

# ENERGY SERVICE COMPANIES – THE SOLUTION FOR TOMORROW'S STREET LIGHTING NETWORKS



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## 1. Introduction

Much has been said and published during the past few years on the restructuring of the electricity distribution industry in South Africa. Conspicuous by its absence, was the inclusion of and discussions regarding the future of street lighting networks, currently maintained by the electricity departments of councils. Street lighting has never been seen as a core function of electricity, but rather as a service to the ratepayers, maintained on behalf of the council, with many variables regarding procurement, maintenance practices and savings in energy and demand costs, and environmental issues. This unfocused approach has resulted in inefficient networks that have high operating costs, and which could contribute to the street lighting industry being stranded amongst the various role players, once RED's become a reality.

## 2. Procurement

The current practices of procurement of street lighting equipment varies from council to council, but in general, it can be in the form of annual tenders, *ad hoc* buying, contractors supplying via contracts awarded to consultants, or through private developers.

Currently, less than 10% of the industry utilise annual tenders to procure street lighting equipment. Tender specifications vary from the most basic, i.e. "streetlight 125 Watt mercury vapour", to fairly sophisticated and detailed specifications, aligned to a large extent with the recommendations contained in ARP 035 and SABS 098. Notwithstanding the use of some excellent specifications, it seems that the adjudication and award of tenders are still mostly based upon initial purchase price per unit. In recent years, annual tenders using a scheme price calculation, which represents an installed cost per kilometre of street lighting, have been introduced and have become fairly popular.

More than 80% of councils, other than metros in South Africa, buy their street lighting requirements on an *ad hoc* basis. This could be on an enquiry basis or directly from the supplier. The successful supplier is often the one that does the best relationship marketing or the one that visits the responsible decision maker, buyer or store man on the most regular basis. Often, *ad hoc* procurement is also done through local wholesalers.

Councils seldom prescribe products to consultants appointed on new street lighting projects. Although consultants mostly issue tender documents with detailed specifications on street lighting, it often involves substantial negotiation to obtain an order for the supply of street lighting equipment from the successful contractor, once the order is due to be placed.

Private developers are also important decision makers when it comes to street lighting. Often, they seek something unique for the street furniture in the development, and street lighting mostly forms part of it. Usually, where the council will do the maintenance of the system, functionality and replacement costs are often the only criteria laid down by a council.

The result of the above is that most street lighting networks in South Africa can boast a range of products spanning an age from brand new to more than 30 years, and are made up of various models of products, supplied by a host of different suppliers. Many of these suppliers do not exist anymore, and the random installation of products has resulted in poor photometric performance and maintenance being an expensive nightmare. There are no considerations for life cycle costing or consequential guarantees, due to the perceived higher initial capital cost. To add to the problem, few councils have up to date GIS based street lighting inventories. This makes it difficult to accurately calculate average maintenance costs, energy and demand costs, or the potential for savings, without conducting a detailed inventory and energy audit, as well as ring fencing the street lighting section.

### **3. Maintenance practices**

Most councils utilise their own maintenance staff, sometimes in conjunction with private street lighting maintenance contractors. Irrespective, the existing reactive maintenance system of electricity departments, essentially spot replacement and repairs of single lamps or luminaires, is inadequate and extremely costly (IIEC-Africa, 2000: 35). Due to the fact that lamps are replaced only once they have failed, which happens at random, as much as 80% of maintenance budgets are spent on operational expenses. There appears to be no group lamp replacement or long-term maintenance contracts in place. Poor lighting knowledge of maintenance staff, related to electrical components and lamps, often result in incorrect lamps and components installed into luminaires. This results in poor lamp life and is further worsened by the use of inferior quality lamps, which are again purchased on initial purchase price per unit. Due to the vast number of models and suppliers, the cost of purchasing and stockholding of spares has become extremely expensive.

### **4. Savings in energy and demand costs, and environmental issues**

Few councils consider any of these aspects in their street lighting network. Where time of use tariffs like Megaflex are used, energy consumption can be calculated using the weighted average of the various tariffs, which results in an average annual purchase cost of 9,32c/kWh. To this needs to be added distribution losses, voltage surcharge and VAT, resulting in an effective average annual purchase cost of approximately 12c/kWh, to be multiplied with an annual average burning period of 4380 hours, or 12 hours per day.

