

Strategy for Eskom's energy-efficient lighting programme for low-income households

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1. Background

Eskom's Residential Demand-Side Management (RDSM) Programme is currently developing an Energy-Efficient Lighting (EEL) Programme. The EEL team has been testing and purchasing various energy-saving lamps, and developing a strategy for the programme, but, for several reasons, progress has been slow. The EEL team is small and has been charged with an immense task. Additionally, there is no local manufacturer of energy-saving lamps in South Africa all lamps must be imported. Coupled with this, the electricity industry is undergoing substantial restructuring. It is unclear how this will affect demand-side management (DSM) initiatives.

This paper seeks to contribute to the EEL programme strategy development process. Though ultimately only the EEL team, on behalf of Eskom, can make the final programme strategy, this paper attempts to detail some of the issues that the strategy should address (in most instances, examples have also been given of the type of strategy that would address these issues). The report is divided into two parts. Building on the situational analysis already developed by Eskom, the first part suggests processes that should be taken account of as the EEL programme and strategy develops, and also provides a brief rationale for the EEL programme targeted at the low-income sector. The objective of the second part is to build on and add insight to the development of the programme itself; it is divided into (i) technical and operational, and (ii) planning and implementation advice.

This paper is the third in a series of papers to be produced by the Energy and Development Research Centre (EDRC) on energy-efficient lighting. Research for these papers falls under EDRC's Energy Efficiency, Equity and the Environment project which is co-sponsored by Eskom and the International Development Research Centre, Canada. The two previous papers were entitled 'Compact fluorescent lamps in an international context', and 'Energy-efficient lighting in an imperfect market: Preliminary thoughts for South Africa'. These reports are referred to extensively in this paper, which applies the international CFL programme experience to a South African context, takes into account market barriers faced by the low-income sector, and keeps in mind the current electricity industry restructuring processes.

This paper focuses on the EEL programme initiative directed towards the *low-income* sector in *urban* areas. Strategy is suggested therefore only where it is clear that it will directly assist poor people in overcoming some of the barriers inhibiting them from acquiring energy-saving lamps. Also, strategy recommendations need to fit within the scope of the EEL programme.

2. Situational analysis

The experience of energy-efficient lighting programmes initiated in other parts of the world has been well documented. While this experience lends insights to the EEL programme, it is important for the EEL team to develop a South African context for its programme. Indeed, a comprehensive situational analysis of the low-income sector and current developmental processes in the country will help the team to shape a programme that makes financial, economic, and organisational sense for this country. Section 2 has three subsections: the first offers a general context for the programme; the second presents a low-income household context; and the third questions some of the possible motivations behind a EEL programme targeted at the urban poor.

2.1 General context

There are two ongoing initiatives in the electricity industry and South Africa in general which are shaping the context in which the EEL programme will be designed and implemented. On the one hand, policy initiatives to restructure the electricity industry are under discussion. On the other, extensive developmental

programmes, initiated in 1994 with the first democratic elections in the country, are gaining momentum. All role-players in the energy-efficient lighting arena – government, the distribution, generation and transmission industries, Eskom's RDSM team, end-users, and manufacturers – will be affected by these processes.

The electricity industry in South Africa is awaiting a new vision. High-level agreement has been reached that the industry will be restructured – although precisely how it will occur is still being debated. It is probable that the distribution industry will be targeted first: currently highly fragmented, it is set to be consolidated. In the medium term, competition is to be introduced into generation, with the possible establishment of a number of independent power producers. Transmission will be separated from generation and distribution, but it is unlikely that its organisational structure of transmission will be altered, as it is a natural monopoly. Finally, a retail industry might emerge out of the distribution structures, but it is unlikely that this will occur for some years to come.

Several difficult questions are currently up for debate:

- Will the RDSM programme and the EEL programme survive this reform?
- If the RDSM programme survives, who will most likely take ownership of its initiatives?
- If the RDSM programme does not survive, will the EEL programme survive? Who will take ownership of it then – the distribution industry? Would the REDs undertake market- or regulator-driven DSM activities? How would this impact on the lighting sector?

Currently, there are few answers forthcoming. There is little doubt that reform will have an impact on Eskom's DSM initiatives in their current forms.¹ It is thus important, in strategising, for the EEL initiative to maintain an awareness of the potential implications of the restructuring process, and the potential changes in the industry. Interestingly, Eskom's Technology Group is gradually breaking away from the traditional Eskom structure. Although it has been operating for years on a project-cost basis, and thus functions independently of Eskom, this distinction is soon to be formally established and it now seems likely that the Technology Group will become an institute in its own right, competing with other organisations within Southern Africa to provide services to the electricity industry. If this happens, the Group will have to become increasingly service-oriented and aware of costs.

Other far-reaching initiatives setting the context for the EEL programme are the housing and electrification initiatives. The Ministry of Housing continues to recognise the "one million by 1999" target and is planning accordingly. According to the Ministry of Housing, some 240 000 low-cost houses have already been built (that is, between March 1994 and December 1996),² and 200 000 more are in the pipeline for 1997 (*Business Day*, 17/09/97). While it has taken housing policy over two years to take effect – and in so doing delayed progress significantly – electrification targets have, on average, been achieved. Eskom, charged by Reconstruction and Development Plan (RDP) targets with 300 000 connections to household customers per annum, made 307 047 connections in 1996. Other municipal distributors, collectively responsible for 150 000 connections per annum, made 126 057 new connections, bringing the total number to 5 008 351 (or 2 015 452 since 1991). Fifty-four per cent of all houses in South Africa are now electrified. The electricity industry's ultimate target is to increase the share of electrified dwellings to 70 per cent by the turn of the century (National Electricity Regulator 1996). Clearly, these initiatives present a huge opportunity for the implementation of energy efficient lighting in this sector.

¹ See Clark (1997b).

² This figure is an estimate. Other sources suggest that it is inflated and that only half of these houses are either under construction or have been completed. See for instance, *Business Day* (30/1/97).

2.2 Low-income household context

Much has been written on energy conditions, and socio-economic indicators of, low-income households in South Africa.³ The following discussion will therefore be brief and limited to aspects of low-income households and communities, and electrification thereof, that have specific relevance and interest to the EEL programme.

Firstly, poor people are usually severely constrained by their financial and socio-economic situations. Often, for instance, they cannot afford to search for a job, or better education – activities which could result in their own upliftment. Yet poor people express a clear entrepreneurial spirit towards overcoming these barriers. This is strongly reflected in the organisation of day-to-day life: in their energy practices, poor people skillfully manage their fuel mixes according to levels of affordability and cultural norms. Aided by strong social networks, poor households often share amongst themselves appliances that they would otherwise not be able to access individually. In addition, low-income households do recognise the benefits of energy-efficient behaviour. Ironically, it is this entrepreneurial spirit that sometimes hinders poor people from using energy efficiently. Aspiring for greater social recognition or status, household dwellers may value corrugated iron roofs or wallpaper. Iron, however, is the archetype of thermally inefficient building material, and wallpaper's contribution to thermal efficiency is negligible. Rather, both are used for decorative purposes, or indicators of affluence. Perhaps this also reflects a lack of full knowledge about energy efficiency. Indeed, research has shown that many poor households believe that saving electricity means switching lights off or running one appliance at a time.

Secondly, it is common for low-income households to use combinations of fuels including paraffin, gas, coal, candles and electricity. These combinations vary greatly between regions and within areas. If electricity is accessible, households will generally use it for lighting and entertainment first, and only thereafter for other fuel-uses (such as cooking, space-heating, and water-heating). Table 1 below is indicative of this.

	<i>Scenario 1 (electricity)</i>	<i>Scenario 2 (electricity & paraffin)</i>	<i>Scenario 3 (electricity, paraffin & gas)</i>	<i>Scenario 4 (electricity & coal)</i>
	<i>Fuel</i>	<i>Fuel</i>	<i>Fuel</i>	<i>Fuel</i>
Cooking	Electricity	Paraffin	Gas	Coal
Space-heating	Electricity	Paraffin	Paraffin	Coal
Water-heating	Electricity	Paraffin	Gas	Coal
Lighting	Electricity	Electricity	Electricity	Electricity
Entertainment	Electricity	Electricity	Electricity	Electricity

Table 1: Typical fuel scenarios for low-income electrified households in South Africa
Source: Adapted from Simmonds & Mammon (1996)

What is of interest here is the huge potential embodied within the electrification initiative for lighting. As Table 1 shows, even though households may be connected to electricity, some will continue to use other fuels to fulfill domestic energy requirements. Full conversion to electricity is generally hindered by the financial implications of doing so. Electrification is already considered an expensive investment; if the full benefits of the service are not utilised, and the economic value of the service declines, electrification becomes even harder to justify. The EEL programme can add value to the electrification initiatives, therefore, by reducing household's electricity bills.

Thirdly, the 'electrification' of a low-income household usually entails the installation of a ready board in a central point in a home. It does not imply that the

³ See for instance Simmonds & Mammon (1996), Mehlwana & Qase (1997).

household is wired throughout. Usually the inhabitants of the household have this responsibility. This places additional burdens on poor people, who often choose not to wire the house and instead rely on the single power point for all applications. Clearly this has implications for lighting within the house: in general, it means that lighting is restricted to a certain area in the house (that is, depending on whether an extension cord is used or not), and to a limited light output (that is, depending on whether an adaptor can and is being used).

