of both generation and distribution assets, either in part or in full; and finally, introduction of competition in wholesale and/or retail markets. The importance of the sequencing of this standard model is noticeable in countries which failed to follow this sequencing, such as Brazil. While the steps should follow this order, international experience has shown that it is not always optimal to follow the sequence through to the end.

In South Africa, the ESI has undergone the first four steps of the standard sequence: (i) Eskom was corporatised and (ii) commercialised; (iii) legislation was enacted; and (iv) a regulator was established. However, minimal progress has been made with regards to vertical unbundling. There has been no divestiture of state assets nor any implementation of wholesale or retail competition.

Numerous experiences were considered. These include several other countries, such as Kenya, China, Brazil and the EU; as well as the tendency for reforms to be experienced in two or three waves. Following from this, a range of reform models, and the set of factors dictating the choice of model, was identified.

Key factors informing the choice of model include: i) the industry structure prior to reform; ii) the regulatory framework; and iii) the aims and objectives for reform. Based on these factors, countries move towards one of three basic market structures: the single buyer model, the wholesale competition model and the retail model.

In addition to altering the market structure, the structure of the utility itself is often changed when reforms are implemented. Typically this entails the unbundling of the vertically integrated utility. Generally, generation is separated from transmission and distribution in order to facilitate the introduction of competition. There are four different levels of restructuring each with increasing severity: accounting separation, functional separation, legal separation and ownership unbundling.

The changes to the market structure often necessitate a change in the approach in which planning and procurement occurs. Traditionally, this would be undertaken by the vertically integrated utility. However, following reforms and unbundling, the planning function may have to be reassigned to maximise the level of competition. Furthermore, the procurement function may need to be reassigned to prevent unfair discrimination against some generators. Thus the positioning of the procurement and planning functions are very important considerations when planning and implementing reforms.

It is clear from the analysis of the current issues in the South African electricity supply industry and the drivers for reform in other countries that some degree of change to the South African ESI is necessary. The four key drivers for reform of the South African ESI (insufficient electricity supply, unreliable electricity supply, unsustainability of Eskom and industry, and rising electricity prices) should be addressed by any reform approach to be implemented. In doing so, it will be possible to achieve the desired sector outcomes of sufficient and reliable electricity supply, financial sustainability for Eskom and the industry and fair and reasonable prices. However, the achievement of these outcomes is constrained by limited government funding available for investment in generation assets (and Eskom) and the requirement that any intervention be practical and cost effective.
The three necessary requirements for achieving these outcomes are timely and cost efficient investment in generation capacity; efficient maintenance of Eskom’s generation assets; and improved financial sustainability of Eskom.

Based on the interventions applied in other countries, a combination of both restructuring of Eskom’s assets and changes to the electricity supply market structure may be necessary to achieve the desired industry outcomes. Any intervention of this nature should also be supported and underpinned by an enabling and conducive policy, legislative and regulatory environment.

In Section 4, we describe possible alternatives for restructuring the ESI before specifying the criteria by which we will evaluate the different alternatives facing South Africa. This is followed by an assessment of the possible models of reform for the sector which could potentially alleviate the current issues facing the industry.

The current structure of the South African electricity supply industry can be described as a single buyer model with a vertically integrated utility. By flexing these two key characteristics alternatives to the existing structure of the industry can be developed. The report identifies the following alternatives that may be implemented in South Africa:

A: Status quo with two variations:
   A.1: Status quo
   A.2: Status quo with IPPs being able to sell directly to eligible customers (direct contracts);
   A.3: Status quo with legal separation of Eskom;

B: Restructuring of Eskom assets and/or operations with the following variations:
   B.1: Introduction of Independent system and market operator (ISMO) (as per ISMO Bill) (separate out system operations);
   B.2: Introduction of Transmission system operator (TSO) (separate out transmission);
   B.3: State generation companies and private sector in generation;

C. Wholesale competition with power exchange pool (multiple buyers); and

D. Retail competition.

Each of these alternatives has different implications for the extent of competition, market structure and ownership of assets. Under each alternative (where relevant), we have also assessed the potential additional impact of strengthening of the provisions concerning the ability of IPPs to sell directly to customers such as distributors.

In order to compare and assess each alternative a set of evaluation criteria is identified. These criteria are based on the drivers for reform previously identified as well as the desired outcomes for the industry and can be used to compare the alternatives. In order to perform an objective and logical assessment of the different alternatives against these evaluation criteria, specific issues, which will guide the assessment and should be considered under each alternative, have been identified. Further, in order to more easily compare the alternatives, a rating system has also been identified for each criterion. The criteria, as depicted in Figure 22: Evaluation criteria of the different restructuring alternatives, are: the impact on efficiency; whether the environment is conducive to private funding; reliance on government funding; ease and cost of implementation; and the impact on electricity prices.
Each alternative is then assessed against the evaluation criteria. The findings, as indicated in Table 5: Summary of different restructuring alternatives against the evaluation criteria below, are as follows:

The status quo by definition requires no implementation, but does not address the reform drivers. Under the status quo, there is a weak incentive to increase efficiency and there is continued reliance on government funding in generation, transmission and distribution. Standard reform literature would generally put forward standard models of reform such as wholesale competition or retail competition to address the difficulties experienced under the status quo. Both alternatives result in the state having no role in generation, and significantly reducing if not completely eliminating the incentive for discrimination in terms of transmission. In addition, both alternatives result in a reduced reliance on government funding as it would be limited to transmission and distribution. These alternatives are however complex in design and can be difficult to implement as they require changes in the utility and market structures as well as regulations. In addition, these models tend to be more suitable in situations where there is adequate or excess supply of electricity.

Other alternatives that were less complex than wholesale and retail competition to implement were also considered. The introduction of an ISMO (B.1) creates a strong incentive to be efficient and is strongly conducive to private investment. There is also likely to be a reduced reliance on government funding for Eskom, although funding may be required for the ISMO. The introduction of a TSO (B.2) goes one step further as Eskom would no longer be active in transmission, providing stronger incentives for private investment in generation. There would also be a reduction in the reliance on government funding which would be reduced to the establishment of the TSO (if necessary) and Eskom’s generation and distribution activities.

