

Case Study

**OPERATION AND MAINTENANCE OF
STREET LIGHTS IN VIJAYAWADA**

Street Lighting

CASE OVERVIEW

Country: India

ULB: Vijayawada, Andhra Pradesh

Sector: Other Urban Services **Sub-Sector:** Street Lighting

Award Date: December 2006

Type and Period of concession: Operation and Maintenance (O&M) Contract for 5 years

Stakeholders:

Contracting Authority	Vijayawada Municipal Corporation (VMC)
Concessionaire	M/s Real Energy, Secunderabad
Oversight Arrangement	Periodic monitoring by Concessioneering Authority

Present Status of Project: The project has been running successfully since 2006.

PROJECT TIMELINE:

2002-03	<i>Failed service contract for street lighting in VMC</i>
2005	<i>Pilot demonstration by VMC to Council in order to convince the council about proposed power saving through PPP – 35% savings on single street</i>
2006-07	<i>Decision to become ‘Energy Efficient City’ as part of Silver Jubilee celebrations Approval of Council to undertake O&M of street lighting on PPP basis Award of concession to M/s Real Energy Limited (Energy Service Company)</i>

1. PPP CONTEXT

1. The Vijayawada Municipal Corporation (VMC) had around 27,000 street lights prior to the PPP initiative, managed entirely through municipal officials. Capital works were undertaken through regular EPC contracts and operation and maintenance (O&M) through 60 contractual staff appointed for the purpose. Funding was through annual budgetary allocations.
2. The Corporation incurred an annual expenditure of Rs.411.18 lakh on energy bills for street lighting and Rs.53.04 lakh for annual maintenance (material and labour). Overall expenditure of the ULB on account of energy bills (all services combined) per year was as high as Rs.12 Crore approximately.
3. As part of its Silver Jubilee celebrations in 2006-07, the ULB set itself the target of becoming India’s first energy efficient city, and an Energy Conservation Plan was proposed including proposals to introduce energy saving technology in street lighting.

2. PROJECT DEVELOPMENT

2.1 PROJECT CONCEPTUALIZATION

In order to implement an energy-efficient street lighting system, through high quality equipment and high-end technology, and reduce overall energy expenditure of the ULB, the VMC decided to adopt a PPP model with an Energy Service Company (ESCO) as the private partner. An ESCO is a company that develops and operates projects designed to improve energy efficiency and reduce maintenance costs for facilities. In the Vijayawada case the ESCO was expected to finance, procure, install and maintain a new system for a period of five years and achieve power savings in return for a fixed proportion of the savings of VMC on energy bills.

Main features of the project included:

1. Latest and highly advanced lighting panels with self protecting and diagnostic features
2. A central computerized control facility – allowing remote monitoring of the system including identification of defects
3. Programmable interface allowing auto switch on/off based on inbuilt database of sunset/sunrise times of the city and adjustments to lighting LUX levels according to traffic patterns, time of night, voltage fluctuations etc.
4. Transmission of real time information regarding status and condition of lights, energy readings (through digital energy meters remotely connected with the central data base server), long term data storage of energy readings (up to 6 months) etc.

2.2 PROJECT DEVELOPMENT

1. One of the primary hurdles with implementing the project on a PPP basis was the initial political resistance to the proposal. The Council had reservations against such an effort, due to a bad precedent of a failed service contract for street lighting given out in 2002-03.
2. In order to address this through demonstration of actual results, the municipal officials decided to pilot the new technology, and for this purpose energy saver devices were installed along a demo road through M/s Servomax India Ltd in 2005. The experiment resulted in 35% savings in energy consumption.
3. The final strategy to implement the project through an ESCO was based on study visits to Bangalore to review the Outer Ring Road Energy Saving Project initiated by the Bangalore Development Authority.
4. An Empowered Committee was constituted for selection of the ESCO and finalization of appropriate technology for the project. The Committee was comprised of various technical personnel from the VMC, with the Chief Engineer as the Chairman.
5. The Council finally approved the project in May 2006 vide resolution no. 61, following a visit (led by the Mayor) to the Nasik Municipal Corporation for studying the performance of their Energy Saving Project.