Fourthly, social networks in low-income communities are complex and vitally important to the functioning of these communities. Most households are represented in some form or other by grassroot organisations including civics, churches, NGOs, unions or neighbourhood alliances and it is vital that the EEL programme work with these structures. At the same time, the EEL team should also be aware of the problems that the housing sector has experienced: community organisations, 'official' area representatives, or social compacts are not always representative of the communities' interests.

Of final relevance is the level of non-payment for electricity services. Low-income households receiving, but not paying for, electricity services have suggested that the quality of service that they do receive is very poor – both in terms of supply, and customer relations. On the supply side, frequent blackouts or power failures at peak times during the day, and poor wiring have been cited as reasons for householders' discontent with the electricity services that they receive. People have also complained about inconsistent and unreasonable metering practices, especially with the new prepayment key-pad system: they argue that these units seem to run faster than usual, and thus make it difficult to budget for energy expenditure. It has also been suggested that many people cannot afford to pay for the electricity that they use or, more commonly, that arrears have accumulated to such an extent that even if the electricity end-users wanted to pay for the services, they would most likely be unable to do so. Moreover, many people regard Eskom with distrust in that it is still widely viewed as an arm of the previous government with very little legitimacy. Interestingly, many people do not differentiate between the local utility that provides them with electricity and Eskom, suggesting that these local utilities are also distrusted. Because there is usually very little interface between the utility and the end-user, opportunities to correct these misconceptions are few. Eskom is striving to improve the non-payment situation through technical measures (improved supply reliability and metering), improved systems (sales and revenue collection), customer focus, monitoring and communication strategies (Mehlwana & Qase 1997). Yet the problem remains, and appears to be worsening.⁴

2.3 Why the low-income sector?

In the EEL team's programme strategy (1996), low-income households are defined as those which earn below R1 000 per month. This group comprises largely people living in squatter camps, township shacks or rural areas. Their electricity consumption is low, and they own few electrical appliances. Middle-income groups have incomes between R1 000 and R3 000 per month; they usually live in township matchbox houses, and have limited electrical appliances. Finally, the high-income group have good access to electricity and usually an extensive range of major appliances. In this paper, the term 'low-income sector' is used to include both the low-income and middle-income groups as defined above, because the market barriers facing these two groups are fairly similar, and also because approximately 70% of South Africa's households earn less than R1 500 per month.

As Table 2 below indicates, there are more energy savings possible in the middle and upper-income household sectors than in the low-income household sector.

⁴ Gauteng's 52 local authorities are now adopting a hardline approach of disconnecting electricity debtors who have not made any attempt to negotiate terms of paying back arrears. Though the nature and flexibility of these vary from one authority to the next, the minimum down-payment seems to be 35% of the total debt. Johannesburg's metro electricity helpline reports that households owing less than R1 500 are 'safe for the moment' (but only for the moment) (*Business Day*, 19/8/97).

Accordingly, Eskom (1997a) notes that, initially, the existing and new high-income segments will be targeted. Thereafter the scope of the programme will expand to include the middle-income and then the low-income sectors.

<i>Energy usage</i>	<i>Income group</i>	<i>Before DSM (100W)</i>	<i>After DSM (25W)</i>
Average consumption/month (kWh)	Low	46.8256	24.8972
Peak demand (19h00) (kW)		0.1334	0.0758
Average daily consumption (kWh)		1.5609	0.8299
Average consumption/month (kWh)	Middle	195.595	159.0479
Peak demand (19h00) (kW)		0.5733	0.4773
Average daily consumption (kWh)		6.5198	5.3016
Average consumption/month (kWh)	High	1 026.616	921.4736
Peak demand (19h00) (kW)		2.1560	1.9220
Average daily consumption (kWh)		34.2210	30.7158
Average consumption/month (kWh)	Weighted total	672.6111	597.3329
Peak demand (19h00) (kW)		1.4387	1.2673
Average daily consumption (kWh)		22.4027	19.9111

Table 2: Average electricity consumption and demand by income group

Source: Eskom (1997a)

This section asks *why* there is a programme for the low-income sector when the potential energy savings are lower. It is important for the EEL team as it undertakes to develop strategy for this sector to understand its importance. Key arguments include the following:

- The electrification and low-cost housing initiatives are moving rapidly ahead in South Africa. Eskom needs to investigate how best these initiatives can be reinforced, and the EEL programme presents opportunity for this. See the commentary in section 2.2.
- Within the context of the South African electrification programme, the energy-efficient lighting programme for low-income households is potentially an aspect of Eskom's greater responsibility to society. There are a number of elements attached to this assertion:
 - The low-income sector typically uses relatively high levels of electricity for short periods during the day, and very little electricity for the rest of the day. This pattern of utilisation is expensive both for Eskom and the user. If managed appropriately, the EEL programme could help to lower these costs to the customer, thus providing an equivalent customer service to that being provided prior to DSM activity but at a lower cost.
 - In general, newly electrified low-income households have few (or no) electric appliances. Eskom could suggest that it is appropriate for them, as Eskom, to market and/or finance energy efficient appliances for initial purchases.
 - As Table 3 indicates, the proportion of expenditure that poor households devote to household energy requirements is greater than for more wealthy households. It seems appropriate that Eskom assist poorer households to utilise electricity efficiently, thus reducing the proportion of total income poor people spend on electricity.

<i>Income groups expressed in terms of per capita expenditure</i>	<i>Total fuel expenditure</i>	<i>Total h/hold expenditure</i>	<i>Fuel expenditure as a % of total h/hold expenditure</i>
< 100	73.67	614.92	12 %
< 200	63.59	1 180.56	5 %
< 300	72.88	1 396.35	5 %
< 400	77.24	1 701.74	5 %
< 500	81.44	1 847.31	4 %
> 500	120.80	3 257.76	4 %

Table 3: Total monthly household and fuel expenditure by income group for electrified metropolitan households
Source: SALDRU (1993)

- Lighting contributes proportionately more to the peak in low-income households than it does to middle- and high-income households, which typically have a wider range of appliances, and a more varied demand for electricity.⁵ It makes economic sense for Eskom to target low-income households because *only one end-use* needs to be targeted to generate peak energy savings.

In essence, Eskom's energy efficient lighting programme could be geared to assist low-income households to overcome barriers that are currently inhibiting their access to energy efficiency, and less expensive energy services.

3. The EEL programme

3.1 Introduction

The main objective of the EEL programme is to encourage the wide-spread use of CFLs in order to substantially and economically reduce the system's evening peak and to reduce energy used by lighting in the residential sector. Specific objectives of the EEL programme (for all sectors) are as follows (Eskom 1997a):

- to launch a pilot programme to verify the viability of the programme;
- to make CFLs widely available at affordable prices;
- to improve customer service by reducing lighting cost in the household;
- to contribute to Eskom's RDP commitment towards conserving the environment; and
- to support the macro-economic development of the country (for instance local manufacturing, job creation, foreign-exchange savings).

The EEL team proposes to implement this programme gradually. In the short term, a gradual awareness of the concept of energy-efficient lighting with low penetration levels in the residential sector will be pursued, with a view to evaluating the probable impact of the programme on local demand curves. In the medium term (to 2005), the EEL team envisages a progression towards aggressively marketing the concepts of energy-efficient lighting in the residential sector, in anticipation of a shortage in capacity. In the long term, the EEL team aims to have a full-fledged package of services, with various components suited to the needs of all stakeholders, for the reduction of peak-load demand in a scenario where no surplus capacity is available in South Africa (Eskom 1996a).

In this part of the report, a range of issues pertaining to the EEL programme are addressed. They are all essential elements of the EEL programme in general, and specifically to the pilot projects and EEL programme's strategic planning framework. The purpose of this discussion is to provide further insight into the future development of the programme, its requirements and potential. Specific

⁵ As evidence of this, Appendix A shows the disaggregated demand profiles for low-middle-, and upper-income households.

technical and operational recommendations are presented first; thereafter, recommendations relating more specifically to programme and project development planning.

3.2 Technical and operational considerations

3.2.1 Light output

As was noted in section 2.2, 'electrifying' a low-income household entails the installation of a ready board at a central point. Generally, the house is not wired throughout, which means that inhabitants must individually organise wiring, at their own expense. In many instances, they are not able to bear this additional monetary burden, and choose to make do with one power point; this can have significant consequences for domestic lighting. First, householders may, especially during peak periods, need the power point for purposes other than lighting. Use of lighting will therefore be restricted if an adaptor is not utilised. Second, this wiring configuration may mean that only one lamp is used per household, so that there is not necessarily a lamp for each section of the house. Households might use an extension cord to light more of the house.

If lighting use in low-income households is restricted in terms of both time and number of lamps, and households only use lighting when it is a priority, it is important that the light output of the lamps the EEL programme distributes are adequate to meet the needs of the households. Literature on the successes and failures of energy-saving lighting programmes around the world goes into detail about this issue, and the message that emerges is clear: low-income households are not generally sufficiently satisfied with *low-wattage* lamps to justify their purchase and installation.⁶ Where CFLs have been used to replace incandescents (so, not necessarily in newly electrified areas), customers frequently express concern about the amount of light that the CFLs are emitting. In many instances, participants complained that low-wattage CFLs did not provide as much light as they received with incandescents.⁷

From Eskom's point of view, it makes sense to distribute and encourage the use of energy-saving lamps with low wattage because higher wattage means lower reduction of kW of peak power demand and less energy saved. Also, if the EEL team initially distributes lamps free of charge, it makes sense to minimise its costs: lamps with higher wattage are more expensive. Table 4 below illustrates this: it presents rough price estimates of energy-savings lamp readily available in South Africa. The prices quoted are for retail purchase and, as such, overestimate the costs per lamp incurred by the EEL programme, which is importing CFLs directly from manufacturers overseas.

