Towards an independent system operator for South Africa

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Executive summary

Purpose of the report

This report considers the implementation of an independent system operator (ISO) in South Africa. In particular the report examines the key functions that an ISO would need to perform in the light of major policy choices facing the country.

Methodology

This research was undertaken at a stage when the South African government had only made very brief policy statements about its intention to establish an ISO. No detailed discussion documents, government policy or draft legislation wwere available to the public. The research was therefore based on interviews with informed individuals, a review of various confidential draft policy documents and a limited review of the international literature.

Terminology

Government initially used the term 'independent system operator'. Strictly speaking this is probably not the correct term given the range of functions under consideration. Government subsequently shifted to 'independent system and market operator'. If government plans to include transmission functions within the new entity it may be more appropriate to rather refer to 'transmission system operator', 'national grid company' or some variation of these. For the sake of consistency and clarity, ISO is throughout the report, focusing on the underlying functions to be performed.

Recent government policy statements on the ISO

In his 2010 state of the nation address President Zuma committed government to establishing an ISO:

> To ensure reliable power supply, we have established an Inter-Ministerial Committee on Energy, to develop a 20-year integrated resource plan.
>
> Among other things, this will look at the participation of independent power producers, and protecting the poor from rising electricity prices. *We will establish an independent system operator, separate from Eskom Holdings*. Eskom will continue to build additional generation capacity and improve the maintenance of its power stations. (Zuma, 2010; emphasis added)

The Minister of Energy, Dipuo Peters, made similar statements in her 2009 and 2010 budget speeches. Senior officials at the Department of Energy (DOE) have since provided further statements on the matter, but no official policy document has been published as yet.

Stakeholder responses

The decision to establish an ISO has attracted strong responses from a range of commentators and stakeholders. All interviewees were positive about the prospect of an ISO, although they also cautioned that much work remained to be done to define the functions, legal status, governance and financing of the entity. Within the public media the proposed ISO has been heartily welcomed by most commentators, with the exception of the National Union of Mineworkers, which sounded a note of caution, and Eskom and the South African National Energy Agency, which both issued somewhat defensive statements arguing that there was no need for a new institution in the sector.

Core function of the system operator

All system operators perform a core function which relates to the scheduling and dispatching of generation resources to meet demand. In order to cope with unexpected surges in demand and unplanned loss of generating capacity the system operator must maintain a safe reserve margin between the anticipated demand and the available generating capacity. Besides dispatching supply-side capacity, system operators can also deploy demand-side measures, such as interruptible load and, as a last resort, load shedding. To achieve its target reserve margin the system operator must monitor and control a wide range of factors relating to both the supply-demand balance (i.e. generation and demand-side measures) and the means by which electrical power is conveyed to consumers (i.e. the transmission system).

Current institutional location of the SO

South Africa's system operator is currently located within Eskom's System Operations and Planning Division. Eskom is a vertically integrated utility that performs generation, transmission and distribution functions. Hence the system operator cannot be termed 'independent' as it is governed by the Eskom Holding's board which also has interests in generation and distribution.

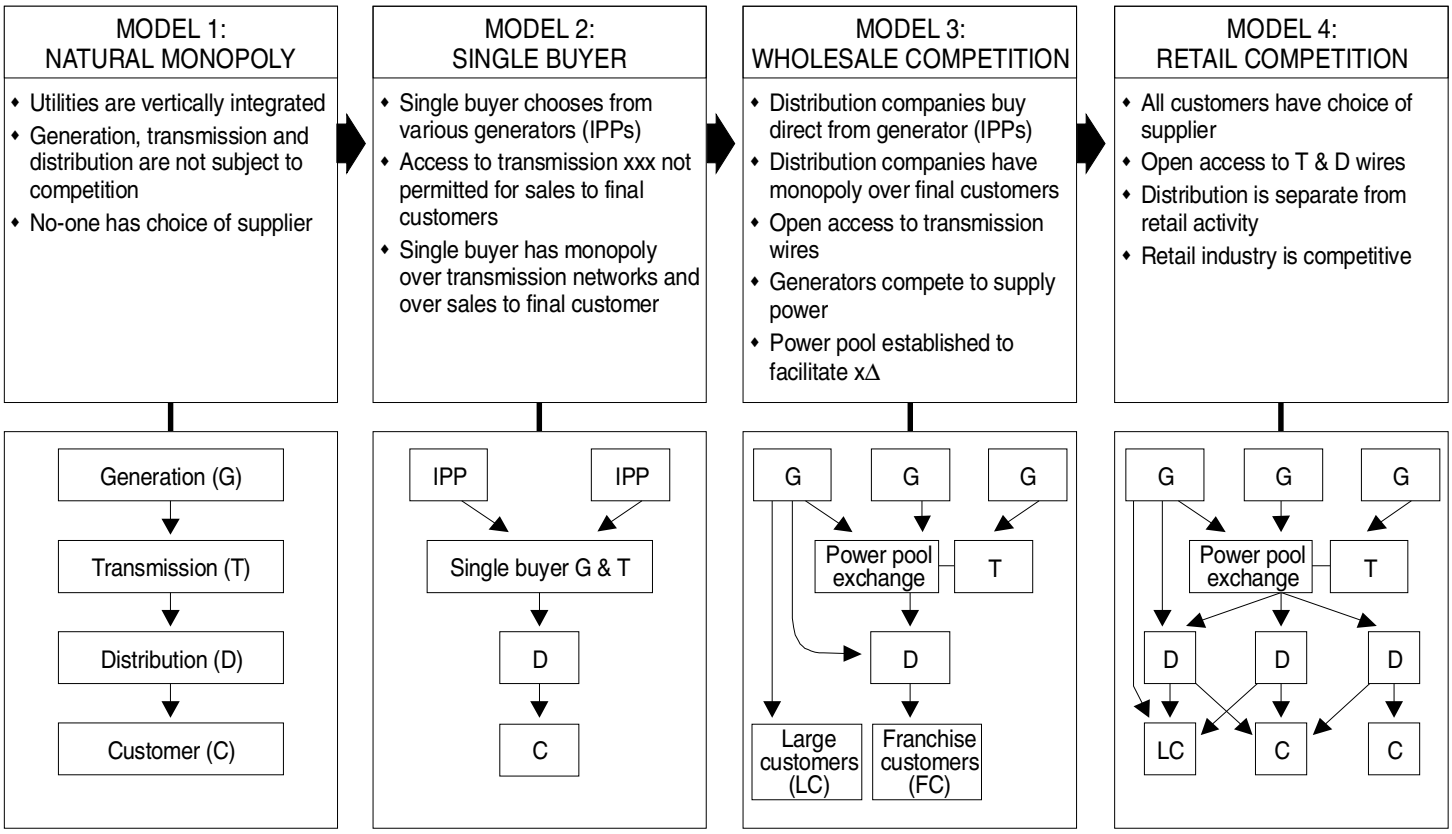
Electricity supply industry market structure

Each country's system operator is located within a broader context. It is generally accepted that there are four main ways to organise the ESI market structure, being:

- the vertically integrated monopoly;
- the single buyer model, whether state-owned or investor-owned;
- the wholesale competition model; and
- the retail competition model. (ABS 2007; Eberhard 2002; Petrov & Grote 2009)

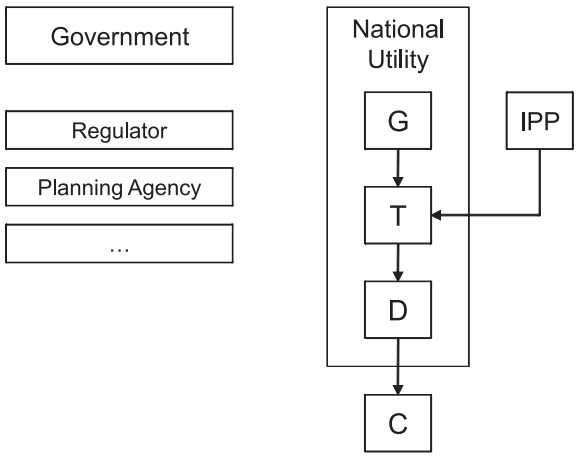
The following diagram displays the arrangement of the various industry elements within each of these archetypal market structures (Eberhard, 2010). The four main models can also be thought of as a series of stages towards increased competition. This process is known as the *standard model* for power sector reform and has been undertaken by many countries – some gradually, and others in a single step.

Archetypal electricity market structures



Experience with non-standard reforms – the hybrid model

Academics Eberhard and Gratwick have undertaken a detailed study of independent power producers (IPPs) across Africa and point out that many developing countries have chosen not to implement the full standard model (Eberhard & Gratwick 2010; Gratwick & Eberhard, 2008) They find that few African countries have unbundled their utilities, that private sector participation is often limited to the introduction of IPPs and that wholesale and retail competition has rarely been established on the continent. They refer to this market structure as the hybrid model.



Hybrid model with vertically integrated national utility

Challenges of implementing the hybrid model

Eberhard and Gratwick point out a number of challenges which arise when implementing the hybrid model. Firstly there is a need for a sound policy framework which must, amongst other things, set a clear standard for energy security. This must be coupled with detailed supply and demand forecasts to produce a coherent power sector plan, including both a least-cost approach and scenario variants on this approach.

Once a clear generation plan is in place a further policy process must be undertaken to allocate responsibility for the construction of new capacity between public and private institutions. And finally, this plan must be implemented through effective procurement and contracting processes. Eberhard and Gratwick stress the critical importance of linking these planning, allocation, procurement and contracting processes.

Problems often arise whereby governments shift responsibility for generation planning away from the utility to the energy ministry, often in a genuine attempt to address the conflict of interest between a vertically integrated SOE and IPPs. Since the ministry did not previously responsible perform these functions it generally lacks the necessary capacity, leading to delays and incoherence.

The Kenyan example

Kenya is an interesting example to consider, since it has experienced considerable difficulties in its power sector, but has also implemented substantial reforms leading to five successful IPP investments with three more under way. As such Kenya is possibly the most successful implementation of the hybrid model in Africa.

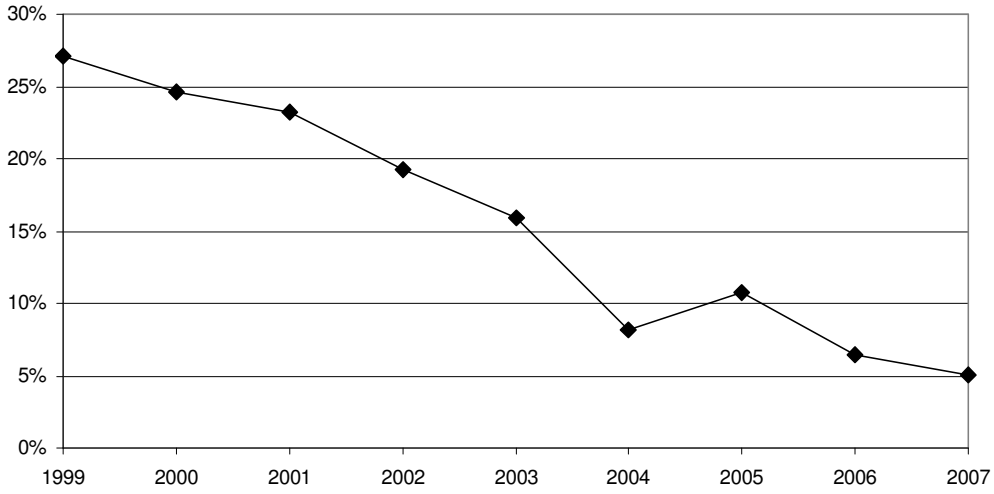
International experience with ISOs

There does not appear to be a firm consensus in the literature as to the 'best way' to implement an ISO. The evident diversity of solutions suggests that the institutionalisation of the system operator and related functions should respond to the local context. This includes the broader ESI market structure and government's intended evolution of that structure. That said, there are some strong opinions, and some significant evidence, in favour of keeping at least the system operator and the market operator in one common institution, if not the transmission operator as well.

State of the South African electricity supply industry

Widespread and persistent load shedding in the first quarter of 2008 fundamentally shook public and investor confidence in Eskom. But the risk of systemic collapse had been growing for a decade, albeit hidden within Eskom's internal reporting systems. Indecision on new capacity investments (with no new capacity added in the years 2002-2004) led to the reserve margin (see figure below) falling well below sensible levels.

South African reserve margin



Causes of the crisis

In their review of the 2008 load shedding, Chettiar et al (2009:26) attribute this disastrous outcome to the following direct problems:

- The increase in generation plant load factor was not supported by the correct levels of maintenance required for such an operational regime.
- Fundamental power system vulnerability due to inadequate reserve margins resulted in a limited capacity to withstand systemic shocks.
- This vulnerability was exacerbated by low coal stockpile levels. The immediate coal related problems were due to poor quality, lower than expected volumes, and logistic constraints which accelerated the generation plant performance decline
- The final condition that led to the power system emergency declaration in January 2008 was the heavy rainfall which made the handling of coal a near impossibility at power stations.
- The long term primary energy contracts were structured for a 60% generation plant load factor and the subsequent inability to support the increased plant load factor lead to restricted coal availability.

Besides these direct problems, Chettiar et al conclude that the root causes of the electricity emergency arose from the following governance failings:

- The policy and regulatory framework of the country did not attract new independent generators which, in conjunction with a restriction on Eskom to build new generation plant, resulted in a deficit in supply that has built up over the years.
- The generation planning assumptions were optimistic in terms of long-term generation performance availability and high plant load factors.
- The economic and electricity growth projections were underestimated.
- Decision-making processes around new generation capacity were not aligned and resulted in timely decisions not being taken.

Whilst these findings were somewhat unusual in that they were voiced by Eskom insiders, they were certainly not the first set of commentators to reach these conclusions. The World Bank (Kessides et al, 2007) and academics (Newbury and Eberhard, 2008) have listed similar factors on several occasions.

The new-build programme

Eskom has embarked on a major new-build programme which is planned to deliver close to 10 GW of new capacity over the next five years.

Scale of the capital programme

Eskom envisages a cumulative nominal capital spend of R500 billion in the five year period FY10/11 to FY14/15. To put the scale of this programme into perspective, Eskom's total assets were valued at R199 billion at the close of the 08/09 financial year (Eskom Annual Report, 2009). Funding this massive capital expansion programme is therefore a serious challenge for the utility.

Potential contributions from independent power producers

The South African government has repeatedly made positive policy statements about its intent to open the power system to IPPs, starting with the Energy White Paper of 1998 (Department of Minerals and Energy, 1998)

In 2001 Cabinet adopted a resolution that up to 30% of existing generating plant should be sold to the private sector. Little was done to implement the privatisation of Eskom power stations through and in 2004 the resolution was re-interpreted to imply that 30% of *new* generation capacity should be built by the private sector.

Once again little was done to implement this resolution, although DME did attempt to procure 1,000 MW of OCGT peaking plant – a process which eventually floundered prior to financial close in March 2007.

The need for a sound system for generation capacity planning was recognised as far back as the Energy White Paper of 1998 which stated in Section 8.1.1 that:

> The Department of Minerals and Energy will ensure that an integrated resource planning approach is adopted for large investment decisions by energy suppliers and service providers, in terms of which comprehensive evaluations of the economic, social and environmental implications of all feasible supply and demand side investments will have to be undertaken. In the electricity sector's case, the National Electricity Regulator will only license new facilities upon the satisfactory completion of an integrated resource plan.

At its ordinary meeting in Cape Town on 5 September 2007 cabinet resolved that,

> The Department of Minerals and Energy will develop an Integrated Resource Plan that will define the magnitude of power generating capacity needed to meet the country's electricity demands. The National Electricity Regulator of South Africa (Nersa) will regulate the single buyer function and specifically approve all commercial agreements between the single buyer and the private producers. Institutional and regulatory mechanisms will be put in place as per the Electricity Regulation Act. (Government of South Africa, 6 September, 2007)

Fifteen months later, the Minister of Energy issued two notices of her intent to pass regulations in terms of the Electricity Regulation Act to regulate, amongst other matters, electricity supply planning and the procurement of new generation capacity (Government of South Africa, 30

January 2009 & 13 February 2009) These draft regulations were subsequently combined into a single regulation which was gazetted nearly two years after the cabinet announcement on 5 August 2009 (Government of South Africa, 2009). These so-called 'New-gen regulations' provide for the Minister to determine an integrated resource plan (IRP), to regulate the licensing of new generation capacity, and for the recovery of costs arising from independent power producers.

Eskom's IPP initiatives

Eskom has initiated a number of IPP procurement processes since 2006, most of which have been abandoned. Eskom has also entered into negotiations with a number of cross-border IPP developers. None of these unsolicited proposals have been finalised and in the course of 2009 Eskom announced that all such initiatives had been put on hold, pending the resolution of its funding model and the implementation of government's policy on new generation capacity.

Renewable energy feed-in tariff (REFIT)

Following a request from the then Department of Minerals and Energy (DME), Nersa published a set of feed-in tariffs for a range of renewable energy technologies (Nersa 26 March, 2009; 29 October, 2009). Nersa subsequently published a draft set of rules to be used as selection criteria for renewable energy projects under the REFIT programme (Nersa. 2010, 19 February). Government has still to clarity how the procurement process will work and who exactly will enter into the off-take agreements.

Funding the new build programme

Eskom's financial director, Paul O'Flaherty, recently informed Parliament's portfolio committee on public enterprises that the utility needed to secure an additional R190-billion funding over the next seven years to complete the build programme, of which a staggering R111-billion would be required over the next three years (Engineering News, 4 May 2010; Business Report 5 May 2010) This despite the record-breaking $3.75bn (~R27.7bn) loan that the World Bank had already granted Eskom in April 2010. (Eskom, 2010a)

Electricity distribution industry restructuring

The issue of electricity distribution industry (EDI) restructuring has been on the agenda since the pre-democracy days of the National Electrification Forum (NELF). After various false starts, government established the Electricity Restructuring Interdepartmental Committee (ERIC) in the late 1990s which commissioned a major study by PriceWaterhouseCoopers. The outcome of this study was known as the Blueprint Report and proposed that Eskom and municipal distribution interests should be merged into six Regional Electricity Distributors (REDs) (Department of Minerals and Energy. 2001).

Unfortunately the departmental members of ERIC and some of the key stakeholders could not reach agreement on certain key policy issues, such as:

- How ownership of the REDs should be determined?
- How local government and Eskom should be compensated for their assets?
- Who should control the REDs?

Since the Constitution effectively grants local government a veto over EDI restructuring these policy gaps have led to an impasse for the past decade.

At first glance, EDI restructuring may not appear relevant to the design of the ISO, but there is a significant link in that the distribution industry is the main buyer of power. The structure of the

EDI is therefore an important constraint on the nature of the market functions which the ISO may perform.

Conceptual framework for the potential ISO functions

The report considers six functions for potential allocation to the ISO.

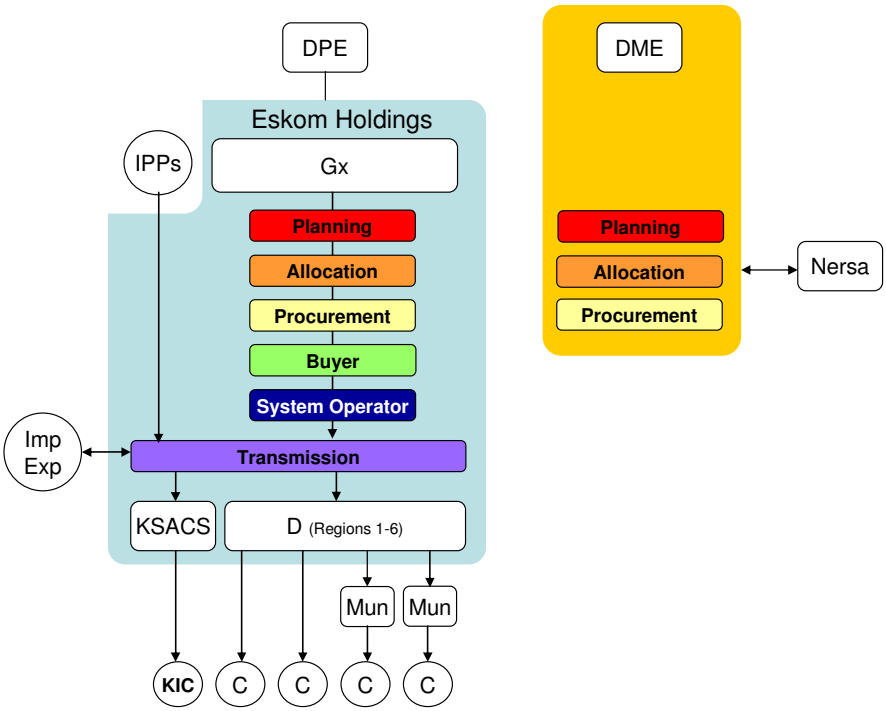
Functions the ISO might perform

Planning	• Undertake/facilitate new generation capacity planning
Allocation	• Allocate new capacity opportunities between Eskom, other SOEs and IPPs
Procurement	• Procure new IPPs (on behalf of the buyer)
Buyer	• Enter into PPAs with generators, on behalf of the distributor/s • Aggregate the wholesale cost of power
System Operator	• Ensure short-term security of supply • Dispatch generation and dispatchable load • Operate the transmission network
Transmission	• Build, own and maintain transmission infrastructure

Historic allocation of the functions (pre-2009 Newgen Regulations)

Prior to the publication of the 2009 Newgen Regulations the responsibility for performing the six functions effectively rested with Eskom, subject to the terms of its Memorandum and Articles of Association, Shareholders Compact and the various licences granted to it by the regulator.

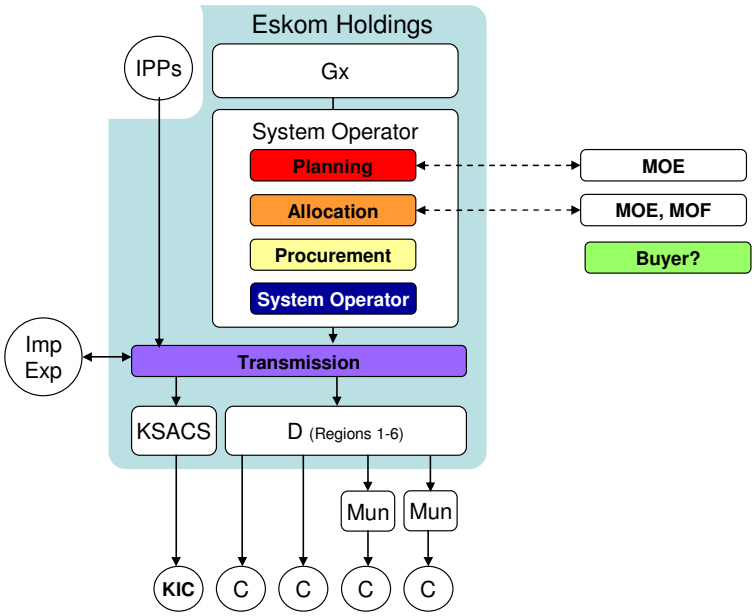
Historic allocation of the functions



Allocation of functions according to the 2009 Newgen Regulation

The 2009 Newgen Regulation (Government of South Africa. 2009, 5 August. Regulation 721) attempted to clarify the relative roles of Eskom, the Minister of Energy, the Minister of Finance and the Regulator with the following allocation of functions.

Allocation of the functions under the 2009 Newgen Regulations.



The Newgen Regulations, read with Eskom's transmission license, assigned planning, allocation, procurement, system operator and transmission functions to Eskom, but left the

Minister of Energy with the final say over IRP and, in concurrence with Minister of Finance, the final say over public/private allocation of generation opportunities.

The Newgen Regulation mentions the buyer function but does not specifically allocate this function to any agency, which presumably means that Eskom continues to play this role, or that the role has still to be allocated.

What market structure will South Africa adopt?

Government, Eskom, Nersa and EDI Holdings have all taken extensive advice on electricity market structures during the past decade. Despite such plentiful advice, government has yet to publish its view on the evolution of the electricity market structure. The Cabinet statement of 6 September 2009, which designated Eskom as the 'single buyer of power from Independent Power Producers' is perhaps the only firm sign of government's intentions. Yet even this statement is open to wide interpretation. For instance PA Consulting, in an advisory piece commissioned by Nersa in 2008, outlined two very different models for the single buyer concept.

Maximal single buyer (MxSB) concept

PA Consulting describe the 'Maximal single buyer' (MxSB) model as lying at one extreme of the potential variations of the Single buyer concept. Under this approach the MxSB would buy all, or nearly all, of the power transacted in South Africa. All distributors (presently Eskom and municipalities and in future the six REDs) would be obliged to purchase their capacity and energy requirements from the MxSB. The MxSB would therefore be obliged to supply sufficient energy to meet all loads, and should therefore ensure it has adequate resources under contract. To meet its obligations it the MxSB would purchase power from existing Eskom Generation, IPPs, cogenerators, renewables, import contracts and the like. It would also procure new supplies through appropriate means.

The MxSB would not be allowed to own generation facilities, in order to ensure that it had no preference to dispatch one generator over another, other than price and reliability. The MxSB would necessarily be an independent body, spun out of Eskom, and would need independent financing or a credit guarantee from government – although the REDs would be its ultimate guarantors once established (PA Consulting, 2008).

Agency single buyer concept

At the other end of the spectrum, PA Consulting describe a very different form of Single buyer, where contracting responsibility lies with the REDs, leaving the Single buyer as a market intermediary. In this model, market operations would be based upon divisible and assignable power supply contracts, which would be derived from an initial set of contracts allocated among the REDs on a proportional basis. As each RED's relative requirements changed, these contracts, or slices of contracts, would be traded between the REDs.

In this model the Single buyer acts as an agent of the REDs to contract jointly with new power plants, and even to sponsor or promote the development of new plant. Such a Joint Action Agency could have an organisational form but could also rely on one or more of the parties to undertaking administrative tasks.The Agency single buyer could, for example, offer standard contracts to all generators who meet specific criteria in order to encourage certain investments, such as cogeneration, and then allocate the resulting power purchase contracts to the REDs as the actual counterparties.

The Agency single buyer could also allocate export commitments proportionally to REDs and aggregate their power contributions for delivery. A separate national independent grid operator would still be required to dispatch the grid and provide balancing supplies.

REDs could be incentivised against relying on the spot market for predictable energy needs, through either the tariff design or through mandated targets for long-term procurement (PA Consulting, 2008).

PA Consulting recommendation on market structure

PA Consulting (2008) recommended to Nersa that South Africa pursue the Agency single buyer model, since it would empower the REDs and avoid the need for a new centralised bureaucracy with additional capital requirements. PA pointed out that end use customers ultimately bear the risks associated with procurement decision-making and since the REDs are closer to the customers they are better located to take such decisions than a remote and centralised Single buyer. PA also point out that the Agency approach would permit variations in procurement strategy according to differences in each RED's geographic or customer base, whereas the MxSB model would be more likely to adopt a one-size-fits-all approach.

Transitional single buyer

Recognising that the REDs do not as yet exist, PA Consulting also explored the possibility of implementing a Transitional single buyer. This entity could begin operating before EDI restructuring is complete and would have the following characteristics:

- It would be the contract counterparty for new IPP investments, with the support of a government guarantee and the objective of diversifying the generation base.
- It need not have a monopoly on the power market.
- It would have to be implemented along with an independent grid operator in order to assure fairness of IPP dispatch.
- It would be a vehicle to establish contracts on Eskom's generation – a process which could take several years to complete following the initial IPP contracts.
- All power purchase contracts should provide for easily assignment.

PA Consulting point out that such a Transitional single buyer would provide for a transition to either the MxSB or the Agency single buyer as an end state model. (PA Consulting, 2008)

Both the MxSB concept and the Agency single buyer concept would have a high degree of synergy with the planning, allocation, procurement and system operator functions discussed above. The two models would clearly follow different philosophies with regard to contracting, in that the MxSB would contract with power producers in its own right, while the Agency single buyer would merely facilitate contracts between producers and distributors. Nonetheless, either of these market models could be performed by the Buyer function as part of the ISO.

Scope for competition

Whilst there are sound arguments for establishing a single buyer to aggregate existing generation capacity while EDI restructuring is still on hold, the question remains as to whether all future generation capacity should be compelled to sell to the single buyer?

On the face of it such a decision would appear to be a regressive step. Government has made many previous policy statements supporting the advancement of competition within the sector (see section 2). One of the key objects of the Electricity Regulation Act (4 of 2006, amended by 28 of 2007) is to 'promote competitiveness and customer and end user choice' (ERA, clause

1(f)). This Act also requires all network operators to provide non-discriminatory access to third parties. Current legislation and licensing conditions therefore appear to require network owners to provide third party access to parties wishing to implement bilateral power purchase agreements by means of wheeling agreements. Eskom has already established policies to this effect and Nersa has determined tariffs for wheeling charges. The mechanisms are therefore largely in place to facilitate such agreements.

Implications for the ISO

Government appears to have issued conflicting policy signals concerning its intentions for the future structure of the electricity market. Given this uncertainty it is too early to determine what functions an ISO may perform in relation to the wholesale electricity market. In all probability it would appear that in the short term the ISO will have to act as counter-party to a set of power purchase agreements (PPAs) with existing generators (possibly one PPA in relation to Eskom). Should policy and legislation allow for the establishment of bilateral PPAs with new IPPs the contractor (or market operator) function may have no specific role to play in relation to these agreements – although of course the system operator function would have to be involved. That said, there is clearly a need to separate the market operator or buyer function out of Eskom and the ISO would be an obvious place to house such a function.

Integrated resource planning

Eskom's system operator and the energy planner (DOE) have already undertaken one planning cycle in terms of the Newgen Regulation which led to the Minister gazetting her determination of the first IRP in late 2009 (Government of South Africa, 31 December 2009). IRP1 was drawn up on the basis of limited consultation within government, with no apparent effort to engage with stakeholders. Not surprisingly this attracted considerable criticism from stakeholders who pointed out that DOE had had a mandate from Cabinet since at least September 2007 to produce the IRP (Government of South Africa, 6 September 2007). In response to these criticisms DOE has commenced a much broader consultation process to draw up IRP2.

On 9 October, 2010 the DOE published its draft integrated resource plan for public comment. Time does not permit a detailed evaluation of these documents, but suffice to say that the process has opened up generation planning to an unprecedented level of transparency and civil consultation.

Allocation of new build opportunities

There is no clarity as to how feasibility studies on public/private allocation of new-build opportunities will be undertaken, or which entity should perform these studies. Such studies are notoriously difficult to undertake and Eskom's system operator would face an obvious conflict of interest when undertaking them.

Alternative approaches to the feasibility study

DOE apparently intends to revise the Newgen Regulations, which would create an opportunity to allocate responsibility for undertaking such feasibility studies to a more appropriate and neutral agency. For instance, National Treasury's Public Private Partnership (PPP) Unit has considerable experience with the design, evaluation and implementation of various infrastructure-related PPPs, including power projects, in terms of the PPP Regulations. Whilst an IPP is not strictly a PPP (since generation is not automatically a state function) the basic issues remain the same. Nersa may be another alternative. Yet another option would be to review whether the allocation function is necessary and/or feasible. For instance it may be possible to implement a more market-based approach to ensuring that power projects are

developed and commissioned on a timely basis – for at least a portion of the future capacity base.

Future procurement of IPPs

South Africa has well developed law, regulations and court precedents around public procurement. As a state-owned entity governed by the Public Finance Management Act, Eskom is very familiar with this framework and regularly enters into major contracts, including PPAs, with other national entities. Nonetheless, Eskom has yet to conclude a significant PPA and the suggestion has therefore been made that National Treasury's PPP Unit could perhaps play a role in facilitating or running such procurements.

Future system operator of the national grid

All interviewees were positive about the prospect of an independent system operator, on the grounds that this was a prerequisite for competition and the entry of IPPs. It is broadly agreed that new legislation will be required to establish the ISO. DOE anticipates that it will take at least two years to pass the legislation, establish the new state owned entity and transfer the relevant SO capacity out of Eskom into the new entity. Eskom will have to perform the system operator function in the meantime.

