

SAMEEEKSHA

SMALL AND MEDIUM ENTERPRISES: ENERGY EFFICIENCY KNOWLEDGE SHARING

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NEWSLETTER

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Inside...

- Energy Conservation Guidelines for MSME Sector



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

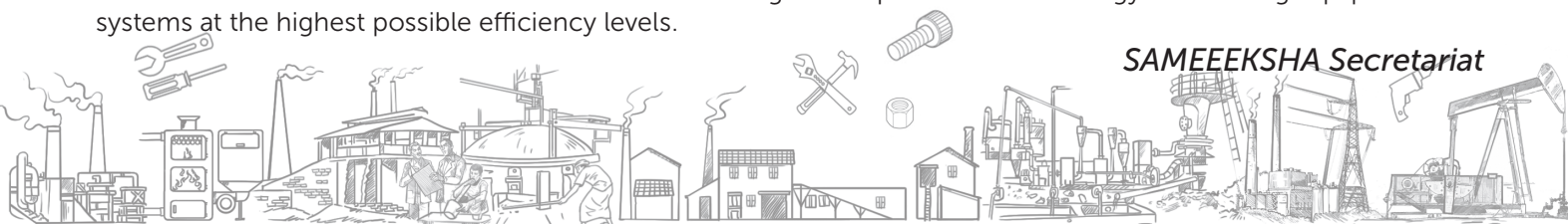
IN THIS ISSUE...

This issue has as its theme a pioneering energy conservation (EC) manual that has been prepared by TERI at the behest of BEE for the Indian MSME sector, titled '*Energy Conservation Guidelines for MSME Sector*'. The manual provides MSME entrepreneurs with knowledge and guidelines that they can use to adopt EC measures including best operating practices (BOP) in various process areas, and thereby reduce energy consumption and energy costs. The manual was formally launched during the National Conclave on Enhancing Energy Efficiency in MSME sector organized by BEE in New Delhi during 23–24 September 2019.

The theme article traces the roots of the manual to 2010, when BEE made the entire Indian industrial sector a prime focus area under the National Mission on Enhanced Energy Efficiency. It describes how, with support from the Ministry of Economy, Trade and Industries (METI), Government of Japan and from the Energy Conservation Centre, Japan (ECCJ), the EC guidelines developed by Japan for its own industrial sector were studied and adapted to develop EC guidelines suitable for Indian industries— first, for large-scale industries/enterprises under PAT scheme (Designated Consumers); and now, for MSMEs in 25 energy intensive industrial sub-sectors.

The EC manual for MSMEs has been developed through extensive interactions and consultations with leading entrepreneurs, industry associations, and other stakeholders. It provides management and operators of MSMEs with guidelines to improve EE not only in the primary energy-consuming process equipment/systems, but also in all the auxiliary systems and utilities (such as air compressors, boilers, fans and blowers, and so on) that are used by MSMEs cutting across sub-sectors. The manual sets down specific benchmarks for the energy performance of different kinds of equipment/systems; these benchmarks are based on empirical research, and serve as EE targets that the MSMEs will strive to achieve and surpass. All in all, the EC manual is a comprehensive, hand-holding document that will enable MSMEs in the sub-sectors covered to manage and operate various energy-consuming equipment and systems at the highest possible efficiency levels.

