

Energy Losses Management Programme

Eskom Distribution

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Abstract

The intent of this paper is to highlight the strategy and to present an overview of the Energy Losses Management Programme. Energy loss is of concern across South Africa and is an issue that many utilities around the globe face. This paper will explain how Eskom is addressing the energy losses issues experienced, what lessons have been learnt over the past few years and what will be the areas of focus going forward.

1. What is energy loss?

In July 2006, Eskom Distribution's total energy losses were approximately 6%. Approximately 2.34% were technical and 3.66%, non-technical losses. This represents a 40/60 split. A 1% loss in energy equates to approximately 400 million Rands (based on average tariffs for 2006), thus energy losses are of great concern to the Distribution business.

Energy losses for Eskom Distribution are defined as the difference between energy purchased from the Transmission network and energy sold to Distribution customers.

Non-technical losses (caused by factors such as illegal electricity connections, electricity theft, tampering with meters, bypassing of meters, etc.) continue to contribute to current capacity constraints and a reduced quality of electricity supply. More worrying still is that lives are endangered due to tampering with electrical installations and exposure to unsafe electrical connections.

2. What is Eskom doing to address energy losses?

Energy losses have increased almost linearly between 2002 and 2006. To combat this challenge, Eskom initiated the Energy Losses Management Programme (ELP) in 2006, to vigorously investigate and address the problem.

The success of the ELP is measured by the impact on the energy losses trend on a National and Regional level. Successes so far reflect the desired impact of ELP during 2006. The ELP strategy is producing results and aims to:

- Arrest the increasing energy losses trend
- Reduce energy losses to an acceptable level by various means
- Ensure the sustainability of effective losses management in the future.

Arresting the increasing trend and reducing it to an acceptable level have been achieved, as is evident in the accompanying trend line (Figure 1). The remaining challenge is to sustain the gains made moving forward. Sustainability is critical to the success of the programme as it determines the successful hand-over from project-based initiatives to normal business operations. Currently, the key focus of the programme is to gear the business towards building this sustainability to ensure that the energy losses handover process will be as seamless as possible.