Future ownership of the transmission system

Interviewees had conflicting views on the desirability of transferring ownership of the transmission system (as opposed to control of the system) to the ISO. The majority of interviewees took the view that the ISO should also take ownership of transmission assets. This view stemmed mainly from a concern that Eskom may use its influence over the transmission system to hinder the entry of IPPs, or to facilitate its own generation projects. However, some interviewees were concerned about the potential impact on Eskom's balance sheet and associated credit rating in the short-to-medium term as the utility struggles to raise debt for its capital expansion programme.

A review of Eskom's balance sheet in the 2010 annual financial report indicates that the carrying value of the transmission assets is a mere R10.5 billion compared to the utility's total asset base of R246 billion. This fraction will reduce further in future since the value of new generation assets will far outweigh the value of new transmission assets. The impact of a vertical unbundling on overall asset values is therefore not significant.

Perhaps a more fundamental concern for lenders and credit agencies would be a performance deterioration as a result of the unbundling – since reduced transmission performance could jeopardise Eskom's cash-flows and ability to repay its debt. Whilst this would be an understandable concern, the establishment of an ISO could also affect Eskom's cash flows, and there does not appear to have been any negative response on the part of lenders to government's announcements in this regard. Vertical unbundling is a fairly common event internationally. As long as it is well managed it is unclear why this should present an insurmountable obstacle to lenders.

There appear to be arguments for and against leaving transmission assets with Eskom. The UK and Kenyan experiences both suggest that a vertical separation is possible and desirable. The cost of and disruption of such a transfer would appear to militate against.

The decision should also be seen in light of the challenges facing the transmission network in coming decades. Whereas transmission services in South Africa were previously concerned with the transfer of power from one region (Mpumalanga, the site of most of Eskom's coal-fired power stations) to the rest of the country, the future challenges may be rather different. Firstly,

there may be a significant amount of power injected into new locations in the grid as IPPs, imports and renewable power generators begin to play a greater role. Renewable power is particularly challenging for grid operators, since it is generally not a dispatchable form of generation and it tends to be located in areas of the country which are not presently well served by the grid – i.e. wind in the southern portions of the country and solar in the north-west. These factors will require the application of new 'smart-grid' technologies to ensure a stable and reliable system. The question therefore arises whether it is sensible to separate long-term grid planning (which must be co-located with long-term generation planning in the ISO) from the transmission owner who will be responsible for implementing these plans? Would it not be more effective for both functions to be located in the same body?

Potential end-state models for the ISO

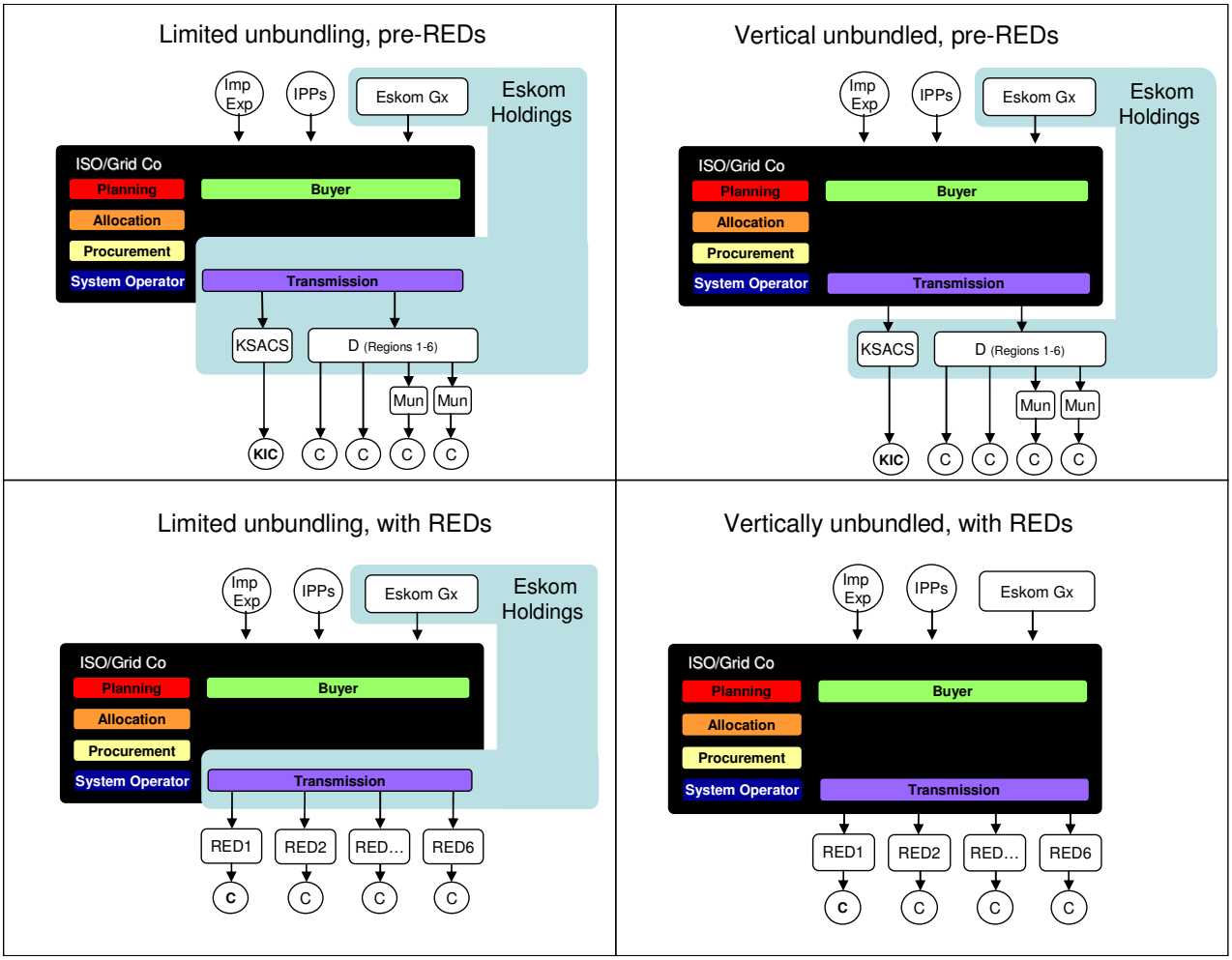
Engagement with stakeholders and a limited review of the literature suggests that there is general agreement that the functions of planning, allocation, procurement and system operations need to be extracted from Eskom. No stakeholder has suggested that these functions should be housed in separate institutions. All stakeholders have instead pointed to the synergies that exist between these functions and hence the logic of containing them within a common institution – the ISO.

There is also general agreement that the buyer function (whatever that may be) will have to be extracted from Eskom. There is a strong consensus that the buyer or market operator function should be housed in the same institution as the above-menioned four functions. This conclusion is supported up by respected international academics and commentators. Government's use of the term ISMO suggests that it supports this view.

Transmission stands out as the one function then about which there is some dispute or uncertainty. As the previous section has pointed out, different countries have adopted different approaches. However, South Africa does appear to be a good candidate for a clean vertical unbundling, with transmission following the other five functions – on the grounds that these are state assets under public ownership and there is no need to follow a sub-optimal compromise to avoid conflict with owners of private transmission assets. This is perhaps particularly important if South Africa is to follow the hybrid model for an extended period, since access to transmission will be a critical factor in the growth and development of the IPP industry, whether these investments are based on traditional fossil fuels or renewable energy sources. Even if responsibility for long term grid planning is shifted out of Eskom and into the ISO there may still be opportunities for Eskom to favour grid investments which suit its own generation plans, and to slow down investments which are primarily in the interests of IPPs.

Given the above assumptions, there are two possible ISO implementations without REDs. The first option entails a limited unbundling with transmission remaining with Eskom Holdings. In this option Eskom remains vertically integrated, in the sense that the utility owns generation, transmission and distribution assets, but control of the key functions relating to the stimulation of the IPP market is taken away and placed in the hands of the ISO. The second option entails a full vertical unbundling. In this option Eskom Holdings surrenders control of the transmission assets to the ISO/Grid company and is no longer a vertically integrated power company. The same two models may also be implemented together with REDs, as follows

Comparison of the ISO end-state options.



Of the four options, the last is the 'cleanest' and should provide the greatest opportunities for balanced competition within the power market. Of course this option requires the greatest degree of restructuring. Government will need to understand these tradeoffs in some detail in order to take a clear decision.

Legal form of the ISO

Some countries have established ISOs and TSOs on a 'for-profit' basis, albeit under strict regulatory regimes. Kenya's KPLC, for instance, is listed on the Kenyan Stock Exchange, although government still holds a majority stake.

Given government's primary motive for restructuring the ESI is to facilitate private investment in the generation sector, rather than the transmission sector, there is no suggestion of privatisation. It is fairly certain that legislation will be passed to establish the ISO (or whatever it will be called) as a public entity in terms of the Public Finance Management Act and to facilitate the transfer of the relevant assets between Eskom and the new entity.

Regulation of the ISO

As a natural monopoly the ISO will of course be subject to regulation by Nersa to ensure that it complies with the applicable standards and earns appropriate returns.

Funding of the ISO

The ISO will sit in the industry value stream (either the entire value stream or at least a significant portion of it) and should therefore be self-funded on the basis of its wholesale tariff to distributors, its network charges (if it owns the transmission network) and various other functions, depending on how the market is structured. No public subsidy should be required, other than the opening balance at establishment. Careful analysis will be required to ensure that the ISO is appropriately capitalised at the outset. There may well be an initial requirement for some form of government guarantee, if the ISO is to build up reserves over time.

International perspectives on governance

Governance is critical, as the state of California discovered in the mid 1990s when a failed governance system led to inappropriate decision-making and widespread blackouts. In 1997 the World Bank commissioned a review of four non-US power pools to compare these systems and draw some lessons for general use. The authors identify four basic governance models, as follows:

Model 1: A multi-class stakeholder board

Model 2: A non-stakeholder board

Model 3: A single class board

Model 4: A single for-profit corporation not affiliated with market participants

Implications for ISO governance in South Africa

The World Bank typology demonstrates the wide variations in governance systems that have evolved for this kind of institution. Whilst the analysis is now over ten years old, the insights remain relevant for South Africa, since we are still at an early stage of the process.

Assuming that government has no intention of breaking up Eskom's generation assets, the ISO will be faced with a supply market in which Eskom has a very dominant position. Even if government applies its policy that IPPs should construct 30% of new capacity, Eskom will remain the dominant player for many decades to come. This reality makes the third model (whereby multiple generators appoint the board) a non-starter, since Eskom would dominate the board.

The first model, whereby multiple classes of stakeholder appoint the board, is also impractical. If REDs are not implemented then Eskom will remain a dominant player at the distribution/retail level of the industry. Even if REDs are implemented it is possible that Eskom may have a significant or controlling ownership interest in each RED. The only 'class' in which Eskom would not have a direct or dominant interest would be consumers – although the argument could be made that Eskom's interests are closely aligned to the interest of large electricity consumers.

The fourth model can probably be dismissed out of hand, as the privatisation of the market operator is even less likely than the privatisation of Eskom itself.

This admittedly brief analysis leaves the second model as the only likely option. Fortunately the concept of expert or independent boards is a well established principle for South African public entities, with Eskom itself falling into this category. It is therefore likely that government will follow this route, and indeed all interviewees expected this to be the case – although the statement by the DOE's Director General that 'The company's board will include municipalities, the private sector and government' (Bloomberg, 13 September 2010) suggests that government may be intending to follow the stakeholder route.

One interviewee did point to the difficulty of locating individuals in South Africa who have both the requisite expertise and no commercial interests in the sector. There is some validity to this point. Academics and consultants may not have a direct interest in the industry, but will often consult to one or other party. IPP staff may have sound knowledge but will certainly have an interest. Power consumers will also have particular interests. A balance will have to be found which maximises expertise and minimises conflicts.

Government may also want to deliberately legislate for advisory structures or systems which ensure that the expert/independent board is obliged to consult with stakeholders on certain matters. This may be similar to the Victoria model noted in the World Bank report which combined models 1 and 2, or it could be based on systemised consultation – such as Nersa's consultative obligations when making a new ruling.

Interim arrangements for ISO functions

The resolution of the outstanding policy issues and their translation into legislation will clearly take some time. In the meantime there is a critical urgency to stimulate IPP investment in new capacity. Some form of interim arrangement is therefore required. Three options appear to be under consideration:

- *Interim ISO as a division of Eskom Holdings:* This option requires the least effort, but has all the disadvantages of the present system.
- *Interim ISO as a subsidiary of Eskom Holdings:* This option would create the opportunity to add additional minority shareholders (e.g. National Treasury to hold 25%) and to co-opt independent directors into the governance structure of the SO. Eskom's articles, memorandum of association and shareholders agreement could perhaps be tweaked to ensure a degree of independence? However, Eskom would still be in a position to exert ownership control over the SO, amongst other forms of control.
- *Interim ISO as a separate company, established prior to founding legislation:* This option could be used as a way to separate just the IPP procurement function out of Eskom, without shifting the planning, buying, system operator or transmission functions just yet.

At this stage DOE appears to favour the third option as the best way to build market confidence in the IPP procurement processes. By contrast, Eskom appears to prefer the first option, with one official going on public record to this effect (Engineering News, 22 July 2010).

A decision on the interim arrangements will need to be pragmatic, and should not divert from the main debate about the long-term solution.

Conclusions – The problem statement

On the surface, the nature of the problem is fairly evident. Inadequate generation planning systems, a failure to implement proposed sector reforms to admit IPPs, and delayed decisions on Eskom's proposed new-build programme all led to a dangerous decline in the system reserve margin over the course of the late 1990s and early 2000s. Coupled with an inexplicable mismanagement of Eskom's coal procurement programme, this situation led to an inability to meet demand and widespread load shedding in early 2008. Although the recession brought Eskom a few years of relief, similar shortages are likely to recur in coming years.

On the financial front, the long period of reductions in real price levels left South Africa with extremely low electricity tariffs, and Eskom with inadequate financial reserves to complete its capital expansion programme or confidently contract with IPPs. This problem was aggravated by ongoing escalations in the cost of Eskom's build programme and the difficulty of securing both equity and debt funding in the post-recession climate.

Despite the dramatic tariff hikes which Nersa has granted in recent years, it appears that further hikes will still be necessary to achieve the financial sustainability of the sector and enable further public and private investment in new capacity.

Although both government and Eskom continue to make positive statements about the need for IPPs to enter the sector, through both conventional and renewable power projects, progress has been painfully slow. Without clear signals as to the nature of the future power market private developers are understandably reluctant to invest significant resources in the expensive business of project development. It could even be argued that uncertainty about government policy is also holding Eskom back from developing new projects.

Compounding these sector-level challenges are a broader set of national debates concerning:

- the country's response to climate change, and the scale and timing of the power sector's contribution towards a lower-carbon future;
- the impact of coal-based emissions on the natural environment in certain parts of the country;
- the impact of coal-related acid mine drainage on certain catchments;
- the extent to which power plants may make further use of scarce water supplies;
- the potential contribution of the power sector to upstream industrialization programmes, through local procurement, the development of the nuclear fuel cycle, and the development of renewable energy component-supply industries; and
- the impact of rising electricity prices on consumers generally, and poor households and energy-intensive industries in particular.

Whilst these sectoral challenges may be evident, the question remains as to what underlying factors led to them becoming so acute. In the opinion of this paper's author the contributing factors have been:

- poor governance of the sector, particularly the unclear allocation of responsibility for new generation capacity planning and the associated responsibility for ensuring security of supply;
- a misguided regulatory strategy which maintained tariffs at too low a level for too long, possibly due to inadequate insight into the challenges facing the sector or political pressure to preserve this so-called competitive advantage for grand industrial schemes;
- a general lack of transparency about the performance of the sector;
- inefficiencies within the current industry structure, potentially attributable to a lack of competition; and
- the clear conflicts of interest between Eskom's various roles as a generator, planner, system operator and procurer of new capacity.

Whilst the establishment of an ISO cannot in itself address all these factors, there is certainly reason to hope that it could address some of them to a significant extent. The simple existence of a second centre of well-resourced and publicly minded expertise should, in itself, help to balance out the severe asymmetry of information and market power which presently prevails within the sector.

Drivers for change

As noted earlier, various commentators, government studies and government policies have proposed power sector reforms in the past, including the establishment of an ISO, all to no

avail. It is therefore necessary to ask whether this latest proposal is likely to succeed where others have failed? Three key drivers may be identified which have perhaps not existed in the past.

1. Firstly, the country's security of supply has been compromised, and there is every indication that it will be compromised further in coming years. This outcome has fundamentally shaken government's and consumer's faith in Eskom. This loss of trust appears to have led to a willingness to consider alternative arrangements to a greater extent than in the past.
2. Secondly, the extent of Eskom's funding problems clearly indicates that the utility simply cannot continue to take sole responsibility for building the country's future generation capacity. With this realisation comes the inevitable question of how the power market should be structured in future? How should new entrants gain access to this market? And what governance and regulatory arrangements will best ensure adequate investment in the development and construction of new capacity in good time to maintain a healthy reserve margin. In short, what are the minimum requirements that will enable IPPs to invest in this market?
3. Thirdly, the challenge of climate change and other natural resource constraints has now grown to such a level that South Africa has little option but to commit to national targets and implement real plans to achieve these. Global experience with renewable power producers is that such projects tend to be much smaller than conventional coal and nuclear power plants and are therefore best undertaken by more nimble private entrepreneurs, rather than large state-owned enterprises. The opening up of the power market is a pre-requisite to such investments.

While the first two drivers may well be resolved in time, the third driver will persist for the foreseeable future. There can be little doubt that the establishment of an ISO could make a significant contribution towards addressing these challenges and facilitating the necessary investments in both supply-side and demand-side initiatives to meet the short- and long-term challenges facing the sector. However, an ISO will still require sound policy frameworks and effective governance and regulation in order to succeed. Establishment of an ISO will not be grounds for government to abdicate its responsibility as policy maker, as it appears to have done for much of the past decade.

State of the policy process

Whilst there is general consensus that some market reform is necessary the debates are still at an early stage and most stakeholders have yet to form a view. Government has yet to consult on the details of these reforms beyond a very narrow internal circle and there appear to be significant differences of opinion within government – so perhaps it is best that these are settled before the issue is taken to the broader public.

The scale or scope of the intended reform is presently unclear in at least three important respects.

1. Firstly, it is unclear how far government wants to go with reforms to the wholesale power market. Reforms could be limited to margin through the procurement of a few IPPs – i.e. limited competition for a limited market. Or the reforms could be broader and enable IPPs to sell directly to willing buyers. This choice may impact on the buyer or market operator function that the ISO must perform. This broader policy decision must be taken before the institutional design of the ISO can be settled.
2. The second key uncertainty relates to the establishment of the REDs. Whilst government has repeatedly recommitted itself to the reorganisation of the distribution sector little or no practical progress has been made on the ground. If in fact REDs are to be established, then

this should have a direct bearing on the future functioning of the ISO, since it will have to deal with multiple, independent buyers, each capable of contracting directly with generators. In such an event there may be no need for the ISO to play the role of a single buyer which would relieve it of one of the six potential functions.

3. The last key uncertainty relates to the future of the transmission system. DOE officials have suggested that the establishment of the ISO should involve a full vertical separation of the transmission grid from Eskom's generation and distribution functions, even if this takes years to achieve. Eskom has, not surprisingly, tended to focus on interim measures based on unspecified forms of 'ring fencing' which look suspiciously like the status quo.

At the time of writing (October 2010) government's announced intention to establish an ISO is still relatively young in policy terms. This will be a complex process which cannot be allowed to worsen the industry's already poor health. That said, it would be irresponsible of government to stand idly by and watch this important sector slide still further into the mire. Something needs to be done – and there is sufficient consensus that Eskom's grip on the sector is untenable and needs to be reformed. All that remains is to agree on the functions that the new entity should perform and to put it into practice.

Before embarking on any institutional reforms government should bear in mind the experience of the last decade of fruitless distribution RED reforms. It is crucial to get the policy right at the outset. Incomplete policy frameworks can only lead to resistance from industry incumbents and other stakeholders.

Recommendations

The following recommendations are based on the findings of this report. These recommendations are intended as a contribution to the public debate and should not be seen as complete or prescriptive.

Electricity sector policy

Government should reach a clear and comprehensive view on the future evolution of the ESI in South Africa and publish this in an appropriate format – such as a White Paper on Electricity. In particular this paper should clarify government's desire or otherwise for competition at wholesale and retail level, and the degree of vertical and horizontal restructuring that will be undertaken to facilitate such competition. If government intends to follow a hybrid model with competition limited to marginal IPP investments, then the terms of such participation need to be defined and clarified.

The long-standing impasse over the REDs needs to be resolved. If this issue cannot be resolved then the functions of the ISO may have to be adjusted over time when EDI reform finally gets underway.

Market structure

A single buyer should be established as part of the ISO, and as a transition towards government's long term vision for the ESI market structure. The single buyer should, preferably from the outset, allow willing buyers to enter into bilateral, wheeled power purchase agreements with IPPs.

Transmission

Government should give serious thought to the option of a full vertical restructuring of the industry, by shifting the ownership of transmission assets out of Eskom and into the ISO – effectively making it a full transmission system operator. There does not appear to be any

fundamental obstacle to taking this step, and there appears to be significant evidence that such a step will improve the prospects for competition in the long term.

Planning, allocation and procurement functions

The ISO should also house the planning, allocation and procurement functions. The integration of these functions into one specialised utility, along with the Buyer function, will avoid inter-organisational communication problems and concentrate scarce expertise in a productive manner.

Nature of the allocation function

The concept of allocation should be reviewed to establish whether it is practical for the ISO to make such determinations. Alternative mechanisms, such as compulsory competitive tendering for all new capacity (other than perhaps nuclear plant), should be considered.

ISO legislation

The ISO should be created by legislation as soon as practically possible. This legislation should provide for the transfer of the relevant assets, staff, contracts and functions from Eskom to the new entity.

Newgen regulations

The new ISO legislation should replace the Newgen Regulations in their entirety. Certain elements of the Newgen Regulations may need to be amended prior to the advent of the new legislation.

ISO governance

The ISO should be established as a Public Company under the Companies Act. The institution should be governed by a board of independent experts with minimal conflicts of interest. The board should be mandated to establish appropriate stakeholder consultation mechanisms. The board should be granted adequate discretion to evolve the market rules and market structure, within the broad mandate of government policy and the specific rules of the regulator.

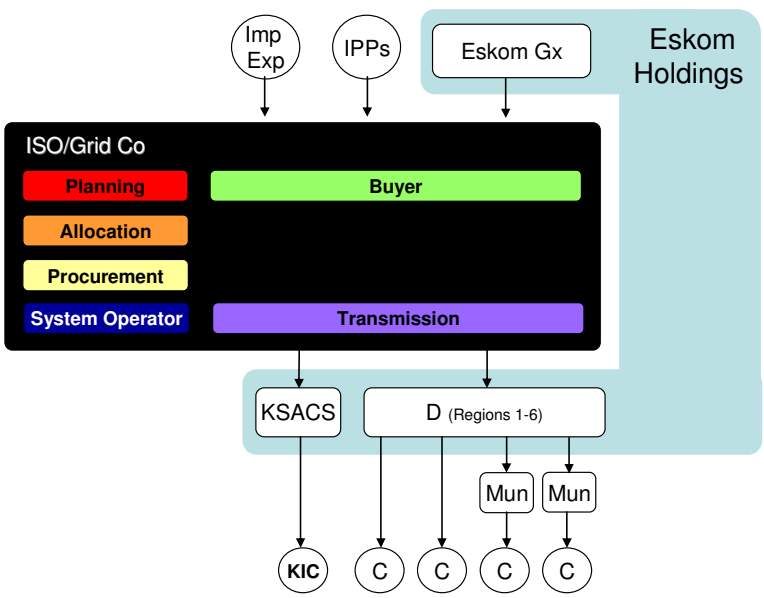
Interim arrangements

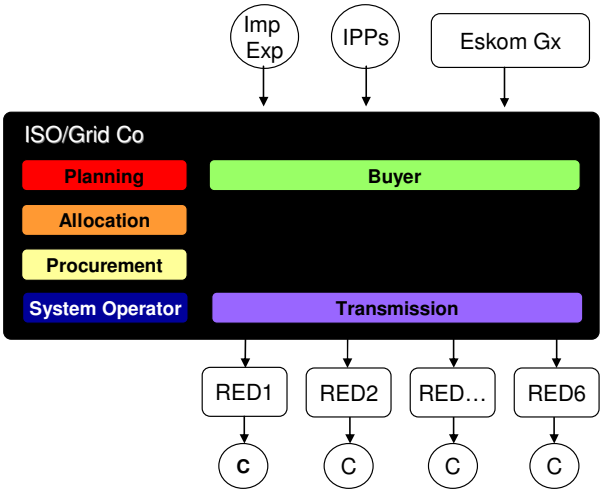
Debate over the nature of interim arrangements must not be allowed to delay the resolution and implementation of the ISO-proper. Where practical independent or neutral governance arrangements should be introduced for those ISO functions where Eskom faces the greatest conflict of interest – namely planning, allocation and procurement.

Summary of the recommended model

To summarise, the recommended functions for a South African ISO will depend on broader policy decisions on the nature of the wholesale market, the establishment of REDs and the extent to which they will access the wholesale market (directly or via a single buyer) and the future ownership of the transmission system. It is beyond the scope of this report to reach firm conclusions on these issues, but on the face of it there appears to be a strong case for vertical disaggregation of the industry and the establishment of a full transmission system operator (TSO). The following diagram depicts the recommended model, depending on whether EDI reforms go ahead and REDs are established or not.

Recommended ESI model incorporating the ISO – Pre-REDs and post-REDs





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Acronyms

AMEU	Association of Municipal Electrical Undertakings
CC	Central Committee (of the National Union of Mineworkers)
CEGB	Central Electricity Generating Board (of the United Kingdom)
CIC	Coal Investment Corporation
COSATU	Congress of South African Trade Unions
DTI	Department of Trade and Industry
DME	Department of Minerals and Energy
DOE	Department of Energy
DPE	Department of Public Enterprises
DSM	Demand Side Management
DWAF	Department of Water Affairs and Forestry
EAF	Energy Availability Factor
ECS	Energy Conservation Scheme (a component of the PCP)
EDI	Electricity Distribution Industry
EIUG	Energy Intensive Users Group
ERC	Electricity Regulation Commission
ERIC	Electricity Restructuring Interdepartmental Committee
ESI	Electricity Supply Industry
FERC	Federal Energy Regulatory Commission (of the United States of America)
FY	Financial Year

GOSA	Government of South Africa
GW	Giga Watt
Gx	Generator
IPP	Independent Power Producer
IRP	Integrated Resource Plan
ISEP	Integrated Strategic Electricity Plan
ISMO	Independent System and Market Operator
ISO	Independent System Operator
KPLC	Kenya Power and Light Company
LF	Load Factor
MO	Market Operator
MOF	Ministry of Finance
MTPPP	Medium Term Power Purchase Programme
MW	Mega Watt
MxSB	Maximal Single Buyer
MYPD	Multi Year Price Determination
NELF	National Electricity Forum
NER	National Electricity Regulator
Nersa	National Energy Regulator of South Africa
NIRP	National Integrated Resource Plan
NT	National Treasury
NTC	National Transmission Company
NUM	National Union of Mineworkers
PCP	Power Conservation Programme
PFMA	Public Finance Management Act
PNCP	Pilot National Cogeneration Programme
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PX	Power Exchange
REDs	Regional Electricity Distributors
REFIT	Renewable Energy Feed-In Tariff
RFP	Request for Proposal
RFQ	Request for Qualification
RTO	Regional Transmission Organisation
SA	South Africa

SAIPPA	South African Independent Power Producers' Association
SALGA	South African Local Government Association
SANEA	South African National Energy Agency
SAPP	Southern African Power Pool
SO	System Operator
SOE	State Owned Entity
SWH	Solar Water Heater
TO	Transmission Operator
TSO	Transmission System Operator
UCLF	Unplanned Capability Loss Factor

1 Introduction

1.1 Background

This report has been prepared by Meridian Economics for the University of Cape Town's Energy Research Centre, with the support of funding from the National Research Foundation.

The report considers the implementation of an independent system operator (ISO) in South Africa and related matters.

1.2 Scope of work

The scope of work required an examination of the *key functions* that an ISO would need to perform. These functions were to be considered in the light of:

- Major policy choices facing the country, such as the choice of fuel and power conversion technologies; the relative roles of the public and private sector in generating and supplying electrical energy; climate change mitigation; affordable access to electricity services, and the like; and
- Detailed technical issues, such as system planning, procurement of new generation and the operation of the system

The research was expected to consider these issues within two time-frames:

- The short term, being the next three to five years during which an ISO might be established; and
- The medium to long-term

The research was also expected to:

- Briefly review experience with ISOs in other countries, focused on potential institutional models;
- Describe a small number of potential institutional models for the ISO; and
- Recommend a preferred option for South Africa.

This project was conducted on a limited budget (less than one month's worth of effort) over a six month period. The report is not intended to be exhaustive or authoritative and should be viewed as a contribution to the debate.

1.3 Objective and target audience

The primary purpose of the paper is to inform stakeholders about the key issues relating to the establishment of an ISO, to highlight outstanding policy choices, and to facilitate debate by placing a set of recommendations into the public domain. As such, the report is aimed at a broad audience and will be made as accessible as possible.

1.4 Research methodology

At the time this research was undertaken the South African government had only made very brief policy statements about its intention to establish an ISO. No detailed discussion documents, policies or draft legislation was available to the public. The research process therefore consisted of:

- Interviews with informed individuals from various government departments, Eskom, Nersa, the AMEU, a large power consumer, an international legal firm familiar with the issues, local policy advisors and local academics. Most of these interviews were conducted off the record at the request of the interviewees;
- Review of various draft documents relating to the ISO and associated functions. Most of these documents were confidential and therefore cannot be quoted or referenced; and
- A limited review of the international literature on the topic.

I would like to thank all those who gave their time and opinions so willingly.

Whilst every effort has been made to reference sources in the normal academic manner the state of the process has meant that certain opinions must remain unattributed.

1.5 Project steering committee

This report was prepared under the guidance of a steering committee consisting of:

Prof Anton Eberhard	Graduate Schools of Business, UCT
Dr Andrew Marquard	Energy Research Centre, UCT
Mark Pickering	Meridian Economics
Dr Grové Steyn	Meridian Economics
Mavo Solomon	Energy Research Centre, UCT
Prof Harald Winkler	Energy Research Centre, UCT

My thanks to all members of the steering committee for their constructive inputs and drafting comments.

1.6 Terminology

The central subject of this report is the functions to be performed by a new institution within the electricity supply industry (ESI). Government initially referred to this institution as an *Independent System Operator* (ISO). Strictly speaking this is probably not the correct term, given the range of functions under consideration and the normal meaning of the term. Perhaps recognising the misnomer government subsequently shifted to the term *Independent System and Market Operator* (ISMO).

Similar institutions in other countries are variously known as Market Operators (MOs), System Operators (SOs), Transmission Operators (TOs), Transmission System Operators (TSOs) and Regional Transmission Organisations (RTOs), amongst other titles.

Government has to date used the terms ISO and ISMO interchangeable without providing a clear definition of the intended functions to be performed by the new entity. If government intends to shift transmission functions into the new entity then neither the ISO or ISMO labels would conform to normal terminology. It would be more appropriate to use the term Transmission System Operator (TSO), national grid company or some variation of these terms.

For the sake of consistency, I have used the simple term ISO throughout the report, unless I am quoting another author or specifically referring to one of these variants.

2 Relevant Government Policy Statements

2.1 Introduction

Given the critical importance of reliable electricity services to modern economies all countries take a keen interest in the structure and functioning of this industry, to the extent that it remains under full or partial public ownership in many countries, and is always under tight control by national and/or sub-national legislation as well as a variety of regulatory devices. Government policy is therefore an important starting point for understanding the intended role of the ISO.

