

Energy Servicing Companies (ESCO's)

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Abstract— The ESCO concept was originated in France before world war-2 when engineer's evolved this mechanism as a means to provide expert services to reduce heating bills of property owners and occupiers that could be paid from savings. India's energy intensity is very high, which is 4.5 times that of Japan, 2.5 times of USA and 1.3 times that of Singapore. For reducing its energy intensity substantially, India needs to implement the proposed "National Response Plan" very aggressively. As it has been proven in many developed countries, the Energy Service Companies (ESCOs) are well equipped for achieving energy efficiency (EE) in all potential sectors. ESCOs can help Indian industry too become cost competitive in the global marketplace.

Energy services companies (ESCOs) can help Indian industry to reduce its energy costs significantly and become cost competitive in the global marketplace, while at the same time reducing the risk of projects "going wrong".

Keywords- ESCO's, HVAC, EE etc.

I. INTRODUCTION

The opening up of Indian economy to competition has made some of the large industries highly energy efficient. Tata Steel has made a mark as the lowest cost producer of Steel and the Indian cement industry has achieved an international benchmark in lowest energy consumption.

The ESCO designs, implements and finances energy efficiency and energy conservation projects on behalf of its customers on a guaranteed performance basis. As the payments to an ESCO are contingent upon the magnitude of the actual savings, ESCOs are often called performance contractors. Some ESCOs may even finance projects, recovering their investment from the resulting savings. In other words, an ESCO is a single-window solution to all aspects of energy efficiency improvement.

India has become the sixth largest energy consumer in the world. Its energy intensity is very high. As Indian industries have even set international benchmark in specific energy consumption per ton of cement and this could be possible due to keen interest taken by the CEOs in energy efficiency improving projects achieved. It ensures savings are achieved through its projects since energy efficiency improvement is its primary business.

A. Energy Consumption in India

More than 8% of the electricity in an industrial unit buy is probably wasted due to the design of equipment and way it has been installed. This is in addition to the energy wasted by running equipment for longer than necessary. Electricity is the most expensive form of energy available-about 8 times the cost of coal and 6 times the cost of gas-must be used widely.

The opening of Indian economy to competition has made some of the large industries highly energy efficient. Tata steel and Indian cement industry has achieved an international benchmark in lowest energy consumption. There is a lot to be done on energy efficiency of SHEs, government buildings, commercial buildings, municipalities, agricultural pump sets and water utilities.

Table I. % Energy use sector wise in India

Sector	Percentage Use
Industrial Sector	40%
Agriculture Sector	10%
Transport Sector	30%
Domestic and Commercial Sector	15%
Other	5%

Experience in many developed countries has shown that the ESCO approach to energy efficiency has reduced energy intensity in conjunction with strong support from regulators, utilities and through rebates/incentives to end users for saving energy.

B. Energy saving potential of India:

The potential for energy conservation in India is up to 23% of the current consumption, which works out to a massive savings of about 25,000 MW. In this scenario, it is high time the ESCO approach to energy efficiency is adopted more easily.

Table II. % Energy saving potential in major sectors of India

Sector	Percentage Use
Agricultural Sector	30 %
Industrial Sector	25%
Transport Sector	20%
Domestic and Commercial Sector	15%
Economy as whole	Upto 23%

II. CONCEPT OF ESCO'S

An Energy Service company (ESCO) is a company that provides integrated energy services (technical and financial) to its customers, mainly large energy users, but also utilities, which may include implementing energy-efficiency improvement projects, on a turnkey basis. An ESCO provides performance and savings guarantees and its remuneration is directly tied to the energy savings that can be sustained. Since energy efficiency improvement is their primary business, projects are more likely to be implemented than through in-house teams where such activity is a secondary or even a tertiary responsibility. Though ESCOs form a \$6 billion market in the US with over 200 players, in Indian this concept is yet to gather momentum, primarily owing to half a dozen

barriers including the lack of awareness among CEOs and CFOs about its impact on organization's profitability.

