BEE SME Programme – Situation analysis in 35 SME clusters

Prepared by

Bureau of Energy Efficiency (BEE)
Ministry of Power, Government of India

Contents

Annexures

Executive Summary

The Bureau of Energy Efficiency (BEE), set up under the Energy Conservation Act, 2001, is responsible for formulation of strategies and policies that help in reducing the energy intensity of the Indian economy. The major focus of BEE in the industry sector remains large industries that are the major consumers of energy, many of which fall under the category of "designated consumers". However, there are many small scale industries that are also large consumers of energy. To address this important segment, BEE has formulated the "BEE-SME Program" that aims to accelerate the adoption of energy efficient technologies and practices in a few chosen industry clusters through focussed studies, knowledge sharing, preparation of detailed project reports and facilitating in the process of developing innovative financing mechanisms. TERI has entered into a strategic partnership with the BEE for carrying out some of the activities in the SME sector. Under the partnership, TERI is providing knowledge as well as manpower support to BEE for the development and implementation of their program amongst SMEs. Under the partnership, a detailed SME program project document has already been prepared and approved.

The first step envisaged in the BEE-SME program was to conduct situation assessment of 35 pre-selected industry clusters to assess their present status, through a questionnaire survey. The questionnaire was designed to collect general data like the number of operating units in a cluster and their turnover, energy usage pattern, production process, major energy consuming equipments, local service providers, etc. Based on these inputs from the survey, a list of most promising clusters has been prepared by BEE for further actions. Subsequent activities in the scheme include undertaking a detailed technology and energy use analysis in the identified clusters to identify, in detail, the opportunities for energy saving through either changes in technology or adoption of best practices. One of the key deliverables under the scheme is a set of around 375 Detailed Project Reports (DPRs) for different technologies/equipment that can be adopted by SMEs to reduce their energy consumption in different sectors. These DPRs can be utilised by other agencies/ departments like banks and Ministry of MSME to develop demonstration projects/ specific schemes for implementing energy conservation projects in different clusters.

This report (including the annexures) provides in detail the results of the survey carried out in 35 clusters. Summary of the survey results is produced in the table 1 below. Based on the outcome of the survey, the clusters marked with an asterisk (*) in the table 1 have been identified by BEE for further intervention.

Table 1 Preliminary results from situation analysis in 35 clusters

Sr. No.	*Cluster Location*	*Product*	*Total units listed in the cluster (No.)*	*Estimated total energy consumption (toe)$*	*Major energy usage*
1*	Firozabad	Glass	181	214727	Natural gas
2*	Belgaum	Foundry	135	25629	Firewood, Coke
3*	Coimbatore	Foundry	410	39701	Electricity, Coke
4*	Rajkot	Foundry	586	205995	Coke, Electricity
5	Alleppey	Coir	242	41	Electricity
6	Dewas and Ujjain	Oil Milling	20	155271	Coal, Electricity
7	Mangalore	Tiles	25	32792	Firewood, Rice husk
8	Meerut & Bijnor	Khandsari	41	681	Bagasse, LDO
9	Ratnagiri	Food Processing	48	34531	Firewood, Coke/Coal
10	Tirupur	Textiles	2000	193225	HSD, Electricity
11*	Ahmedabad	Chemicals & Dyes	600	62049	Firewood, Coke/Coal
12*	Jamnagar	Brass	1000	175421	Coke/Coal, Firewood
13*	Morbi	Ceramics	400	151116	Coke/Coal, LNG
14*	Pali	Textiles	400	41992	Pet coke, Lignite, Electricity
15*	Surat	Textiles	550	859379	Coke/Coal, Lignite, Natural gas, Electricity
16*	Solapur	Textiles	350	55978	Firewood, Electricity
17*	Warangal	Rice Milling	125	17002	Firewood, Husk
18*	Alwar	Oil Milling	90	2421	Coal, Electricity
19*	Bangalore	Machine Tools	75	9354	Electricity, HSD
20*	Batala, Jalandhar & Ludhiana	Foundry	440	54855	Coke, Electricity
21*	Bhimavaram	Ice Making	33	25	Electricity
22*	Bhubhneshwar	Brass	44	433	Coke
23*	East & West Godavari	Refractories	45	32709	Coke/Coal, Firewood
24*	Ganjam	Rice Milling	231	339	Rice husk, electricity
25*	Gujarat	Dairy	22	40681	Electricity, Furnace oil
26*	Howrah	Galvanizing	105	40452	Coal, HSD/LDO
27*	Jagadhri	Brass & Aluminium	150	13663	Coke/Coal, Firewood
28*	Jodhpur	Limestone	79	5981	Coke/Coal
29*	Jorhat	Tea	55	12532	Coke/Coal, HSD, Electricity
30*	Cochin	Sea Food Processing	45	5443	HSD, Electricity
31*	Muzaffarnagar	Paper	25	49498	Biomass (various forms)
32*	Orissa	Sponge Iron	45	2033764	Coke/Coal, Electricity
33*	Vapi	Chemicals & Dyes	600	19699	Electricity, LDO, Firewood
34*	Varanasi	Brick	226	316326	Coal
35*	Vellore	Rice Milling	150	14299	Firewood, rice husk
		Total	9573	4918003	

$ Tonnes of oil equivalent

It may be noted that the estimated total energy consumption in different clusters listed in the above table has been arrived at based upon the data collected through detailed questionnaire based survey in 4158 SME enterprises spread over the 35 clusters. This data has been extrapolated on a pro-rata basis to cover all the listed units in 35 clusters to arrive at a total figure of around 4.9 million tones of oil equivalent (mtoe). However, it is felt that still a few enterprises which do not figure in any of the records of industry associations or local organizations have got left out from this survey. This will also include a large number of micro enterprises (cottage/tiny units) that normally do not figure in any records. As a result, the total energy consumption figure in these 35 clusters is likely to be higher than 4.9 mtoe estimated above.

An analysis of the total energy consumption (by source), indicates that there is a great dominance of solid fossil fuels, also thereby meaning, in many cases (and not all), that the technology in use is primitive. The surveyed biomass usage also shows that it accounts for about 4% of the energy usage. However, in many cases biomass usage is not accounted for by the units themselves, as methodically as other sources of energy like electricity or coal. The figure 1 below shows the energy consumption, by source, of the 35 surveyed SME clusters.

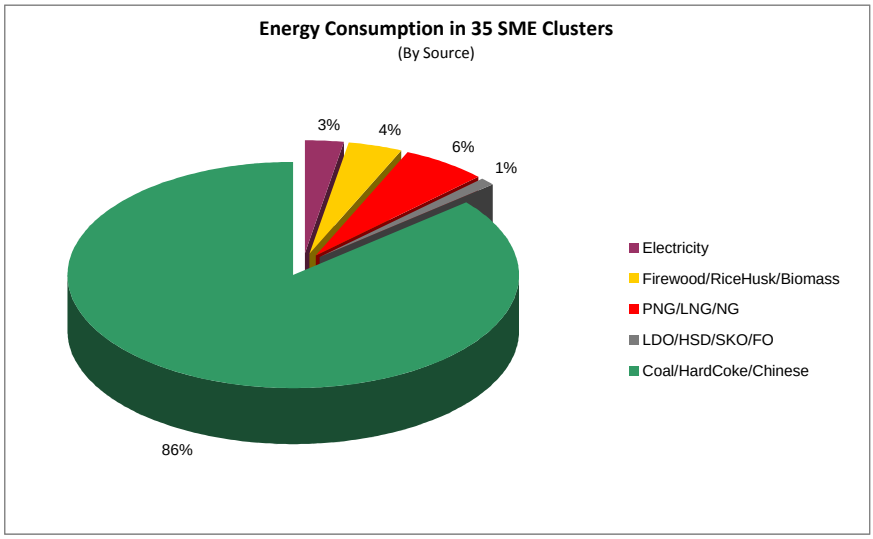

Figure 1 Energy consumption in 35 SME clusters (By source)

Some of the key observations from this survey are given below:

- Coal/coke/lignite accounts for 85% of total energy usage in all clusters put together. The reported direct electricity usage accounts for only 4% of total energy usage. The consumption of oil and natural gas put together is 7%.

- Biomass usage is still significant in the small scale industries. As per the survey, it accounts for 4% of the total energy usage. The actual biomass usage will be higher as in a few cases (e.g. rice mill clusters, khandsari cluster etc), the biomass which is an internal fuel is not accounted for while calculating the total energy consumption.
- Looking at the pattern of energy usage and the major energy consuming equipment/sections in different industry clusters, the majority of energy use is in thermal form (like in furnaces and boilers). As a result, it is envisaged that major energy saving technologies are likely to involve furnace/boiler re-designing/refurbishment/up-gradation and corresponding system reconfiguration at the plant level to accommodate these changes.
- Apart from sponge iron units in Orissa (which are mainly medium/large sized units), the five top energy consuming clusters are Surat (textiles), Varanasi (brick), Firozabad (glass), Rajkot (foundry) and Tirupur (textiles).
- The top three important sectors for intervention appear to be textiles, foundries and brick from the overall energy consumption and geographical spread of units/clusters. In case of brick, although only one cluster (having 226 units) was covered under the survey, the overall energy consumption in brick sector is likely to be very high with as many as 100,000 units existing in India (as per independent estimates made earlier by TERI). Similarly foundry and textile industry are the most widespread in the country and thus offer opportunities for replication. Based on the results of the subsequent studies to be undertaken by executing agencies in terms of available opportunities for energy saving, BEE might like to consider developing sector specific national programs in these three sectors focussing on energy efficiency options.
- Considering that biomass usage exists in MSME sector to a fairly large extent, it might be worthwhile to undertake a closer examination at some of the sectors where biomass usage is widespread so as to initiate a program for improving efficiency of biomass usage in the industry sector.
- It may be noted that in a few clusters, certain energy types have not got accounted for in energy surveys (e.g. rice husk and firewood in Ganjam, biomass and waste fuels in Varanasi, bagasse in Meerut, coal/oil in Diary, etc).
- BEE may undertake updation of the survey results at the end of the program based upon the inputs by various executing agencies which will be intervening in different clusters for longer durations subsequently.

CHAPTER 1 Current status and needs of MSME

MSMEs (Micro, Small and Medium enterprises) form the backbone of the Indian economy and this sector plays a vital role in the growth of the country contributing about 6% of the GDP during the financial year 2006-07. MSMEs manufacture a vast range of products, mobilize local capital skills and thereby provide the impetus for growth and development, particularly in rural areas and small towns. It contributes almost 40% of the gross industrial value added in the Indian economy. The small-scale sector has grown rapidly over the years particularly after the FY 1992-93 with a growth rate of 7.5-10%, which is substantially higher than the large industrial sector. The number of small-scale units has increased from 0.87 million units in the year 1980-81 to over 13 million by now. MSMEs are also a large employment provider particularly in rural areas, next only to the agriculture sector. It provides employment to about 32 million people.

The definition of MSMEs by the Government of India is given in table 1.

Table 1 Definition of MSME enterprises

	Investment in plant and machinery/ equipment (excluding land and building)	
Sector	*Manufacturing enterprises*	*Service enterprises*
Micro	Upto Rs 25 lakh	Upto Rs 10 lakh
Small	More than Rs 25 lakh and upto Rs 5 crore	More than Rs 10 lakh and upto Rs 2 crore
Medium	More than Rs 5 crore and upto Rs 10 crore	More than Rs 2 crore and upto Rs 5 crore

This sector also plays a major role in India's present export performance and contributes to about 30%-35% of total export. The exports from MSME sector have been clocking excellent growth rates in this decade. The product groups where this sector dominates in exports, are sports goods, readymade garments, gems and jewellery, woollen garments and knitwear, plastic products, processed food and leather products.

MSME sector has performed exceedingly well and enabled our country to achieve a wide measure of industrial growth and diversification. By its less capital intensive and high labour absorption nature, MSME sector has made significant contributions to employment generation and also to rural industrialization and built on the strengths of our traditional

skills and knowledge. MSMEs are found in clusters all over India. There are many historical reasons for the clustering of units – availability of fuels and raw materials, access to pools of semi-skilled labour, proximity to markets, and so on. There are about 6500 MSME clusters in all, of which around 400 are industrial clusters and the remaining are low-technology micro-enterprise clusters. There are an estimated 140 clusters within or in the periphery of urban areas in India, with at least 100 registered units in each. These urban clusters vary significantly in size; some clusters are so large that they account for 70–80% of the entire country's production of a particular item. For example, Ludhiana produces 95% of India's woollen hosiery, 85% if sewing machine components, 60% of bicycles and bicycle parts, and accounts for over half of the Punjab state's total exports. Similarly, Tirupur in Tamil Nadu has thousands of small scale units engaged in spinning, weaving, and dyeing of cotton garments; this city alone accounts for around 60% of India's total cotton knitwear exports.

In general, for a MSME unit, cost factors weigh more than issues such as energy efficiency and pollution. Hence an MSME unit uses the cheapest fuels that are available in its locality. The share of energy in the overall production costs varies between 10–40% in an MSME enterprise. Because of the easy availability of biomass such as fuelwood, husks, and assorted agricultural wastes, a large number of rural MSMEs burn fuelwood and other biomass for energy. For instance, each year an estimated 438,000 tonnes of fuelwood are used up for curing tobacco leaf; 250,000 tonnes for tea drying; and 100,000 tonnes for silk reeling. Urban MSMEs too burn fuelwood; around 1.72 million tonnes of fuelwood is used up each year by fabric printing units. Coal and petroleum-based fuels are used mainly by urban MSMEs[1].

1.1 Issues and needs concerning Indian MSME sector

The MSME sector has largely remained a neglected and under-serviced sector from the technology and knowledge support point of view. Some of the major challenges faced by the sector include the following:

- Use of obsolete and resource inefficient technologies
- Limited access to technology and product innovation
- Lack of awareness of best practices
- Weak institutional support framework
- Limited knowledge sharing and technical capacity
- Inability to attract and retain quality manpower.

[1] Kishore V V N, et al. 2004. Biomass energy technologies for rural infrastructure and village power – opportunities and challenges in the context of global climate change concerns. *Energy Policy* **32**:801-810.

These constraints have a negative impact on the competitiveness of MSME sector, significantly affecting their ability to reduce operational costs, increase productivity and adapt to external challenges.

On a broader scale for the MSME sector as a whole, it can be said that many of these issues have remained the same for years. This is primarily due to the enormity, geographical spread and complexity of the sector. Within the MSME sector, one has seen lots of technological changes/ advancements in certain sub-sectors like the MSMEs catering to the Information technology or automotive sectors. However, for many energy intensive sectors, there is an urgent need to develop, demonstrate and disseminate energy efficient technologies at the cluster level that can be adopted by local MSMEs. Technology need assessment and technology development to suit the requirements of the local MSMEs at the cluster level has emerged as one of the most important aspects that needs to be addressed in the MSME sector.

CHAPTER 2 BEE-SME Scheme and the methodology for undertaking situation analysis steps

The Bureau of Energy Efficiency, set up under the Energy Conservation Act, 2001, is entrusted with the responsibility of reducing the energy intensity of Indian economy in various ways. An important area of BEE's work is the small scale sector, known more popularly as the Small & Medium Enterprises (SME) sector. A scheme called the BEE SME Programme has been designed focussing on a few industrial clusters spread across the country.

2.1 BEE-SME scheme

Large number of Small and Medium Enterprises (SMEs) like foundries, brass, textiles, refractories, brick, ceramics, glass, utensils, rice mills, and khandsari manufacturing units etc, are said to have large potential for energy savings. Many of these units are in clusters located in various states of the countries.

In quantitative terms, there is not much authentic information and data available with respect to their energy consumption and energy saving opportunities. Majority of SMEs are typically run by entrepreneurs who are leanly staffed with trained technical and managerial persons to deploy and capture energy efficiency practice to reduce manufacturing cost and increase competitive edge. Therefore, it will be useful to build their energy efficiency awareness by funding/subsidizing need based studies in large number of units in the SMEs and giving energy conservation recommendations including technology up-gradation opportunities. It is envisaged that such interventions are supported by diagnostic studies and pilot projects at cluster level focusing on energy/resource efficiency, energy conservation and technology up gradation. This would help in addressing the cluster specific problems and enhancing energy efficiency in SMEs.

The short term objective of the project is to accelerate the adoption of EE technologies and practices in 25 chosen clusters in the SME sector through knowledge sharing, capacity building and development of innovative financing mechanisms.

2.2 Issues to be addressed

The main issues to be addressed by the project are related to information and knowledge sharing, building capacities at the local level and developing innovative financing mechanisms.

2.2.1 Information and Knowledge Sharing

One of the primary issues regarding limited use of energy efficient (EE) technologies in MSMEs is lack of information about the opportunities for energy conservation. The information and knowledge sharing mechanisms at the formal level (as through industry associations) as well as the informal levels (as through informal networks) within the MSMEs are weak and need to be strengthened. In many clusters, entrepreneurs culturally do not discuss technology, markets and other topics which give them a competitive edge with each other. However, they do discuss matters of common interest like industry regulation, problems of infrastructure development and pollution.

The detailed information regarding technologies, opportunities and markets is also however, missing from the public domain. This issue can be addressed by undertaking a technology and energy use analysis and putting the knowledge thus created in the public domain.

2.2.2 Building Capacities

Entrepreneurs also look for off-the-shelf solutions for many problems, which, however do not come easily because of the lack of technical expertise at the local level. It is generally the service providers who may double as the technology providers in many clusters and vice versa, which in some cases diffuses the roles as well as the potential impact of technological up-gradation. A common problem is also the lack of any pool of technical expertise at the local level. It has been observed that the entrepreneur, many a times, also plays the role of the technology expert as well as the business expert. Problems also exist due the lack of business management capabilities at the local level. Thus the problems of obtaining finance due to poor book keeping etc are prevalent.