Wattage (W)	Retail price of lamp (Rands)	
	Energy-saving lamp	Energy-saving lamp with ballast
7 W	R10.41 – R10.57	R51.58
9W	R10.57	R40.70
11W	R10.50 – R30.00	R51.58
13W	R21.18	n/a
15W	N/a	R48.10 – R51.58
18W	N/a	R57.75
20W	N/a	R51.86 – R54.77
23W	N/a	R54.77

Table 4: CFL retail prices

⁶ Low-wattage CFLs, as represented here, are any CFLs of 15W or less.

⁷ With given parameters, and products to choose from, 86% of low-income customers interviewed in Mexico expressed a strong interest in obtaining 22W lamps, while only a small percentage preferred 13W lamps, and even fewer preferred 9W lamps (Blanc & du Beun 1994).

Distributing low-wattage CFLs, however, threatens to compromise the EEL programme. As international experience has shown, householders are concerned with light output, not watts. If they receive a poor service from low-wattage CFLs, they will reject them in favour of incandescents, regardless of energy savings. Clearly, this could have implications for the EEL programme.

Furthermore, if Eskom is committed – through the electrification and energy-efficient lighting initiatives – to contributing towards the general upliftment of society, low-wattage lamps are clearly not appropriate. Surely, the advantages presented by lower energy costs would be significantly reduced if the benefits offered by electricity are also reduced in the process of attaining low energy costs? Indeed, if their quality of life is to be significantly improved, householders must benefit from electric light, and perceive it to add value to their lives: light should be both useful, and appropriate. The word 'appropriate' is used here to include a service that suits household needs and requirements (for instance, educational, health, and business), and household capacities (for example, wiring, affordability).

Lamps of 9W will not provide enough light to ensure an appropriate level of service. Table 4 shows that lamps with higher wattage are only marginally more expensive than lower wattage lamps. In other parts of the world, electricity users have expressed a preference for taking longer to pay for a lamp and receiving a higher output of light over a less expensive, lower wattage lamp. In sum, the EEL team needs to assess this in a South African context to determine the threshold at which lamps distributed emit adequate amounts of light, are affordable to both Eskom and the household, and also do not compromise the savings during peak hours.

3.2.2 Quality

The control gear systems of CFLs can be electromagnetic or electronic. The electromagnetic CFL has a lower cost than the electronic system, but has higher losses. The current trend in the developed world is to choose the electronic system. Initially, the EEL team has chosen to use both. The EEL team should continue to monitor these different systems as they are distributed. Criteria for monitoring should include the quality of the lamp, light output, and affordability to both Eskom and the electricity user.

It is vital that the EEL team choose lamps and ballasts that are unlikely to malfunction. As has been shown elsewhere in the world, customers tend to rapidly lose interest in the concept of energy-efficient lighting if units are seen to be consistently faulty. Even if the EEL programme (or the lamp distributors) offered full warranties on ineffective lamps, people tend to be discouraged by breakages. In this respect, the EEL team should ensure that the quality of the lamps does not in any way compromise the EEL programme. Again, it might be useful for the EEL team to conduct a series of price/quality sensitivity analyses during initial pilot project stages. These analyses should give some indication to the EEL team how the project participants prioritise quality and price.

3.3 Development planning considerations

The purpose of this part of the report is to build upon the EEL programme in its current form in accord with the objectives of the programme, as outlined above. The following section presents a broad organisational structure for the programme; thereafter aspects of the structure are addressed individually. First, the pilot projects are compared with the EEL programme. Then a commentary on the pilot projects is provided, including a brief presentation on criteria for choosing the pilot projects, designing the pilot projects, and designing criteria for evaluation. A brief discussion is also presented on transforming these processes into large-scale sustainable projects. Mindful that these processes are only as good as the 'support structures' that run parallel to the pilot projects, the final sections investigate marketing, purchasing and testing, customer support, distribution, finance and incentive, co-ordination, monitoring and evaluation, and research and development-related requirements.

3.3.1 Programme framework

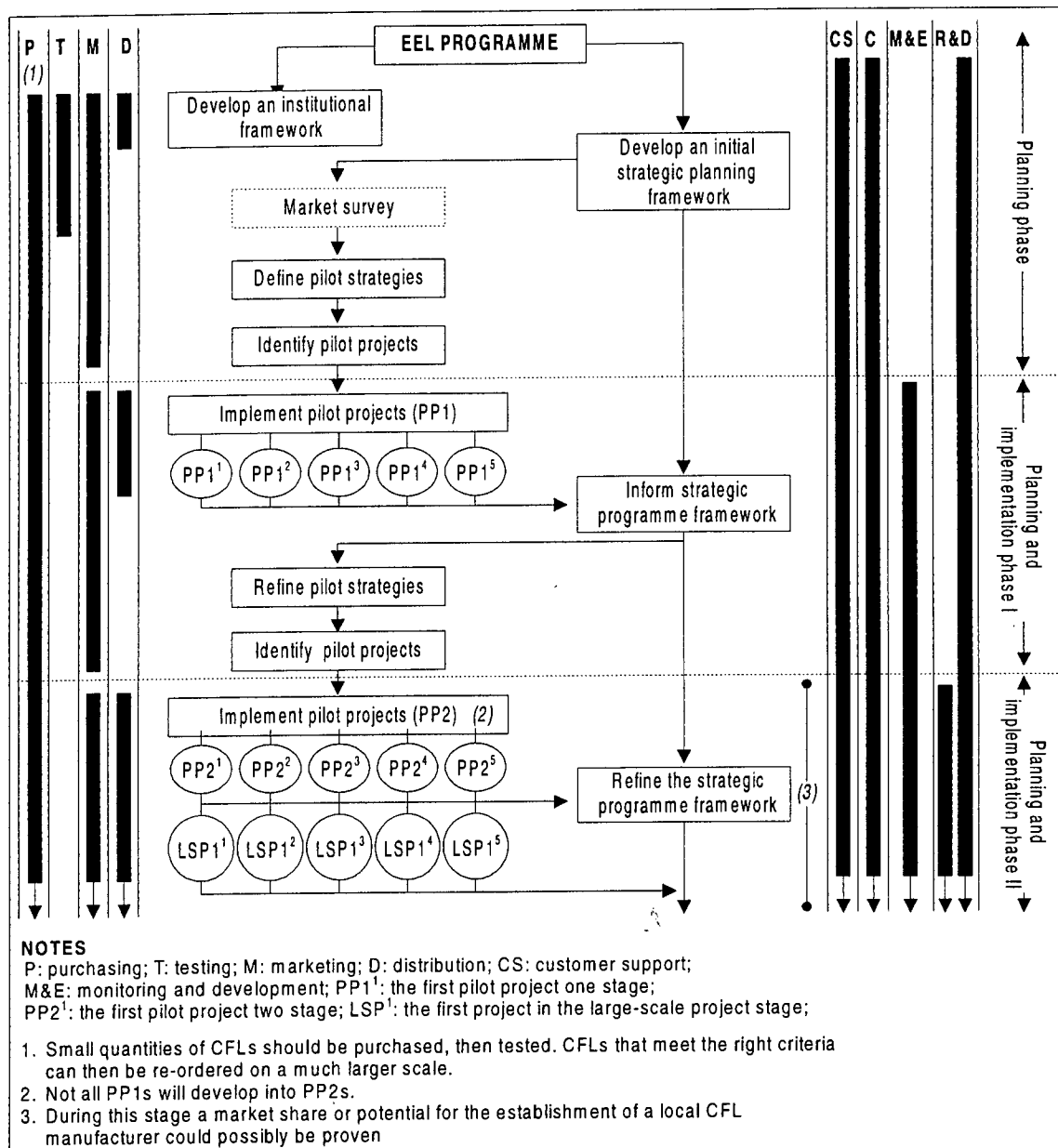


Figure 1: Organisational chart for the EEL programme

Figure 1 illustrates graphically the processes that need to be put into place for the EEL programme to become operative. Essentially, there are two primary processes, namely (i) the development of a strategic planning framework and plan for the EEL programme, and (ii) the pilot project processes. On the one hand, a strategic planning framework for the EEL programme involves a series of ongoing, iterative planning exercises. Though much of the strategic planning framework of the EEL programme will be developed at the outset of the programme, it is vital that it is revisited in light of later experience. This is necessary because the pilot project processes are bound to provide new and more accurate information which will undoubtedly change or refine the content of the strategic planning framework. In turn, the strategic planning framework for the EEL programme will continue to inform the pilot project processes.

The pilot project processes call, on the other hand, for both planning and implementation activities. In the initial Planning Phase, pilot project strategies are formulated, and pilot projects are identified (the section to follow will suggest

criteria for these processes). At the outset of Planning and Implementation Phase 1, the first pilot projects are implemented. In these early stages of the EEL programme, when relatively little is known about the customer market, and the impact on the grid, the pilot projects should be exploratory, open-ended, and designed to test broad issues (for instance, market penetration rates, hours per day of lamp usage, colour and type of light preferred, number of lamps used, impact on grid, and so on). In Figure 1, these projects are called Pilot Projects 1 (or PP1s). In essence, the purpose of PP1s is similar to that of a market survey, but lamps are also physically distributed. In fact, a market survey could precede the formulation of pilot project strategies but this is not essential, because this could be accomplished far more comprehensively and effectively by the PP1s.

