SAMEEEKSHA

SMALL AND MEDIUM ENTERPRISES: ENERGY EFFICIENCY KNOWLEDGE SHARING

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NEWSLETTER

Promoting Energy Efficiency in SMEs

SAMEEEKSHA

A PLATFORM FOR PROMOTING ENERGY EFFICIENCY IN SMEs

In this issue...

Editorial

India is a multifaceted country transforming from a developing to a developed economy. It has witnessed fast growth, and its GDP is expected to grow at a high rate during the next years. With this growth comes an increase in energy demand and greenhouse gas emissions; there is already a huge gap between the demand and supply of energy, resulting in persistent power shortages and frequent power cuts. Hence, it is essential to realize the potential for energy saving through improved energy efficiency.

In this era of globalization, the pressure on industries to become globally competitive is constantly increasing. Rising concerns about the availability of energy and higher energy prices pose a big challenge, especially to small and medium enterprises (SMEs). In India, SMEs represent 95% of all industry establishments with more than 28.5 million units, and contribute to 40% of the domestic exports and industry output and 45% of the manufacturing sector.

Under the Indo German cooperation, these challenges are being mainly addressed by two GIZ initiatives: the MSME Umbrella Programme, which aims to strengthen India's micro, small and medium enterprises (MSMEs) by helping them to modernize and innovate in order to increase their competitiveness in a socially and environmentally responsible manner; and the Indo German Energy Programme, which is focused on optimizing the energy supply and demand side management. The two programmes joined forces with KAEFER, one of the world's largest provider of complete insulation solutions, under the public private partnership project 'Moving India's SMEs towards Energy Efficiency' (MovIEE). Its objective is to provide companies with access to advisory services, training and credit schemes, enabling them to implement energy efficient insulation.

The importance of insulation has increased in times of scarce and expensive resources. The correct application of professional insulation can increase overall efficiency without major capital investments, resulting in several advantages such as energy savings, reduction of operational costs, optimization of machinery performance, protection of personnel from hot surfaces, and reduction of emissions.
To demonstrate the various benefits of professional insulation, three pilot projects have been implemented in different industry clusters, which are showcasing a huge cost saving potential without the need for major process modifications and plant shutdown periods. This newsletter presents one of our case studies, and I hope it arouses your interest in following or engaging with our work for SMEs in India.

Mr Jens Burgtorf
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CLUSTER PROFILE

ODISHA SPONGE IRON CLUSTER

Background

The state of Odisha has iron ore deposits estimated at around 4.18 billion tonnes (34% of India's total reserves), and coal reserves at over 57 billion tonnes (25% of India's total reserves). The annual production of iron ore in Odisha is about 46 million tonnes (2004–05 figures). Due to this plentiful and ready availability of resources, around 107 sponge iron manufacturing units, both large and small-scale, are located in Odisha. A majority of these units are located in Sundergarh and Keonjhar districts.

Profile of units in Odisha sponge iron cluster

No.	District	No. of units	Capacity of kilns (tpd)*					No. of kilns
			25	40 & 50	100	300 & 350	375 and above	
1	Sundergarh	47	1	37	71	2		111
2	Keonjhar	20	–	15	31	6	2	54
3	Angul	3	–	–	3	1		4
4	Dhenkanal	4	–	–	2	2	6	10
5	Jajpur	5	–	2	5	2	2	11
6	Mayurbhanj	1	–	–	2	–		2
7	Sambalpur	10	–	1	10	4	5	20
8	Jharsuguda	13	–	1	22	5		28
9	Cuttack	4	–	2	4	–	1	7
	Total	107	1	58	150	22	16	247

