SAMEEEKSHA

SMALL AND MEDIUM ENTERPRISES: ENERGY EFFICIENCY KNOWLEDGE SHARING

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NEWSLETTER

A PLATFORM FOR PROMOTING ENERGY EFFICIENCY IN SMEs

In this issue...

Editorial

It is satisfying to note that the SAMEEEKSHA platform is now finally a reality as part of which various activities in the field of energy efficiency in the MSME sector are being planned. The quarterly newsletter and the proposed website of SAMEEEKSHA are two important channels for putting together the knowledge resources available with TERI and other agencies in this field in the public domain. TERI as an institute has always laid great emphasis on capacity building and knowledge sharing in all its initiatives. Hence, the vision of SAMEEEKSHA, to contribute in building a strong and robust MSME sector through knowledge sharing and promoting energy efficiency, in a way reflects TERI's inherent philosophy.

I would like to thank SDC for providing the initial support for setting up the Secretariat of SAMEEEKSHA at TERI. In fact, the extended support provided by SDC has helped TERI to remain engaged with the MSME sector for more than 15 years. It is important to note that in developing countries like India, the MSME sector plays a very important role in the economy as it provides an impetus for growth in small towns and peri-urban areas. It is therefore essential to ensure that this sector remains competitive and continues to grow in an environmentally sustainable manner. The growing importance of the MSME sector can also be seen from the fact that several new multilateral and bilateral initiatives including those by the World Bank, JICA, UNIDO and KfW have been launched recently with MSMEs as the central focus. SAMEEEKSHA could act as a springboard for collaborative efforts of various like-minded public and private entities with regard to facilitating sharing of knowledge among different agencies as well as amongst the final beneficiaries in the field.

I am also grateful to BEE and Ministry of MSME for conceiving this idea and giving impetus to the SAMEEESHA initiative. TERI has been working with BEE as a knowledge partner under the BEE-SME program which focuses on identifying and promoting energy efficient solutions in 29 SME clusters across the country. With the 12th Five Year Plan (2012–17) preparations currently under way in various Ministries of the Government of India, this is perhaps an appropriate time to ensure that adequate emphasis is given to promoting energy efficiency in MSME clusters across the country while formulating the 12th Plan.

R K Pachauri
Director General, TERI

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CLUSTER PROFILE

LUDHIANA KNITWEAR CLUSTER

Background

Ludhiana is an important textile manufacturing cluster located in Punjab. There are around 14000 MSME units in the cluster, of which 9800 are micro (70%), 2800 are small-scale (20%) and 1400 are medium-sized (10%) enterprises. Knitwear manufacturers (including manufacturers-cum-traders/exporters) form the core of the cluster. The Ludhiana knitwear industry manufactures the entire range of winter and summer wear for men, women, and children. The products include high-fashion garments, T-shirts, sweat shirts, pullovers, jackets and grey fabric. Spinners, dyers and sub-contracting knitting units provide backward process support.

The Ludhiana knitwear industry is highly labour-intensive. Including the large-scale industries, the cluster provides direct and indirect employment to about 400,000 people. The cluster has an annual turnover of around Rs 5000 crores (2007–08) which includes exports worth about Rs 1000 crores. There are around 70 industry associations in the cluster representing various interest groups such as exporters, dyers, readymade hosiery manufacturers, spinners, knitters etc.

Technology status and energy use

There are many categories of textile units in the Ludhiana cluster, engaged in different processes related to the manufacture of knitwear products. The most energy-intensive units are those engaged in dyeing, processing and spinning. The printing units are relatively less energy-intensive. Among all the units, energy cost forms the largest component of production cost.

The textile units in Ludhiana cluster use energy mainly in the forms of (1) electricity for equipment such as air compressors, boilers, motors and transformers; lighting, cooling and temperature control systems; etc. and (2) heat for generating steam which is used for dyeing of yarns and knitted fabrics. The steam is generated in boilers by using fuels such as wood, rice husk, pet coke and high-speed diesel (HSD).

Dyeing machine

Options for energy saving

Under a SIDBI-supported project to promote 'business development services' (BDS), Apex Cluster Development Services Pvt Ltd conducted a number of energy audits on textile units in the Ludhiana cluster to study the pattern of energy utilization in the textile units and to identify techno-economically viable options for energy conservation that would help improve the specific fuel consumption. The table highlights the potential monetary savings through adoption of energy conservation options in three units that were studied.