The investigations, and results, of the PP1s could then be used to (i) feed into the EEL programme strategy, and (ii) refine the pilot project strategies in preparation of a second round of pilot projects (or PP2s). Here, the EEL team's investigations would be more specific to the area in which the pilot project is situated. The objective of the PP2s would be to ascertain the 'best fit' for each particular area, with an ultimate view to implementing each pilot project on a larger-scale sustainable basis. In Figure 1, these projects are labelled Large-Scale Projects (or LSPs). Most probably these pilots (and the large-scale projects) would all differ, because each project would be designed for the area. Conceptually, the role of the PP2s in this entire process should not diminish: rather, the PP2s should be considered as ongoing initiatives of the EEL programme, launched each time the EEL team identifies a new implementing area.

3.3.2 *The strategies of the EEL programme and pilot projects*

As shown in Figure 1, pilot projects are a vital component of the EEL programme. They represent a powerful tool which Eskom could use to learn how to achieve the objectives of the EEL programme: how to help poor people overcome barriers to entry into the lighting market, and to achieve energy savings on peak demand. Pilot projects produce information that feeds not only into the strategy for the *pilot projects* but also the EEL *programme's* strategic planning framework.

It is important to distinguish between these two processes (pilot projects and programme strategy), because their objectives are different. The information that emerges from the pilot projects is clearly particular to the area in which the research is undertaken – indeed, pilot projects are vital to understand the needs and trends of specific areas. The insights cannot be directly applied directly to a strategic planning framework for lighting in all low-income households; the information is too specific to do this. As international experiences have shown, policy and practice that has worked in some environments has been the reason for the demise of similar projects launched in other areas.⁸ The EEL programme's strategic planning framework lays out *broad* directions that the programme will take and, as such, identifies the parameters within which the pilot projects can be designed and implemented. By recognising these differences, the threat of creating centralised and standardised procedures for situations that, in fact, comprise a complex variety of factors, can be avoided. Examples of the distinctions in focus between the strategic planning frameworks of the pilot projects and the EEL programme are presented in Table 5 below.

⁸ See for instance Clark (1997a).

	<i>Strategic planning frameworks</i>	
	<i>EEL programme</i>	<i>Pilot projects</i>
Focus	Broad	Narrow
Examples of elements of a strategic planning framework	<ul style="list-style-type: none"> Focusing on low-income households Focusing on household affordability (in general) and household needs (in general) Advocating extensive local research Conducting a number of pilot projects Utilising CFL technology Adopting a participatory, and transparent approach Providing customer support Providing a co-ordination function Developing marketing strategies Utilising research to build the programme 	<ul style="list-style-type: none"> Specifying exact location of low-income household Specifying quantity and quality of lamps Specifying groups for participation, and nature of participation (for example, community representation, involvement of civics and neighbourhood shops) Investigating ways in which Eskom will support customer (e.g. customer support centre, warranties) Investigating nature of incentives offered (e.g. rebates, discount on sales) Investigating different methods of payment (e.g. gradual payback on utility bills, installments, give-aways) Investigating different marketing approaches (e.g. advertising, flyers, radio, events, surveys)

Table 5: Programme and pilot project strategic planning frameworks

3.3.3 *Pilot projects*

Considering the general objective of the EEL programme, the strategic planning framework of the EEL programme should allow for projects to be designed and implemented in any low-income area in South Africa. It should not necessarily matter where the first pilot projects are launched. Sites for pilots could be chosen on the basis of the following criteria: nine projects in each region, or projects in leading housing developments such as Kutlwanong in the Northern Cape and Marconi Beam in the Western Cape). The EEL programme strategy in its current form advocates that Gauteng should be a priority because it has the highest population, disposable income per capita, and housing shortage in the country. On the other hand, in early stages of the EEL programme, while the viability and purpose of the programme is being monitored from many quarters, it might be prudent for the EEL team to choose locations which are conducive to helping the projects to succeed, and lending support to ensuing programme processes. In this regard, projects could be initiated on the basis of communities indicating clear interest in the EEL programme, and a willingness to participate in a pilot study. This would require a pre-implementation survey.

The EEL team may wish to choose pilot areas even more strategically. Some areas chosen might be ones which have been recently electrified. In these cases, energy-saving lamps will be the first lighting devices to be used. Other areas chosen might include well-established communities, where most lamps would be retrofitted. In both instances, the communities participating should be socially stable, to avoid difficulties of marketing and distributing lamps to people who are in transition, moving between locations in urban areas, or between urban and rural areas. For the more-established communities, an indicator of social stability might be the existence and strength of community organisations, and networks in the area. The degree to which people are committed to an area is more difficult to establish in newly-developed areas. Householders' commitments to housing finance or the level of additional investment in household goods might be used as some indication. Different pilot areas could also be selected on the basis of the average

household income of potential participants. A widespread range of incomes could also lend strength to the EEL programme: this approach would show, by the end of the first Planning and Implementation Phase, how household wealth relates to project participation, if at all.

More important is the way in which the projects are then managed. First and foremost it is essential that the programmes' support structures are in place before the pilot projects are implemented. *In fact, it would be less damaging to the EEL programme to delay the process than to go ahead without support structures.* This means that capabilities to purchase and test equipment, provide technical and information support to participants, distribute, finance, and market lamps, monitor and evaluate pilot projects and the EEL programme, conduct ongoing research and development, and co-ordinate or liaise between all stakeholders must be well established prior to the EEL programme commencing pilots. The institutional and operational requirements of these structures are presented in greater detail from section 3.3.5 onwards, and as such will not be dealt with here.

Firstly, pilot projects (both PP1s and PP2s) can be designed and then implemented in various ways. One of most important project design determinants relates to the strategic objective of the pilots. The pilot projects could be launched on the understanding that only one variable will be tested in each project (such as levels of customer acceptance, impact on the grid, or marketing strategies). Alternatively, a pilot project could be designed to test a number of variables concurrently. It is important at the outset to determine what the focus or purpose of the pilot project would be. International experience has shown that both approaches have merit. Although the second approach is generally favoured because it is less time- and resource-consuming, the first approach is perhaps more thorough and less risky.

In most instances, it is difficult to estimate the duration of the pilot projects. If only for strategic planning or marketing reasons, the programme would require some time. In this regard, a number of issues should be borne in mind. Firstly, it is possible to place a time limit on some aspects of the pilot projects (for example on particular marketing initiatives or financing arrangements). Time limits cannot, however, be placed on the support services the EEL team offers project participants or on the monitoring and evaluatory elements of the programme. Marketing and selling a new product, especially to poor people who would generally have to adjust their expenditure-related habits significantly to afford the product, should include a tacit agreement that support will be given on an ongoing basis, even if this support involves a place to go when a bulb is faulty. If this commitment cannot be fulfilled, the lamps should be distributed free of charge. Likewise, important impacts of using energy-saving lamps in households might only emerge later on in the life of the lamp. In low-income areas of Cape Town, households where lamps were distributed a few years ago were recently revisited. In general, the householders were happy with the lamps though many commented on the film of grime that had developed on the lamps that in turn was reducing the net light output of the lamp. Most of the householders were using these lamps for multi-purpose lighting including lighting for cooking, for external use and so on (Thorne, personal communication). Clearly, this impact would only be picked up in later stages of monitoring and evaluation. Secondly, many participants will pay for lamps in installments: this clearly, would extend the life of the project.

In project planning, it is also important to consider the time required to disseminate information about energy-saving lamps. In low-income areas in particular, word-of-mouth is one of the most effective means of communication. Thus, the project life should make provision for a period of time that will allow users to first test the lamps in their own environment, before they suggest the device to other people in the area. Related to this is allowing adequate time for people to determine for themselves how the new lamps are altering their energy expenses; this may take less time for households which receive utility bills than for those paying for electricity in advance.

Thirdly, if CFLs break, they tend to do so in the first three months of usage. As one of the important research areas relates to the quality and life of the lamps, time

should be provided for these assessments. Finally, the project life will depend on the number of lamps that are available for distribution, which, in turn, would be partially a function of market penetration rates.

3.3.4 *Testing and purchasing the lamps*

As the EEL programme develops, purchasing is likely to become an increasingly time-consuming activity. Since pilot projects are completely dependent on the availability of CFLs, this particular institutional requirement should be provided for early on in the process. The EEL team is presently engaging in dialogue with international manufacturers to import large quantities of lamps. This is difficult because, although manufacturers can send lamp specifications, these lamps need to be evaluated domestically for quality and for affordability. Here, good timing is crucial: while provision for delays or time lags must be made (so that the ordering, purchasing, testing, re-ordering, re-purchasing processes do not interfere with the launch of pilot projects), the foreign exchange implications of doing so could be significant. The purchasing department will also need to liaise with local business around luminaires, extension cords, and assembly.

In addition to the above, the purchasing department needs to build up expertise in monitoring international lamp prices to make predictions on when the world lamp price will stabilise. Purchasing must track new technologies as they become readily available. Finally, it is advisable that the EEL programme should drive an ongoing effort towards assessing the viability of local manufacturing. This activity would include monitoring local sales, and energy efficient lighting's market share in the overall domestic lighting sector.

In Figure 1, the purchasing and testing functions of the programme are denoted by the letters 'P' and 'T' appearing on the left hand side of the diagramme.