A. Origin of ESCO concept

The ESCO concept was originated in France before world war-2 when engineer's evolved this mechanism as a means to provide expert services to reduce heating bills of property owners and occupiers that could be paid from savings. Gradually this concept moved from Europe to USA in the 1970's especially during the OPEC oil embargo and the resultant energy crisis. Thanks to the pressure from regulators who demanded that electric utilities adopt demand side management and undertake integrated resource planning before sanctioning the costs of new power plants as part of the electricity rates, ESCOs became popular in USA. Many utilities themselves established or took over ESCOs and this business model became quite successful after an initial period of evolution. A recent estimate of the US ESCO market is US\$6 billion, mainly under the US federal Government sponsored federal energy management program (FEMP). There are over 100 active ESCOs in USA. From the USA, the concept has travelled to many countries and there is a great interest in ESCOs in emerging market countries like India.

B. ESCOs' Current Scenerio

There are over 30 ESCOs in the country and most of them are small players. The ESCOs are two types, one vendor based and the other consulting based.

Table III. Potential Energy Services Market

Market Type	Investment Potential Billion Rs.	Energy Savings kWh	Energy Savings MW
Industrial	2.80	49056	7000
-Generic EE	0.96	23827	3400
- Process EE	1.80	25229	3600
Commercial	0.13	739	247
-Govt. Owned Offices	0.08	345	160
-Hospitals	0.02	210	34
Municipal	0.30	3700	1688
Total	3.21	53495	8935

The vendor based ESCOs are very limited and Asian Electronics Ltd, Honeywell and Thermax EPS are prominent among them. The majority of ESCOs are consulting based and some of them are DSCL, Elpro, Energy Economy & Environmental consultants, Inteseco, Shri Shakti, sudnya, Saket projects, MK Raju consultants, and See-tech.

C. ESCOs business profile:

The energy audit firms and energy efficiency (EE) consultants are slowly graduating to ESCO business. Most ESCOs do business under guaranteed savings and are gaining experience in performance contracting. Their transaction size

is usually small and the typical projects have simple payback of 2 years. Building energy efficiency is an emerging market for ESCOs in India.

D. Market segmentation:

- Large industries: Able to plan and implement EE projects independently
- SMEs: Good fit for ESCO/EE projects. Need for awareness creation and EE benchmark in Various industries, Buildings, Hostels, Hospitals, commercial and office complexes are new market for new market for ESCO/EE projects.
- Agriculture: sensitive, Regulator and policy frame work not in place for ESCO projects.
- Utility-driven DSM programmers: Need for incentive to implement efficiency measures.

III. ESCO PROJECTS

ESCOs report broad range of projects in a wide range of customer categories and they are as follows.

- Industry: Heat recovery, fuel switching, process upgrades, lighting.
- Commercial and government buildings: HVAC, lighting, instrumentation and controls
- Power utilities/ municipal corporations: capacitors, instrumentation and controls, water pumping, street lighting

A. A typical ESCO project:

A typical ESCO project includes the following elements:

- Investment grade energy audit.
- Identification of possible energy savings and efficiency improving actions.
- Comprehensive engineering, project design and specifications.
- Guarantee of the results by proper contract clauses.
- Code compliance verification and guarantee.
- Procurement and installation of equipment.
- Project management and commission.
- Facility and equipment operation and maintenance for the contract period.
- Monitoring and verifications of the savings results.
- Project financing.

While an ESCO will ensure all the above actions, it may not necessarily conduct all the work itself and some work can be and is sub-contracted. However, the ESCO has to ensure project implementation and he responsible for the result.

B. Financing of ESCO projects:

A number of financing options are available for energy performance contract projects. These include:

1. Bank financing
2. Direct customer financing
3. Public financing(bonds)
4. ESCO or third party financing

IV. SAVINGS FROM TYPICAL ESCO'S PROJECT

A. Shared savings:

Under a shared savings structure, the ESCO finances the project, usually by borrowing money from one or more third parties. This structure is much less common than the guaranteed savings structure.