Lastly, B.3 considered an alternative in which Eskom divests from generation and these generation assets are taken over by a number of state-owned generation companies and private sector players. This alternative creates a strong incentive to be efficient, largely because of the share of generation that is privately owned. It is also strongly conducive to private investment and has a reduced reliance on government funding as funding is only required for the remaining state-owned generation companies and transmission. However each of these alternatives is likely to be costly and difficult to implement and could be considered burdensome in terms of their legislative and regulatory change requirements.

The remaining alternatives that were considered provide greater incentive for efficiency than the status quo and do not require significant changes to the structures of Eskom or the industry. In A.2 where IPPs are allowed to sell directly to eligible customers, there is a strong incentive to become more efficient as IPPs have access to additional customers whom they can service without risk of discriminatory treatment by Eskom. In addition, there is a reduced reliance on government funding compared with the status quo. The required changes can be implemented at little cost and with little policy, legislation and regulatory changes as this alternative is not a significant departure from the status quo. However, this alternative is only weakly conducive to private investment.

The legal separation of Eskom (A.3) provides a stronger incentive to increase efficiency and will result in a reduced reliance on government funding compared with the status quo. Much like A.2, the changes can be implemented easily and with little cost, and no great changes to policy, legislation and regulation are required. Unlike A.2, this alternative is strongly conducive to private investment. In addition, if IPPs are permitted to sell directly to customers, the incentive to increase efficiency strengthens and the environment becomes even more conducive to private investment.
Thus each alternative has advantages and disadvantages which must carefully be weighed against each other. Furthermore, as discussed previously, the positioning of the procurement and planning functions are very important considerations and depend on the alternative chosen.

The planning function determines the type and nature of new generation capacity required and the associated details. The procurement of new generating capacity should be independent of any company active in generation to prevent distortion of competition for the market. At present, the planning function is vested in the Minister of Energy and the procurement is performed through the Department of Energy’s ad hoc structure known as the Independent Power Producer Procurement Programme unit. The report discusses some of the challenges resulting from the status quo, before presenting an analysis based on the practices of several other countries. Various options are available, depending on the circumstances.

The report suggests the following possible allocations of the planning and procurement functions:

- Where Eskom is involved in generation and there is no independent systems operator, it will be appropriate to maintain the planning function with the DoE or allocate it to the sector regulator with clearly demarcated policy guidelines. The procurement function could be allocated to Eskom, if sufficient safeguards are in place.

- Where there is an independent system operator that is either Eskom (with no involvement in generation) or as a separate state owned company, it would be appropriate to allocate both planning and procurement to the system operator.

Finally, the report provides considerations for the implementation of any of the identified alternatives. The role of competition and IPPs is of critical importance to the achievement of many of the benefits arising from the different options. These are therefore critical considerations in designing implementation of any of the alternatives, as illustrated with the example of the South African telecommunications sector. The example highlighted key lessons for reform in the electricity sector particularly regarding the choice of equity partner(s) and the need to implement required regulation timeously and effectively.

Mechanisms for competition are therefore vital to avoid delaying the benefits of competition. Potential issues should be considered prior to implementation of any reform in order to avoid inadvertently creating a climate conducive to abuse of dominance. In particular, the report highlighted three possible considerations to avoid such a situation in electricity: (i) IPPs must be supported through the allocation of new generation capacity in relevant plans and policies, that must have a mandatory nature; (ii) a predictable and stable regulatory environment is essential and must be timeously implemented; and (iii) regulatory mechanisms ensuring fair and non-discriminatory access to infrastructure at reasonable tariffs are required.

Thus selection of the optimal industry structure requires consideration of numerous essential factors, as well as a careful comparison of the advantages and disadvantages of each of the possible industry restructuring alternatives for the South African electricity supply sector.
APPENDIX A: SUMMARY OF INTERNATIONAL EXPERIENCE

Below we provide summaries of international experience related to the European Union, Kenya, China and Brazil. We provide details regarding various reforms undertaken as well as the reform drivers leading these reforms.

EUROPEAN UNION

The EU thus far had 3 directives that have addressed reform of the electricity industry in the EU. Beginning from a position where there was a surplus of generation capacity, the reforms sought mainly to increase efficiency and competition and reach the European Union's goal of a single internal market. These directives published in 1996, 2003 and 2009 mainly emphasise the need for a competitive, open EU market for member states, the need for security of supply, the need for the separation of vertically integrated companies especially the need for an independent transmission systems operator and the need for independent national regulatory bodies. Due to the directives being applied to different countries across the EU, the results of the reforms brought about the directives have been mixed.

Directive 1996/92/CE

This was the first directive and it addresses planning by requiring that each member state is to appoint an authority or public or private body to that will be responsible for the organisation, monitoring and a controlling of the tendering process that member states are allowed to use for the construction of new generation capacity. This authority will not be able to participate in any electricity generation, transmission or distribution activities.\(^\text{175}\) The directive also allows member states to choose between a tender process and an authorisation procedure for the construction of new generation capacity.

The directive declares that member states will have to designate a transmission systems operator or have companies that own transmission systems to designate a transmission systems operator. The operator will be required to be independent (in management terms) from other activities not related to transmission such as generation, transmission and distribution.\(^\text{176}\)

Article 14 in the directive sets the unbundling rules for vertical integrated electricity undertakings. Vertically integrated undertakings were required to keep separate internal accounts for their generation, transmission and distribution activities. This was requires in order to avoid discrimination, cross subsidisation and the distortion of competition.

Member states with a single buyer model where the single buyer is a vertical integrated electricity undertaking we required to make sure that the single buyer operates separately from the any generation and distribution activities of the vertically integrated firm. In addition, there would be no flow of information between the single buyer and these separated activities.\(^\text{177}\)

\(^{175}\) The European Parliament and the Council of the European Union. (1996), Directive 96/92/EC of the European parliament and of the council, article 6, paragraph 5.

\(^{176}\) Ibid, article 7, paragraph 6.

