

## ESCO

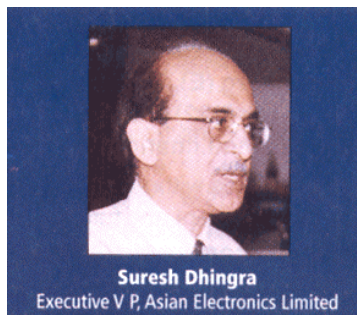
### 'Cashless' Alternative for Energy Conservation

To meet the increasing Energy Demand our endeavors as a nation till recently has been on increasing the Energy supply. Therefore main focus has been on adding Electricity generation capacities. Electricity Generation has been primarily through the fossil fuel based power plants and somewhat growing importance of Non Conventional Energy Sources. However, there is now increasing realization that concurrent with government's accelerated programmes for creating additional power generation and implementing reforms in supply, transmission and distribution systems to bridge the staggering gaps between the demand and supply, energy efficiency route should also be given thrust for 'generating' energy.

Bureau for Energy Efficiency (BEE) under Ministry of Power, Government of India has initiated several measures in this direction... ranging from star ratings and labeling for lighting products and electrical consumer products at primary level to listing of approved ESCO companies at the macro level. At the behest of directives contained in electricity act, energy audit has been made mandatory for specified category of industrial and large users of electricity. Gratifying is that response towards this priority and national concern has been very encouraging from electricity consumers of all categories. Awareness campaigns both by government and private sector have been effective in propagating that energy efficiency without sacrificing the task, energy conservation and DSM are important for the good of citizens and country as a whole.

ESCO route for achieving significant energy savings has been well recognized by large industrial and commercial establishments and government departments and organizations. Government of India to set the example has already awarded ESCO performance contracts for Rashtrapati Bhavan and Shramshakti Bhavan and Transport Bhavan for achieving energy savings. Under stages fo processing / finalization are awards of ESCO contracts for PMO, Rail Bhavan, AIIMS and Airport authority of India buildings, to name a few.

ESCO performance contracts have also become favorites of organizations and consultants promoting the need of environment protection by helping the hand picked municipal corporations and channeling grants for ESCO projects. Recently ECONOLER international helped cities of Indore and Ujjain from drafting comprehensive tender documents to the conclusion of award of ESCO contract for entire streetlighting installations of city for implementation of energy efficiency measures. That these are timely both in terms of upgradation of quality of lighting system plus equipment on one hand and bridging the gap of supply and demand on the other, is well substantiated by following relevant statistics on the power generation available and required by year 2012.



## Some Basic Statistics at Glance

- The installed generation capacity of power in the country, as on January 2003 is 105437.39 MW.
- The estimated requirement of power of country will be in excess of 200,000 MW by 2012 that is close to two times the present capacity.
- In 2001 – 2002, 515.27 billion units of Power were generated. Energy deficits are estimated at 7.5% and peak deficits at 12.6% as on March 2002.
- In 2001 – 2002, the average tariff was Rs. 2.40 / kWh whereas the overall cost of supply was Rs. 3.50 / kWh, thus covering only 64.66% of the cost.

The Indian Power Sector faces two fundamental issues:

- Inadequate Capital Mobilization.
- Inferior operational performance.

DSM as an initiative got a tremendous impetus after the Prime Minister's speech at Vigyan Bhavan on August 23<sup>rd</sup>, 2002 at the International Conference on Strategies for Energy Conservation in the New Millennium. Honorable Prime Minister Called on accomplishing a 30% reduction in energy consumption in Government sector and 20% in private sector by year, 2007.

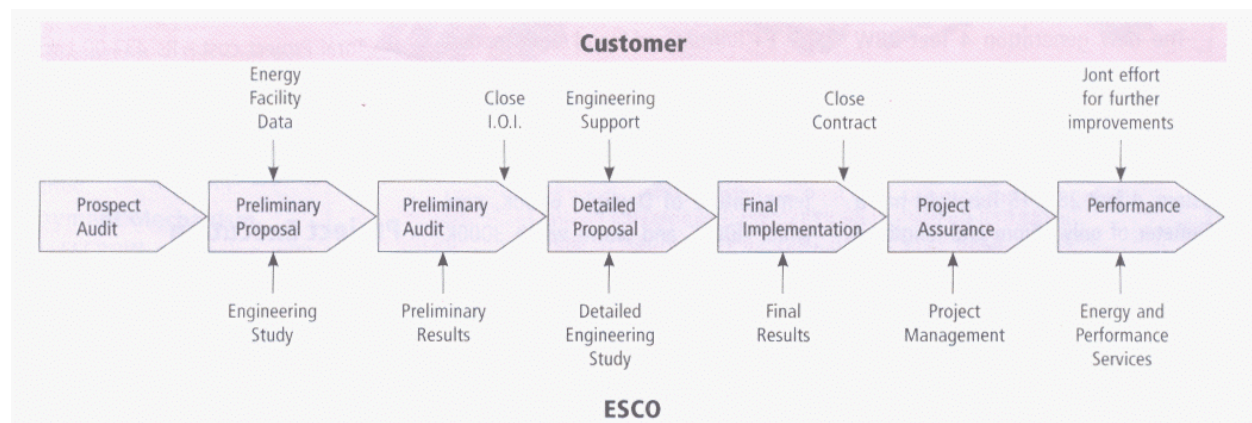
In India, DSM can be achieved via following two ways:

- Energy efficiency, which is the reduction of kilowatts hours (kWh) of energy consumption.
- Demand Load Management, which is the reduction of (kW) of power demand or the displacement of demand to off peak times.