2.3 PROCUREMENT PROCEDURE

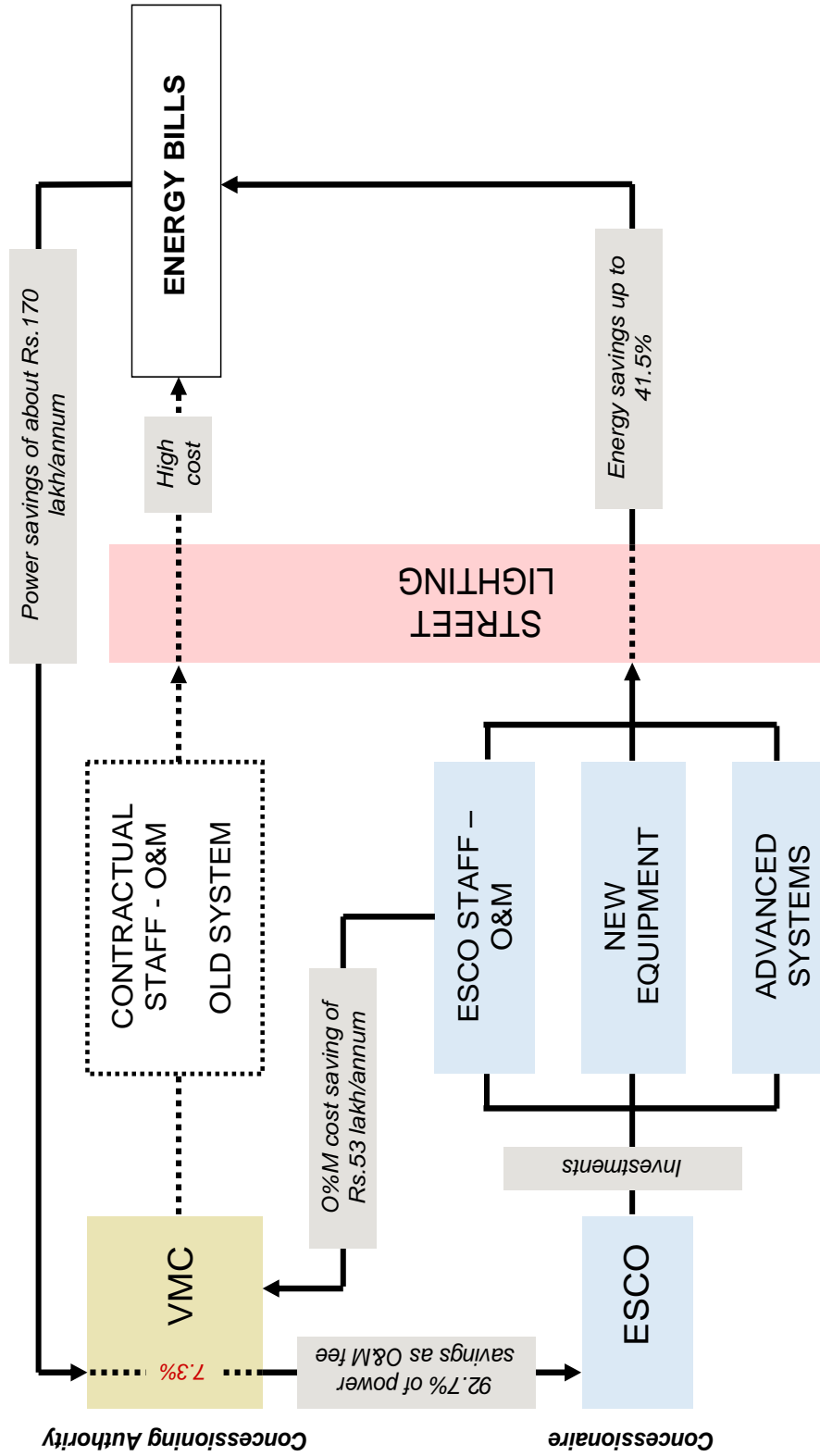
Procurement of the ESCO was based on a competitive bidding process initiated in September 2005. Eligibility criteria included the following:

1. Annual turnover of at least Rs.1 Crore in any of the last five years
2. Experience of completing an energy saving project for street lights of at least 1000 KVA for any ULB or Development Authority

The 5 year O&M concession was awarded to M/s Real Energy, based on their quote for 41.5% savings in power consumption (bid parameter). The ESCO was expected to conduct a pilot in selected areas for a period of 3 months and the full term was to be granted only upon successful demonstration within the period.

3. CONTRACTUAL ARRANGEMENTS

3.1 PROPOSED CONTRACTUAL STRUCTURE



3.2 OPERATOR OUTPUT OBLIGATIONS

The ESCO was responsible for:

1. Design of the system and technology to be used, so as to achieve features such as centrally networked computerized operations and energy control, real time data acquisition, monitoring of power and equipment thefts and maintenance of illumination at specified levels.
2. Achieve a minimum of 30% power savings through the new system
3. Completing procurement and installation of equipment (as per design and as specified within the contract) within a period of 1 year and conducting O&M of the system for 5 years
4. Deployment of own staff for O&M of the system (40 employees were employed during implementation)
5. Resolution of consumer complaints within a stipulated time frame.
6. Handover of peaceful possession of all project facilities and equipment free of cost and in good operating condition at the end of the Concession period.

3.3 OBLIGATIONS OF THE CONCESSIONING AUTHORITY

The Concessioning Authority was responsible for timely and peaceful handover of all existing infrastructure and facilities to the ESCO and redeployment of existing maintenance staff (contractual) at own cost.

3.4 REGULATORY AND MONITORING ARRANGEMENTS

Regular and periodic monitoring is done by the VMC at various levels. In addition to frequent site inspections by senior engineering officials of the Corporation, the Commissioner reviews performance once in a fortnight. Councilors from respective electoral wards also provide feedback on the functioning of the system

3.5 PROJECT FINANCIALS

1. All investments for procurement, installation and O&M of the new system were to be borne by the ESCO (approximately Rs.384 lakhs for equipment and systems alone).
2. Revenue for the ESCO was envisaged as a fixed share of the savings in power bills for VMC. The cost savings were shared on a 92.7% to 7.3% basis between the ESCO and the VMC.
3. Baseline data used for the calculations was set at the start of the contract. As per this data, annual expenditure on power bills due to street lighting (before the PPP) was Rs.411 lakh. Assuming that the ESCO was able to meet its quote of 41.5% energy savings, the estimated cost savings for VMC would be Rs.170 lakhs. The revenue for the company would then be approximately Rs.158 lakhs per annum and the remaining amount of Rs.12 lakhs would be the cost saving of the VMC (for street lighting).
4. The contract assured Rs.12 lakh as minimum gains for the VMC irrespective of the performance of the ESCO. Actual savings were verified every year and the ESCO's share was determined accordingly.

- a. In case energy savings exceeded 41.5%, the ESCO would get 25% of the surplus savings and 75% would be the actual saving of VMC.
 - b. In case of energy savings below the 41.5% bar, payments to the ESCO were made after deducting the guaranteed savings for the VMC.
 - c. In case the performance fell below the 30% mark, no payment was to be made to the Company.
5. Payments to the ESCO were made from an Escrow account created for the purpose.

3.6 PROJECT RISKS AND ALLOCATION

Construction Risk	Borne by the ESCO since the contract obligated the company to complete all procurement and installation within 1 year of commencement of contract. Time overruns due to delays in handover of the existing system and facilities were borne by the VMC.
Performance Risk	Including design of the system, and O&M was borne by the ESCO since the contract specified output parameters and penalties for non-compliance. Performance risk was further borne by the ESCO through a Performance Guarantee.
Investment Risk	Investment risk was borne by the ESCO.
Investment and Revenue Risk	Revenue risks were borne by the ESCO since revenue was envisaged as a percentage of the cost savings accruing from the project. VMC mitigated the 'payment risk' through creation of an Escrow account - ensuring timely payments to the ESCO.