12 Month Moving Average (MMA)

Dx wide energy losses initiatives

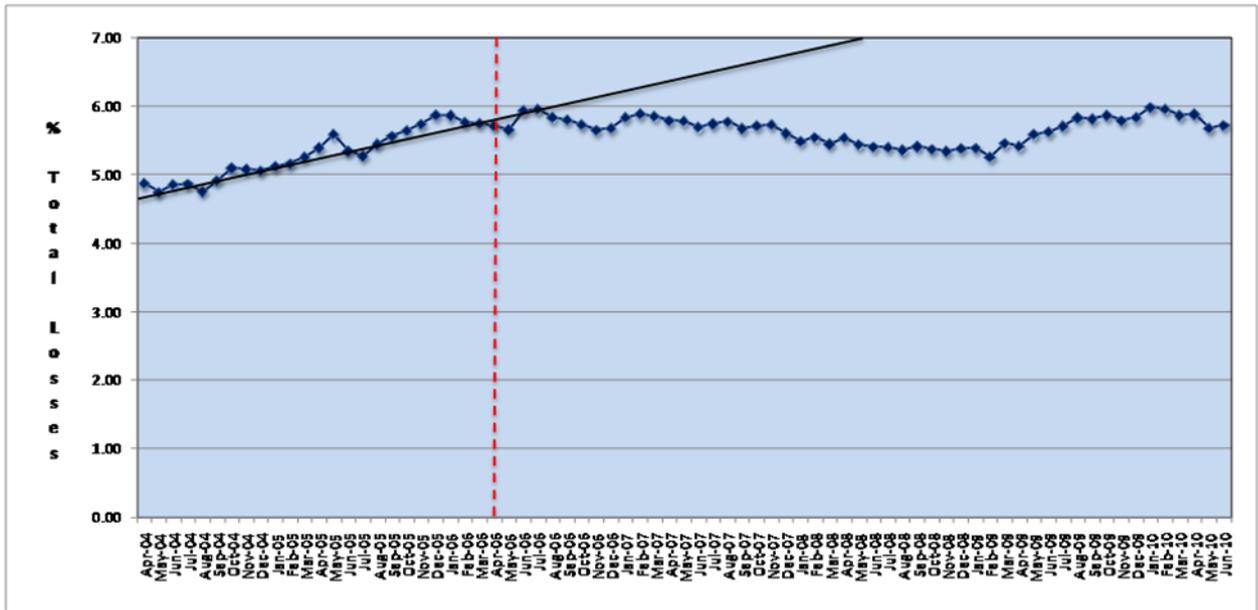


Figure 1: Trend of total Distribution energy losses

3. What is the Energy Losses Management Programme about?

The ELP is founded on a strategy supported by key stakeholders in Eskom Distribution. From September 2006 to March 2007, the strategy was developed through careful analysis of the nature, extent and causes of energy losses over a significant period of time, using data and resources across Distribution's business. Ratified and approved by the various Distribution committees, the strategy was deployed within the ELP. The Programme has actively implemented this strategy since then.

ELP is divided into five work streams, each looking at specific aspects that assist in the management of energy losses. These streams include:

- More effectively managing the way Large Power User (LPU), Small Power User (SPU) and Pre-paid Power User (PPU) Revenue Protection Audits are planned and conducted
- Ringfencing of networks to balance energy consumed accurately and consistently by measuring energy inflows into and outflows from a ringfenced area
- Investigating technologies to assist in the consistent management of energy losses in high loss areas
- Establishing the appropriate governance, process refinement and resource requirements to ensure sustainability
- Communicating to and educating stakeholders and highlighting their involvement in the management of energy losses.