An intervention that builds capacities at the local level both in terms of the technical expertise, and managerial capacities as for financing etc can help address the issues pertaining to the uptake of EE technology in the SME clusters.

2.2.3 Developing Innovative Financing Mechanisms

Problems related to financing are usually two fold: (a) those related to poor book keeping and (b) those related to actual lack of financial muscle to obtain financing. While those related to poor book keeping can be addressed through capacity building, the solutions to actual lack of financial prowess will be only through the development of innovative financing solution. Other opportunities like the leveraging of carbon funds etc can also be used in this context.

Funding of collaterals/credit guarantee can be a possible way of addressing the issue of financing the implementation of EE technologies.

2.3 Project Strategy

The project focuses on uptake of EE technologies and practices in the SME clusters through market-driven mechanisms. This implies creation of knowledge products through a technology and energy use analysis, building of capacities of local service providers/technology providers and creating or co-opting innovative financing mechanisms for the uptake of technologies/ best practices. The strategy of the project is:

2.3.1 Improving Knowledge Base

The project will conduct situation assessment of 35 (maximum) clusters in the country to assess the situation vis-à-vis the number of operating units, energy usage pattern, energy consuming equipments and probable impact of intervention. From this list around 25 clusters will be identified for intervention. A Technology and Energy Use Analysis in 25 identified clusters will be carried out that will identify in detail the prevalent technologies in the sector, audit them for energy use on a sample basis and identify opportunities for energy saving through either changes in technology or through best practices. This study will also identify possible sources of technology and/or expertise in different clusters as the case may be.

2.3.2 Cluster Approach

The project document identifies 25 clusters based on the BEE work plan that will be undertaken for intervention. In addition, to accommodate priorities of other participating agencies like the UNDP or the World Bank (WB) (which have proposed working with BEE in this initiative) a list of 10 more clusters will be developed. Finally 25 clusters will be short listed. The cluster based approach has been implemented by UNIDO in many interventions. Because of the similar characteristics like geographical location, markets, products manufactured, technology, development issues and common pool of resources, cluster based approach has often been undertaken while working with SMEs. Generally this has been found to be resource efficient and effective.

2.3.3 Market Development

Since the time plan is limited to 5 years and it is intended that by the end of the project market forces take up the challenge of taking this initiative on EE forward the project will focus on developing both technical expertise and business/managerial

expertise in these clusters. Thus capacity building programme will focus on things like development of implementation capability in the cluster, development of financing expertise including service and technology providers.

2.3.4 Financial Support

The cornerstone of the project is to conduct its activities through market mechanisms without creating distortion in the market in any way. Thus the project will focus on facilitating investments by the SMEs wherever required by funding of collaterals and not by any kind of hardware subsidies. The project will also provide software support in the form of development of bankable DPRs and project reports in cases where they are required.

2.3.5 Pooling Resources

The project will pool available resources as those from WB and UNIDO which have already shown interest in partnerships with BEE for undertaking work on EE with the SME sector in India.

2.4 Project Activities

The main project activities as envisaged in the BEE-SME scheme are:

- Energy Use and Technology Analysis
- Capacity Building,
- Implementation of EE measures, and
- Development of Innovative Financing Mechanisms

These are described in detail below:

2.4.1 Activity 1:Energy Use and Technology Analysis

The objective of the activity is to develop better information base on status of SMEs in the 25 chosen clusters, possibilities for undertaking EE measures, potential of impact, status of technology and energy use and identification of possible EE measures that could be undertaken by the SMEs.

Detailed situation analysis has already been undertaken and given in chapter 3.

2.4.1.1 Activity 1.1: Situation Analysis in 35 SME clusters.

25 SME clusters have been preliminarily chosen for intervention in this project. However, details of all the clusters are not available from the DCMSME Survey of SMEs 2001-02. It is possible that some of these clusters do not have a large number of units or do not have much energy usage. This will lead to interventions that take place in clusters which are not adequately suitable for these activities. Since some effort has

already been undertaken to carefully choose the cluster, only 10 more clusters will be added to this for the situation analysis.

The situation analysis in the 35 clusters will comprise an assessment of the total number of units in the cluster, their complete contact details, capacity, products manufactured, total energy usage by different types of fuels, profit/loss situation for the past three years and comments on preparedness of the management for taking part in this programme. This activity will be partly conducted with the help of data from a representative (numbers) of local associations, whose contact details also need to be provided, and also by making a visit once to the SME unit. The situation analysis will also recommend a list of 30% (of the number of units subject to a minimum of 30) units where further activities should be undertaken. These 30% (or 30) units should be representative of the entire cluster in terms of technology used and/or products manufactured.

Output 1.1: The outcome of the activity will be an assessment of total energy usage, preparedness of the cluster to undertake further action and a list of units where further action is recommended along with filled in data collection formats.

2.4.1.2 Activity 1.2: Energy Use and Technology Audit

Once the situation analysis has been conducted, a smaller group of 25 SME clusters will be identified by the BEE based on the report of Activity 1.1. These SME clusters will be undertaken for the Energy Use and Technology Audit. The energy use and technology audit will aim to assess the energy productivity of the units through a detailed assessment of total energy usage in the unit, an energy audit for the main energy consuming areas, potential for energy savings and recommendation in terms of EE measures that can be undertaken (in terms of EE technology and Best Practices). This activity will also identify the possible source of technology or expertise for the recommended measures. A minimum of 2 local service providers, one each in technology and managerial areas are to be identified. An important part of the activity will be to identify the current Best Practices prevailing in the cluster and to prepare case studies for each of those, representative of the products, technologies and production capacities in the cluster. The Energy Audit component will be conducted in approximately 30% of the units. Since, clusters usually comprise similar units this number will be good enough to take into account a representation of all the technologies and scales in the cluster.

Output 1.2: The output of this activity will be cluster manual for each of the 25 SME clusters which will give an overview of the cluster in terms of name and numbers of units, contact details, production capacity, technologies in use, products

manufactures, potential for energy savings, EE measures applicable, sources of technology/expertise and case studies on Best Practices / Technological Innovations in the cluster.

2.4.2 Activity 2: Capacity Building

The objective of this activity is to create capacities among local services providers/technology providers in the SME clusters that would help in the uptake of the EE measures identified in Activity 1.

2.4.2.1 Activity 2.1: Introductory Local Service providers' Workshop

The local service providers and the technology providers identified during Activity 1 will be registered as experts with the SME programme of the BEE. A one day workshop will be organized with these experts and representatives from the industry/associations to share the outcome of Activity 1 with them and will identify issues regarding avenues for implementing EE measures, roadblocks in terms of capacities in the cluster, financing issues and carbon-market related issues. This activity will also involve the concerned SDA(s).

Output 2.1: The output of Activity 2.1 will be workshop proceedings which cover the entire activities of the workshop along with the outcome of the workshop on issues regarding implementation of EE measures. The activity will also enrol all the attending experts for the BEE SME Programme.

2.4.2.2 Activity 2.2: Information Dissemination Workshops

A 2 day Information dissemination workshop will be conducted in all the 25 clusters with the help of local industry association and enrolled local service providers. The main focus of these workshops will be to share with the cluster the Energy Use and Technology Analysis manual prepared for each of the 25 clusters. The workshop will discuss the EE measures identified in the cluster manuals and shortlist a minimum of 5 projects for which bankable DPRs will be prepared across maximum three segments of capacities in each cluster. Another important focus of the cluster workshop will be to share the best practices prevailing in the cluster.

The workshop will also discuss managerial issues related to implementing EE measures. These will have mainly the financing component; how to keep books, what types of financing schemes are presently available and discuss what further can be done in this regard. SDA(s) will also be involved in order to help disseminate information.

Output 2.2: The output of this activity will be a list of 15 projects for each cluster for which bankable DPRs will be prepared.

2.4.3 Activity 3: Implementation of EE Measures

The objective of this activity is to facilitate implementation of EE measures in the 25 identified clusters through development of DPRs.

2.4.3.1 Activity 3.1: Preparation of DPRs

This activity is meant to prepare bankable DPRs for 15 projects in each cluster (over maximum 3 segments of capacities). This activity will also target identification of the match between the projects and the specific expertise of the local services providers (LSPs) in order to allot the project to the LSPs which they will have to take forward in the clusters. These LSPs will be responsible for reporting to BEE for the progress that they may make with regard to implementation of the projects. LSPs, if they wish so, can also group together to form a team to take up projects.

Output 3.1: The output of this activity is a bank of 15 DPRs for all the 25 clusters and a match for experts and projects in all the 25 clusters. Thus the total number of DPRs will be 375.

2.4.3.2 Activity 3.2: Capacity Building of LSPs

This activity is meant to enhance the capacity of the enrolled BEE experts to implement EE measures in the identified SME clusters. This will be based on identification of needs of the experts in line with the DPRs/projects allotted to them. The training will be undertaken at centres of learning to be identified during the course of the project.

Output 3.2: The LSPs will be equipped with the necessary capacity to undertake the implementation of the EE projects measures in the identified clusters.

2.4.4 Activity 4: Facilitation of Innovative Financing Mechanism

The objective of this activity is to encourage uptake of EE measures through facilitation of innovative financing mechanisms without creating market distortion.

2.4.4.1 Activity 4.1: Facilitation of Financing EE

Financing is often projected as one of the major roadblocks for implementing new technology including EE measures. The project will work to facilitate a financing arrangement in the form of partial funding of collaterals for EE measures being undertaken by the units in the 25 clusters. Such a scheme could be implemented through CGFTI, SIDBI and the lead banks in various districts. Such a fund is being proposed by the World Bank as a part of multilateral funding for SMEs. The Bureau would work to facilitate the formation of this fund. The Partial Guarantee Fund for SMEs (PGFSME) will cover 30% of the risk guarantee, along with the entrepreneur sharing 30% and the

banks the remaining 40% of the risk. The Bureau estimates that a funding of approximately Rs. 40 crore would be required to give shape to this fund. However, only facilitation of the formation of this fund and not the fund itself is a part of the Bureau's activities.

Output 4.1: The output of this activity will be an arrangement between the World Bank and with SIDBI/lead banks which will fund collaterals for EE measures.

2.4.4.2 Activity 4.2: Capacity Building of banks to evaluate EE projects

A 3 day training programme will be conducted with the officers of the SIDBI and the lead banks in the 25 clusters where the project is being undertaken. A training manual for the same will also be prepared. The training programme will be conducted at a central location and will be oriented towards enabling the bank officials with requisite information and knowledge on how to evaluate an EE project.

Output 4.2: The outcome of the activity will be enhanced capacities of the lead banks in the 25 clusters where the project is working. The training programme will also come up with a training manual.

2.4.4.3 Activity 4.3: Concluding LSPs Workshop

A 2-day workshop of the LSPs and representatives from the industry/associations will be called to share with each other the results of implementations that have been undertaken in the cluster. The concluding LSPs' workshop will detail the projects undertaken; savings made and will discuss future needs of the clusters to carve out a suggested roadmap for future BEE programme. SDA(s) will also participate in this workshop.

Output 4.3: This activity will result in an assessment of the impact of the project and a roadmap for future action.

2.5 Methodology for undertaking situation analysis

The backbone of conducting the situational analysis in 35 SME clusters is the questionnaire survey (Annexure 2.1). The situational analysis was conducted in two phases, phase 1 where 10 clusters were covered and phase 2 where 25 clusters were covered. The questionnaire was slightly modified for phase 2 based on the learning from phase 1.

The questionnaire primarily sought to obtain data on:

1. Unit location, contact details
2. Products, production and turnover
3. Major energy consuming equipment and overall energy use
4. Production process
5. Some basic details about bankers / loans

The situation analysis was supposed to help BEE shortlist the 25 clusters for further intervention.

2.5.1 On-field survey methodology

The study of the different clusters spread across India was carried out by M/s A C Nielson using two combined approaches.

2.5.1.1 Secondary Research

- Preparing the questionnaire, translating the same in local language
- Scanning of different journals/ periodicals

2.5.1.2 Primary Research

The following stepwise procedure was adopted by M/s A C Nielson for gathering primary data in all the 35 clusters:

- Contacting the local bodies / service providers/industry associations/local banks in that area to know the spread, type of units and carry out the listing exercise of the units in the cluster. This helped in preparing a tentative list.
- Approaching the local Industries Officer / Estate Officer / President / Secretary & explain the purpose of the information so that the units extend cooperation. It was also planned to take their help if required.
- Organizing a field briefing at respective locations wherein researchers as well as supervisors of the survey team were present
- Field briefing and carrying out the census exercise to know the spread of the units, type of units, products manufactured, whether in operation or closed, etc.
- Developing the inventory of units in the different cluster through a listing exercise. Thereafter conducting survey of the units in the cluster as per the information areas, through a structured interview/ questionnaire survey
- Ensuring that the units surveyed represent the diversity of the cluster in terms of products, capacity, technology and scale.

2.6 Linkage with MoMSME

The Ministry of Micro Small & Medium Enterprises, is the main central ministry for MSMEs. It has various programme and schemes. Some of those allow it to subsidize implementation of projects in MSME units.

The BEE SME programme will be preparing DPRs (see 2.4 above) for projects in energy efficiency in MSMEs. It is possible for MoMSME to capitalize these DPRs and further use them for installations in the MSME units.

On similar lines synergies could be explored with SIBI and UNIDO for capitalisation of DPRs and provision of subsidy for investment in energy efficiency project in MSMEs.

CHAPTER 3 Summary of situation analysis in 35 SME clusters

This section gives in brief a summary of the situation analysis in the 35 clusters that were surveyed by A C Nielson – ORG Marg Pvt Limited. Detailed report of each cluster prepared by A C Nielson is given in Annexure 3.1. As mentioned in the previous section, the survey was based on a questionnaire developed jointly by TERI and A C Nielson, which primarily covered the points related to listing of units in a cluster, turnover, main products, energy usage pattern and overall energy use in the cluster. This information is expected to provide an initial understanding of the cluster to various executing agencies (to be selected subsequently by BEE) so that they are able to initiate detailed activities (such as detailed technology and energy usage activities, etc) in the chosen clusters.

The energy consumption in a cluster, in tonnes of oil equivalent (TOE)[1], is estimated based on the fuel & electricity consumption figures provided by units surveyed using the questionnaire, which is extrapolated for the total numbers of working units in that cluster. It is also felt that the energy consumption could be much more than the estimated figure for the cluster because of older census data.

3.1 Firozabad (Glass)

Firozabad is located in the state of Uttar Pradesh (UP) and is famous for its glass items such as bangles, decorative glasswares, etc. These units are spread across Agra Road, Dholapur Road, Raja ka Tal, Bhau ka Nagla, S.N. Road, Coal shed area while in Makhanpur the units are in Jijoli, Nawada Mohamadpur. Majority of the units operate 2 shifts a day whereas some EOUs (export oriented units) engaged in glass ware & table ware articles run round the clock.

There are 181 registered units in operation currently. The units are in operation since many years (in some cases more then 50 years) and it has been their traditional business. The big units (around 40) in Firozabad are engaged in decorative / table ware glass wherein they are using Tank furnace. There are about 95 units involved in bangle manufacturing. They use pot furnace for glass melting. Other than these, there are many tiny units involved in bangle joining and other glass finishing operations. These operations are undertaken in micro enterprises, mostly as

[1] 1 TOE = 10^7 kCal

household/backyard activities. The annual turnover and production of the surveyed units are shown in figure 3.1a & 3.1b below.

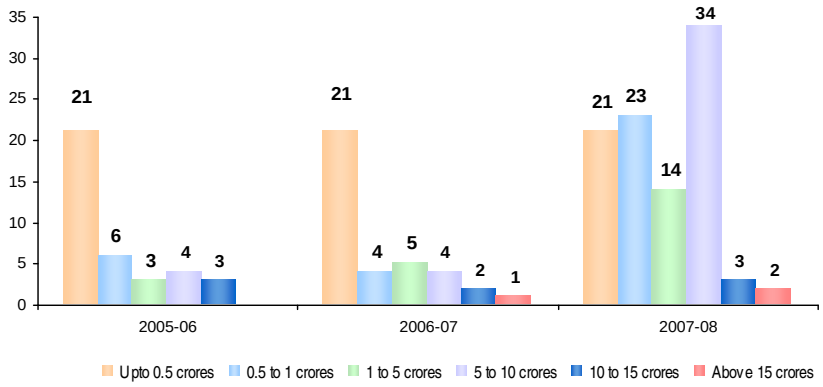

Figure 3.1a Annual Turnover (Crores) of the units in cluster

All the units were operating on coal as fuel in the past and have converted to natural gas recently, after the ordinance passed by honourable Supreme Court. Many of the units (about 150) use natural gas as fuel for all operation whereas some of the units (about 30-35) in the cluster got the gas connection for partial operation and hence use other fuels also. Most of the muffle furnaces (close to 800) continue to use coal as primary fuel.