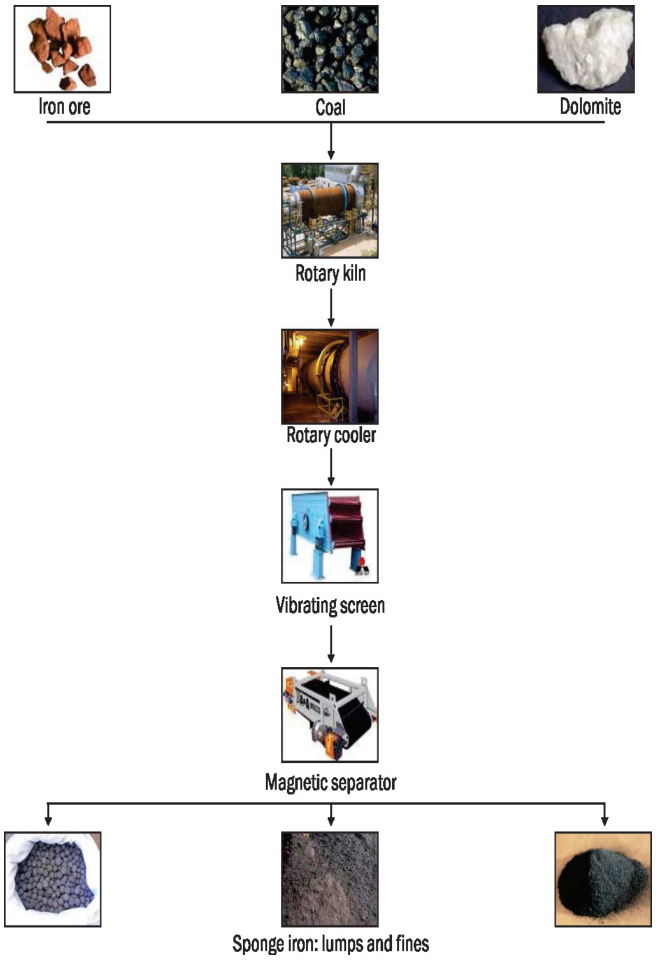
**tpd–tonnes per day*

The units have formed the 'Orissa Sponge Iron Manufacturers Association' (OSIMA) which helps them in tackling issues related to technology, finance, policy and manpower. Other cluster-level actors include banks and financial institutions that provide term loans and working capital to units; District Industries Centre (DIC), Rourkela which facilitates the procurement of raw materials; Odisha Industrial Infrastructure Development Corporation (IDCO) which provides and maintains the existing industrial estates; and National Small Industries Corporation Ltd (NSIC) which provides support services in the areas of marketing, export finance, hire purchase/leasing of equipment, etc.

Technology status and energy use

The majority of the sponge iron units use horizontal rotary kilns of different capacities ranging from 25 tonnes per day (tpd) to 350 tpd. The main raw materials in the manufacture of sponge iron include iron ore (containing about 64% iron in the form of iron oxide), coal, and limestone/dolomite. The raw materials are separately crushed to the requisite size, mixed in calculated proportion and continuously fed into the kilns which are heated to about 700–900 °C. The carbon from the char generated by the coal reduces the iron oxide to metallic iron. The limestone/dolomite serves as a flux, i.e., it removes sulphur compounds from the iron and also reduces the reaction temperature. The reactants from the rotary kiln are cooled to below 250 °C in rotary coolers, and the metallic iron is separated from the residues using electromagnetic separators.

Thermal energy accounts for a major share of the energy consumed in the manufacture of sponge iron. Coal is used for heating the iron ore and also as a reaction agent. Electricity is used to operate different machinery/equipment like motors, compressors, blowers and pumps. The total energy consumption of the sponge iron units is estimated to be 4.53 million tonnes of oil equivalent (Mtoe).

