

SMALL AND MEDIUM ENTERPRISES: ENERGY EFFICIENCY KNOWLEDGE SHARING

VOLUME 6 | ISSUE 4 | DECEMBER 2015

SAMEEEKSHA

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NEWSLETTER

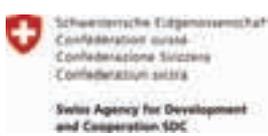
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VISION

SAMEEEKSHA envisages a robust and competitive SME sector built on strong foundations of knowledge and capabilities in the development, application and promotion of energy-efficient and environment-friendly technologies.



A PLATFORM FOR PROMOTING ENERGY EFFICIENCY IN SMEs

IN THIS ISSUE...

This issue focuses on foundries, which are among the most energy intensive industries in the Indian MSME sector. A profile is presented of the Coimbatore foundry cluster, which is renowned for producing castings for diverse industrial applications ranging from textile machinery and pump sets to wet grinders and auto components.

This issue also outlines the progress made in promoting and implementing energy efficient technologies (EETs) in the Rajkot foundry cluster during the first year of the TERI–SDC 'ESEE' project.

TERI is implementing a project supported by Shakti Sustainable Energy Foundation (SSEF), under which ten energy intensive MSME clusters are being identified in the states of Haryana, Gujarat and Tamil Nadu; energy-related data collected on these clusters; and detailed cluster profiles prepared for sharing among MSME stakeholders through the SAMEEEKSHA platform. An outline of the project is presented in this newsletter.

This issue also carries the gist of the 10th meeting of SAMEEEKSHA, held in New Delhi on 15th December 2015.

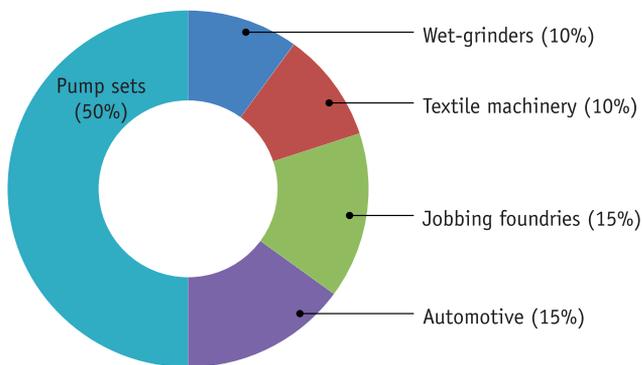
SAMEEEKSHA Secretariat



COIMBATORE FOUNDRY CLUSTER

Background

Coimbatore is an important industrial cluster located in the state of Tamil Nadu. The cluster is renowned for its numerous textiles and spinning units, as well as manufacturers of pump sets, electric motors and wet-grinders. In recent years, a number of major automobile manufacturing units have come up in the vicinity, including Hyundai, Honda, Leyland, Allwyn Nissan, Pricol, L&T, LMW and Mahindras. There is a large demand for castings from these different industries, which are met by about 535 foundry units located in the Coimbatore cluster. About 15 foundries are large-scale, 70 medium-scale, and the remaining units in the small and micro category.



Profile of foundries in Coimbatore cluster (%)

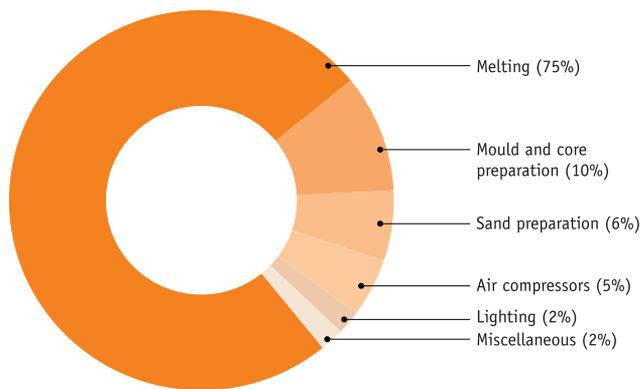
The production of castings is about 2000 tonnes per day (about 0.6 million tonnes per annum), and the estimated annual turnover is 3400 crore rupees. The Coimbatore foundry industry provides direct employment to about 10,000 people. Several of the foundries in the cluster are of 'captive' type, i.e., they are dedicated to produce castings for specific end-use applications by their client firms. There are also a number of jobbing foundries that manufacture a diverse range of castings as per market orders. The major industry associations related to foundries in the cluster are listed below.