DSM is the potential area to mitigate India's endemic problem of energy and peak capacity shortages and capital mobilization for supply expansion. In short term, DSM can be viewed as a peak load reduction strategy that encompasses strategic conservation, co generation and electricity end use energy efficient technologies and practices. Over the long term, DSM can help Indian utilities to move from curtailing loads through load shedding to controlling and altering load shapes and load growth.

India's cost effective energy conservation potential has been estimated by the planning commission at 23% of the total commercial energy generated in the power sector, our peak and base load shortages are 8% and 13% respectively. A national movement for energy conservation can significantly reduce the need for fresh investment in energy supply systems in coming years.

Energy efficiency can be capital intensive if we have to deploy the energy efficient equipment to replace the power guzzlers. But the new concept which has really gained acceptance and popularity is the ESCO route which is synonymous with Performance Contracting or Third party energy efficient equipment financing or shared saving or Contract Energy Management.



## What is ESCO?

An ESCO is a company that carries out performance contracting (among any number of energy services that they provide) who use third party financing to finance the project investment for their customer.

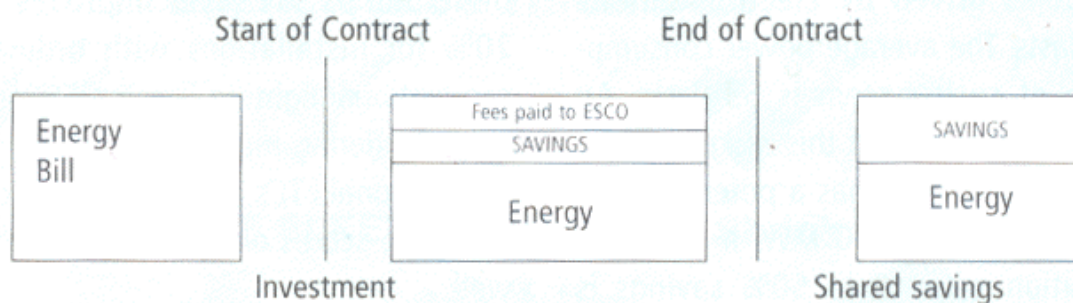
Or

An energy service company (ESCO) is a company that provides a wide range of energy conservation and / or load reduction services to owners like industrial, commercial, institutional, agricultural and domestic facilities in such a way that the owner's risk and required capital outlay are greatly reduced or eliminated. ESCO's usually implement comprehensive energy efficiency, conservation and cost reduction measures on a turn key basis and risk payment for services based upon the performance of equipment and services that it implemented.

## Why ESCO?

ESCO's are unusual in their ability to integrate all these skills and apply them efficiently to ENERGY DEMAND in user-friendly approach as against huge finance and significant efforts involved for commissioning a power plant to generate capacity equivalent to energy thus saved. Good old adage is energy saved is energy generated. We are aware that a watt saved at usage point is equal to two watts at the generating point.

### The Concept of Shared Savings: An Illustration



The following are the strengths of ESCO:

- Market Penetration.
- Energy system analysis and technology integration.
- Financial, legal and contract technology.
- Rapid mobilization
- Project and quality management.
- Maintaining energy savings.

It is a win win proposition for all the parties involved viz customers, utilities, market intermediaries and society.

Benefits to customers (facility owners):

- The facility owners pay only for demonstrated results.
- The facility owner's energy bills are reduced.
- The facility owner has no risk.
- The facility owner, if industrial, is competitive in the market and many other.

Benefits to utilities:

- Reduces utilities capital requirement.
- Able to cater to more customers more efficiently.
- Better quality of power.

Benefits to market intermediaries:

- Creates business opportunities to suppliers of energy efficient equipment.
- Creates demand for local financial intermediaries.

Benefits to society:

- Lower energy costs.
- Higher productivity.
- Reduced pollution.
- Reduced capital needs.
- Reduced forex requirements.

### **ESCO and FTL Lighting Installations**

The country has an estimated installed base of 200 million FTL sockets. Most of these are with conventional 4 feet 40W T12 and 36W T8 Tubelights systems driven by Electromagnetic Ballasts. The average power consumption of such system is 53Watts. An installation base of this magnitude by simple arithmetic has a potentiality of savings up to 5000 MW, if a retrofit solution with 45 to 50% savings is implemented.