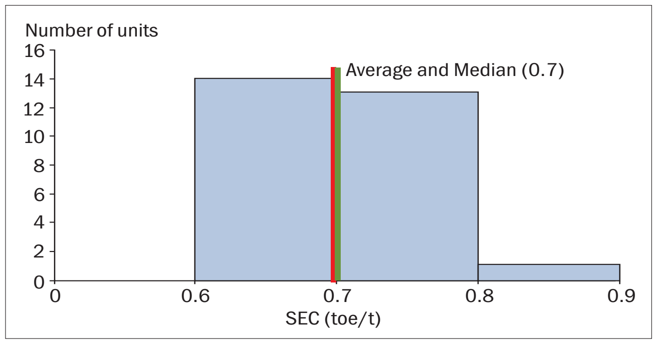


Sponge iron manufacturing process

Annual energy consumption in Odisha sponge iron cluster			
Fuel	*Quantity*	*Million tonnes of oil equivalent (Mtoe)*	*Energy share (%)*
Electricity	617.7 million kWh	0.05	2
Coal	9.53 million tonnes	4.48	98
Total		4.53	100

Options for energy saving

Detailed energy audits were conducted on 28 units in the cluster. The results showed that the units consumed about 1.05 Mtoe of energy annually, with specific energy consumption (SEC) ranging from 0.6 toe/t to 0.9 toe/t.



Distribution of SEC– Orissa sponge iron cluster

About 14 units exhibit higher energy consumption than the average SEC levels, indicating significant potential for improving the energy efficiency of these units through modernization/upgrading of existing technologies. In particular, there is great scope for energy savings through flue gas heat recovery. The main energy efficiency measures identified are summarized below.

Options for energy efficiency			
Energy efficiency option	*Replication potential (units)*	*Annual energy saving potential**	*Total investments (Rs million)*
Waste heat recovery in existing kilns to preheat raw material	14	229671 tonnes coal (107858 toe)	520
Waste heat recovery from existing kilns to generate power	14	214.2 million kWh (18421 toe)	1978

** Based on energy audit of 28 units. Cumulative energy saving potential in the cluster is likely to be much higher.*

Sponge iron unit

Compiled by TERI from: (i) 'Manual on energy conservation measures in sponge iron manufacturing cluster, Orissa' under the BEE-SME Programme, 2010; (ii) Study on 'Benchmarking and mapping Indian MSMEs energy consumption': a BEE–AfD–TERI study, 2012

VENEERING TECHNOLOGY FOR IMPROVING THE ENERGY EFFICIENCY OF HEAT TREATMENT FURNACES

A CASE STUDY IN PUNE FORGING CLUSTER

Backdrop

The Indian forging industry comprises hundreds of units of different capacities that are dispersed across the country. The forging industry has been growing at a phenomenal rate of over 20% in the last few years. There are around 50 small and medium sized forging units operating in Pune, Maharashtra, along with 20 heat treatment units which are mainly vendors of the forging units. The forging and heat treatment furnaces are major energy consuming operations, accounting for 60–70% of the total energy consumption. Consequently, there is a big opportunity for energy conservation through insulation and waste heat recovery.

About the project

The Pune forging cluster is one of the five MSME clusters targeted under the GEF–World Bank project titled 'Financing Energy Efficiency at MSMEs' being implemented by Bureau of Energy Efficiency (BEE). Under this project, the German Agency for International Cooperation (GIZ) associated with KAEFER, the world's largest provider of complete insulation solutions, to demonstrate the techno-economic feasibility of veneering (hot face insulation) technology as an energy efficiency measure in heat treatment furnaces, along with advisory services, capacity building, financing etc. KAEFER is implementing a development partnership titled 'Moving India's SMEs towards a sustainable future' on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ).

Intervention

A heat treatment unit was selected as demonstration unit for the project, based on a pre-feasibility test and in consultation with Association of India Forging Industry (AIFI). The demo unit uses a box type heat treatment furnace of capacity 0.7 tonnes. The furnace is operated in batches, and used for heat treatment processes like normalization, annealing and tempering. Depending on the heat treatment process, the material is heated up to 940 °C and soaked at this temperature for a few hours before it is cooled. The furnace is operated on compressed natural gas (CNG).