Technology status and energy use

The flowchart (next page) shows the major process steps in a typical foundry.

Energy is used by foundries in two main forms: coke and electricity. Melting accounts for a major share of energy consumption (about 70–80%) in a foundry unit. Melting is carried out either in electrical induction furnaces or coke-based cupola furnaces. Other important energy consuming areas are mould sand preparation, moulding, and compressed air generation for various applications (see chart).

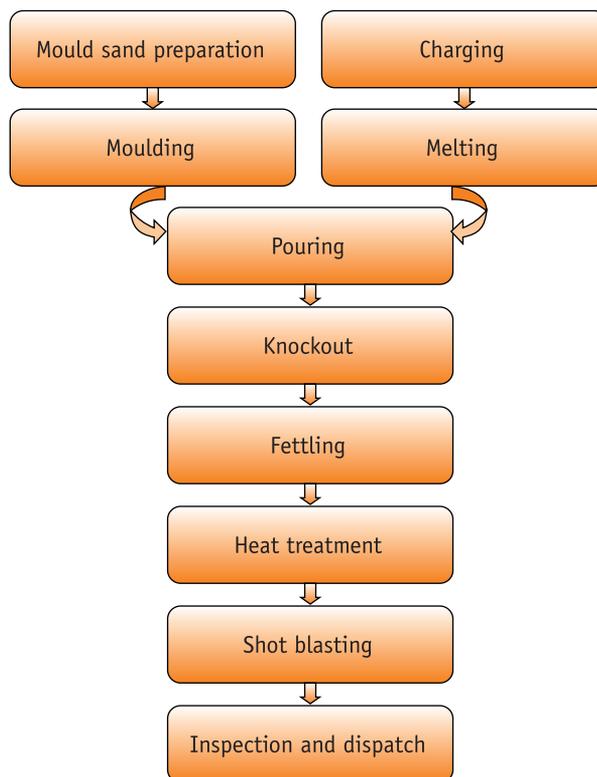
Name of association	Profile
Southern India Engineering Manufacturers' Association (SIEMA)	Most of the members are engaged in manufacture of electric motors, mono block pumps and submersible pumps. SIEMA is the major promoter of two other institutions: Si'Tarc (an NABL- accredited laboratory for scientific and industrial testing and research) and COINDIA.
COINDIA (Coimbatore Industrial Infrastructure Association)	A special purpose vehicle (SPV) created for implementing cluster infrastructure development projects; conceived and promoted by SIEMA with the support of IIF-Coimbatore Chapter, COSMAFAN and COFIOA.
Coimbatore District Small Industries Association (CODISSIA)	It has a permanent trade fair complex and is a joint promoter of Si'Tarc along with SIEMA.
The Institute of Indian Foundrymen (IIF), Coimbatore Chapter	One of the most vibrant IIF chapters in the Southern Region. It has its own office and conference facilities.
Coimbatore Tiny and Small Foundry Owners Association (COSMAFAN)	Represents the smaller castings units in the cluster. With COINDIA, it has procured about 100 acres of land in Arasur and about 50 acres of land in Manikkampalayam to establish common premises (foundry parks) with state-of-the-art facilities under the Industrial Infrastructure Upgradation Project, implemented by COINDIA.
The Coimbatore Foundry and Industry Owners Association (COFIOA)	It represents the small and micro scale foundry units in the cluster.