3.3.5 *Providing customers with support*

Considering that energy-efficient lighting is a new concept to many, and that a programme of this nature has never been launched in South Africa, it makes sense that customer-support services become a significant aspect of the EEL programme. The term 'customer support' has been used here to refer to technical and informational support concerning energy efficiency in general, and energy saving lamps more specifically. Customer support could include the following:

Technical support

- installation
- wiring
- light output
- energy audit
- energy efficiency demonstration

Informational support

- financial planning
- strategic planning
- other energy efficiency programmes
- energy saving advice (devices, time-of-use)
- environment, health and safety concerns
- where to go for help

International experience has shown that not only do project participants require support during the time of purchase and installation, but also for extended periods of time afterwards. If anything, people need to be assured that they are not 'on their own', that they will *always* be able to secure support for this 'new technology', and that the current programme is not just a once-off initiative.

Participants in both smaller and larger projects also need to know where to seek this support. This support must be easily accessible or the programme will lose participants to conventional lighting technologies. The EEL programme will need

to make provision for this level of support.⁹ In some developing countries, utilities have benefited from not being directly involved in providing this service, but rather contracting it out to third parties which then provide a direct interface with the end-users. In turn, the utility provides the third party with the resources and support that it requires to take the initiative forward. If there is any element of distrust or disharmony between the participants and the utility this approach has, in general, been favoured. As was mentioned in section 2.2, a culture of non-payment for services is developing in South Africa. It is suspected that this is the consequence of many electricity users' distrust or scepticism for Eskom. Ironically, electricity users' distinction between their distributing utility and Eskom is blurred: the result being that Eskom's reputation has been tarnished. Within this context, two broad options are available to the EEL team. Either the team can engage a third party to interact with the communities identified, or the team (and Eskom) can provide an interface with these communities itself.

If Eskom were to engage a third party to undertake customer support services, Eskom's exposure on the ground will be minimal. Furthermore, Eskom's current relation with electricity users will not necessarily compromise the programme's progress. The EEL team could approach local community organisations or representatives to assist them in identifying a technically-minded person (or organisation) based in the project area who could then be supported by Eskom to initiate and manage a small agency with a primary mandate to service the community's needs. In this regard, Eskom might form an agreement with a formally unemployed technician or electrician, a local electrical outlet or spaza shop. Preferably this person, or group of people, should also understand how life functions in the community to be serviced. The EEL team could provide opportunities for training. While creating employment, and opening up opportunities for wealth to be generated and retained locally, this option holds the risk for Eskom of the third party defaulting on the terms of the agreement. It might also be difficult to monitor the various projects and thus to track trends and determine best practice. Though not advisable, the EEL team could put out tenders with a view to contracting out the pilot project process to a professional implementing agency that does not necessarily have direct ties with the areas where the pilot projects are situated.

Alternatively, Eskom could use the EEL programme as an opportunity to improve its interaction with low-income electricity users. By providing customers with a tangible and direct link with Eskom, it is possible that the EEL programme could become Eskom's gesture of goodwill to the low-income sector. For the EEL team, this would be the most challenging option to adopt, but the rewards for Eskom in general are far more significant. In essence, this option provides Eskom with the opportunity to utilise the EEL programme for more than its specific objectives and to also foster and capture positive spin-off effects for Eskom in general. This option would clearly require a stronger institutional base within Eskom than if a third party were involved. The EEL programme could choose to conduct a door-to-door visit with a view to do the following: (i) introduce the programme to electricity users; (ii) conduct a brief energy audit and identifying the electricity users' needs (not only just for lighting, but also to determine what electricity users concerns are, if any; (iii) provide a demonstration of energy-saving lamps; (iv) calculate the costs and benefits of the lamps for the specific household; (v) set in motion a direct link or channel of communication between Eskom and the electricity users; and (vi) distribute energy-saving lamps. A group of people (possibly students), whose specific mandate would be to conduct these visits could be hired by the EEL team. In this context, the EEL team would still need to develop a more permanent presence in the area to service ongoing concerns and also to provide an address where faulty lamps could be returned and replaced. The most obvious location for

⁹ Telephonic services have not been considered here because they (i) are unrealistic for the low-income sector in that the majority of households in this sector do not have access to a telephone; and (ii) do not provide a direct interface with the electricity users.

this to be established would be at the centres where electricity users currently purchase pre-paid electricity cards. At these contact points the EEL team might also chose to execute ongoing marketing exercises (including, for instance, displaying housing information boards such as illustrated in Figure 2 in section 3.3.8).

In determining which approach is best, Eskom should consider not only the cost but also the relative benefits of each of the approaches. These issues could be tested during the PP1s.

In Figure 1, the customer support services are denoted by the letters 'CS'.

3.3.6 Distributing the lamps

It is logical for the distribution function of the EEL programme to run in conjunction with the customer support functions. As such, much of what has been noted in section 3.3.5 also applies to the distribution of the lamps. Again, the EEL team could distribute CFLs through a third party, or the team could choose to have more exposure to the electricity users and distribute the lamps as an 'Eskom initiative'. In the case of the former option, a third party could, by utilising existing community networks and contacts, distribute the lamps from a central point within the community, or could conduct door-to-door visits (see section 3.3.6 above). The third party could be contracted to keep details of (i) how, when, where, to whom the CFLs are being distributed, and also (ii) why any of them are being returned, after how long, and so on. Furthermore, the EEL team could also operate a warrant system through the agency whereby any faulty lamps would be replaced free of charge. Finally, the EEL team might chose to develop packages whereby the agency could receive a commission on the lamps distributed, and electricity users serviced, such that the agency contracted could have the opportunity to expand and eventually operate as an independent business. It would be in the EEL programme's interests to monitor these activities closely to develop a clear understanding of the factors driving the project successes and failures. This could be determined by asking questions such as how often the agency is visited, how high the rate of CFL turnover is, and where the market demand lies. The EEL team should determine whether this kind of research and data collection is best undertaken by the agency, by a professional research group, or by the team itself.

If the EEL team chooses to distribute the CFLs as an Eskom-driven initiative, then the locations where electricity-users purchase electricity in advance could be utilised. Alternatively, the EEL team could invest in a fleet of 'mobile energy-saving-lamps centres', and/or door-to-door distribution could be arranged.

In Figure 1, the distribution function is denoted by the letter 'D'.

3.3.7 Financing and facilitating the availability of the lamps¹⁰

Considering the low levels of affordability of the lamps, financing is one of the EEL team's most powerful tools. Indeed, the EEL programme has been built around Eskom assisting low-income households in overcoming the affordability barriers they face. While a simple cost-benefit analysis can be undertaken to determine the price at which it is optimal for Eskom to distribute CFLs to low-income households, the following issues should be noted. First, it is in Eskom's interests to distribute CFLs at as low a cost to the customer as possible because more households will be able to engage in energy-efficient lighting practices. Second, Eskom should not give the lamps away free of charge. As is well known, people tend to take better care of goods that they have in some way have paid for – they attach a value to price. People also tend to make more use of goods that they have paid for above those freely distributed. Thus, Eskom should in some way, require a return (even if it is small) on the lamps, which could be in the form of a cash payment, or a commitment towards co-operating in Eskom's monitoring and evaluation

¹⁰ Financing the lamps is essentially an element of the customer support function of the programme. As it is a critical element of the programme, however, it is examined separately.

processes, or the release of information of some nature (socio-economic data, lighting need and rates of usage, and so on).

Generally, the two points above would apply to CFLs distributed during the pilot project phases and also to the larger-scale projects. The exception to this could be in the early experimental stages of the EEL programme, where it might be informative to conduct a sensitivity analysis (measuring price elasticities of demand) by distributing CFLs at cost, free of charge, and at various amounts falling within this range. If this is done, care should be taken in identifying the areas for distribution: opportunities for arbitrage could emerge and, more concerningly, participants could take different prices as reasons to further distrust Eskom, and its motivations. At the same time, the areas chosen cannot be too disparate as dissimilar conditions could prejudice comparison. The results of a sensitivity analysis such as this could be used to guide, though not dominate, the EEL team's pricing strategies.

It might, as noted earlier, be in Eskom's interests to determine, through testing, what kinds of lamps are more acceptable to low-income households than others. One aspect of the investigation could question the extent to which low-income households are prepared to pay a premium (more) for a better quality lighting device, or one of higher wattage (again this relates to the customers' price elasticity of demand). This broad-based research could be a point of investigation for the PP1s, thus informing not only the smaller ongoing pilot projects, but also the EEL programme itself. Likely, the research results will differ according to the areas identified. This leads one to ask whether, ultimately, Eskom will be distributing the CFLs for a standard price, or whether Eskom will continue to distribute them according to levels of affordability and needs. Evidently, the answer lies within Eskom's motivations for the programme.

In some developing countries, electricity users have stated a preference for paying cash for the full price of the lamps; in other areas, electricity users prefer to pay for the lamps gradually. This distinction is not necessarily shaped by household wealth: poor households may choose to purchase lamps in one lump sum, and wealthy households may choose to pay by installment. It would be worthwhile testing this in low-income sectors of South Africa. If, for instance, people distrust Eskom, they may choose to purchase the lamps for the full cash amount. If Eskom does not market the lamps on its behalf, then electricity users may prefer to pay by installments. Interestingly, research has found that if households do pay by installment for household goods, they tend to purchase more or better quality units of the particular good than if they had chosen a credit scheme. With a view to incorporating different household livelihood strategies, it is important for the EEL team to investigate how flexible payment methods can be.