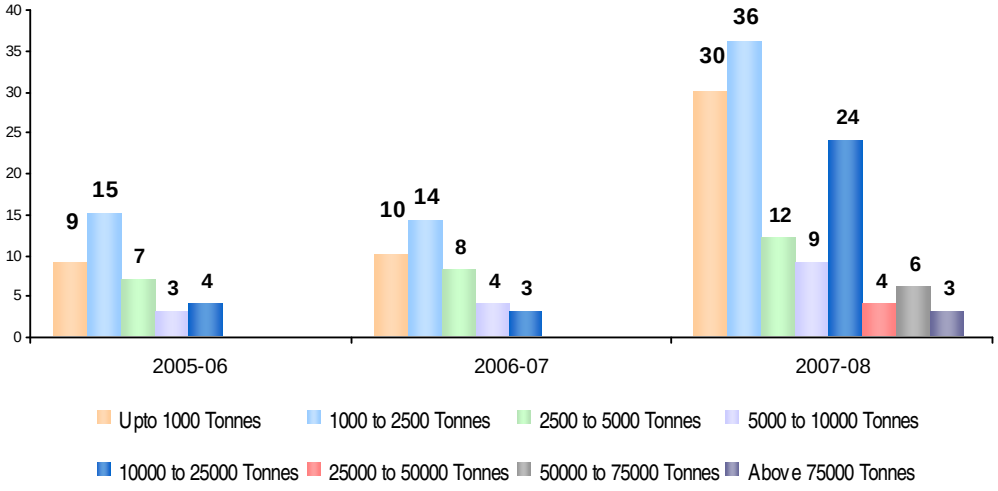

Figure 3.1b Annual Production (Tonnes) of units in cluster

Situation of power supply from the state grid is also grim as it is available for maximum 12 –14 hours with 5/6 interruptions every day. Therefore, units in this cluster don't rely on grid for power supply and they have captive arrangements to meet their electricity needs. Most of the units having the natural gas connection are using gas based generators for electricity

generation and remaining units use DG sets. Total consumption of natural gas in the cluster for the year 2007-08 is about 184.6 million sm^3. The consumption of natural gas by the units, during 2007-08, in the cluster is given in figure 3.1c.

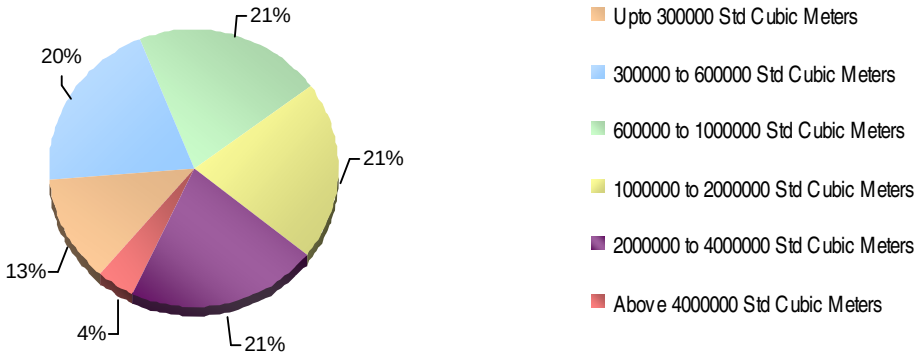

Figure 3.1c Usage of Natural gas (sm^3) by the units in the cluster (2007-08)

3.2 Belgaum (Foundry)

Belgaum is located in the state of Karnataka, southern part of India and is known for foundry cluster. The units in this cluster are largely manufacturing graded cast iron as well as ductile iron parts – gear box, motor cases, machine bodies, valves ranging from 25 to 350 mm., pump casing, jacks etc.

There are approximately 135 units in the Foundry cluster spread across different areas in Belgaum e.g. Udyambagh, Machhe Industrial area, Jamboti Road, Kangrali Road, Dharwa Road, etc. The turnover and the production for the year 2007-08 of the surveyed units for this cluster is shown in figure 3.2a and 3.2b.

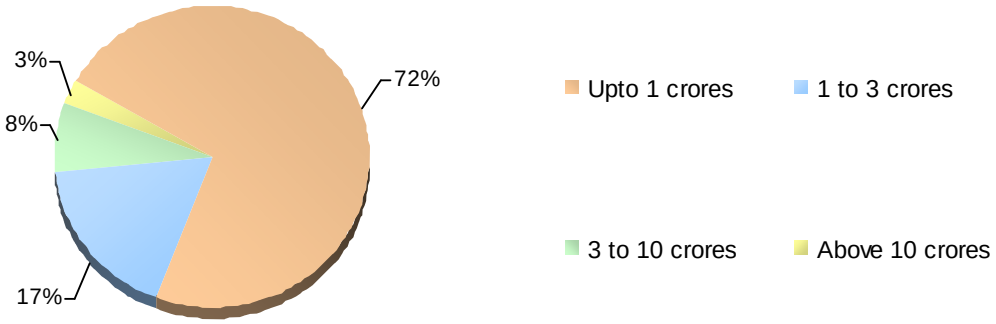

Figure 3.2a Annual Turnover - 2007-08 (Crores) of units

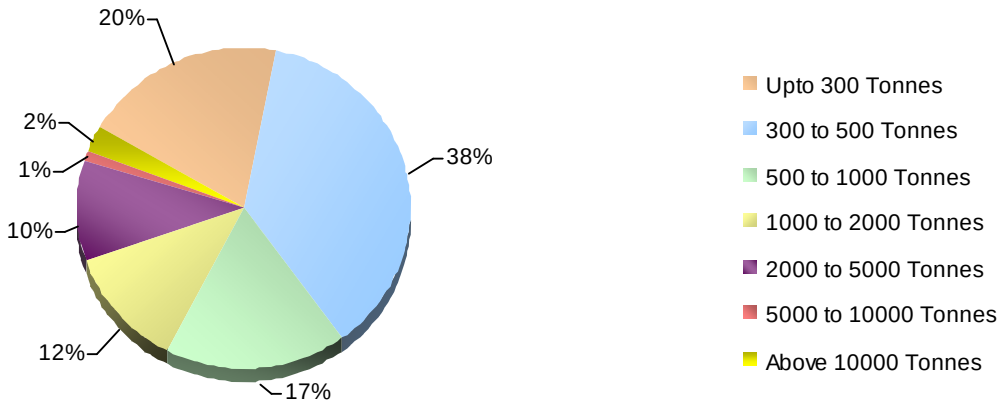

Figure 3.2b Annual Production - 2007-08 (Tonnes) of units

The energy cost accounts for 15% of the total cost of production which is second to the raw material cost (60%) only. Various fuels such as coal, coke, firewood, HSD, LDO, furnace oil, etc and electricity are used to meet the energy requirement of the units. For the foundry units, having cupolas for melting operation, coke is the primary fuel. All the units in the cluster have grid connection. Power situation is satisfactory here and there are no major grid breakdowns. Few units also have DG sets (of the size 20kVA) for power backup. The energy consumption for the year 2007-08 is shown in table 3.2.

Table 3.2 Fuel/electricity consumption in foundry cluster during 2007-08

Type of fuel/energy	*Consumption*
Electricity (million units)	3.86
HSD (Kilo Litres)	8.5
Furnace Oil (Kilo Litres)	29.5
Firewood (Tonnes)	27348
Low Ash Coke (Tonnes)	7452
Chinese Coke (Tonnes)	1176
LDO (Litres)	78
Coal (Tonnes)	846

The foundry cluster in Belgaum is well developed and has good infrastructure support in terms of roads, testing labs, modern IT facilities, effluent treatment plant, etc. All the units also have skilled manpower for their critical plant operations. The units, generally, operates about 10 hours a day and the process is combination of manual operation as well as mechanized.

3.3 Coimbatore (Foundry)

Coimbatore is located in the state of Tamilnadu, southern part of India and is also known for foundry cluster. The units in this

cluster manufacture castings which have different applications but mainly used in auto spares, motor parts, textile machinery parts, pumps, etc.

There are approximately 410 units in this cluster involved in manufacturing of ferrous as well as non ferrous castings. These units are spread across Peelamedu, Ganapathy, Irugur, Singanalur, Kurichi, Arasoor and Chettipalayam area. Majority of the units are operating in a single shift with extended working hours. The turnover and the production of the surveyed units for this cluster are shown in figure 3.3a and 3.3b below.

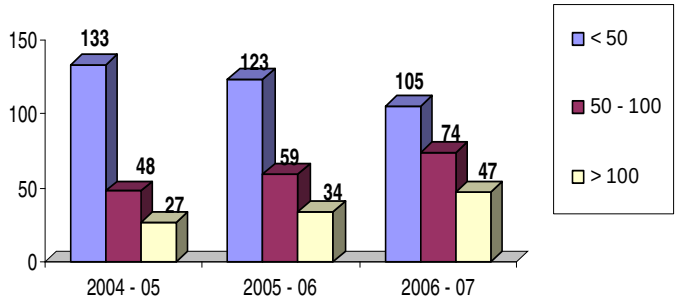

Figure 3.3a Annual turnovers (lakhs) of units

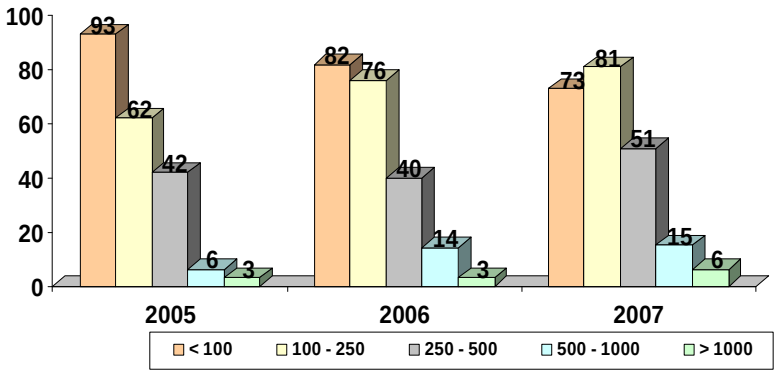

Figure 3.3b Annual Production (Tonnes) of units

Various fuels such as coal, coke, firewood, HSD, LDO, furnace oil, etc and electricity are used to meet the energy requirement of the units. The energy consumption for the year 2007-08 is shown in table 3.3.

Table 3.3 Fuel/electricity consumption in foundry cluster during 2007-08

Fuel	*Annual consumption*
Electricity (million units)	202.5
HSD (kilo litres)	242.3
Furnace oil (kilo litres)	231.1
Coal (tonnes)	6600
Fire wood (tonnes)	4300

3.4 Rajkot (Foundry)

Rajkot is located in the state of Gujarat, western part of India and has a foundry cluster. The units here are engaged in foundry and forging activities. Majority of the foundry units at Rajkot produce G.I. casting, and catering to domestic as well as export market. The industrial segments covered by this cluster are automotive, textile machinery, engine parts, etc.

There are approximately 500 plus units in the Foundry cluster spread across Jamnagar road, Sapar, Metoda, etc areas in Rajkot. The process in the cluster is a combination of manual and mechanized operations and the major equipments in these units are cupola /induction furnace, oil furnace, power press, etc. The turnover and the production of the surveyed units for this cluster are shown in figure 3.4a and 3.4b.

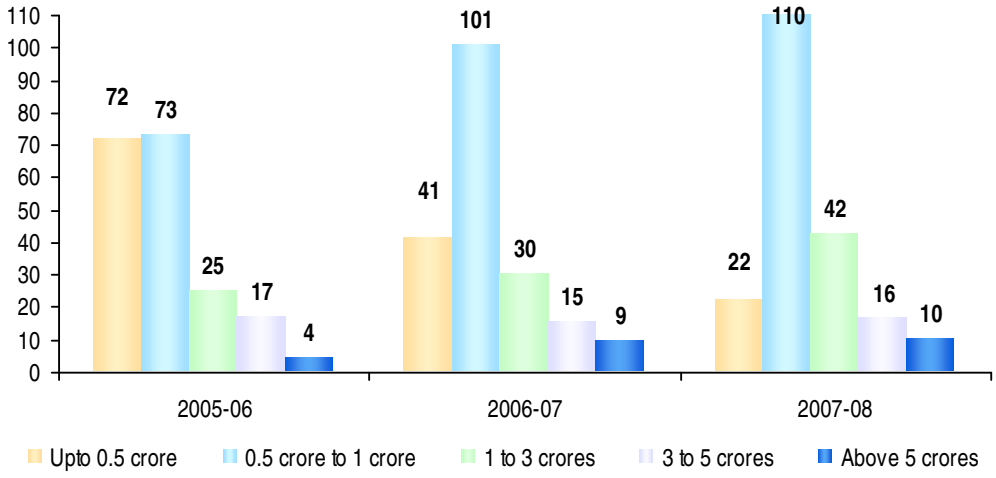

Figure 3.4a Annual turnover (Crores) of units

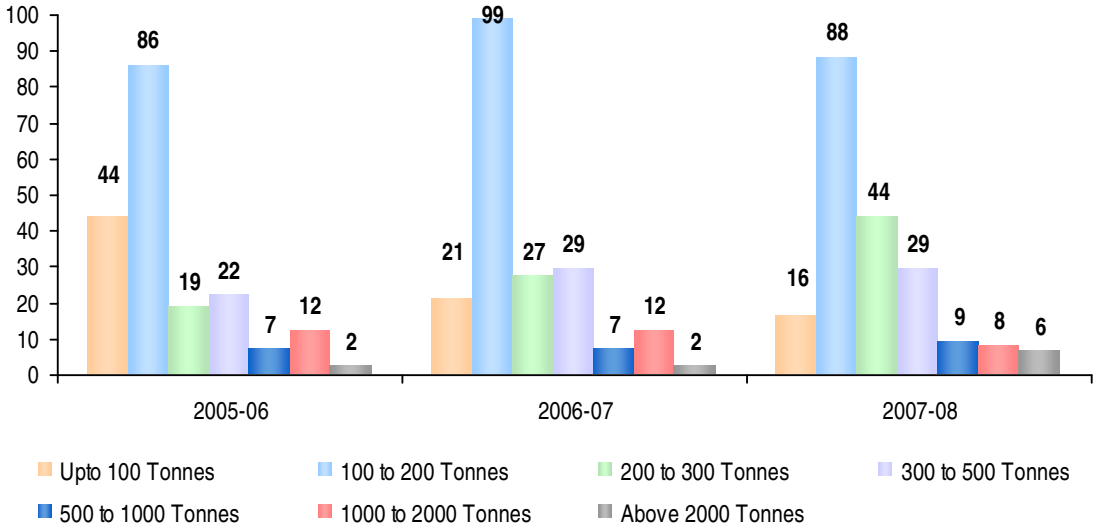

Figure 3.4b Annual Production (Tonnes) of units

Coal/coke and electricity are used as the source of energy in the cluster. There are certain pockets in the cluster wherein electrical furnace is only used due to high cost of coal /coke. Larger units in the cluster also use electrical furnaces as the electricity supply is by and large stable. The energy cost represents 8 to 10% share of the total production cost. Energy consumption in foundry cluster of Rajkot for the year 2007-08 is given in table 3.4.

Table 3.4 Fuel/electricity consumption in the cluster during 2007-08

Fuel	*Annual consumption*
Electricity (million units)	36.87
Coal/ coke (tonnes)	126384

3.5 Alleppey (Coir)

Alleppey, also known as Alappuzha, is located in the state of Kerala , southern part of India, and also known for SME cluster producing different Coir (by product of coconut) based product for indigenous as well as exports with major thrust on exports. The products manufactured in this cluster are coir ropes, coir mats, door mats, car mats, fibre mats, and certain other consumer products. Certain units in the cluster also manufacture garments by adding jute fibres with coir.

There are a total of 242 units spread across the district of Alleppey. This industry is labour intensive and hardly has any mechanization. Coir industry is a seasonal one and majority of the units remain shut for 2/3 months during the monsoon season due to raw material unavailability. Generally, a unit operates one shift of about 8-10 hours a day. The turnover and the production for the year 2007-08 of the surveyed units for this cluster are shown in figure 3.5a and 3.5b below.

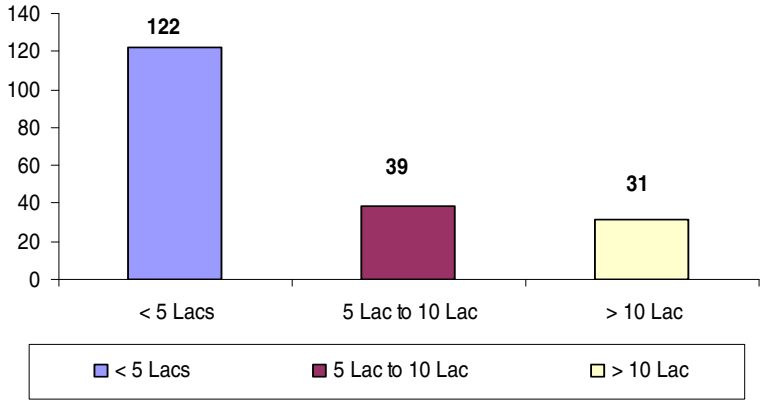

Figure 3.5a Annual turnover of units in the cluster

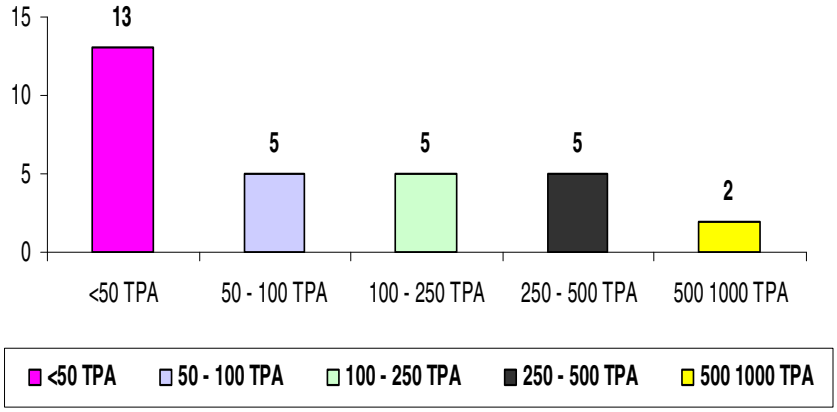

Figure 3.5b Annual production (tonnes) of units in the cluster

The major equipments in a plant are shearing machine, sewing machine, power loom, etc. In some instances certain units also have boiler but it's in only a couple of units. Electricity is the main energy source used by the units in this cluster and it is drawn from the local grid. Total electricity consumption in the cluster for the year 2007-08 was about 0.41 million units. The electricity consumption of various units is shown in figure 3.5c below.