2.2 Recent policy statements on the ISO

President Zuma – 2010

In his 2010 state of the nation address President Zuma committed government to establishing of an independent system operator (ISO),

> To ensure reliable power supply, we have established an Inter-Ministerial Committee on Energy, to develop a 20-year integrated resource plan.
>
> Among other things, this will look at the participation of independent power producers, and protecting the poor from rising electricity prices. We will establish an independent system operator, separate from Eskom Holdings. Eskom will continue to build additional generation capacity and improve the maintenance of its power stations. (Zuma, 2010. Own emphasis)

Minister of Energy – 2009

This is not the first time that a national politician has proposed the establishment of an ISO. In 2009 the Minister of Energy, Dipuo Peters, stated during her budget speech that,

> One of the most critical interventions I will introduce is the separation of the Independent System Operator from Eskom. This entity will be responsible for planning, procurement and the scheduling of generators to balance the system demand-supply equation on a daily basis. The difference brought by this initiative is that it enhances the extent to which Nersa regulates Eskom and it will lead to improved efficiency within Eskom generators.
>
> It is our intention initially for the ISO to be independently licensed, with the ultimate intention of establishing it as a separate legal persona owned by the state. (Peters, 2009. Own emphasis)

Minister of Energy – 2010

In her 2010 budget speech the Minister reiterated her 2009 statement, albeit with a variation to the title of the institution,

> **Private sector participation in the electricity sector**
>
> Honourable members, you will recall that cabinet took a decision that 30% of our new generation capacity should be supplied by Independent Power Producers.
>
> We however remain firmly committed to the fact that transmission should remain under the control and ownership of the democratic developmental state.
>
> In order to give effect to the 2010 State of the Nation Address injunction by President Zuma, we are establishing, as a solution in the short term, and within the

> next 6 months, the Independent System and Market Operator (ISMO) in order to, amongst others, resolve the perceived conflict of interest with regard to the role of Eskom as both buyer and seller of electricity.
>
> Legislation related to the establishment of the ISMO as a public entity is about to be tabled before cabinet and as is the convention this will go through this house soon thereafter. In the main, the ISMO will have the responsibility to negotiate the power purchase agreements.
>
> I am happy to confirm that the first 300 MW of co- generation from IPPs will be signed within the next month. (Peters, 2010. Own emphasis)

Department of Energy – 2010

Senior DOE officials have issued several statements of support for the establishment of an Independent Systems and Market Operator

At a press conference on 25 August, DOE's Acting Deputy Director-General, Ompi Aphane, is reported to have said that,

> Eskom Holdings Ltd., South Africa's main utility, may lose its transmission operations to a state-run power purchaser as the government seeks to lure investors to the generation industry and ward off the threat of blackouts. The company's distribution grid may be 'separated out' into an independent purchaser that South Africa aims to set up, the Department of Energy's Acting Deputy Director-General Ompi Aphane said today. The government is studying 'scenarios, not plans' for its 20-year power industry strategy, Aphane said.
>
> 'The jury is still out as to what happens to the transmission business,' he told a conference in Johannesburg. The government might also look at scrapping Eskom's planned 145 billion rand ($20 billion) Kusile power plant, he said. Eskom has suspended some work on the plan because of a lack of funds. (Bloomberg. 25 August, 2010)

On 13 September, 2010 DOE's Director General, Nelisiwe Magubane, made similar statements, as reported by Bloomberg,

> South Africa plans to have an independent buyer of power in place by April [2011] and the Department of Energy is in talks with National Treasury about how the company can be funded…
>
> The 'establishment of an independent buyer is critical' and will remove Eskom Holdings Ltd. from its 'conflicted role' of being a producer and the primary buyer of electricity, [Magubane] said at a conference in Johannesburg today.
>
> The independent buyer will be established in a phased way, Magubane said. The company's board will include municipalities, the private sector and government, she said. It may take 10 years for the company to run as envisioned…. (Bloomberg. 13 September, 2010)

Reuters reported similarly that,

> South Africa plans to establish an independent power purchasing authority by April 2011 in an effort to encourage private investment in power generation, a senior energy official said on Monday.
>
> Under the existing system, the state-owned power utility Eskom, the country's main power distributor, also buys power from independent producers.

> Once established, the independent authority is expected to take over the purchasing function from Eskom and will buy power from the state utility and independent power producers (IPPs).
>
> Nelisiwe Magubane, director general for electricity at the Department of Energy, told a conference that the independent body would also take responsibility for distribution and planning later down the line.
>
> 'By April next year it should be established ... as soon as parliament has approved the legislation we are going to establish it almost immediately,' Magubane told Reuters on the sidelines of the conference.
>
> 'It is our view that it should not only be an entity that buys power, but also plans and dispatches. It will take up to 10 years for the entity to do all these functions,' she said.
>
> South Africa's power demand is expected to grow by 3 percent annually over the next 20 years, leading to a doubling by 2030 of present demand levels of around 37,000 MW.
>
> Private producers say they could supply thousands of much-needed megawatts, either through greenfield projects or via cogeneration at their plants, but these plans have been delayed by a lack of power purchase deals.
>
> Magubane said the establishment of an independent buyer is key to attracting private sector investment in electricity generation in South Africa, the continent's largest economy.
>
> 'Investors need to be sure that they will be treated fairly and in a transparent manner,' Magubane said. (Reuters, 13 September, 2010.)

2.3 Related policy statements

It is instructive to compare these recent statements with similar statements over the past decade or more.

White Paper on Energy – 1998

The 1998 White Paper on Energy announced Government's general intention to 'steadily increase competitive pressures in the generation sector in order to improve efficiencies and reduce electricity prices'. (Energy White Paper. 1998:52) together with the following specific undertakings to restructure the sector,

> *In the long term Eskom will have to be restructured into separate generation and transmission companies.*
>
> *In the long term Eskom will have to be restructured into separate generation and transmission companies.* (Energy White Paper. 1998:55. Emphasis in original)

Minister of Public Enterprises – 2000

As far back as 2000 the then Minister of Public Enterprises, Jeff Radebe, spelled out a high level vision for fundamental ESI reforms entailing:

- Giving customers the right to choose their electricity supplier
- Introducing competition into the industry, especially the generation sector
- Permitting open, non-discriminating access to the transmission system

- Encouraging private sector participation in the industry

To effect this vision the Minister proposed a series of detailed restructurings:

> Generation - The central challenge confronting us in this regard is the timing and phasing in, of introducing a competitive market structure in generation. It is our view that it is not desirable to introduce private participation in ESKOM Generation while it is still organised in a single holding structure. We believe that competition should be introduced systematically, in a phased manner, so as not to prejudice the existing strengths of the electricity supply industry. In this regard, the first phase of restructuring of generation, is the separation of ESKOM's power stations into a number of independent competing generation companies directly owned by the state. As the system evolves, companies in the generation sector should not be allowed to gain control of the transformation and distribution part of the industry as this could lead to abuse of market power.
>
> Distribution - After several years of extensive investigations Government (under the leadership of the Ministry of Mineral and Energy Affairs) has initiated the restructuring process for the distribution sector. This process will amalgamate Eskom's distribution division with the local authority distributors into a number of regional electricity distribution companies or (REDs). As an interim step, Eskom's Distribution Division will form part of a holding company for the entire distribution industry, EDI Holdings. A number of issues will have to be addressed in structuring REDs, including the contractual or commercial arrangements between the REDs AND customers as well as between the REDs and the transmission company.
>
> Transmission - The appropriate governance regime for the natural monopoly business of transmission is part of our view of future options for restructuring. One option is that transmission of energy should remain, at least partially in the hands of the state, but this could take the form of a separate independent transmission company. The introduction of a strategic equity partner into the transmission company or of an IPO will have to be evaluated in the future. This assessment will have to be made against the background of the role of the transmission network in providing the infrastructure within which competition takes place. This often gives rise to the conclusion that generators should be precluded from owning the transmission network and vice versa. (Radebe, 2000. Own emphasis)

EDI Restructuring Blueprint – 2001

In 2001 the then Department of Minerals and Energy (DME) commissioned an extensive blueprint for the restructuring of the electricity distribution industry (EDI) into six regional electricity distributors (REDs). (DME, 2001) Although the blueprint was adopted by Cabinet in the same year, and reaffirmed on several occasions since, the implementation process has dragged with no clear end in sight.

Multi-Market Model – 2003

In 2003 DME conducted a detailed study of a Multi-Market Model for the power sector, which appears to have gone nowhere. (SAD-Elec, 2003)

Single buyer – 2007

At its ordinary meeting in Cape Town on 5 September 2007 cabinet resolved that,

> …Eskom be designated as the single buyer of power from Independent Power Producers (IPPs) in South Africa. Eskom will be responsible for ensuring that

> adequate generation capacity is made available and that 30% of the new power generation capacity is derived from IPPs. This policy will ensure that the responsibility and accountability for the construction of power generation capacity is co-ordinated and provide certainty to the private providers.
>
> The introduction of the private sector into the power generation sector will also allow production cost benchmarking with the state utility, thereby ensuring that the lowest cost production of electricity is achieved. Over the next 20 years, Eskom will build all nuclear power plants in South Africa and the IPPs will build more than 50% of all non-nuclear power plants. (Government of South Africa, 6 September, 2007)

Summary

The above statements are just a small sample of the many government investigations, policy statements and executive decisions on ESI reform over the last decade.

In practice few of these statements have led to any real change. The structure of the industry is exactly the same as it was ten years ago and interest from independent power producers has waned.

Why have so many decisions translated into so little action? Resistance from industry incumbents and other stakeholders? Government failure to translate policy into detailed action and regulations? A lack of implementation capacity? Whatever the reason, it is evident that policy statements are not sufficient in themselves to achieve reform. This report will therefore consider a broader set of drivers which may facilitate or derail the latest set of reform intentions.

2.4 Stakeholder Responses

The decision to establish an ISO has attracted strong responses from a range of commentators and stakeholders.

Interviewee perspectives

All interviewees were positive about the prospect of an ISO, although all cautioned that much work remained to be done to define the functions, legal status, governance and financing of the entity.

The Eskom interviewee noted that there were diverse opinions within the organization, and that neither management or the board had adopted a formal position on the matter at this stage. The Eskom interviewee also noted that government had yet to request Eskom's opinion on the matter.

The issue has apparently been discussed at the Inter Ministerial Committee, where some reservations were expressed by Eskom's shareholding ministry (Department of Public Enterprises, DPE) about the initial concept tabled by the Department of Energy (DOE).

World Bank perspective

In its project appraisal document on the proposed loan of US$3,750 million to Eskom the World Bank spelt out its understanding of government's proposed reforms for the South African power sector,

> In parallel, the government is taking steps to create a single buyer and independent system operator, which are expected to be endorsed by the Cabinet in the next few months. It is expected that upon endorsement by the Cabinet, Eskom will create an independent subsidiary as an Independent System Operator & Single Buyer. It is expected that the Electricity Regulation Act will be

> promulgated in late 2010 before the ISO/Single Buyer can be divested as a separate entity.
>
> It is expected that the ISO will be responsible for planning, procurement of IPPs, dispatch and market aggregation. In this context, the MoF will also agree to guarantee PPAs signed by the ISO, on a case by case basis as this entity is not expected to have an asset base and may not be seen as creditworthy in the near term. This proposed restructuring and creation of a Single Buyer with MoF support is expected to go a long way in giving comfort to the private sector to enter the sector and mitigate part of the resource constraints it currently faces. The new regulation also provides for cost recovery for private projects through the bulk tariff approved by Nersa. In the medium term, DoE is also considering the creation of a transmission organization and restructuring of the distribution sector. (World Bank. 19 March, 2010. Own emphasis)

Public opinions

The first head of the National Electricity Regulator and former Eskom CEO Dr Ian McRae recently backed the establishment of an ISO and criticized government for taking so long to implement its own policy,

> 'The embattled power utility Eskom should be broken up'…
>
> Eskom's 'vertically integrated monopoly structure that generates, transmits and distributes power' should be unbundled into a number of individual competing companies, which would introduce diversity and competition in generation.'
>
> [McRae] spoke of the need for an independent system operator - separate from Eskom - as well as an effective and independent regulator. The National Energy Regulator of SA 'appeared to be too readily influenced by the government', he noted…
>
> However, McRae pointed out that a white paper detailing an energy policy had been submitted to the cabinet 12 years ago, calling for the restructuring of the industry.
>
> 'If the 1998 policy proposals had been implemented, South Africa would not have experienced the disruptions to production experienced over the past few years,' he said. (Business Report, 19 May, 2010)

Respected commentator *Engineering News* published an editorial supporting the move, and proposing that the transmission system should be included within the ISO's brief,

> **SA's new electricity wholesaler will need to own the transmission network**
>
> It appears increasingly likely that the long-anticipated unbundling of the power transmission business from State utility Eskom – a scenario that has been mooted for nearly 20 years – might finally take place over the coming months and/or years.
>
> The reason is the promised establishment of a so-called Independent Systems and Market Operator, or ISMO, which is viewed as an important mechanism to facilitate investment by independent power producers (IPPs) into the power-stressed South African environment.
>
> It is expected that the ISMO will, eventually, be responsible for both tariff aggregation and transmission operations, which would end Eskom's controversial position as player and referee in the purchase of power from the IPPs.

> To be sure, there is an obvious conflict of interest between Eskom as generator and transmitter, as well as the 'single buyer' of all cogenerated, or IPP, power – a fact that has been highlighted over and over again as an impediment to investment.
>
> The ISMO, by contrast, will be independent from the equity interests of any one generator, which should free it up to make purchase decisions that are in the interest of consumers without its board, or governing structure, feeling constrained by other competing demands.
>
> But, operationally, this independence can really only be exercised in the context of an open-access transmission system that is unbundled from Eskom and, arguably, controlled by the ISMO.
>
> In other words, it is premised on the dismantling of the current structure of vertical integration, which had, until recently, served South Africa relatively well. It has since emerged, though, as an impediment to facilitating the entry of private finance, technology and skills into South Africa's power market, despite the obvious demand for the product.
>
> To be sure, there is going to be a period of transition from the current structure to one where the ISMO can properly control the wholesale electricity market. Ultimately, though, this new wholesaler should be in a position to buy power from a variety of generators, most probably at different tariffs, and aggregate these to provide a selling price for distributors or large direct customers.
>
> If all goes according to plan, the legal framework for the creation of the ISMO should be outlined soon, and could well be in place by early 2011. At this stage, it is unlikely that the new entity will own the transmission lines from the outset. But, at some point, it would be advisable, if not essential, for such a transfer of assets to take place.
>
> To be realistic, though, South Africans would be well advised to accept that this process is going to take some time to play itself out. It will also not happen at a pace that will satisfy our immediate need for the introduction of new cogenerators and IPPs.
>
> Therefore, it is likely that there will have to be an interim arrangement, whereby Eskom signs the initial power purchase agreements. Failure to accept this could mean yet further delay and will definitely lead to further frustration. (Engineering News. 16 April, 2010)

Prof Anton Eberhard and I authored an opinion piece entitled 'Urgently unbundle Eskom to unlock private investment' which presented the essential findings of this research paper. (Business Day. 23 August, 2010).

Dissenting opinion – NUM

The National Union of Mineworkers (NUM) is one of few parties that have expressed public reservations about the proposed ISO,

> **Energy**
>
> … The [Central Committee (CC)] rejects the privatization of Eskom in the form of outsourcing, and or selling part of any power station including Kusile. The proposal for International Organization for Standardization (ISO) [sic] without consultation which will result in dislodging of Eskom Transmission from Eskom Holdings is

> rejected and cannot be supported. CC re-affirms the NUM position on the need to have a national distributor with Regional Electricity Distributors (REDs) beneath the National Distributor.
>
> **Independent Power Producers**
>
> The CC mandates the NEC to investigate an appropriate framework for the Independent Power Producers (IPP's) to participate in the South African energy sector and these IPP should not be on the basis of breaking up part of Eskom. (Baleni, 18 May, 2010)

NUM's caution is understandable, since the nature of the proposed reform is unclear at this stage, making it difficult to determine the potential impacts on Eskom's workers, the financial viability of either entity, or even the ultimate price of electricity.

Dissenting opinion – Eskom

Predictably, another dissenting voice in the public media has come from Eskom in the form of Senior General Manager for Regulatory Affairs, Mohamed Adam, who argued against unbundling,

> UNBUNDLE NOW?
>
> Adam also dismisses arguments that the vertical separation of Eskom's transmission business is the key immediate impediment to further investments by IPPs.
>
> This argument was aired again recently in an opinion piece written for Business Day by University of Cape Town Graduate School of Business Professor Anton Eberhard, who also sits on The Presidency's National Planning Commission, and Meridian Economics partner Mark Pickering.
>
> Pickering and Eberhard argue that the immediate unbundling of the Eskom's transmission business is preferable to the creation of a ring-fenced system operator within the utility, as is currently envisaged.
>
> The development of a new utility company, which they dub 'Central Power', would help attract IPPs, the emergence of which had been 'painfully slow'. Such a move would also have only a marginal impact on Eskom's balance sheet and credit rating, owing to the fact that the transmission unit accounts for only R10,5-billion in a total balance sheet worth R246-billion.
>
> But Adam questioned the figures, arguing that the effect of an unbundling exercise on Eskom's balance sheet would depend on the assets included. 'If it is the entire transmission business, it will have a very significant effect on Eskom's balance sheet,' he tells Engineering News.
>
> Instead, he asserts that the immediate obstacle to the introduction of IPPs relates to the confirmation of the PPA terms and the final selection criteria for the Refit projects.
>
> 'Eskom is ready to sign up IPPs under this programme once these two elements are concluded by Nersa and we are anxious to do this to support security of supply and gain momentum and learning in terms of renewable energy generation.
>
> 'We are sure that serious developers want to rather get going as long as there is clarity on the PPA and criteria and the procurement process is transparent,' Adam

explains, warning that any unbundling process could delay implementation by a further 18 to 24 months.

The target is to sign up at least 1 025 MW of renewable power under the Refit programme between now and March 31, 2013. The longer-term role of IPPs will be determined by the contents of the second integrated resource plan, or IRP2010, which is currently being drafted and should be published, the Department of Energy says, by early in the fourth quarter.

NOT CONFLICTED

Adam says that a ring-fenced Eskom system operator will not be conflicted, owing to the fact that the IRP2010 will dictate what new capacity will be introduced.

Further, IPPs will demand 'take-or-pay' contracts to make their projects bankable, which means that Eskom will not face a conflict of interest in dispatching such power, as there would be no financial incentive to favour Eskom capacity over IPP production.

'In other words, there is likely to be very little conflict of interest in pursuing a ring-fenced model.

'On the other hand, we have to be cautious, particularly in the context of a tight supply/demand balance, of pursuing a model that further separates the system operator from the generators.

'There is going to be a need for constant communication and planning to get us through this period of tightness,' Adam avers.

South Africa's power system is expected to become vulnerable again from 2011 through to 2012, ahead of the synchronisation to the grid of Medupi's first of six 790-MW units in April 2012. Eskom has also cautioned of medium-term supply-side threats, as from 2017, which will emerge unless decisions are made during 2010 about further base-load capacity beyond the R142-billion Kusile power station, for which funding is still being secured.

Therefore, Adam stresses that the IPP programmes are a necessary component of future electricity supply, particularly given that the utility is not in the financial position to build additional power stations beyond the Kusile project, which is under way in Mpumalanga province.

'However, the success of the IPP programme is predicated on the establishment of an appropriate and enabling legislative and regulatory framework,' he concludes. (Engineering News. 26 August 2010 and 10 September 2010.)

Dissenting opinion – SANEA

In an article in *ESI Africa* the chairman of the South African National Energy Association (SANEA) Brian Statham provided a set of views on the events that led to South Africa's power crunch of 2008, and the overall state of the electricity supply industry in the country, including government's proposed ISO

And it is here where Statham believes that another self-destructive red herring is being propagated in the electricity supply industry – the belief that there must be an independent system and market operator (ISMO). That now seems inevitable but Statham believes it diverts focus, which should be on ensuring power is being supplied, toward establishing a new entity instead.

> 'The fact is that any self-respecting PPA agreement will have defined take or pay terms, with both supplier and off-taker having to commit to making certain capacity available and to buying a certain amount of power. Thus with such an agreement signed, Eskom would have nowhere to run, no matter what its intentions may be. The National Electricity Regulator of South Africa (Nersa) would be able to enforce the agreement.
>
> 'The plan to go ahead and establish an ISMO company is an emotional decision and does not change anything. The issues of a state owned ISMO company buying power from a generation company whose major stakeholder is the state, and concerns about parties with potential vested interests that might lead the ISMO company to favour Eskom, are not removed. This is a red herring at a time when the electricity supply industry cannot afford such things.'
>
> Statham believes the distraction of senior management that should be focusing on how to provide power is not helpful, added to the fact that there will be jockeying for position as to who heads the new ISMO company. The distraction of National Control operators, who should be focused entirely on ensuring the grid stays up rather than wondering where their future lies, is not what is needed at this point. 'It only creates the illusion of progress, is indicative of short term thinking and the assumption people like to make that those who managed things in the past invariably were incorrect.' (ESI Africa, circa 22 September, 2010)

Summary

The proposed establishment of an ISO has been heartily welcomed by most commentators, with the exception of NUM's note of caution and the somewhat defensive statements from Eskom and SANEA. It would appear from these statements that Eskom and SANEA do not share the view that Eskom faces a conflict of interest, or believe that this conflict may be addressed by establishing an independent body to undertake system and market operations.

3 Conceptual Foundations

3.1 Introduction

This section of the report presents some conceptual foundations relating to the concept of an ISO.

3.2 What does a System Operator do?

Core function of the system operator

System operators perform a range of functions, depending on the prevailing laws and market structure within their applicable country/region. Nonetheless, they all perform one core function which relates to the scheduling and dispatching of generation to meet demand.

The nature of electricity

Electricity is an unusual commodity in that it is very difficult and costly to store. It is therefore necessary to schedule generation on a real-time basis to meet demand as it varies from moment to moment on the national grid.

Establishing and protecting a reserve margin

Electricity demand is reasonably predictable by time of day, day of week and season of the year based on historic usage and other forecasting methods. But all forecasts have a margin of error.

Generation plant is also subject to trips or unplanned outages.

In order to cope with unexpected surges in demand and unplanned loss of capacity the system operator must therefore maintain a safe *reserve margin* between the anticipated demand and the available generating capacity. This reserve margin takes many forms, including instantaneous response plant such as spinning reserve (generators that are synchronised and spinning, but not yet taking load), 10 second response plant, 10 minute response, and so on. Besides these supply-side options system operators can also deploy demand-side measures, such as interruptible load and, as a last resort, load shedding. These various forms of reserve are costly, but, as South African electricity consumers have come to realise, electricity interruptions are far more costly.

To put the scale of these costs into perspective, Eskom's average tariff in 2009 was 33c/kWh, whereas Nersa estimates the cost of unserved energy at R75.00/kWh – or over 200 times greater. (Peters, 2009b)

To achieve its target reserve margin the system operator must monitor and control a wide range of factors relating to both the supply-demand balance (i.e. generation and demand-side measures) and the means by which electrical power is conveyed to consumers (i.e. the transmission system). The following table lists some of these factors, according to the applicable time frame, together with target values for the South African system. (Lakmeeharan. March, 2010)

Table 1 Performance targets for the system operator.

Time horizon	Balancing supply & demand	Transmission system
Real time	▪ Meet immediate demand needs ▪ Frequency at 50Hz ▪ 4 to 6% as Operating Reserve Margin (~1500 MW to 2200MW in 2008)	▪ Voltage profiles ▪ Line loading ▪ Transformer loading
Week-ahead to year-ahead	▪ Ability to schedule maintenance ▪ 9 to 12% as Operating Reserve Margin (~3400MW to 4500MW in 2008/9)	▪ Vulnerability to single mode failures ▪ Security margins ▪ Scheduling of maintenance
Week-ahead to 25 years ahead	▪ Net reserve margin of at least 12% to support growth and ensure security of supply (preferably above 15%) ▪ Adequate fuel security	▪ Adequate level of redundancy for contingencies, maintenance and growth

Current institutional location of the SO

South Africa's system operator is currently located within Eskom's System Operations & Planning Division. Eskom is a vertically integrated utility that performs generation, transmission

and distribution functions. Hence the system operator cannot be termed 'independent' as it is governed by the Eskom Holding's board which also has interests in generation and distribution.

3.3 Electricity supply industry market structure

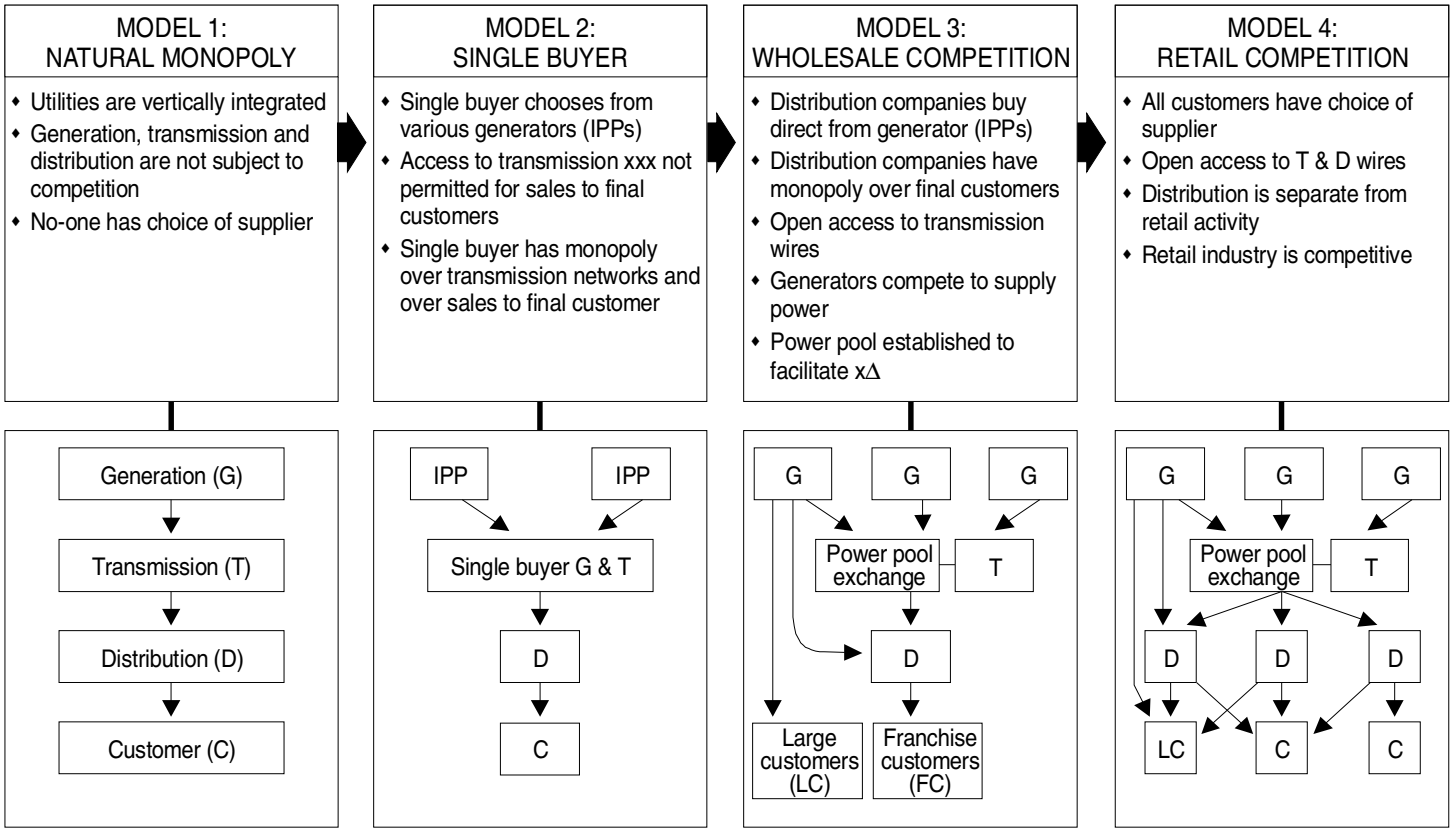
Four main models

Each country's system operator is located within a broader context. It is generally accepted that there are four main ways to organise the ESI market structure, being:

- The *vertically integrated monopoly*;
- The *single buyer model*, whether state-owned or investor-owned;
- The *wholesale competition* model; and
- The *retail competition* model. (ABS 2007; Eberhard 2002; Petrov & Grote 2009)

The following diagram displays the arrangement of the various industry elements within each of these archetypal market structures. (Eberhard, 2010)

Figure 1 Archetypal electricity market structures.



The vertically integrated monopoly

In this model the system operator is embedded within the national utility, which typically owns all or most of the generation capacity. As such there is no scope for competition at the wholesale level and consumers also have no opportunity to choose their supplier.

To prevent vertically integrated utilities from abusing their monopoly status, whether public or private, governments generally establish an independent professional regulator to establish service standards and ensure that tariffs are kept at reasonable levels.

The single buyer model

In this model a single buyer is mandated to purchase energy from public and independent power producers (IPPs) – implying a degree of competition at the generation level. This is limited to competition *for* the market though, rather than competition *in* the market, since investors and lenders will generally require long term power purchase agreements (PPAs) in order to finance new plant. This is particularly the case if one generator has sufficient market power to prevent real competition within the wholesale market.

The system operator will typically be located within the transmission system and will be responsible for dispatching generators according to their PPAs. The system operator may, or may not, be responsible for procuring new PPAs.

The regulator will generally oversee new PPAs, as well as the blended wholesale tariff and retail tariffs. Because the transmission system is a natural monopoly the regulator will try to ensure that new generators have equal access to the network.

The wholesale competition model

In this model a competitive wholesale market is established where distributors purchase power directly from individual generators, via a power pool, rather than from a single buyer as in the previous model. Large customers are sometimes allowed to contract directly with generators.

The system operator can be institutionalised in a variety of ways (see more below in 3.8).

The regulator must determine tariffs for the natural monopoly elements of the system (i.e. the networks and retail tariffs to captive or franchise consumers) and also monitor the market to ensure that competition is achieving the desired outcomes.

The retail competition model

In this model competition is taken a step further to allow end consumers to purchase from retailers who, in turn, purchase power on the wholesale market. Power is then delivered to consumers over the network, for which they are charged a separate network fee.

As in the previous model the system operator can be implemented in a variety of formats (see more below in 3.8).

The task of the regulator is to determine tariffs for the monopoly elements of the system and to monitor the effectiveness of competition in these markets.

3.4 The standard model for ESI reform

The four main models can also be thought of as a series of stages towards increased competition. This process is known as the *standard model* for power sector reform and has been undertaken by many countries – some gradually and others in a single step. These stages generally include the following activities:

- Corporatization;
- Commercialization;
- Passage of the necessary legislation;
- Establishment of an independent regulator;
- Introduction of IPPs;
- Restructuring and vertical unbundling;
- Divestiture of generation and distribution assets; and

- Introduction of competition at wholesale and, eventually, retail levels. (Bacon, 1999: 4; Adamantiades et al., 1995: 6-7; Besant-Jones, 2006: 11; Williams and Ghanadan, 2006: 822, quoted in Eberhard & Gratwick, 2010)

This formulation of the standard model is largely based on the early power sector reforms carried out in England and Wales, Chile and Norway. In practice is has not been followed to completion in many countries, particularly within the developing world. (Gratwick and Eberhard 2008)

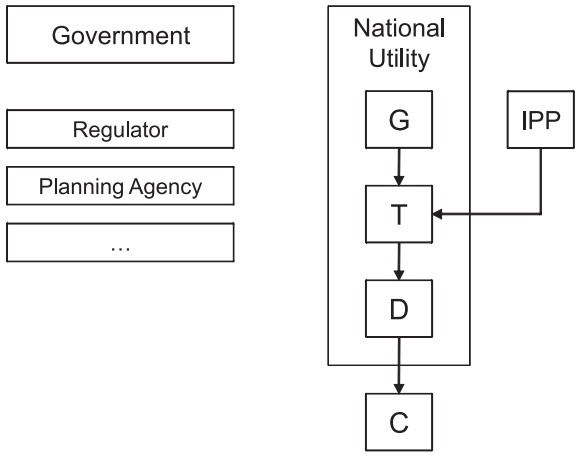
3.5 Experience with non-standard reforms – The hybrid model

Although many countries have applied the standard model a significant number have taken a more cautious approach.