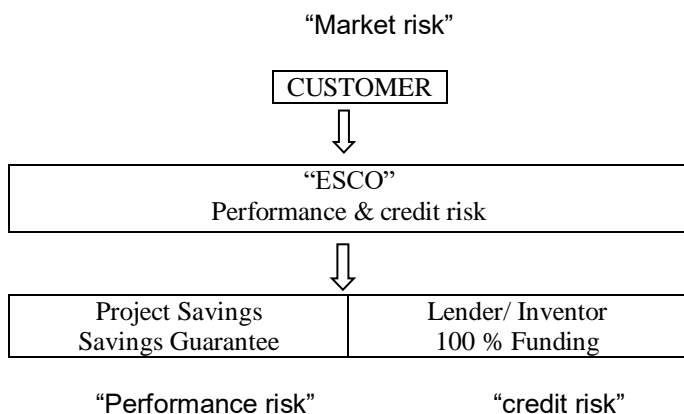


Figure1. Shared savings model

In the case of shared savings, the ESCO assumes not only the performance risk, but the financial risk as well (including the underlying customer credit risk). The customer assumes no financial obligation other than to pay a percentage of the actual savings to the ESCO over a specified period of time. This obligation is not considered debt and does not appear on the customer's balance sheet. The portion of savings than the guaranteed savings projects, reflecting greater risk and expense for borrowing money.

Since the ESCO is a service company, it typically has few assets that it can offer as a security to a lender. To add to this, the ESCO assumes the risk of non-performance of the measures as well as the credit risk of the customers. This makes borrowings by ESCO expensive. As a commercial entity, the ESCO has no option but to recover this cost from its customers and this results in higher share of the savings going to the ESCO, something not quite in the customers best interest. For this reason, the model was found to be less attractive as ESSCOs markets matured. The 'guaranteed savings system' overcomes this hurdle.

B. Guaranteed savings

Under a guaranteed savings structure, the customer finances the project in return for a guarantee from the ESCO that the project's energy savings will cover the customer's debt service. Thus the customer assumes the obligation to repay the debt to a third party financier, which is often a commercial bank or a leasing company. If the project savings fall of the amount needed for debt service, the ESCO pays the difference. If the savings exceed the guarantee amount, the customers and the ESCO usually share the excess savings. The size of the share and the method of calculation vary widely, depending on the degree of risk assumed and the extent of services provided by the ESCO.

It is important to note that in a typical guaranteed savings project, the ESCO has no contractual relationship with the bank or leasing company. The ESCO's guarantee is to the customer, and is a guarantee of performance that the project will result in enough cost savings to repay the loan assumed to finance it, and not a guarantee of payment. As a consequence, the bank or leasing company confines its analysis to the customer's general credit standing. The financial institution may regard the performance guarantee as a form of credit enhancement.

ESCOs prefer the guaranteed savings for three general reasons:

- A third party financier more qualified in credit assessment than most ESCOs. Bears the customer credit risk.
- This structure keeps the ESCO's own balance sheet clear of project debt. Thus it imposes the lowest debt service cost overall because the bank or leasing company provides the debt based on the creditworthiness of the customer.
- By segregating credit risk from performance risk for the ESCO, the guaranteed savings structure serves as an incentive for the customer to resolve on-going project issues expeditiously since customer bears ongoing debt service obligations.

Typical projects that would be implemented by ESCOs include (but not be limited to) the following.

- HVAC systems improvement in buildings.
- Installation and operation of combined heat and power plants.,
- Industrial facility refurbishment and operation.
- Industrial process improvements.
- Public lighting refurbishment and operation.
- Public water works refurbishment etc.

V. ESCO VS ENERGY AUDITS

Energy audits are not new in India and have been spearheaded by well known institutions such as PCRA, NPC, TERI, NCB and CII for the past nearly thirty years. Yet India's high energy intensity and its dependence on oil imports leave the country very vulnerable to price fluctuations and supply disruptions making energy security a big concern. Even though there is lot of scope of saving energy, there are several barriers like lack of capability on the clients to identify and implement energy efficiency (EE) projects, lack of financing mechanisms for such projects, lack of service providers etc, to achieving the same. Experience worldwide has shown that the ESCO approach has worked quite well for implementing EE projects.