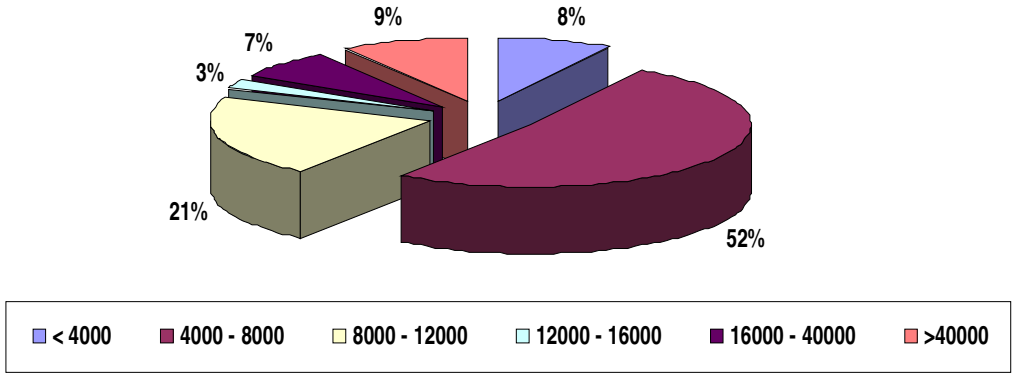

Figure 3.5c Annual electricity consumption (units/annum) of the units in the cluster

Irregular employment and short supply of raw material are constraints for this industry.

Low costs of production in neighbouring states such as Tamil Nadu and the use of acrylic fibre have depressed the earnings of the small-scale coir entrepreneur. The decline of coconut production in the traditional coir-producing areas has increased the scarcity of coconut husk and fibre and this has made Kerala depend on fibre imports from Tamil Nadu.

3.6 Dewas-Ujjain (Edible Oil)

Dewas and Ujjain belt is known for edible oil extraction industry and is located in the state of Madhya Pradesh, central part of India. Units in Dewas are involved in manufacturing/ extraction of soyabean oil and vanaspati whereas the units at Ujjain are extracting oil from cotton seed. Some of the plants at Dewas are 100% export oriented units (EOUs) and exporting soyabean oil and de-oiled cake, which is used for cattle feed. The units are located across Chotamal, Sapura and Madhumilam Industrial area which is app 6/7 kms from Dewas. The units in Ujjain are spread across Agar Road Industrial area with major concentration in Udyog Nagar, Nimad, Khetia, Khategaon, etc.

There are around 10 units each in Dewas and Ujjain. Units at Dewas are much bigger than the same in Ujjain. Majority of the units are run as family business. The process is completely automatic in nature and the plants are running continuously. The Units are operating 10 /12 hrs per day. The turnover and the production of the surveyed units for this cluster in Dewas and Ujjain are shown in figure 3.6.1a to 3.6.2b below.

3.6.1 Dewas

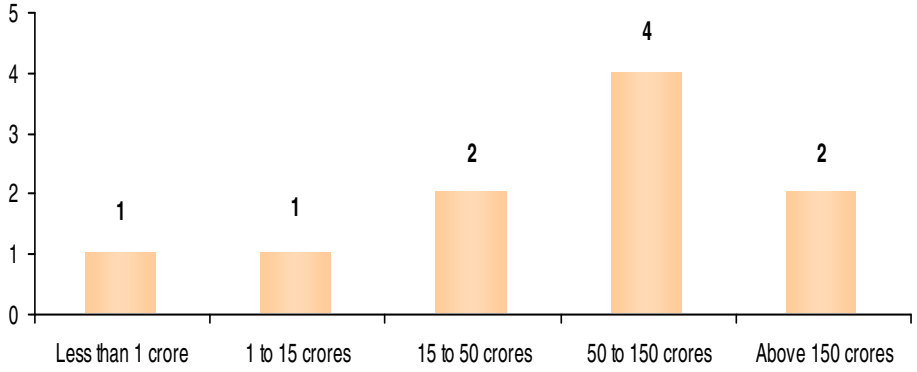

Figure 3.6.1a Annual turnover (crores) of units in the Dewas cluster during 2007-08

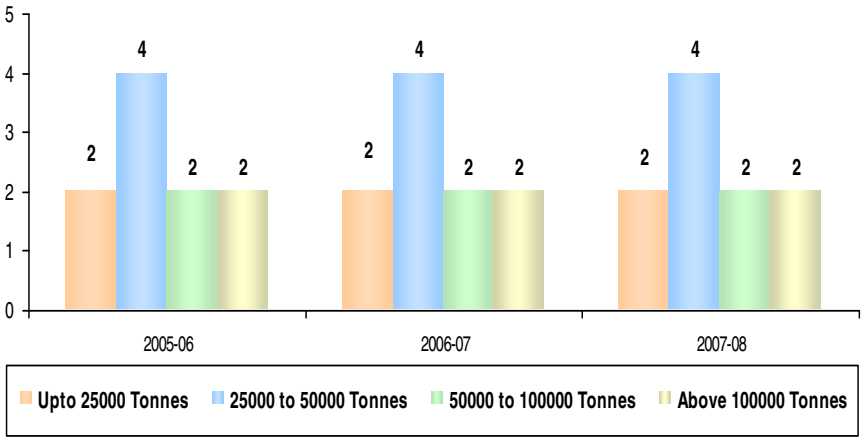

Figure 3.6.1b Annual production (tonnes) of units in the Dewas cluster

3.6.2 Ujjain

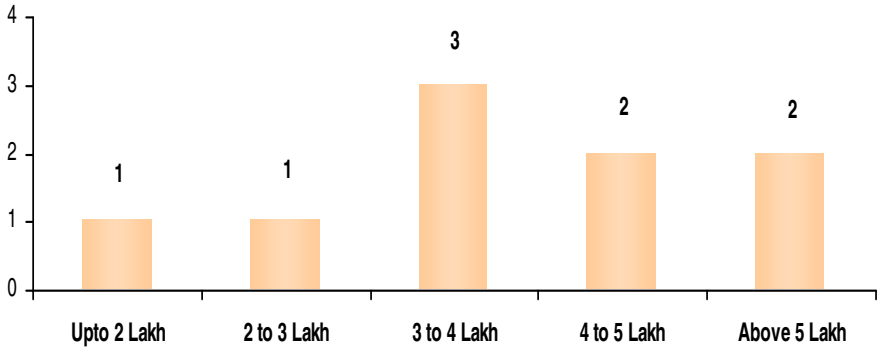

Figure 3.6.2a Annual turnover (lakhs) of units in the Ujjain cluster during 2007-08

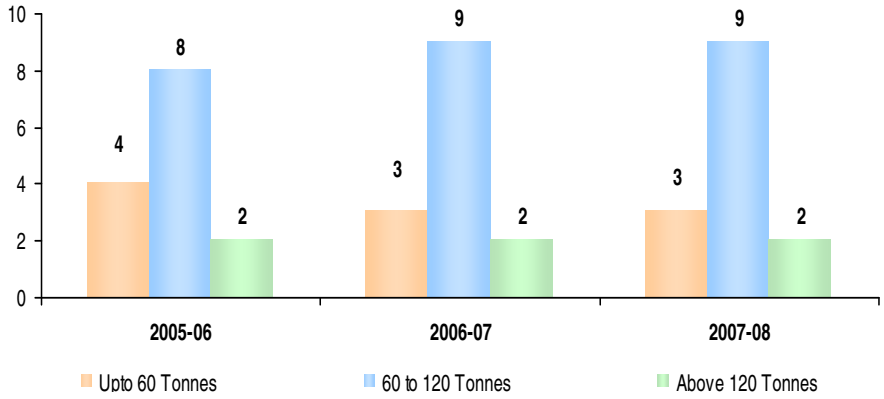

Figure 3.6.2b Annual production (tonnes) of units in the Ujjain cluster

Fuel and electricity are used to meet the energy need of the cluster. Since, units in Dewas are larger in size and also producing Vanaspati, they also use coal and HSD in the process, whereas only electricity is used in plants in Ujjain. Most of units have backup power generation system. Energy consumption for the year 2007-08 for the units at Dewas and Ujjain are given in table 3.6.

Table 3.6 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Dewas*	*Ujjain*
Electricity (million units)	90.79	0.87
Coal / Hard Coke (Tonnes)	274500	0
HSD (Kilo Litres)	57.6	0

Since the crops (soyabean and cotton) are seasonal majority of units are not able to operate to their full capacity. Some large units are storing the raw material for the use in lean season and also buying from other states.

3.7 Mangalore (Roof Tiles)

The roof tiles cluster in Mangalore is located in the state of Karnataka, southern part of India. Since this is a very low end hand made product, this industry is recognized as a cottage industry. The cluster in Mangalore has about 43 units, hardly 25 are in operation. Remaining units are slowly closing due to low demand. All the units are running in a single shift and are always under scarcity of labour. Though, an institute was open in 1992 with foreign collaboration to help the local units of roof tiles industry but it is lying idle since long. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.7a and 3.7b.

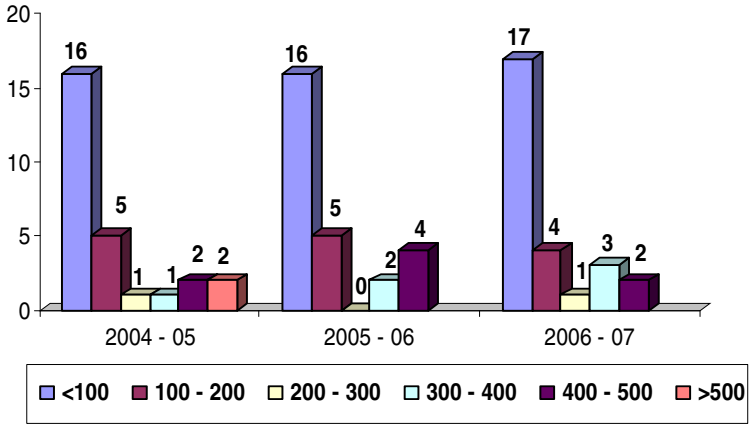

Figure 3.7a Annual turnover (lakhs) of units in the cluster

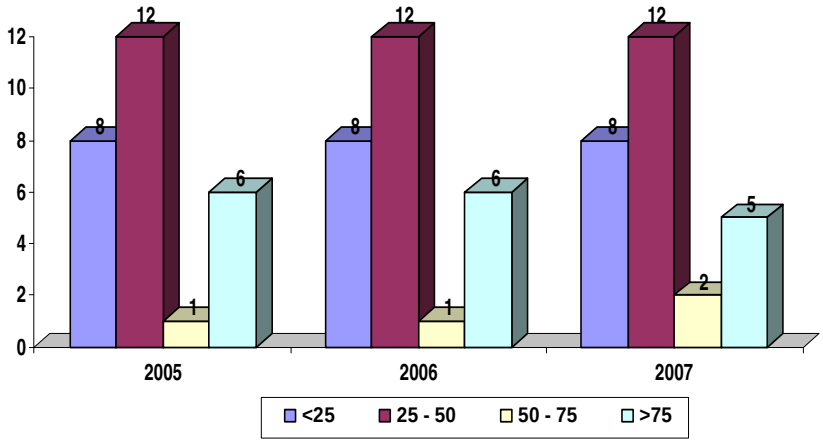

Figure 3.7b Annual production (tonnes) of units in cluster

Mainly firewood and casual cake (homogeneous mixture of husk & oil) are used as fuel in the cluster, which is basically used for heat generation to dry the tiles. Fuel consumption for the year 2007-08 in the cluster is given in table 3.7 below.

Table 3.7 Fuel consumption in the cluster during 2007-08

Fuel	*Quantity*
Fire wood (tonnes)	46000
Casual cake (tonnes)	3500

3.8 Meerut & Bijnor (Khandsari)

Main Khandsari clusters (Meerut, Bijnor and Saharanpur) are in the state of Uttar Pradesh, Northern part of India, which is also the largest sugarcane producing state in India. In Meerut district total 80 khandsari industries are licensed but at present only 7 units are working & at Saharanpur total licensed 50 units

but currently only 2 units are working. In Bijnor district, which covers Nazibabad, Noorpur & Dhampur areas, there are app. 165 licensed units but actual working units are only 32. The basic reason for closure of these industries is increase in numbers of sugar mills & raw material shortage as most of cane produced goes to the sugar mills. The local farmers prefer to sell their produce to the sugar mills as they get higher payment than the khandsari mills and that too quickly. Therefore, khandsari units get surplus cane only.

The process of khandsari manufacturing is of two types- sulphurisation and non-sulphurisation. The plant capacity depends on the process type involved. The units having non-sulphurisation process have crushing capacity between 45-70 TPD, whereas units with sulphurisation process have crushing capacity up to 600 TPD. Annual turnover and production for the year 2007-08 of the surveyed units for the khandsari units are shown in the figure 3.8a and 3.8b, respectively.

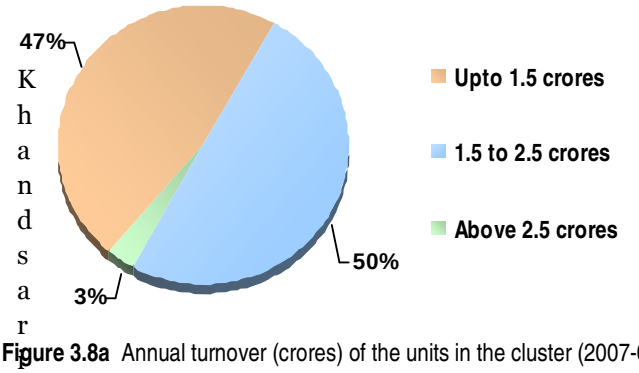

Figure 3.8a Annual turnover (crores) of the units in the cluster (2007-08)

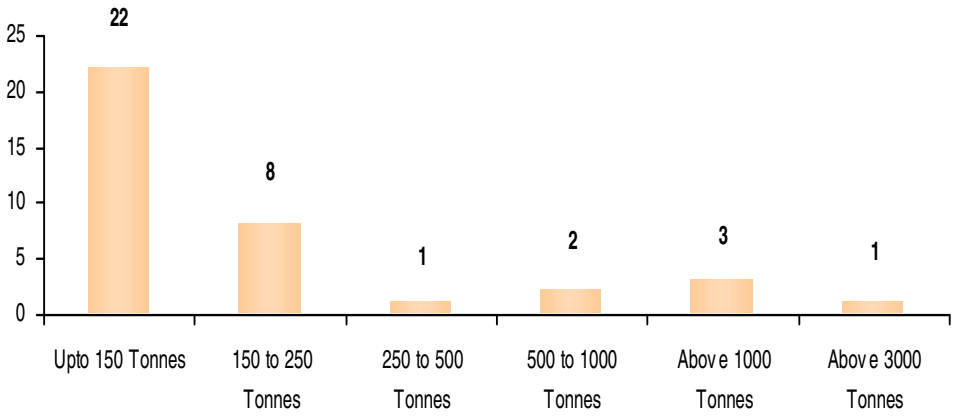

Figure3.8b Annual production (tonnes) of units in cluster

is a seasonal product (depending on the availability of sugar cane crop) and the units operate for 4/5 months (winter) in a year. Therefore, most of the unit owners have some other main

stream business. During the season the units are operating in 2 shifts or 12 hours shift.

The units use coal and electricity as the major source of energy. The energy cost is 12 to 15 % of the total production cost. Fuel and electricity consumption for the year 2007-08 in the cluster are given in table 3.8 below.

Table 3.8 Fuel/electricity consumption in the cluster during 2007-08

Fuel/electricity	*Quantity*
Electricity (million units)	2.46
LDO (kilo litres)	348
Bagasse	Not specified

3.9 Ratnagiri (Fish and Mango processing)

Ratnagiri is located in Maharashtra state, western part of India, and has 2 SME clusters, namely i) fish processing and ii) mango pulping. Both the clusters are discussed in details below-

3.9.1 Fish Processing

There are 7/8 units in this cluster which are engaged in fish processing. Ratnagiri District also has many fishing harbours which include Ratnagiri Jetty, Jaigad, Nate, Harnai, Deogad, Vengurla, Malvan, and Dabhol. The processing includes the cleaning, grading, freezing and packaging operations. The main energy consumers are freezing, cold storage and compressors. Energy cost is reported to be about 5% of the total production cost. Electricity supplied by the local electricity board is the source of energy for the cluster.

3.9.2 Mango processing

There are about 40 mango processing units in Ratnagiri district, spread over Ratnagiri, Pawas & Sangmeshawar area. 98% of the units are manufacturing mango pulp & remaining 2% are in the business of ready to eat/juice products. Main raw material is mango & sugar. It is a seasonal industry and main season is April to June. Manufacturing process is partially mechanized and major equipments are boiler, pulper, etc. The cluster gets power from Maharashtra State Electricity board for its energy need.