Mindful of the above, poor households in South Africa are likely to require some *additional* financial incentive and/or assistance to be able to purchase energy-saving lamps. Various options are available to the EEL team to allow for this, including the following. Firstly, the EEL team could create a rebate or coupon scheme whereby households are given rebate coupons, the amount of which would be deducted from the price of the lamp at the point of purchase. Alternatively, customers could purchase lamps and then later receive a rebate on the purchase. The first approach would most likely be more appropriate to a low-income context. Secondly, lamps could be offered at a discount, during specific time periods. Marketing strategies could bolster this approach. A period of time called something like 'Lamps saving energy week' could, for instance, be declared in a pilot area. During this week, lamps could be sold at discount prices. A variation on this option could be offering special prices to customers when they go to purchase pre-paid electricity cards.

The options above would offer energy-saving lamps at discounts. As the market survey conducted by Integrated Market Research in July 1996 indicates, the retail price of energy-saving lamps (approximately R50) is considered by many to be too high, and many households would therefore require additional assistance in paying for the lamps – essentially, this relates to the offer of credit facilities. A

number of credit options are available. With reference to the first and second options in the paragraph above, cash purchases could carry additional discounts to credit purchases. Contractual agreements with shorter payback periods could also be arranged for cash purposes. The credit packages could specify that, if all payments are made timeously, then the customer would receive a free lamp, or forego a number of the payback periods. Thirdly, lamps could be leased to project participants, who would still purchase the lamps, but ownership would only be transferred to the leasee once the full lease amount is fully paid off. If a lamp breaks or burns out, upon return of the lamp the lease would stop. A new lamp, with a new lease agreement could then be issued. If the customer does not like the lamp, it could be returned, and again the lease would stop.

Up to this point, little has been said regarding who would take on the role of the leasor, or the creditor, and how in fact the payments – cash or credit – would be made. This issue is complicated in South Africa because there is no lamp manufacturer. Normally, many of these transactions go through the manufacturer who would naturally be producing the lamps for the programme. In lieu of a manufacturer, these transactions should then go through Eskom. Lamp purchasers could gradually pay for the lamp on their utility bill – assuming they pay for the electricity after usage. The EEL team should structure these payments such that what is paid back each month is less than the savings on the bill as a result of using energy-saving lamps. Lamp purchasers in the low-income sector are likely to pay for their electricity in advance. Apart from the centres which sell the cards, there is no direct link between the electricity user and the lamp distributors. A mechanism would then have to be developed to make use of these links. An arrangement could be made whereby customers purchasing energy-saving lamps could then pay an amount on each card that they purchase such that the incremental amount paid would be less than the energy savings. In essence, the customer would pay more for the card, but the kilowatt hours purchased would last longer because the lamp also uses electricity more efficiently. When there is no utility bill, the financing mechanisms are clearly more difficult. Customers would be wary of absconding because their name could be computerised and linked to a personal account which would be tapped into each time any transaction is made. Keeping track of these transactions could become unwieldy. The EEL team might need to contract out this responsibility, probably to the private sector or to local municipalities or service providers of electricity. This function could possibly be linked with lamp distribution. Because financing arrangements largely determine whether projects will be successful or not, EEL team should identify areas for its first pilot projects where the financing arrangements are uncomplicated (where, for example, payment can be made via a utility bill, or metering systems are personalised and linked to the local service provider). Once the team has learnt more about the acceptability of the programme and also where it has developed a strong relationship with local service providers, it can identify areas where the financing arrangements are more complicated.

Clearly, on the supply side there is a price for what Eskom could offer energy-saving lamps to the low-income sector. Because there are no manufacturers of energy-saving lamps in South Africa, the EEL team has to order all lamps internationally and pay unavoidable import duties. The EEL team is currently motioning, where possible, to reduce these taxes. Nevertheless, importing CFLs does affect the availability of energy-saving lamps. In addition, it is important, because of the pending electricity industry restructuring processes, that the programme urgently becomes a going concern which is operational in its own right.

It is important for the EEL programme that CFLs are always available on demand. If stocks run low or run out, the programme could be seriously damaged. Customers' interest and a future market for Eskom could be irrevocably lost and energy savings during peak hours would also be forfeited. Because lamps are not always available, not because of poor planning in South Africa, but because of bottlenecks in manufacturing and distribution, it is probably in Eskom's interest to keep a surplus stock of lamps. When determining stock levels, the EEL team

should take into account that the pilot projects are bound to have spin-off effects, so other markets for CFLs will emerge as a result of the pilot projects.

It make sense for Eskom to motion for the establishment of a local CFL manufacturer. For this to be a realistic venture, however, there would need to be a proven demand for these particular lighting devices. Ironically, this demand may only appear if the lamps can be sold less expensively and, for this to occur, South Africa needs at least one manufacturer of energy-saving lamps.

3.3.8 Marketing the EEL programme and the lamps

Marketing is important to the EEL programme for two reasons. The first is to disseminate information about the EEL programme. It is clearly in Eskom's interests to distribute as many lamps as possible and, as such, marketing initiatives should be given high priority. The second reason would concern education: electricity users need to understand the benefits that come with utilising energy efficiently and why they should be interested in energy efficiency. This means that marketing programmes may be targeted at correcting users' misconceptions of energy efficiency. Frequently electricity users reduce the notion of energy efficient lighting to meaning *saving* the light, so they turn lights off more often than they normally would, or install bulbs of lower power, thus worsening the quality of light produced.

The rich experience of utilities worldwide to market energy-saving lamps is well documented. Much of this experience is specific to local circumstances, and so its applicability to South Africa should be cautiously reviewed. The experience of other countries should not be used to directly develop specific marketing strategies for a South African energy-efficient lighting programme. Instead, this experience is useful to provide *options* for, or *insight* into, the EEL team's own marketing strategies.

Marketing essentially involves the promotion of a package of services to potential project participants. The package of services could potentially include an offer of financial incentives (for instance, the sale of energy-saving lamps at discount prices, or give-away programmes), warranties (for instance, a guarantee that lamps will be replaced free of charge if they falter), customer support (for instance, free installation, door-to-door visits), and so on. The package of services should essentially make it easier for potential users to better afford, or access energy-saving lamps.

Utilities around the globe have used various methods of conveying these packages of services. Conventional methods include advertising on television, radio, and in print media. Besides perhaps radio advertising, these methods would probably not be as effective for targeting households in the low-income sector in South Africa. Energy efficiency is a relatively new concept to many people, and therefore marketing would be more effective if it were more interactive. Furthermore, low affordability of television and print media would inhibit market penetration. More obvious marketing techniques would include an interactive presence in the pilot areas. This presence could include household visits either directly as an Eskom initiative, or through third party intervention. In addition, the EEL team could organise a community 'event' that could offer hands-on activities related to energy efficiency, documentation, demonstrations, and special event prices for lamps. This event could be concurrent with the launch of pilot projects. Finally, it might be worthwhile to develop a series of simple illustrations demonstrating the benefits electricity users could derive from using energy-saving lamps. Figure 2, an illustration of a user-friendly, simple and understandable information board, is an example of this type of advertising. These information boards could be housed with local service providers, or the centres where householders go to purchase electricity cards, or alternatively at the agencies described in sections 3.3.6 and 3.3.7.

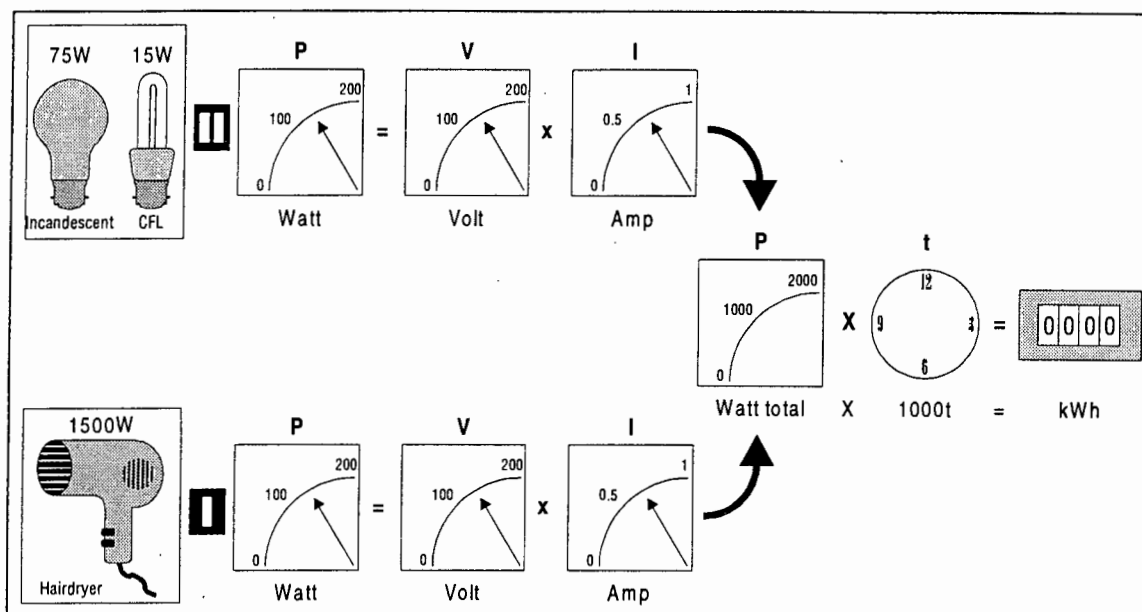


Figure 2: Energy usage display board

It is difficult, at this stage, to assess which of these options would be most acceptable to the EEL programme, and best absorbed by the target market. As such, it is advisable that the EEL team seeks to incorporate elements of each of these strategies into the initial pilot projects. This would not necessarily add to the marketing costs. A competition calling for marketing strategies for this sector and the low-income sector could be held. As alluded to above, one of the most important decisions to be taken by the EEL team, and Eskom, is whether the programme will be marketed as an Eskom initiative or not. Clearly, this will have significant impact on the type of marketing strategies then employed.