Energy use in a typical small/medium-sized foundry (%)

Energy consumption

The specific energy consumption (SEC) varies considerably among foundries, depending on the type of furnace used and degree of mechanization. On an average, induction furnace-based foundry units consume about 1000–1200 kWh per tonne of good castings. Out of this, about 600–700 kWh



Process flow-chart



Cupola Furnace

is consumed per tonne of molten metal and the balance is consumed in other associated operations and in rejections and wastages. In cupola-based foundries, the average coke consumption varies between 10–15% of the metal melted and 15–20% of good castings.

Table 1 shows the typical energy consumption of an induction furnace-based unit. Table 2 shows the cluster-level energy consumption.

Table 1. Typical energy consumption in induction furnace-based foundry

Production—saleable castings (tpa)	Annual energy consumption		Annual energy bill (million rupees)
	kWh	toe	
500	550,000	47	3.9
1000	1,100,000	95	7.7
2000	2,200,000	189	15.5

Note: tpa—tonnes per annum; toe—tonnes of oil equivalent

Table 2. Energy consumption in the Coimbatore foundry cluster (2014–15)

Energy source	Annual consumption		Annual energy bill (million rupees)
	Quantity	toe	
Electricity	460 million kWh	39,740	3000
Thermal	32,000 tonnes coke	18,900	790
	Total	58,640	3790

Options for energy saving

Table 3 summarizes major energy-saving opportunities for foundry units in the cluster.

Table 3. Energy conservation measures for foundries in Coimbatore cluster

ECM	Summary
Improved operating practices	
Lid mechanism for induction furnace	In the absence of lids, most existing induction furnaces suffer high heat losses (4–6% of energy input). A lid mechanism will reduce these losses. Payback— less than one year.
Reduction in rejections	Many foundries have high rejection levels (6–9%), which can be reduced to below 5% through improved process control. Investments—marginal.
Cleaning of runner and risers by using shot/tumble-blast before re-melting	Foundry returns, i.e. runners and risers, make up a significant share of charge material. They usually have moulding sand sticking to them (2–4% by weight), which leads to slag formation and higher energy consumption levels. Cleaning the sand will yield considerable energy saving. Investment—marginal.
Providing glass wool cover for ladles used to transfer molten metal	With covers for ladles, heat losses will be reduced. Investment—marginal.
Arresting compressed air leakage	Compressed air leakages in piping systems are often quite high (above 20%). The air leakages can be brought down to about 5% with good housekeeping practices, yielding significant energy saving. Investment—nil.
Reduction in pressure setting of air compressor	The pressure settings of air compressors are often much higher than the actual air pressure requirement in the plant. Reducing the compressed air pressure to match end-use requirements will result in high energy savings. Investment—nil.
Retrofit	
Retrofitting air compressor with variable frequency drive (VFD)	During normal operation, an air compressor is operated on 'unloading' position for more than half the time. Installation of a VFD will minimize the unload power consumption. Investment: about Rs 2–3 lakhs. Simple payback period —about 2 years.
New plant/equipment	
Replacement of conventional coke-based cupola with energy-efficient (EE) divided blast cupola (DBC)	Payback—less than a year on account of coke saving alone
Replacement of low-efficiency induction furnaces (e.g., with SEC 750 kWh per tonne or higher) with EE induction furnaces	SEC of about 550 kWh per tonne can be achieved. Payback— less than a year.
Replacement of rewind motors with EE motors	Old motors that have been rewind three times or more may be replaced with EE motors (IE3 efficiency class) to yield significant energy savings. Simple payback period— 2 to 3 years.
Replacement of inefficient pumps in the cooling water circuit of induction furnace with EE pumps	Payback—one to two years

Compiled by TERI from 'Cluster Profile Report – Coimbatore Foundry Cluster', 2015, prepared under EESE project.