Monetary saving potential (Rs lakh)							
Textile unit		*Unit–1*		*Unit–2*		*Unit–3*	
S No	*Particular*	*Annual savings*	*Investment*	*Annual savings*	*Investment*	*Annual savings*	*Investment*
Thermal							
1	Boilers	26.6	4.5	4.6	3.5	4.3	2
2	Miscellaneous equipment			3.1	3.3	0.6	0.5
Electrical							
1	Electricity distribution system	0.04	0.04	0.3	0.02	0.02	0.02
2	Motors					0.18	0
3	Lighting	3.1	2.3	2.5	2.4	2.5	1.6
4	Air compressors	3.2	3.3	0.2	0.1	2.7	0.7
5	Boiler	1.3	1.5	0.2	0	0.2	0
6	Miscellaneous equipment	0.6	0.9	5.9	4.4	1.0	0.3
Total (thermal and electrical)		34.8	12.5	16.8	13.7	11.5	5.1

The table shows significant monetary saving potential (Rs 11.5 lakh to Rs 34.8 lakh per year) through the adoption of various energy saving measures. Of these, major energy savings can be realized in boilers, air compressors and lighting. Some of the energy saving options within these areas are listed below.

Thermal energy

- *Boilers:* Reducing excess air, flue gas temperature, radiation losses and unburnt in ash; auto stopping of ID fan etc.
- *Steam distribution system:* Improvement in condensate recovery; reducing steam generating pressure; improvement in steam distribution system
- *Other measures:* Optimum capacity utilization of machines

Electrical energy

- *Boilers:* Auto stopping of ID fan; providing variable frequency drive (VFD) on ID fan; direct coupling of ID fan and VFD or pulley in FD fan
- *Air compressors:* Reducing pressure and temperature; overhauling of compressor; reducing air leakage
- *Lighting:* Providing proper reflectors and lighting transformers; replacement of magnetic ballasts with electronic ballasts; replacing halogen lamps with LED lamps or CFLs, ordinary GLS lamps with LED lamps, and ordinary watt tubes with T5 tubes; reducing/ preventing misuse and wastage and providing controls
- *Electricity distribution system:* Shifting some capacitors to after servo stabilizer and UPS; balancing of current in different phases; installing auto control on distribution transformer fans
- *Other measures:* Full capacity utilization of machines; regular cleaning of machines

Contributed by Apex Cluster Development Services Pvt Ltd

CLUSTER PROFILE

REFRACTORY MANUFACTURING CLUSTER, EAST AND WEST GODAVARI

Background

The East and West Godavari districts of Andhra Pradesh are rich in mineral resources like fireclay, ball clay and china clay. This has led to the establishment of many small-scale refractory manufacturing units in Rajhamundry, Morampudi and Dhavaleswaram in East Godavari district and Chebrolu, Bhimdole, Dwarka Tirumala, Timmaya and Palem Road in West Godavari district. The units manufacture solid/ hollow bricks, acid rain bricks, ceramic jars, and other products which are widely used in many applications like steel and other metallurgical industries, furnaces, etc. There are 83 refractory manufacturing units of small and medium capacities in the cluster: 50 are in East Godavari and 33 in West Godavari. The cluster produces about 73,542 tonnes of fireclay bricks and 4715 tonnes of ceramic products annually. These products are marketed in southern India and some parts of northern India. The cluster has an annual turnover of about Rs 50 crores, and provides regular employment to more than 800 people.

The refractory units have formed an association called 'The Ceramic Manufacturers Welfare Association'. The Industries Department, Andhra Pradesh facilitates the supply of required coal from Singareni Collieries Company Limited (SCCL) through the District Industries Centre (DIC). The coal is allocated among the local units based on their installed capacity. The units draw their required electricity from the Andhra Pradesh Eastern Power Distribution Company Limited.

Technology status and energy use

The refractory manufacturing units use downdraft (DD) kilns, crushers, pug mills, clay mixers, ball mills and filter presses in their processes. Slurry is prepared by mixing clay (60%) and refractory grog (40%) with water. Semi-automatic moulding machines are used to prepare 'green' moulds of desired shape from the slurry. The 'green' moulds are then baked in DD kilns in slow and rapid firing modes for a period of 5-6 days. This firing process is followed by a 24-hour 'soaking' process, following which the kiln is allowed to cool on its own and the end-products are unloaded.

Thermal energy is required for heating of refractory products in DD kilns; coal and firewood are the main fuels used. Electricity is used to drive the motors in different equipment like crushers, mixers, ball mills etc. The total energy cost for manufacturing refractory products varies between 25–35 % of the total production cost. The estimated annual energy consumption in the East & West Godavari refractory cluster is around 18853 tonnes of oil equivalent (toe).

Options for energy saving

The East & West Godavari refractory cluster is one of the clusters covered by the BEE-SME Program under the 11th Plan. APITCO, a premier technical consultancy organization in Andhra Pradesh, is the executing agency for project activities including detailed energy audits and preparation of Detailed Project Reports (DPRs) on energy efficient technologies. The studies by APITCO reveal significant potential for energy savings both in thermal and electrical processes through adoption of improved and energy efficient technologies. A number of identified energy saving options are listed below.