\(^{177}\) Ibid, article 15.
In terms of the directive, access to the transmission system could be granted on the basis of either negotiated access or on the basis of a regulated system of access.\textsuperscript{178}

Although calling for member states to enforce the directive, the directive states that member states may choose not to apply certain provisions. Included in this list are criteria for the granting of authorisation of the construction of generating capacity, guidelines on the use of tender procedure for the construction of generating capacity, the organisation of access to the system and the responsibilities of member states in enabling electricity producers and suppliers to supply customers via direct lines.\textsuperscript{179}

**Directive 2003/54/EC**

The 2003 directive built on the 1996 directive by identifying some issues that came with the enforcement of the 1996 directive and sought to address this. This Directive replaced accounting unbundling with legal unbundling, where the generating companies would retain ownership of their transmission grid assets, but the transmission company would be legally independent of generation (with its own autonomous management and under strict regulatory control).

The directive notes that the implementation of the 1996 directive showed the benefits that included efficiency gains, price reductions, higher service standards and more intense competition. It was noted however that the functioning of the market can be improved by ensuring a level playing field in generation, reducing the risk of market dominance and predatory behaviour and ensuring non-discriminatory tariffs for transmission and distribution.\textsuperscript{180}

In order to guarantee access to the network that is efficient and non-discriminatory, it is suggested that distribution and transmission systems need to be operated by firms that are legally separated in the event that these operators are vertically integrated entities.\textsuperscript{181}

In order to try and ensure consistent application of the directive by all member states, the Commission intended to set up a European Regulators Group for Electricity and Gas. This group would be used to encourage coordination between the national regulatory authorities of the member states.\textsuperscript{182}

The directive introduces the idea of a combined transmission and distribution systems operator. This is a type of operator not mentioned in the 1996 directive. In the event that the combined operator is a vertically integrated entity, it will be required to be separate in terms of its “legal form, organisation and decision making” from the other activities it may be involved in that do not relate to transmission and distribution.\textsuperscript{183}

Finally, the directive requires that all member states must establish a regulatory body that will operate independently from the interests of the electricity industry. Again this is requirement not made in the 1996 directive. The responsibilities of the national regulatory include the monitoring of the allocation of interconnection capacity, the effective unbundling of accounts,\textsuperscript{184}

\textsuperscript{178} Ibid, article 16, 17 and 18.
\textsuperscript{179} Ibid, article 3, paragraph 3.
\textsuperscript{181} Ibid, paragraph 8.
\textsuperscript{182} Ibid, paragraph 16.
\textsuperscript{183} Ibid, article 17.
terms and conditions of connecting producers and the level of competition among other things.\(^{184}\)

**Directive 2009/72/EC**

The EC implemented the 2009/72/CE Directive following the findings of the EC Sector Inquiry into the electricity and gas sectors. The 2009/72/CE Directive broadened the previous sector legislation by proposing the ‘effective separation of networks from activities of generation and supply’. Two ownership unbundling models were originally proposed by the EC:

- Full ownership unbundling (FOU) – networks are not controlled or majority-owned by supply companies.
- Independent system operator (ISO) – the transmission network remains under the ownership of the supply companies, while the operation and control of the supply business is transferred to an independent systems operator.\(^ {185}\)

This directive begins by noting that the internal market still experiences obstacles when it comes to the sale of electricity on equal and non-discriminatory terms. Particularly, network access is still discriminatory at times and there is not yet an equal level of effective regulation in each member state.\(^ {186}\)

In paragraph 9 it is noted that unless there is a separation of the networks from the generation and supply activities through effective unbundling, there will still be risks of discrimination with regards to network assets as well as a lack of incentive for vertically integrated firms to invest adequately in their networks. Unlike previous directives where accounting and legal unbundling were considered sufficient, this directive calls for a stronger form of unbundling. The directive does however indicate that member states have the “right to opt for full ownership unbundling”\(^ {187}\), indicating that member states can choose whether to enforce unbundling.

The directive goes further to state that if a member state chooses ownership unbundling with the appointment of an independent systems operator, it will be possible for two separate public bodies to control generation and supply on one hand and transmission on the other.\(^ {188}\)

Finally, having required member states to establish regulatory authorities in the directive of 2003, this directive calls for the need for regulatory authorities to have more power to issue binding decisions and more independence from the government of the member state. This perhaps indicates that regulatory authorities were unable to perform their duties as envisioned by the directive of 2003.

**Impact of the reforms**

Parties opposing the directives argued that increased competition was possible without implementing an ISO model, especially if sufficient safeguards were in place to monitor the independence, management and investment decisions of the supply companies (Massoni,\(^ {189}\))

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\(^{184}\) Ibid, article 23.
\(^{187}\) Ibid, paragraph 21.
\(^{188}\) Ibid, paragraph 23.
Other opposing parties argued against implementing the FOU model, stating that 'no correlation can be found between implementing ownership unbundling and the levels of prices and investment decisions which are determined by other factors' (Euractiv, 2008).

Numerous studies that analyse the impact of the FOU model as opposed to the independent transmission operator (“ITO”) model have been conducted. Zachmann conducted an econometric comparison of the responsiveness of electricity prices to cost changes in the UK (FOU) and Germany (ITO). Zachmann found that electricity prices in the UK were more responsive to short-run cost factors as opposed to those in Germany, suggesting that competition in the German electricity market may be limited.

Further, the experience in France with the ITO model implemented in the electricity sector demonstrates the disadvantages of this form of unbundling. The sector remained relatively concentrated at the generation level, while the transmission capacity is limited.

On the other hand, Gugler came to a negative conclusion concerning the dynamic effects of ownership unbundling on the transmission grid. In their cross-country study, they found that unbundling of generation from the grid stages reduces the aggregate investment rate in the sector by at least 10%. Although at the initial introduction of the reforms, capacity generation may have not been a concern, the directives had always made mention of security of supply, which would depend on adequate investment.

KENYA

Energy supply industries across Africa can be characterised as facing a number of similar challenges which often stem from the lack of generation capacity. This has resulted in unreliable and inadequate electricity supply as well as high electricity prices, and is exacerbated by sharp increases in demand and low access coverage. Kenya faced these main problems and steps towards industry reforms were firmly taken in 1996 when competition was introduced to the generation sector. In 1997 the first two independent power producers (IPPs) were commissioned, a likely response to the severe droughts experienced by Kenya in the 1990s which dramatically affected their main source of generation capacity – hydropower.