4. The energy losses management strategy

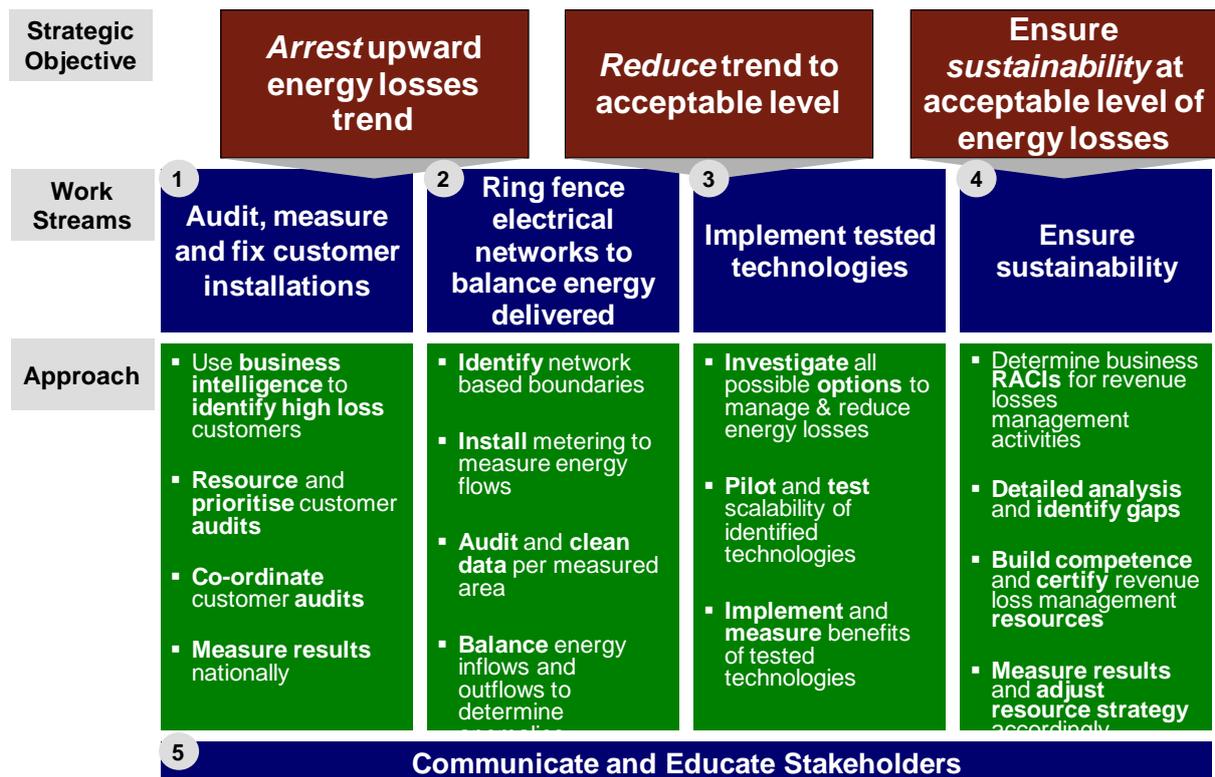


Figure 2: Strategy

The 'audit, measure and fix' workstream uses business intelligence to identify and target customers that are high loss, and hence high risk, customers. Customer audits are prioritised using anomaly reports such as customers that are consuming very little in comparison to other customers in the same category, or customers consuming even though their accounts have been terminated. The results of audits are measured on the ELP scorecard where the number of audits done per month and number of problems fixed per month are tracked and measured.

The 'ringfence electrical networks to balance energy' workstream focuses on the identification of network boundaries, installing statistical meters to measure energy flows and to balance energy inflows and outflows so that all anomalies can be identified. The results of statistical meter installations and feeder balancing data are also measured on the ELP scorecard, to ensure timeous installation and accurate data and reporting.

The 'implemented tested technologies' workstream focuses on investigating technology options to reduce energy losses, piloting and testing these technologies and measuring the benefits.

The 'ensuring sustainability through resourcing' workstream focuses on detailed business and environmental analyses to determine gaps in the business – these gaps could be process, people and technology related. The programme has developed an energy losses management process that is currently being integrated into the business.

The 'communications' workstream focuses on both internal communication as well as communication to the general public. Internal staff is educated on what energy losses are and the impact their work activities have on energy losses. A public engagement drive has been initiated using a social marketing approach that encourages all South Africans to be or become legal power users. The ELP Social Marketing Campaign objective is to *influence the voluntary behaviour* of consumers to be *legal* users by reducing the number of illegal electricity consumers, mobilising citizens to report and prevent tampering and illegal connections, and by building partnerships to deal with illegal electricity consumption.

Using advertising, social mobilisation, partner mobilisation, strengthened enforcement measures through criminal procedures, and engagements with stakeholders, this hard-hitting campaign targets Eskom staff and contractors, business, commerce and the public to become partners in a drive to reduce electricity theft and ensure legal power use.

5. The structure of the ELP

The structure of the ELP consists of a National Programme Management Office (PMO) with all workstreams reporting to Project and Programme Managers. The National Sponsor is ultimately accountable for all deliverables of the National PMO. The ELP Steering Committee consists of executive members of Eskom Distribution. It is this committee that approves, supports and drives the ELP strategy and implementation approach.

All six Eskom Regions also have Regional ELP implementation structures in operation. There are Task Teams in place where Regional Project Managers are responsible for all ELP-related activities. The Project Manager reports to the Regional Champions (Revenue Protection Managers and Energy Trading Managers), who then report to the Regional Sponsor who is ultimately accountable for all Regional deliverables.

6. What lessons can be shared with the Industry?

6.1(a) Successes in Audit Workstream

The ELP shifted audit attention to focused LPU, SPU and PPU meter audits. Regions were encouraged to target high risk customers as opposed to blanket audits, using tools such as customer stratification, customer billing reports and energy loss reports for projects balanced. Audit target setting and budget allocations were based on an Energy Losses Analysis Model, to target high-loss areas per Region. Since the existence of the ELP, Regional auditing involvement and enthusiasm has increased. All Regions have exceeded their LPU audit targets (high revenue source) for the past financial year.