3.3.9 Co-ordinating stakeholders

The EEL programme will need to consider two types of co-ordination functions (denoted in Figure 1 by the letter 'C'). First, all aspects of the programme – distribution, monitoring and evaluation, research and development, marketing, purchasing and co-ordination in the second sense – are appropriately co-ordinated. Clearly there are some very direct links between these functions. For this programme, cohesiveness is essential.

Second, the EEL team will need to take on the responsibility of bringing the role-players in energy-efficient lighting together, or at least ensuring that there is liaison between these groups. Considering the potential size of the EEL programme, liaison is vital to the programme. Role players could include government, utilities, manufacturers/dealerships/distributors, community-based organisations, households, local authorities, low-cost housing developers and international organisations. Within these groups, opportunities for co-operation and efficient uses of resources are immense. In government for instance, the EEL programme can begin a dialogue concerning import duties and exchange regulations with the Department of Trade and Industry, and the Ministry of Finance. Dialogue would also be important with the Ministry of Housing, and the Department of Minerals and Energy concerning the mass housing and electrification initiatives. There might also be opportunity for dialogue between the EEL team and international interest with regards structuring the EEL programme around a Joint Implementation (JI), or Activities Implemented Jointly (AIJ) project.¹¹ Also, it is likely that interaction

¹¹ See for instance van Horen & Simmonds (1997). Put simply, Joint Implementation (JI) allows a country to enter into an arrangement with another country to carry out

between the EEL team and low-cost housing developers could be of benefit – for instance, displaying the board illustrated in Figure 2 in section 3.3.8 in the show villages.

Finally, and perhaps most importantly, the EEL team should seek to build strong links with local service providers around the country. Co-operation of this nature is vital to the success of the programme. Given the pending restructuring of the electricity industry, and that the EEL team is small, and resources are limited, it makes sense for Eskom to seek the buy in of these service providers to manage and implement the various initiatives. Indeed, partnerships of this nature would help to reduce the complexity of the billing/financing systems, as noted in section 3.3.8. In a restructured electricity industry, the regional electricity distributors (REDs) would become the natural partners of the EEL team, and could ultimately drive the entire process.

3.3.10 Monitoring and evaluating the EEL programme, and the pilot projects

Broadly speaking, a monitoring and evaluation functions will be important for the EEL programme, both for assessing the overall programme, and as a tool to develop the programme. In terms of the programme performance, the EEL programme should undergo periodic internal and external review. Internal review processes could, for example, assess whether the human resources of the EEL programme are sufficient, or whether the marketing strategies or third party involvement is working well for the programme. External review might question similar aspects of the programme, but might do so from a more holistic point of view. The purpose of the external review would be for uninvolved parties to offer strategic advice to the EEL team and, where necessary, to guide its development, and to provide an independent assessment.

From a project-development perspective, monitoring and evaluation of the projects will be vital if the EEL team chooses to develop the EEL programme and pilot projects on a learning-by-doing basis. Indeed this is an immense task, and clearly not one that Eskom can currently undertake in-house. Eskom should continue to monitor the impacts on the grid and technical aspects of the lamps, while contracting in expertise to monitor and evaluate market dynamics, and household data including economic, sociological, and environmental impacts. Regarding the latter, a database should be established and carefully maintained in order that the development and needs of the programme, Eskom and customers can be established. It will also be useful, even vital, for this function to compare projects between regions, different socio-economic indicators, climatic conditions, rates of acceptance and participation, impact on the grid, and so on. In comparing different projects, critical project success factors might begin to emerge. These types of undertakings will help the EEL team to develop skills in implementing projects that suit the needs of both Eskom and the electricity users.

The monitoring and evaluatory needs of the programme and the pilots will evolve as progress is made, it is important that monitoring and evaluatory activities should continue irrespective of the stage of development of the EEL programme. It is also critical that these activities commence at the same time as, or prior to, the launching of the PP1s. For evaluatory procedures in particular it is essential that databanks cover all stages of the process.

Whether the EEL programme calls for discrete or multi-tasked testing procedures, there are a number of variables that must be tested prior to large-scale project implementation. As noted, the first round of pilot projects will investigate broad issues, while the second will scrutinise more area-specific indicators. The following gives examples of the questions that could be asked during the pilot project process. Note that many of the questions asked during the PP1s should be revisited in PP2s and even LSPs stages. These processes require iterative approaches whereby it might be necessary to refine any one aspect of the project numerous

than it is in the former (Maya, 1995) AIJ projects are similar to the above, but those implemented as pilot projects.

times before it is acceptable to all parties. It may never reach that stage, in which case it will be necessary to try to reach a compromise. Moreover, even if an aspect of the project works well, it should continue to be monitored.

General PPI uncertainties

- Do the projects achieve the EEL programme and Eskom load management goals?
 - What is the impact of the projects on the grid? Are the forecasted energy savings realistic? Is it realistic to assume that there will be an impact on the peak electricity demand? Are the mechanisms for measuring electricity demand savings accurate and in place?
 - Are the financial requirements of the project reasonable?
 - Are the institutional requirements and administrative controls of the project reasonable?
 - How does reform in the electricity industry affect the project management?
- Do the projects meet the needs of electricity users?
 - What barriers do electricity users in this area face that inhibit them from purchasing and using energy efficient lighting, or lighting in general?
 - Do these projects improve electricity users' quality of life? How?
 - Is the price right? Incentive to purchase? Disincentive?
 - Is the package being offered to end-users affordable?
 - Would electricity users prefer to lease or buy energy savings lamps? Credit, or full payment?
 - Is the light output sufficient?
 - Does the colour of the light satisfy users? Are electricity users happy to use fluorescent lamps?
 - Are the project forecasts relating to the number of lamps on average that people require and demand correct?
 - What are the low-income sectors' lighting requirements? How many hours a day do low-income electricity users require lighting?
 - Are electricity users being adequately supported? How much support is required?
 - Do the projects have the potential to create jobs and retain generated income locally?
- How effective are the marketing strategies?
 - Are the marketing strategies currently employed reaching the target market? Are there ways of improving these strategies?
 - Is there a general acceptance of the programme in the targeted areas? How do electricity users view Eskom? Does this need to be improved?
- How effective are the projects' administrative controls?
 - Does it work to involve a third party in this process? Or, should the EEL programme and Eskom be more involved with the community?
 - If a third party is involved, what can be expected from a project management point of view?
- How will the transition from pilot projects to large-scale implementation be managed?
 - Could these projects be replicated on a much larger scale? How sustainable would they be? How much external support would they continue to require?

- How can the project be improved?

During PP2 stages, the questions asked will be significantly refined, and will take the form of the following:

Specific PP2 uncertainties¹²

- Does the project achieve the EEL programme and Eskom load management goals?
 - What is the (potential) impact of the project on local sub-stations? Where and when are the savings being achieved? Peak, or off peak savings? If need be, how can this be improved? Do the savings justify the costs?
 - Would it be feasible to augment the project to large-scale implementation status?
 - Realistically, can the EEL team manage the project internally – that is, test, purchase, distribute, support, monitor and evaluate?
- Does the project meet the needs of electricity users in the area?
 - What barriers do electricity users in this area face that inhibit them from purchasing and using energy efficient lighting, or lighting in general?
 - What are the lighting requirements in this area?
 - Are project participants satisfied with the level of support and service that the project offers?
 - What is the level of acceptance of the project? What market penetration (or participation) rate could be realistically assumed?
 - Judging by the average monthly income of the project area, does it make economic sense to sell the CFLs at the price quoted?
 - Is the package being offered to electricity users affordable?
 - Is the light output sufficient? Is the colour of the light satisfactory?
 - Do electricity users find survey analysis involvement acceptable?
 - How many lamps do electricity users demand or need?
 - Is it optimal to make use of the local retail outlet for pre-paid electricity cards?
 - What are the reasons for lamps being returned and replaced?
 - How many jobs has the project created?
 - What has been the nature of community organisations' involvement in this project? Has it been positive?
- How effective are the marketing strategies?
 - Is the current marketing strategy effective? Why was it chosen over another? Retrospectively was this appropriate? How can this be improved?
 - Is the target market being reached? Is it having any unanticipated effects? If so, what is the nature of these impacts? Should they be reinforced or removed?
 - Has a balance between financial incentives and market strategies been achieved?
- Administrative controls

¹² Examples of the kinds of questions this pilot project stage addresses are more difficult to compose, as they rely very much on the specific project design. In order to illustrate the level of investigation required during this stage, assumptions relating to specific aspects of the project design have been assumed. These are for illustrative purposes only, and care should be taken not to discount other possibilities.

- Realistically, can the EEL team manage the project internally (i.e. test, purchase, distribute, support, monitor and evaluate)?
- How does community organisation involvement in the project affect the project and the community?
- Are the methods currently being utilised to receive payment for the savings working?
- Are electricity users satisfied with the form in which incentives are being granted (i.e. rebate forms, discount sales, surveys)?
- Transition to large-scale projects
 - How likely is it that electricity users will continue to purchase or use CFLs in the future?
 - How can this project be replicated on a large-scale basis? Would it be a worthwhile initiative in terms of the programmes' specific and general objectives?