Academics Eberhard and Gratwick have undertaken a detailed study of IPPs across Africa and point out that many developing countries have chosen not to implement the full standard model. (Eberhard & Gratwick 2010, Gratwick & Eberhard, 2008) They find that few African countries have unbundled their utilities, that private sector participation is often limited to the introduction of IPPs and that wholesale and retail competition has rarely been established on the continent. Instead, power markets have been implemented where:

- Incumbent state-owned utilities have retained dominant market positions;
- IPPs are introduced on the margin; and
- both State Owned Enterprises (SOEs) and IPPs are involved in new generation investments.

Figure 2 Hybrid model with vertically integrated national utility.



They refer to this market structure as the *hybrid model* and point out that 'Approximately 20 grid-connected IPPs, each in excess of 40 MW, holding long-term PPAs with the largely state-run utilities, have been developed in Sub-Saharan Africa to date. In total, about 4 GW of IPP capacity has been added. With few exceptions, they represent a small fraction of total generation capacity and have mostly complemented incumbent state-owned utilities.' (Eberhard & Gratwick, 2010)

3.6 Challenges of implementing the hybrid model

Eberhard and Gratwick point out a number of challenges which arise when implementing the hybrid model. Firstly there is a need for a sound policy framework which must, amongst other

things, set a clear standard for energy security. This must be coupled with detailed supply and demand forecasts to produce a coherent power sector plan, including both a least-cost approach and scenario variants on this approach.

Once a clear generation plan is in place a further policy process must be undertaken to allocate responsibility for the construction of new capacity between public and private institutions. And finally, this plan must be implemented through effective procurement and contracting processes.

Eberhard and Gratwick stress the critical importance of linking these *planning*, *allocation*, *procurement* and *contracting* processes together. The continent is rich with examples where governments have failed to adequately resource these functions, leading to power shortages, sub-optimal investments and a crippling reliance on expensive 'emergency power' diesel generator supplies.

Some of problems identified in the review include failures to:

- define a security of supply standard
- allocate responsibility for achieving this standard
- monitor whether the standard is being achieved
- allocate responsibility for generation expansion planning
- update generation expansion plans on a regular basis
- clarify whether plans are mandatory or indicative, particularly in relation to generation licensing procedures
- allocate new-build opportunities between incumbent SOEs and IPPs
- allocate responsibility for initiating IPP procurements
- define a framework to deal with unsolicited bids
- allocate responsibility for undertaking contract negotiations with new IPPs
- address potential conflicts of interest when the incumbent SOE is both a generator and the single-buyer
- clarify who should approve long term PPAs, and
- ensure fair dispatch between SOE generators and IPPs. (Eberhard & Gratwick, 2010; Eberhard, 2010)

These problems often arise from a genuine attempt to address the conflict of interest between a vertically integrated SOE and IPPs, whereby the government shifts responsibility for generation planning away from the utility to the Energy Ministry. Since the Ministry did not previously responsible perform these functions it generally lacks the necessary capacity, leading to delays and incoherence. Ministries become the bottle neck in the system.

As later sections of this report will show, South Africa has already fallen into this trap and displays many of these failures. Fortunately we also have the opportunity to learn from cases where other countries have succeeded.

3.7 The Kenyan example

Kenya is an interesting example to consider, since it has experienced considerable difficulties in its power sector, but has also implemented substantial reforms leading to five successful IPP investments with three more under way. Kenya is also negotiating a possible off-take agreement with a 300 MW wind power project which will be the largest of its kind in Africa. As

such Kenya is possibly the most successful implementation of the hybrid model in Africa. How did it manage to achieve this?

In 1997 Kenya unbundled its vertically integrated state owned entity into two separate companies: Kengen took control of the generation assets and the Kenya Power and Light Company (KPLC) retained the network assets (transmission and distribution).

Electricity legislation assigned responsibility for generation planning to the Energy Regulatory Commission (ERC). Recognising that it did not have the internal capacity, resources or planning tools to develop the plan the ERC then delegated this function to KPLC, under the guidance of an ERC-chaired government committee.

Responsibility for allocating new build opportunities between Kengen and IPPs remained with the Energy Ministry, although responsibility for running competitive bid processes for IPPs was also delegated to KPLC.

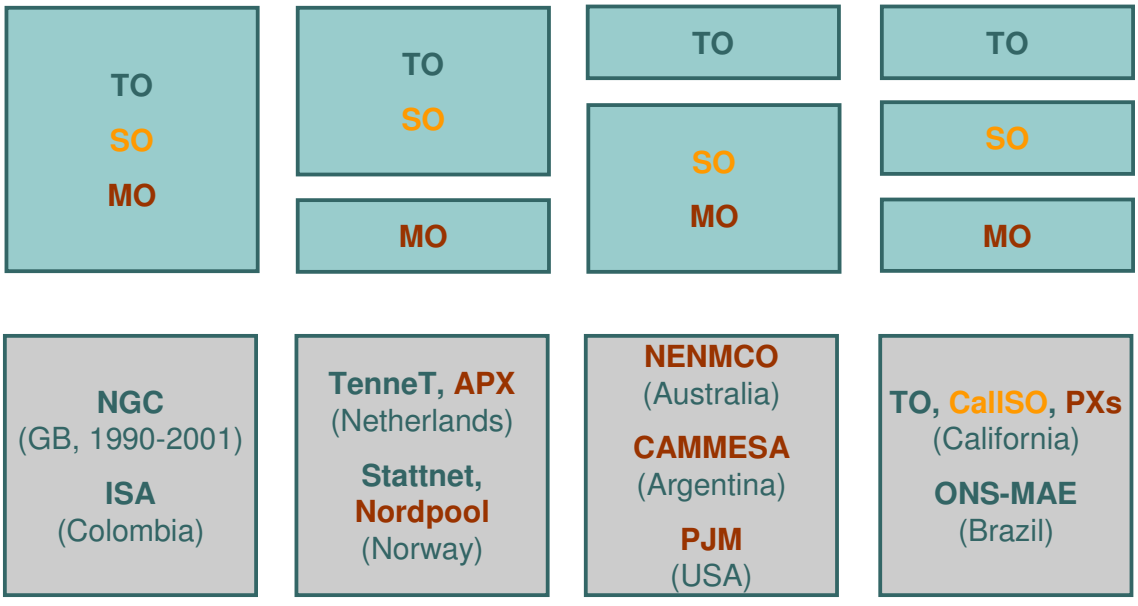
Initially KPLC relied on transaction advisors to perform these functions, but over time it built up the necessary standardised power purchase, financing agreements and internal capacity to run these processes on its own. (Eberhard & Gratwick, 2010)

3.8 International experience with ISOs

Organisation of the system operator function in competitive market models

Petrov and Grote (2009) provide a useful schema for the various ways in which the system operator (SO) can be institutionalised in relation to the market operator (MO) and the transmission operator (TO)

Figure 3 Potential institutional arrangements for the Market, System and Transmission Operator.



It is evident from this simple diagram that there are a diverse approaches – even within a single country such as the USA where differing models can be found in different states/regions.

It should be noted that the above examples are all taken from countries that have applied the standard model to a greater or lesser extent – in the sense that they have all enforced a measure of vertical and horizontal disaggregation together with competition at the wholesale level, and at least to some extent the retail level.

The fallacy of separation

The separation of the Market Operator from the System Operator has attracted criticism from Professor William Hogan, one of the world's leading thinkers in this area. In a paper titled 'Electricity market design and structure: Avoiding the separation fallacy' (Hogan, 2002) he summarises arguments made from as early as 1995 when the US first began to experiment to ISOs that

> 'Short-term dispatch and short-term transmission are two sides of the same coin. They cannot be separated, but should be designed to support an efficient, non-discriminatory spot market administered by an independent system operator. To do otherwise would unnecessarily increase costs, create hidden subsidies and require more regulation.' (Hogan, 1995)

Hogan points to the painful collapse of the Californian system, which had implemented a separate Independent System Operator and Power Exchange, as proof of his assertion.

Summary

There does not appear to be a firm consensus in the literature as to the 'best way' to implement a system operator. The evident diversity of solutions suggests that the institutionalisation of the system operator and related functions should respond to the local context. This includes the broader ESI market structure and government's intended evolution of that structure. That said, there are some strong opinions and some significant evidence in favour of keeping at least the system operator and the market operator in one institution, if not the transmission operator as well.

3.9 Summary

The lack of clarity on government's vision for ESI reform makes it difficult to judge which functions the ISO will be required to play, and how these may evolve over time. Nonetheless, it seems fairly evident that government is unlikely to propose a rapid transition to the standard model and is more likely to implement some version of the single buyer model – with the primary objective of attracting IPPs into the sector. It is therefore instructive to look at the experiences of other developing countries who have implemented similar partial or hybrid reforms.

The experience of many other African countries that have attempted to attract IPP investments suggests that South Africa is likely to face the range of implementation challenges associated with the hybrid model. The Kenyan example suggests that a vertical unbundling of the incumbent utility, together with the clear allocation of the planning/procurement functions to competent bodies, is one way to overcome these problems.

4 State of the South African Electricity Supply Industry

4.1 Introduction

Before considering the functions that a South African ISO should perform it is useful to first reflect on the state of the sector in order to derive a problem statement against which the potential contribution of the ISO may be tested.

4.2 Recent developments

Load-shedding crisis of 2008

Widespread and persistent load shedding in the first quarter of 2008 fundamentally shook public and investor confidence in Eskom. But the risk of systemic collapse had been growing for a decade, albeit hidden within Eskom's internal reporting systems. In an unusually candid paper the Managing Director of Eskom's System Operator, Kannan Lakmeeharan, together with two of his colleagues, reviewed the lead-up to the load shedding.

> Over the last 10 years the electricity reserve margin in South Africa, has been steadily declining, due to increasing demand for power and limited new generation capacity being commissioned. In 2006, regional load shedding was required due to network inadequacies and insufficient regional generation resources. In early 2007, the first incident of national load shedding occurred due to the inability to supply demand with the operational generation capacity. After successfully navigating through a winter peak demand of 37000 MW several incidents of load shedding were initiated during the generation maintenance season in October, November and December 2007. In January 2008, there was almost daily load shedding for two weeks leading to a government declaration of a national power emergency on 25 January 2008. This had a severe impact on production levels in all sectors of the economy and compromised the image of Eskom and South Africa. (Chettiar, Lakmeeharan & Koch. 2009, p21)

The paper contained a set of performance indicators which demonstrated how severely security of supply had been compromised. (Chettiar, Lakmeeharan & Koch, 2009)

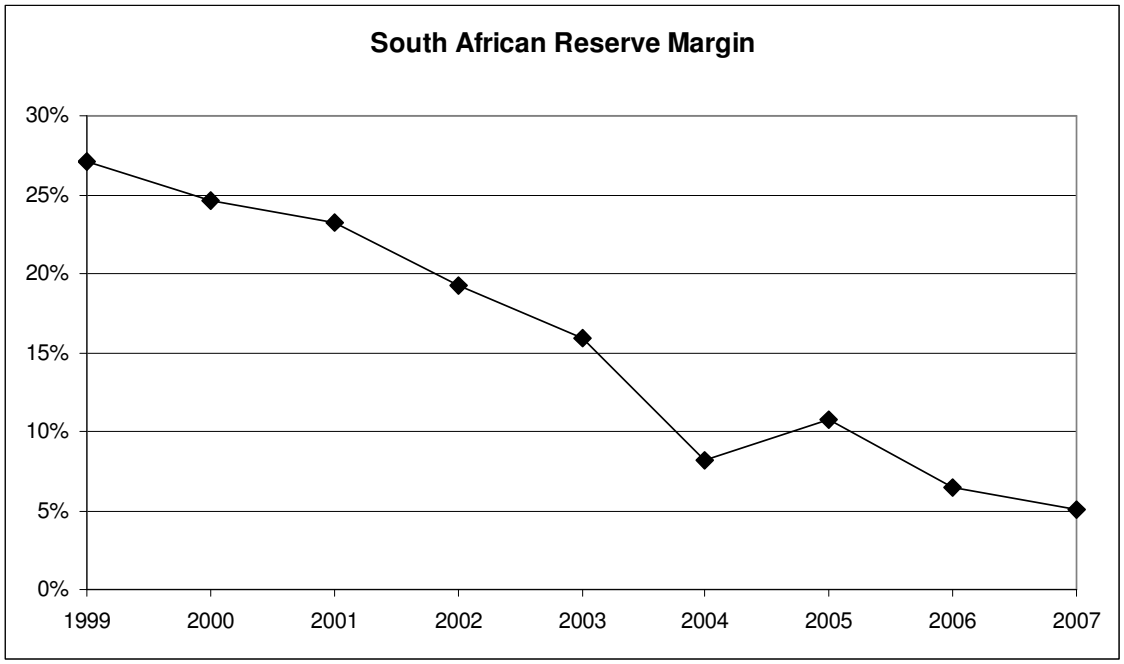
Table 2 Power system performance indicators in recent years.

		1999	2000	2001	2002	2003	2004	2005	2006	2007
Peak demand	*GW*	27.8	28.3	30.5	31.6	31.6	34.2	33.5	35.2	37.1
Capacity added	*MW*	900	300	300	0	0	0	195	377	1,684
Load factor	*%*	61.0%	60.5%	60.0%	62.5%	66.5%	69.0%	70.0%	72.5%	74.0%
Reserve margin	*%*	27.1%	24.6%	23.2%	19.2%	15.9%	8.2%	10.8%	6.4%	5.1%
UCLF[1]	*%*	2.4%	2.1%	2.0%	3.0%	4.1%	3.1%	4.1%	4.3%	5.0%
EAF[2]	*%*	91.0%	92.0%	92.0%	89.5%	87.5%	89.5%	89.5%	87.5%	87.5%
Coal stockpile	*days*	68	61	44	33	34	44	48	38	28

[1] Unplanned Capability Loss Factor.

[2] Energy Availability Factor.

Figure 4 South African reserve margin.

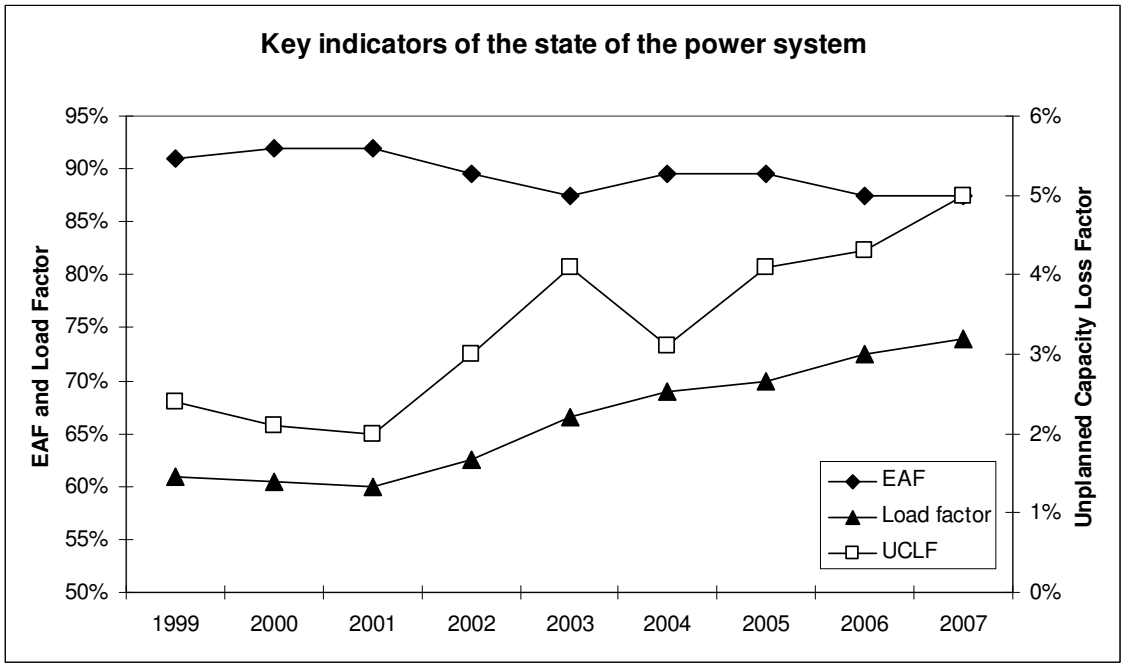


It is evident from these figures that indecision on new capacity investments (with no new capacity added in the years 2002-2004) led to the reserve margin falling well below sensible levels. Although South Africa had no formal policy on this issue at the time Nersa has suggested that the reserve margin should be maintained between 15% and 19%, and that imports should not be allowed to rise above these levels. Eskom's System Operator has noted that a reserve margin of under 12% will severely compromise its ability to operate the grid securely. (Lakmeeharan, 2010)

The declining reserve margin meant that the existing generation plant had to run harder, leading to a rise in the load factor of large coal-fired stations from their design level of around 60% to a stressful 74%. As a result plant availability began to decline, as witnessed by the steady drop in Energy Availability Factor (EAF) from the management target of 90%+ down to 87.5%.

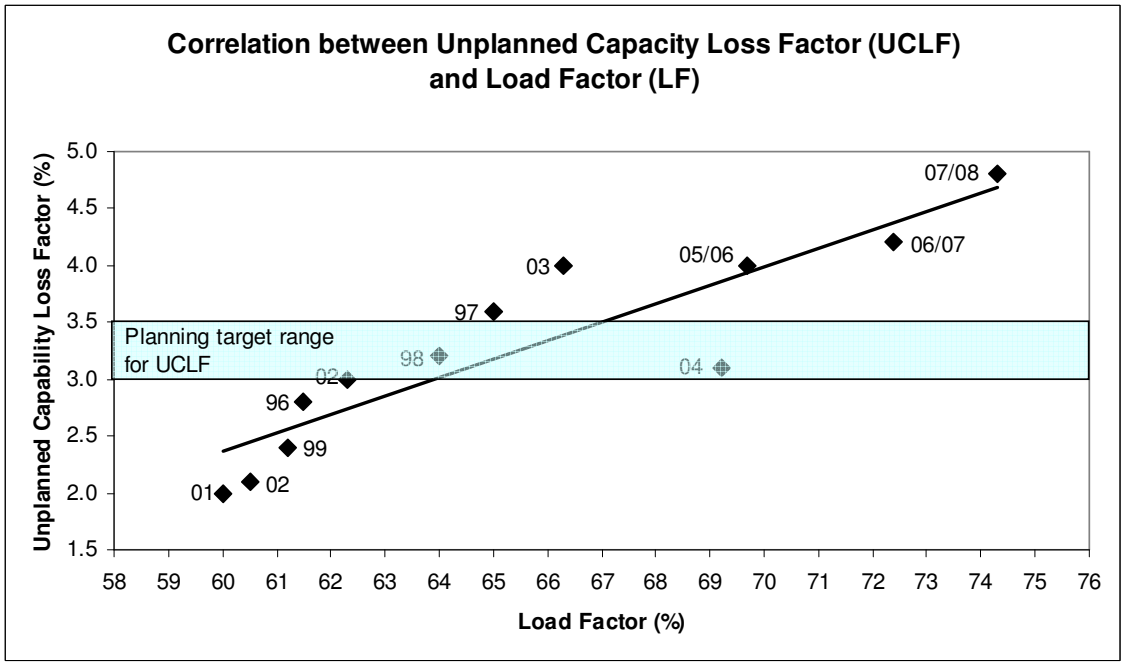
As maintenance cycles were compressed to meet higher utilisation levels the rate of unplanned outages, as shown by the Unplanned Capability Loss Factor (UCLF), rose sharply from 2.5% to a disastrous 5%.

Figure 5 Key indicators of the state of the power system.



The relationship between the UCLF and the Load Factor is clearly demonstrated in the following graph which plots the observed load factor and UCLF over the past 12 years. (Chettiar, Lakmeeharan & Koch, 2009)

Figure 6 Correlation between unplanned capacity loss factor and load factor.



It is evident that in a period of supply capacity constraints, rising demand can only be met if the generation plant achieves higher and higher energy availability factors. But increased load factors inevitably lead to higher unplanned capability loss factors, which are costly and impose further stress on the system. The system operator must therefore guard the integrity of the system by requesting demand-side reductions or, as a last resort, shedding load in as planned a manner as possible.

Causes of the crisis

In their review of the 2008 load shedding Chettiar et al attribute this disastrous outcome to the following direct problems:

- The increase in generation plant load factor was not supported by the correct levels of maintenance required for such an operational regime;
- Fundamental power system vulnerability due to inadequate reserve margins resulted in a limited capacity to withstand systemic shocks;
- This vulnerability was exacerbated by low coal stockpile levels. The immediate coal related problems were due to poor quality, lower than expected volumes, and logistic constraints which accelerated the generation plant performance decline;
- The final condition that led to the power system emergency declaration in January 2008 was the heavy rainfall which made the handling of coal a near impossibility at power stations; and
- The long term primary energy contracts were structured for a 60% generation plant load factor and the subsequent inability to support the increased plant load factor lead to restricted coal availability. (Chettiar, Lakmeeharan & Koch, 2009:26)

Besides these direct problems, they conclude that the root causes of the electricity emergency arose from the following governance failings:

- The policy and regulatory framework of the country did not attract new independent generators which, in conjunction with a restriction on Eskom to build new generation plant, resulted in a deficit in supply that has built up over the years;
- The generation planning assumptions were optimistic in terms of long-term generation performance availability and high plant load factors;
- The economic and electricity growth projections were underestimated; and
- Decision-making processes around new generation capacity were not aligned and resulted in timely decisions not being taken. (Chettiar, Lakmeeharan & Koch, 2009:26)

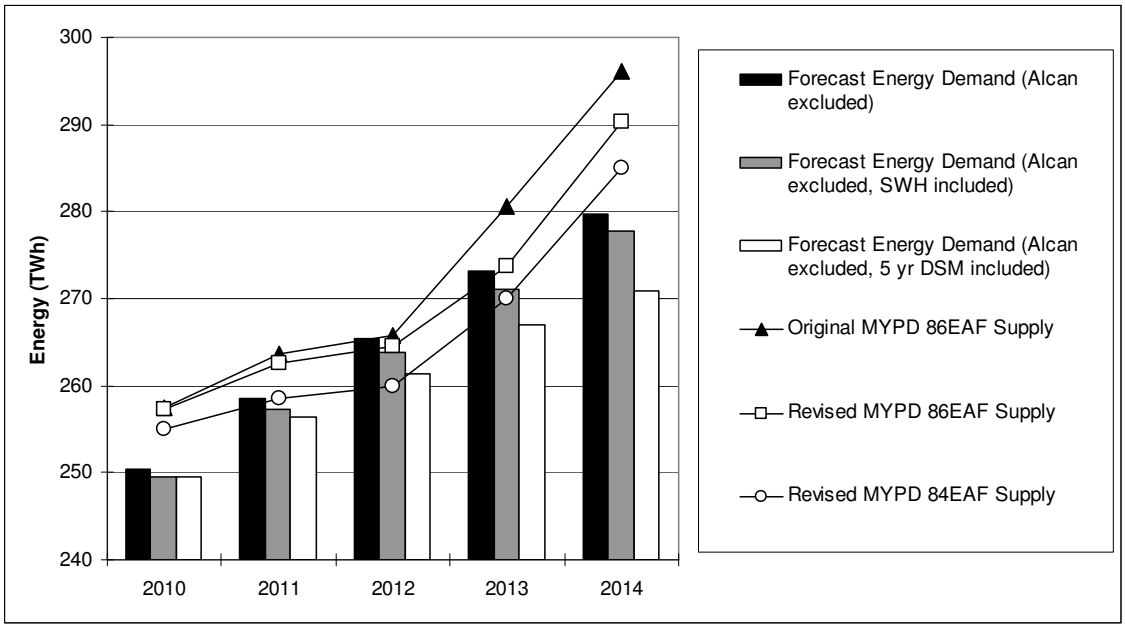
Whilst these findings were somewhat unusual in that they were voiced by Eskom insiders, they were certainly not the first set of commentators to reach these conclusions. The World Bank (Kessides et al, 2007) and academics (Newbury and Eberhard, 2008) have listed similar factors on several occasions.

4.3 Outlook for the demand-supply balance

Energy balance perspective

The following diagram presents Eskom's revised demand forecast and supply outlook for the multi-year pricing determination period (MYPD2), plus two years thereafter. (Eskom MYPD2 30 November, 2009:40)

Figure 7 Eskom's demand and supply outlook.



Demand is shown by the vertical columns, with successive reductions for scenarios concerning the impact of the government's proposed solar water heater (SWH) programme and the various demand side management (DSM) programmes.[3]

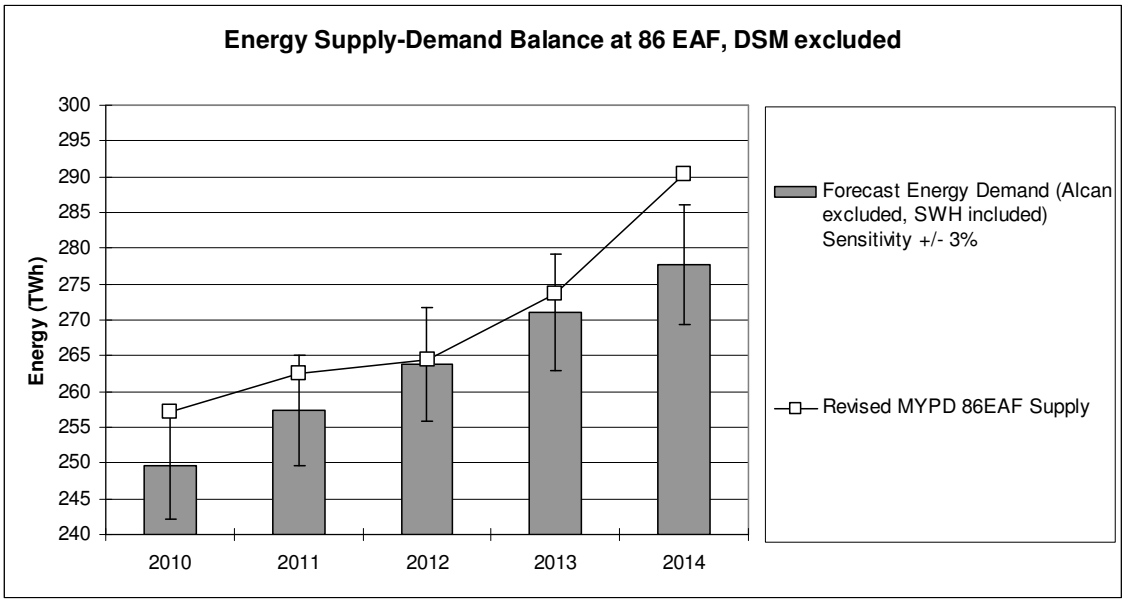
The lines on the graph describe scenarios for the maximum energy supply capacity, given varying rates of plant construction and levels of plant performance. The top line (▲) indicates the energy supply capacity constraint forecast in Eskom's 30 September, 2009 MYPD2 proposal. The next line down (□) indicates the supply capacity forecast in its 30 November, 2009 proposal, assuming the same level of plant performance (i.e. an EAF of 86). The reduction in supply capacity arises from certain delays in the new-build programme which was acknowledged in the November, 2009 version of the MYPD2 application. The lowest line (❍) indicates supply capacity for a lower level of plant performance (i.e. the bottom of the EAF target with an EAF of 84). It is very clear from this graph that Eskom is anticipating energy shortages in the period 2011-2013.

Two simplified versions of this graph appears below, showing the supply demand balance for the scenario where the SWH programme is successfully implemented (which may be a generous assumption) with a +/-3% sensitivity range to account for potential variations in demand due to economic performance, weather and the like.

In the first graph Eskom is assumed to achieve the upper range of its target plant performance (i.e. an EAF of 86). In this scenario there is a small probability of supply shortages in 2010 and 2011, but a significant probability in 2012 and 2013. (Eskom MYPD2 30 November, 2009:40; own calculations)

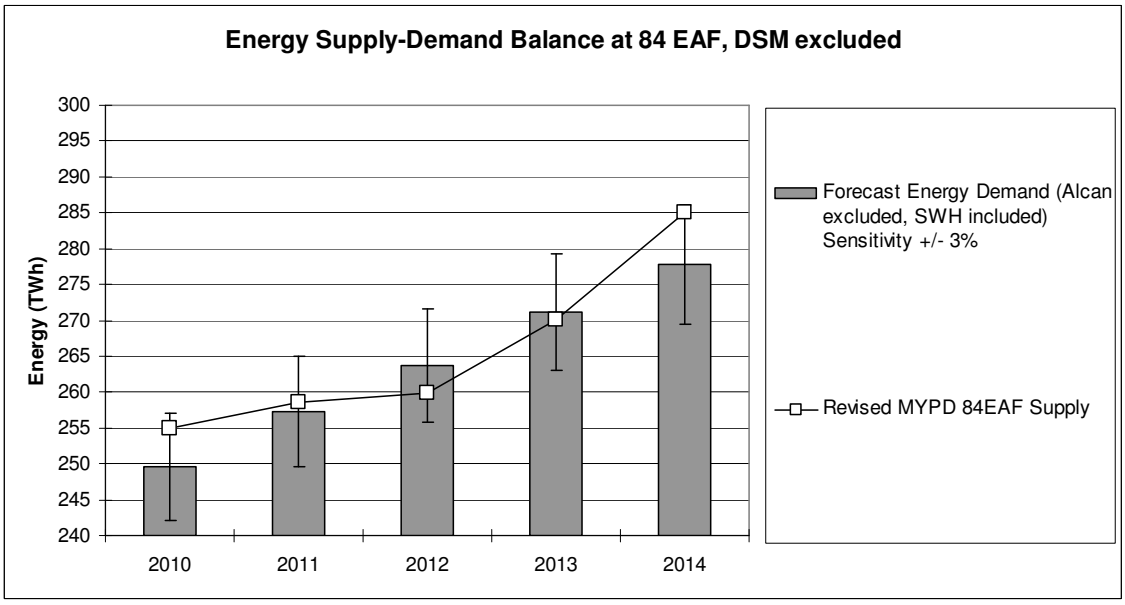
[3] Note that the 'demand' values represent energy sent out, which is a sum of final sales and various losses in the supply chain, and as such are larger than projected energy sales.

Figure 8 Eskom's demand and supply outlook with an EAF of 86.



The next graph deals with the scenario where Eskom's plant performance is at the lower end of the EAF target range of 84-86, in which case the probability of supply shortages is even greater. (Eskom MYPD2 30 November, 2009:40; own calculations)

Figure 9 Eskom's demand and supply outlook with an EAF of 84.