SAMEEEKSHA Secretariat



ENERGY CONSERVATION GUIDELINES FOR MSME SECTOR

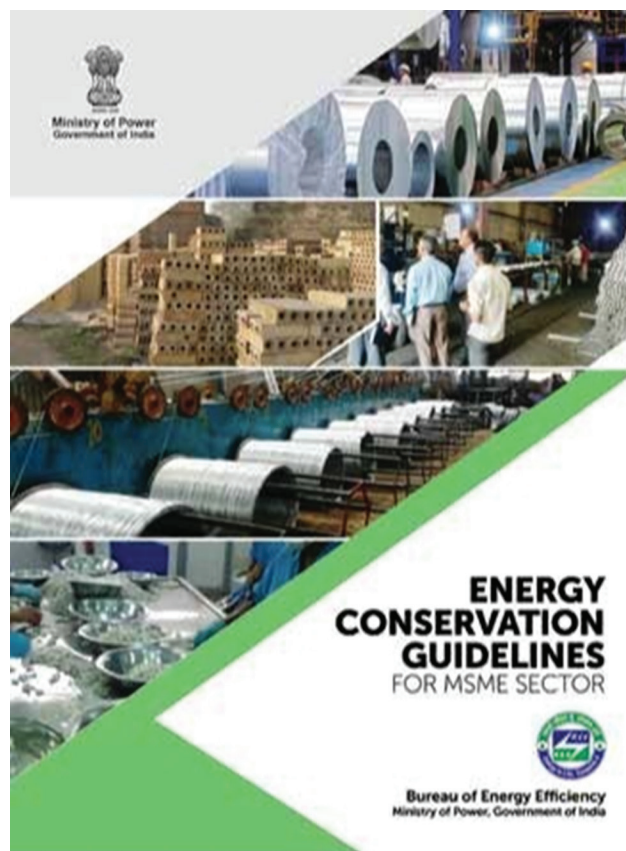
A path-breaking manual for promoting energy efficiency (EE) in the Indian MSME sector, titled '*Energy Conservation Guidelines for MSME Sector*', has been prepared by TERI at the behest of BEE, and was launched during the National Conclave on Enhancing Energy Efficiency in MSME sector organized by BEE in New Delhi during 23–24 September 2019. The manual has been placed on the SAMEEEKSHA website ([Please click here to view/download](#)). As summarized below, the manual provides MSME entrepreneurs in the sub-sectors covered with knowledge and guidelines that they can use to adopt best operating practices (BOP), and thereby reduce energy consumption and energy costs. The manual also offers a model for extending EE measures to cover other MSME sub-sectors across the country.

Genesis

The genesis of the manual goes back to 2010, when BEE, through Ministry of Power, assumed responsibility for executing the National Mission on Enhanced Energy Efficiency (NMEEE) after it was given formal approval by Government of India as one of the eight Missions under the National Action Plan on Climate Change (2008). BEE made the industrial sector a prime focus area for bringing about EE improvements, considering that industry accounts for the largest share of the total energy consumption in the country.

BEE evolved and implemented different strategies for two segments of the industrial sector, namely:

- » A set of very large-scale industries/enterprises titled 'Designated Consumers' (DCs), which are relatively few in number but account for over 50% of the total industrial energy consumption. The DCs include enterprises under energy intensive sub-sectors like fertiliser, cement, iron & steel, thermal power plants, refinery, petrochemicals, etc. Till PAT Cycle-V, BEE has included DCs belonging to 13 industry sub-sectors.
- » Other industries, including an estimated 63 million MSMEs that contribute about 29% to India's GDP. Although the MSMEs are relatively



small in size individually, their sheer number makes the MSME sector a significant contributor to the overall industrial energy consumption and carbon emissions. At the same time, MSMEs are of vital socio-economic importance in terms of providing livelihoods to millions of people and driving economic growth in semi-urban and rural areas.

For the DCs, BEE developed a unique EE scheme titled Perform, Achieve and Trade (PAT), which sets targets for specific energy consumption (SEC) in energy intensive sub-sectors, and is mandated for implementation by DCs within those sub-sectors. PAT is achieving considerable success in achieving and surpassing its EE targets (see Box).