ENERGY EFFICIENCY INITIATIVES IN RAJKOT FOUNDRY CLUSTER

Rajkot is one of the important foundry clusters in India, with a number of foundry units scattered within and around the city. The foundries can be classified into two broad categories: (1) sand moulding; (2) wax moulding, also known as investment casting.

While majority of the foundries use sand moulding for production of gray iron castings, there are a number of foundries producing precision steel and alloys casting through the lost wax process (also known as investment casting). Coke and electricity are the major sources of energy in both categories of foundries. Additionally, investment casting units use natural gas (NG) for shell baking and heat treatment. Figure 1 shows the area-wise energy consumption in the two types of foundries.

The ‘Scaling-up Energy Efficiency in Small Enterprises’ (ESEE) project under the TERI–SDC



Pouring metal into moulds

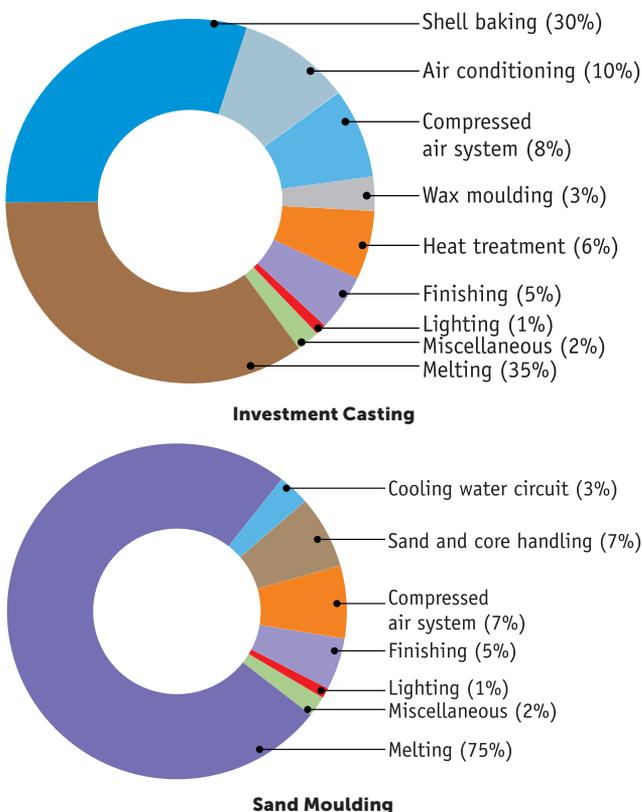


Figure 1. Area-wise energy consumption in foundries

partnership aims to improve energy efficiency in about 110 foundry units in Rajkot cluster in three years, i.e., January 2015–December 2017. The approach is systematic:

- The foundry units are individually visited to collect basic data on process, equipment and energy consumption.
- Based on the equipment installed in the foundry unit, sophisticated portable instruments are used to conduct detailed energy audit.
- After thorough measurements and analysis of the measured and historic data, certain energy conservation measures (ECMs) are formulated.
- These ECMs are discussed with the unit management, and technical and commercial implementation support is provided for implementing the ECMs.

The identified ECMs are categorized in three levels: (1) improved operating practices, (2) retrofits, and (3) revamps.

Under improved operating practices, the recommended ECM requires little or no investment; it just requires minor tweaking in current operating practices and/or requires some maintenance. An example of such an ECM is optimization in the compressed air system, which includes reduction

of compressed air leakages and optimization of pressure setting of the air compressors. This can yield energy saving of up to 10% of energy used in compressor system.

Retrofits entail adding on additional components to existing equipment, for which minor investments are required. An example is retrofitting a lid/cover on the crucible mouth of an induction furnace to reduce radiation losses. Retrofits can lead to energy saving of up to 15% of radiation losses.

Revamps involve replacement of existing inefficient equipment with efficient equipment. An example is the replacement of an old pump of low operating efficiency with an EE pump. Revamp can lead to energy saving of up to 30% of energy consumption in the pumps.

