



World Business Council for
Sustainable Development

Case study

2006

Eskom Energy Efficiency

South Africa's marked economic growth in recent years has propelled electricity peak demand to rise at around 4% a year. Consequently, unless something is done, by 2007 peak-period demand will exceed Eskom's ability to supply electricity during these periods, and by 2010 additional base load capacity will be required. It is vital to have reliable and uninterrupted electricity for the South African economy to grow. Thus, Eskom is addressing this challenge by the expansion of supply options, return to services program of three mothballed power stations and the Demand Side Management (DSM) program.

DSM allows Eskom to influence electricity usage patterns of electricity consumers. Eskom is implementing DSM in South Africa through collaboration with the Department of Minerals and Energy (DME) and the National Electricity Regulator (NER). Eskom's DSM strategy comprises a dual approach: to reduce electricity demand at peak periods (07:00-10:00 and 18:00-20:00) by shifting load to off-peak periods and by overall electricity consumption reduction (24-hour reduction) by installing energy-efficient equipment and optimizing industrial processes. Sustainable DSM projects often involve a combination of both methods.

From small beginnings in 1991, starting with research, pilot studies and time of use tariffs, Eskom's DSM program has grown into a concerted national electricity-saving effort officially initiated in the last quarter of 2002. (Figure 1).

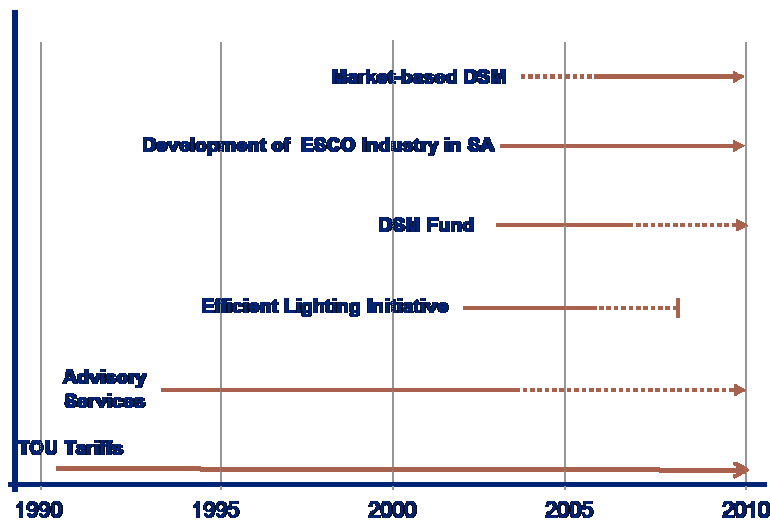


Figure 1: DSM activity and progress (PS. Bonesa was initiated in 1999 and is not reflected above)

The 1999 launch of the local efficient lighting initiative called Bonesa was among the major milestones in the early phase of DSM in South Africa. The Global Environment Facility and Eskom jointly funded this over a period of 3 years. Now the use of compact fluorescent lamps (CFLs) through customer education, advertising and marketing is being promoted. The focus is to lower the price of energy efficient globes. The CFLs were originally priced between R60-80 (US\$ 9-12) per lamp and in 2004 the price for CFLs



dropped to between R13-20 (US\$ 2-3) due to joint sales promotions with local suppliers and increased volumes of CFLs.

In September 2002 the DSM Fund was approved and 2003 was spent mainly on setting up the DSM business model and operations, customer awareness and education campaigns, as well as the establishment of Energy Services Company (ESCO) industry.

DSM aims to achieve a market-driven business environment by 2007.

Targets

South Africa is among a few countries worldwide that have set comprehensive targets for energy efficiency improvements. The Energy Efficiency Strategy compiled by the DME for South Africa proposes the following energy efficiency targets:

- A final energy demand reduction of 12% by 2015;
- To save 4 255 MW over a period of 20 years.

Eskom's overall DSM target/objective, as per the National Integrated Resource Plan (NIRP), is to save 4,255 MW over a period of 20 years, to mitigate the negative impacts on the environment via energy efficiency targets and to support local job creation. There is currently an annual DSM target of 152 MW that will be increased to higher levels as the markets gain momentum in DSM implementation. This annual target is divided into energy efficiency and load management targets for the residential, industrial and commercial sectors.