### **Innovation of T5 Retrofit**

The new generation 4 feet 28W T5 fluorescent Tubelights driven with High Frequency Electronic Ballast have a system Wattage of 28 Watts for matching lumen output of conventional system. 4 feet 28W T5 Tubelight has a diameter of only 16mm and length of 1150mm (3feet 10 inches). As a part of ongoing endeavors to innovate Energy Efficient solutions for various end applications E+ Tubelight System has been developed. E+ Tubelight system is an integrated assembly comprising High Efficiency T5 lamps, State of the Art Electronics Control Gear (ECG) and an Engineering Grade Plastic extrusion. E+ system is a perfect Retrofit for existing FTL lighting installations having any Liminaire as housing of the conventional FTL and electromagnetic ballast.

### **Convenience of Retrofit**

E+ Retrofit system does not require any change in wiring or modification in the existing fixture. Only T12 or T8 lamp and starter has to be removed and retrofit has to be put in the socket. In simple terms a T5 retrofit is for existing FTL installation what CFL is for existing GLS Lamps....A ready to fit convenient solution for saving up to 50% of energy consumption without compromise on either the quantity or quality of light. As a matter of fact because of built in unique photometry of extrusion and higher lumen output of T5 lamps lux level improves by 20% for installations with ordinary conventional lighting fixtures. T5 lamp color rendering index is 85 as against conventional FTL's index of 55. Retrofit therefore scores on quality of light as well.

### **E+Retrofit System is Win-win for Stakeholders**

E+ Retrofit and Stand Alone models are available in all standard sizes i.e. 2 feet, 4 feet, and 5 feet and in executions involving single, twin or multilamp arrangements. Choice of color temperature of Daylight 6000K, cool white 4000K and warm white 3000K are also in range as per requirements of users.

ESCO with E+Retrofit systems deliver savings for the user improve power factor and thus savings in reactive power compensation, reduction in distribution losses in the system and thus improving overall power quality and all this with no initial investment by the customer.

<b>Technical Comparison</b>		
	<b>Existing FTL System</b>	<b>T5 Retrofit System</b>
Input Wattage	53 W	28 W
Input Power Factor	0.5 – 0.65	> 0.95
Input Voltage	230 V AC	230 V AC
Input Current	48 mA	125 mA
Resistance of Choke	55 Ohms	55 Ohms
Dissipation in Choke	$0.480 \times 0.480 \times 55 = 12.70 \text{ W}$	$0.125 \times 0.125 \times 55 = 0.86 \text{ W}$

### **An Example of ESCO in Streetlighting – Indore City**

Sailent highlights of streetlight energy management for indore Municipal Corporation

- Project partners are Econoler Canada, MPEB and IMC
- Project to conserve Energy and accrue savings to user through Energy Efficient Lighting System.
- No investment by user
- AEL supplies and Installs Energy Efficient FTL and LMS.
- Recovers payment through installments based on shared savings  
80% : AEL  
20% User
- Once AEL recovers its investment cost (including interest accrual) the user enjoys 100% savings.
- Project cost funded by AEL.
- Partial Financial supports of Rs 22.00 Lacs approx from Econoler, Canada.
- Total Project cost – Rs 437.00 Lacs approx.
- Contract Period – 46 Months
- 100% Saving per annum Rs 145.00 Lacs appx.

### **Project Execution**

It is primarily divided into following activities.

- Energy audit to establish consumption/ savings benchmark.
- Supply and Installation of Proposed improvements.
- Guarantee for the installations.
- Payment mechanism

### **Energy Audit**

- Record load current of each phase (R,Y,B) for each switching point.
- Record total Nos of lamp connected to each switching point and also record the quantity of each type of lamps (FTL, HPSV, Metal Halide).
- To identify working / Non-working quantity of lamps.
- Establish baseline consumption for each type of lamps in streetlight.
- Establish consumption after the improvements.
- Existing Lighting levels to be sustained and same will be measured before and after installation of improvements for select points.
- Update the project cost and Energy savings as per results of audit.
- Audit for improvements will be repeated every year to establish the savings and rework the monthly savings accordingly.

## **Installation**

- Replace existing 40 W FTL and starter with Asian E + Retrofit.
- Install the required capacity of LMS at each switching point.
- Clean the existing, FTL fixtures where improvements will be installed.

**Guarantee** – The improvements are guaranteed for free replacement/repair of defective items during Contract Period.

## **Payment Mechanism**

- ESCROW mechanism with Municipal Corporation.
- Revenue collections of the city will be deposited in ESCROW account.
- Monthly payments by the city of the Energy Saving bills under this agreement will be made from this account.
- Such ESCROW account arrangement will remain in operation until receipt of an official letter from AEL for discontinuation.
- Corporation will have access to amount in excess of unpaid bills of AEL with interest thereon, and other incidental charges as may be advised by EMF in writing.

## **Conclusion**

It is now well acknowledged that ESCO is truly WIN WIN proposition for all stakeholders, it is quite certain in the coming time, significant savings in Energy Consumption will be achieved by wide scale implementation of ESCO contracts both in Government and Private Sector.

## **Reference Book:**

IEEMA Journal (Energy Conservation Week 14-21 Dec., 2004)  
Energy Conservation Special Issue