SAMEEEKSHA

SMALL AND MEDIUM ENTERPRISES: ENERGY EFFICIENCY KNOWLEDGE SHARING

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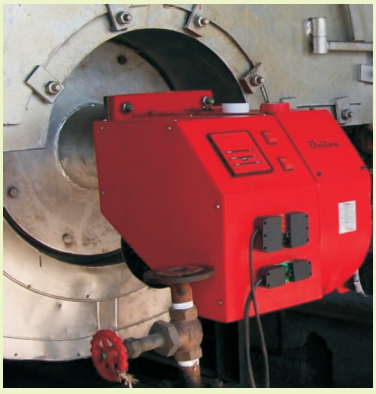
NEWSLETTER

A PLATFORM FOR PROMOTING ENERGY EFFICIENCY IN SMEs

In this issue...



Editorial

Energy consumption in India has been increasing with its rapid economic growth, and the country has become the third largest energy consumer in the world. India always finds it difficult to meet the increasing demand for power supply. In such circumstances, the Japan International Cooperation Agency (JICA) envisages its focus of cooperation on three key areas: 1) to support technology-based solutions through projects intended for energy efficiency and energy saving, 2) to contribute to power supply infrastructure development, and 3) to support India's initiatives to develop renewable energy sources.

As the Micro, Small and Medium Enterprises (MSME) sector plays a significant role in the Indian energy market, JICA also assists MSMEs' efforts to improve energy efficiency. For example, in 2008 and 2010, JICA provided Official Development Assistance (ODA) loans of US$ 600 million equivalent to assist the 'MSMEs Energy Saving Project' through SIDBI. The objective of this project is to promote energy saving efforts by MSMEs through the provision of medium to long-term funds for installing energy conservation equipment.

Our activities are not only limited to ODA loans. JICA also motivates business interests, both in India and Japan, through promotion and adaptation of Japanese low-carbon technologies in the Indian MSME Sector. JICA and TERI have partnered in a scientific and technical cooperation project for 'Application of Low Carbon Technology for Sustainable Development', under which low-carbon energy saving technologies such as gas heat pump /electric heat pump systems, as well as Best Operating Practices (BOP) in electric induction furnace and compressed air system, have successfully been demonstrated to disseminate their benefits in terms of energy savings (reduced energy costs) and reduced carbon emissions.

Japan has been contributing technological and financial solutions to India that endeavour to increase energy efficiency and to meet increasing energy demands. JICA will continue to cooperate with the Indian government and related agencies for this purpose.

Shinya Ejima
Chief Representative
Japan International Cooperation Agency, India

ENERGY IS LIFE
BEE
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teri
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MSME

CLUSTER PROFILE

JAGADHRI BRASS AND ALUMINIUM CLUSTER

Background

Jagadhri is an important industrial town located in Yamuna Nagar district of Haryana. A number of large-scale industries are located in this town, such as the Northern Railway Workshop, paper mills, plywood and board factories, and sugar mills. Jagadhri is also renowned for its brass and aluminium ware, which are manufactured by about 175 MSME units in the cluster. The brass units manufacture utensils, sheets, coils and strips; the aluminium units mainly produce utensils. The brass sheets, coils and strips are sold to appliance manufacturers, and the brass/aluminium utensils are sold throughout India through a network of dealers. The Jagadhri cluster produces an estimated 67,200 tonnes of brass and aluminium products each year. The cluster has two associations, 'Jagadhri Metal Manufacturers & Suppliers Association' and 'Small Scale Aluminum Utensils Manufacturers Association', which help them in tackling issues related to technology, finance, policy and manpower.