Eskom's integrated DSM strategy seeks to promote the creation of a sustainable energy efficiency market environment in which independent Energy Service Companies implement DSM. While creating jobs, this approach has led to the birth or expansion of energy services companies in South Africa. In support of the government's Black Economic Enterprises (BEE) policy, in 2004 a significant investment of R42.7 million (US\$ 7 million) was made towards the operations of these enterprises.

Activities

The DSM program is comprised of the following program themes:

- Residential, commercial and industrial programs - Transforming the South African electricity market into an energy efficient industry. Figures 2 to 4 below show the identified areas that represent significant savings potential in each market sector.
- Public education - Increasing awareness about energy efficiency. The program includes a broad range of marketing and public relations activities, and feeds directly into programs in different income segments as well as residential, commercial, industrial and institutional program activities.
- Schools program - Highlighting the benefits and importance of using electricity efficiently to school pupils. DSM seeks to increase the awareness of students and faculties on energy efficient measures by providing participating institutions with teacher, learner and electricity audit guides.

Residential

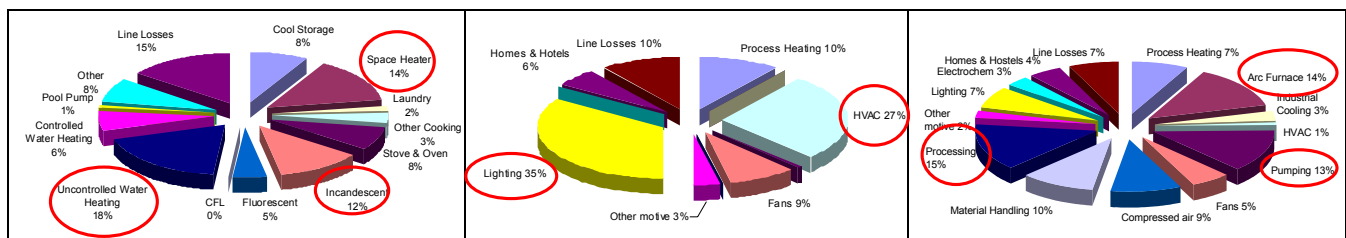


Figure 2, Figure 3 and Figure 4: Contribution to maximum demand and areas representing significant savings potential in the residential, industrial and commercial sector, respectively (2003 data).



Results

Highlights of the DSM roll-out in 2004 can be summarized as follows:

- Updating of the DSM agreement, based on the NER Policy, to conform to the new requirements stipulated in the EEDSM policy.
- Savings of 197 MW were recorded during 2004 financial year – a major improvement from the 101 MW achieved in 2003.
- Equally significant was that the 152 MW annual savings target was exceeded by approximately 30% in 2004.
- The 197 MW was made up of 114 MW of energy efficiency and 83 MW of load management. It must be noted that South Africa's electricity supplies are largely generated from coal-fired power stations consuming large quantities of coal and water while also emitting considerable quantities of greenhouse gases. For every 1 kWh reduced through energy efficiency implementation, there is approximately 1 kg of carbon dioxide that is not vented to the atmosphere while the power plants reduce water intake/consumption by approximately 1.2 liters.
- More than 100 ESCos were evaluated and registered.
- DSM's successful marketing efforts saw a 10% increase in initial awareness levels among all target markets over 12 consecutive months.
- This improved awareness of energy efficiency amongst the sample of 267 residential South Africans resulted in behavior change and a 0,5 MW saving was achieved during the first National Energy Efficiency Month (EEM) in May 2004.
- Over 2 million CFLs were sold and 64 MWs were saved during peak periods – thanks to joint sale promotional campaigns between Eskom DSM and the product suppliers.
- The DSM belief is that empowerment starts with education. The successful Eskom DSM school awareness program, called "Counting the Cost of Energy" has the youth - in particular school-going youth – as their primary target audience. In 2004 five of the participating schools won the "Bontle ke Botho" (Being beautiful is being human – linking to creating a beautiful environment for people to live in and a better quality of life) Cleanest Municipality, Cleanest Ward and School Campaign at district level.
- As one of the cornerstones of ensuring successful DSM implementation, ESCos have an established scorecard, evaluation criteria and a national association. Furthermore, annual ESCo capacity building conferences are held.
- In support of government BEE policy a significant investment of R42.7 million (US\$ 7 million) was made in the operations of black economic enterprises.