Energy consumption in East & West Godavari refractory cluster

Energy form	*Annual consumption*		*% share*
	Quantity	toe	
Coal	45104 tonnes	15786	84
Wood	14637 tonnes	2927	15
Electricity	1626426 kWh	140	1

Install waste heat recovery systems

Among the 83 refractory units in the cluster, there are 11 units of different capacities that manufacture pickle jars. These 11 units have the potential to install waste heat recovery (WHR) systems in DD kilns. These WHR systems can help in preheating of the raw material and achieve an energy saving of about 20–22% per batch of production. Assuming that 24 batches are processed per year, each unit would save around 110 tonnes of coal annually, equivalent to monetary savings of 3.85 lakhs per year. The capital cost of a WHR system is around Rs 5 lakhs, giving a simple payback period of less than 15 months.

Switch from DD kilns to tunnel kilns

The tunnel kiln is an energy efficient option for the DD kiln, offering reduced energy consumption and improved productivity. During interactions with the entrepreneurs, around 25 units have shown interest in adopting tunnel kilns in place of the existing DD kilns. With the support of BEE, a group of entrepreneurs and technical experts visited Morbi ceramic cluster (Gujarat) and observed the tunnel kiln process. Comparative performance analysis of tunnel kiln vis-à-vis DD kiln indicates an energy saving potential of 30–35% per batch processed by adopting tunnel kiln technology. Assuming 24 batches per year, each unit would save around 170 tonnes coal annually, equivalent to monetary savings of Rs 6 lakhs per year. The capital cost of a tunnel kiln is around Rs 35 lakhs including engineering, procurement and construction (EPC) charges, giving a simple payback period of under 6 years.

Replacement of conventional coal-fired systems in 11 pickle jar units

Option–1: Coal gasifier systems

Coal gasifier systems could be adopted in place of direct coal firing in DD kilns. A fuel saving of 22% is expected due to improved thermal efficiency. Each unit can save around 120 tonnes of coal annually (assuming 24 batches processed per year), equivalent to monetary savings of Rs 4.2 lakhs per year. The capital cost of the coal gasifier system is around Rs 25 lakhs including EPC charges, giving a simple payback period of just over 6 years.

Downdraft kiln

Option–2: Biomass gasifier systems

Alternatively, biomass gasifier systems can be used instead of direct coal firing in DD kilns. A fuel saving of 16% is expected and each unit can save around 86 tonnes of coal annually, equivalent to monetary savings of Rs 3.2 lakhs per year. The capital cost of a biomass gasifier system is around Rs 15 lakhs including EPC charges, giving a simple payback period of under 5 years.

Install energy efficient motors

Most of the existing standard motors that are currently being used in crushers, mixers and brick presses in the cluster have been rewound several times. Replacement of the existing standard motors with energy efficient (eef1) motors would improve the operational efficiency by at least 10–12%. The eff1 motor has higher efficiency while operating on both part and full loads under dusty operating conditions. Adoption of eff1 motors in various equipment would save at least 2000 kWh per year in a typical refractory unit. The annual electricity saving potential at cluster level is estimated to be worth Rs.6 lakhs. The investment required for implementation of this measure is estimated to be Rs 25,000 per unit, giving a simple payback period of around 3½ years.

Contributed by APITCO Ltd, Hyderabad

PROMOTING ENERGY EFFICIENT DBC IN THE HOWRAH FOUNDRY CLUSTER

Location: Howrah, West Bengal
Partners: TERI, SDC, Cast Metals Development Limited, M B Associates, Sorane SA

Background

There are about 5000 small-scale foundry units in India, with a collective annual output of about six million tonnes of castings which are marketed both in India and abroad. The foundry industry provides direct employment to an estimated 500,000 people.

The Howrah foundry cluster is one of the oldest and largest foundry clusters in India. There are about 300 foundries operating in the cluster that mainly produce low-value-added castings such as manhole covers and pipes. Many of the foundry units still use poorly designed melting systems and sub-optimal operating practices.

Context

The foundry sector is among the most energy intensive MSME sectors in India, consuming around 600,000 tonnes of coke per year (equivalent to around 1,640,000 tonnes CO_2). Melting is by far the most energy-intensive stage of a foundry's operations. Recognizing the potential to increase the energy efficiency of the conventional coke-based cupolas and thereby reduce CO_2 emissions, SDC partnered with TERI in a project to demonstrate and promote a more energy-efficient cupola for small-scale foundries in India. The Howrah foundry cluster was chosen for demonstration of the energy efficient melting technology. After considering various technological options the project partners short-listed 'Divided Blast Cupola' (DBC), developed by the British Cast Iron Research Association (BCIRA), UK, as the best option suitable for Indian foundries which would help in improving energy efficiency of the foundry sector at a modest investment.