Technology status and energy use

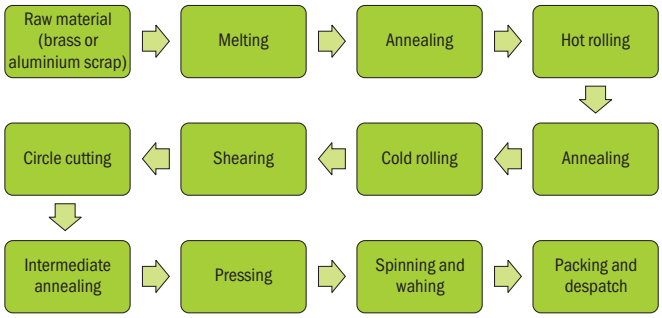
The primary raw materials for brass units are copper, zinc and brass scrap, while for aluminium units it is aluminium scrap (secondary aluminium). The raw materials are mixed in the required proportions, melted down in a furnace and poured into castings of required size and shape, which are then subjected to annealing (heat treatment), acid washing, hot and cold rolling, shearing and pressing to give the finished products. The brass units mainly use coke-fired 'pit furnaces' for melting; some units use electrical induction furnaces. The aluminium units commonly use oil-fired pit furnaces for melting. Three types of annealing furnaces are employed in the cluster: electrical, wood-fired or oil-fired.

Thermal energy accounts for a major share of energy consumption in the brass and aluminium units (94%). The major fuels used in the cluster are imported coke, furnace oil and wood. Electricity is used for operating the induction furnaces and hot & cold rolling machines. The

Profile of units in Jagadhri brass and aluminium cluster

Type	*No. of units*	*Capacity range (tpa)*★	*Total production (tpa)*
Brass	100	180–600	31200
Aluminium	75	240–960	36000
Total	175		67200

★ tpa—tonnes per annum

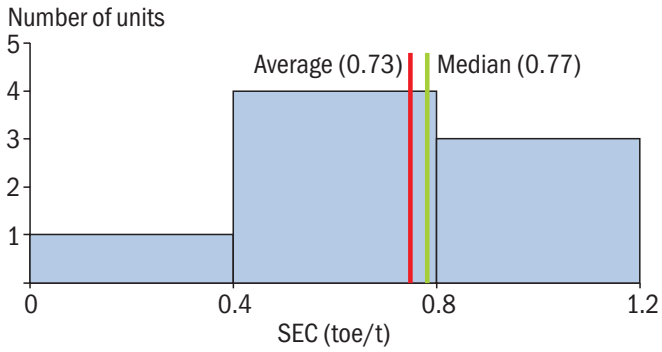


Manufacturing process (brass and aluminium units)

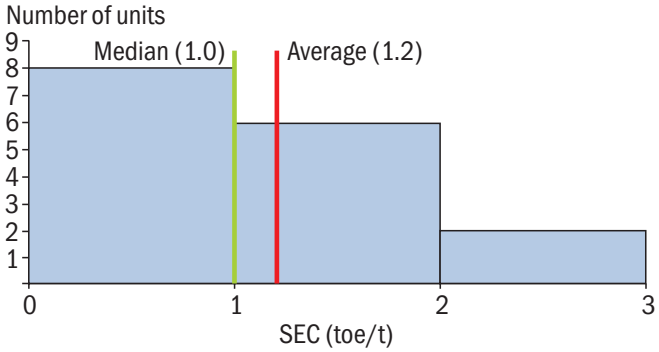
Annual energy consumption in Jagadhri brass and aluminium cluster

Energy source	*Tonnes of oil equivalent (toe)*	*Energy share (%)*
Thermal	34606	94
Electricity	2150	6
	36756	100

Coke-fired pit furnace for brass melting



Distribution of SEC in brass units—Jagadhri cluster



Distribution of SEC in aluminium units—Jagadhri cluster

total annual energy consumption of the Jagadhri cluster is estimated at around 37000 tonnes of oil equivalent (toe).

The graphics indicate the energy efficiency levels that can be achieved by other low-performing units.