The cluster is using mainly coal, Chinese coke, low ash coke, fire wood, furnace oil, LDO, HSD, LPG and electricity to meet the energy requirements. The situation of electricity is not good and many units have power backup systems to generate electricity during the power cuts. Fuel and electricity consumption for the year 2007-08 in the cluster are given in the table 3.9 below.

Table 3.9 Annual energy requirement of the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	3.866
Chinese coke (tonnes)	1176
Coal (tonnes)	846
Low ash coke (tonnes)	7452
Firewood (tonnes)	27348
HSD (Kilo Litres)	8.5
LDO (Kilo Litres)	55.5
Furnace oil (Kilo Litres)	29.5
LPG (tonnes)	450

3.10 Tirupur (Textiles)

Tirupur textiles cluster is located in the state of Tamilnadu, southern part of India. This cluster is dominated by knitting, garment manufacturing, fabric, embroidery, and dyeing, bleaching units. Many of the units are operating as export houses. There is a high demand for the garments having hand and computer aided embroidery work.

The textiles cluster at Tirupur is spread across the town and there are more than 2000 units engaged in textiles related business. There are about 250 embroidery units in this cluster, which are catering to export requirements. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.10a, 3.10b and 3.10c.

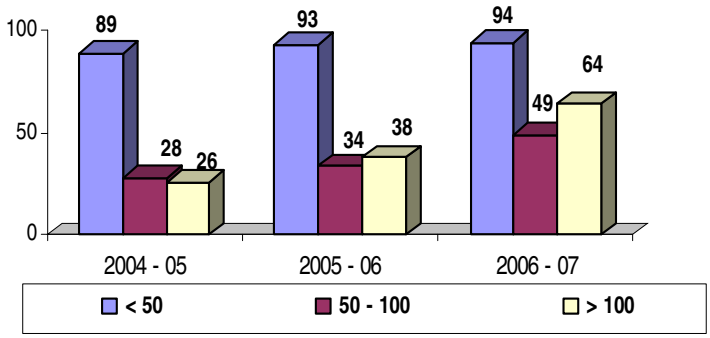

Figure 3.10a Annual turnover (lakhs) of units in the cluster

The cluster is using mainly coal, HSD and electricity to meet the energy requirements. The situation of electricity is not good and many units have power backup systems to generate electricity during the power cuts. Fuel and electricity consumption for the year 2007-08 in the cluster are given in the table 3.10.

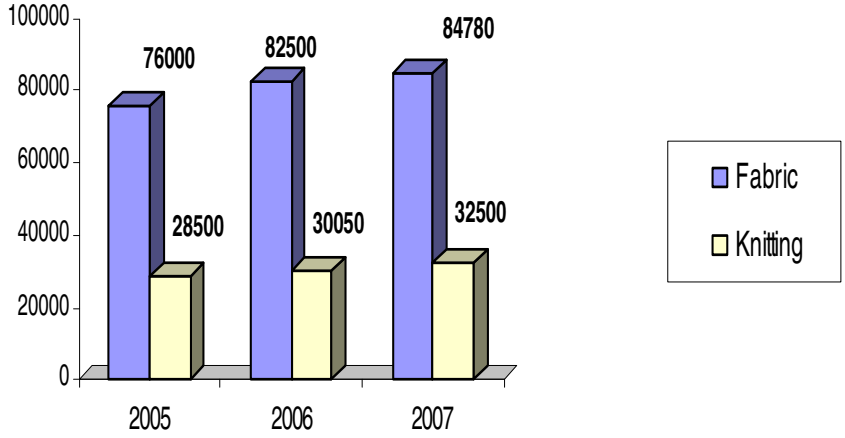

Figure 3.10b Annual production (tonnes) of units in the cluster

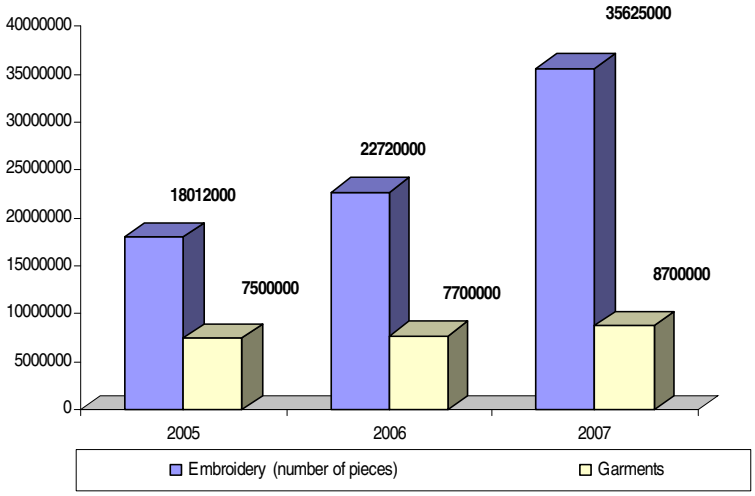

Figure 3.10c Annual production (in pieces) of units in the cluster

Table 3.10 Annual energy requirement of the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	125
HSD (Kilo Litres)	11700
Coal (tonnes)	370
Chinese coke (tonnes)	60
LDO (Litres)	125

3.11 Ahmedabad (Dyes & chemicals, pigments)

A dye, chemicals and pigment cluster in Ahmedabad is located in the state of Gujarat, western part of India. The cluster in Ahmedabad is spread across Vatwa – Phase-1-4, Odhav industrial area, Dudheshwar & Naroda industrial area. Finished products are generally chemicals, dyes & dyes intermediates, fine chemicals, food chemicals & foundry chemicals. Ahmedabad plays a vital role in rendering the commercial resources and market access for the economies of neighboring cities.

There are approximately 600 units in this cluster who are engaged in manufacture of various types of dyes & chemicals, pigments. Maximum units are operating in 1 to 2 shifts per day. Major raw materials used in the cluster include sulphuric acid, hydrochloric acid, acetylic acid, chlorine gas, benzene, sodium nitrate, pigments, soda, methylene, ethylene, ammonia, disulphonic acid, etc. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.11a and 3.11b.

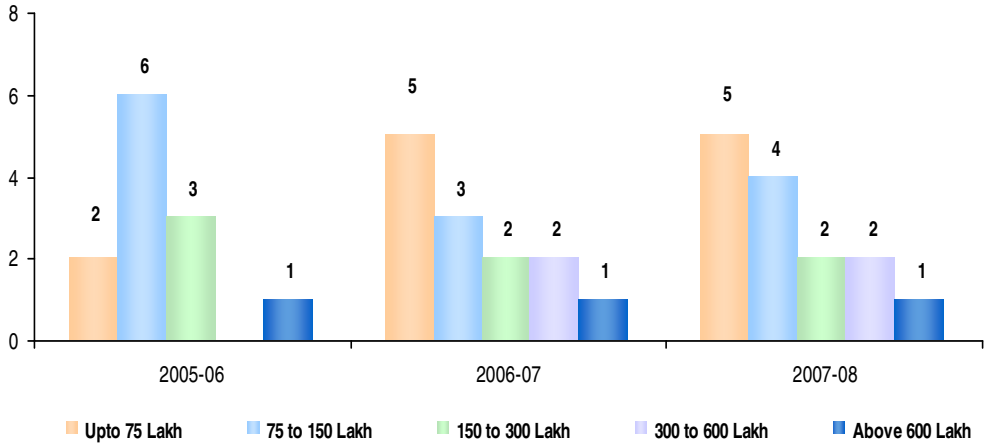

Figure 3.11a Annual turnover (lakh) of the units in the cluster

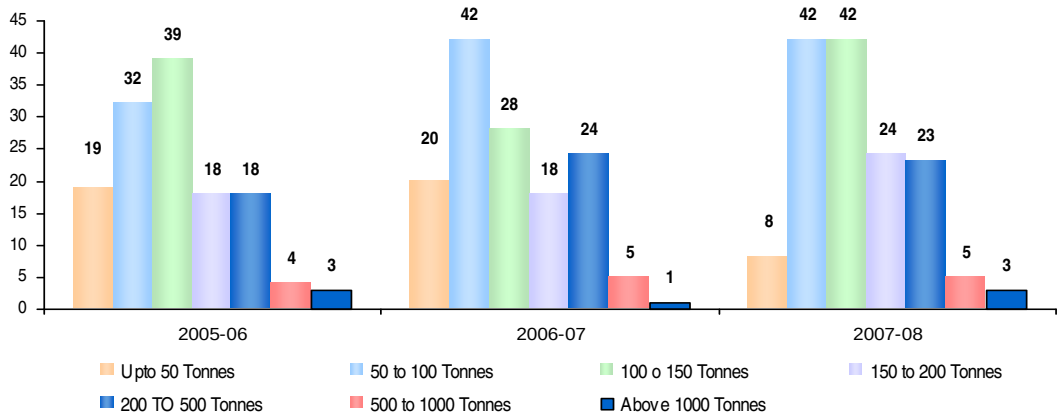

Figure 3.11b Annual production of the units in the cluster

Energy cost is 5 to 8% of the total production cost whereas the raw material costs as high as 65 to 70%. Major energy consuming equipments are pressure vessel, dryer, boiler & mixer. Piped natural gas, LDO, coal, biomass (firewood/husk) are used as fuel in the cluster and electricity is supplied by a private player. Fuel and electricity consumption in the cluster for the year 2007-08 is given in the table 3.11 below.

Table 3.11 Fuel/electricity consumption in the cluster during 2007-08

Quantity	*Energy/fuel type*
Electricity (million units)	6.14
Firewood / Husk (tonnes)	45534
LDO (KL)	299.76
PNG (1000 sm^3) {tonnes}	1307 {784.2}
Coal (tonnes)	3300

The major concerns/issues in the cluster are the pollution and effluent generated from the units. To tackle this problem, the Green Environment Co-operative was formed which collects the primarily treated liquid effluent and gives it the secondary treatment & proper disposal.

3.12 Jamnagar (Brassware)

Jamnagar is known as the hub of brass components and is located in the state of Gujarat, western part of India. The units in Jamnagar cluster are spread in the areas GIDC (Phase-1, 2), Patel Colony, M.P.Shah industrial area, Hapa industrial area & 46 Digvijay plot, etc. Major products are brass rods, fittings, profiles, castings, screw, nuts, washers, sections, etc.

There are about 1000 units in this cluster who are engaged in manufacture of various types of brass related products. Majority of the units in this cluster are family owned business, which

through experience and trials have grown over the years. All the units are using the locally available technology. Majority of the units normally work for 10-12 hours a day but few units are also running for all the 3 shifts. The major raw material is scrap, which is being imported and sometimes due to shortage as well as high price, the units are working partially. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.12a and 3.12b below.

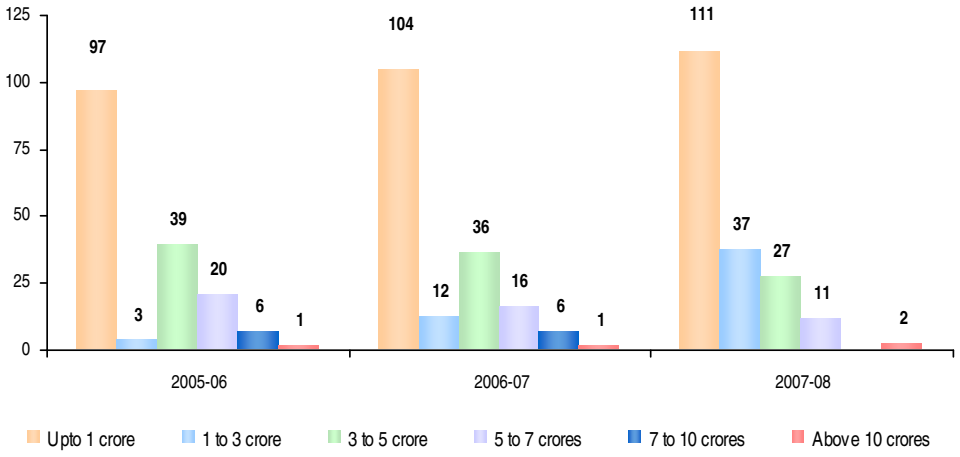

Figure 3.12a Annual turnover of the units in the cluster

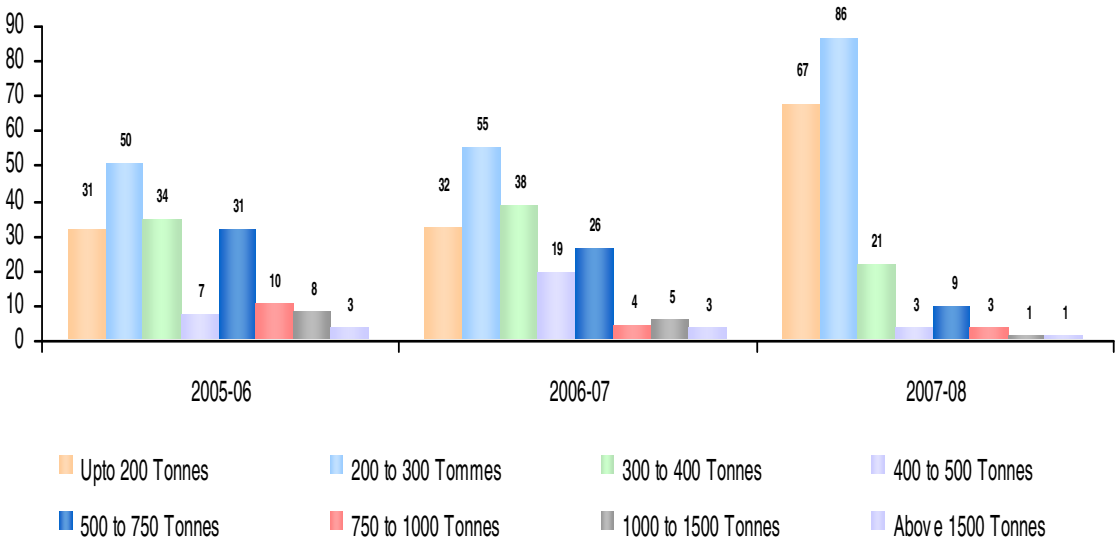

Figure 3.12b Annual production of the units in the cluster

The average energy cost in the cluster is about 15-20% of the production cost. Fuels used in the cluster are coal/coke and firewood. Electricity to the units in the cluster is supplied by the state electricity board. Major energy consuming equipments are blower, lathe machine, cutting machine/ pantograph, electric furnace, annealing furnace, etc. Fuel and electricity consumption in the cluster for the year 2007-08 is given in the table 3.12.

Table 3.12 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	16.28
Coal/coke (tonnes)	59777
Firewood (tonnes)	4425

3.13 Morbi (Ceramics)

Morbi ceramic cluster is located in the Saurastra region of the state of Gujarat, western part of India. Morbi is the heart of ceramic industry in India with more than 70% market share of the country. This cluster is spread over a stretch of 10 Kms on the Morbi – Dhuva highway. The major areas are on, Morbi 8-A National Highway, Lalpar, old Ghuntu road, Lakhdhirpur road, Dhuva road & Jambudiya area. The main products are vitrified tiles, floor tiles and wall tiles. The reason for flourishing ceramic business in Morbi is availability of raw material and suitability of local clay for ceramics making. Product from this cluster is also exported to many countries.

There are approximately 400 ceramic units in this cluster manufacturing different types of tiles. Majority of the units are family owned business and operate round the clock. Primary raw materials for the tiles are various types of clay, quartz, calcite / woolastonite, frits & glazes. Most of the raw materials are easily available in Gujarat and in the neighbouring state of Rajasthan. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.13a and 3.13b.

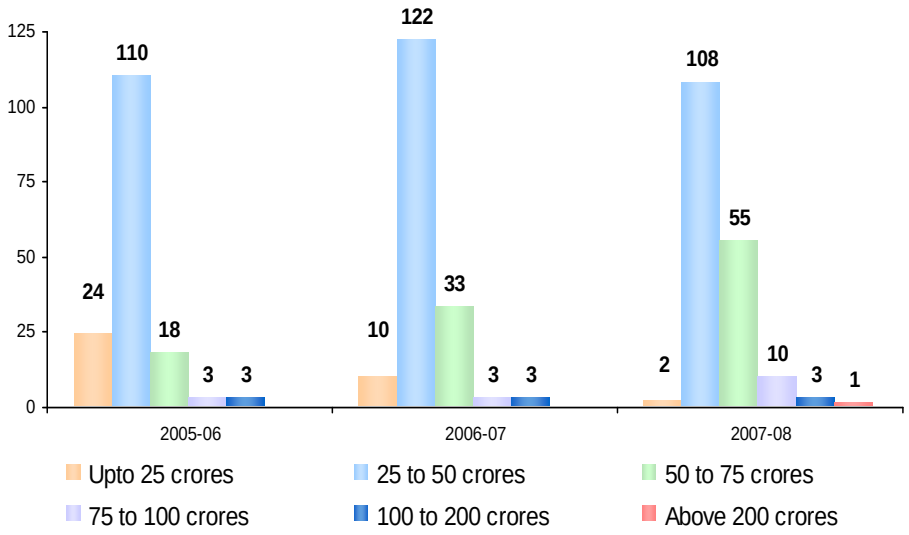

Figure 3.13a Annual turnover of the units in the cluster

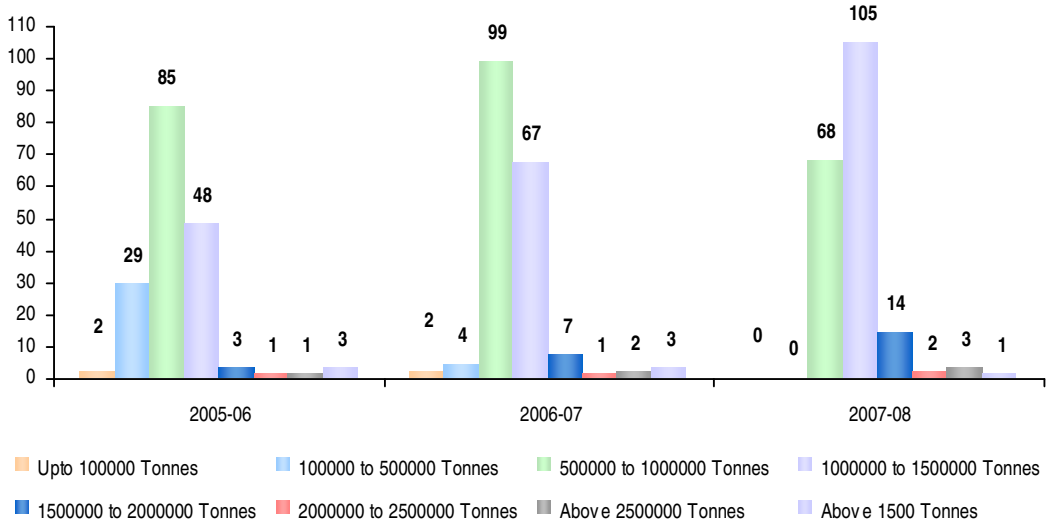

Figure 3.13b Annual production of the units in the cluster

Energy represents 30-35% of the total production cost. Firing of the tiles in the kiln is the major energy consuming operation, which is done using the piped natural gas (PNG). Other major energy consuming equipments in the process are press machine, boil miller, drier, etc. Major fuels used in the cluster are coal/coke, HSD, LDO, PNG, etc. For meeting their electricity needs, units in the cluster get it through local state electricity board. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.13.