The reforms that were initiated in 1996 were followed by The Electric Power Act of 1997 which resulted in two main changes – the unbundling of the electricity industry and the establishment of the Electricity Regulatory Board. From this unbundling the Kenya Electricity Generating Company (KenGen) was established and incorporated the assets of the Kenya Power Company, remaining state-owned, but solely responsible for electricity generation. The Kenyan Power and Lighting Company’s (KPLC) scope of responsibility changed to focus on only distribution and transmission networks. The government has a 50.1% stake in KPLC

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191 Zachmann, G. (2007), A Markov switching model of the merit order to compare British and German price formations, DIW Berlin, German Institute for Economic Research.
(obtained in 1970), with the remaining shares traded on the Nairobi Stock Exchange. In 2006 KenGen was partially privatised, with 30% of the company’s equity offered to the public in 2006, becoming (at the time) the biggest-ever public offering on the Exchange.

The partial privatisation of KPLC was seen to have “increased the level of commercial discipline, aided cost containment and efficiency, and enhanced the profitability of the sector”. The mixed ownership of both KenGen and KPLC implies that the utilities are subject to the requirements of the State Corporations Act as well as the reporting and corporate governance rules of the Stock Exchange, opening them up to higher scrutiny from the public given the documents that they have to make public. Their shareholders are also in a unique position of being both profit-seeking, and consumers who want their electricity to be of a certain quality, reliability and competitively priced. There is therefore more transparency and accountability in the system that allows for the participation of civil society, though may also present a potential barrier to raising public and donor funds for the industry which could be important given the major role that investment plays in solving the main drivers of the reform. However, given that the majority of the population is not yet on the grid, and demand is growing rapidly, KenGen can only develop within its organisational and capital constraints, meaning that investment in generation capacity by IPPs likely adds to public investment rather than displacing it.

In addition to the unbundling of the industry that occurred in 1997, the Electricity Regulatory Board was established, but in 2006 (with the passing of the Energy Act) it was dissolved to be replaced with the Energy Regulatory Commission (ERC) whose mandate goes beyond electricity to include natural gas (including petroleum), renewables and all other forms of energy. Among its objectives and functions it importantly deals with the regulation of the supply and use of electricity, along with the protection of consumer interests, promotion and safeguarding of competition, and preparation of the national energy plan. In 2006 the role of power-sector planning was also undertaken by the ERC, taking over the responsibility from the Ministry of Energy. Procurement on the other hand is dealt with by the government through its appointed agent, KenGen, with ERC “planning at the front-end and licensing at the back-end” of the procurement.

The role the ERC plays in licensing is vital to the role played by IPPs in increasing Kenya’s electricity-generation capacity, and therefore in maintaining competition in the market. The ERC’s efficient processes and avenues for being held accountable are likely to lead to them being seen as credible and legitimate by stakeholders. The ERC are held accountable through both accounting measures through the auditor-general and overall by the Energy Tribunal. The Tribunal was created through the Energy Act out of which the ERC were also established, with its purpose to enhance the accountability of the ERC and provide “an avenue for expeditious dispute resolution”.

The role of IPPs is critical in Kenya’s reform approach, and “shows that it is possible to leverage the private sector to achieve national power goals”. Its success has also been

\[198\] Ibid, p. 6.
\[200\] Ibid, p. 27.
\[203\] Ibid, p. 43.
\[204\] Ibid, p. 35.
\[205\] Ibid, p. 35
facilitated by KPLC’s perfect record of payment and its mandate to acquire reliable electricity at a reasonable price while remaining ambivalent about the source, which is a major positive aspect of separating public generation and distribution.

Regarding distribution and transmission the Kenya Electricity Transmission Company (KETRACO) is a wholly state-owned operation that was established in 2008. The purpose of this entrant was to overcome the possible problems with KPLC’s ownership in terms of worries related to mixed ownership proving to be a barrier to entry to the ability to raise funds for the expansion of the transmission network; or if KPLC were to be unbundled into separate transmission and distribution businesses the ownership structure would increase in complexity and additional costs are associated with that.207 Essentially KETRACO’s role is to take on all new transmission projects with its main business, centring on the planning, design, building and maintenance of transmission lines and the relevant substations.208

As it stands Kenya have been able to increase generation capacity since reforms in the 1990s largely due to the role played by IPPs, with 23% of generation capacity in 2011 attributable to IPPs.209 However there are still problems with the reliability and quality of generation, and a large number of residences are without access to the grid (with 23% of the population having access in the most recent World Bank data from 2012, though this is a dramatic increase in access levels of 14.5% in 2000).210 In the face of these problems the relevant authorities have set ambitious targets to overcome the present challenges, such as KenGen seeking to double generation capacity between 2010 and 2018211, and the government’s vision to achieve 100% access by 2030. Although ambitious the investment confidence that has been shown in the industry could mean these become realities. In addition to these targets Kenya is also undertaking projects which will result in renewable energy being a significant proportion of their energy mix, such as the Lake Turkana Project (a wind power project) that is the largest single private investment in Kenya.212 This is a further example of the investment that the industry has been able to attract in Kenya.

CHINA

China has significantly expanded its electricity generation and distribution capacity since 1989. This has been due to significant reforms to the sector and the move by China to a market economy. China’s installed capacity has grown from 100 GW in 1989 to over 900FW in 2011.213

- China’s reform was driven primarily by the move to a market economy, but also by the inefficiencies associated with a monopoly power utility. China’s move to a market economy resulted in a marked increase in demand for electricity (the bulk of which stemmed from primary and secondary industries214), and economic growth was highly dependent on the electricity supply.215 Energy shortages were exacerbated by insufficient investment into the sector by government.216 This forced development of
the electricity sector. Reciprocally, the increased electricity supply has also stimulated economic growth.\textsuperscript{217} To a lesser extent, the reform was also driven by difficulties associated with the monopoly state-owned power utility as well as inefficiencies arising from the model.\textsuperscript{218}

- \textit{The reform entailed both regulatory and structural changes.} In 1955, the Ministry of Electric Power Industry was created.\textsuperscript{219} This ministry was responsible for both regulation and production of electricity; however, the regulatory burden was small, given the planned economy model under which China operated. There was no independence in the energy sector prior to the economic reform\textsuperscript{220} - the electricity sector was a single, state-owned monopoly until 1985\textsuperscript{221}.