PAT scheme

Under the Perform, Achieve and Trade (PAT) scheme for Designated Consumers (DCs), Energy Savings Certificates ('EScerts') are issued to DCs that achieve or better their respective SEC targets. The ESCerts can be banked, or traded and used for compliance by other DCs that are unable to achieve their own SEC targets. The first PAT cycle (2012–13 to 2014–15) covered 478 DCs in eight energy intensive sectors, and achieved energy saving of 8.67 million tonnes of oil equivalent (Mtoe) against a targeted saving of 6.68 Mtoe. The ambit of PAT has been expanded in subsequent cycles to cover more DCs in additional sectors.

For the MSME sector, BEE formulated and implemented its SME Program from 2012 onwards in partnership with TERI. Under the SME Program, energy-related data was collated on 35 of the most energy intensive MSME sub-sectors/clusters; estimates were made of energy saving potential and possible EE measures were identified; and cluster manuals and detailed project reports (DPRs) were prepared to assist in implementation of the identified EE measures. In parallel, BEE partnered with UNIDO in the GEF-funded project 'Promoting energy efficiency and renewable energy in selected MSME clusters in India', covering 12 MSME clusters; and with SIDBI in the GEF–World Bank supported project 'Financing energy efficiency at MSMEs', covering 5 MSME clusters. The results, experiences and lessons from these initiatives, and from other major EE initiatives like the TERI–SDC, TERI–SSEF, and JICA–JST–TERI partnership programs, have been documented in this newsletter and elsewhere; they have also been consolidated on the SAMEEEKSHA platform. While these initiatives have achieved significant successes in terms of improving EE in the targeted MSME sub-sectors/clusters, the overarching challenge remains to find a way to scale up EE improvements across the entire Indian MSME sector.

Developing EC guidelines

During the implementation of PAT, it was noted that there are a large number of equipment/ systems that consume significant amounts of energy, but are usually operated at lower efficiencies than

their design levels. Examples are boilers, pumps, air compressors, blowers, and other such systems/ equipment that are commonly used across different industry sub-sectors with varying sizes and capacities. This clearly pointed to the need for developing and implementing EE standards as well as best operating practices (BOP) for efficient operation of such utilities/auxiliary equipment.

BEE turned to Japan for assistance and advice in this endeavor—a natural choice, with Japan having achieved the highest global standards for energy conservation (EC) in every sector of its economy, through innovative collaborations between its industry, academia and government. In particular, the Government of Japan has developed EC guidelines for Japanese industries that have helped them in improving their overall energy performance. With support from the Ministry of Economy, Trade and Industries (METI), Government of Japan and from the Energy Conservation Centre, Japan (ECCJ), BEE reviewed the Japanese EC guidelines for its industries, and in 2018, with the assistance of TERI, developed EC guidelines for selected large-scale Indian industries/enterprises covered by PAT (i.e., DCs), in the form of an EC manual titled '*Energy Conservation Guidelines for Industries*'. While formally launching this manual in September 2018, the Minister of State for Power (IC) Mr R K Singh suggested that similar EC guidelines should be prepared for the Indian MSME sector.

BEE commissioned TERI to undertake the exercise of developing a comprehensive EC manual for MSMEs; one that would help MSMEs in diverse sectors to adopt EC measures including BOP in different process areas. Having already studied the EC guidelines for Japanese industries in preparing the EC guidelines for DCs, TERI drew up a blueprint for developing EC guidelines that would be suitable for high energy/resource-consuming MSMEs, as well as for large (non-DC) industries whose energy consumption is less than the threshold limit for PAT. Secondary data on various industrial sub-sectors/clusters was collated for analysis from resources generated under the BEE SME Program, GEF–World Bank project, GEF–UNIDO project, the SAMEEEKSHA platform, and other interventions by different agencies and organizations. Further secondary information was obtained through field visits to different industrial units/clusters in 25 energy intensive sub-sectors, and through consultations with leading entrepreneurs, industry associations, original equipment manufacturers (OEMs), sectorial experts, and other stakeholders. Table 1 lists a few of the clusters visited and key stakeholders consulted.