With regard to the Megaflex demand charge, currently at R8,17/kW, it is common knowledge that two distinct load peaks characterise the electricity supply system of South Africa, occurring in the early morning and early evening hours. Many councils have their maximum electricity demand between the hours of 18:00 and 20:00, during which time street lighting too, adds to the peak load, as at the time of the diurnal peak, it is already dark and either photoelectric cells or timers have switched on the street lighting (Seifried, 2001:10).

More than 50% of new street lighting equipment sold in South Africa today is still for use with mercury vapour lamps, which have a poor efficacy of only 50 lumen per watt and a high lumen depreciation of 24% in the first 36 months. This indicates that the South African street lighting market is still not sensitive to either energy or demand costs, or environmental issues. The argument has been brought locally that mercury vapour, which appears as white light to the human eye, is preferred for residential areas, but with a colour rendering index of only Ra48 and consuming energy at a premium of 40% to high-pressure sodium, it is a huge premium to pay for a subjective measure of aesthetics, an insignificantly small driver in residential street lighting when compared to security. Its use in most European countries have just about died out and the

time has come for South Africa to follow suit, irrespective of the fact that we still enjoy cheap energy.

## **5. Energy Service Companies (ESCOS) – the solution**

According to Chege (2001:1), ‘the provision of new infrastructure and maintenance of existing infrastructure presents a daunting challenge to governments worldwide.’ The South African government has also been actively seeking alternative methods for financing and maintenance. According to the Public Private Infrastructure Advisory Facility (quoted in Chege, 2001:2), government is seeking to transform its role from being the exclusive financiers, managers and operators of infrastructure to being the facilitators and regulators of services provided primarily by private firms. This is particularly evident in the provision and operation of toll roads, prisons, hospitals, water supply, fleet management and others.

Recent energy efficiency scoping investigations by the International Institute for Energy Conservation (IIEC) have concluded that immediate opportunities for savings in operational costs, energy and demand savings, as well as a reduction in greenhouse gas (GHG) emissions, exist within a number of municipal activities, with street lighting being one of the most promising (IIEC-Africa, 2001:5). ESCOS can address the inefficiencies and corresponding spiraling maintenance and energy costs, associated with the provision of a street lighting service, as has been proven internationally where ESCOS have been introduced to provide capital, expertise and capacity, and tasked with generating savings and improved service levels through retrofits and renewable term maintenance contracts.

## **6. What is an ESCO?**

An ESCO is a specialised business whose operation and primary revenue is linked to saving other parties money on energy consumption, maintenance costs and related services (IIEC-Africa, 2001:23). ESCOS utilise their own capital or arrange their own funding to carry out a technical intervention or energy efficient retrofit for the client, which will result in long-term cost savings to the client. It also subsequently harbours the responsibility for maintenance of the new network through a renewable term maintenance contract, typically 5 years. ESCOS guarantee a minimum amount of savings accruable to the client under the terms and conditions of the Service Level Agreement (SLA) signed between the two parties.

## **7. Key features of a street lighting ESCO contract**

- It is based on the concession principle with a minimum duration of 5 years, renewable, whereby the council procures a full service, not just an asset (ILE, 1999:7). The ESCO would be responsible to conduct a network inventory and energy audit, ring fence the street lighting function and submit conceptual designs of the proposal. All inefficient and outdated equipment are to be replaced with new, energy efficient equipment, with all other remaining equipment to be refurbished to an as new state. The ESCO would be required to provide all the capital, infrastructure, plant, equipment and labour to finance, design, construct, operate and maintain the new network, as well as to operate its own toll free call and control centre.
- The provision of the service would be specified as outputs in a SLA between the ESCO and the council. The SLA would include, amongst other aspects, compliance with all relevant SABS codes and guides, required lighting levels, response times, percentage of failures, and so forth. Compliance to the SLA would be audited and monitored by the council, through monthly inspections of the network and the computerised KPI reports generated by the ESCO’s call and control centre. International experiences have proven, however, that a smart partnered ESCO contract requires minimum monitoring.