Following the economic reform, legislation was used to diversify the market. A 1985 regulation, which was later reinforced by the 1996 Electricity Law, permitted private investment in power plants while the grid remained under control of the state.\textsuperscript{222} This is discussed in more detail later.

Furthermore, separation of the regulatory and production functions was proposed and in 1997 the State Power Corporation (SPC) was founded as an independent legal, state-owned entity responsible for electricity production.\textsuperscript{223} However, the SPC was also given certain regulatory responsibilities, including planning, construction, monitoring and management of the network and the grid.\textsuperscript{224} Other regulatory and financial functions were transferred to various other government ministries.\textsuperscript{225} These ministries included the National Development and Reform Commission (NDRC), the State Electricity Regulatory Commission (SERC) and the China Electricity Council (CEC).

In 2002, further structural reforms were enacted. The reforms entailed separation of the SPC into two grid companies and five generation companies.\textsuperscript{226} The three primary motivations for this reform were to:

- “break entrenched monopolies in the electricity sector by more clearly separating the functions of government and business, which remained ambiguous even after the dismantling of much of the country’s central planning regime and commercialization of state-owned enterprises;
- “support and encourage this separation through the creation of markets based on competitive pricing mechanisms and regional wholesale power trade; and
- “Create and institutionalize a specialized central government agency, the State Electricity Regulatory Commission (SERC), to regulate the new system.”\textsuperscript{227}

\begin{footnotesize}
\begin{enumerate}
\item Chiu, K. and Huang, W. \textit{}, (2015).
\item Nan, Y. and Moseley, M. \textit{,} (2011).
\item Qiu, X. and Li, H. \textit{(2012) (42): 678 – 693.}
\item Qiu, X. and Li, H. \textit{(2012) (42): 678 – 693.}
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\item Nan, Y. and Moseley, M. \textit{(2011).}
\item Williams, J.H. and Kahrl, F. \textit{(2008)}, p. 2.
\item Nan, Y. and Moseley, M. \textit{(2011).}
\item Williams, J.H. and Kahrl, F. \textit{(2008)}, p. 2.
\end{enumerate}
\end{footnotesize}
All five generation companies, as well as the two grid companies, are state-owned enterprises; however, there are a number of other generation companies which are not state-owned. Nevertheless, the state-owned companies form an oligopoly, and thus privately-owned companies face the corresponding challenges.

The figure below reflects the structural reforms discussed above.

**Figure 33: Structural reforms to the electricity sector in China**

Financing of China’s power sector. Towards the end of the 1980s, China experienced a shortage of funding for large infrastructure projects. As a result, China implanted a reform programme aimed at introducing foreign direct investment. Foreign investment was encouraged through specific benefits in terms of tariffs, and other terms and conditions applicable to plants funded in this manner. As a result, a large number of plants were built using foreign investment. However, early in the 2000s Chinese state-owned entities began to enjoy increased liquidity and low interest loans from state-owned commercial banks. Furthermore, these entities were listed companies, thus benefiting from access to international capital markets. As competitive advantages previously enjoyed by foreign companies began to diminish, together with the gradual elimination of benefits previously offered to foreign investors, foreign investment was withdrawn. Consequently, the Chinese power sector is now dominated by state-owned enterprises once more.

Other notes

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Regulatory changes - More recently, the Chinese government has become more concerned with increased pollution, energy conservation and environmental impacts. Regulations have been introduced accordingly.\textsuperscript{232} There are 4 key energy legislations:\textsuperscript{233}

- The 1995 Electricity Law (mostly outdated now)
- The 1996 Coal Law, amended in 2011 ("regulates the exploration, utilization, and production of coal, as well as the operation and business of the coal industry")
  - The 1997 Energy Conservation Law, amended in 2007 ("comprehensive energy law aimed at promoting energy conservation")
  - The 2005 Renewable Energy Promotion Law, amended in 2009 ("focuses on the development and utilisation of renewable energy to improve the country's energy structure, ensure stable energy supply, and prevent pollution and ecological damage due to the rapid increase fossil fuel energy usage.")
- The current energy regulatory system is compromised by having a number of regulators and a lack of clarity relating to the mandate of each regulator.\textsuperscript{234}
- Structural changes\textsuperscript{235} - "China's electricity sector has undergone a profound institutional transformation from a vertically-integrated, state-owned electricity monopoly to an unbundled, corporatized system in which individual plants and companies operate on a commercial basis, but central and local government agencies remain heavily involved."\textsuperscript{236}

China. With China's rapid development has come high pollution and electricity consumption, with regulation having an emphasis on energy supply rather than other aspects of the industry's impacts. As it stands the energy industry is undergoing a process of unbundling enterprise from the government. In 2002, based on the standard reforms of unbundling electricity production and transmission, China reorganised the State Power Corporation, set up IPPs, and ended the government's vertical-control framework in which the electricity production, transmission, distribution, and selling were tied together. The industry has mostly separated electricity production from transmission, and made notable progress in investment system reform. However, structural reform is still incomplete, civil and foreign investments still have some disadvantages compared to state-owned companies, and the market is still far from being a competitive market. Qui and Li identify four areas that present room for improvement in China's ESI, namely an insufficient understanding of energy legislation, an inconsistent energy regulatory authority, over-regulation, and inadequate environmental regulation.\textsuperscript{237} The Chinese example also demonstrates an interesting approach in how to deal with the state-owned utility where a minority stake in the utility was sold.

BRAZIL

First reforms

The motivation for the first wave of reforms in Brazil started in 1980s. Following about 30 years of high supply growth enabled by access to funding, the institutional model used by Brazil had to be reconsidered due to the following reasons identified by Pires238:

- The financial crisis led to a slowdown in the rate of growth of the supply expansion. This occurred while consumption grew, despite fluctuations in economic activity.
- The electricity companies were poorly managed as there was a lack of incentive for the efficient production.
- Without an appointed regulator, the industry lacked regulation in key areas. The tariff regime was also a hindrance as the government could set tariffs to control inflation and at times this meant companies would not be compensated for costs they had incurred.

