Benchmarking and mapping Indian MSMEs energy consumption

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Background

The 'micro, small and medium enterprises' (MSME) sector plays a vital role in the Indian economy. It contributes to about 45% of manufacturing output and 40% of exports. MSMEs generally use inefficient technologies and practices. One of the important MSME development programs under the Government of India is the 'BEE-SME program' initiated during the 11th Five Year Plan period (2007–2012), implemented by the Bureau of Energy Efficiency (BEE). Using the data from various reports prepared under the programme as well as other projects, a study was carried out to analyse the energy consumption in different MSME clusters. The objective of the study is to benchmark the 'specific energy consumption' (SEC) in each of the clusters, and initiate the construction of the 'overall picture' of energy consumption for the MSME sector.

Total energy consumption in MSMEs

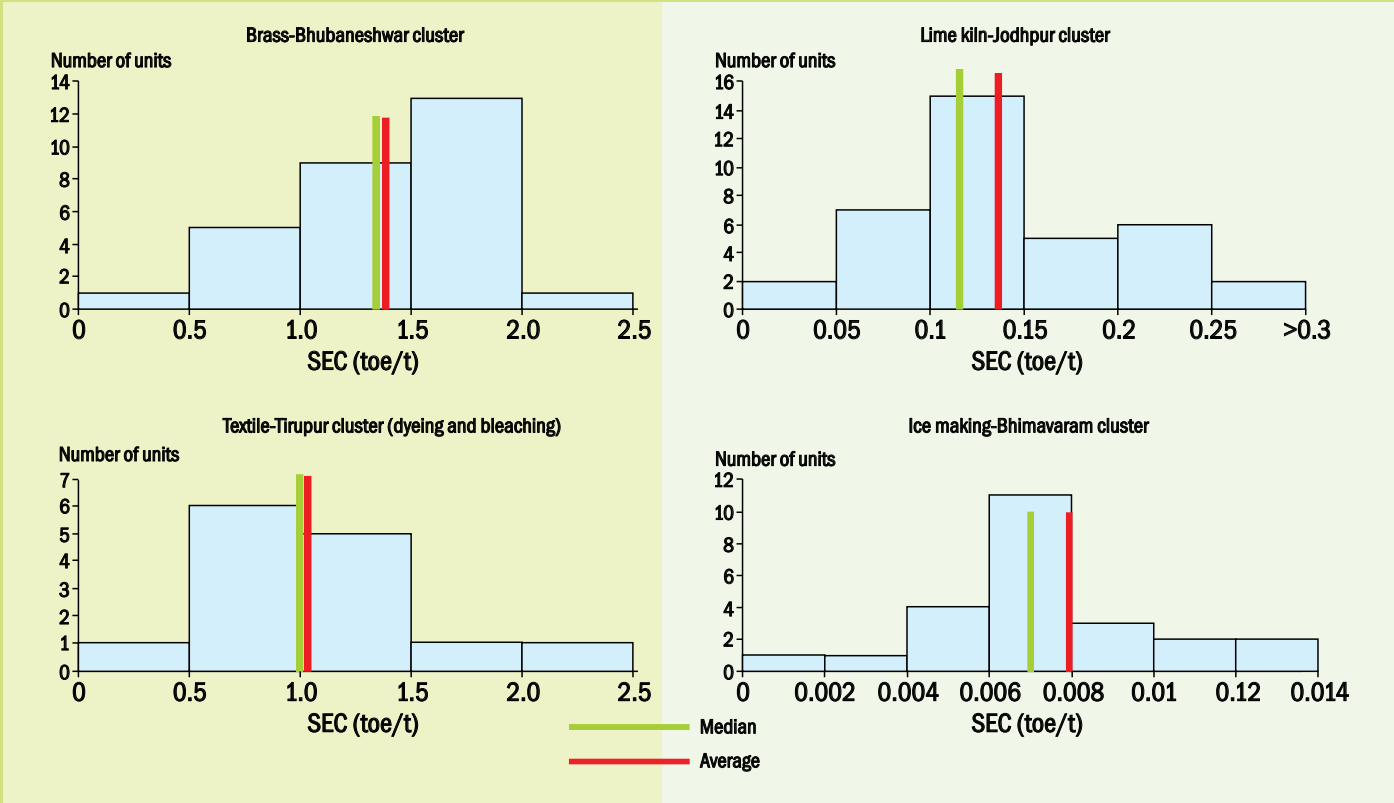
The energy data was collated for 19 sub-sectors covering 36 clusters. The total energy consumption covered in the sub-sectors was estimated to be 19.9 million tonnes of oil equivalent (Mtoe). Recognizing the fact that there are a large number of MSME clusters scattered across India, the total energy consumption will be much higher for the entire MSME sector. Further studies at cluster and sub-sector level, and manufacturing/ production output data will be necessary to map the total energy consumption in India.

