



Scaling up energy efficiency in MSMEs through **ENERGY SERVICE COMPANIES (ESCOs)**

An innovative ESCO-based financial model for driving the adoption of high efficiency motors in Ankleshwar chemical cluster

CURRENT CHALLENGES

EFFICIENCY CLASSES FOR ELECTRIC MOTORS

The International Electrotechnical Commission (IEC) has established energy efficiency classes for electric motors, summarized in IEC International Standard: IEC 60034-30-1:2014. The IEC Standard has four levels of motor efficiency: IE1—standard efficiency; IE2—high efficiency; IE3—premium efficiency; and IE4—super premium efficiency. Replacing standard efficiency motors with IE3 motors typically results in energy saving of 4–5%.

Electric motors are the workhorses of industry. They drive process equipment and utilities, and account for 70% of overall electrical energy consumption in industries. Most countries in the world have given top priority to the adoption of higher efficiency (IE3) motors in the industrial sector.

Despite the availability of IE3 motors in Indian markets, industrial units—particularly Micro Small and Medium Enterprises (MSMEs)—continue to use motors of lower efficiency. The main barriers to the adoption of IE3 motors are:

- **Low awareness:** Industries are largely unaware of the advantages that IE3 motors offer, and the fact that their relatively higher upfront costs are quickly recovered through savings in energy costs.
- **Financing difficulties:** Large banks/financial institutions (FIs), as well as motor manufacturers, are reluctant to extend credit for motor replacement due to the low ticket size of investments required and/or the high transaction costs.
- **Lack of technical support:** Industries do not have access to the technical support required for energy efficiency studies on their existing motor systems; quantification of the energy and cost savings that will result from replacement of motors by IE3 motors; the paybacks on investment; and so on.

Less than 5% of the motors sold in Indian markets in 2015 were IE3 motors. Clearly, there is a vast market for IE3 motors in industries; one that promises attractive financial benefits for motor manufacturers as well as for industrial units. The large-scale uptake of IE3 motors also carries the potential for huge energy savings and equivalent reductions of carbon emissions. The challenge is to overcome the barriers that prevent this market from being tapped.

SOLUTION



The Energy and Resources Institute (TERI) and Shakti Sustainable Energy Foundation (SSEF) partnered in a project to promote the adoption of IE3 motors among MSMEs in Ankleshwar chemical industry cluster, Gujarat. This cluster has about 750 chemical units, mainly MSMEs, which use motors for a range of applications such as agitators, pumps, fans, centrifuges, dryers and so on. Most of the motors are of standard efficiency. TERI conducted energy audits which revealed that energy savings of 5%–6% could be obtained by replacing the existing motors with IE3 motors; the savings would increase to 10%–15% if the IE3 motors were integrated with systems like variable frequency drives (VFDs), soft starters, gear assemblies, etc.



ESCOs

Under the project, TERI aimed at identifying and strengthening cluster-level business entities having good rapport and strong linkages with the local MSMEs, and the business acumen and wherewithal to provide the MSMEs with turnkey services to replace their existing motors with IE3 motors. In essence, the business entity functions as a cluster-level demand aggregator and Energy Services Company (ESCO). Through extensive engagement with MSME entrepreneurs, industry associations, banks/FIs, and other cluster-level stakeholders, TERI generated awareness on the energy saving and cost benefits of retrofitting IE3 motors. The project also created interest among local business to participate as potential ESCOs.

The awareness campaign inspired four cluster-level equipment suppliers to take on the role of ESCOs. TERI, in consultation with the Ankleshwar Industries Association (AIA), identified the MSMEs and assessed the energy saving potential through replacement of existing motors with high efficiency IE3 motors. The ESCO then sourced the required IE3 motors; installed them with initial investment by the MSME; and recovered the investment from the MSME on 'deferred payment' terms, based on the actual energy savings.

WHAT IS AN ESCO?

An ESCO is a business entity that provides a comprehensive package of energy efficiency solutions to its customers on turnkey basis. The ESCO identifies inefficient technologies in an establishment, and procures, installs and commissions the efficient equipment at its own expense. Unlike other entities that provide any or all of these services for a fee, the ESCO links its own earnings to the actual energy savings yielded by the project (through a 'performance-based contract'). Thus, the ESCO takes on the 'risk' typically associated with energy efficiency financing.

RESULTS

The cluster-level ESCOs established under the project have successfully installed IE3 motors in several MSMEs in the Ankleshwar chemical cluster. TERI provided hand-holding support to the ESCOs by conducting feasibility studies in the MSMEs, helping in development of energy performance contracts, and in monitoring and verification (M&V) of energy savings. As the table shows, the IE3 motors are yielding substantial energy and cost savings to the concerned MSMEs, with attractive paybacks on investment.



WAY FORWARD

The project has demonstrated the effectiveness of the ESCO model in promoting energy efficient (IE3) motors among industries. There is huge potential to scale up this ESCO-based financial model to promote energy efficient motor systems in other industrial sub-sectors, where low-efficiency electric motors and related end-use equipment account for a major share of the total electricity consumption.

Energy and cost savings through replacement of 5.5 kW standard motor with high efficiency IE3 motor

Parameter	Before	After
Rated capacity (kW)	5.5	5.5
Efficiency classification (IS 12615:2011)	IE1	IE3
Efficiency (%)	84.7	89.2
Loading (%)	78.5	78.5
Annual operating hours	7200	7200
Annual electricity consumption (kWh/year)	37,354	34,850
Electricity saving (%)	-	6.7
Annual cost saving (Rs/year)	-	17,027
Price of new IE3 motor (Rs)	-	20,570
Simple payback period (year)	-	1.2

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