Aluminium – Thirumudivakkam cluster



Galvanizing & Wire Drawing – Howrah cluster

Table 1. A few of the clusters visited and stakeholders consulted in preparation of EC manual

Sub-sector	Clusters visited	Stakeholders consulted
Aluminium	Thirumudivakkam, Tamil Nadu	Thirumudivakkam Industrial Estate Manufacturer Association
Brass	- Jagadhri, Haryana - Yamunanagar, Haryana	Haryana Chamber of Commerce & Industry (HCCI)
Brick	Indri, Karnal, Haryana	Haryana Brick Kiln Owners Association
Ceramic	Khurja, U.P	Central Glass and Ceramics Research Institute, Khurja
Clay tile	Vallioor & Panagudi, Tamil Nadu	Tirunelveli Chamber Brick Association
Coir	Kangeyam, Tamil Nadu	Kangeyam Coir Cluster
Dairy	Chandigarh	The Punjab State Co.Op Milk Producers' Federation Ltd.
Foundry	- Chennai, Tamil Nadu - Howrah, W.B - Agra, U.P	- IIF - IISWBM, Kolkata - PPDC, Agra
Galvanizing and Wire drawing	Howrah	- Federation of Small and Medium Industries , W.B - IISWBM, Kolkata
Glass	Firozabad, U.P	Glass Industries Syndicate
Machine tools	Rajkot, Gujarat	Machine Tools Manufacturers Association (MTMA) Rajkot
Oil mills	Alwar, Rajasthan	Laghu Udyog Association, Khairthal (Alwar)
Refractory	Ranchi, Jharkhand	IRMA Kolkata
Rice mills	Red Hills, Tamil Nadu	Red Hills Rice Millers, Paddy and Rice Merchants' Association



Tea	Jorhat, Assam	- Indian Tea Association, Assam - Tea Research Association - Tocklai Tea Research Institute
Textiles	Tiruppur, Tamil Nadu	- Dyers Association of Tiruppur - Tiruppur Murugampalayam Effluents Treatment Company Limited - Tamilnadu Water Investment Company Limited



Brass – Jagadhri and Yamunanagar clusters



Refractory - Ranchi cluster

The analysis of the data gathered from the 25 sub-sectors revealed that the equipment used by most of the MSMEs could be grouped under two categories: (1) process equipment and (2) common equipment.

- » **Process equipment** is directly involved in the production process, and generally accounts for a major share of energy consumption in the industry. The energy performance of process equipment largely influences the overall performance of the MSME unit.
- » **Common equipment** comprises auxiliary equipment such as pumps, air compressors, fans and blowers, cooling towers, power generation systems, transformers, lighting, etc., that are used by MSMEs across different sub-sectors to provide support for the production processes. Common equipment generally accounts for only a small share of the overall energy consumption in the MSME unit.

Extensive interactions were held with industry personnel and industry associations, in order to finalize and validate key operating parameters in regard to the various kinds of process equipment as well as common equipment. The key operating parameters include air ratio, flue gas temperature, surface temperature, level of waste heat recovery (WHR), type of electric motors used and the various kinds of motor driven equipment, types of lighting

systems, etc. Based on the data gathered, draft EC guidelines were drawn up and presented to the industry entrepreneurs and other stakeholders in consultation workshops. These workshops helped obtain more ideas and suggestions from all key stakeholders including relevant government bodies at cluster/state levels, progressive industrial units, industry associations, technical consultants, and others. Based on the stakeholder inputs, the EC manual for MSMEs was finalized and formally released in September 2019 by Mr Nitin Gadkari, Minister of MSME and Minister of Road Transport and Highways; and Mr R K Singh, Minister of State (IC) for Power and New & Renewable Energy and Minister of State for Skill Development and Entrepreneurship.