In 1993, the government passed laws that allowed utilities to raise prices. A price-cap tariff system which allowed utilities to reap efficiency gains as profits was also put in place. This worked to improve the financial situations of the utilities and prepared them for privatisation.239 The privatisation element of the reforms initially focused on the distribution segment. This was largely due to the fact that the government believed that it would be difficult to attract investors to its generation assets because there was no private wholesale electricity market.240 The focus on the distribution segment was evidenced by the fact that by 1999, private operators accounted for 62% of electricity distribution compared to 12% for electricity generation.241

In 1995, independent power producers were introduced. Coupled with this was a provision allowing large consumers of electricity (greater than 10MW) to purchase electricity from the supplier of their own choosing, including IPPs.242

An autonomous regulatory body was created in 1996 in the form of the National Electric Power Agency (“ANEEL”). Law 9 427/96 established the legal nature of ANEEL and granted it the following243:

- Financial and decision making autonomy.
- Autonomy for managers.
- The authority to legislate on specific technical issues relating to the sector.
- Technical motivation, as opposed to political motivation for the decisions it takes, so that it is a neutral party in dispute resolution.

Among its other functions, ANEEL played a decisive role in the determination of rules for entry, the setting of tariffs and the definition of the market structure.244 In the same year, there was unbundling of generation, transmission and distribution in existing state utilities by way of separation of accounting systems.245

238 Pires, J.C.L, The reform within the Brazilian electricity sector, p. 3.
240 Ibid, pg. 5.
241 Ibid, pg. 2.
242 Ibid, pg. 9.
243 Pires, J.C.L, The reform within the Brazilian electricity sector, p. 4.
244 Ibid.
245 Almeida and Pinto Junior, pg. 9.
In addition to the creation of a regulator, an independent systems operator was created in 1998 in the form of Operador Nacional do Sistema ("ONS"). ONS was to be responsible for the transmission services including the coordination of dispatching of electricity and management of the transmission services. Negotiations for the creation of a wholesale market took place following the creation of ANEEL. The Mercado Atacadista de Energia ("MAE") was created to oversee competition in the future wholesale market.246

An interesting feature regarding Brazil’s reforms is the order in which the standard model was applied. The privatisation of operators began before a regulator was established. By the time ANEEL had been set up, 10 distribution utilities had already been privatised.247

Lessons and challenges of first waves of reforms

Although privatisation in the electricity supply industry created a lot of investor interest in distribution (due to the low economic risks and higher potential to increase productivity relative to generation), some important issues of the reform process were overlooked.

Firstly there was no decision regarding industry structure in the generation sector, even after privatisation of the sector occurred. This coupled with an inadequate regulatory framework that took into account the peculiarity of the Brazilian electricity industry meant that there were no definitive rules for the wholesale electricity market. Despite the price of electricity trade at the MAE being fixed at the short-term marginal cost, the calculation of this cost was not transparent for all players in the market. This made it difficult to predict future price levels.

Secondly, the price of hydroelectric companies was calculated on a historical cost basis. And these were the prices in the initial contracts entered into by the power producers. These costs were below the current marginal costs at the time. Additionally there were no rules stipulating how the new thermal power generation would coexist and compete with the hydroelectricity. This was problematic because during times of normal rainfall, hydroelectricity would have a much lower short-term marginal cost, meaning thermal generation plants could remain uncompetitive for long periods.

With the government anticipating a rise in private investment, it suspended its investment program with intention to possibly resume investment after privatisation occurred. However, the private sector decided to also delay their investments in greenfield projects until privatisation was complete. Privatisation would result in the determination of new costs and prices relative to those that were based on the initial contracts. As a result, the investment in generation fell sharply.248 Thus although the reforms worked well to improve the operational performance and recover the financial viability of distribution companies, they failed to create the required conditions for the expansion of the installed generation capacity.

This result of the reforms came to the fore when demand continued to grow without proportional growth in generation capacity. The expansion into gas-based thermal plants was also delayed as the Brazilian Real lost value, resulting in an increase of the gas price of about 80% between 1997 and January 1999.249 The result was a rise in electricity prices.

246 Ibid.
247 S. B Karmacharya (2008), The evolution of Brazil’s electricity market from textbook to regulated long term contracts, Network industries Quarterly, 2 (10), pg. 9-11.
248 Almeida and Pinto Junior, pg. 9-11.
249 Ibid, pg. 11.
The response of the government was to ration consumption and charge penalties to those who exceeded the consumption bands. Some of these penalties as well as a special tax that was imposed were used to purchase more expensive emergency power when needed.

Through this rationing and information campaigns, the government was able to get consumption under control. The reduction of demand along with new uncontracted generation capacity in the market (as many initial contracts were close to expiration) meant that prices fell. This made things particularly difficult for new projects due to the prevailing price of electricity being below the required price to ensure their viability.

Second wave of reforms

The government elected in 2003 decided to pursue reforms in a different manner. The new proposed model intended to:

- Reinforce the role of the Ministry of Mines and Energy by reverting to a more centralised institutional design.
- Give more priority to competition for the market as opposed to competition in the market. Operational competition would be less important relative to the competition for new investments.
- Privatisation would be delayed and publically-owned utilities would return to being important players, especially in the expansion of the industry.

In 2004 the government’s proposal for a new model was approved by congress and had the following salient features:

- A pool would be created from which distributors could procure electricity.
- There would be two "markets" for electricity. A regulated one i.e. the pool and a free market.
- New institutions to support coordination, planning and expansion of the system would be created.

The most noticeable part of the reforms was the electricity pool. The design of the contracts that the distributors enter into with generators allowed certainty and economic feasibility of new projects. The electricity would be sold in an auction format market.

There are two types of contracts available to distributors i.e. 2 auctions. For new capacity, there would be two public auctions held every year for contracts for electricity to be supplied 3 and 5 years later. This would allow the winners of the auctions time to build plants as well as arrange the required finances. The contracts for new capacity would have duration of 15 years, giving the investors in new capacity certainty of electricity sales for a given period following completion of their project.

For existing capacity, the auctions to be held would be for contract renewals. There would be two types of auctions for existing capacity. Firstly, contracts of between 5 and 8 years could be signed for electricity that is to be delivered 1 year later. Alternatively, there would be 1 to 2

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250 Reform of the electricity sector in Latin American countries: Main characteristics and emerging lessons, pg. 5.
year contracts for electricity to be supplied 4 months later. These are known as adjustment auctions.