During the calendar year 2015, detailed energy audits have been conducted in 30 foundries in Rajkot, and a total of 230 ECMs have been identified.

Upon implementation, these will result in energy saving of 525 tonnes of oil equivalent (toe) annually and avoided CO₂ emissions of 48,600 tonnes. Implementation of 50 ECMs has already begun in about 17 units; these ECMs will yield annual energy savings of 60 toe, besides avoiding 10,020 tonnes of CO₂ emissions each year (Figure 2).

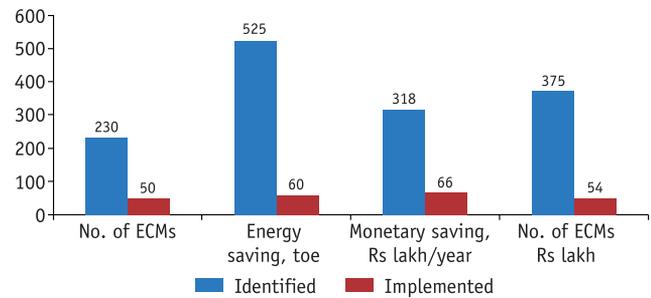


Figure 2. ECMs recommended and under implementation in Rajkot foundry cluster



Revamp of inefficient induction furnace with EE induction furnace



The implemented ECMs include the following:

Operating Practices	Retrofits	Revamps
Melting process optimization of induction furnace	Relining of fuel-fired furnace to reduce surface losses	Replacement of inefficient melting furnace
Optimization of air compressor pressure and arresting air leakages	Air manager for compressed air system	Replacement of inefficient water pump
	Power factor improvement and maximum demand control	Replacement of inefficient air compressor
	Lid mechanism for induction furnace crucible	

Compiled by TERI based on ongoing activities under the EESE project.



PROFILING OF ENERGY INTENSIVE MSME CLUSTERS

Location: MSME clusters in Haryana, Gujarat and Tamil Nadu

Duration: 9 months (2015–16)

Funding agency: Shakti Sustainable Energy Foundation (SSEF)

Implementing agency: TERI

Background

A major barrier to formulate policies and programs on energy efficiency improvement in the MSME sector is the lack of comprehensive data on energy usage patterns among many MSME clusters. The energy consumption data for about 40 MSME clusters covered under the BEE SME Program and TERI-SDC partnership have already been collated and put on the SAMEEEKSHA website. Under its current partnership with SDC, TERI is collating energy data and preparing cluster profile reports on 100 more MSME clusters.

In order to complement the efforts to gather updated energy data on MSME clusters, SSEF is providing support to TERI to prepare cluster profile reports on MSME clusters in the three states of Haryana, Gujarat and Tamil Nadu. These states host many of the 200-odd energy-intensive MSME clusters in India, covering sub-sectors such as chemicals (Ahmedabad, Vapi), metal casting/engineering (Chennai, Bhavnagar, Manesar, Samalakhya), plywood (Yamunanagar), textiles (Panipat, Tirupur, Surat, Faridabad), cold storage (Kundli, Ahmedabad), and so on.

Objectives

The project will collate the energy-related data of ten selected energy-intensive MSME clusters in the states of Haryana, Gujarat and Tamil Nadu. A detailed cluster profile will be developed for each of the selected clusters. The information gathered will be shared among MSME stakeholders and policy makers through the SAMEEEKSHA platform.

Components

Short-listing of ten new energy-intensive clusters

TERI-SSEF will select ten new energy-intensive clusters from the three states in consultation with State Designated Agencies of BEE and MSME-Development Institutes (MSME-DIs). This project will ensure that

there are no overlaps with other programs in the clusters selected.

Organizing cluster-level workshops

A cluster-level workshop will be organized in each of the clusters for initiating project activities. The workshops, which will be jointly organized with the local industry associations, will bring together key stakeholders in each cluster.