Release of 'Energy Conservation Guidelines for MSME Sector' by Mr Nitin Gadkari, Minister of MSME and Minister of Road Transport and Highways; and Mr R K Singh, Minister of State (IC) for Power and New & Renewable Energy and Minister of State for Skill Development and Entrepreneurship




Interactions with industry stakeholders

Manual at a glance

The overall objective of the EC manual for MSMEs is to guide the management and operators of industrial units on how to better manage energy consumption comprehensively, i.e., in every process area.

The EC manual covers a wide range of MSMEs in 25 energy intensive sub-sectors (table 2). The industries have been categorized by BEE based on whether and to what extent energy costs or raw material costs predominate in their production costs (table 3).

Table 2. Industrial sub-sectors covered by EC manual

S. no.	Sub-sector	Manual Section
1	Aluminium	6.4
2	Brass	6.5
3	Brick	6.10
4	Ceramic	6.9
5	Clay tile	6.11
6	Chemical & Dyes	6.13
7	Coir	6.17
8	Dairy	6.24
9	Food processing	6.25
10	Forging	6.2
11	Foundry	6.1
12	Galvanizing & Wire Drawing	6.7
13	Glass	6.12

14	Ice-making	6.22
15	Jaggery	6.18
16	Limestone	6.16
17	Machine tools	6.6
18	Oil mill	6.19
19	Paper	6.15
20	Refractory	6.8
21	Rice mill	6.21
22	Seafood	6.23
23	Sponge iron	6.3
24	Tea	6.20
25	Textiles	6.14

Table 3. Categorization of industries covered by EC Guidelines

Category	Details
A*	DCs covered under PAT scheme but limited to the following industries: (1) aluminium, (2) cement, (3) chlor-alkali, (4) fertilizers, (5) iron and steel, (6) petrochemicals covering only cracker units, (7) petroleum refineries, (8) pulp and paper, (9) textile, and (10) thermal power stations.
B	Large industries with energy consumption less than the minimum threshold limits for DCs



C	Small-scale enterprises with energy costs accounting for more than 30% of the total production cost, but limited to the following sub-sectors: (1) glass, (2) foundry, (3) forging, (4) ceramic, (5) dairy, and (6) textiles
Group D	Medium enterprises with energy costs accounting for 10–30% of the total production cost, but limited to the following sub-sectors: (1) brick, (2) hand tools, (3) food , and (4) limestone
Group E	Micro industries with material costs more significant than energy costs

The EC manual is structured into six different sections. Sections 1–4 provide introductory details, including background to the preparation of the document and the definitions used. Section 5 elaborates on EC measures to be adopted by all industries on common equipment/areas (table 4); while Section 6 sets out BOP for process equipment used in specific sub-sectors, including performance assessment indicators and efficient utilization of resources.

Table 4. Common equipment/areas covered in EC manual

Common equipment/area	Manual Section
Air compressors	5.1
Pumps and pumping systems	5.2
Fans and blowers	5.3
Cooling towers	5.4
Electric motors	5.5
Transformer	5.6
Lighting	5.7
Power generation set	5.8
Harmonic distortion	5.9

Standards and targets

The EC guidelines have been structured around the principle that for an industry to operate efficiently, it is essential to operate all the various energy consuming equipment efficiently, and to ensure proper monitoring and recording of all key operating

parameters pertaining to each piece of equipment.

The guidelines set two distinct benchmark performance values for energy consuming equipment, whether it is common equipment or equipment specific to a sub-sector/process:

- » **Standard value**, which is the *optimum* performance value of the equipment in daily operation
- » **Target value**, which is the *best* performance value that can be obtained from the equipment in daily operation

The standard values and target values for each equipment and process area have been derived based on statistical analysis of real-time operational data. These values have been validated by industrial bodies as well as sectorial experts.

Based on the EC guidelines, an industrial unit should first aim at operating different equipment at the *standard value* set for each equipment, based on feedback received from the relevant sections of the plant. Thereafter, the unit should aim at further improving the operating parameters of different equipment to the best possible levels, and thereby achieve the *target value* set for each equipment.