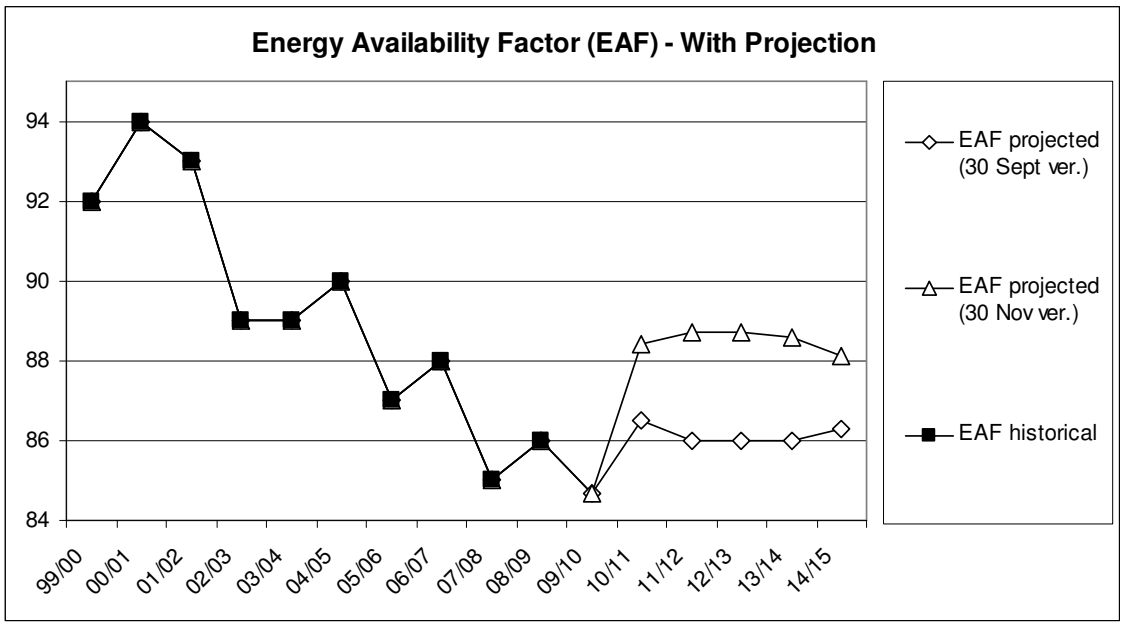


These graphs clearly demonstrate that the South African power system faces critical challenges in the coming years. Eskom and government will have little choice during this period but to drive DSM programmes to achieve security of supply.

The scenarios also indicate that plant performance will have a significant impact on the supply-demand balance in years to come. Whereas the September 2009 version of the MYPD2 application assumed an EAF performance of 86 the second version assumed an average EAF of around 88. Since plant performance has been on a steady downward trend for the past ten years, and has hovered at just over 85 for the past two calendar years, it is unclear how Eskom

expects to achieve these improved levels of plant performance in a context when utilisation levels will inevitably be higher than they have been in the past?

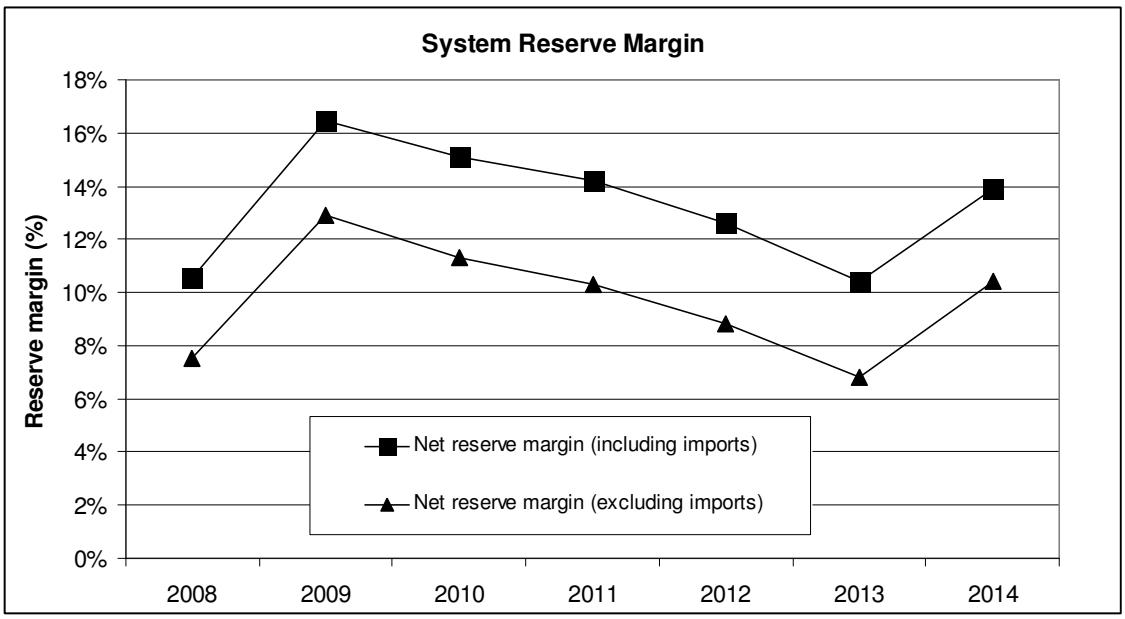
Figure 10 Historic and projected EAF performance.



Demand perspective

Turning from energy to capacity, the outlook for the system reserve margin is similarly grim. The temporary respite of the 2008-2009 recession is expected to slip away as demand recovers in the course of 2010 and normal levels of economic growth resume. The reserve margin is therefore expected to drop to a low of 10.4% (including imports) or 6.8% excluding imports in 2013. (Lakmeeharan, 2010)

Figure 11 Projected system reserve.



This forecast is premised on the following assumptions:

- economic growth as projected in the Eskom MYPD2 forecast;
- Eskom's new-build programme coming on line as per original schedule;
- An unstated portion of potential independent power producers (IPPs) coming on line; and
- An unstated portion the potential impact of DSM programmes or other demand management programmes. (Lakmeeharan, 2010)

Given the range of uncertainties and hidden assumptions it is difficult to comment on the accuracy of this forecast. Nonetheless, it is clear that Eskom is counting on its new-build programme to begin delivering in a big way by 2013 to pull the system out of the hole that it has got into.

4.4 The new build programme

Eskom's view of the new-build programme

Eskom's MYPD2 application describes the following (adjusted) new-build programme. (Eskom MYPD application, 30 November, 2009)

Table 3 Eskom's view on the new-build programme over the next five years.

New capacity (MW)	2010	2011	2012	2013	2014
Existing capacity (less decommissioning)	43,415	43,445	43,445	43,445	43,445
IPPs	517	862	1,142	2,743	3,012
Return to Service (Eskom)	1,455	1,859	1,859	1,859	1,859
Sere (Eskom)	-	-	100	100	100
Medupi (Eskom)	-	-	738	1,476	2,952
Kusile (Eskom)	-	-	-	-	723
Ingula (Eskom)	-	-	-	666	1,332
Total new capacity (cumulative)	1,972	2,721	3,839	6,844	9,978
Total capacity	45,387	46,166	47,284	50,289	53,423

Government's view of the new-build programme

Government has subsequently published a slightly different plan in its first Integrated Resource Plan (IRP1) determination. (Government of South Africa, 31 December, 2009 and 29 January, 2010)

Table 4 Government's view on the new-build programme over the next five years.

New capacity (MW)	2009	2010	2011	2012	2013
Existing capacity at beginning of year	43,385	44,157	45,363	47,360	48,382
New capacity					
Return to service capacity	772	683	404		
Medupi				738	738
Kusile					723
Ingula					666
DOE OCGT IPP			1,020		
MTPPP, REFIT		343	518	284	
Sere, CSP		150			
Other capacity and decommissioning		30	55		
New capacity in year	772	1,206	1,997	1,022	2,127

System capacity at year end	44,157	45,363	47,360	48,382	50,509

Comparison of plans

The following table compares the two plans.

Table 5 Comparison of Eskom and government plans.

Comparison of plans (MW)	2010	2011	2012	2013
Eskom view on new capacity in year	1,972	749	1,118	3,005
DOE IRP view on new capacity in year	1,206	1,997	1,022	2,427
Eskom view on cumulative new capacity	1,972	2,721	3,839	6,844
DOE IRP view on cumulative new capacity	1,206	3,203	4,225	6,652

Since both plans were effectively produced by Eskom's system operator it is unclear why they differ. Possibly the plan was updated in the two months between publication, or a different year-end definition was used? The expected timing of Eskom's 100 MW wind project (Sere) and the Department of Energy's (DOE's) much-delayed 1,020 MW OCGT peaker project appears to have shifted. Interestingly DOE's view on timing is more optimistic than Eskom's. The basis for this optimism is unclear, since Eskom expressed frequent caution in its MYPD2 application on the feasibility of delivering this ambitious programme and the utility has already announced several delays with existing projects.

It is evident that IRP1 does not consider new capacity from cross-border projects, such as Coal Investment Corporation's (CIC's) 1,200 MW Mmamabula project in Botswana. The publication of IRP1 has therefore been a blow to the confidence of such developers. Following this news CIC, for instance, stopped development expenditure on the project. (Engineering News, 2 December, 2009; 15 December, 2009)

Scale of the capital programme

The following table shows the projected cost of Eskom's capital programme (including interest during construction but excluding the cost of cover). (Eskom MYPD2 application, 30 November, 2009:67)

Table 6 Projected cost of Eskom's capital programme.

R'm	FY08/9	FY09/10	FY10/11	FY11/12	FY12/13	FY13/14	FY14/15
Generation	34,805	51,832	71,009	82,660	69,449	50,510	64,375
Transmission	6,587	9,609	15,110	11,877	17,706	18,315	24,284
Distribution	5,825	6,390	8,654	10,705	12,784	14,893	17,129
Corporate (incl. ED)	460	1,123	679	372	423	317	366
R&D	269	441	851	2,706	3,628	2,275	529
Total	47,945	69,394	96,303	108,320	103,991	86,310	106,683
Cumulative	**47,945**	**117,339**	**213,642**	**321,962**	**425,953**	**512,263**	**618,946**

To put the scale of this programme into perspective, Eskom's total assets were valued at R199 billion at the close of the 08/09 financial year. (Eskom Annual Report, 2009) Funding this massive capital expansion programme is therefore a serious challenge for the utility.

Later versions of the integrated resource plan

Since this report was initially drafted the Department of Energy has released a draft integrated resource plan for public comment which extends, and to some extent amends, the projections described in this section. (DOE, 2010c, 2010d and 2010e) See section 6.3 for further detail.

4.5 Potential contributions from independent power producers

Official policy stance

The South African government has repeatedly made positive policy statements about its intent to open the power system to IPPs, starting with the Energy White Paper of 1998. (Department of Minerals and Energy, 1998)

In 2001 Cabinet adopted a resolution that up to 30% of *existing generating plant* should be sold to the private sector. Little was done to implement the privatisation of Eskom power stations through and in 2004 the resolution was re-interpreted to imply that 30% of *new generation capacity* should be built by the private sector.

Once again little was done to implement this resolution, although DME did attempt to procure 1,000 MW of OCGT peaking plant – a process which eventually floundered prior to financial close in March 2007.

The need for a sound system for generation capacity planning was recognised as far back as the Energy White Paper of 1998 which stated that,

> *'The Department of Minerals and Energy will ensure that an integrated resource planning approach is adopted for large investment decisions by energy suppliers and service providers, in terms of which comprehensive evaluations of the economic, social and environmental implications of all feasible supply and demand side investments will have to be undertaken. In the electricity sector's case, the National Electricity Regulator will only license new facilities upon the satisfactory completion of an integrated resource plan.'* (Department of Minerals and Energy, 1998: Section 8.1.1.)

At its ordinary meeting in Cape Town on 5 September 2007 cabinet resolved that,

> The Department of Minerals and Energy will develop an Integrated Resource Plan that will define the magnitude of power generating capacity needed to meet the country's electricity demands. The National Electricity Regulator of South Africa (Nersa) will regulate the single buyer function and specifically approve all commercial agreements between the single buyer and the private producers. Institutional and regulatory mechanisms will be put in place as per the Electricity Regulation Act. (Government of South Africa, 6 September, 2007)

Fifteen months later the Minister of Energy issued two notices of her intent to pass regulations in terms of the Electricity Regulation Act to regulate, amongst other matters, electricity supply planning and the procurement of new generation capacity. (Government of South Africa, 30 January, 2009 & 13 February, 2009) These draft regulations were subsequently combined into a single regulation which was gazetted nearly two years after the cabinet announcement on 5 August 2009. (Government of South Africa, 2009) These so-called 'New-gen regulations' provide for the Minister to determine an integrated resource plan (IRP), to regulate the licensing of new generation capacity, and for the recovery of costs arising from independent power producers. (See further discussion in 5.3 below)

Eskom's IPP initiatives

Eskom has initiated a number of IPP procurement processes since 2006, including:

The 2006 *Pilot National Cogeneration Programme* (PNCP) which was designed to procure a minimum of 900 MW of cogeneration capacity on a self-despatch basis. Eskom received expressions of interest for some 5,000 MW, but eventually received very few proposals due to investor concerns with the proposed power purchase agreements (PPA) terms, looming power shortages, and the sense that alternative and better-priced programmes might be offered in future. No PPAs have been concluded under this programme to date;

The 2007 *Medium Term Power Procurement Programme* (MTPPP) which was intended to procure capacity for the period 2010-2018, also on a self-despatch basis, with a tariff that declines over the period from 105 ZAc/kWh in the early years down to 65 ZAc/kWh in later years (2007 Rands). In the face of Eskom's funding problems this programme was shelved for over a year, but both government and Eskom have recently suggested that six PPAs with five separate companies (including Sasol and Sappi who have invested in own-generation facilities) may yield up to 400MW. Eskom hopes to sign the first PPA in May 2010 and to have between 200 and 300 MW commissioned by July 2010. (Engineering News. 19 May, 2010) If Nersa approves this PPA it will be the first significant IPP in South Africa to conclude a PPA with Eskom in many decades;

A 2007 *expression of interest* round to take over Eskom's 100 MW Cere wind project, which appears to have gone nowhere;

The 2008 *Multi-Site Base Load Independent Power Producer Programme* (Base Load IPP programme) which was intended to procure between 2,100 and 4,500 MW of capacity in minimum tranches of 200 MW. After pre-qualifying 23 developers in October 2008 this programme was placed on hold. (Engineering News 18 August, 2008 & 20 October, 2008; Eskom web site, undated).

Eskom has also entered into negotiations with a number of cross-border IPP developers, including notably the Mmamabula project in Botswana, the Kudu gas project in Namibia and the Moamba gas project in Mozambique. None of these unsolicited proposals have been finalised and in the course of 2009 Eskom announced that all such initiatives had been put on hold, pending the resolution of its funding model and the implementation of government's policy on new generation capacity.

Renewable Energy Feed-in Tariff (REFIT)

Following a request from the then Department of Minerals and Energy (DME) Nersa published the following feed-in tariffs for a range of renewable energy technologies. (Nersa 26 March, 2009; 29 October, 2009)

Table 7 Nersa-approved renewable energy feed-in tariffs.

Technology	***REFIT tariff (R/kWh)***
Wind	1.25
Small hydro	0.94
Landfill gas	0.90

Technology	*REFIT tariff (R/kWh)*
Concentrated Solar Power plant with 6 hours storage	2.10
Concentrated Solar Power (CSP) trough without storage	3.14
Large scale grid connected PV systems (≥ 1 MW)	3.94
Biomass solid	1.18
Biogas	0.96
CSP Tower with storage of 6 hrs per day	2.31

Nersa subsequently published a draft set of rules to be used as selection criteria for renewable energy projects under the REFIT programme. (Nersa. 2010, 19 February) Government has still to clarity how the procurement process will work and who exactly will enter into the off-take agreements.

4.6 International experience with IPPs

International experience with IPPs varies widely, depending on the approach taken by different countries and regions. The following table was prepared by Globeleq, a UK-based IPP, to demonstrate the differing outcomes between six countries in Latin America, a region which has generally followed a pro-IPP approach in line with the Standard model, and Africa, which has generally followed a more cautious approach in line with the hybrid model. (Globeleq, 2010, based on ECLAC, 2009 and own market research)

Table 8 Comparison of IPP penetration in six Latin American and six African countries.

Country	*Private %*	*No of IPPs*
Guatemala	76%	12
Costa Rica	25%	32
Nicaragua	59%	12
Panama	88%	23
El Salvador	61%	14
Honduras	69%	20
Average	**63%**	**19**

Country	*Private %*	*No of IPPs*
Ghana	11%	1
Tanzania	28%	2
Kenya	27%	5
Cote d'Ivoire	41%	2
Senegal	18%	2
Uganda	45%	1
Average	**28%**	**2**

The data indicates very different outcomes in each of the two regions. Globeleq attribute this outcome to the degree to which each region has successfully addressed three key factors:

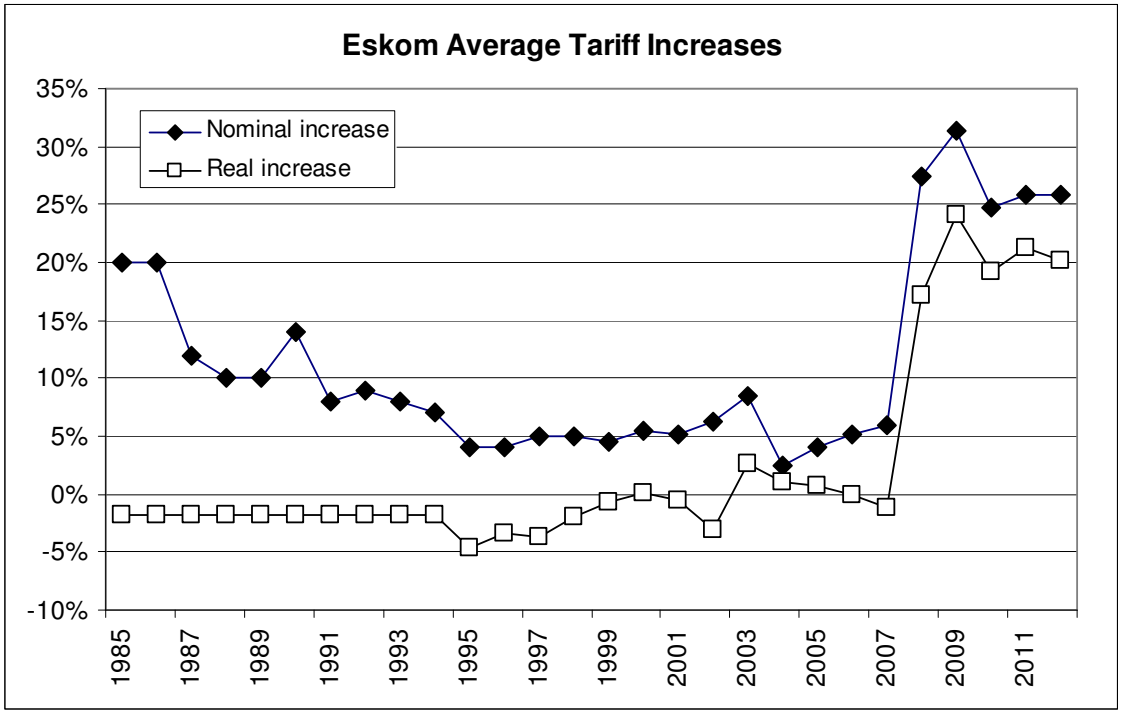
1. The implementation of power tariffs which
    A. Adequately reflect both costs and risks, and
    B. Achieve financially healthy utilities;
2. Establishment of clear rules and policy for IPP entrants; and
3. Are committed to the entry of private power. (Globeleq, 2010)

In fact there are some 50 IPPs operating across Africa, the majority of which are successful, stable and contributing to economic and social development. (Eberhard & Gratwick, 2010)

4.7 Tariffs

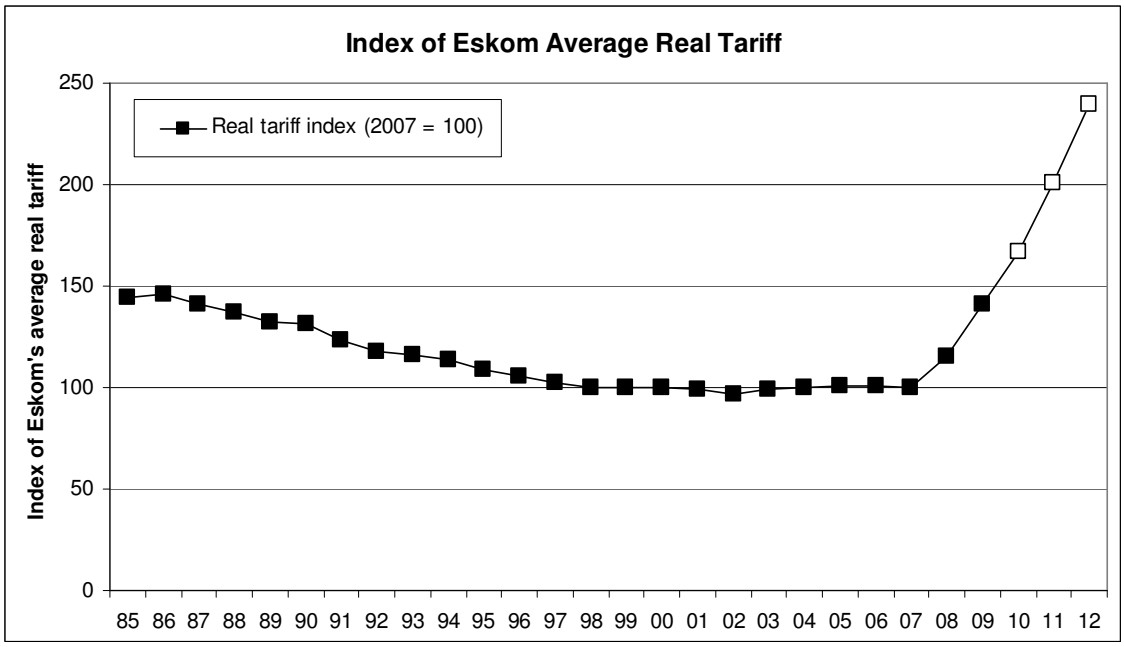
The South African electricity supply industry has enjoyed a long period of stability since the 1980s. For most of this period annual electricity tariff increases were kept below the inflation rate, leading to real reductions in electricity prices. By 2008 it had become evident that low electricity prices could not be sustained any longer if Eskom was to make the necessary investments in generation and system capacity. Tariffs therefore rose sharply that year (27.5%) and have continued to climb at similar rates ever since. (Source: Eskom annual reports; Nersa tariff decisions)

Figure 12 Eskom average tariff increases over the past 25 years.



It is useful to examine the real price of electricity over time, in order to eliminate the distorting effect of inflation. The following graph compares Eskom's average real tariff to a base index of 100 in 2007 – the last year of 'cheap' electricity. (Source: Eskom annual reports; Nersa tariff decisions; StatsSA)

Figure 13 Index of Eskom's average tariff over the past 25 years.



The analysis demonstrates that tariffs fell from an index of 146 in 1986 (towards the end of Eskom's last major build programme) to the base of 100 in 2007 – a 30% drop over a twenty year period.

Following Nersa's latest determination on Eskom's price path, real tariffs will rise to an index of 239 by 2012. This represents an increase of 139% over a five year period and will constitute a significant price shock to the economy. All indications are that tariffs will continue to rise at similar rates in the following three year pricing period.

The main driver behind these tariff increases is undoubtedly Eskom's massive capital programme.

4.8 Funding the new build programme

Funding strategy

The following table contains Eskom's last published funding strategy (premised on its proposed 3x35% tariff increase). (Eskom MYPD application, 30 November, 2009: Table 2 on p32)

Table 9 Eskom's funding strategy.

Funding Plan (R'm)	FY09/10	FY10/11	FY11/12	FY12/13	FY13/14	FY14/15
Tariff increase	*31%*	*35%*	*35%*	*35%*	*13%*	*13%*
Cash outflows						
Capex	60,232	87,646	94,417	86,239	68,783	88,905
Interest during construction	4,197	8,657	13,903	17,752	17,527	17,778
Loan repayments	16,669	1,044	132	6,606	224	312
Swap cash flows	4,872					
Total funding required (A)	85,970	97,347	108,452	110,597	86,534	106,995
Funding sources						
Opening cash balance	17,921	22,611	1,852	-14,102	-7,875	18,089
Assets Maturing	4,232	551	0	0	0	0

Funding Plan (R'm)	FY09/10	FY10/11	FY11/12	FY12/13	FY13/14	FY14/15
Operating cash flows	8,521	16,037	39,498	66,824	77,498	102,208
Government Loan	30,000	20,000	0	0	0	0
New equity participant	0	0	10,000	10,000	0	0
Clean technologies Funding	0	0	3,000	0	0	0
Committed and planned loans	47,907	40,000	40,000	40,000	35,000	35,000
Total available funding (B)	108,581	99,199	94,350	102,722	104,623	155,297
Surplus/-shortfall (B-A)	22,611	1,852	-14,102	-7,875	18,089	48,302

Government is injecting R60 billion into Eskom in the form of an 'equity-like' subordinated shareholder loan over a four year period in order to improve financial ratios to the level that Eskom can continue borrowing. The bulk of this loan has already gone into Eskom. The scale of this loan far exceeds the level of shareholder support provided to other state owned entities – most of which are also sorely in need of capital injections. National Treasury has indicated to Eskom that no further equity funding will be made available.

Government is also providing some R185 billion in government loan guarantees which will be used to access debt funding. This constitutes the bulk of the 'Committed and planned loans' shown above. Eskom has suggested that it may not be possible to borrow more than R40 billion per year from local and international markets. (Eskom MYPD application, 30 November, 2009)

Eskom initially proposed to raise the balance of its equity target through the sale of a 30-49% stake in the Kusile power station, hoping to raise two R10 billion tranches of equity in the course of FY11/12 and FY12/13. Many commentators have dismissed this option as misguided, on the grounds that investors are unlikely to take a minority stake in a power project where they are exposed to construction cost and completion risk, but have no opportunity to influence design, procurement, construction or even operations. Commentators such as Genesis, the Energy Intensive Users Group (EIUG), the South African Local Government Association (SALGA) and academic Prof. Eberhard have all suggested that Eskom should rather consider selling some of its existing operational power stations in order to close the funding gap – with Genesis suggesting that the utility would need to sell about three of the large coal power stations to raise the target amount. (Genesis, 2009; EIUG, 2009; SALGA, 2009; Business Day, 14 January, 2009; Engineering News, 14 January, 2010)

If Eskom does manage to sell a substantial stake in Kusile, or an equivalent transaction from other assets, this will be the largest public-private partnership ever attempted in South Africa. COSATU, not surprisingly, has seen this proposal as 'tantamount to privatisation' and begun vociferous campaign to oppose it. (Engineering News, 11 January, 2009; Bloomberg, January 12, 2009)

Given the scale of its capital programme commitments and its perceived borrowing constraints the utility was left with little option but to rely on operating cash flows (i.e. after-tax earnings) to meet its funding requirements over the coming years. In effect the MYPD2 proposal envisaged around half the capex programme to be funded from this source.

Implications of Nersa decision

Nersa's decision to limit Eskom's average tariff increase to around 25% for each of the three MYPD2 years, rather than the requested 35%, has, however, significantly reduced the available operating cash flows, as demonstrated by the following table. (Own calculations, based on Eskom November 2009 MYPD2 application and Nersa's 24 February 2010 reasons for decision)

Table 10 Implications of Nersa's MYPD2 decision for Eskom's funding strategy.

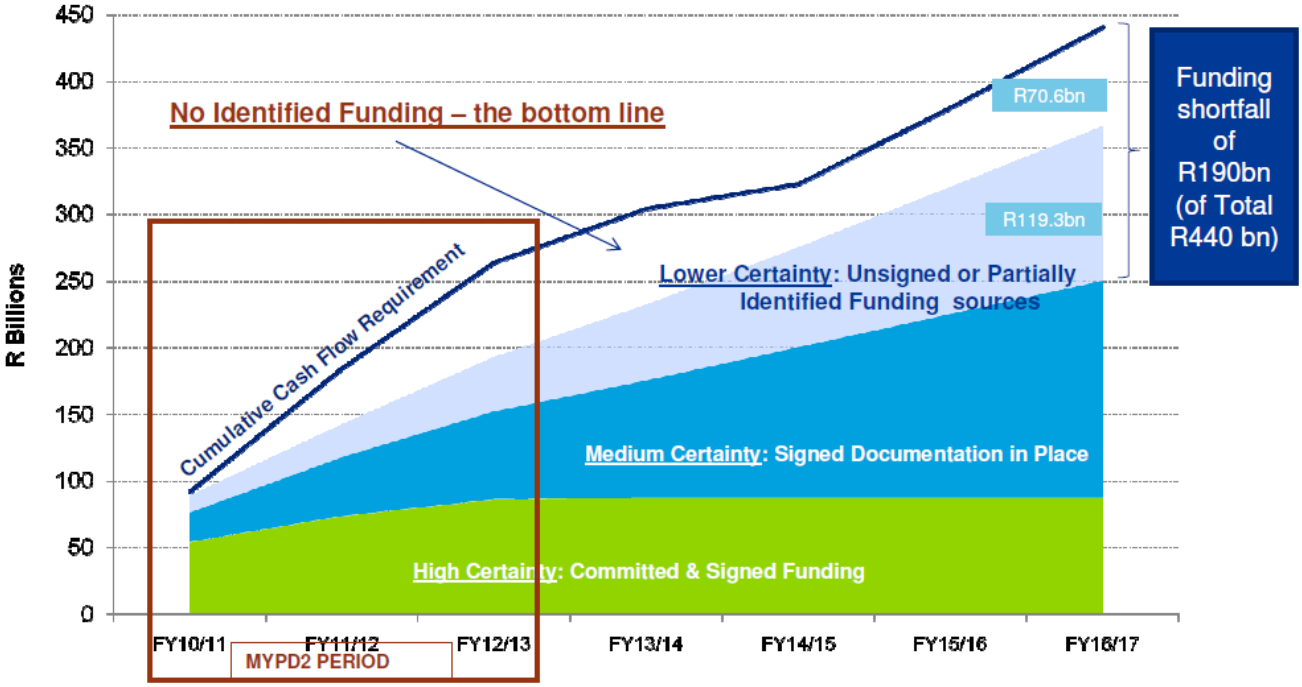
Implication of Nersa decision	*2010/11*	*2011/12*	*2012/13*
Change in earnings	-7,428	-16,427	-31,729
Less company tax (28%)	-2,080	-4,600	-8,884
Change in retained earnings	-5,348	-11,827	-22,845
Cumulative change in retained earnings	-5,348	-17,176	-40,020

In effect the Nersa decision put an additional R40 billion hole in Eskom's planned funding programme, equivalent to some 13% of the cumulative R308 billion capital expenditure planned over the MYPD2 period.

Eskom's funding gap

Eskom's financial director Paul O'Flaherty recently informed Parliament's portfolio committee on public enterprises that in fact the utility needed to secure an additional R190-billion funding over the next seven years to complete the build programme, of which a staggering R111-billion would be required over the next three years. (Engineering News. 4 May, 2010; Business Report. 5 May, 2010) This despite the record-breaking $3.75bn (~R27.7bn) loan that the World Bank had already granted Eskom in April 2010. (Eskom, 2010a)

Figure 14 Eskom's cumulative funding gap.



Whilst Eskom has consistently defended its ability to meet its timelines for the new-build programme some commentators have expressed concerns. For instance, South African construction major Murray & Roberts recently warned shareholders that it is experiencing scope changes and delays with two of the contracts in which it is involved at Eskom's R120 billion Medupi power station site. The group also anticipates that the R142-billion Kusile project could be delayed by 18 months. (Engineering News. 25 February 2010) Various interviewees

expressed similar concerns, all of which suggest that the 2013 reserve margin dip may be somewhat longer and deeper than Eskom is presently reflecting.

4.9 Electricity distribution industry restructuring

The issue of electricity distribution industry (EDI) restructuring has been on the agenda since the pre-democracy days of the National Electrification Forum (NELF). After various false starts, government established the Electricity Restructuring Interdepartmental Committee (ERIC) in the late 1990s which commissioned a major study by PriceWaterhouseCoopers. The outcome of this study was known as the Blueprint Report and proposed that Eskom and municipal distribution interests should be merged into six Regional Electricity Distributors (REDs). (Department of Minerals and Energy. 2001)

Unfortunately the departmental members of ERIC and some of the key stakeholders could not reach agreement on certain key policy issues, such as:

- How ownership of the REDs should be determined?
- How local government and Eskom should be compensated for their assets? And
- Who should control the REDs?

Since the Constitution effectively grants local government a veto over EDI restructuring these policy gaps have led to an impasse for the past decade.

