Operational perspective on the Electricity Distribution Industry (EDI) turnaround

by Dr Willie de Beer, Chief Operations Officer, EDI Holdings, South Africa

While it is acknowledged that South Africa is not unique and that many other countries throughout the world are experiencing some electricity industry related challenges, which provides a good reference source, it is clear that the challenges faced in South Africa will not automatically disappear. This paper addresses some of the challenges facing the electricity distribution industry (EDI) from an engineering and operational perspective and provides some insight into the thinking behind the future business model and how it will address some of the current challenges faced by the EDI.

There is globally significant similarity in the electrical systems, amongst others from a physical and operational perspective. The picture below represents a classical electricity supply industry value chain which consists of the generation, transmission and distribution components. In the case of South Africa the generation is dominated by Eskom with a small number of municipalities and co-generators contributing to the generation capacity. The transmission grid which consists of networks predominantly operating at 765kV, 400kV and 275kV is owned and operated by Eskom. While there are a limited number of 132kV networks within the transmission portfolio, for the purpose of this paper, the distribution business includes all networks and associated plant operating at voltages of 132kV and below. Within the current distribution environment you have Eskom and 187 municipalities, licensed by the National Energy Regulator of South Africa (NERSA), operating in the current EDI.

![Electricity Supply Chain](image)

**Fig. 1: Electricity Supply Chain.**

Current Electricity Situation from an EDI perspective

It is generally accepted that the electricity supply industry (ESI) in South Africa is facing a number of challenges and amongst others that the electricity distribution component of the industry is posing a significant risk in respect of reliable. The current situation within the EDI and the challenges faced by the electricity industry in South Africa are confirmed amongst others through expert views expressed, industry modeling, performance evaluation, and infrastructure audits.

The generation side of the ESI is faced with major challenges to meet the current and future demand and it is envisaged that these challenges will remain with us for some time into the future. Based on the Eskom generation build projections and also considering the current initiatives to encourage co-generation, independent power producers (IPP’s) and the introduction of effective demand side management (DSM), it can be assumed that over the next 5 to 7 years the generation challenges should be under control. The electricity distribution industry is an integral part of the electricity supply industry and as such the challenges faced in generation with respect to the availability of generation capacity will filter through to the EDI. However, the electricity distribution industry finds itself currently in a relatively favourable position from a power outage perspective since “every lights off” incident, is in the minds of the customers, in most of the cases “blamed” on load-shedding or a generation related incident. Reality is however that many of the power outages experienced are directly related to distribution related incidents. Without an accelerated EDI consolidation and reform process; the fragmentation in the industry, maintenance and refurbishment backlogs, inconsistent tariff and customer service approaches and skills shortage will not be addressed. The power outage incidents over the last couple of months demonstrated the importance of a reliable ESI to support the economic growth.
and without a reliable distribution industry to ensure effective distribution of electricity to end customers; the desired economic growth will just “become a dream”.

To illustrate the financial investment requirement per annum with respect to maintenance and to address the future annual refurbishment requirement, the graph below was compiled. From the graph it is clear that there is a shortfall of approximately R1,6 bn per annum based on current funding allocations. Considering all the challenges faced by the industry it is essential that an appropriate holistic asset management programme must be introduced to ensure the effective allocation and utilisation of resources. This cannot be achieved through the current EDI structure and approach to the business of electricity distribution, since the existing approach, is not allowing for efficiency improvement and resource optimisation to the extent which it is required. To get this right, focussed attention is required with clearly defined; short, medium and long term strategies and objectives.

**Fig. 2: EDI Combined Maintenance and Refurbishment Requirement.**

Ageing infrastructure and a higher demand for reliable performance are further challenges confronting the EDI and the lack of investment in infrastructure refurbishment over the last number of years is not assisting in this regard.

Furthermore the equipment is currently loaded to a level significantly higher than the historic operating conditions. The loading is directly attributed to amongst others the growth in demand which is mainly as a result of customer behaviour changes, economic growth and an increase in more energy intensive processes. Additional operating of the ageing infrastructure, such as load-shedding, is definitely not assisting in this regard and an increase in the trend of plant failure can be expected. As reflected in the graph below the combined refurbishment and maintenance backlog, based on the 2004 statistics are in the order of R20,1 bn, while provision is only made for R1 bn investment per annum in this area. The latest revised calculations suggest that the current backlog is in the order of R26 bn which indicates that the “investment adversive” approach is continuing in the EDI and that the position is not improving.