Table 3.13 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	16.02
Coal / Hard Coke (tonnes)	102000
HSD (kilo litres)	6092.4
LDO (kilo litres)	1500.3
LNG (tonnes)	9360.9

3.14 Pali (Textile dyeing and printing)

The textile dyeing cluster in Pali is famous for using vibrant colour combinations for dyeing and block printing. There is a big demand for such products outside Rajasthan. The cluster is located in the state of Rajasthan, western part of India. The dyeing and printing units, in the district of Pali, are spread across Mandiya road, RIICO industrial area, Pali industrial area (phase – I/II/III), etc. The reason for such a large number of units in Pali is the availability of cheap labour and the suitability of ground water for dyeing & block printing. The peak season is during April to October.

There are about 400 units in the Pali cluster involved in dying & printing. All the units are family run businesses. On an average the units are running for 2 shifts a day. The major chemicals used in the process such as pigments, dyes, chemicals are sourced locally whereas the grey fabric (in some cases only), used for bleaching & dying, is sourced from Surat and Cochin. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.14a and 3.14b.

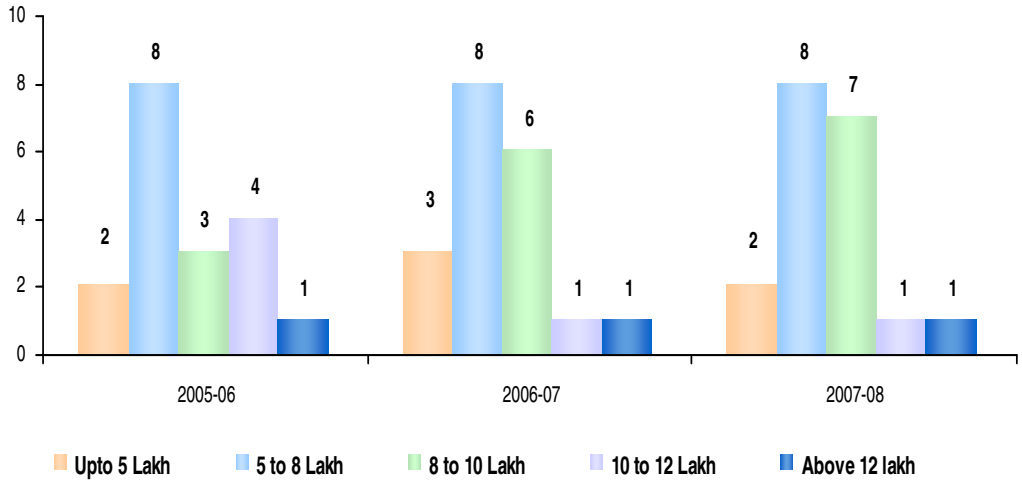

Figure 3.14a Annual turnover of the units in the cluster

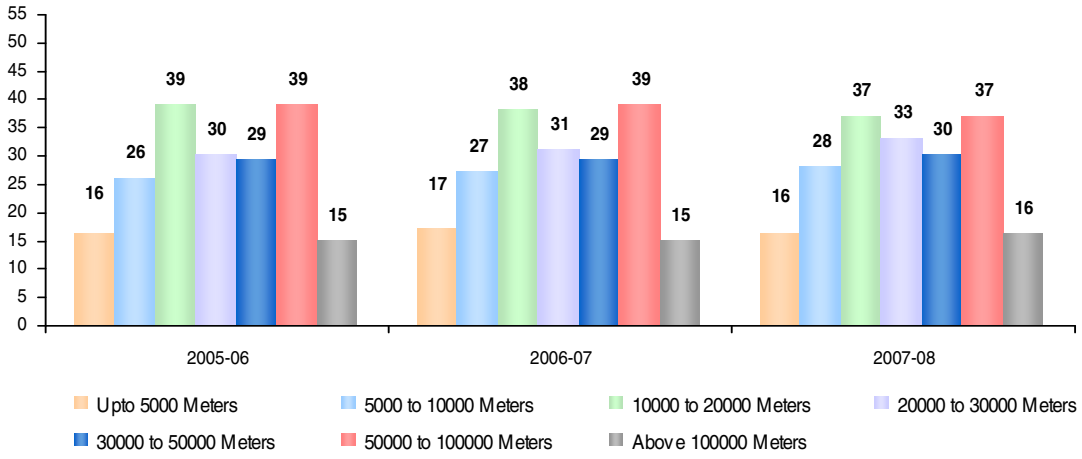

Figure 3.14b Annual production of the units in the cluster

The energy cost is about 20% of the total cost of production, which is second to raw material cost (60%) only. The major equipments used in the process are boiler, mixer, multi colour screen printing, jiggers, hot air stenter, etc. The major fuels used in the cluster are HSD, firewood/husk, lignite coal, petro coke, coal/coke, biomass, etc. For electricity, units have taken connection from local state electricity board. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.14.

Table 3.14 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	51.31
HSD (Kilo Litres)	89.64
Firewood / Husk (tonnes)	2716
Lignite Coal (tonnes)	16635
Petro Coal (tonnes)	11820
Coal / Coke (tonnes)	2967
SKO	Not specified
Biomass	Not specified

3.15 Surat (Textiles processing)

Textile processing cluster in Surat is located in the state of Gujarat, western part of India. Surat, an emerging city, is known as the textile city in the state of Gujarat. Textile industry is one of the oldest and the most widespread industries here and is associated with production of yarn as well as processing of fabric and jari & embroidery works. The textile units are spread across main industrial areas in Surat such as Sachin, Pandesara, Katodana, Palsana and Udhana.

There are approximately 550 textile processing units in this cluster who are engaged in textile processing. There are about 200 units of in Sachin, about 200 in Pandesara, about 100 units in Katodana and some 100 spread across Palsana & Udhana. All the operating units in the cluster are mechanized.

The primary raw material (grey cloth) is procured from local manufacturer/traders. Majority of the units are into dyeing and printing of grey fabric (cotton, viscose, synthetic, etc) but there are some integrated units also where the process includes yarn making to fabric to dyeing/printing and finishing. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.15a and 3.15b below.

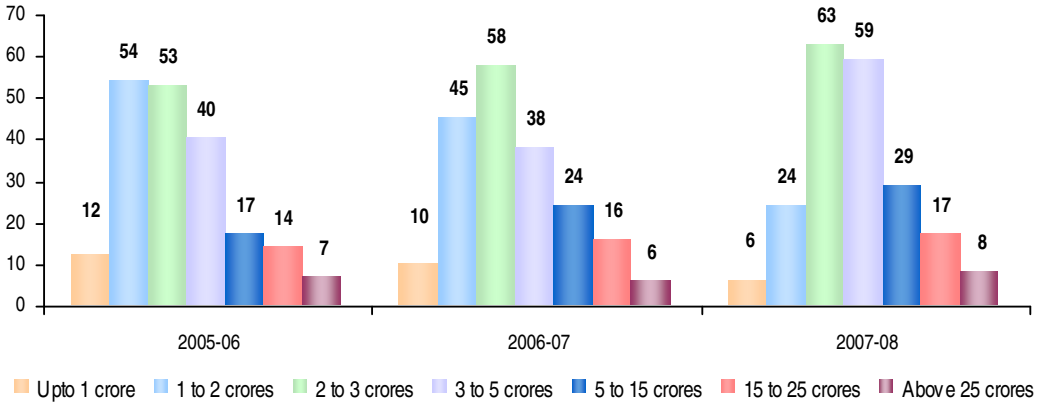

Figure 3.15a Annual turnover of the units in the cluster

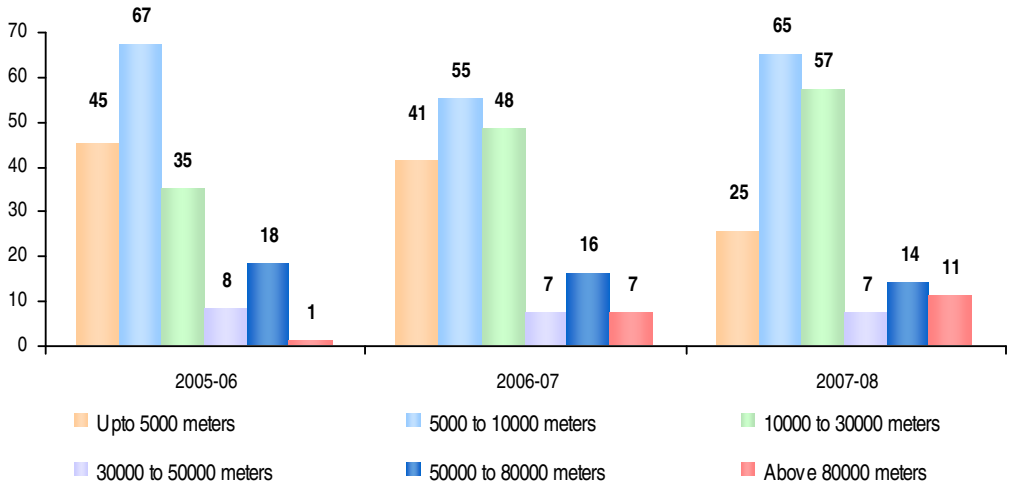

Figure 3.15b Annual production (meters/day) of the units in the cluster

Energy accounts for 12 to 15% of the total production cost. Major fuels used in the cluster are natural gas, lignite, coal/coke, HSD, LDO, etc. Electricity supply is from Gujarat

State Electricity Board and supply situation is good. Gas is supplied by Gujarat Gas Company Limited in the cluster and supply is not adequate. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.15.

Table 3.15 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	144.14
Coal / Hard Coke (tonnes)	378600
LDO (kilo litres)	7822.5
Lignite (tonnes)	297900
Natural gas (1000 sm^3)	19170
HSD (kilo litres)	2749.2

3.16 Solapur (Textile spinning)

Textile cluster in Solapur is located in the state of Maharashtra, western part of India. The cluster is mainly involved in spinning activity and the products are towels, napkins, bed sheets, etc. The units are also involved in yarn making from the cotton. The cluster is spread over Tilak road, Ashok chowk, MIDC, Akalkot road Kamtam Nagar. Majority of the units are in the cottage industry segment.

There are about 350 units in this cluster who are engaged in textile spinning. The units in the cluster are engaged in manufacturing towels, bed sheets as well as yarn. The units are working in general shift and use power looms for production. 2/3 units in the cluster have also opted for very advanced looms which are computer controlled and costly. The main raw material is cotton which the units are getting from local traders. The turnover for the year 2007-08 and the production of the surveyed units from the cluster are mentioned in the figure 3.16a and 3.16b below.

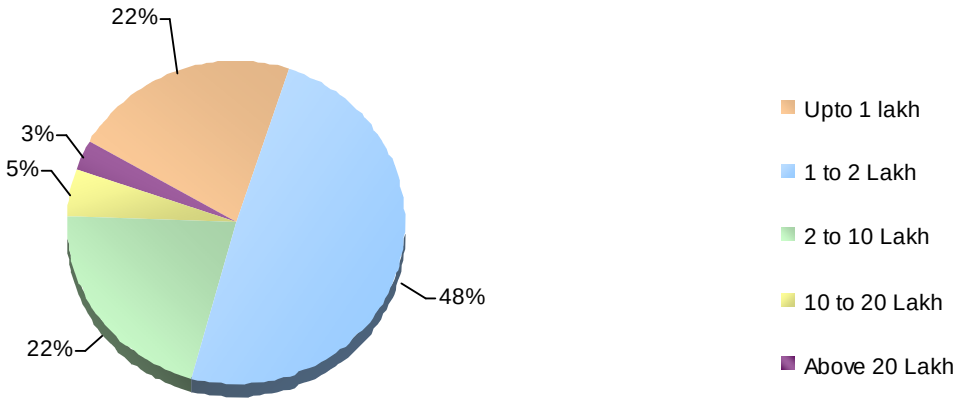

Figure 3.16a Annual turnover (for the year 2007-08) of the units in the cluster

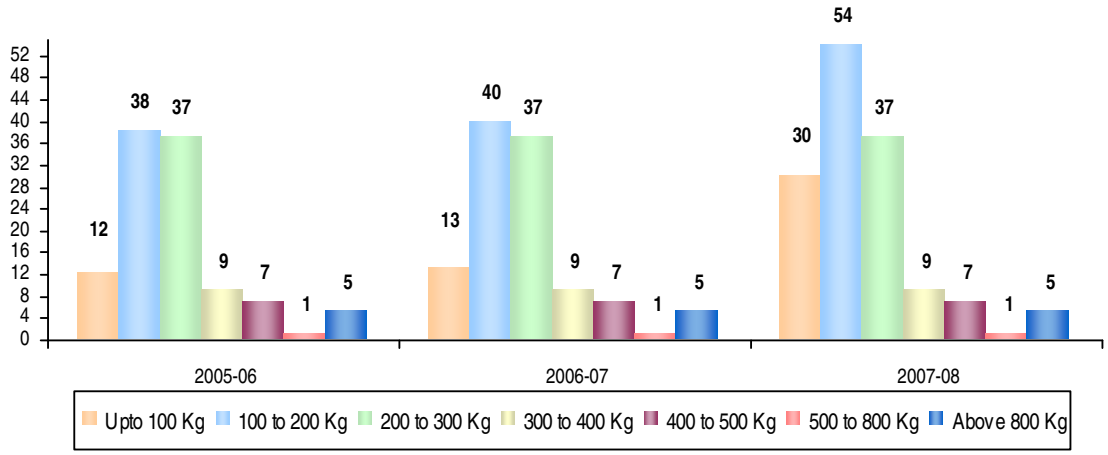

Figure 3.16b Annual production (kg/day) of the units in the cluster

Electricity and firewood are the major energy source for this cluster. Situation of power supply is not good and long power cuts are regular. Though many of the units have backup DG sets but they are not using it due to high diesel cost. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.16.

Table 3.16 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	6.40
Firewood (tonnes)	70209

3.17 Warangal (Rice processing)

Rice processing cluster of Warangal is located in the state of Andhra Pradesh (AP), south-eastern part of India. The units in the cluster are spread across Khamam, Nakkalpally road, Rajupet, IDA Rampur, Gorrekunta areas. Raw material here is paddy and the final products are raw and boiled rice.

There are about 125 small-scale units in this cluster wherein boiled rice as well as raw rice is manufactured. Majority of the units generally operate for one shift a day but some operate in 2 shifts per day. The major equipments employed in the industry are elevator, rubber sheller and polisher. Rice processing is seasonal in nature and the peak season is during October to February. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.17a and 3.17b.

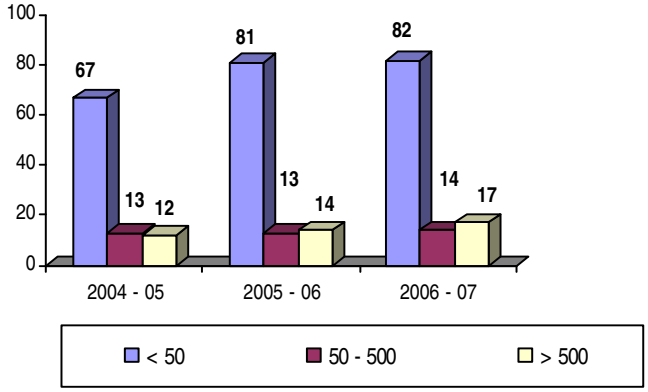

Figure 3.17a Annual turnover (in lakh)) of the units in the cluster

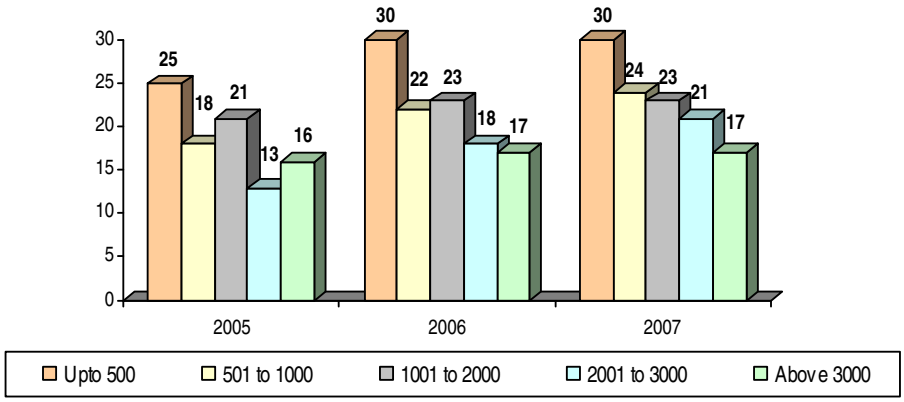

Figure 3.17b Annual production (tonnes) of the units in the cluster

The major fuels in the cluster are husk and firewood. Electricity is supplied by the state electricity board. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.17.