At first glance EDI restructuring may not appear relevant to the design of the ISO, but there is a significant link in that the distribution industry is the main buyer of power. The structure of the EDI is therefore an important constraint on the nature of the market functions which the ISO may perform.

4.10 Official recognition of the problem

One positive trend in the past few years has been far greater willingness on the part of Eskom to acknowledge the depth of the crisis. For instance, Brian Dames (then Eskom's chief operating officer for generation, now CEO) recently admitted to Parliament that 'We do not have enough capacity to meet requirements. The country has to focus on how do we reduce our energy usage. We have no choice but to do that. We cannot be in a position where electricity constrains economic growth.' (Bloomberg, 2 March, 2010)

His colleague in Eskom, Erica Johnson, Chief Officer for Customer Network Business, similarly acknowledged that 'While there is no short-term threat to security of supply, the system will be vulnerable from 2011 through to 2012, when the first Medupi turbine is scheduled for synchronisation to the grid. Therefore, there is no alternative but to have an intensive focus on demand management.' (Engineering News, 1 December, 2009)

Government has done a lot to help Eskom out of its financial hole, but appears to be reaching the limits of its fiscal capacity. Public Enterprises spokeswoman Ayanda Shezi recently stated that 'It is clear that the government does not have money to provide further loans, and there is also a limit on the total guarantees that the government can issue before the sovereign rating is affected. Other options have to include accelerating independent power producers, energy efficiency and demand-side management, more private equity in for example the Kusile coal-fired power station and additional borrowings' (Business Report, 7 March, 2010)

Government's work on sector reforms has been ramping up for some time. In a January 2010 interview the newly appointed Director General for Energy, Nelisiwe Magubane, noted that 'the Cabinet had instructed the department at its last meeting of 2009 to develop a model for the

purchase of independent power and to report back before the end of March. Magubane stated that the proposed model would ensure that the wholesale purchase of power by the independent operator would be transparent and would take place outside Eskom. The electricity would then be resold in bulk for transmission and distribution by Eskom and municipalities. 'What has been happening is that Eskom has been acting like a real monopoly, trying to keep other players out of the industry,' Magubane said. 'We want to take that function of buying power away from it.' (Business Day. 28 January, 2010)

The Minister of Public Enterprises Barbara Hogan is in a particularly good position to understand the root causes of the situation, since she chairs the Inter-Ministerial Committee on Electricity (IMC) tasked with solving these problems. This committee is apparently running eleven work streams in an effort to understand the scale of the problem and the potential contributions that various demand and supply side initiatives may contribute towards security of supply. The committee is considering various sector reforms besides the mooted ISO. Minister Hogan recently commented that 'Inevitably there is going to be a much, much larger funding deficit going forward. We are definitively reaching a stage now where we cannot rely on Eskom to be the single source of energy for the country.' (Bloomberg. 2 March, 2010)

4.11 Summary

This brief review of the state of the sector has hopefully demonstrated that the problems within South Africa's electricity industry and related planning and governance systems are deep and systemic in nature and cannot be solved in the short term. The establishment of an ISO is just one of many interventions and reforms which will be required to stabilise the system and place it on a more sustainable basis.

It should also be clear that the lack of an effective generation planning and procurement system in past years has been a key cause of inadequate public and private investment in new capacity.

5 Potential Functions for the ISO and their Current Allocation

5.1 Introduction

This section of the report presents a conceptual framework for the potential functions that an ISO may perform and describes the current allocation of these functions according to the legislative and regulatory system.

5.2 Conceptual framework

For the sake of terminological consistency the remainder of this report will consider the following six functions for potential allocation to the ISO.

Figure 15 Functions the ISO might perform.

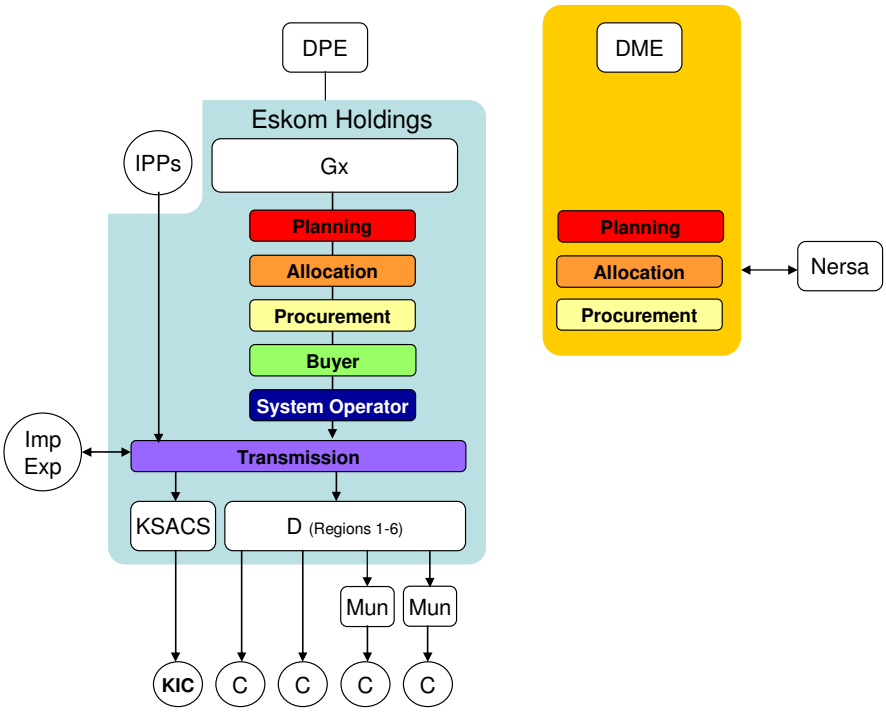
Planning	• Undertake/facilitate new generation capacity planning
Allocation	• Allocate new capacity opportunities between Eskom, other SOEs and IPPs
Procurement	• Procure new IPPs (on behalf of the buyer)
Buyer	• Enter into PPAs with generators, on behalf of the distributor/s • Aggregate the wholesale cost of power
System Operator	• Ensure short-term security of supply • Dispatch generation and dispatchable load • Operate the transmission network
Transmission	• Build, own and maintain transmission infrastructure

The nature of each of these functions is explored in more depth in the following sections.

5.3 Historic allocation of the functions (pre 2009 Newgen Regulations)

Prior to the publication of the Newgen regulations in 2009 the responsibility for performing the six functions effectively rested with Eskom, subject to the terms of its Memorandum and Articles of Association, Shareholders Compact and the various licences granted to it by the regulator.

Figure 16 Historic allocation of the functions.



Planning function

Prior to the 2009 Newgen regulations there was considerable uncertainty as to who was responsible for planning new generation capacity, with three separate authorities undertaking planning.

The National Energy Act (No 34 of 2008) requires the Minister of Energy to develop and, on an annual basis, review and publish an Integrated Energy Plan. This plan is required to deal with the supply, transformation, transport, storage of and demand for energy in a way that accounts for various socio-economic goals and the existence of any related plans.

Nersa was in the habit of preparing a National Integrated Resource Plan (NIRP) and was busy preparing the third version, known as NIRP3.

Eskom continued to develop its internal Integrated Strategic Electricity Plan (ISEP), a document which Eskom regarded as commercially sensitive and declined to publish.

Of these three plans it was unclear which had primacy. For instance it was unclear whether the National Energy Act viewed the Integrated Energy Plan as merely a summary of the other plans, or as a binding directive for other planning process. In practice this was somewhat academic as the department lacked the capacity to produce a detailed plan anyway.

Allocation and procurement functions

In 2007 the Electricity Regulation Act (4 of 2006), was amended (Act 28) to provide the Minister, in consultation with the Regulator, with the executive authority to determine that new generation capacity was required and whether this capacity should be established by Eskom or procured from the private sector (i.e. IPPs), as follows,

(1) The Minister may, in consultation with the Regulator –
  (a) determine that new generation capacity is needed to ensure the continued uninterrupted supply of electricity;

(b) determine the types of energy sources from which electricity must be generated, and the percentages of electricity that must be generated from such sources;
(c) determine that electricity thus produced may only be sold to the persons or in the manner set out in such notice;
(d) determine that electricity thus produced must be purchased by the persons set out in such notice;
(e) require that new generation capacity must –
    (i) be established through a tendering procedure that is fair, equitable, transparent, competitive and cost effective;
    (ii) provide for private sector participation. (Electricity Regulation Act 4 of 2006)

This amendment was probably motivated by the need to provide the Minister with the necessary executive authority to conclude a procurement process for approximately 1,000 MW of peaking capacity that the department had commenced in 2005. The amendment provided very little guidance as to how future planning and allocation decision making would be undertaken.

In effect the amendment empowered the Minister with Planning, Allocation and Procurement functions without taking these away from Eskom, thereby creating a dual system.

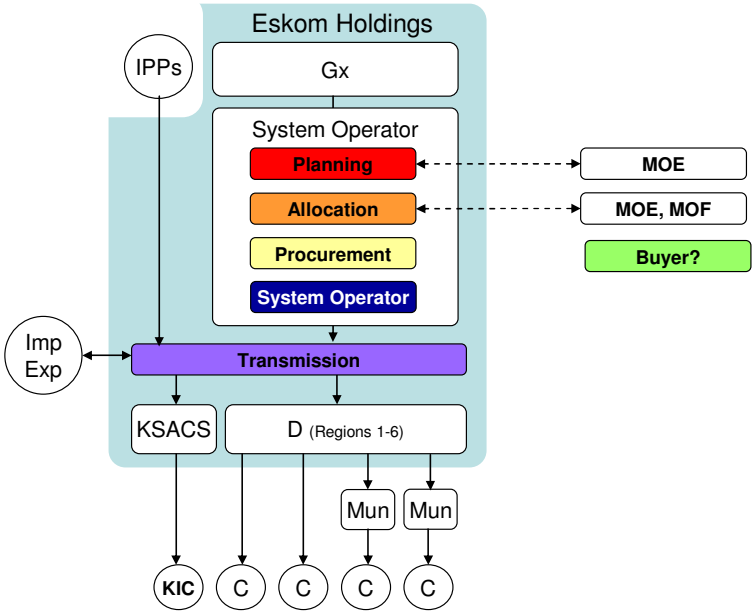
Buyer function

Since the Amendment did not explicitly empower the Minister of Energy to buy power the Buyer function presumably remained with Eskom as part of its Transmission licence.

5.4 Allocation of functions according to the Newgen Regulation

The 2009 Newgen Regulation (Government of South Africa. 2009, 5 August. Regulation 721) attempted to clarify the relative roles of Eskom, the Minister of Energy, the Minister of Finance and the Regulator with the following allocation of functions.

Figure 17 Allocation of the functions under the 2009 Newgen Regulations.



In short, the Newgen Regulations, read with Eskom's Transmission license, assigned Planning, Allocation, Procurement, System Operator and Transmission functions to Eskom, but left the

Minister of Energy with the final say over Integrated Resource Plan and, in concurrence with Minister of Finance, the final say over public/private allocation of generation opportunities.

The Newgen Regulation mentions the Buyer function but does not specifically allocate this function to any agency, which presumably means that Eskom continues to play this role?

Objectives of the Newgen Regulations

The Newgen Regulations apply to all types of generation technology, including renewable generation and cogeneration technology, but excluding nuclear power generation technology. (Government of South Africa, 2009: Clause 1(a)) It is unclear how exactly the system operator will produce an 'integrated resource plan' without considering the nuclear option.

The objectives of the regulations are stated as follows

> 2. The objectives of these regulations are -
>
> (a) the regulation of entry by a buyer and an IPP into a power purchase agreement;
>
> (b) the facilitation of fair treatment and the non-discrimination between IPP generators and the buyer;
>
> (c) the facilitation of the full recovery by the buyer of all costs incurred by it under or in connection with the power purchase agreement and an appropriate return based on the risks assumed by the buyer thereunder and, for this purpose to ensure the transparency and cost reflectivity in the determination of electricity tariffs;
>
> (d) the establishment of rules and guidelines that are applicable in the undertaking of an IPP bid programme and the procurement of an IPP for purposes of new generation capacity
>
> (e) the provision of a framework for the reimbursement by the regulator, of costs incurred by the buyer and the system operator in the power purchase agreement; and
>
> (f) the regulation of the framework of approving the IPP bid programme, the procurement process, the REFIT programme, and the relevant agreements to be concluded. (Government of South Africa, 2009)

Relevant definitions

The Newgen Regulations define the following functions, in some cases for the first time in South African legislation:

> '**buyer**' means any person or entity designated by the Minister in terms of section 34(1)(c) and (d) of the Act and authorised under a licence; this includes any person or entity running a procurement process in respect of the IPP bid Programme or entering into a power purchase agreement;
>
> '**energy planner**' means the Department of Energy;
>
> '**Independent Power Producer**' or '**IPP**' means any undertaking by any person or entity, in which the government of South Africa does not hold a controlling ownership interest (whether direct or indirect), of new generation capacity at a generation facility following a determination made by the Minister in terms of section 34(1) of the Act;

'**IPP bid programme**' means a bidding process for the procurement of new generation capacity and/ or ancillary services from IPPs;

'**IPP project**' means a project undertaken following an IPP bid programme for the selection of a preferred bidder;

'**national transmission company**' or '**NTC**' means any person or entity licensed to execute the national transmission responsibility;

'**power purchase agreement**' or '**PPA**' means an agreement concluded between an IPP and the buyer for the sale and purchase of

(a) electricity generation capacity;

(b) electricity; and/ or

(c) ancillary services;

'**project agreements**' means the agreements including the power purchase agreement to be entered into by and between the buyer, the government and the IPP in respect of any IPP project;

'**renewable feed-in tariff'** or '**REFIT**' means a tariff approved by the regulator for a renewable energy generator or cogeneration;

'**scheduling**' means the process to determine which unit or piece of equipment will be in operation and at what loading;

'**system operator**' means the entity responsible for short-term reliability of the interconnected power system, which is in charge of controlling and operating the transmission system and dispatching generation (or balancing the supply and demand) in real time. (Government of South Africa, 2009)

Allocation of the planning function

The Newgen Regulations define a central role for the system operator in the process of planning for new generation capacity

Planning for new generation capacity

3. (1) The process of developing the integrated resource plan shall include the-

(a) adoption of the planning assumptions;

(b) determination of the electricity load forecast;

(c) modelling and scenario planning based on the planning assumptions;

(d) determination of a base plan derived from a least cost generation investment requirement;

(e) risk adjustment of the base plan, which shall be based on

aa. the most probable scenarios; and

bb. government policy objectives for a diverse generation mix, including renewable and alternative energies, demand side management and energy efficiency; and

(f) approval and gazetting of the integrated resource plan.

(2) The system operator, in consultation with the energy planner and the regulator, shall be responsible for executing 3(1)(a), (b), (c), (d) and (e) above.

(3) The energy planner, in consultation with the regulator, shall approve the policy input insofar as the risk adjustment contemplated under regulation 3(1)(e) above.

(4) The system operator shall provide the regulator with any information that the regulator might request in relation to the integrated resource plan.

(5) The Minister shall approve the integrated resource plan and publish it in the government gazette for implementation.

(6) The regulator -

(a) must consider applications for licences in accordance with the determination in line with sub-regulation (5);

(b) may, in terms of section 14(1)(q) of the Act, impose a licence condition on the buyer to buy all the new generation capacity procured by the system operator in accordance with the approved integrated resource plan;

(c) shall issue rules relating to the keeping of relevant information and the rendering of returns by licensees pursuant to integrated resource planning. (Government of South Africa, 2009. Newgen regulations. Own emphasis)

Allocation of the procurement function

Besides requiring the system operator to undertake the bulk of the planning work the Newgen Regulations require it to perform two further functions. The first of these relates to the undertaking of 'feasibility studies' to advise the Minister as to whether a particular tranche of new capacity should be procured from a public utility (Eskom or other) or a private IPP?

Procurement mobilisation

4. (1) Having regard to the need for new generation capacity in the integrated resource plan, the system operator shall undertake a feasibility study to determine whether procurement of the generation capacity should be undertaken by Eskom as part of its services as the national electricity producer, another utility provider or an IPP.

(2) The following shall form part of the considerations and outcomes for the feasibility study contemplated in sub-regulation (1)

(a) the affordability of the proposed generation capacity;

(b) the proposed allocation of financial, technical and operational risk between the buyer and the IPP;

(c) the demonstration of the anticipated value for money to be achieved by the IPP; and

(d) the capacity of the buyer to enter into project agreements with the IPP.

(3) The concurrence by the Minister of Finance with the approval of the outcome of the feasibility study to procure the generation capacity through IPPs, shall be confirmed before a determination by the Minister.

(4) Having considered the outcome of the feasibility study and the approval from the Minister of Finance in terms of sub-regulation (3), the Minister shall make a determination in accordance with section 34 of the Act. (Government of South Africa, 2009. Newgen regulations. Own emphasis)

The second function relates to the resulting procurement processes.

Procurement process under the IPP bid programme

5. (1) The procurement process for the IPP bid programme shall comply with applicable legal requirements including preference for the advancement of previously disadvantaged individuals.

(2) The system operator, in consultation with the buyer, shall be responsible for the activities related to procurement under the IPP bid programme.

(3) The procurement process shall have the following stages:

(a) Request for prequalification (RFQ);

(b) Request for proposals (RFP); and

(c) Negotiation with the preferred bidder.

Concluding the power purchase agreement

6. (1) The power purchase agreement must meet the requirements of the treasury regulations in respect of -

(a) affordability of the project;

(b) value for money;

(c) substantial technical, operational and financial risk transfer;

(d) effective implementation, management, enforcement and monitoring of the IPP; and

(e) satisfactory due diligence including a legal due diligence in respect of the buyer's representative and the proposed IPP in relation to matters of their respective competence and capacity to enter into the project agreements.

(2) The buyer, having participated in the process under regulation 5, must purchase all the generation capacity negotiated and concluded by the system operator under the IPP Bid Programme. (Government of South Africa, 2009. Newgen regulations. Own emphasis)

In this regard the regulations also require the system operator to play a specific role in the procurement of renewable energy and cogeneration under the REFIT Programme,

7. (4) The system operator shall be responsible for selecting the preferred IPP under the REFIT Programme. The criteria prescribed by the regulator under regulation 7(2)(a) shall be applied by the system operator in the selection of the preferred IPP.

(5) In line with the determination by the Minister under section 34 of the Act, the buyer must purchase all the generation capacity procured in terms of regulation 7.

Respective roles of the System Operator and the Buyer

The distinction between the role of the 'system operator' and the 'buyer' in the Newgen Regulations appears to be quite deliberate. The System Operator is envisaged as an entity with significant expert capacity to engage in:

- planning concerned with primary fuel and conversion technologies;

- planning concerned with ownership and control issues;
- execution or facilitation of procurement processes (albeit assisted by the system operator in some unspecified fashion); and
- the actual operation of the national transmission system.

As such the system operator appears not to be expected to take on any major financial risks. Expenses relating to these functions may be recovered in terms of rules to be passed by the Regulator.

By contrast the Buyer is envisaged as taking responsibility for the substantial commercial risks that arise when entering into power purchase agreements and related project agreements. As such the Buyer must clearly be in a position to tolerate such risks and to generate such revenues as are necessary to meet its obligations under the PPAs that it takes on.

It is notable that the Newgen Regulations allow for multiple public entities to build new generation capacity (Eskom or 'another utility provider') but only allow for one entity to undertake the role of the 'Buyer'. As such the Newgen Regulations reinforce the single buyer model, but allow for a proliferation of state owned generators.

Allocation of the system operator function

As far as I am aware the Minister has yet to issue a determination designating any person or entity as the System Operator.

Eskom's current transmission licence is available on the Nersa website (see www.nersa.org.za and click on licences). The transmission licence was, however, issued on 1 April 2004 in terms of the Electricity Act (No. 41 of 1987, as amended) and does not appear to have been updated to take into account either the new Electricity Regulation Act (No. 4 of 2006) or the Newgen Regulations. The licence defines the system operator fairly narrowly as,

> **System Operator (SO)**
>
> The entity within the Licensee's Transmission Division responsible for the control and operation of the interconnected power system, in accordance with the Grid Code. (Nersa, 2004)

This definition is similar to the definition of the System Operator in the Newgen Regulations which makes it 'responsible for short-term reliability of the interconnected power system [and] in charge of controlling and operating the transmission system and dispatching generation (or balancing the supply and demand) in real time' (Government of South Africa, 2009. Newgen regulations).[4]

Although the definition of a system operator in the transmission licence does not include the functions described in the Newgen Regulations relating to planning, feasibility studies and procurement of IPPs some of these functions are addressed by the prescribed services of the licensee,

> **4. PRESCRIBED SERVICES OF LICENSEE**
>
> The licensee shall conduct the Transmission Division of its business to undertake the following key activities for the electricity supply industry, namely that of Transmission Network Service Provider, System Operator, Transmission System Planner, Grid Code Secretariat and the Integrated Resource Planner, with the responsibilities as set out below.

4 .

…

The Transmission Division, in conducting its business under this Licence is prohibited from buying and selling energy, other than for its own use. (Nersa, 2004)

It is notable that Eskom's existing transmission licence appears to make no mention of the system operator functions of feasibility studies and the procurement of IPPs. Presumably the Transmission licence will have to be amended in order to enable Eskom's System Operations and Planning Division to undertake these functions?

Allocation of the buyer function

The Electricity Regulation Act does not define the concept of a 'Buyer' and, as far as I am aware, the Minister has yet to issue a regulation designating any person or entity as such.

Eskom's current transmission licence includes the following definition,

Market Rules

The rules by which participants must abide when participating in the South African electricity market. These are the rules that must be accepted by market participants and must be approved by the NER. (Nersa, 2004)

The licence refers to these 'market rules' when defining the detailed tasks of Eskom's system operator.

4.2 THE SYSTEM OPERATOR (SO)

4.2.1 The Transmission Division shall control the operation of and be responsible for the short-term reliability of the interconnected power system (IPS) as defined in the Grid Code. In so doing the Licensee shall act in accordance with the prevailing Grid Code and Market Rules in order to:

a) Ensure system reliability, safety and security;

b) Dispatch generation;

c) Set operational procedures;

d) Control the operations of the IPS;

e) Acquire sufficient ancillary services;

f) Provide operational information to the industry and

g) Define, on an annual basis in agreement with customers, the demarcation for the IPS (Schedule 4).

4.2.2 In execution of its responsibility for system reliability, the Transmission Division shall have authority over the operation of the IPS [interconnected power system], in accordance with the provisions of this licence, the Grid Code and Market Rules. (Nersa. 2004)

As far as I am aware no such market rules have been determined.

5.5 Forthcoming legislation

ISO Bill

The Department of Energy (DOE) has announced that draft legislation is being prepared for the ISO. This legislation will presumably repeal and replace the Newgen Regulations.

Amended Newgen Regulations

Since the ISO Bill will take some time to pass through the legislative process DOE are apparently also considering some amendments to the Newgen Regulations in the meantime.

EDI Restructuring Bill

DOE have been working on an EDI Restructuring Bill for several years and are, apparently, waiting for the 17th Constitutional Amendment to be passed before completing this Bill.

5.6 Summary

This brief review of the Act, the Newgen Regulations and the Eskom transmission licence suggests that most of the system operator functions envisaged under the Newgen Regulations are already allocated to Eskom's existing system operator in terms of the existing transmission licence. However, there does not appear to be any clear basis for the system operator to perform feasibility studies or to procure IPPs. Similarly, the function of the buyer does not yet appear to have been allocated to any entity. These oversights will presumably be addressed in the short term by an amendment to the Newgen Regulations and in the long term by a new act.

6 Potential Allocation of Functions in Future

6.1 Introduction

This section of the report considers each of the six potential functions and their potential allocation based on present government policy and international experience.

6.2 Market structure and the Buyer function

6.2.1 Introduction

This section of the report extends the discussion on electricity market structures begun in section 3.3 and considers the implications of different structures for ISO functions.

6.2.2 What market structure will South Africa adopt?

Government, Eskom, Nersa and EDI Holdings have all taken extensive advice on electricity market structures during the past decade. International firms with considerable experience in these matters, such as McKinsey, PA Consulting, Nexant, PwC, Econ, Adam Smith, Monitor, Power Planning Associates and McKenna & Associates, have all had a say. Local advisors such as SADElec, ENS, Webber Wentzel and others have added their opinions. Multinational agencies such as the World Bank, IEA and World Energy Council have no doubt contributed further perspectives. Hopefully the forests have not perished in vain!

Despite such plentiful advice government has yet to publish its view on the evolution of the electricity market structure. The Cabinet statement of 6 September, 2009 which designated Eskom as the 'single buyer of power from Independent Power Producers' is perhaps the only

firm sign of government's intentions. Yet even this statement is open to wide interpretation. For instance PA Consulting, in an advisory piece commissioned by Nersa in 2008, outlined two very different models for the single buyer concept.

6.2.3 Maximal Single Buyer (MxSB) concept

PA Consulting describe the 'Maximal Single Buyer' (MxSB) model as lying at one extreme of the potential variations of the Single Buyer concept.

Under this approach the MxSB would buy all, or nearly all, of the power transacted in South Africa. All distributors (presently Eskom and municipalities and in future the six REDs) would be obliged to purchase their capacity and energy requirements from the MxSB. The MxSB would therefore be obliged to supply sufficient energy to meet all loads, and should therefore ensure it has adequate resources under contract. To meet its obligations it the MxSB would purchase power from existing Eskom Generation, IPPs, cogenerators, renewables, import contracts and the like. It would also procure new supplies through appropriate means.

The MxSB would not be allowed to own generation facilities, in order to ensure that it had no preference to dispatch one generator over another, other than price and reliability.

The MxSB would necessarily be an independent body, spun out of Eskom, and would need independent financing or a credit guarantee from government – although the REDs would be its ultimate guarantors once established. (PA Consulting, 2008)

6.2.4 Agency Single Buyer concept

At the other end of the spectrum PA Consulting describe a very different form of Single Buyer, where contracting responsibility lies with the REDs, leaving the single buyer as a market intermediary.

In this model, market operations would be based upon divisible and assignable power supply contracts, which would be derived from an initial set of contracts allocated among the REDs on a proportional basis. As each RED's relative requirements changed these contracts, or slices of contracts, would be traded between the REDs.

In this model the Single Buyer acts as an agent of the REDs to contract jointly with new power plants, and even to sponsor or promote the development of new plant. Such a Joint Action Agency could have an organisational form but could also rely on one or more of the parties to undertaking administrative tasks.

The Agency Single Buyer could, for example, offer standard contracts to all generators who meet specific criteria in order to encourage certain investments, such as cogeneration, and then allocate the resulting power purchase contracts to the REDs as the actual counterparties.

The Agency Single Buyer could also allocate export commitments proportionally to REDs and aggregate their power contributions for delivery.

A separate national independent grid operator would still be required to dispatch the grid and provide balancing supplies.

REDs could be incentivised against relying on the spot market for predictable energy needs, through either the tariff design or through mandated targets for long-term procurement. (PA Consulting, 2008)

6.2.5 Recommended option

PA Consulting recommended to Nersa that South Africa pursue the Agency Single Buyer model, since it would empower the REDs and avoid the need for a new centralised bureaucracy with additional capital requirements. PA pointed out that end use customers ultimately bear the

risks associated with procurement decision-making and since the REDs are closer to the customers they are better located to take such decisions than a remote and centralised Single Buyer.

PA also point out that the Agency approach would permit variations in procurement strategy according to differences in each RED's geographic or customer base, whereas the MxSB model would be more likely to adopt a one-size-fits-all approach. (PA Consulting, 2008)

6.2.6 Transitional single buyer

Recognising that the REDs do not as yet exist, PA Consulting also explored the possibility of implementing a 'Transitional Single Buyer'. This entity could begin operating before EDI restructuring is complete and would have the following characteristics:

- It would be the contract counterparty for new IPP investments, with the support of a government guarantee and the objective of diversifying the generation base;
- It need not have a monopoly on the power market;
- It would have to be implemented along with an independent Grid Operator in order to assure fairness of IPP dispatch;
- It would be a vehicle to establish contracts on Eskom's generation – a process which could take several years to complete following the initial IPP contracts; and
- All power purchase contracts should provide for easily assignment.

PA Consulting point out that such a Transitional Single Buyer would provide for a transition to either the MxSB or the Agency Single Buyer as an end state model. (PA Consulting, 2008)

Both the MxSB concept and the Agency Single Buyer concept would have a high degree of synergy with the Planning, Allocation, Procurement and System Operator functions discussed above. The two models would clearly follow different philosophies with regard to contracting, in that the MxSB would contract with power producers in its own right, while the Agency Single Buyer would merely facilitate contracts between producers and distributors. Nonetheless, either of these market models could be performed by the Buyer function as part of the ISO.

6.2.7 Scope for competition

Whilst there are sound arguments for establishing a single buyer to aggregate existing generation capacity while EDI restructuring is still on hold, the question remains as to whether all future generation capacity should be compelled to sell to the single buyer?

Compatibility with policy and legislation

On the face of it such a decision would appear to be a regressive step. Government has made many previous policy statements supporting the advancement of competition within the sector (see section 2). One of the key objects of the Electricity Regulation Act (4 of 2006, amended by 28 of 2007) is to 'promote competitiveness and customer and end user choice'. (ERA, clause 1(f)) This Act also requires all network operators to provide non-discriminatory access to third parties under the following conditions,

> **21. Powers and duties of licensee**
>
> (1) A licence issued in terms of this Act empowers and obliges a licensee to exercise the powers and perform the duties set out in such licence and this Act, and no licensee may cede, transfer any such power or duty to any other person without the prior consent of the Regulator.

(2) A licensee may not discriminate between customers or classes of customers regarding access, tariffs, prices and conditions of service, except for objectively justifiable and identifiable differences approved by the Regulator.

(3) A transmission or distribution licensee must, to the extent provided for in the licence, provide non-discriminatory access to the transmission and distribution power systems to third parties.

(4) Access in terms of subsection (3) must be provided on the conditions set out in the licence of such transmitter or distributor, that may relate to—

(a) the circumstances under which access must be allowed;

(b) the circumstances under which access may be refused;

(c) the strengthening or upgrading of the transmission or distribution power system in order to provide for access, including contributions towards such upgrading by the potential users of such systems, if applicable;

(d) the rights and obligations of other existing or new users regarding the use of such power systems;

(e) compliance with any rule, code or practice made by the Regulator; or

(f) the fees that may be charged by a licensee for the use of such power system. (Electricity Regulation Act 4 of 2006, as amended by Electricity Regulation Amendment Act 28 of 2007. Own emphasis)

Current legislation and licensing conditions therefore appear to require network owners to provide third party access to parties wishing to implement bilateral power purchase agreements by means of wheeling agreements. Eskom has already established policies to this effect and Nersa has determined tariffs for wheeling charges. The mechanisms are therefore largely in place to facilitate such agreements.

At present the relatively low level of electricity tariffs creates an economic disincentive to enter into bilateral purchase agreements with greenfield producers. However, there are a number of scenarios in which this could change. For instance:

Power scarcity: In the event of power shortages government may implement a rationing system, such as the envisaged Energy Conservation System (ECS) under the Power Conservation Programme (PCP). In such an event firms may wish to contract for 'top-up' power to be delivered by means of wheeling agreements. The implementation of a MxSB would appear to preclude such agreements.

Power security: Large consumers may be willing to enter into long-term off-take agreements with IPPs, either inside or outside the country's borders, to ensure power security. Although the initial price of these contracts may be above the wholesale price, the off-taker may be prepared to accept this in return for long-term security and certainty on the price level. There are a number of large firms considering such deals at the moment.

Green Power: Some consumers may wish to purchase 100% green power from renewable producers. The strict implementation of the single buyer would appear to preclude such bilateral power deals over the national transmission system.