For assessing the energy saving potential, the project team conducted a detailed study of furnace design, operation and maintenance practices and identified two major factors that led to energy losses, and that offered potential for energy saving through improved insulation:

- High levels of heat storage by the refractory material
- High surface temperature of furnace (120 °C), leading to radiation losses.

To reduce these heat losses, the project team implemented veneering (hot face insulation) technology. Veneer modules (75 mm thickness) were applied from the hot face of the furnace to its existing refractory lining. The veneer modules are a low mass insulation material made from compressed ceramic fibre blanket with a low thermal conductivity. The process involved surface finishing/preparation, pasting the veneer modules, and heat retardant coating. The veneer reduced the levels of heat storage by the refractory, and thereby decreased heat

Heat treatment furnace before veneering

Heat treatment furnace after veneering

losses during furnace operation. Conversely, the veneer enabled heat retention in the refractory bricks during furnace shutdown, thereby reducing the heat and time required for the next startup.

Results

After veneering, the furnace operation was monitored for about a month to assess its benefits. The results, as confirmed by the plant personnel, are as follows:

- For cold start, the time required to reach the desired temperature (940 °C) reduced from 9 hrs to 4 hrs.
- Fuel required during cold start reduced to 50% without any design or process modifications.
- Around 8–10% reduction in fuel consumption during the heat treatment process.
- Thermal scanning of the furnace confirmed reduction in the surface temperature from 120 °C to 55 °C, thereby reducing radiation losses.

The payback period for the veneering technology is estimated at about 5–6 months, assuming the cost of procurement and installation of 75mm thick veneer module at Rs 1200/ft², 225 days of operation and 72 cold starts per annum. The actual payback period will differ from unit to unit.

As the veneer modules are applied on the existing refractory lining, the complete implementation process requires only 3–4 days of down time. Other benefits that result from the veneering process include the following:

- Enhanced production capacity due to reduction in cold start up time
- Enhanced refractory life, as the veneer reduces thermal spalling (breaking up of refractory due to repeated heating and cooling)
- Decreased risk of burns to factory personnel, due to lower surface temperatures
- Reduction in greenhouse gas emissions

A documentary of this activity can be seen at *http://www.youtube.com/watch?v=BQxalZ4eGng*

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Contributed by GIZ, New Delhi

6th COORDINATION COMMITTEE MEETING OF SAMEEEKSHA

The 6th Coordination Committee Meeting of SAMEEEKSHA was held on 23 January 2013. The meeting was chaired by Ms Abha Shukla, Secretary, BEE. The other participants included representatives from BEE, Embassy of Switzerland, SIDBI, GIZ, JICA, KFW, PCRA, UNIDO, industry associations, and technical consultancy organizations.

Mr Daniel Ziegerer, who has recently taken over as Director of Cooperation, Embassy of Switzerland, underlined the key role that SAMEEEKSHA platform can play in promoting energy efficient (EE) technologies and practices through the sharing of knowledge on best practices, case studies, and energy-related data. Mr K K Chakarvarti, Energy Economist, BEE, noted SAMEEEKSHA's efforts to gather comprehensive data on energy use in different MSME clusters, and suggested that sector-specific task forces could be set up for the purpose on the lines of the task forces set up under the Canadian Industry Program for Energy Conservation (CIPEC). He also suggested that the SAMEEEKSHA website could publicize and host information on MSMEs that successfully adopt EE practices: for instance, winners of the National Energy Conservation Awards in the SME category selected for different sub-sectors by BEE. Ms Abha Shukla mentioned that while BEE has developed about 375 DPRs on EE technologies for MSMEs, the challenge is to persuade entrepreneurs to implement the DPRs. The SAMEEEKSHA platform could provide an avenue to achieve this end.