With DSM everyone benefits in the following ways:

- Reduced electricity demand during peak periods, thus delaying additional capital investment to further increase electricity supply.
- Improved value of electricity service to customers by reducing costs – customers have a wide range of energy efficient options and financial benefits.
- Conservation of the environment by reducing emissions and water consumption at power stations.
- Support of macro-economic development through job creation and improved productivity.
- Contribution to addressing the affordability of electricity to low income consumers

The future of DSM remains focused on commerce and industry, which collectively consume 77% of South Africa's energy. However various initiatives will also be put in place to reduce the residential consumption that reaches more than 30% during peak periods. Some of the key initiatives to be explored comprise the following:

- Demand Market Participation: On the Eskom Power Pool, customers are treated as generators and through a special tariff, demand market participation (DMP), they are encouraged to offer any flexible load onto the Eskom Power Pool.



- Co-generation: The NER has agreed that co-generation programs in industrial markets in particular through waste heat recovery or combined heat power are an efficient option and a cheaper alternative to supply side expansion.
- Residential CFL roll-out: DSM plans to provide 3,000,000 CFLs to communities in South Africa in order to reduce peak electricity demand too often related to residential lighting use. This initiative seeks to communicate and demonstrate the benefits of energy efficient lights, encourage their use and reduce energy usage.
- National roll-out of residential load management (RLM): The RLM project is specifically aimed at the residential sector and largely targets geyser usage patterns in households. One of the programs launched to date involves the connection of ripple or radio-controlled units (or relays) to geysers, allowing them to be switched on and off by remote control. The main aim is to help consumers better manage their electricity consumption, particularly during peak periods, thus leading to cost savings for customers and Eskom.

Concrete examples

Alexandra CFL roll-out

The Alexandra Township forms part of the City of Johannesburg and consists of both formal and informal residences that have access to essential services. The energy efficiency roll-out project focused on approximately 50 000 houses, including both one and two bedroom houses with between four to six occupants.

The Alexandra CFL roll-out project is a pilot project of energy efficiency improvement, aimed at replacing incandescent lamps with CFLs in the residential sector. At least 150,000 of the targeted 3,000,000 lamps, were targeted for replacement in Alexandra Township as part of the pilot phase.

To encourage community buy-in and community empowerment, project staff was drawn from unemployed community members of Alexandra. These recruits were subsequently trained in compact fluorescent lighting and its advantages over incandescent lamps. They were also trained in safety issues, data gathering forms and procedures on visiting households.

A number of challenges were experienced in the rollout of the project, and these were recorded to form a basis for recommending a future roll-out strategy. The challenges can broadly be categorized under the following headings:

- Unavailability of household data
- Limited Supervisory skills of local resources
- Logistics relating to the collection and distribution of CFL's during working hours
- Unavailability of households outside of normal working hours
- Lamps' light output - Eskom had used the 60-Watt incandescent bulbs as a basis for specifying 11-Watt Warm White CFL whereas 50% of households were using 100-Watt incandescent lamps.
- Facility for exchange of lamps

Pick 'n Pay

With its countrywide chain of super- and hypermarkets, Pick 'n Pay has realized that it can enjoy notable electricity account savings by converting its lighting, heating and air conditioning (HVAC) systems to energy efficient ones.

The company has installed energy-efficient lighting in all its new stores and is currently doing a retrofit on 97 established outlets. This should save approximately R1.5-million (US\$ 250,000) annually in reduced energy bills, and the capital costs of the project should be recouped in just over two years. After that, all savings are a direct improvement to the bottom line.



About the WBCSD

The World Business Council for Sustainable Development (WBCSD) is a coalition of leading international companies that share a commitment to the principles of sustainable development via the three pillars of economic growth, ecological balance and social progress. All regions of the world and most major industry sectors are represented in our membership. The WBCSD also benefits from a global network of national and regional business councils and partner organizations representing a large and diversified group of business leaders.

Our mission is to:

- Provide business leadership as a catalyst for change towards sustainable development;
- Support the business license to operate, innovate and grow in a world increasingly shaped by sustainable development issues.

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