The figures below are a summary of the customer audits carried out since the start of the project, up to the end of June 2010:

- **19,298 LPU** audits were done, with 1,960 problems identified and **1,913 problems fixed**
- **254,507 SPU** audits were done, with 46,688 problems identified and **20,691 problems fixed**
- **2,117,977 PPU** audits were done, with 240,300 problems identified and **168,062 problems fixed**.

To date **a loss to the business of over R120 million has been prevented** as a result of the fixes done on problems identified from April 2009.

In addition, the ELP Revenue Recovery process has assisted the business to **re-bill over R58 million** from these audit findings.

This has been a result of dedicated and focused customer auditing and fixing from all the Regions, particularly in the LPU and SPU customer domains.

Over and above the development of the standardised audit methodologies and data specifications, the ELP redefined the Customer Care and Billing anomaly reports criteria in the LPU, SPU and PPU domains for improved usability and quality. These reports include customers that seem to be consuming very low kilowatts as compared to others in the same category, or customers consuming even though their accounts have been terminated.

The ELP has also implemented Quality Assurance (QA) for customer meter audits. The Regions are visited every three months to ensure data validity and authenticity, and to ensure compliance with the audit methodology.

6.1(b) Risk and Mitigation on the Audit Workstream

The low fix rates of problems found through audits has been identified as an area that needs attention. Low fix rates occur as a result of departmental prioritisation and a general lack of departmental resources. The 'resourcing for sustainability' workstream has done a detailed analysis of the resource gaps and resource requirements in the business, to ensure ELP is a success. The Regions were asked to encourage stakeholders such as Engineering Delivery and Field Services to be more involved in the fix process, and to highlight the value of their involvement. Regions were also encouraged to make use of skilled and authorised contractors to overcome departmental resource constraints, and to 'clean-up' the backlog of fixes that exists for LPU, SPU and PPU meter installations, picked up from audits.

6.2(a) Successes in the Ringfence Workstream

Regional statistical meter installation is underway in all the Regions. The ELP has played a key role in the process to obtain financial assistance from the Capital Projects Department in order to fast-track stats meter installations in the Regions in the previous financial year. Stats meter installation targets were exceeded at Distribution level for both the 2008/9 and 2009/10 financial years.

The Energy Losses Model, which was developed by the ELP, is used by the business and Regions to identify Customer Services Areas that have high losses and should be targeted for audits. The results obtained from the Energy Losses Model were also used for target setting for total energy losses for Eskom Distribution, as well as Regional total energy loss targets.

Feeder Balancing Model (FBM) reports are now published on a monthly basis by all the Regions.

The measurement of additional Key Performance Indicators to track monthly statistical installations and FBM reporting progress were successfully introduced in the ELP Scorecard.

6.2(b) Risks and Mitigation on the Ringfence Workstream

Departmental prioritisation may impact the number of statistical meters installed. Adequate and focused compacting of relevant stakeholders must be applied to ensure that statistical metering targets are met. The ELP 'ringfence' workstream continuously monitors and influences progress towards meeting these targets.

The accuracy of statistical meter information was also identified as an area of concern. The ELP has identified gaps in business processes allied to data management and data capture. Hence, alternate means of capturing information when sites are visited (e.g., using LPU audit teams) need to be investigated.

6.3(a) Successes on the Technology Workstream

The ELP 'technologies' workstream investigated and participated with Eskom metering specialists to apply metering and meter installation technologies for reliable meter readings. This was done over the meter's life cycle and to reduce the possibilities of tampering with the meter.

In the prepayment metering environment, split meter technologies were found to be an appropriate solution in addressing the meter tampering problems. But, installation costs were a concern, especially where unauthorised access to the meters needed to be prevented. Pole-top box installation for split meters promises to be a cost effective solution in the quest to limit access to the meter installation. Pilot initiatives are currently underway in some Regions and a National roll-out project is currently under consideration.