Each winning generation company entered into a bilateral contract with each distribution company based on the forecasted loads of each. The result was that this was not a single buyer model as the government would not participate in the contracts nor provide any payment guarantees but simply facilitate a scheme of centralised procurement by the distribution companies.\footnote{Ibid, pg. 8.}

The non-regulated market would function parallel to the regulated market. In this market, consumers would be able to enter into long-term bilateral contracts. The price agreed upon would not be allowed to be below the pool’s price for hydro-based generation. The free market would be a residual market in that it would act as a balance for the regulated market in cases distribution companies are too conservative or optimistic with their demand forecasts.\footnote{Almeida and Pinto Junior, pg. 17.}

Finally, in order to avoid further shortages and ensure security of supply, distribution companies would contract for 100% of their projected demand. This would lessen the mismatch between demand and supply. If there is a shortfall, the distribution companies would be penalised at a prices that reflects the cost on new energy.\footnote{Almeida and Pinto Junior, pg. 15 and Reform of the electricity sector in Latin American countries: Main characteristics and emerging lessons, pg. 6.}

The planning function would also undergo a change. Distribution companies will have to forecast their demand 3 and 5 years ahead. The Empresa de Planejamento Energetico (“EPE”), handles the supply part of the supply side planning by receiving the demand forecasts and calculating the capacity that the Ministry of Mines and Energy should have go through the pool each year. The EPE is also meant to advise on the best technological option for capacity to be offered in the bidding process. From this the Ministry can identify strategic projects that take priority in the pool and who’s capacity cannot be replaced by capacity from other projects.

Finally a monitoring committee (“CMSE”) would be set up to monitor electricity supply and demand. It would also monitor the progress of new generation capacity projects, providing advice where there are issues that may result in shortages.

The Electricity Commercialisation Chamber (“CCEE”) would manage the contracts in the pool. ONS and ANEEL would keep most of their initial responsibilities but in addition, ANEEL would be in charge of organising auctions in both the transmission and generation segments.
APPENDIX B: THE SOUTH AFRICAN EXPERIENCE OF SECTOR REFORM IN THE TELECOMMUNICATIONS INDUSTRY AND LESSONS FOR THE ELECTRICITY SECTOR

Like the electricity sector, the South African telecommunications sector has undergone a series of reforms since the mid-1990s, which have followed the sequencing suggested above, as per the figure below. The industry was dominated by a monopoly (South African Posts & Telecommunications (SAPT), later Telkom) and the reforms entailed corporatisation and commercialisation of Telkom, the introduction of necessary legislation and a regulator, and ultimately, introduction of upstream and downstream competition. The experience of reform in the telecommunications sector provides key lessons for reform of the electricity sector.

In 1991, the SAPT was corporatised and commercialised and became Telkom SA, with government being the sole shareholder.\(^{254}\)

This was followed by the enactment of the Telecommunications Act of 1996, which led to the establishment of an independent regulator, the South African Telecommunications Regulatory Authority (SATRA) (later the Independent Communications Authority of South Africa (ICASA)).\(^{255}\) The White Paper on Telecommunications Policy was released in 1996. It laid out the reforms to be implemented in the sector to achieve “affordable communications for all”\(^{256}\) – specifically advanced services should be provided to all citizens and businesses. To achieve these aims, the White Paper stated that Telkom would be partially privatised and that it would be granted a statutory monopoly for a five year period, which would allow Telkom to roll out additional infrastructure and prepare for additional competition.\(^{257}\) The statutory monopoly would end with the introduction of the Second Network Operator (SNO) at the end of the five year period.

Figure 34: Reforms in the South African telecommunication sector

<table>
<thead>
<tr>
<th>Corporatisation</th>
<th>Telkom corporatised in 1991</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercialisation</td>
<td>Telkom commercialised in 1991</td>
</tr>
<tr>
<td>Requisite legislation</td>
<td>Telecommunications Act passed in 1996; Telecommunications Amendment Act passed in 2001</td>
</tr>
<tr>
<td>Independent regulator</td>
<td>SATRA established in 1996 and ICASA established in 2000</td>
</tr>
<tr>
<td>Sector restructuring</td>
<td>initial changes took place following the Telecommunications Act of 1996 and more significant changes from 2001 onwards</td>
</tr>
</tbody>
</table>

\(^{254}\) CC vs Telkom, Reasons and order, Case no: 11/CR/Feb04 (Competition Tribunal), 7 August 2012, para 19
\(^{255}\) CC vs Telkom, Reasons and order, Case no: 11/CR/Feb04 (Competition Tribunal), 7 August 2012, para 22
\(^{257}\) CC vs Telkom, Reasons and order, Case no: 11/CR/Feb04 (Competition Tribunal), 7 August 2012, para 20
Thus, Telkom was partially privatised and given an exclusivity period of five years (1997 to 2002) under these terms (i.e. Telkom was a *de jure* monopoly for this period). A 30% stake was sold to a strategic equity partner (“SEP”). Thintana Communications.

As expected, the difficulty with the SEP was the distinct focus on maximising monopoly rents rather than achieving the central mandate: universal access. Thintana charged exorbitant management fees and Telkom charged profit-maximising prices which were not affordable to many citizens, thus failing to achieve its social goals. Telkom was required to roll out 2.69 million lines at an estimated cost of R17 billion. Telkom built 2.81 million new lines (i.e. more than required); however, many were disconnected as customers could not afford them. In order to meet its obligations, Telkom needed to connect approximately 16 500 more lines in 2002, but opted instead to pay a fine of R15 million. The partnership was established before ICASA and was able to influence both the relevant regulations and the regulator, thereby undermining the regulator’s independence.

Recognising the potential for Telkom to abuse its position, price regulations were imposed to regulate the prices of Telkom’s retail services (but not the wholesale services or other value-added services (VANS) that Telkom provided). A price cap, designed to mimic the effects of competition, was in place from 1997 to 2008. The price regulation imposed on Telkom which was aimed at curbing its potential to abuse its dominant position (as recognised in the White Paper) was ineffective. At a retail level, although a price cap, which was above cost, was implemented, certain consumer groups experienced real price increases and, when compared with international levels, South African prices remained markedly high. Furthermore, during an 18-month regulatory vacuum between prior to ICASA’s regulation commenced, Telkom increased prices above the price cap and sustained these prices going forward.