The following presentations were made to help guide the discussions:

- SAMEEEKSHA platform—an update (Mr Upinder S Dhingra, TERI; Secretary, SAMEEEKSHA)
- Outcomes of the National Summit on Energy Efficiency in MSMEs held on 30–31 July 2012 and Next Steps (Mr Prosanto Pal, TERI)
- World Bank-GEF Project : Financing Energy Efficiency in SME sector (Mr Manoj Gautam, AGM, Energy Efficiency Centre, SIDBI)
- GIZs ongoing initiatives under the 'MSME umbrella programme' for promoting energy efficiency in Indian MSMEs (Ms Stefanie Bauer, GIZ, New Delhi)

The above presentations can be downloaded from the link *http://sameeeksha.org/index.php?option=com_content&view=article&id=23*

The discussions focused on key issues that need to be addressed to promote energy efficiency in MSMEs. The participants acknowledged that the lack of availability of reliable and authentic energy data of the MSME sector is emerging as a key barrier for initiating targeted programs/activities for the sector. This was also evident from the deliberations at the National Summit on energy efficiency in MSMEs. It was observed that a comprehensive effort to collect and analyse energy consumption is needed for MSME sector as a whole. The network of MSME Development Institutes across the country could be involved in this data gathering exercise.

POLICY DIALOGUE ON UPSCALING ENERGY EFFICIENCY IN METAL CASTING IN SOUTHERN INDIA

TERI, in association with IIF, Chennai Chapter organized a regional level policy dialogue to deliberate on strategies to up-scale energy efficient (EE) technologies and practices in the metal casting sector at Chennai, Tamil Nadu on 21 February 2013. The event was supported by REEEP and CCD, Embassy of Switzerland. The participants included senior representatives from industry, government, financial and academic institutions.

In the inaugural session, Mr Girish Sethi, TERI and Mr K S Anbuselvan, IIF-Chennai outlined the TERI–SDC initiative to promote an energy efficient melting furnace – the divided blast cupola (DBC) – among metal casting units. A short film highlighting TERI-SDC's demonstration and dissemination of cleaner technologies for the foundry sector was screened to provide background information for the participants. Mr Daniel Ziegerer, Director of Cooperation, Embassy of Switzerland, delivered the keynote address during which he urged the participants to reflect on the issues that could facilitate the up-scaling of EE technologies and practices in the metal casting sector. Presenting the industry's view, Mr N Narasimhan, Brakes India, emphasized the importance of technical support to industry in the area of new technologies. He mentioned that the establishment of technical support centres at cluster level, jointly with industry associations, would be useful.

A panel discussion followed, during which the panelists shared their views on the role of different institutions in promoting energy efficiency in the sector. Mr V Sridharan, SIDBI was of the view that providing soft loans to MSMEs for capital-intensive EE technologies would accelerate their uptake. Mr S Sivagnanam, MSME-Development Institute, Chennai felt that the government should support more diagnostic studies, as these would help industry in identifying appropriate EE solutions. Mr A Pari, owner of an aluminum metal casting unit in Chennai, underlined the importance of better monitoring of energy-related parameters at unit level. He added that there is a need for promoting awareness and R&D on cleaner technologies in the sector. Mr Gopal Ramaswami, a local service provider, noted that the initiatives aimed at energy benchmarking and capacity building will help in promoting energy efficiency. The need for conducting more energy audits and hands-on capacity building programs on energy conservation was reiterated by Mr P Dharmalingam, National Productivity Council, Chennai. Dr H Sundara Murthy, an eminent foundryman and office-bearer of the World Foundry Organization, highlighted the importance of best practices in reducing scrap levels and saving energy in metal casting units. He urged foundry entrepreneurs to adopt the TERI designed DBC as it is a better alternative to the induction furnace from the energy perspective, especially considering the difficult power situation that prevails in Tamil Nadu.

It was decided to undertake a few more stakeholder consultations at other locations/regions in India, and thereafter come out with a national level strategy paper to upscale energy efficiency in the Indian metal casting sector.

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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