Table 3.17 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	8.85
Fire wood (tonnes)	30300
Husk (tonnes)	10650

3.18 Alwar/ Sawai Madhopur (Edible oil)

The edible oil cluster of Alwar and Sawai Madhopur is located in the state of Rajasthan, western part of India. The cluster is spread across industrial area, Khairthal, Tijara, Malgodam Road, Gangapur, Kherda, Gandhi Chowk, etc. The main product from the cluster is refined and expelled mustered oil. There are

kolhu and mechanized plants in the cluster for oil extraction from the mustered seed.

There are about 40 units are in Alwar and 50 units in Sawai Madhopur cluster who are engaged in extraction of edible oils. The cluster in Alwar is relatively new compared to Sawai Madhopur. The main raw material is mustard seed but other seeds such as Mahua, Arandi, Guava, etc. are also processed sometimes. The raw material is sourced from local mandi as it's the crop grown in deserts. The units are in operation in the general shift only except for some units which are running for 12 hours. The production of the surveyed units from the Sawai Madhopur and Alwar cluster are mentioned in the figure 3.18a and 3.18b, respectively.

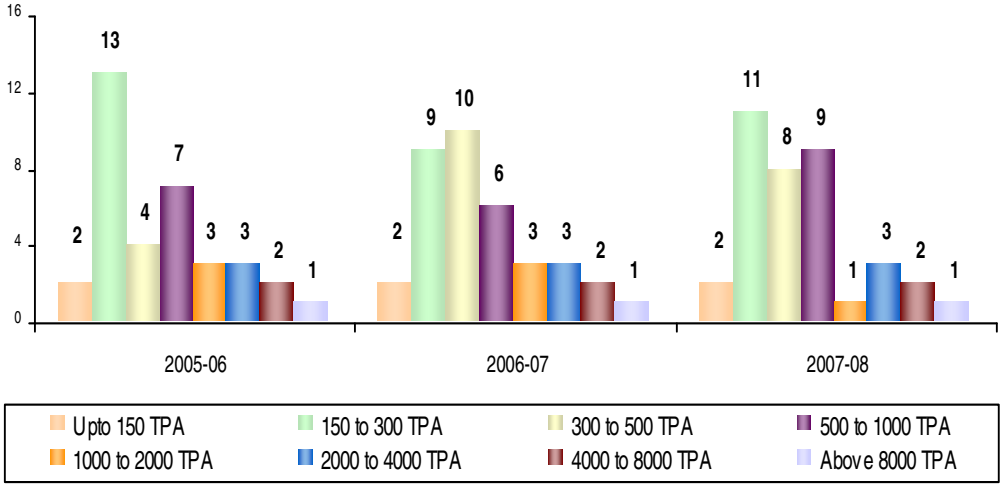

Figure 3.18a Annual production (tonnes) of the units in Sawai Madhopur cluster

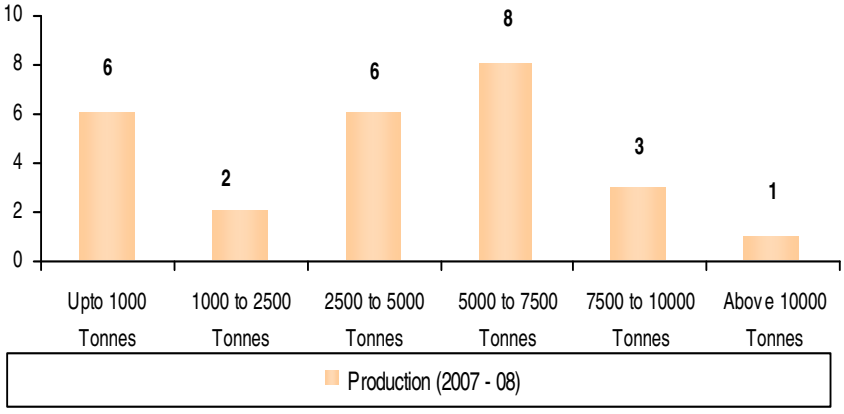

Figure 3.18b Annual production (tonnes) of the units in Alwar cluster

Coal, HSD and electricity are the main energy sources. Electricity is provided by Rajasthan State Electricity Board.

Power availability is a major issue as there are long power cuts upto 14-16 hours a day. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.18.

Table 3.18 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Sawai Madhopur	
Electricity (million units)	5.17
Alwar	
Electricity (million units)	4.97
Coal (tonnes)	1788

3.19 Bangalore (Machine component)

Machine component manufacturing cluster in Bangalore is located in the state of Karnataka, southern part of India. The units are spread over Peenya and Bommasandra industrial area. In the machine tool cluster there are no specific end products being manufactured, some units are engaged in making spares, accessories; some are engaged in assembly of major parts, components for CNC machines; etc.

There are approximately 75 units in this cluster, which are engaged in manufacturing various CNC machine components as well as normal machine components. The units are running one shift a day. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.19a and 3.19b.

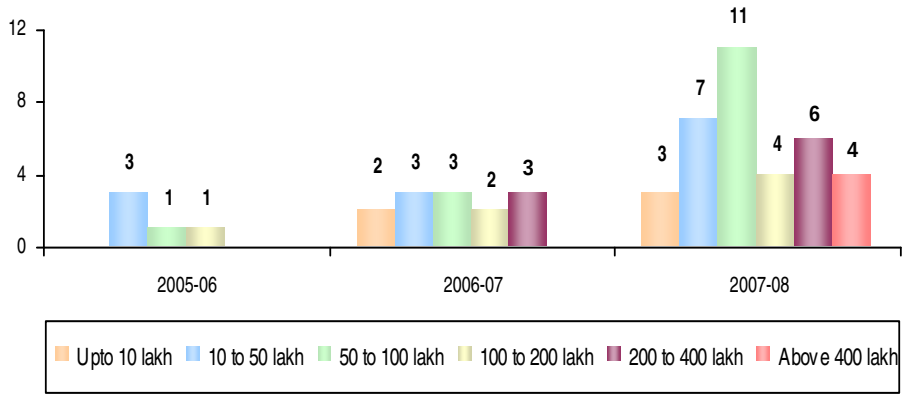

Figure 3.19a Annual turnover (in lakh)) of the units in the cluster

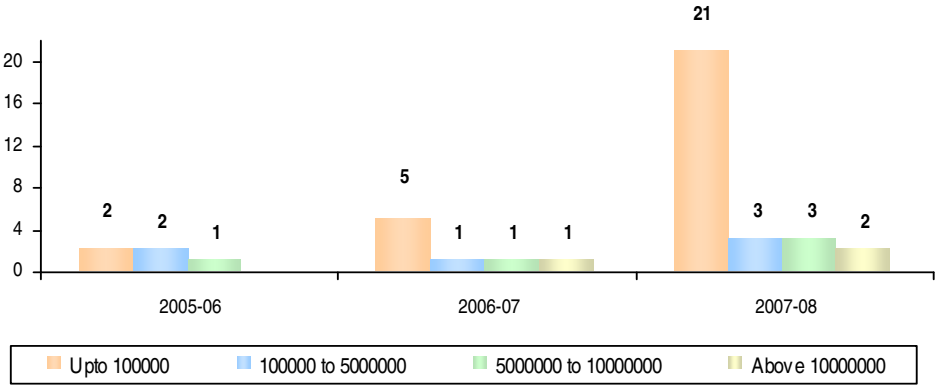

Figure 3.19b Annual production (pieces) of the units in cluster

Electricity and HSD are the major energy sources for this cluster. Situation of power supply is good. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.19.

Table 3.19 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	78.31
HSD (Litres)	200

3.20 Ludhiana, Jalandhar and Batala (Foundry)

Foundry clusters in Ludhiana, Jalandhar and Batala are located in the state of Punjab, northern part of India. Majority of the foundry units are in the small-scale sector and produce G.I. castings. The major locations wherein the units are spread are Focal point Phase 5 to 8, Janta Nagar, Bhagwan Chowk area & industrial area – A/B in Ludhiana; Dada Colony industrial area, Focal point, Focal point extn, Udyog nagar, I.D.C, Kapurthala road & Preet nagar in Jalandhar; and G.T. road, industrial area, Focal Point in Batala. The products manufactured in Ludhiana cluster are automobile parts, agricultural machinery, machine tool bodies etc. Batala cluster is known for producing lathe machines, milling/ pantograph, fan bodies, pump bodies etc.

There are approximately 105 units in Ludhiana, 200 units in Jalandhar and 135 units in Batala cluster, respectively, which are involved in foundry activities. All the units in Batala are in operation since last 30 – 35 years and use Cupola for melting as the normal production capacity of the units is 150 to 200 tonnes/month as compared to Ludhiana wherein only few units have equivalent production capacity. Units in Ludhiana are relatively new and owned as family business. Smaller units use induction furnace (0.5-1 TPH capacity) whereas large units use cupola (3-5 TPH). Main raw materials used are pig iron, steel

scrap, coke/coal, limestone, manganese & sand across the entire cluster. The turnover and the production for the year 2007-08 of the surveyed units from the clusters are mentioned in the figure 3.20.1a to 3.20.3b below.

3.20.1 Ludhiana

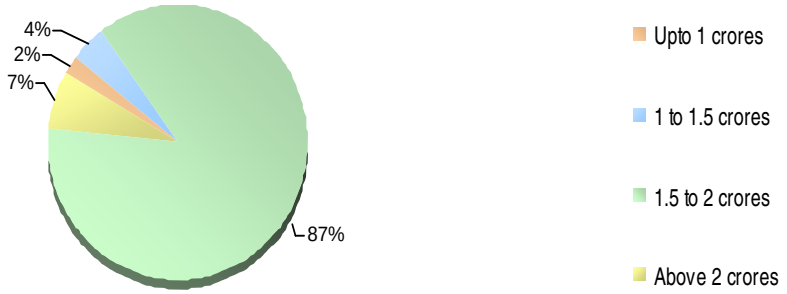

Figure 3.20.1a Annual turnover (crores) of the units in the Ludhiana cluster (2007-08)

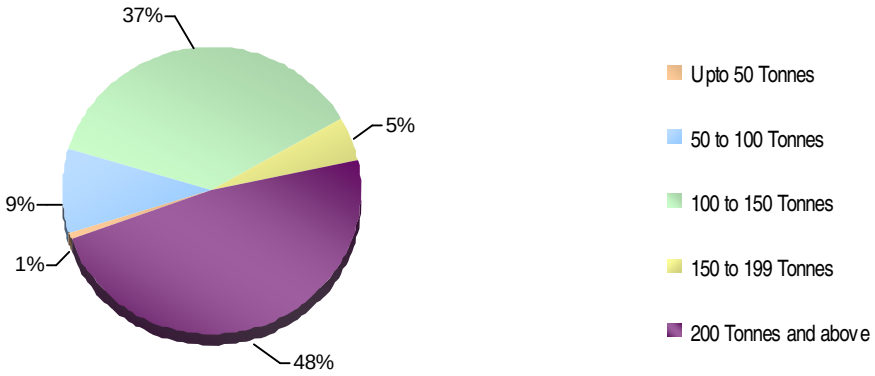

Figure 3.20.1b Annual production (tonnes) of the units in Ludhiana cluster (2007-08)

3.20.2 Jalandhar

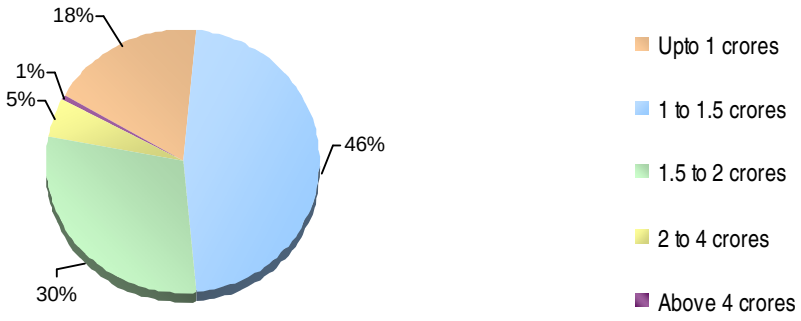

Figure 3.20.2a Annual turnover (crores) of the units in the Jalandhar cluster (2007-08)

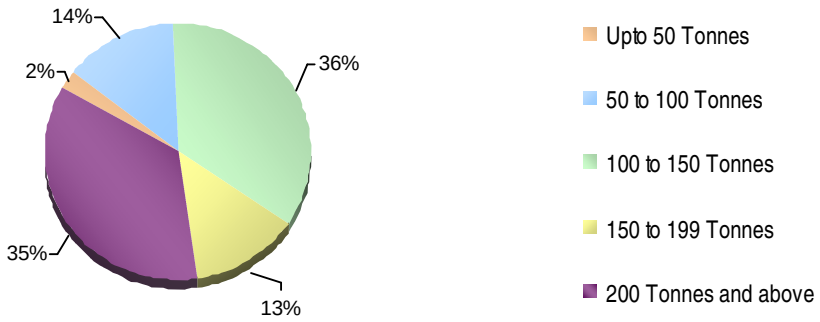

Figure 3.20.2b Annual production (tonnes) of the units in Jalandhar cluster (2007-08)

3.20.3 Batala

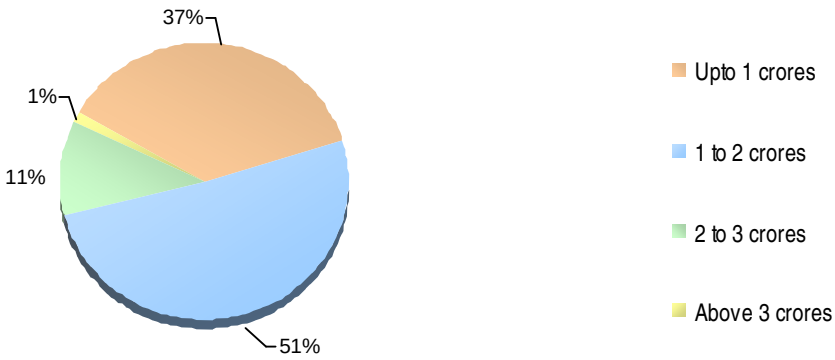

Figure 3.20.3a Annual turnover (crores) of the units in the Batala cluster (2007-08)

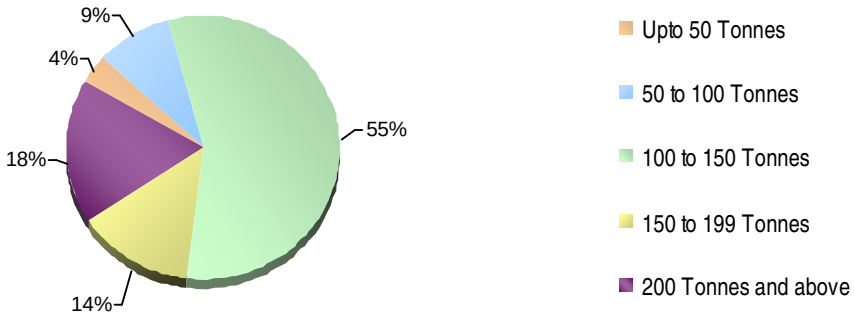

Figure 3.20.3b Annual production (tonnes) of the units in Batala cluster (2007-08)

The share of energy cost is 8 to 10% of the total production cost whereas raw material & consumables accounts for 80%. Electricity is supplied by Punjab State Electricity Board (PSEB) and every unit has taken HT connections. The fuel and electricity consumption in the all the 3 clusters, for the year 2007-08, is given in the table 3.20.

Table 3.20 Fuel/electricity consumption in Ludhiana, Jalandhar and Batala clusters during 2007-08

	Quantity		
Energy/ fuel type	*Ludhiana*	*Jalandhar*	*Batala*
Electricity (million units)	3.64	6.87	5.1
Coal / Hard Coke (tonnes)	22944	42202	32292
LDO (Kilo Litres)	23.1	39.07	36.132

3.21 Bhimavaram (Ice making)

Ice making cluster in Bhimavaram is located in the state of Andhra Pradesh, south-eastern part of India. The units in this cluster are spread across West Godavari as well as Veeravasam Nagar, Hundi Road, etc. These units are manufacturing ice slabs, cubes and crushed ice. Main customers for the units in this cluster are sea food industry as well as exporters.

There are about 33 units in the cluster and most of them operate in single shift except a few who have direct tie up with export house and operate 3 shifts a day. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.21a and 3.21b.