- The ESCO may make use of innovative and creative solutions to provide a quality and value for money service (ILE, 1999:7). It is a common misconception that an ESCO can only generate a profit if it reduces the quality of the equipment or reduces the standard of the service provided. To the contrary, the use of life cycle costing and the consequential guarantees applicable to new equipment, innovation and creativity, as well as performance contracting, establishes a focused business, which in turn, offers substantial reductions in operational and management costs, and provides the ESCO with its profit.
- The cost for the provision of the service would be recovered by making monthly charges. These monthly charges would be made up of an agreed monthly maintenance rate per type and wattage of luminaire, guaranteed to be less than what it currently costs the electricity department to maintain it on behalf of council, and payable via the existing street lighting maintenance budget, as well as a share of the savings guaranteed to the client in respect of reductions in maintenance costs, energy and demand costs, and the sale of GHG emissions, known as carbon credits, on the international market. A minimum of 20% of the payment to the ESCO would be at risk for non-performance, on a sliding scale, as determined by the council during the auditing and monitoring process. The contract should further contain an escape clause, whereby the council may cancel the contract if the agreed service level deteriorates below the minimum level agreed to in the SLA. The council retains ownership of all assets, including those provided and installed by the ESCO, thus providing insurance against failure of the contract.
- The council would need to retain only a small staff complement to manage the contract and ensure that the SLA is adhered to. The ESCO would negotiate with both employed staff and subcontractors to employ them directly, or contract out part or the entire contract to them, as they normally have an excellent knowledge of the area, network and equipment. The ESCO would also provide training and finance to enable those interested to subcontract for the labour portion of the contract to establish their own subcontracting businesses within the contract. The transfer or seconding of excess staff members, with their concurrence, as well as plant and equipment, should be negotiated with the ESCO.

## **8. Responsibilities of the council**

- The council remains responsible to supply power in accordance with NRS048 to the input terminals of the pole mounted circuit breaker.
- Since the council retains ownership of the assets, it remains responsible to manage technical risks, including commercial insurance of the network against accidents, vandalism, theft and *force majeure* (IIEC-Africa, 2001:19).
- It must provide reasonable access to the network by the ESCO and its subcontractors.
- It must liaise with the ESCO on the types of equipment for capital projects and private developments, in the case that it is envisaged that the maintenance thereof will be added to the contract.
- It must audit and monitor the ESCO's performance in terms of the SLA as detailed above.
- It must make monthly payments to the ESCO as stipulated in the contract.

## **9. Advantages of a street lighting ESCO contract to the council**

- It provides the council with a means to bring forward capital projects in disadvantaged communities that it cannot finance by normal means.

- It guarantees savings, typically in the order of 25% (IIEC-Africa, 2000:22), in maintenance costs, energy and demand costs, as well as a reduction in GHG emissions, meeting the objectives of the Cities for Climate Protection (CCP) campaign as detailed by the International Council for Local Environmental Initiatives (ICLEI).
- It results in a new street lighting network, providing better lighting levels than the existing, thus improving safety to road users and the public, as well as reducing street crime, while providing an efficient, world class service to ratepayers.
- It creates new job opportunities, and builds capacity through skills transfer, due to its capital injection, guaranteed savings, refurbishment and scouting contracts.
- Although street lighting is regarded as a non core function and unfocused activity, it has a high political profile, and through an ESCO, it places the council on par with international practice, and in line with government policies on private sector participation.

## 10. Municipal Systems Act

The Municipal Systems Act (Act No. 32 of 2000), specifically Sections 76 to 84, sets out the terms for the provision of services and service delivery agreements in detail. However, the Act defines a service provider merely as “a person or institution or any combination of persons and institutions, which provide a municipal service”. This poses the question of whether an ESCO could be classified as a service provider. According to Chege (2001:2), in a publication of the CSIR on recent trends in private financing of public infrastructure projects in South Africa, the key responsibility for capital investment remains with the public sector in the case of service contracts, management contracts and leases. This implies that a service provider is a private firm that under a service contract, ‘performs a specific operational service for a fee, for example meter reading, billing and collection.’

This may imply that other private sector participation options, like the options of concessions, build operate transfers (BOT’s) and divestures, where the key elements of capital investment and commercial risk rest with the private sector, could not be defined as service providers in terms of the Act. It could thus be argued that the Act does not apply to these forms of private sector participation, allowing negotiation of an ESCO contract following an unsolicited bid. An unsolicited bid does not imply that the criteria and process of assessment and consultation, as detailed in Section 78 of the Act, should be ignored. These processes are crucial to transparency and the successful introduction of a street lighting ESCO. However, COSATU (2001:6) concedes that ‘local governments, under pressure to hand service delivery over to private managers and investors, have rarely undertaken the analytical work and consultation required by the Act. They argue that it is too onerous and time consuming to conduct a proper investigation of delivery options and to consult stakeholders’.