The accurate capturing of field audit data is a major contributing factor to the successes of the meter audit drive. A suitable mobile computing solution with data dictionaries was selected to collect field audit data, recommended to the business and successfully implemented. The back office data

management and data accuracy also required attention. The uploading of field audit data from the mobile computers to back office systems was also addressed and successfully implemented. However, before the data could be uploaded onto the Eskom mainframe systems, the field audit data needed to be verified and accurately linked to existing data on the Eskom systems. Requirements for such a verification system were specified and are currently being developed.

A key focus of the ELP drive is to establish sustainable solutions for energy loss management and much attention was devoted to the development and acquiring of an energy management system. The system should provide specific energy- and losses-related business management information (BMI), reconcile energy sales with energy distributed, and provide data verification and control. Due to the high costs of replacing existing Eskom systems with a system taking the needed energy loss management requirements into account, an approach was selected to develop a system which interfaces with the existing Eskom systems. The development of a system to verify the accuracy of customer data linked to the network data (Customer Network Link (CNL) verification) has been done. This CNL verification tool is specified to accommodate future expansion into other loss management requirements, and to incorporate the field data verification and upload tool as mentioned above. Future phases will include energy related BMI and integrated energy reconciliations requirements.

6.4(a) Successes on the Resourcing for Sustainability Workstream

The ELP 'resourcing' workstream had the task of ensuring sustainability through proper structures and resourcing in the business.

Resource gaps were identified and a comprehensive analysis was carried out to determine what skills and amount of resources the business requires for energy losses management to be effective and successful. A resourcing plan was developed as to how to source the skills required and ensure full utilisation of resources towards energy losses management. The workstream also implemented measures to align the processes in the business and identify and address gaps in processes that impact losses management.

6.4(b) Risks and Mitigation on the Resourcing Workstream

Current global financial constraints could affect budget availability and hence impact negatively on sources required for resources to manage energy losses.

6.5(a) Successes on the Communications Workstream

At the outset of the ELP it was recognised that once the internal challenges have been addressed, it would be necessary to launch a public communication campaign to engage with customers.

The ELP developed an external Public Communications and Education Strategy in conjunction with Eskom's Group Communications Department, with the aim of changing the public's behaviour towards legal electricity use. The Programme garnered input and support for the Strategy from various stakeholders.

In order to achieve the objective of reducing losses and encouraging people to stay and or become legal electricity users it was evident that a behavioural change approach was needed. The Social Marketing Campaign provided the perfect vehicle to drive this change. The campaign further holds the opportunity for Eskom to partner with various corporates and organisations, thereby extending its reach.

The objectives of the ELP Social Marketing Campaign are:

- To influence the voluntary behaviour of consumers to be legal users, by reducing the number of illegal electricity consumers
- To mobilise citizens to report and prevent tampering and illegal connections
- To deal with illegal electricity consumption by building partnerships.

Following months of analysis, planning, preparations, creative design and production, April 2010 saw the start of the phased roll-out of the energy losses public engagement initiative, aptly branded: Operation Khanyisa, The power is in your hands.

The word 'Khanyisa' means 'to give light' or 'to enlighten'. The name is ideally suited to the campaign, which is aimed at enlightening people about the need for all South Africans to become legal power users. The campaign will also address the impact and consequences of electricity theft for all South Africans. Operation Khanyisa will entice audiences to 'wise-up' to legal, safe and energy-efficient electricity use.

Operation Khanyisa commenced phased roll-out at the end of April 2010 and will see a series of activities kicking in through to December 2010. Among the first activities were Employee blitz awareness events: Eskom's tough stance on dealing with customers, contractors, employees and 'street electricians' who are caught stealing electricity was emphasised through a mock arrest by the South African Police Service, DVD clips following an edutainment approach, and an industrial theatre production. The results of these events were very positive in that employees showed passion and willingness to participate in the campaign.