3.3.11 Research and development

Monitoring and evaluation, as noted in section 3.3.10 above, comprises one of the elements of the research and development function of the EEL programme. The outcome of the monitoring and evaluation function will feed into research and development, which in turn should be seen as an ongoing process that moves proactively in the direction of the needs of the programme and towards developing procedures and policies on energy-efficient lighting.

Research undertaken will most likely comprise technical, financial, functional, economic, sociological and environmental aspects of energy-efficient lighting for the low-income sector. While the EEL team should co-ordinate research undertaken, given current resources it would make sense for Eskom to undertake the technical, functional and financial elements of the research, and contract out the economic, sociological and environmental aspects.

3.3.12 Transforming the pilot projects into large-scale initiatives

Clearly, the ultimate objective of EEL programme is to make energy-saving lamps widely available, and also to facilitate their broad-based use. The pilot projects are an important tool in learning to achieve these objectives. Arguably, these projects alone would not be large enough to capture the energy savings that Eskom would require to justify postponing new power plant investment. Pilot projects, in essence, are a means towards an end, the end being large-scale projects that operate on a sustainable basis. As more projects are identified, the EEL team will not be able to maintain the high-level marketing initiatives initially utilised, nor would this be necessary. Once the market for CFLs has developed, and a proportion of electricity users in the particular area have purchased energy-saving lamps, sales in the area will evidently level off. This is because energy-saving lamps last for up to eight years, so demand will not be ongoing. Instead, sales will come from additional bulbs purchased by households, or new energy-saving lamp users. So essentially, the nature of each project will change – from high-level marketing, distribution, marketing and evaluation and customer interaction, to lower-level marketing and monitoring and evaluation, and ongoing customer support services. The EEL team will need to plan for these developmental stages to ensure that the right mechanisms are in place at the right time, and that pilot projects do not rely on promotional strategies such as lamp give-aways, excessive discounts, or unsustainable marketing practices.

This aspect of programme development falls within both the monitoring and evaluatory, and research and development functions of the EEL programme but is specifically addressed here because of its importance. As international experience has shown, moving from a pilot stage to large-scale project status is a difficult process which requires a great deal of planning and foresight. Lessons concerning marketing, customer preferences, impacts on the grid, financial and other incentives from both first and second stage pilot projects are vital though

insufficient inputs to this process. Also required are strategies for taking advantage of the spin-off effects of the pilot projects. International experience has shown, for instance, that there is a tendency for additional groups of people, not specifically targeted by the pilot project, to participate in the project of their own accord. Large-scale projects would need to take account of this by drawing this additional group into the processes and providing for their support.

3.4 Conclusion

The EEL programme for low-income households is clearly worthwhile for Eskom and its customers, not only in terms of the energy savings that can be made, but also in terms of the programme having the capacity to add value to the crucial housing and electrification initiatives currently underway in South Africa. The question is not so much *whether* the EEL programme should go ahead; rather, it is *how* it should go ahead. An important decision which the EEL team and Eskom needs to take prior to developing strategy for the EEL programme relates to Eskom's public role in the process. Will the EEL team present the programme within the communities as an 'Eskom initiative', or will it take a step back and engage a third party to provide a grassroots interface? As the discussion above has indicated, this is not an easy decision: each approach has its distinct advantages and disadvantages. If it is a priority for both Eskom and its customers to develop a better day-to-day relationship, it would make sense for Eskom to use the EEL programme as a means towards achieving this. The EEL programme would therefore be an Eskom initiative. Even if Eskom chooses to drive all the activities a programme of this nature entails, and instead contracts these activities out to other organisations, the planning and implementation phases can still be undertaken on behalf of Eskom.

This report has identified a number of critical factors for the success of the EEL programme. Firstly, a strong institutional capacity to undertake the various activities is essential. This capacity – which must include purchasing and testing, distributing, marketing, monitoring and evaluating, co-ordinating, and research and development – could lie within Eskom, or could be contracted out and must be robust. Secondly, there needs to be a strong co-ordinating function behind all of these activities. Lamps, for instance, must be available, when pilot projects are initiated. This may sound obvious, but if it is decided that different arms of Eskom or other institutions will be undertaking various components of the programme, this function will be essential. Similarly, monitoring and evaluation must coincide with the launching of the pilot projects. Thirdly, when designing and implementing the pilot projects, it is vital that a balance be struck between marketing the programme and the lamps, and providing financial incentives to purchase and utilise the lamps. It is not adequate to focus on one of these aspects alone. Fourthly, local research and dialogue, and a learning-by-doing approach must constitute major imperatives for the programme. Fifthly, it will be important to maintain accurate records of all of the activities of the programme. For the purchasing function, for instance, it will be important to record all lamps purchased, at what price, time between ordering and receiving, and so on. Likewise, the distribution function should detail the number of lamps distributed, location of distribution, price, return details, and so on. Finally, it is vital that the programme and projects are designed in such a way that they can become ongoing and self-sustaining initiatives.

Whether the motivation behind the EEL programme is related to Eskom's responsibility for the social upliftment of the majority of South Africans, or the drive towards making significant savings on peak energy demand for electricity, these objectives will only be achievable if every effort is made to design and implement the EEL programme robustly. Unless a vigorous attempt is made to penetrate the low-income lighting market, this will not be a worthwhile venture from the point of view of either the electricity user or Eskom.

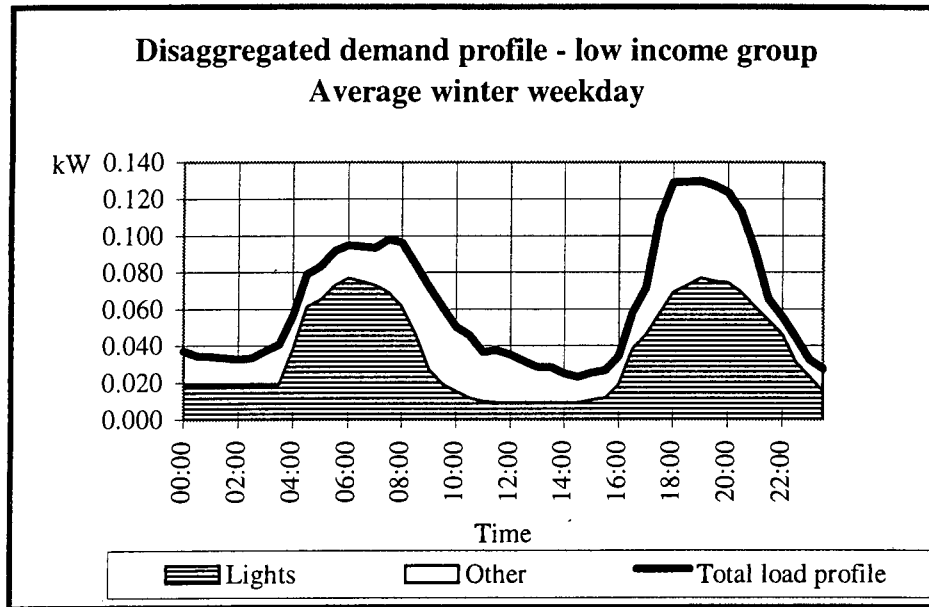
Mindful that the programme is new and instituted years before savings on peak demand are needed by Eskom, the resources, both human and financial, committed to the programme to date are inadequate given the stated objectives of the

programme. Eskom therefore is faced with two alternatives: either it can bolster its capacity and house the programme within Eskom structures, or maintain an energy-efficient lighting secretariat (similar to the team it now has) and contract most of its activities out to other institutions. In the light of the pending electricity industry restructuring, the first option, which requires a significant amount of resource commitments is problematic.

The second option should be examined more closely. While maintaining some control over the programme, Eskom could commission other institutions to conduct the activities of the programme. Institutions contracted to do this could be organised in various ways. Eskom could contract out each of the activities to different organisations (that is, one institution conducting all distribution, or marketing, or monitoring and evaluatory functions for all pilot projects). In this case, there would need to be a significant amount of interaction between the functions. The EEL team in its current form could guide and co-ordinate these functions, and continue to develop the overall EEL programme strategy. Alternatively, Eskom could contract out a 'pilot study' to a particular organisation. This organisation would distribute, market, provide support and could then subcontract the work if necessary. In this case, the EEL team would, again support the activities of the various organisations in the various areas, while at the same time maintaining control over the overall strategy and purchasing if necessary.

Who would these organisations be? In the first instance, where a number of organisations would be working on each pilot project, it would make sense for Eskom to 'employ' institutions for their particular expertise. Thus, local service providers, ESCOs, lighting retailers, electricians, research organisations, and market surveyors could be engaged to conduct the activities. The 'mix' of involvement of these organisations will most likely differ according to the area. Where one organisation is employed to cover all activities in a given area, it might perhaps be most appropriate to engage the services of local distributing utilities. Ideally for Eskom, a long-term perspective should be that many of these functions (in particular, distribution, purchasing, customer support and marketing) could be permanently and sustainably operated by these other organisations. In order for this to occur, the EEL team, or Eskom more generally, would have to offer incentives to these organisations such that it is financially and socially worthwhile for them to operate these programmes of their own accord. Most obviously, Eskom could offer local distribution utilities incentives for reducing peak demand for electricity in their particular jurisdictions. In a restructured industry, the REDs could drive this processes. Energy-efficient lighting would be one of the vehicles these local or regional utilities could use to achieve these savings. Clearly though, the EEL team would need to demonstrate that these energy-saving lamps can have marked impact on peak load.

Appendix



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