6.2.8 Summary on market structure

Government has issued limited, and apparently conflicting, policy signals concerning its intentions for the future structure of the electricity market. This section of the report has touched

very briefly on some aspects of the debate. In reality the design of the market is a very complex process, well beyond the scope of this report. The simple point that this discussion has tried to make is that it is too early to determine what function an ISO may perform in relation to the market. In all probability it would appear that in the short term the ISO will have to act as counter-party to a set of power purchase agreements with existing generators (possibly one PPA in relation to Eskom). Should policy and legislation allow for the establishment of bilateral PPAs with new IPPs the Contractor (or market operator) function may have no specific role to play in relation to these agreements – although of course the System Operator function would have to be involved.

That said, there is clearly a need to separate the market operator or Buyer function out of Eskom and the ISO would be an obvious place to house such a function.

6.3 Integrated resource planning

Integrated resource plan ver. 1

Eskom's system operator and the energy planner (DOE) have already undertaken one planning cycle in terms of the Newgen Regulation which led to the Minister gazetting her determination of the first IRP in late 2009. (Government of South Africa. 2009, 31 December). A month later a second determination was published with made a minor adjustment to the first.[5] (Government of South Africa. 2010, 29 January)

IRP1 was drawn up on the basis of limited consultation within government, and no apparent effort to engage with stakeholders. Not surprisingly this attracted considerable criticism from stakeholders who pointed out that DOE had had a mandate from Cabinet since at least September 2007 to produce the IRP. (Government of South Africa, 6 September, 2007)

Integrated resource plan ver. 2

In response to these criticisms DOE has commenced a much broader consultation process to draw up IRP2. This process was initially based on the following activities and timeframes. (DOE. 2010a)

Table 11 Initial timeframes for the integrated resource planning process.

Milestone	*Description*	*Milestone*
Registration Advert	Invitation for stakeholders to register as an interested and affected party	19th April
Registration Closed	Cut-off date for registration	30th April
Release of Stakeholder Consultation Packs	Send information and consultation packs to registered stakeholders	3rd to 16th May
Hold Stakeholder IRP Introduction Workshop	Ensure stakeholders understand the parameters and can participate effectively	Between 3rd – 10th May
Close submissions for written inputs on Parameters	To ensure adequate time for the modelling the final parameter values need to be aggregated and agreed	21st May
Parameter Values finalised	After the input aggregation process the values of the parameters are finalised	1st June

[5] The content of IRP1 is described above in section 4.4.

Milestone	*Description*	*Milestone*
Modelling of Draft Scenarios Complete	The inputs are modelled to produce the scenarios for the draft IRP	30th June
Send out draft IRP to the Stakeholders for comment	Provide the stakeholders with the draft IRP for review and final comment	5th July
Draft IRP Workshop	Host Draft IRP workshop to collate stakeholder feedback	12th July
Finalise Consultation on the draft IRP	Update the draft IRP based on consultative inputs	15th July
Develop the final IRP Draft for Cabinet approval	Provide the final draft to Cabinet for approval	3rd August
Publish IRP in the Government Gazette	Publish the IRP as required by law and start the public participation process	17th September

DOE subsequently announced on 27 July that the promulgation date of IRP2010 would be extended from September 2010 to November 2010 (DOE communication to registered IRP stakeholders) and on 3 August presented the following timetable to Parliament. (DOE, 2010b)

Table 12 Amended timeframes for the integrated resource planning process.

Base case submitted to DoE	*22 July*
Modelling of Base case with Sensitivities	26 July
Evaluation criteria to WG2 for approval with base case	11 Aug
Scenarios for economic impact modelling	11 Aug
Base case with Scenarios ready	16 Aug
Complete 1st draft IRP 2010	30 Aug
Draft IRP published for public comment	1 Sept
Closing date for comments	30 Sept
Public hearings on draft IRP in conjunction with Nersa	21/22 Sept
Revised draft IRP	6 Oct
Cabinet approved IRP 2010 to gazette for public participation	27 Oct
Promulgated IRP 2010	12 Nov

Timeframes

IRP2 will apparently deal with three time periods:

Short Term: The plan will describe the choices that have already been made and the projects that will begin within the next four years.

Medium Term: The plan will develop options that are likely to be needed in the next period, i.e., five to ten years from now.

Long Term: The plan will develop a long term picture considering potential risks and opportunities and identify and scope a set of broad options. (DOE. 2010a)

IRP Governance

The IRP2 process is apparently being driven by a DOE-led task team consisting of the following individuals. (Yelland, 2010)

Table 13 Composition of the IRP task team.

Individual	*Organisation*
Nelisiwe Magubane	DOE
Ompi Aphane	DOE
Thabang Audat	DOE
Ria Govender	DOE
Kannan Lakmeeharan	Eskom System Operations and Planning Division
Callie Fabricius	Eskom Planning and Market Development
Mike Rossouw	Xstrata
Ian Langridge	Anglo American
Brian Day	Exxaro
Piet van Staden	Sasol
Kevin Morgan	BHP Billiton
Roger Baxter	Chamber of Mines
Doug Kuni	SAIPPA
Paul Vermeulen	City Power
Prof. Anton Eberhardt	UCT Graduate School of Business
Shaun Nel	Project manager

The task team members were apparently required to sign confidentiality agreements and are expected to participate as individual experts, rather than as stakeholder representatives. Not surprisingly the composition of the task team has been criticised for the extent to which energy intensive users are represented, as compared to say aspirant renewable energy IPPs.

The task team is required to produce a technically competent and credible IRP that considers principles of electricity sustainability, affordability, accessibility, security of supply and environmental impact. Furthermore, the task team is required to develop a stakeholder strategy and plan for implementation by the DoE. Finally, they must develop, where necessary, a position around the legislative and regulatory framework that would be required to implement the IRP. (Yelland, 2010)

Modelling

The task team appears to be making concrete progress and issued a substantial stakeholder pack in June 2010 containing its views on the various input assumptions that will drive the model and calling for stakeholder inputs. The following table lists the areas covered in this phase of the consultation process. (DOE, 2010a)

Table 14 IRP input assumptions.

Parameter	*Owner*	*Key Effects*
1 Discount rate	NT	Price cone
2 Demand	DOE	Security of supply
3 Energy Intensity (Long)	DTI	Security of supply
4 Energy Intensity (Short)	DOE	Security of supply
5 Economic multipliers	Planning	Key Outcome
6 Rate of Exchange	NT	Price cone
7 Inflation	NT	Price cone
8 GDP	NT	Price cone
9 Cost of energy not served	DOE	Security of supply
10 Price Elasticity	NT	Price cone
11 DSM	DOE	Security of supply
12 EE	DOE	Security of supply
13 DMP	SO	Security of supply
14 Conservation	DOE/Nersa	Security of supply
15 Gx Mix Parameter	DOE	Price cone
16 Cogeneration	DOE	Price cone
17 Nuclear	DOE	Carbon
18 Funding / Financing	NT	Price cone
19 Reserve Margin	DOE	Security of supply
20 Own Generation	DOE	Price cone
21 Gx Lifecycle Costs	DOE	Price cone
22 Imports	SAPP	Security of supply
23 Price cone	DOE	Key Outcome
24 Renewables	DOE	Carbon
25 Water	DWAF	Externality
26 IRP 2010 Approach & Methodology Overview	DOE	Governance
27 IRP Consultation Plan	DOE	Governance
28 Carbon & Climate Change	DEAT	Carbon
29 Carbon taxes	DEAT	Carbon
30 Distribution	DOE	Externality
31 Base Scenarios	DOE/Nersa	Key Outcome
32 Gx Location	DOE	Externality

Draft integrated resource plan

On 9 October, 2010 the DOE published its draft integrated resource plan for public comment, three months behind the original schedule and one month behind the adjusted schedule. The draft IRP consists of three documents:

- A detailed plan of 83 pages covering the period 2010-2030;
- An executive summary of 46 pages; and
- A 22 page medium term risk mitigation plan for the period 2010-2016.

Time does not permit a detailed evaluation of these documents, but suffice to say that the process has opened up generation planning to an unprecedented level of transparency and civil consultation.

Summary

DOE's second-round implementation of the IRP appears to be following a broad and welcome process of consultation. The timelines has inevitably slipped, given the complexity of the process and the extent of uncertainty about many of the key input assumptions, but there is little doubt that the process has promoted a far deeper and broader understanding of the issues than has been the case in the past.

The involvement of Eskom's system operator in the task team suggests that the approach defined in the Newgen Regulations has been followed to some extent. However, the heavy reliance on Eskom's system operator and the apparent bias in the composition of the task team will inevitably leave question marks over the outcome.

The finalisation of the IRP will be an important step towards the establishment of a more robust and functional governance system for the ESI. However, as the draft IRP documents themselves make clear, it is just one component of a much broader set of changes that need to be undertaken.

6.4 Allocation of new build opportunities

Allocation of responsibility to undertake feasibility studies

It has already been pointed out in section 5.4 that there does not appear to be a legal mechanism in place to allocate the responsibility for conducting feasibility studies on public/private allocation of new-build opportunities to Eskom's system operator. Perhaps this is appropriate since such studies are notoriously difficult to undertake and Eskom's system operator would face an obvious conflict of interest when performing such studies. Incumbent monopolies are not well known for concluding that the private sector can do the job better than they can. If this were the case we would probably have seen a few more IPPs come into being during the past decade.

Can the regulations be implemented?

Practically speaking it is difficult to see how any system operator (whether Eskom's or an ISO) should apply the criteria defined in the Newgen Regulations.

For instance, criteria 4.(2)(c) requires the system operator to consider 'the demonstration of the anticipated value for money to be achieved by the IPP'. Since value for money necessarily entails a comparison between alternatives the system operator will have to compare the options of:

1. Eskom building the new generation capacity;

2. Another state owned enterprise building the capacity;
3. An IPP building the capacity.

Since this stage of the process must, by definition, be conducted prior to any procurement exercise, the nature of the IPP alternative will be ill defined.

In some cases, such as co-generation projects, or regional hydro projects, it is highly unlikely that Eskom would ever be afforded the opportunity to undertake the project. Hence there would appear to be little purpose in even conducting a feasibility study to determine whether the project should be conducted by Eskom or another entity.

One interviewee indicated that Eskom has written to the DOE to request clarity on the criteria and the manner in which these feasibility studies will have to be implemented, but had yet to receive an answer.

Decisions for the IRP1 period

As described in section 4.4 IRP1 provides for a number of IPP programmes, including the DOE's peaker procurement, Eskom's MTPPP programme and the proposed REFIT programme.

It is interesting to note that neither Eskom's PNCP (cogen) programme or its multi-site base load independent power producer programme are listed in IRP1 - and can therefore presumably be regarded as scrapped?

It is also interesting to note that IRP1 provides for Eskom's Sere wind project and concentrating solar (CSP) project. By comparison capacity contributions from the REFIT programme are not described at project level but as an aggregate. This mixture of project (Eskom) and programme (presumably IPP?) is somewhat confusing.

The obvious question arises as to whether the System Operator has in fact performed the necessary feasibility studies to justify the decision to allocate REFIT and MTPPP procurement programmes to IPPs and, if not, on what basis Eskom, or any other buyer to be nominated by the Minister, would enter into a PPA with the project owners? It would seem highly unlikely that Eskom's system operator has conducted such studies, since Eskom only recently asked DOE to clarify the issue and there has been no public consultation on the matter or any determinations gazetted by the Minister. Nonetheless, as described earlier, Eskom has already announced that it is only awaiting Nersa approval before it signs the first PPA under the MTPPP.

Given that the MTPPP is a limited, once-off programme the risk of legal challenge is probably quite low. The same cannot be said for the REFIT programme through, where government decisions are likely to be hotly contested – particularly if Eskom projects are seen to be getting privileged access to REFIT tariffs.

Decisions for the IRP2 period

Eskom has frequently pointed out of late that a decision needs to be taken in the course of 2010 as to who will be responsible for developing the next base load power station to come on line after Kusile. The deferral of the promulgation of IRP2 to November leaves little time for the completion of feasibility studies before the end of the year. Unless the task team intends for IRP2 to simultaneously deal with the allocation issue?

Potential limitation on future change of ownership?

Eskom is presently investigating the potential sale of a portion of Kusile power station, plus various other possibilities for raising much needed equity. At this stage there appears to be no

legal impediment to the state agreeing to the sale of a portion of Eskom's assets, including possibly the sale of a controlling stake in one or more power stations.

Whilst the sale of power stations from public to private interests, or vice versa, is an entirely normal matter in most parts of the world the Newgen Regulations appear to raise the possibility that such sales would, in future, require the consent of the Ministers of Energy and Finance if the relevant power station had been the subject of a feasibility study and related determination. The Newgen Regulations are silent on this matter.

Alternative approaches

If indeed DOE are considering revising the Newgen Regulations then this may be an opportunity to allocate responsibility for undertaking such studies to a more appropriate and neutral agency?

For instance, National Treasury's Public Private Partnership (PPP) Unit has considerable experience with the design, evaluation and implementation of various infrastructure-related PPPs, including power projects, in terms of the PPP Regulations. Whilst an IPP is not strictly a PPP (since generation is not automatically a state function) the basic issues remain the same.

Nersa may be another alternative.

Yet another option may be to review whether the Allocation function is necessary and/or feasible? For instance it may be possible to implement a more market-based approach to ensuring that power projects are developed and commissioned on a timely basis – for at least a portion of the future capacity base.

Stakeholder perspectives

The existence of the feasibility study phase does not appear to have been widely recognised, with very few commentators having expressed public views on the matter. Only a few of the interviewees were aware of this requirement in the Newgen Regulations. All of these individual expressed concern about the practicality of implementing this function. No alternatives were suggested.

6.5 Procurement of IPPs

Allocation of the function

DOE's predecessor DME has previously launched an IPP procurement process in terms of the executive authority granted to the Minister by the Electricity Regulation Act. However, that process preceded the Newgen Regulations. It is unclear whether the existence of the Newgen Regulations precludes DOE or Eskom from initiating IPP procurements outside of the process envisaged in the Newgen Regulations?

Relevant procurement procedures

South Africa has well developed law, regulations and court precedents around public procurement. As a state owned entity governed by the Public Finance Management Act (PFMA) Eskom is very familiar with this framework and regularly enters into major contracts, including PPAs with other national entities.

Nonetheless, Eskom has yet to conclude a significant PPA and the suggestion has therefore been made that National Treasury's PPP Unit could perhaps play the role in facilitating or running such procurements. Discussions with Treasury's PPP Unit indicate that the unit would

prefer to assist Eskom or the ISO with the process, rather than take responsibility for leading the process.

Stakeholder perspectives

All interviewees acknowledged that until the ISO is created Eskom will have to play a significant role in IPP procurement processes, for the simple reason that this is an urgent matter and there is no obvious alternative institution to perform the function. All interviewees were also clear that the conflict of interest was a serious problem which needed to be resolved as rapidly as possible.

6.6 System operator of the national grid

Stakeholder perspectives

All interviewees were positive about the prospect of an independent system operator, on the grounds that this was a prerequisite for competition and the entry of IPPs.

Interim arrangements

It is broadly agreed that new legislation will be required to establish the ISO. DOE anticipates that it will take at least two years to pass the legislation, establish the new state owned entity and transfer the relevant SO capacity out of Eskom into the new entity. Eskom will have to perform the System Operator function in the meantime.

6.7 Owner of the transmission system

Stakeholder perspectives

Interviewees had conflicting views on the desirability of transferring ownership of the transmission system (as opposed to control of the system) to the ISO. The majority of interviewees took the view that the ISO should also take ownership of transmission assets. This view stemmed mainly from a concern that Eskom may use its influence over the transmission system to hinder the entry of IPPs, or to facilitate its own generation projects. However, some interviewees were concerned about the potential impact on Eskom's balance sheet and associated credit rating in the short to medium term as the utility struggles to raise debt for its capital expansion programme.

Scale of transmission assets

A review of Eskom's balance sheet in the 2010 annual financial report indicates that the carrying value of the transmission assets is a mere R10.5 billion compared to the utility's total asset base of R246 billion. This fraction will reduce further in future since the value of new generation assets will far outweigh the value of new transmission assets. The impact of a vertical unbundling on overall asset values is therefore not significant.

Credit risk

Perhaps a more fundamental concern for lenders and credit agencies would be a performance deterioration as a result of the unbundling – since reduced transmission performance could jeopardise Eskom's cash-flows and ability to repay its debt. Whilst this would be an understandable concern the establishment of an ISO could also affect Eskom's cash flows, and there does not appear to have been any negative response on the part of lenders to government's announcements in this regard. Vertical unbundling is a fairly common event

internationally. As long as it is well managed it is unclear why this should present an insurmountable obstacle to lenders.

International experience

The concept of an independent system operator (separate from the transmission owner) became particularly popular as a result of a ruling by the Federal Energy Regulatory Commission (FERC) of the United States in April 1996. Commonly known as the MEGA-NOPR[6] this ruling aimed to support competition in the wholesale electricity market by requiring public utilities to provide open access and non-discriminatory transmission services. (Hogan, 1996)

A key point to note is that the ISO concept arose from FERC's recognition that it could do little to change the prevailing pattern of ownership of grid assets, and was therefore limited to focussing on the control of those assets.

By contrast, the United Kingdom did not face such a constraint when it implemented its electricity market reforms in March 1990, since the entire transmission system fell under the publicly owned Central Electricity Generating Board (CEGB). The UK therefore chose to separate out the transmission system and combine it with the market operator in the National Grid Company. (Steyn, 2001)

In a recent paper titled 'An independent network operator should and can be established for South Africa' Jacobs and Edeson of PA Consulting, together with de Beer from EDI Holdings, make the following observation

> Whether a market operator is organized as a [Transmission System Operator (TSO)] or an ISO has often depended on the ease with which that scale could be obtained – for example, when a national monopoly has been privatized, such as in the United Kingdom, it has been possible to spin off a national TSO. On the other hand, when a large regional market includes several vertically integrated entities, which wish to retain their investments in transmission (or in some cases to transition from generation owners to transmission owners) as well as their independence, it is more common to create an ISO. This has been the case in several regions of North America. In certain circumstances, several generators may decide to pool their transmission assets and dedicated them to a TSO, as for example in Spain. An ISO can also be instituted as a transitional arrangement in the development of a TSO. (Jacobs et al, 2010)

The authors appear to be arguing that ownership and control of transmission assets should preferably be contained in one entity, and only separated when this cannot be achieved. Despite this observation the authors go on to suggest that ownership of the transmission system 'can remain with Eskom' although they also recommend that 'Over the first couple of years, the transmission planning responsibility should shift from Eskom to the ISO' and further that 'at a later date competition to build new transmission lines should be introduced'

Summary

There appear to be arguments for and against leaving transmission assets with Eskom. The UK and Kenyan experiences both suggest that a vertical separation is possible and desirable. The cost of and disruption of such a transfer would appear to mitigate against.

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[6] Federal Energy Regulatory Commission. 1996. Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities & Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, Docket No. RM95-8-000 and Docket No. RM94-7-001, Order No. 888, Washington, DC, April 24, 1996.

The decision should also be seen in light of the challenges facing the transmission network in coming decades. Whereas transmission services in South Africa were previously concerned with the transfer of power from one region (Mpumalanga, the site of most of Eskom's coal-fired power stations) to the rest of the country, the future challenges may be rather different. Firstly, there may be a significant amount of power injected into new locations in the grid as IPPs, imports and renewable power generators begin to play a greater role. Renewable power is particularly challenging for grid operators since it is generally not a dispatchable form of generation and it tends to be located in areas of the country which are not presently well served by the grid – i.e. wind in the Southern portions of the country and solar in the North-West. These factors will require the application of new 'smart-grid' technologies to ensure a stable and reliable system. The question therefore arises whether it is sensible to separate long term grid planning (which must be co-located with long term generation planning in the ISO) from the transmission owner who will be responsible for implementing these plans? Would it not be more effective for both functions to be located in the same body?

6.8 Summary of potential end-state models

6.8.1 Starting assumptions

This section presents possible end-state models for the ISO. As has been pointed out the design of the ISO will be contingent on other factors, particularly government's decision on the structure of the electricity market. For the sake of progress let us assume that some form of single buyer will be adopted, at least for the foreseeable future. Whether IPPs are permitted to enter into bilateral contracts with consumers or not is probably not a deciding factor for the design of the ISO.

Another key uncertainty relates to the implementation of the REDs. In some senses the horizontal unbundling (of Eskom) and bundling (of municipalities into the six REDs) will be a greater organisational task than the vertical unbundling of transmission and the related ISO functions from Eskom. Hence the REDs can be expected to take longer to complete. Nonetheless, the REDs process has already had many years to plan and prepare and may be quicker off the mark. If REDs are to go ahead then the two restructuring processes would need to proceed in parallel. Since there is no clarity as to whether REDs will go ahead or not the end state models need to consider both scenarios.

Engagement with stakeholders and a limited review of the literature suggests that there is general agreement that the functions of Planning, Allocation, Procurement and System Operations need to be extracted from Eskom.

No stakeholder has suggested that these functions should be housed in separate institutions. All stakeholders have instead pointed to the synergies that exist between these functions and hence the logic of containing them within a common institution – the ISO.

There is also general agreement that the Buyer function (whatever that may be) will have to be extracted from Eskom. There is a strong consensus that the Buyer or market function should be housed in the same institution as the preceding four functions. This conclusion is supported up by respected international academics and commentators. Government's use of the term ISMO suggests that Government supports this view.

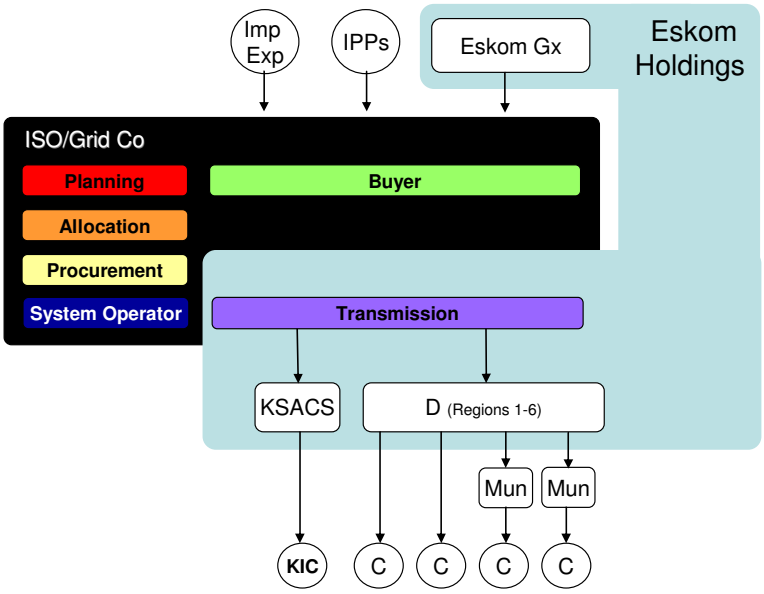
Transmission stands out as the one function then about which there is some dispute or uncertainty. As the previous section has pointed out different countries have adopted different approaches. However, South Africa does appear to be a good candidate for a clean vertical unbundling with Transmission following the other five functions – on the grounds that these are state assets under public ownership and there is no need to follow a sub-optimal compromise to

avoid conflict with owners of private transmission assets. This is perhaps particularly important if South Africa is to follow the hybrid model for an extended period, since access to transmission will be a critical factor in the growth and development of the IPP industry, whether these investments are based on traditional fossil fuels or renewable energy sources. Even if responsibility for long term grid planning is shifted out of Eskom and into the ISO there may still be opportunities for Eskom to favour grid investments which suit its own generation plans, and to slow down investments which are primarily in the interests of IPPs.

6.8.2 ISO models without REDs

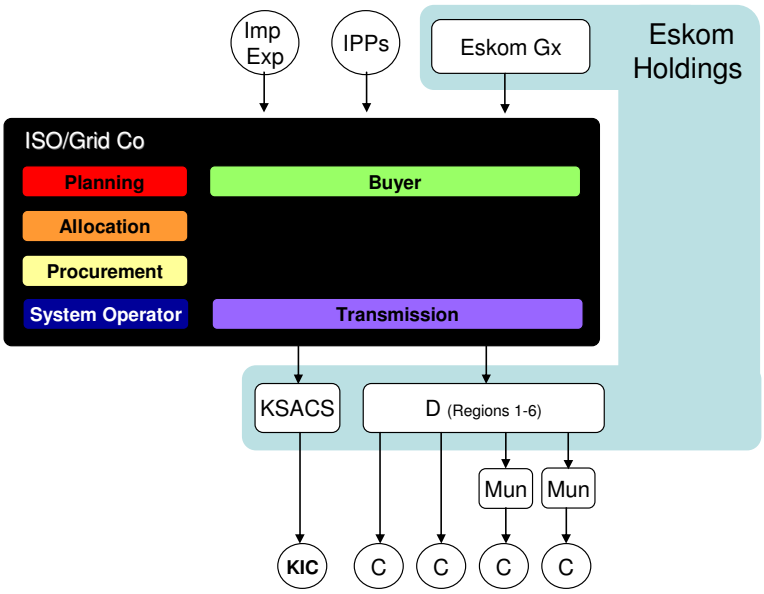
Given the above assumptions, there are two possible ISO implementations without REDs. The first option entails a limited unbundling with transmission remaining with Eskom Holdings. In this option Eskom remains vertically integrated, in the sense that the utility owns generation, transmission and distribution assets, but control of the key functions relating to the stimulation of the IPP market is taken away and placed in the hands of the ISO.

Figure 18 ISO implementation – Limited unbundling, pre-REDs.



The second option entails a full vertical unbundling. In this option Eskom Holdings surrenders control of the Transmission assets to the ISO/Grid company and is no longer a vertically integrated power company.

Figure 19 ISO implementation – Vertical unbundling, pre-REDs.



6.8.3 ISO models with REDs

The same two models may also be implemented together with REDs, as follows

Figure 20 ISO implementation – Limited unbundling, with REDs.

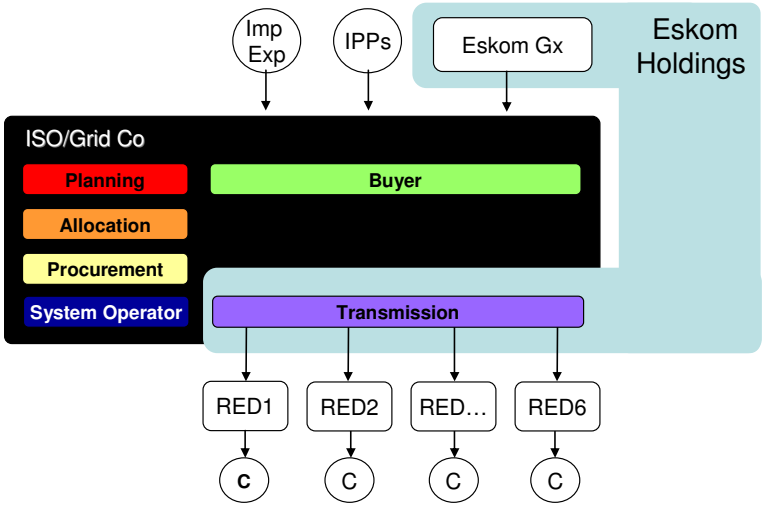
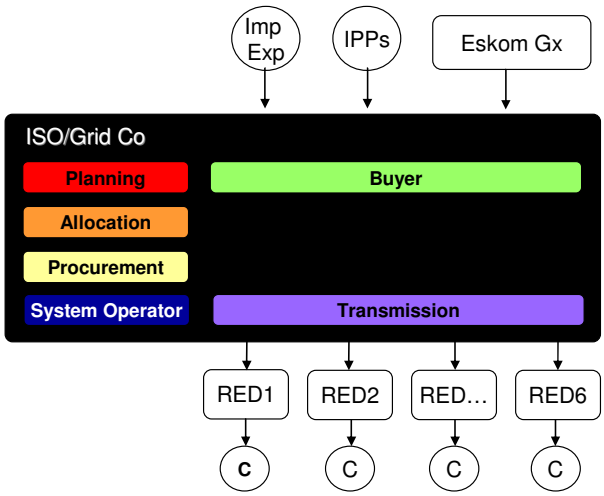


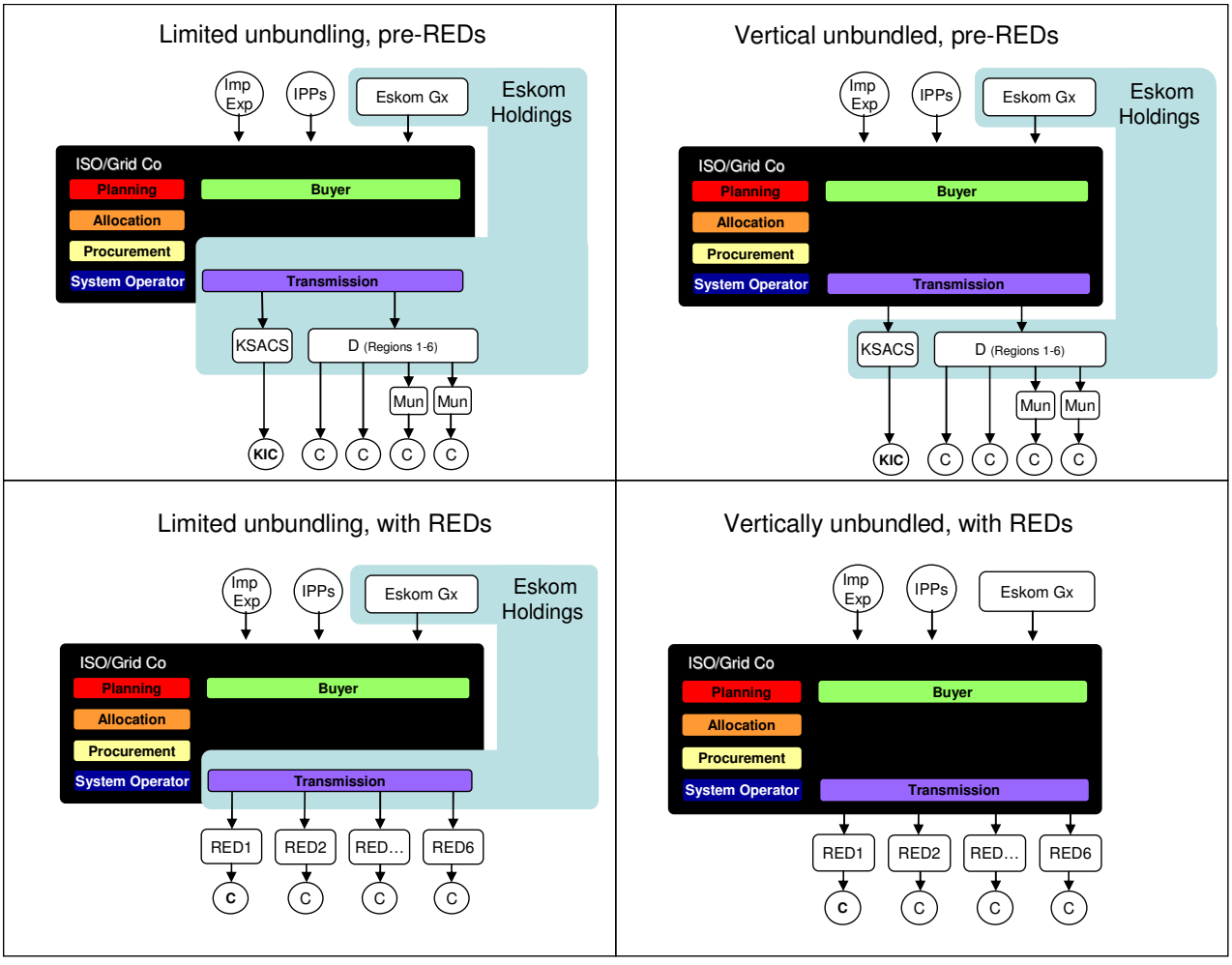
Figure 21 ISO implementation – Vertical unbundling, with REDs.



6.8.4 Comparison of options

The following diagram presents all four options.

Figure 22 Comparison of the ISO implementation options.