Following the introduction to staff, the Social Marketing Campaign was introduced to the agricultural sector during the National Maize Producers' Organisation (NAMPO) annual harvest exhibition in Bothaville, Free State. NAMPO attracts farmers and agricultural suppliers from across the country and was a perfect opportunity to roll-out Operation Khanyisa to the estimated 64,000 visitors during May 2010. The stand at NAMPO was supplemented by live reads and radio ads on the RSG and OFM radio stations, internet banners on OFM news pages, and various radio and print interviews.

Next, Operation Khanyisa rolled out in Soweto at the end of May through a three-week radio ad campaign, supplements in the Sowetan and Daily Sun, taxi rank blitzes, mall activations and industrial theatre road shows, as well as 40 billboards including spaza billboards and wall murals. The aim of this roll-out was to clearly position this campaign as the real Operation Khanyisa and launch the drive for communities to stand together and promote legal power use. The roll-out created a first wave of awareness of the campaign and issued a call to action to report illegal electricity use by anonymous SMS tip-off to Primedia Crimeline at 32211.

A national launch and roll-out of various sub-campaign legs across all Eskom customer groups, stakeholders and partners will take place over the next six months.

6.5(b) Risks and Mitigation on Communications Workstream

Due to the recent increase in electricity prices granted by the National Energy Regulator of South Africa (NERSA), in combination with the current economic situation, not only in South Africa but worldwide, the level of energy losses is at great risk of increasing. People are feeling the financial pinch, and may therefore be more susceptible to giving in to illegal activities, such as tampering with meters and illegal connections. This does not only apply to households, but also to businesses, small and large.

It is therefore crucial for the ELP to nationally launch its Social Marketing Campaign in order to educate the public on energy losses and drive a behaviour change that speaks out against tampering, bypassing and illegal connections.

7. What does the future hold for Eskom's Energy Losses Management Strategy and Programme?

In conclusion we would like to share our focus areas for the year ahead:

Eskom utilises contractors to perform LPU, SPU and PPU audits in Regions. Hence, it is imperative to control and monitor the work done. The contract management requirements for energy losses audits, which include contractor scope of work, audit quantity and rates for various areas, have been aligned and standardised in all Regions. The next step is to train the Regions on these requirements, this initiative has commenced in two Regions, with other Regions to follow.

The QA of audits will also be carried out on an ongoing basis to ensure that audit data quality and validity are prioritised by both internal staff as well as contractors. The scope of such QA includes work done in the field and corrections on the billing system, as well as across all types of customer audits (LPU, SPU and PPU). The ELP will also be increasing the focus on the SPU audit and fix domain in order to ensure sustainability of the gains made over the past few years.

As we move towards ensuring sustainability, QA becomes more important. Hence, it is also imperative that statistical meter installations are monitored and tracked. The ELP will emphasise the need for the involvement of the Capital Programme Department as funding and prioritisation are vital. The 'ringfence' workstream will also focus on completing the analysis comparing technical and non-technical losses per Eskom Region. This analysis will show what the acceptable and sustainable level of total loss is in each Region and in the Distribution business as a whole. Another focus area for the 'ringfence' workstream will be to improve the accuracy of reported non-technical losses on feeders being balanced. Accurate measurement enables focus and the ability for the Regions to prioritise actions to manage energy losses.

The ELP has identified all the roles that should be incorporated under an energy losses management function in order to ensure energy losses are managed effectively. When Eskom implements the proposed organisation transformation initiatives, energy losses management will be enabled in the long term through adequate capacity and capability and the Eskom Regions will be able to deal sustainably with energy losses.

We plan to nationally launch the ELP Social Marketing Campaign, Operation Khanyisa, within this financial year. Prior to the implementation of the public communications campaign, the creation of a wider internal awareness of the ELP has commenced, and will continue with ongoing initiatives within the Eskom business.

The ELP team is excited about the positive gains made to date and looks forward to addressing the challenges of the current year and beyond. In order to ensure that a programme of this magnitude is successful, it is vital that all stakeholders become part of, and are ambassadors for, the solution. Together we can make a difference!

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