A. Benefits of ESCO services:

The benefits of using services include:

- The customer does not need to commit its own human and financial resources into non-core activities like energy efficiency improvement.
- High probability of reduction in energy costs because the ESCO's remuneration is contingent upon savings being actually achieved and measured.
- The customer benefits from the latest energy efficiency expertise and technology.
- The ESCO can arrange financing for the project.
- The ESCO can arrange grant financing, potential subsidies and other public investment incentives as carbon credits.
- Most importantly, energy savings can begin to affect the company's profitability rather than remain as a project in some pending folder.
- The ESCO service fee is paid from the savings achieved, so there is no existing cash flows, in fact there is usually a net positive cash flow throughout the relationship with the ESCO.

B. Government role in promoting ESCOs

As the market becomes more familiar with the business, it is hoped that the most of the barriers will fall in place with the lapse of time, but some of them do need action by the government and large efficiency organizations because:

- The concept is new and widely known. Many customers find the model too good to be true and believing an ESCO to help them.
- Customers are reluctant to sign a long-term contract, which has to be a long document to cover the entire customer with help customers to surmount their fears about such relationships.

- There are too few ESCOs in India. This I largely because there are very few persons who have the technical and contracting knowledge to be able to deliver a good service.
- Most ESCOs are small companies with limited geographical reach who cannot meet the most common demand that they invest in the projects promoted by them.
- Customers often want the contractual guarantees to be backed up by bank guarantees. This places an enormous demand for capital to be locked up to provide the guarantee. This could be placed with banks that will extend the guarantee. This could be overcome by the creation of Guarantee Funds by a suitable government agency or a large bank, insurance company or a financial institution.
- In India, the greatest barrier to energy efficiency improvement is that this is still considered to be the engineer's domain. Getting CEOs and CFOs interested in energy efficiency improvement will certainly give a fillip to ESCOs.

C. ESCOs in India

As on date, the ESCOs is a well established concept in developed countries but is still struggling to grow in India. In the last nine years, it is observed that ESCO operations have remained at a nascent stage in India and the true impact of such services has not been realized due to limitations on the side of service providers, industries and commercial banks and policy makers. The ESCOs operations faces hurdles like standardization of measurement & verification protocol (M & V), financial structuring of ESCO Projects, ability to borrow funds etc. However, these barriers to the growth of ESCOs in India can be overcome by the joint efforts of all those interested in promoting energy efficiency in the country.

Several interventions by bilateral and multilateral funding agencies and more recently by Bureau of Energy Efficiency (through CPWD for ESCO projects in government buildings in New Delhi) have not yet yielded the expected results. Presently, there are over 30 ESCOs in India but the number of projects completed by them so far is not many.

D. Barriers to ESCO's growth:

Implementation of energy efficiency measures/demand side energy management can significantly ease the present energy situation in India.

However, still the potential for energy efficiency remains largely unexploited in India due to following six major barriers:

- Customer inertia
- Absence of focus
- Unattractive rates
- Lack of technical resources
- Poor understanding of project idea
- Lack of interest in energy efficiency at top level

- ESCOs provide a lot of benefits for a company.
- ESCOs will help us to save energy in a various sector in India.

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E. Market barriers:

Some of barriers which are under ESCOs are:

- Small in size, weak in asset base and balance sheet.
- Legal framework to safeguard contracts still to develop.

Banks:

Some of the barriers which are under banks:

- Reluctant to depart from convectional asset-based lending.
- Ready to finance modernization and up-gradation of plant and machinery.
- Reluctant to finance EE projects in an ESCO mode
- Guarantee mechanism for banks to be put in place to safeguard investment.

DISCUSSION

Following are the conclusions:

- ESCOs were very high in numbers in developed countries. Where it is new in India.
- Energy audit is known concept in India. But compared to ESCOs concept it is not that much of perfect.
- It is necessary to improve ESCOs in India.
- There were very few peoples knew about a ESCOs in India.