Looking ahead

The EC guidelines for MSMEs will be revised on a periodical basis, based on inputs from various stakeholders and as per the recommendations of the technical committee constituted by BEE.

The EC manual for MSMEs marks a very significant milestone in the efforts to bring about EE improvements among MSMEs in different sub-sectors over the past few decades. It is a comprehensive, hand-holding document for different industries in the MSME sector; it will enable them to manage and operate various energy-consuming equipment and systems at the highest possible efficiency levels. Also, the EC manual is intrinsically expandable and renewable—in the sense that, as industrial units implement EC measures and as further energy studies and EE interventions are undertaken by various agencies and organizations in other MSME sub-sectors and clusters, the data, insights and lessons from these initiatives too can be incorporated into future editions of the EC manual. Thus, the ambit of the manual may progressively be extended to cover the entire Indian MSME sector.



17th meeting of SAMEEEKSHA

The 17th meeting of SAMEEEKSHA was held in New Delhi on 8th January 2020. The participants included representatives from Ministry of MSME (MoMSME), BEE, prominent MSME associations, DISCOMs, banks, implementing agencies, etc.

Mr Girish Sethi, Senior Director, TERI mentioned that the last three platform meetings had been organized at regional levels: for Eastern region at Kolkata (August 2018), Southern region at Coimbatore (Jan 2019), and Western region at Rajkot (Aug 2019). Mr Sachin Kumar, Secretary, SAMEEEKSHA and Senior Fellow, TERI, provided an update on the SAMEEEKSHA platform, including the outputs of the three regional meetings and also the Energy Efficiency Conclave organized by BEE during September 2019.

Mr Shubhashis Dey, Program Manager (Energy Efficiency), SSEF, noted the effectiveness of regional-level meetings in eliciting participation and responses from cluster-level stakeholders. Looking ahead, he suggested that the focus should expand to include, besides energy efficiency, concepts such as energy transition, demand management, innovation, and adoption of low-carbon technologies. Mr G. Shanmuganathan, Additional Industrial Adviser, MoMSME mentioned the plans of the ministry to expand tool rooms in the country. Mr R K Rai, Secretary, BEE stressed the need to create common facilities (e.g. for compressed air) that can meet cluster-wide demands. He also spoke on the comprehensive mapping exercise being undertaken by BEE in 10 energy intensive MSME sub-sectors.

Dr. Ajay Mathur, Director General, TERI underlined the potential for MSME clusters such as Morbi ceramic cluster to achieve global prominence in terms of product quality and market share. The keys to success are: (1) a very strong eco-system of knowledge; and (2) excellent technology, coupled

with best operating practices. He also said there is need for more collaborative multi-stakeholder interventions in the MSME sector, such as the EESL/UNIDO/MoMSME model of supporting EE technology adoption in MSME clusters.

The following presentations were made to guide the discussions that followed.

- Energy Efficiency programs for MSME—Mr. Milind Deore, BEE
- Promoting Energy Efficiency and Renewable Energy in selected MSME Clusters in India—Mr Niranjan Rao Devela, UNIDO
- Initiatives by SIDBI in Energy Efficiency— Mr P R Reddy, SIDBI

The salient points from the discussions are summarized below.

- Some of the leading MSME associations have shown interest in adopting the Energy Conservation Guidelines developed by BEE for MSME sector. BEE could consider facilitating the adoption process, starting with two or three clusters and then scaling up.
- BEE should also focus on sector-specific documentation, on the lines of the booklet titled '*Energy conservation measures in the fruit and vegetable processing sector*' prepared by TERI with support from SIDBI.
- To reach out to MSME units located in industrial estates, it is important to initiate programs with the relevant State Industrial Development Corporations
- BEE should consider creating a portal on which any MSME entrepreneur willing to carry out energy audit of his unit could register his interest. Based on the applicant's requirements, BEE / MoMSME could then send accredited consultants to conduct the study

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.

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