**Fig. 3: EDI Refurbishment Requirement.**

A further area which requires attention is the managing of technical and non-technical losses. Technical losses for the ease of reference, can be defined as relate to the “transport” of the energy and can be managed through optimal network configuration, effective maintenance, plant loading etc. Non-technical losses on the other hand relates to metering inefficiencies, revenue collection, revenue cycle management inefficiencies, electricity theft etc. The graph below
reflects the combined technical and non-technical losses as currently reflected per the envisaged Regional Electricity Distributor (RED) area. The six Metropolitan Municipalities in the country forms a key reference for each of the REDs which will be formed through the consolidation of the municipal electricity distribution assets and the relevant Eskom Region in each of the six RED areas.

The envisaged REDs (referenced to the relevant Metro for ease of reference) are:
- RED ONE; City of Cape Town
- RED TWO: Ekurhuleni
- RED THREE: Nelson Mandela Bay Municipality
- RED FOUR: City of Johannesburg
- RED FIVE: eThekweni
- RED SIX: Tshwane

![Figure 4: Technical and Non-Technical Losses per RED.](image)

International best practices indicate that an overall loss percentage of 7% is achievable and while it is acknowledged that these results are not obtained by “default” and that it requires focussed attention to achieve these results, the current situation in South Africa is not acceptable and it calls for serious attention. Should the leadership in the current and future EDI be able to turn the current situation around and get the average losses down to 7% there is the potential of a 6,842 GWh saving. This type of saving will make a significant difference in managing the current shortage of generation capacity.

The diagram below illustrates a potential improvement approach over a five year period:

![Fig. 5: Potential Savings in GWh.](image)

People

One of the major challenges that face South Africa currently is that of skills shortage. The South African Government was mandated in 2004 to halve poverty and unemployment by 2014. In order to achieve this, Government initiated the Accelerated and Shared Growth Initiative for South Africa (AsgiSA) which targets an economic growth rate for the country of 6%. However one of the major constraints identified by AsgiSA was the shortage of suitably skilled labour.
Countering this constraint requires decisive interventions i.e. skills and education initiatives and these interventions could include amongst others:

- The roll-out of the National skills development strategy.
- Both public and private investment programmes.
- Development of an Employment Services System.
- The development of a scarce skills database.
- Deployment of experienced professionals and managers.
- The establishment of a new institution the Joint Initiative for Priority Skills Acquisition (JIPSA).

In terms of the current status, the Joint Initiative on Priority Skills Acquisition (JIPSA) has set a target to facilitate the training of up to 50,000 artisans by 2010. JIPSA has identified a number of priority skills such as artisans, engineers and town and regional planners. In relation to artisans, JIPSA has made a commitment to facilitate the training of up to 50,000 artisans by 2010. State Owned Enterprises (SOEs) are playing a critical role in the implementation of AsgiSA. However, the commercialisation of SOE’s from 1987/88 onwards coupled with the rationalisation and consolidation, which took place within Government post 1994, has created unforeseen consequences since there was no central oversight or strategic co-ordination of training.

The main factors hampering expanding training capacity are as follows:

- Costs of upgrading training equipment and facilities.
- Severe shortage of qualified technical instructors.
- Shortage of workplace assessors, coaches and mentors.

One of the major challenges that will face the management of the REDs is that of effectively staffing the organisation due to:

- The major skills shortage in South Africa.
- The high number of current vacancies in the legacy organisations.
- Fragmented policies with regards to training and development.
- The limited number of instructors/trainers/coaches within the Industry.
- The confusion surrounding SETAS and skills programmes, learnerships etc.
- Many of the professional staff i.e. engineers, technicians and artisans are of an age 50+.
- Staff loss to other industries and overseas.

**Why do we have the current situation?**

**Current Situation in Context**

The Electricity Distribution Industry (EDI) as a business did not deteriorate over night; we are now paying for the “sins of the past”. The EDI in South Africa is currently experiencing significant challenges as a result of amongst others;

- Under investment in asset maintenance.
- Lack of refurbishment investment.
- Under performing industry.
- Shortage of skills.

To effectively manage the future maintenance and refurbishment requirement, an estimated R2bn per annum will be required. The estimated shortfall to address the future maintenance and refurbishment requirement is approximately R1.6bn per annum while the combined maintenance and refurbishment backlog is estimated at R20.1bn, as indicated earlier in this paper. In general the current practices in the EDI are no guarantee for business sustainability and economic growth. While there are pockets of good performance in the EDI, and recognised; to avoid a collapse of the EDI an urgent structured intervention it is essential. The current business approach, load shedding and associated increased operating of under maintained plant is a recipe for disaster.

**UBS Investment Research – March 2008**

During March 2008 the UBS Investment research report was released and amongst others it makes reference to lack of investment in the electricity distribution networks which confirms some of the views expressed in this paper.
The UBS report states: “In addition to the lack of investment in generating capacity, the South African electricity distribution network is (according to industry experts) also in a state of critical under-investment. Eskom is responsible for 95% of generation and 100% of transmission. Distribution, however, is owned about 50-50 between Eskom itself and the “munics” (municipality-owned distribution companies). As a rule of thumb, distribution companies should be investing at a rate of about 10% of asset value per year. However, for a number of reasons beyond the scope of this report, investment rates in many (especially non-Eskom) distribution companies are as low as 1-2% per year. Thus, while much of the focus has been on generating capacity, a major threat to efficient energy supply is distribution”.