Options for energy saving

Energy audits were conducted on a total of 26 units in the cluster covering both brass and aluminium units. The specific energy consumption (SEC) of the brass units was found to range from 0.4 toe/t to 1.2 toe/t, while the SEC of aluminium units ranged from 1.0 toe/t to 3.0 toe/t. A large number of units exhibited higher energy consumption as compared to the average SEC levels in both type of units, indicating significant potential for improving the energy efficiency. The total annual energy saving potential for the cluster is estimated at around 7900 toe, which is about 21% of the total estimated energy consumption of the cluster. The investment requirements are Rs 336 million towards technology upgradation and modernization with the simple payback period ranging from 2 months to 3.5 years. The different energy conservation options along with their potential energy saving are summarized below:

Options for energy efficiency

Energy efficiency option	*Replication potential (units)*	*Annual energy saving potential (toe)*	*Total investments (Rs million)*
Coke-fired pit furnace			
• Wood gasifier	50	1151	75.0
• Waste heat recovery	25	97	0.8
• Energy efficient pit furnace	50	196	1.5
• Induction furnace for melting	30	865	55.8
Sub-total (i)		2309	133.1
Oil-fired pit furnace			
• Wood gasifier	50	1751	75.0
• Waste heat recovery	25	151	0.8
Sub-total (ii)		1902	75.8
Wood-fired annealing furnace			
• Wood gasifier	75	1443	60.0
• Thermocouples	150	1443	7.5
• Modified annealing furnace	100	845	60.0
Sub-total (iii)		3731	127.5
Total (i) + (ii) + (iii)		7942	336.4

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

Replacement of Low Efficiency, Manually Controlled NG Burner by Energy Efficient Automatic Burner in Boiler

A CASE STUDY FROM ANKLESHWAR CHEMICAL CLUSTER

Backdrop

The Ankleshwar chemical 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, TERI conducted a study in June–July 2012 in order to obtain a comprehensive profile of the Ankleshwar cluster and understand the energy related cluster dynamics. Following the study, TERI initiated walk-through surveys and detailed energy audits in different types of chemical industries in the cluster. These studies have helped in identifying a number of energy conservation measures that could be adopted by units in the cluster.

Intervention

A small-scale chemical unit named Minol Acids & Chemicals Pvt. Ltd expressed interest in adopting energy efficiency measures and approached TERI for specific recommendations. The unit was established in 1988, and manufactures different categories of textile chemicals, dyes and intermediates like violet acid, Koch's acid, Mixed Cleve's acid, Chicago acid and benzoyl H acid. The total installed capacity of the unit is 240 tonnes per year. The total production during 2011–12 was about 192 tonnes. At the request of the unit, TERI conducted a walk-through energy audit of the unit in March 2013, and followed this up with a detailed energy audit during April–May 2013 covering all energy intensive equipment/ systems that were in operation.

The total annual energy consumption of the unit was estimated to be 146 tonnes of oil equivalent (toe), of which thermal energy consumption accounted for 115 toe (78%) and electricity consumption 31 toe (22%). Natural gas (NG) is used in the low pressure steam generator and hot air generator (HAG) to cater to the direct and indirect heat requirements of the reaction and drying processes. High speed diesel (HSD) is used in diesel-based backup power generators to meet the electricity demand during the non-availability of power from the grid. Electricity is used in auxiliaries of the thermal system, pumping system, process agitators and lighting system.

TERI identified and recommended several energy conservation options for the unit, including:

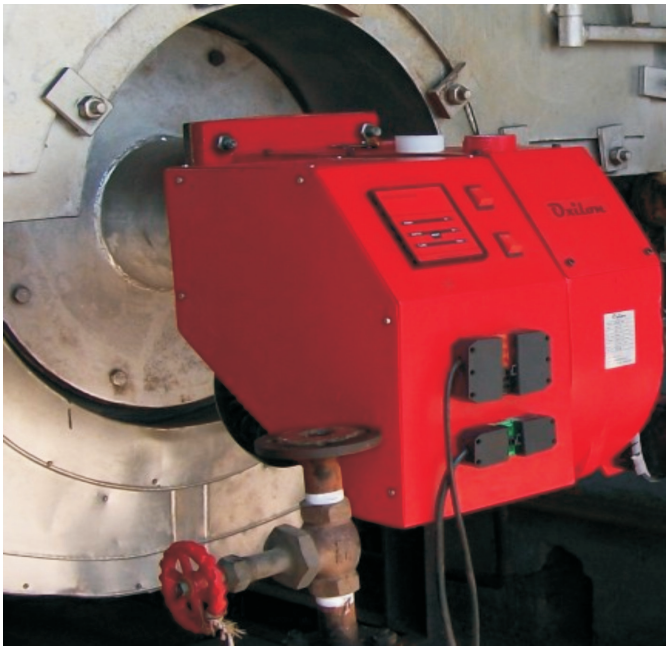
- Replacement of the existing manually controlled NG burner in the boiler with an automatic double stage burner to ensure the complete combustion of the fuel
- Installation of economizer in the boiler for waste heat recovery from flue gases to preheat the boiler feedwater
- Replacement of old and inefficient air compressor with energy efficient compressor of similar capacity
- Periodic maintenance of the HAG to optimize the dry flue gas losses
- Re-designing of 'tray dryer' to improve the heat utilization in dryer chamber
- Improvement of the insulation in the HAG and associated ducts to avoid surface heat losses
- Installation of automatic power factor controller at main incomer to maintain the unity power factor and thereby avoid the billing penalty

Results

After considering the various energy efficiency options, the unit replaced the existing low efficiency burner in its boiler with an automatic double-stage burner in June 2013. The new energy efficient burner allows operation at both full and part loads, reducing the need to turn the burner on and off and thereby offering better performance. The unit undertook post-installation trials in association with TERI and the technology provider to confirm the performance of the new system. The results of the trials were successful: the boiler is operating with an oxygen level of 3% and no carbon monoxide (CO) formation was reported in the flue gases, indicating the proper combustion of the fuel.

The annual energy saving from this implemented measure is estimated to be 3793 standard cubic metres (SCM) of NG, equivalent to an annual monetary saving of 1.39 lakh rupees. The unit has made an investment of Rs 1.53 lakh rupees for installation of the energy efficient burner, which is expected to be recovered in a year.

Low efficiency single stage burner



Energy efficient double-stage burner

Contact details for further information

Mr Pawan Tiwari

Fellow, Industrial Energy Efficiency Division

TERI, New Delhi

Email: pawan.tiwari@teri.res.in

Compiled by TERI based upon the ongoing activities being undertaken by TERI under the World Bank–GEF–SIDBI project titled 'Financing Energy Efficiency at MSMEs'

SESSION ON 'ENERGY EFFICIENCY' DURING THE 'INDIA – JAPAN ENERGY FORUM 2013'

The 5th India–Japan Energy Forum was organized by TERI in association with New Energy and Technology Development Organization (NEDO), Japan during 10–11 September, 2013 in New Delhi. The Forum provided an opportunity for prominent personalities in energy-related fields from the private and public sectors of both countries to deliberate on matters related to energy efficiency, renewable energy and building smarter communities. Over 250 participants including around 100 from Japan participated in the event. The key speakers included H.E. Mr Toshimitsu Motegi, Minister of Economy, Trade and Industry, Japan; Mr Montek Singh Ahluwalia, Deputy Chairman of the Planning Commission; Mr B K Chaturvedi, Member, Planning Commission; Dr R K Pachauri, Director General, TERI; Mr Amitabh Kant, CEO and MD, Delhi Mumbai Industrial Corridor Development Corporation; Mr Kazuo Furukawa, Chairman, NEDO; senior officials from BEE, Ministry of New and Renewable Energy (MNRE), Kawasaki Heavy Industries Ltd, NEC Corporation, Toshiba Corporation; and many other experts and industry leaders.