Energy data collection through interactions with major stakeholders

Information related to cluster location, size, technologies in use, products and their markets, energy sources, quantum of energy used, and CO₂ emissions will be collected through interactions with industry associations, selected entrepreneurs, and state/cluster-level government agencies like DICs, SDAs, and MSME-DIs.

Identification of energy efficient options and preparation of cluster profile reports

Detailed analyses will be undertaken to access the total/specific energy consumption of the major energy intensive equipment/processes. The typical unit-level energy data will be extrapolated to arrive at the total energy consumption at the cluster level. The cluster profile will also provide information about production processes, major energy conservation options and energy saving potential.

Widespread dissemination among cluster and national-level stakeholders

The cluster profile will be published for dissemination among cluster/national-level industry stakeholders. In addition, the cluster profiles and related energy consumption information will be uploaded on the SAMEEEKSHA website.

CONTACT DETAILS

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10TH MEETING OF SAMEEEKSHA

The 10th Coordination Committee Meeting of SAMEEEKSHA was held at TERI, New Delhi on 15th December 2015. The meeting was chaired by Dr Ajay Mathur, Director General, Bureau of Energy Efficiency (BEE). The other participants included representatives from BEE, UNIDO, SIDBI, CRISIL, Credit Analysis and Research Limited (CARE), financial institutions, implementing agencies, and technical consultancy organizations. The following presentations were made:

- SAMEEKSHA platform: an update, and demonstration of the 'MSME Map of India'—Mr Upinder Singh Dhingra, TERI; Secretary, SAMEEKSHA
- Activities under the BEE-SME Program—Mr Milind Deore, BEE
- SIDBI ongoing programs on EE in MSMEs—Mr M.A Sudheesh, SIDBI
- Update on TERI-SDC EESE project—Mr Prosanto Pal, TERI

Salient points from the presentations and discussions are summarized below.

- Energy-related data on 33 clusters has already been placed on the website. Under the current TERI-SDC EESE project, data has been collected on 20 more clusters, and 15 cluster profiles have been prepared. With support from Shakti Sustainable Energy Foundation, TERI is collecting energy data on 10 new energy-intensive clusters in Gujarat, Haryana and Tamil Nadu; this too will be shared on SAMEEKSHA.
- An interactive 'MSME Map of India' has been designed and shall be placed on the SAMEEKSHA website. It provides user-friendly access to data and knowledge products on MSME clusters across India, which can be explored level by level through hyperlinks within and beyond the SAMEEKSHA website.

- The SAMEEKSHA Secretariat can prepare a 'one-sheeter' (like a flyer) that can be used by various agencies to generate awareness about the 'MSME Map of India' and the SAMEEKSHA platform. This flyer can be disseminated in clusters through events being organized by various agencies.
- Traffic through the SAMEEKSHA website can be increased if, in addition to increasing links from SAMEEKSHA to other websites, efforts are made to create linkages to the SAMEEKSHA website from other websites (i.e., to create 'bi-directionality' in links).
- The utility of SAMEEKSHA would be increased by getting MSME service providers (LSPs) to register. An informal working group may be established to explore ways by which this could be achieved; all agencies are welcome to join and contribute to the process.
- SAMEEKSHA website should be linked with the knowledge portal that has been developed by BEE. The information from the portal can also feed into the 'MSME map of India'.
- Agencies associated with SAMEEKSHA should consolidate their knowledge and experiences theme-wise and/or sector-wise, for sharing with SAMEEKSHA Secretariat.



SAMEEKSHA is a collaborative platform aimed at pooling the knowledge and synergizing the efforts of various organizations and institutions—Indian and international, public and private—that are working towards the common goal of facilitating the development of the Small and Medium Enterprise (SME) sector in India, through the promotion and adoption of clean, energy-efficient technologies and practices.

SAMEEKSHA provides a unique forum where industry may interface with funding agencies, research and development (R&D) institutions, technology development specialists, government bodies, training institutes, and academia to facilitate this process.

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