Of the four options the bottom-right option is the 'cleanest' and should provide the greatest opportunities for balanced competition within the power market. Of course this option requires the greatest degree of restructuring. Government will need to understand these tradeoffs in some detail in order to take a clear decision.

7 Related Governance and Implementation Issues

7.1 Introduction

Besides concluding on the high-level allocation of functions to the ISO Government must also conclude on various institutional-level factors, such as the governance, funding and regulation of the ISO, and also the practical issues associated with the organisational transition. This section of the report highlights some of the important issues which will have to be dealt with.

7.2 Legal form of the ISO

Some countries have established ISOs and TSOs on a 'for-profit' basis, albeit under strict regulatory regimes. Kenya's KPLC, for instance, is listed on the Kenyan Stock Exchange, although government still holds a majority stake.

Given government's primary motive for restructuring the ESI is to facilitate private investment in the generation sector, rather than the transmission sector, there is no suggestion of privatisation. It is fairly certain that legislation will be passed to establish the ISO (or whatever it will be called) as a public entity in terms of the Public Finance Management Act and to facilitate the transfer of the relevant assets between Eskom and the new entity.

Government has, of late, chosen to draw on the well established framework of the Companies Act and to establish public entities as Public Companies (one of the forms of company under the Act). In Eskom's case its status was amended from a statutory corporation (i.e. governed by its founding Act) into a Public Company. There is no reason to suggest that a different form would be selected for the ISO.

7.3 Regulation of the ISO

As a natural monopoly the ISO will of course be subject to regulation by Nersa to ensure that it complies with the applicable standards and earns appropriate returns.

Nersa will need to licence the ISO and will have to develop a suite a new regulations to provide it with the appropriate incentives, checks and balances.

7.4 Funding of the ISO

The ISO will sit in the industry value stream (either the entire value stream or at least a significant portion of it) and should therefore be self-funded on the basis of its wholesale tariff to distributors, its network charges (if it owns the transmission network) and various other functions, depending on how the market is structured. No public subsidy should be required, other than the opening balance at establishment.

Careful analysis will be required to ensure that the ISO is appropriately capitalised at the outset. There may well be an initial requirement for some form of government guarantee, if the ISO is to build up reserves over time.

Careful thought will have to be given to the risk allocation between the ISO and IPPs, on the one hand, and the ISO and distributors and consumers, on the other. The ISO's balance sheet

will be relatively small in comparison to the rest of the industry, particularly if transmission is not included in its functions. The ISO should be able to withstand any potential payment defaults by its customers.

7.5 Governance of the ISO

Meaning of governance

Governance can be thought of broadly – as the set of legislation, regulations and incentives within which a body such as the ISO will operate – or more narrowly – as the system by which decisions are made and implemented within an organisation. This section of the report is concerned with the latter perspective.

International perspectives on governance

Governance is critical, as the state of California discovered in the mid 1990's when a failed governance system led to inappropriate decision-making and widespread blackouts.

Prof Hogan makes a compelling argument that the choice of governance system should be informed firstly by the functions that the institution is expected to perform. The following text was written in 1996 when the US was first considering the introduction of ISOs and indicates the wide range of options that were under consideration,

> **Evaluating ISO Governance Structures**
>
> The roles and responsibilities attributed to an ISO narrow the field of feasible options for any particular ISO governance structure. For example, if an ISO is to be a regulated private, for-profit single-owner transmission system, it would not make sense to call for multi-party governance structure. Or, the ISO might not own any part of the transmission system, leaving that responsibility with current (integrated utility) owners and asking the ISO only to operate those systems (as with California's proposal, described above). Alternatively, the ISO could lease transmission facilities from utility owners. As another option, the ISO could build and own only new transmission facilities.[66] Finally, utilities could be required to divest transmission assets and have a public or private entity own them outright (as suggested by Alan Richardson of the American Public Power Association). These different ownership responsibilities have different governance implications.
>
> The ISO's relationship to electricity markets is another example of a role which would affect an ISO's governance structure. The extent to which these should work cooperatively is open to debate. Some have argued that the only way to make an ISO serve competition would be to completely remove it from electricity markets - its responsibilities would be limited to responding to the demands of those who submit firm bilateral contracts and to maintaining system reliability. Others have argued that the only way (due to the physical laws that govern electricity movement) to create efficient electricity markets is to have an ISO match bids from buyers and sellers, determine and impose congestion costs, and dispatch generators accordingly. Bridging these two proposals are those who suggest that a spot market for power be established by a power exchange (PX) that maintains links to the ISO (as in California). The geographic size of an ISO's control area and the ISO's transmission planning responsibilities also could affect ideal governance options. Ultimately, the roles assigned to an ISO must be considered in the formulation of its governance structure. (Hogan, 1996)

The Federal Energy Regulatory Commission (FERC) went so far as to propose 11 principles to guide the establishment of ISO governance systems at state or regional level. (See Appendix A).

Based on US experiences various other countries and regions went on to implement ISOs (and independent market operators) with varying governance arrangements. In 1997 the World Bank commissioned a review of four non-US power pools to compare these systems and draw some lessons for general use. (Barker, Tenenbaum & Woolf, 1997) These pools were in England and Wales, Victoria (Australia), Alberta (Canada) and Scandinavia (Norway and Sweden). Although the World Bank report focussed on the governance of power pool operators the authors make the point that

> … in almost every instance, the discussion would apply equally well to system or grid operators. In fact, in all four cases the power pool operator is also the real-time system operator, either directly or indirectly through an affiliate or a hired agent. By and large, there were no debates similar to the debate that took place in California about the need to separate the system operator from the pool operator. Outside the United States, it is generally assumed that the pool operator and the system operator should be one and the same or affiliated entities. Consequently, even though most examples are drawn from power pools, the paper is really an examination of governance and regulation for both pools *and* system operators. (Barker, Tenenbaum & Woolf, 1997)

The authors identify four basic governance models, as follows:

> **Model 1. A Multi-Class Stakeholder Board**
>
> A multi-class stakeholder board is the club or legislative approach to governance. In its governance structure, most or all classes of users and owners are represented on the governing board. It is designed for collective, self-governance by all who participate in the market. Collective governance tries to achieve independence through voting allocations and rules that attempt to balance the often conflicting interests of different classes. It has been described as 'independence by diffusion,' but will fail to achieve independence if one company or one class has the voting power to block actions that everyone else supports.
>
> **Model 2. A Non-Stakeholder Board**
>
> A non-stakeholder board tries to achieve independence directly. The board is not meant to be a representative board. Board members are explicitly prohibited from having current or future financial interests in any market participants. The goal is to create a board that will represent the broader 'public interest,' not the commercial interests of any particular market participant. Board members are usually required to have professional qualifications and experience that are relevant to the activities of the pool. The principal danger of a non-stakeholder board is that it can become isolated and politicized. To minimize this problem, Victoria combines Models 1 and 2 in a two-tier approach to governance (see below).
>
> **Model 3. A Single Class Board**
>
> In a single class board, one class controls decision making. This has been the historic model for most of the old style tight power pools that have operated in the United States. It is also the current approach in Chile where the largest pool is effectively a club of large generators. Single class domination can be achieved directly by simply limiting voting membership to a one class. It can also be achieved indirectly by giving independent decision-making authority to committees

dominated by one class or by allowing the favored class to select 'independent' board members who are not really independent.

Model 4. A Single For-Profit Corporation Not Affiliated With Market Participants

Most power pools around the world are organized as non-profit associations or corporations owned or controlled by some or all market participants. An alternative is to create a single for-profit corporation not affiliated with any market participants. If this approach is adopted, governance becomes an internal corporate matter for the profitmaking corporation. The Nord Pool comes closest to this approach. It is a for-profit corporation that is indirectly owned by the governments of Norway and Sweden. Thus, it is probably not a good example of the for-profit governance model because government policies are likely to affect corporate decisions directly. (Barker et al, 1997)

Implications for South Africa

The World Bank typology demonstrates again the wide variations in governance systems that have evolved for this kind of institution. Whilst the analysis is now over ten years old the insights remain relevant for South Africa, since we are still at an early stage of the process.

Assuming that government has no intention of breaking up Eskom's generation assets, the ISO will be faced with a supply market in which Eskom has a very dominant position. Even if government applies its policy that IPPs should construct 30% of new capacity Eskom will remain the dominant player for many decades to come. This reality makes the third model (whereby multiple generators appoint the board) a non-starter, since Eskom would dominate the board.

The first model, whereby multiple classes of stakeholder appoint the board, is also impractical. If REDs are not implemented then Eskom will remain a dominant player at the distribution/retail level of the industry. Even if REDs are implemented it is possible that Eskom may have a significant or controlling ownership interest in each RED. The only 'class' in which Eskom would not have a direct or dominant interest would be consumers – although the argument could be made that Eskom's interests are closely aligned to the interest of large electricity consumers.

The fourth model can probably be dismissed out of hand, as the privatisation of the market operator is even less likely than the privatisation of Eskom itself.

This admittedly brief analysis leaves the second model as the only likely option. Fortunately the concept of expert or independent boards is a well established principle for South African public entities, with Eskom itself falling into this category. It is therefore likely that government will follow this route, and indeed all interviewees expected this to be the case – although the statement by the DOE's Director General that 'The company's board will include municipalities, the private sector and government' (Bloomberg. 13 September, 2010) suggests that government may be intending to follow the stakeholder route.

One interviewee did point to the difficulty of locating individuals in South Africa who have both the requisite expertise and no commercial interests in the sector. There is some validity to this point. Academics and consultants may not have a direct interest in the industry but will often consult to one or other party. IPP staff may have sound knowledge but will certainly have an interest. Power consumers will also have particular interests. A balance will have to be found which maximises expertise and minimises conflicts.

Government may also want to deliberately legislate for advisory structures or systems which ensure that the expert/independent board is obliged to consult with stakeholders on certain matters. This may be similar to the Victoria model noted in the World Bank report which

combined models 1 and 2, or it could be based on systemised consultation – such as Nersa's consultative obligations when making a new ruling.

7.6 Limits of discretion

As in the past the DOE will continue to define government policy for the electricity sector and Nersa will continue to develop and apply detailed regulations to support this policy. An important governance design question then is the limits of discretion for the ISO board. For instance, to what extent may the ISO board experiment with market rules, if not new forms of power markets? For instance, the ISO may be mandated to achieve a particular level of security of supply. In the course of its duties it may discover untapped demand-side opportunities, or require particular ancillary services. Will the ISO Board have the discretion to evolve the market? Or will this remain DOE's prerogative? Or Nersa's?

7.7 Interim arrangements

The resolution of the outstanding policy issues and their translation into legislation will clearly take some time. In the meantime there is a critical urgency to stimulate IPP investment in new capacity. Some form of interim arrangement is therefore required. Three options appear to be under consideration:

Interim ISO as a division of Eskom Holdings: This option requires the least effort, but has all the disadvantages of the present system;

Interim ISO as a subsidiary of Eskom Holdings: This option would create the opportunity to add additional minority shareholders (e.g. National Treasury to hold 25%) and to co-opt independent directors into the governance structure of the SO. Eskom's articles, memorandum of association and shareholders agreement could perhaps be tweaked to ensure a degree of independence? However, Eskom would still be in a position to exert ownership control over the SO, amongst other forms of control; or

Interim ISO as a separate company, established prior to founding legislation: This option could be used as a way to separate just the IPP procurement function out of Eskom, without shifting the Planning, Buying, System Operator or Transmission functions just yet.

At this stage DOE appears to favour the third option as the best way to build market confidence in the IPP procurement processes. By contrast Eskom appears to prefer the first option, with one official going on public record to this effect. (Engineering News. 2010, 22 July)

A decision on the interim arrangements will need to be pragmatic, and should not divert from the main debate about the long-term solution.

7.8 Summary

This section of the report has touched on some of the institutional factors which will have to be resolved before the ISO can come into being. It may be tempting for government and stakeholders to focus on these issues – such as the design of the interim arrangements and the composition of the governing board – but this could be a dangerous distraction from the more fundamental decisions relating to the design of the future electricity market and the allocation of functions between the various players.

8 Conclusions and Recommendations

8.1 Conclusions

This report set out to explore the key functions that an ISO would need to perform and to recommend a preferred option for South Africa, based on international experience and the particular challenges facing the country.

Before presenting specific proposals in this regard it may be useful to conclude on the problem statement which this institutional reform is seeking to address.

8.2 Towards a problem statement

Nature of the problem

On the surface the nature of the problem is fairly evident. Inadequate generation planning systems, a failure to implement proposed sector reforms to admit IPPs and delayed decisions on Eskom's proposed new-build programme all led to a dangerous decline in the system reserve margin over the course of the late 1990s and early 2000s. Coupled with an inexplicable mismanagement of Eskom's coal procurement programme this situation led to an inability to meet demand and widespread load shedding in early 2008. Although the recession brought Eskom a few years of relief, similar shortages are likely to recur in coming years.

On the financial front the long period of reductions in real price levels left South Africa with extremely low electricity tariffs, and Eskom with inadequate financial reserves to complete its capital expansion programme or confidently contract with IPPs. This problem was aggravated by ongoing escalations in the cost of Eskom's build programme and the difficulty of securing both equity and debt funding in the post-recession climate.

Despite the dramatic tariff hikes which Nersa has granted in recent years it appears that further hikes will still be necessary to achieve the financial sustainability of the sector and enable further public and private investment in new capacity.

Although both Government and Eskom continue to make positive statements about the need for IPPs to enter the sector, through both conventional and renewable power projects, progress has been painfully slow. Without clear signals as to the nature of the future power market private developers are understandably reluctant to invest significant resources in the expensive business of project development. It could even be argued that uncertainty about government policy is also holding Eskom back from developing new projects.

Compounding these sector-level challenges are a broader set of national debates concerning:

- the country's response to climate change, and the scale and timing of the power sector's contribution towards a lower-carbon future;
- the impact of coal-based emissions on the natural environment in certain parts of the country;
- the impact of coal-related acid mine drainage on certain catchments;
- the extent to which power plants may make further use of scarce water supplies;
- the potential contribution of the power sector to upstream industrialization programmes, through local procurement, the development of the nuclear fuel cycle, and the development of renewable energy component-supply industries; and

- the impact of rising electricity prices on consumers generally, and poor households and energy-intensive industries in particular.

Whilst these sectoral challenges may be evident the question remains as to what underlying factors led to them becoming so acute? In my opinion the contributing factors have been:

- Poor governance of the sector, particularly the unclear allocation of responsibility for new generation capacity planning and the associated responsibility for ensuring security of supply;
- A misguided regulatory strategy which maintained tariffs at too low a level for too long, possibly due to inadequate insight into the challenges facing the sector or political pressure to preserve this so-called competitive advantage for grand industrial schemes;
- A general lack of transparency about the performance of the sector;
- Inefficiencies within the current industry structure, potentially attributable to a lack of competition; and
- The clear conflicts of interest between Eskom's various roles as a generator, planner, system operator and procurer of new capacity.

Whilst the establishment of an ISO cannot in itself address all these factors, there is certainly reason to hope that it could address some of them to a significant extent. The simple existence of a second centre of well-resourced and publicly minded expertise should, in itself, help to balance out the severe asymmetry of information and market power which presently prevails within the sector.

Drivers for change

As noted earlier, various commentators, government studies and government policies have proposed power sector reforms in the past, including the establishment of an ISO, all to no avail. It is therefore necessary to ask whether this latest proposal is likely to succeed where others have failed? Three key drivers may be identified which have perhaps not existed in the past.

4. Firstly, the country's ***security of supply*** has been compromised, and there is every indication that it will be compromised further in coming years. This outcome has fundamentally shaken government's and consumer's faith in Eskom. This loss of trust appears to have led to a willingness to consider alternative arrangements to a greater extent than in the past.
5. Secondly, the extent of ***Eskom's funding problems*** clearly indicates that the utility simply cannot continue to take sole responsibility for building the country's future generation capacity. With this realisation comes the inevitable question of how the power market should be structured in future? How should new entrants gain access to this market? And what governance and regulatory arrangements will best ensure adequate investment in the development and construction of new capacity in good time to maintain a healthy reserve margin. In short, what are the minimum requirements that will enable IPPs to invest in this market?
6. Thirdly, the challenge of ***climate change*** and other ***natural resource constraints*** has now grown to such a level that South Africa has little option but to commit to national targets and implement real plans to achieve these. Global experience with renewable power producers is that such projects tend to be much smaller than conventional coal and nuclear power plants and are therefore best undertaken by more nimble private entrepreneurs, rather than

large state owned enterprises. The opening up of the power market is a pre-requisite to such investments.

While the first two drivers may well be resolved in time, the third driver will persist for the foreseeable future. There can be little doubt that the establishment of an ISO could make a significant contribution towards addressing these challenges and facilitating the necessary investments in both supply-side and demand-side initiatives to meet the short and long-term challenges facing the sector. However, an ISO will still require sound policy frameworks and effective governance and regulation in order to succeed. Establishment of an ISO will not be grounds for government to abdicate its responsibility as policy maker, as it appears to have done for much of the past decade.

8.3 State of the policy process

Whilst there is general consensus that some market reform is necessary the debates are still at an early stage and most stakeholders have yet to form a view. Government has yet to consult on the details of these reforms beyond a very narrow internal circle and there appear to be significant differences of opinion within government – so perhaps it is best that these are settled before the issue is taken to the broader public.

The scale or scope of the intended reform is presently unclear in at least three important respects.

4. Firstly, it is unclear how far government wants to go with reforms to the ***wholesale power market***. Reforms could be limited to margin through the procurement of a few IPPs – i.e. limited competition for a limited market. Or the reforms could be broader and enable IPPs to sell directly to willing buyers. This choice may impact on the Buyer or Market Operator function that the ISO must perform. This broader policy decision must be taken before the institutional design of the ISO can be settled.

5. The second key uncertainty relates to the ***establishment of the REDs***. Whilst government has repeatedly recommitted itself to the reorganisation of the distribution sector little or no practical progress has been made on the ground. If in fact REDs are to be established then this should have a direct bearing on the future functioning of the ISO, since it will have to deal with multiple, independent buyers, each capable of contracting directly with generators. In such an event there may be no need for the ISO to play the role of a Single Buyer which would relieve it of one of the six potential functions.

6. The last key uncertainty relates to the future of the ***transmission system***. DOE officials have suggested that the establishment of the ISO should involve a full vertical separation of the transmission grid from Eskom's generation and distribution functions, even if this takes years to achieve. Eskom has, not surprisingly, tended to focus on interim measures based on unspecified forms of 'ring fencing' which look suspiciously like the status quo.

At the time of writing (October 2010) government's announced intention to establish an ISO is still relatively young in policy terms. This will be a complex process which cannot be allowed to worsen the industry's already poor health. That said, it would be irresponsible of government to stand idly by and watch this important sector slide still further into the mire. Something needs to be done – and there is sufficient consensus that Eskom's grip on the sector is untenable and needs to be reformed. All that remains is to agree on the functions that the new entity should perform and to put it into practice.

Before embarking on any institutional reforms government should bear in mind the experience of the last decade of fruitless distribution RED reforms. It is crucial to get the policy right at the

outset. Incomplete policy frameworks can only lead to resistance from industry incumbents and other stakeholders.

8.4 Recommendations

The following recommendations are based on the findings of this report. These recommendations are intended as a contribution to the public debate and should not be seen as complete or prescriptive.

Electricity sector policy

Government should reach a clear and comprehensive view on the future evolution of the ESI in South Africa and publish this in an appropriate format – such as a White Paper on Electricity.

In particular this paper should clarify government's desire or otherwise for competition at wholesale and retail level, and the degree of vertical and horizontal restructuring that will be undertaken to facilitate such competition. If government intends to follow a hybrid model with competition limited to marginal IPP investments then the terms of such participation need to be defined and clarified.

The long-standing impasse over the REDs needs to be resolved. If this issue cannot be resolved then the functions of the ISO may have to be adjusted over time when EDI reform finally gets underway.

Market structure

A Single Buyer should be established as part of the ISO, and as a transition towards government's long term vision for the ESI market structure.

The Single Buyer should, preferably from the outset, allow willing buyers to enter into bilateral, wheeled power purchase agreements with IPPs.

Transmission

Government should give serious thought to the option of a full vertical restructuring of the industry, by shifting the ownership of transmission assets out of Eskom and into the ISO – effectively making it a full Transmission System Operator (TSO). There does not appear to be any fundamental obstacle to taking this step, and there appears to be significant evidence that such a step will improve the prospects for competition in the long term.

Planning, allocation and procurement functions

The ISO should also house the Planning, Allocation and Procurement functions. The integration of these functions into one specialised utility, along with the Buyer function, will avoid inter-organisational communication problems and concentrate scarce expertise in a productive manner.

Nature of the allocation function

The concept of Allocation should be reviewed to establish whether it is practical for the ISO to make such determinations. Alternative mechanisms such as compulsory competitive tendering for all new capacity (other than perhaps nuclear plant) should be considered.

ISO legislation

The ISO should be created by legislation as soon as practically possible. This legislation should provide for the transfer of the relevant assets, staff, contracts and functions from Eskom to the new entity.

Newgen regulations

The new ISO legislation should replace the Newgen Regulations in their entirety.

Certain elements of the Newgen Regulations may need to be amended prior to the advent of the new legislation.

ISO governance

The ISO should be established as a Public Company under the Companies Act.

The institution should be governed by a board of independent experts with minimal conflicts of interest.

The board should be mandated to establish appropriate stakeholder consultation mechanisms.

The board should be granted adequate discretion to evolve the market rules and market structure, within the broad mandate of government policy and the specific rules of the regulator.

Interim arrangements

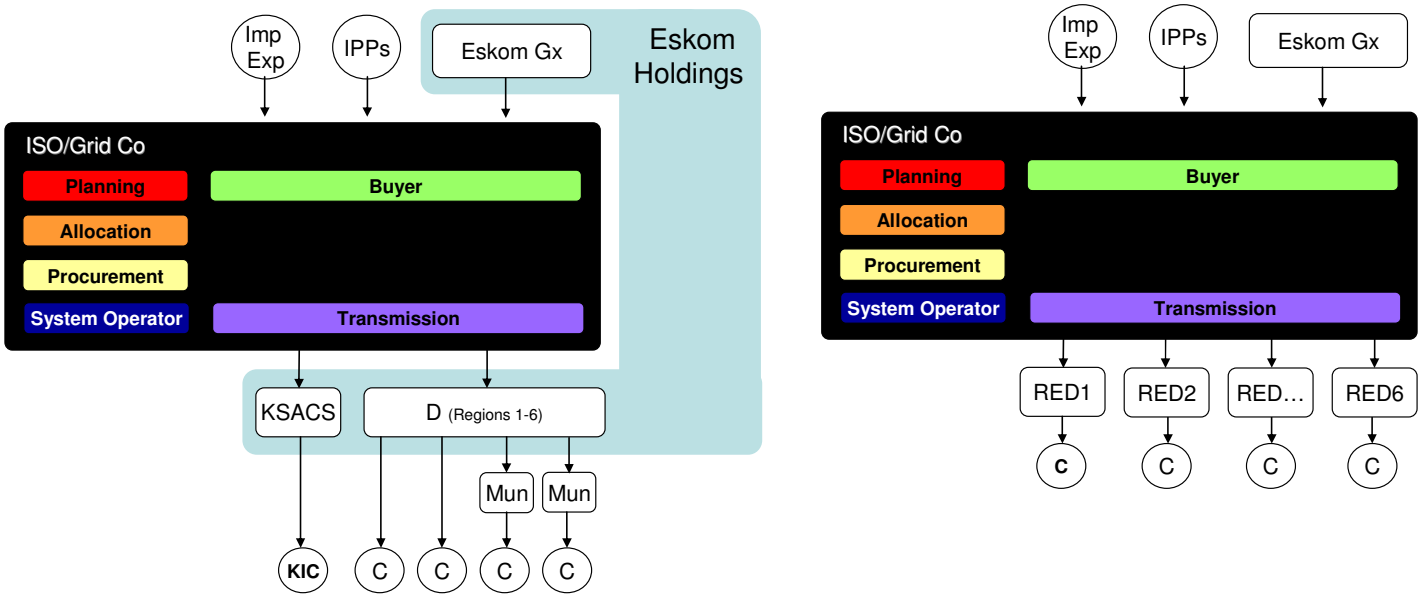
Debate over the nature of interim arrangements must not be allowed to delay the resolution and implementation of the ISO-proper.

Where practical independent or neutral governance arrangements should be introduced for those ISO functions where Eskom faces the greatest conflict of interest – namely Planning, Allocation and Procurement.

Summary of the recommended model

To summarise, the recommended functions for a South African ISO will depend on broader policy decisions on the nature of the wholesale market, the establishment of REDs and the extent to which they will access the wholesale market (directly or via a single buyer) and the future ownership of the transmission system. It is beyond the scope of this report to reach firm conclusions on these issues, but on the face of it there appears to be a strong case for vertical disaggregation of the industry and the establishment of a full transmission system operator (TSO). The following diagram depicts the recommended model, depending on whether EDI reforms go ahead and REDs are established or not.

Figure 23 Recommended ESI model incorporating the ISO – Pre-REDs and post-REDs.



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Appendix 1: FERC's Proposed Principles for Independent System Operators

FERC Order 888. April 24, 1996. (Extract from pp. 279-286)

Docket Nos. RM95-8-000 and RM94-7-001

The Commission recognizes that some utilities are exploring the concept of an Independent System Operator and that the tight power pools are considering restructuring proposals that involve an ISO. While the Commission is not requiring any utility to form an ISO at this time, we wish to encourage the formation of properly-structured ISOs. To this end, we believe it is important to give the industry some guidance on ISOs at this time. Accordingly, we here set out certain principles that will be used in assessing ISO proposals that may be submitted to the Commission in the future.

These principles are applicable only to ISOs that would be control area operators, including any ISO established in the restructuring of power pools. We recognize that some utilities are exploring concepts that do not involve full operational control of the grid. Without in any way prejudging the merits of such arrangements, the following principles do not apply to independent administrators or coordinators that lack operational control. We do not have enough information at this time to offer guidance about such entities, but recognize that they could perform a useful role in a restructured industry.

Because an ISO will be a public utility subject to our jurisdiction[7], the ISO's operating standards and procedures must be approved by the Commission. In addition, a properly constituted ISO is a means by which public utilities can comply with the Commission's non-discriminatory transmission tariff requirements. The principles for ISOs are:

1. The ISO's governance should be structured in a fair and non-discriminatory manner.

The primary purpose of an ISO is to ensure fair and non-discriminatory access to transmission services and ancillary services for all users of the system. As such, an ISO should be independent of any individual market participant or any one class of participants (e.g., transmission owners or end-users). A governance structure that includes fair representation of all types of users of the system would help ensure that the ISO formulates policies, operates the system, and resolves disputes in a fair and non-discriminatory manner. The ISO's rules of governance, however, should prevent control, and appearance of control, of decision-making by any class of participants.

2. An ISO and its employees should have no financial interest in the economic performance of any power market participant. An ISO should adopt and enforce strict conflict of interest standards.

To be truly independent, an ISO cannot be owned by any market participant. We recognize that transmission owners need to be able to hold the ISO accountable in its fiduciary role, but should not be able to dictate day-to-day operational matters. Employees of the ISO should also be financially independent of market participants. We recognize, however, that a short transition period (we believe 6 months would be adequate) will be needed for employees of a newly

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[7] (Footnote 425 in original) A public utility is any person that owns or operates facilities used for the transmission of electric energy in interstate commerce or the sale of electric energy at wholesale in interstate commerce. An ISO will operate facilities used for the transmission of electric energy in interstate commerce and thus will be subject to the Open Access and OASIS rules.

formed ISO to sever all ties with former transmission owners and to make appropriate arrangements for pension plans, health programs and so on. In addition, an ISO should not undertake any contractual arrangement with generation or transmission owners or transmission users that is not at arm's length. In order to ensure independence, a strict conflict of interest standard should be adopted and enforced.

3. An ISO should provide open access to the transmission system and all services under its control at non-pancaked rates pursuant to a single, unbundled, grid-wide tariff that applies to all eligible users in a non-discriminatory manner.

An ISO should be responsible for ensuring that all users have non-discriminatory access to the transmission system and all services under ISO control. The portion of the transmission grid operated by a single ISO should be as large as possible, consistent with the agreement of market participants, and the ISO should schedule all transmission on the portion of the grid it controls. An ISO should have clear tariffs for services that neither favor nor disfavor any user or class of users.

4. An ISO should have the primary responsibility in ensuring short-term reliability of grid operations. Its role in this responsibility should be well-defined and comply with applicable standards set by NERC and the regional reliability council.

Reliability and security of the transmission system are critical functions for a system operator. As part of this responsibility an ISO should oversee all maintenance of the transmission facilities under its control, including any day-to-day maintenance contracted to be performed by others.

An ISO may also have a role with respect to reliability planning. In any case, the ISO should be responsible for ensuring that services (for all users, including new users) can be provided reliably, and for developing and implementing policies related to curtailment to ensure the on-going reliability and security of the system.

5. An ISO should have control over the operation of interconnected transmission facilities within its region.

An ISO is an operator of a designated set of transmission facilities.

6. An ISO should identify constraints on the system and be able to take operational actions to relieve those constraints within the trading rules established by the governing body. These rules should promote efficient trading.

A key function of an ISO will be to accommodate transactions made in a free and competitive market while remaining at arm's length from those transactions. The ISO may need to exercise some level of operational control over generation facilities in order to regulate and balance the power system, especially when transmission constraints limit trading over interfaces in some circumstances. It is important that the ISO's operational control be exercised in accordance with the trading rules established by the governing body. The trading rules should promote efficiency in the marketplace. In addition, we would expect that an ISO would provide, or cause to be provided, the ancillary services described in this Rule.

7. The ISO should have appropriate incentives for efficient management and administration and should procure the services needed for such management and administration in an open competitive market.

Management and administration of the ISO should be carried out in an efficient manner. In addition to personnel and administrative functions, an ISO could perform certain operational functions, such as: determination of appropriate system expansions, transmission maintenance, administering transmission contracts, operation of a settlements system, and operation of an

energy auction. The ISO should use competitive procurement, to the extent possible, for all services provided by the ISO that are needed to operate the system. All procedures and protocols should be publicly available.

8. An ISO's transmission and ancillary services pricing policies should promote the efficient use of and investment in generation, transmission, and consumption. An ISO or an RTG of which the ISO is a member should conduct such studies as may be necessary to identify operational problems or appropriate expansions.

Appropriate price signals are essential to achieve efficient investment in generation and transmission and consumption of energy. The pricing policies pursued by the ISO should reflect a number of attributes, including affording non-discriminatory access to services, ensuring cost recovery for transmission owners and those providing ancillary services, ensuring reliability and stability of the system and providing efficient price signals of the costs of using the transmission grid. In particular, the Commission would consider transmission pricing proposals for addressing network congestion that are consistent with our Transmission Pricing Policy Statement. In addition, an ISO should conduct such studies and coordinate with market participants including RTGs, as may be necessary to identify transmission constraints on its system, loop flow impacts between its system and neighboring systems, and other factors that might affect system operation or expansion.

9. An ISO should make transmission system information publicly available on a timely basis via an electronic information network consistent with the Commission's requirements.

A free-flow of information between the ISO and market participants is required for an ISO to perform its functions and for market participants to efficiently participate in the market. At a minimum, information on system operation, conditions, available capacity and constraints, and all contracts or other service arrangements of the ISO should be made publicly available. This information should be made available on an OASIS operated by the ISO.

10. An ISO should develop mechanisms to coordinate with neighboring control areas.

An ISO will be required to coordinate power scheduling with other entities operating transmission systems. Such coordination is necessary to ensure provision of transmission services that cross system boundaries and to ensure reliability and stability of the systems. The mechanisms by which ISOs and other transmission operators coordinate can be left to those parties to determine.

11. An ISO should establish an ADR process to resolve disputes in the first instance.

An ISO should provide for a voluntary dispute resolution process that allows parties to resolve technical, financial, and other issues without resort to filing complaints at the Commission. We would encourage the ISO to establish rules and procedures to implement alternative dispute resolution processes.