Demonstration unit at Howrah

Approach and results

The demonstration unit in Howrah, Bharat Engineering Works, was selected in consultation with the local industry association, i.e. Indian Foundry Association (IFA). In setting up the DBC demonstration plant, the project adopted a '*competence pooling*' approach, i.e. it brought together local and international experts in many disciplines like project management, foundry technology, energy management, cupola operations, and environmental technology. Cast Metals Development Limited, U.K., a BCIRA group

Key features of energy efficeint DBC
Reduces coke consumption by about 25–65% compared to conventional cupola
Increases molten metal tapping temperature by about 50 °C
Increases the melting rate
Reduces silicon and manganese losses in the metal

company and consultants from M B Associates and Sorane SA provided crucial support and expertise in transferring technical know-how related to the DBC, and at every stage during the design and commissioning the demonstration plant. The DBC was successfully demonstrated in July 1998. The demonstrated DBC yielded an energy savings of about 40% compared to the conventional cupola. The DBC system paid back its capital investment in less than two years.

In order to ensure the sustained uptake of the energy efficient DBC technology in the Howrah cluster, the project identified technically capable local service providers (LSPs) who could generate awareness on and provide technical backup support for adoption of the TERI-designed DBC technology by other foundry units. Thanks to the LSPs' sustained efforts, around 23 DBC replications have taken place in the Howrah cluster till June 2011; these have exhibited consistent energy savings.

Key lessons

The Howrah experience illustrates the vital role played by LSPs in ensuring the sustained uptake of energy efficient technology in an MSME cluster. While the demonstration unit helped showcase the benefits of the energy efficient DBC technology, other foundry units in Howrah were initially cautious about adopting the new technology—primarily because of its relatively high capital cost, coupled with uncertainty about the availability of necessary technical support services at cluster level in the long term. The LSPs identified and supported by TERI were technically adept persons already familiar to foundry entrepreneurs and other stakeholders in Howrah. The LSPs were also sensitive to the cluster dynamics — in particular, they were aware of the differing profiles, priorities and technological requirements of different foundry entrepreneurs. In essence, the LSPs commanded both credibility and trust among the local industry, and this has enabled them to promote, support and sustain replications of the energy efficient DBC in the Howrah cluster.

Contributed by TERI

4TH COORDINATION COMMITTEE MEETING

The 4th Coordination Committee Meeting of SAMEEEKSHA was held in TERI on 6th May 2011. The meeting was chaired by Dr Ajay Mathur, Director General, BEE; the participants included representatives from BEE, SDC, PCRA, SBI, SIDBI, CII, JICA, DFID, GTZ/IGEN, KfW and others. The discussions helped identify a number of measures to increase the effectiveness of SAMEEEKSHA which are given below:

- The website will be designed to help the MSME entrepreneur easily find information specifically related to his own industrial processes/technologies and cluster.
- The SAMEEEKSHA website will provide opportunities to upload useful content on to the website, subject to review and approval by the Secretariat. Links could be provided to the cluster manuals, detailed project reports as well as lists of LSPs and vendors developed by BEE.
- SAMEEEKSHA could explore linkages with SBI's initiatives for the MSME sector, as well as the bank's Consultancy Services Cells for MSMEs.
- The basic structure of the website is nearly ready. Once complete, the website could be fine-tuned by members (in '*beta testing*' mode) for formal launching later this year.
- The members were requested to provide case studies, cluster profile and other related information on energy efficiency for the clusters in which they are active.

CORRIGENDUM

In the article '*Improving the energy efficiency of electric motors*' carried in the March 2011 issue of this newsletter, it was mentioned that an 'Enabling Technology Centre (ETC) is being set up at the premises of NFTDC'. UNDP–GEF clarifies that the ETC has been operational since last one year. The error is regretted.

ABOUT SAMEEEKSHA

SAMEEEKSHA 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.

SAMEEEKSHA 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.

ABOUT TERI

A dynamic and flexible not-for-profit organization with a global vision and a local focus, TERI is deeply committed to every aspect of sustainable development. From providing environment friendly solutions to rural energy problems to tackling issues of global climate change across many continents and advancing solutions to growing urban transport and air pollution problems, TERI's activities range from formulating local and national level strategies to suggesting global solutions to critical energy and environmental issues.

With staff of over 900 employees drawn from diverse disciplines, the institute's work is supported by ministries and departments of the government, various bilateral and multilateral organizations, and corporations of repute.

VISION OF SAMEEEKSHA

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.

FOR MORE DETAILS, PLEASE CONTACT

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