It is essential that the current electricity distribution asset owners invest in the assets under their control and that they address the development of skills required to operate this industry effectively. Furthermore the management of the future REDs will have to make a significant investment in the areas indicated above to boost investor confidence and to establish a sustainable industry.

**How to turn the current EDI status around**

**Approach to EDI Turnaround**

All indications are that the current status of the EDI is not acceptable and that it will have extremely negative consequences for the country if the reform is not accelerated and introduced without any further delay. Since there is a need for an urgent intervention it is essential, from an infrastructure and resource perspective, that a pragmatic but holistic asset management approach is adopted in addressing the challenges. Key focus areas must be identified which will provide the highest improvement opportunities in the short term while sound work done to date must be leveraged. Furthermore it is essential that where desirable that existing structures be utilised in the execution of the turnaround approach. There is a need for focused skills transfer, training and development. In addition to this structured project governance and tight project management will be critical. It is essential that there is alignment between the turnaround approach and the future RED Business Model to ensure that best practices are entrenched.

**Turnaround Execution**

Since the announcement earlier this year by the President that a “business unusual” approach is required to address some of the challenges, this term was widely adopted to convey the message of the need to do things differently. In the case of addressing the EDI challenges it will be essential to adopt a business as “unusual” approach. This also implies that it is critical to adopt a focused approach and defined assignments with clear non compliance, risk and issue escalation mechanisms to avoid under or no delivery. To effectively execute a turnaround approach it would be necessary to follow a regional approach and leverage the available skills. We do have a shortage of skills and therefore it would be necessary to identify and recruit skills for such a project to complement the existing resources. Various options will have to be considered and while not limited to might have to include; bringing back retired people, identify semi skilled people or people requiring limited additional training to meet the desired criteria, contractors, consultants and turnkey projects. As far as practical possible there is a need to move towards standardised implementation strategies and incentivize high quality delivery. Without the alignment and support of manufacturers and suppliers it will be very difficult to address the current infrastructure challenges in the EDI.

**What will be different in the future REDs?**

Recognising that, generally speaking, the current EDI dispensation is not working; the next question then to be answered is how the future dispensation will bring about improvement. The structure of the future REDs promote a balanced approach to the overall business and as indicated in the diagram below a much stronger emphasis is put on the balance between revenue, operating and capital expenditure, efficiency and continuous business improvement, creating shareholder and customer value to underpin a financially sustainable business.
Fig. 6: Business Model: RED Sustainability.

To ensure that the current resources are optimally utilised the business model further suggest that under the leadership of EDI Holdings the current EDI will be consolidated into six REDs, consisting of a defined wires (engineering) and retail (inclusive of customer service) focus, operating in one “bundled” business supported by a common corporate and business support function. Existing infrastructure will be leveraged to minimise stranded assets and to provide for efficiency improvement.

Fig. 7: EDI Interim State.

Furthermore it is envisaged that the REDs could migrate from the interim state as described above to the future model as indicated in figure 8 below. Informed by the world trends on EDI reform it is envisaged that the future state of the industry could be six defined wires businesses with a number of defined, but separate, retail businesses which leverage of an industry shared service and industry association capability. It is therefore important that the DAY ONE approach to the future REDs accommodates the future thinking to avoid any unnecessary restructuring and to avoid a situation where staff and customers must be subjected to unnecessary changes.
Conclusion

It is now time for action and to address the challenges faced by the electricity distribution industry in South Africa. The assets are deteriorating, customers are becoming increasingly unhappy and it is difficult to retain skills. However, never before has the environment for the establishment of the REDs looked so promising. The current electricity challenges however calls for an integrated and holistic approach to the solution from all industry players, business and citizens of this country.

The constraints that were protracting the process are well on their way to being resolved with the immediate focus for 2008/9 financial year being:

- Finalising the implementation strategy
- Concluding the Deal (both design and negotiation)
- Advocating for the EDI restructuring enabling legislation and policies to ensure rapid implementation;
- Development of a systems solutions for the industry;
- Enhancing current asset owner readiness to transfer to the REDs
- Continued stakeholder engagement to ensure that the restructuring process is accelerated

A restructured Electricity Distribution Industry can only contribute to a sustainable industry which will support the economic growth required and create the important investor confidence while the customer and employee expectations will be met.

Contact details

Willie de Beer, COO EDI Holdings, (012) 316-7824, willie.debeer@ediholdings.co.za