- Total energy consumption of 36 clusters is 7.3 mtoe
- Total energy consumption of 4 sub-sectors at national level (brick, dairy, iron foundries and tobacco) is 12.6 mtoe
- 6 sub-sectors, namely brick, dairy, ceramics & refractories, sponge iron, textile, and tobacco account for more than 1 mtoe each.

Specific energy consumption (SEC)

SECs can be considered as energy efficiency (EE) indicators for MSME units. Large variations in SECs were observed in heterogeneous sub-sectors whereas the variations were minimal in homogeneous clusters. Thus, averaging SECs to arrive at total energy consumption is more suitable for homogenous clusters. The average and median SECs show the significant scope for EE improvements, which may be considered as the first step for benchmarking. The benchmark must also take into account the 'best available technologies' (BAT) and the 'best operating practices' (BOP) for each cluster and sub-sector. The benchmarking will help MSMEs to identify their energy saving potential. It will also guide policy makers designing the road map for EE programmes in MSMEs during the 12th Five Year Plan.

- SEC analysis shows wide distribution in clusters
- The analysis suggests probable high potential for energy savings while moving the highest SEC toward the best ones or, at least, toward the average value.



Few examples of SEC distribution

SEC comparison in MSME clusters

Sub sector	Cluster	Product/Process	SEC (toe/tonne)			Total energy consumption (toe)
			Minimum	Average	Maximum	
Brass	Bhubaneshwar	Utensils	0.46	1.36	2.08	420
	Jagadhri	Brass	0.29	0.73	0.96	36756
		Aluminium	0.25	1.19	2.75	
	Jamnagar	Extrusion	0.08	0.10	0.19	37742
		Foundry	0.06	0.08	0.11	
		Electroplating	0.03	0.08	0.14	
		Machining	0.01	0.04	0.19	
Brick	Varanasi	Fired clay bricks	0.024	0.028	0.033	59,586
Ceramics & refractories	Morbi	Wall tiles	0.07	0.23	0.68	1,022,705
		Floor tiles	0.12	0.20	0.28	
		Vitrified tiles	0.08	0.19	0.59	
		Sanitary ware	0.005	0.10	0.35	
		Spray dryer powder	0.04	0.05	0.06	
	East & West Godavari	Refractory bricks	0.10	0.74	1.76	20,219
		Ceramic jars	0.67	0.90	1.19	
	Khurja	Ceramic and potteries	0.17	0.20	0.47	17,244
	Thangarh	Tiles, sanitary ware	0.08	0.09	0.10	30,293
Chemical	Ahmedabad	Chemicals	0.01	0.52	1.06	262,481
		Dyes	0.03	0.69	1.54	
	Vapi	Chemicals	0.01	0.55	2.76	107,766
		Dyes and pigments	0.02	0.44	1.98	
Dairy	Gujarat	Milk chilling & pasteurization	0.002	0.003	0.007	9,353
		Other milk products	0.009	0.097	0.21	
Foundry	Batala, Jalandhar & Ludhiana	Foundry	0.127	0.147	0.167	4,250
	Belgaum	Cupola	0.045	0.069	0.093	9,486
		Induction furnace	0.048	0.058	0.067	
	Coimbatore	Cupola	0.043	0.075	0.11	29,201
		Induction furnace	0.048	0.058	0.067	
Galvanizing and wire-drawing	Howrah	Galvanizing	0.03	0.10	0.17	2,043
		Wire drawing	0.01	0.04	0.07	
Ice making	Bhimavaram	Ice blocks	0.001	0.008	0.013	3,978
Paper	Muzaffarnagar	Kraft paper	0.06	0.45	1.05	103,066
Rice mill	Ganjam	Rice	0.26	0.37	0.48	1,248
	Vellore	Rice	0.036	0.088	0.143	113,688
	Warangal	Raw rice	0.001	0.003	0.004	21,510
		Parboiled rice	0.053	0.063	0.086	
Sponge Iron	Orissa	Sponge iron	0.64	0.70	0.82	1049752
Tea	Jorhat	Coal based	0.58	0.70	0.82	68,838
		Natural gas based	0.40	0.50	0.60	
Textiles	Solapur	Towels and blankets	0.07	0.34	1.58	19,200
	Surat	Sarees and dress materials	0.14	0.40	1.26	1,592,566
	Tirupur	Compacting	0.02	0.07	0.31	817,965
		Dyeing and bleaching	0.49	1.02	2.06	
		Washing, heat setting and drying	0.23	0.63	0.92	
		Knitting	0.01	0.02	0.04	
Glass	Firozabad	Glass products	0.30	0.34	0.38	287,905