The Forum included a special session on 'Energy Efficiency—technology cooperation efforts and opportunities', during which TERI/IGES presented the results of a project to promote energy efficiency in the Indian SME sector titled 'Research Partnership for Application of Low Carbon Technology for Sustainable Development' (ALCT). The project is being coordinated by Japan Science and Technology Agency (JST), Japan International Cooperation Agency (JICA) and Ministry of Environment and Forests, Government of India. It is being implemented in India by TERI and select SMEs, in collaboration with Institute for Global Environmental Strategies (IGES), Japan; Kyoto University's Graduate School of Engineering; and select Japanese suppliers of LCTs. By deploying a strategy that directly involved businesses on both supply and demand sides (i.e. Japanese LCT supplier and Indian SME) along with capacity building support, the project successfully demonstrated electric heat pump technology (EHP) in two dairy units (Amul in Anand and MILKFED in Chandigarh); and gas heat pump technology (GHP) in two foundries in the Rajkot engineering cluster. These LCTs are yielding energy savings of 30%–50%. The project also implemented two 'soft' LCTs in the shape of best operating practices (BOP) in induction furnaces and in compressed air systems. TERI has planned to disseminate awareness on these LCTs through cluster-level capacity building programs during the remaining project period.

The ALCT project provides a good model for mutually beneficial cooperation between India and Japan to promote energy efficiency in the Indian MSME sector.

For further information, please contact prosanto@teri.res.in

BANKERS TRAINING ON ENERGY EFFICIENCY FINANCE FOR MSMEs

GIZ India (Private Sector Development Program), in cooperation with State Bank of India (SBI), Small Industries Development Bank of India (SIDBI) and Bank of India (BOI), coordinated a training series for bankers on 'Energy Efficiency Finance for MSMEs', with particular focus on strengthening the capacities of bankers in the fields of energy efficiency and environment protection measures. Under this initiative, workshops are planned in 50 MSME clusters across the country. So far, 30 training workshops have been organized.

During the one-day training sessions, the bankers are exposed to their role in promoting energy efficiency loan schemes among MSMEs. The program includes important topics that introduce bankers to the lending process of energy efficiency loan schemes such as viability analysis for energy efficiency loan proposals; role of credit rating and risk management; and monitoring and measurement of energy efficiency projects. GIZ has commissioned Dun & Bradstreet (D&B) to develop training modules and provide these training sessions to the bank's MSME Relationship Managers, Credit Manager, Trainers and other staff.

Each of the training sessions was attended by 40–100 bankers who cater to MSMEs. Over 500 bankers have been trained so far. The participants include representatives from SBI, BOI, SIDBI, Canara Bank, Punjab National Bank, Axis Bank, ICICI Bank, Indian Overseas Bank, Oriental Bank of Commerce, Corporation Bank, etc.

For further information please contact: kultar.verma@giz.de

THE BRICK STORY ONLINE!

The Indian clay-fired brick making sector presents enormous challenges as well as opportunities for energy saving. The numbers are huge: each year, over 100,000 brick kilns produce 290 billion bricks and provide employment to an estimated 10 million people. The brick industry is the third largest consumer of coal, and one of the largest employment providers outside agriculture. The traditional brick making technologies are low in energy efficiency—in particular, the brick stacking patterns and firing practices have remained virtually unchanged for nearly two centuries.

TERI, with support from Swiss Agency for Development and Cooperation (SDC), has been working in the small-scale brick sector to bring about energy saving as well as improvement in the socio-economic conditions of its workforce. The TERI-SDC initiatives in the sector have been captured in a short video film. The video has been released and is available for viewing on the SAMEEEKSHA website. Kindly visit the videos section of the SAMEEEKSHA website (http://sameeeksha.org/) to watch the video.

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

Mr Upinder Singh Dhingra
Secretary – SAMEEEKSHA
Industrial Energy Efficiency Division, TERI, Darbari Seth Block
IHC Complex, Lodhi Road, New Delhi – 110 003, India
Tel: +91 11 2468 2100, 2468 2111, Fax: +91 11 2468 2144, 2468 2145
Email: upinder.dhingra@teri.res.in
Website: http://sameeeksha.org