At a wholesale level, prices were not regulated. This allowed Telkom unrestrained control over pricing of wholesale and other value-added services.

There were also significant (procedural) delays in the introduction of the second network operator (“SNO”), now Neotel, which was intended to be licensed from May 2002 but was in fact only licensed in May 2005. Part of the delay in licensing the SNO was the need for an amendment of the Telecommunications Act, which was passed in 2001. This was followed by other procedural delays until Neotel’s licensing in May 2005.

The ineffective price regulation and the delays in the introduction of the SNO resulted in various complaints made by value-added network services (VANS) which are competitors in Telkom in the downstream telecommunications markets regarding its abuse of its dominant position. The particular issue was that in terms of the Telecommunication Act, they were required to procure all their telecommunications network services from Telkom. This, coupled with its monopoly position (extended by the delays in the licensing of the SNO), enabled Telkom to hinder its competitors’ ability to effectively compete in the downstream markets. In order to effect its strategy, Telkom provided SATRA with document explaining its interpretation

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258 CC vs Telkom, Reasons and order, Case no: 11/CR/Feb04 (Competition Tribunal), 7 August 2012, para 21
262 Horwitz, R.B., Currie, W., 2007, p. 445–462
264 Genesis, 2008, p.43.
265 CC vs Telkom, Reasons and order, Case no: 11/CR/Feb04 (Competition Tribunal), 7 August 2012, para 24
of the relevant exclusivity clauses, which it understood to suggest that VANS were infringing on Telkom’s exclusivity. SATRA disagreed with this interpretation and this formed the base for later cases raised with the Competition Commission. Two complaints were made to the Competition Commission against Telkom. The first, which was referred to the Tribunal in 2004, alleged excessive prices for access services as well as price discrimination between Telkom and its customers, and refusal to supply; the Competition Tribunal found Telkom to have refused access to an essential facility and to have substantially lessened or prevented competition. The second 2009 complaint alleged that Telkom charged excessive prices in respect of leased lines and imposed a margin squeeze in respect of IP VPNs and internet access services. Telkom was accused of exerting significant control over the VANS by restricting network access, limiting offerings from VANS, and constraining pricing. Ultimately, a settlement was reached in 2014. The settlement included functional separation between Telkom’s retail and wholesale divisions, transparent pricing, and effective monitoring.

One of the key objectives for the telecommunications sector was the provision of high-level telecommunications services. However, Telkom’s focus on profit maximisation and its continued monopoly position in the market reduced its incentive to invest in upgrading its infrastructure and technology. In particular, the roll out of ADSL (high speed access) was delayed and coverage limited and was only available at relatively high prices. This is in stark contrast to the mobile telecommunications industry in South Africa where there has been significant investment in the mobile networks to keep up with new technology developments. The population coverage of the mobile networks of the different providers is close to 100% and the providers have continuously upgraded their networks with the latest data technologies, such as LTE which has been introduced on some networks. The outcome of this is that mobile communications services have seen massive growth in subscribers whereas fixed line telecommunications has not. There are more than 80 million mobile subscribers (some customers have multiple sim cards and are therefore double counted) but only 3.4 million fixed line subscribers.

There are thus several key lessons for reform in any regulated sector:

6. Strategic equity partnerships should be carefully considered as the selected partners may have a significant impact on the outcome of the industry. For instance, incentives may not align with social objectives (for example, as seen with Telkom, profit maximising incentives derailed effective increases in coverage).

7. When reform in contemplated in an industry where the state still owns outright or partially the incumbent utility, the incentives for government to ensure that the introduction of competition happens timeously and effectively may be conflicted. This was potentially a contributing factor to the delay in the introduction of competition (and the SNO) in the telecommunications industry. Therefore, safeguards should be put in place to ensure reforms are implemented timeously and effectively and mitigate the potential for interference from government.

267 CC vs Telkom, Reasons and order, Case no: 11/CR/Feb04 (Competition Tribunal), 7 August 2012, para 46
268 CC vs Telkom, Reasons and order, Case no: 11/CR/Feb04 (Competition Tribunal), 7 August 2012, para 159
269 CC vs Telkom, Reasons and order, Case no: 11/CR/Feb04 (Competition Tribunal), 7 August 2012, para 4
270 Vodacom: 32.1 million subscribers (Vodacom annual results presentation for the year ended 31 March 2015)
271 MTN: 28.5 million subscribers (MTN Group Ltd Results presentation for the period ended 30 June 2015, p.31)
Cell C: 18.1 million subscribers in 2014 (Cell C grows subscribers by 1.5m (25 July 2014), available from http://www.moneyweb.co.za/uncategorized/cell-c-grows-subscribers-by-15m/)
8. Stringent price regulation is necessary to prevent abuse and charging of high prices. In Telkom’s case, although price cap regulation was imposed, it was ineffective in ensuring low prices to end customers and preventing it from using its position to hinder competition.

9. The requirement for downstream competitors (e.g. VANS) to rely on a single upstream competitor, if not stringently regulated, can also result in abuse of dominance. In such circumstances, effective regulation, access to the required infrastructure – and at fair and reasonable prices – would be required to ensure that the incumbent utility is not able to abuse its dominant position.

10. Telkom’s dominant position coupled with its focus on profit maximisation led to significant delays in investment in upgrading its telecommunications network. This led to a decline in fixed line telecommunications services, and to these services being replaced by mobile services. Although, similar alternatives do not exist in the electricity sector, the risk is that customers that are able to move off-grid by installing fossil fuel or small-scale renewable energy generators will do so. This could impact on Eskom’s (as well as municipalities) ability to generate the revenue required to recover the cost of electricity supply with a consequent impact on prices and its ability to fund its operations and investment requirements.

Thus it is imperative to create mechanisms for competition to avoid delaying the benefits of competition. These issues must be avoided and should be considered prior to implementation of any reform in order to avoid inadvertently creating a climate conducive to abuse of dominance.