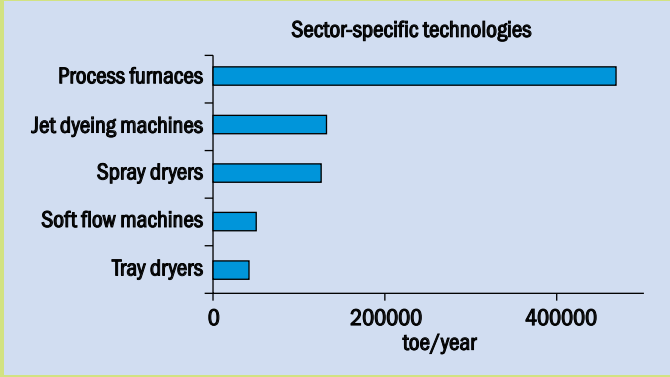
Analysis primarily based on data collected under the BEE-SME program (2007-12)

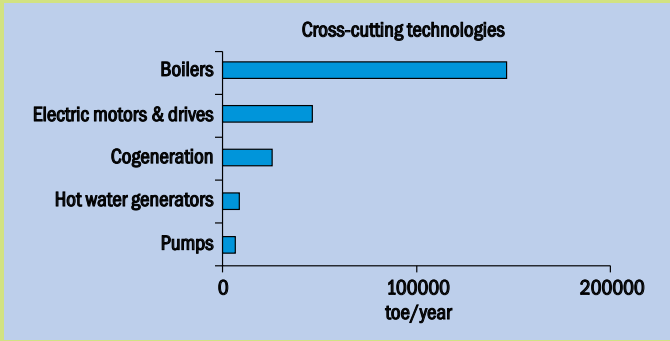
Energy saving potential

A majority of the MSME clusters use conventional and inefficient technologies and practices. The energy audits conducted in representative MSME units and the cluster profile reports clearly indicate that significant improvements in energy efficiency exist in these clusters.

A set of sector-specific technologies (SST) and cross-cutting technologies (CCT) have been identified that would help in improving the EE considerably. Among SST, process furnaces, dryers, jet dyeing machines and hot air generators have large energy saving potential. Under CCT, boilers, hot water generators, cogeneration, electric motors & drives and pumps have significant scope for energy saving.

The total energy saving potential identified is 1.14 Mtoe, about 16% of the total energy consumption of the clusters/ sub-sectors covered. The energy saving potential in the entire MSME sector is significantly higher as the data for a number of the sub-sectors/ clusters are not readily available.





Energy saving potential

Impact assessment

An impact assessment of energy audits was conducted on random basis. Although the importance of EE has been recognized by majority of the units, the implementation status of EE measures by individual units remains low. This may be attributed to a number of barriers such as non-availability of technologies, lack of local service providers (LSPs), poor technical capacities of MSMEs, and the gap existing between banks and MSME units in availing loans.

Major findings of the study

- The total aggregated energy consumption of 36 clusters including 4 sub-sectors at national level covered under the study is estimated to be 19.9 Mtoe. The energy consumption of the entire MSME sector will be much higher. The aggregation of energy consumption would require a concerted and regular data collection system at cluster, regional and national levels. A common template would be useful in collection and analysis of energy data. This mapping exercise would require involvement of various state level stakeholders like State Designated Agencies (SDAs), District Industries Centres (DICs), MSME-DIs, etc.
- Benchmarking of SEC using average and median values will be useful for MSME units to recognize their position with regard to energy efficiency. Nevertheless, benchmarking must be implemented at the right level of disaggregation according to parameters such as production capacity, process, products, vintage and BAT.
- There is a lack of awareness among MSMEs about the various financial schemes available with specialized financial institutions. Local financial counsellors can play a major role in terms of bridging the existing gaps.
- The adoption of SST and CCT would help in realizing an energy saving of upto 1.14 Mtoe in the identified clusters.
- MSMEs have low technical capacities and hence would require external support for technology development, demonstration and adoption. Cluster-specific intervention programs would help in achieving energy efficiency in MSMEs.

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