Should the council prefer to follow the route of competitive bidding, a Request for Proposals (RFP) for implementing the project should be drawn up. Despite the advantages of using RFP’s to determine best-suited bidders, they can also sometimes be costly and time consuming for all parties involved. For this reason, it is advisable that the process be streamlined as best as possible. One way to do this is to first create a shortlist of companies to target, following preliminary investigation of appropriate potential bidders to meet a specific service or technology requirement (IIEC-Africa, 2001:16). After receiving these proposals, the council would then select a preferred bidder and negotiate the final terms and conditions of the contract in terms of Section 84(1) of the Act.

## 11. ESCO project cycle

# ESCO Project Cycle

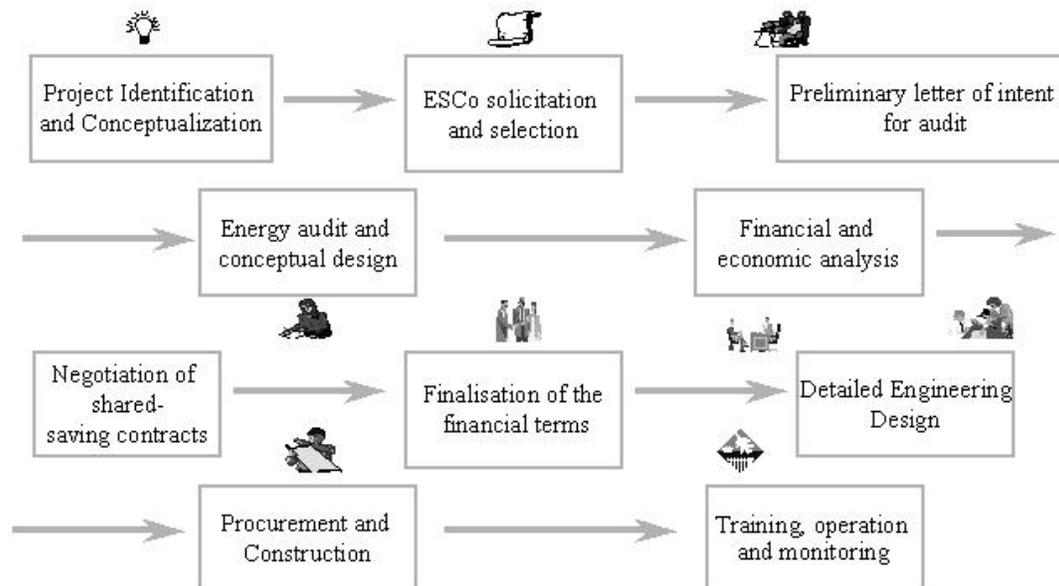


Figure 1: Illustration of the ESCO project cycle (IIEC-Africa, 2001:24)

## 12. Conclusion

With capital, expertise and capacity at a premium, the South African street lighting industry is at a crossroads in its existence. Irrespective of whether the provision of a street lighting service becomes the responsibility of RED's or councils in the near future, the industry needs to become energy efficient and cost effective rather sooner than later. The IIEC states that 'South Africa makes a significant impact upon global climate change. Over 90 percent of its electricity is supplied from coal-fired generation. On a basis of GHG emissions per output of GNP, South Africa is the world's third highest emitter, after North Korea and Kazakhstan.' Draft legislation to reduce GHG emissions and global climate change within local government has already appeared. An energy efficient ESCO contract will allow the industry to make a major contribution to alleviating GHG emissions and global climate change.

The development and implementation of an ESCO contract for a street lighting network is not a short-term task to be completed in a month or two, but is rather a long-term project, which needs to be carefully planned and negotiated to provide the maximum benefits. A successful ESCO contract requires input at all levels of operational and management staff, who should ensure the approval and backing of the council. Negotiations should be conducted on an open book basis and be as transparent as possible, with all interested parties being able to comment on proposals in an open and democratic manner, in order to achieve a win-win situation for all parties concerned.

The successful implementation of ESCO's, energy performance and term maintenance contracting in various parts of the world is an inspiration to those of us serious about making a difference to both the current state of the industry and our environment. Preliminary discussions, held with a number of councils in South Africa over the course of the past few months, regarding the introduction of the concept into South Africa, have been received with great interest and will hopefully soon lead to the concept being adopted as the solution for tomorrow's street lighting networks.

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