3.7 DISPUTES RESOLUTION MECHANISM

All disputes emanating from the contract were to be resolved through the Commissioner of VMC.

4. PARTNERSHIP IN PRACTICE

4.1 PROJECT OUTCOMES

1. Reduction in wastage of energy due to street lighting to the tune of 41.5% annually. The success of the initiative has encouraged the Corporation to conduct energy audits in other municipal services and develop strategies for reducing consumption. The project also sets an important replicable precedent for reduction in overall energy consumption by urban areas in the country.
2. Financial benefits for the VMC include savings in power bill of at least Rs.12.4 lakhs annually and savings in the O&M expenditure (labour and material) of roughly Rs.53 lakhs per annum. Upon completion of the project all power savings (approximately Rs.170 lakh at 2006 prices) would accrue entirely to the VMC.
3. All project equipment and systems, including lighting fixtures, control panels, burglar alarms, central control systems etc. would be handed over to the VMC upon project completion. Thus the city would get a World Class street lighting technology without any investments on part of the Corporation.

4. It should be noted that all street lights operated by the Corporation including those in urban poor clusters have been brought under the system and as such the benefits of better facilities are enjoyed by all.
5. Citizen interface and grievance redressal has also improved. The VMC records all system related consumer complaints and these are conveyed to the ESCO on a daily basis. Redressal is to be achieved within 24 hours, failing which the complaint automatically moves to the level of the Municipal Commissioner.

4.2 PROJECT SHORTCOMINGS

The project has been running successfully and has not experienced any serious shortcomings so far.

4.3 LEGAL/CONTRACTUAL ISSUES

1. The contract allowed the ESCO to initially measure energy consumption through meters installed under the project. However the VMC later requested the ESCO to undertake such calculations based on Transmission Corporation of Andhra Pradesh (APTRANSCO) meters. Power bills generated by APTRANSCO (power distributor) now form the basis for measuring power savings and for payments to be made to the ESCO.
2. A significant issue which emerged during implementation was the matter of base line information to be used for calculating energy savings. The new panels were installed in phases and there was a time lag in between installations at two different areas. The ESCO felt that baseline information should be considered separately for each panel cluster installed since load factor may have changed due to the time lag. However the VMC insisted that the baseline information set during the start of the contract would continue to remain the basis for payments and calculations.
3. At the beginning of the O&M contract, all temporary staff previously engaged by VMC was retrenched, leading to resistance from such employees. VMC is now attempting to reemploy such employees for other municipal works.

5. LESSONS LEARNT

1. Considering that the entire financial mechanism, specially the revenue for the ESCO was derived only from energy savings, the project makes a special case for replication in other ULBs (hardly any ULBs in the country are energy efficient). The ULB does not need to bear any investment risks and can bring in enormous systemic efficiency and advancement.
2. Making the ESCO responsible for investments ensured the quality of equipment and systems installed in the project period, since all retrieval was based on the performance of such installations
3. Rules of the game should be endorsed by both parties right at the inception. While all issues regarding baseline information and meter reading (4.3 above) were solved amicably they could easily have derailed the project due to inaccurate revenue forecasts at the ESCO end.
4. The role of proper IEC, particularly for generating political consensus for implementing projects on a PPP model cannot be understated. In the Vijayawada case, the precedent of failed privatization had

substantially weakened the political support for a PPP. However the Authorities persevered, demonstrated the strength of the scheme through pilots and conducted several meetings with the councillors leading to the eventual sanction of the project.

5. One of the key issues that the project did not address at inception is the issue of O&M after the project period. Considering that the project involved installation and operation of substantially advanced technologies and systems, the project could have involved existing ULB staff so as to ensure adequate skill transfer during the implementation period.