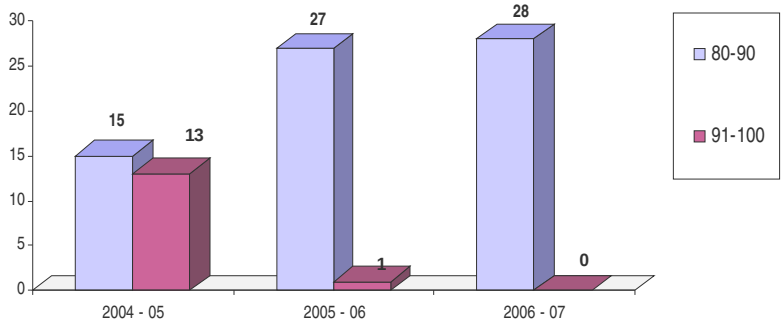

Figure 3.21a Annual turnover (lakh) of the units in the cluster

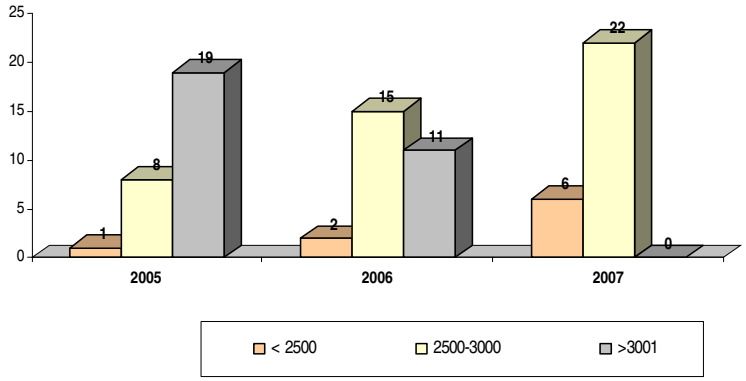

Figure 3.21b Annual production (tonnes) of the units in cluster

Electricity is the source of energy and the total consumption in the cluster during 2007-08 is 0.24 million units. Major energy consumer in a ice plant is the compressor. The electricity consumption range by the units in the cluster, for the year 2007-08, is given in the figure 3.21c.

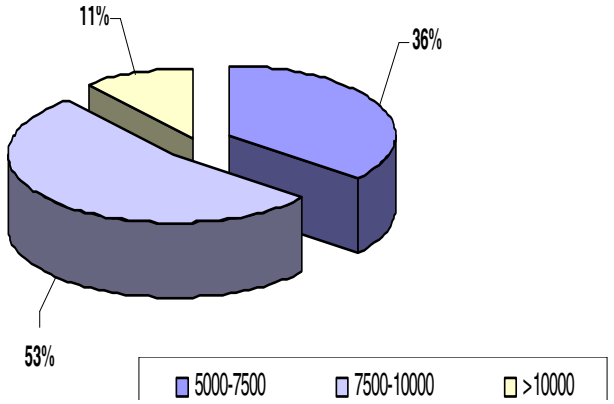

Figure 3.21c Electricity consumption (units) by the units in

3.22 Bhubaneshwar (Brassware)

The brassware cluster in Bhubhneshwar is located in the state of Orissa, eastern part of India. The units are located within the 15 KM radius of Bhubhneshwar, mainly in the areas called Balakati, Pratap Sasan, Rathijema and Bainchua. The products manufactured in the cluster are lota, thali, lamp, worship idols, stands, etc. The production capacity and turnover from the units range between 4-10 tonnes and Rs. 3-7 lakhs per annum, respectively.

There are about 44 units involved in manufacturing of brass items. Now this activity is slowly dying down and is restricted to certain tribes/communities. This work is seasonal in nature and units do not run throughout the year. These units operate mainly before the festive season when orders are plenty.

Since this is low value family run business, institutional financing is difficult for the units in the cluster. Only few could avail the loan and that too from Grameen Banks only. As brassware industry in Bhubhneshwar falls in unorganized sector and has no association there is no one to hear their issues/problems, as conveyed, and the industry is gradually dying. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.22a and 3.22b.

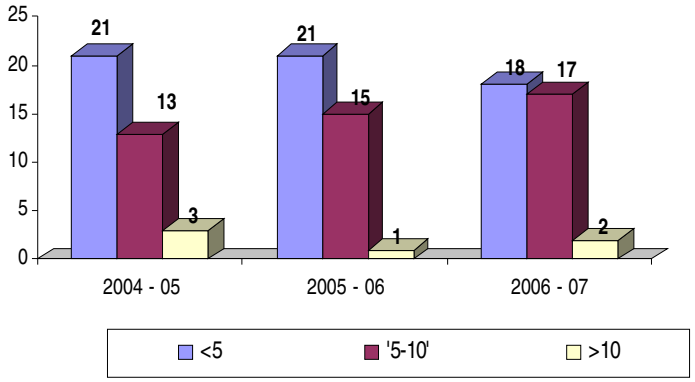

Figure 3.22a Annual turnover (lakh) of the units in the

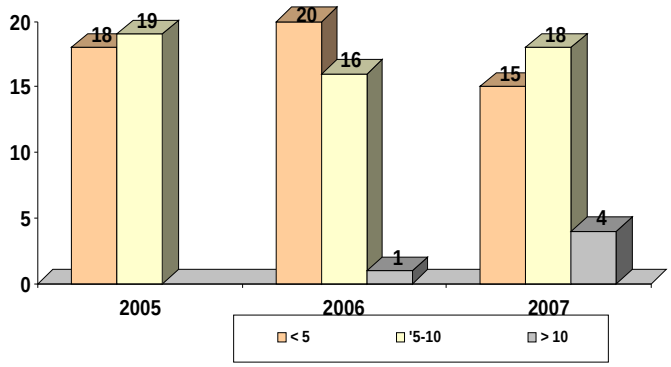

Figure 3.22b Annual production (tonnes) of the units in cluster

The energy consumption in the cluster is negligible as there is no major equipment consuming large energy. Only a buffing machine is used which is basically a polishing wheel. Other than this a small chulha is also used to melt the metal. Hard coke is used as fuel and the annual consumption is about 438 tonnes.

There is an urgent need for developing an energy efficient technology that can replace their traditional techniques and institutional mechanism to demonstrate/disseminate the developed technology.

3.23 East & West Godavari (Fire brick and refractory)

Fire brick and refractory cluster in East & West Godavari is located in the state of Andhra Pradesh, south-eastern part of India. The units in East Godavari are located in Rajhamundry and spread across Morampudi and Dowelswarm within a radius of 5 kms from Rajhamundry. The units in West Godavari are spread across Chebrolu, Bhimdole, Dwarka Tirumala, and Timmaya Palem road. The units are manufacturing various grades of firebrick from fire clay, which is widely used as refractory insulating bricks for maintaining consistent temperature in the furnaces, kilns, fireboxes and fireplaces. These are built primarily to withstand high heat and also find applications in extreme mechanical, chemical, or thermal stresses.

There are approximately 25 kiln units in East Godavari and about 20 units in West Godavari cluster engaged in manufacture of various types of firebricks and other refractory materials. These units operate in general shift for 8 –10 hours a day and not functioning throughout the year because of lower demand. All the units are semi mechanized in nature and use locally available technology. The major equipments are Draught Kiln (DD kilns, as locally called), besides this a Grator, Muller Mixer, hammer press, etc. Plants operating at 30-50 tonnes per month capacity are having 2/3 DD kilns whereas the plants operating at 400 to 500 tonnes per month (in East Godavari cluster) are having 7/8 DD kilns. The turnover and the production of the surveyed units from the clusters are mentioned in the figure 3.23.1a to 3.23.2b.

3.23.1 East Godavari cluster

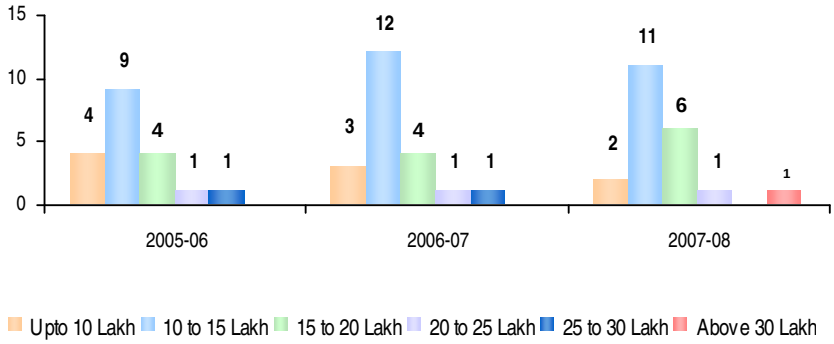

Figure 3.23.1a Annual turnover (lakh) of the units in the East Godavari cluster

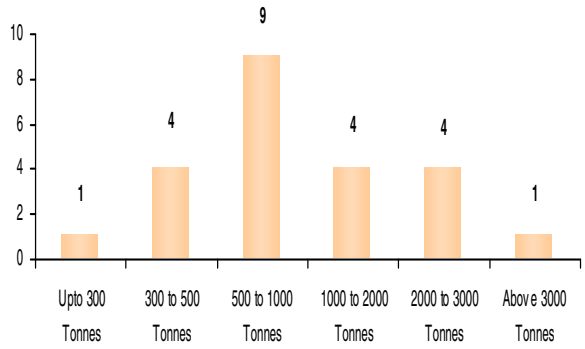

Figure 3.23.1b Annual production (tonnes) of the units in the East Godavari cluster (2007-08)

3.23.2 West Godavari cluster

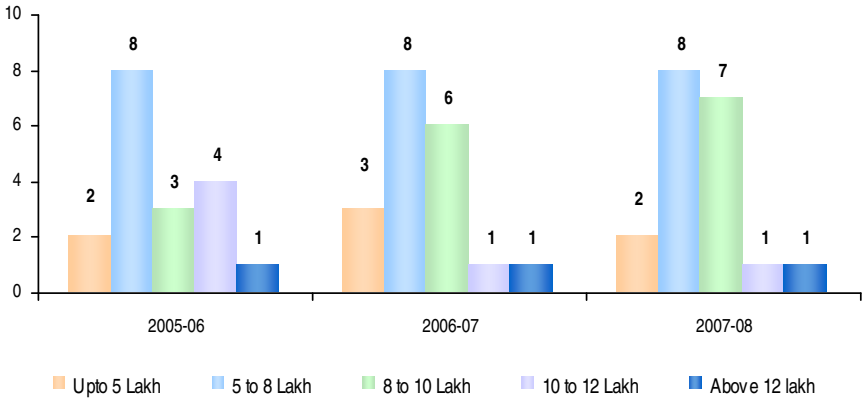

Figure 3.23.2a Annual turnover (lakh) for the units in the West Godavari cluster

Figure 3.23.2b Annual production (tonnes) of the units in the West Godavari cluster (2007-08)

The energy cost is about 30 to 35% of the total production cost. Electricity, coal/hard coke fire wood, husk, etc are the source of energy in both the clusters. All the units in these clusters are having grid connection and power availability is not a problem as the duration of power cuts is about 30 – 40 minutes per day only. The fuel and electricity consumption in both the clusters, for the year 2007-08, is given in the table 3.23.

Table 3.23 Fuel/electricity consumption in East and West Godavari clusters during 2007-08

	Quantity	
Energy/fuel type	*East Godavari*	*West Godavari*
Electricity (million units)	2.05	1.70
Coal / Hard Coke (tonnes)	33084	21840
Firewood/Husk (tonnes)	6480	1560

3.24 Ganjam (Rice milling)

Rice milling cluster in the district of Ganjam is located in the state of Orissa, eastern part of India. The rice mills are spread across Ganjam, Behrampur, Khusabadi, Konkarda, Gosaninuagaon, etc. The operation of this cluster is seasonal in nature. The entire produce of this cluster is being sold to Food Corporation of India (FCI). The turnover of units in this cluster varies in a great range. Most of the units fall in the range of 10-50 lakh turnover range but there are few units having annual turnover as high as Rs. 4 crores. Plant capacity in this cluster ranges from 5 to 45 tonnes per annum with most of the units falling in range of 15-30 tonnes per annum.

There are about 231 registered units in the cluster. Most of the units are mechanized and operating in 2 shifts per day. The major equipments are sheller, sorter & polisher (whitener). The raw material (paddy) is supplied by local traders and farmers. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.24a and 3.24b.

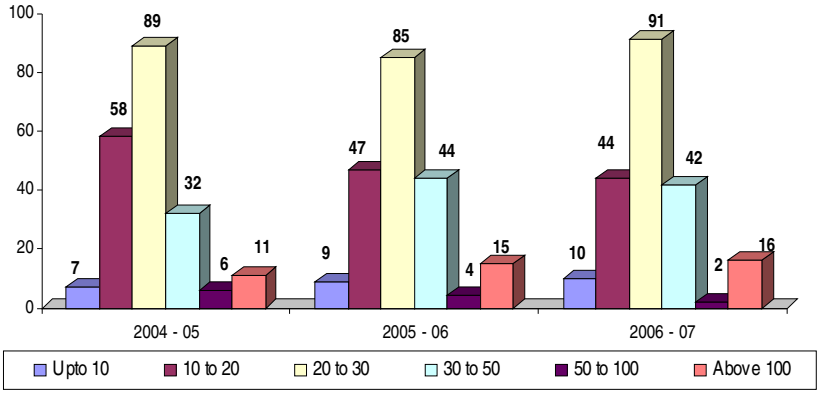

Figure 3.24a Annual turnover (lakh) of the units in the cluster

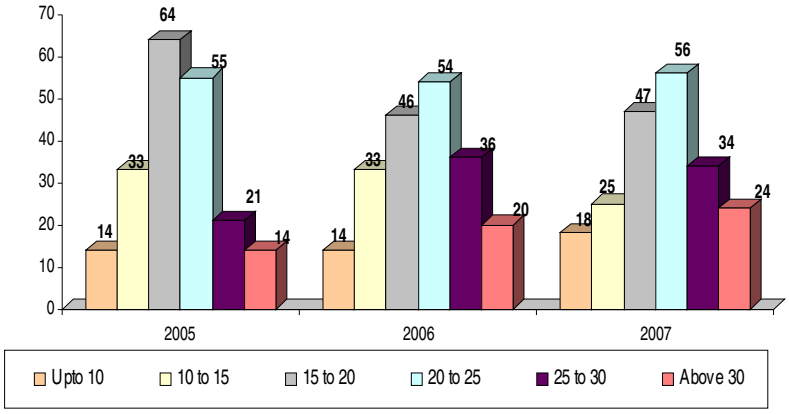

Figure 3.24b Annual production (tonnes) of the units in the cluster

Major energy consumers in the rice milling units are boiler and electric motors. Electricity, supplied by the local state electricity board, and rice husk, generated internally, are two major source of the energy in the plants. Electricity consumed in the cluster during the 2007-08 is about 3.5 million units. It was also reported that none of the units surveyed was having DG set and in case of power failures, a daily routine, the units remain idle.

3.25 Gujarat (Dairy)

The state of Gujarat is the leading state in the country for milk production and processing. North Gujarat, particularly, is one of the major hubs in milk processing. The main milk producing and supplying areas are Viramgam, Dehgam, Katodan, Dhanduka, Kapadvanj, Bayad, Dhansura, Shamalji, Idar, Khed brahma, Prantiz, Kheralu, and Kadi. Asia's second largest dairy 'Dudhsagar Milk Cooperative Dairy' and largest market yard 'Unjha' are located in Mehsana, Gujarat. At village level 12,057 Milk Co- operative societies, 43 chilling centers and 13 dairy processing units at district level (Dairies) are functioning in the state. On an average the total milk collected is 76.49 lakh liters per day (LLPD) for processing. The Dairy cluster does not fall under the SME category as the minimum processing plant cost is approximately Rs. 40 to Rs. 50 crores.

In North Gujarat 7 to 8 processing units are located, working round the clock. Majority of the plants are functioning from 15 to 20 years with expansions as well as modernization in the past. Milk is collected from local villages/milk co-operative societies and chilled in the chilling units having the capacity in a range of 30000-200000 litres per day. The chilling units normally work in 2 shifts per day. The chilled milk is sent to the milk processing plants for further processing.

The major energy consumers in a milk plant are boiler, refrigeration system, electrical equipments, etc. Furnace oil and electricity, from the local power supplying company (Gujarat State Electricity Board), are the major source of energy. Power consumption in the cluster is reported to be 473 million units for the year 2007-08.

3.26 Howrah (Galvanizing and wire drawing)

The galvanizing and wire drawing cluster in Howrah are located in the state of West Bengal, eastern part of India. The wire drawing units are scattered across Jalan, Domjur, Dhulagarh, Alampur, Liluah, Chamrail areas. The galvanizing units are located in different parts such as Salap More, Ratan Haldar lane, Noor Mohammad Munshi lane, Ghusuri etc. Wire drawing units are involved in five main processes which are thick wire drawing, intermediate wire drawing, medium wire drawing, fine wire drawing, and enameling, whereas the products used for galvanizing are pipes/rods, nuts/bolts, channels, angles, sockets, etc. The major customers for these products from the cluster are the manufacturers of motor, transformer, instruments, magnetic coils, ballast, fan, etc.

Both types of units are facing the challenge to survive. The major issue which is plaguing this cluster is that it doesn't have regular flow of orders and working on job basis, except few large integrated pipe manufacturers. Under these circumstances it's difficult for the units to survive for long with the escalating raw material prices. Though as per the DIC and the census carried out in 2001, 96 wire drawing units were registered and in operation but as on date about 60 units were found running. Similarly, there are 70 registered galvanising units as per the census in 2006 and about 45 are working now. Also, the galvanizing units are termed as the red industry due to effluent discharge related issues and are constantly under the threat of closure. The other reasons for the closure as told by the local association are power problem, labour problem and high cost of raw material. The units are operating in single shift only except for some high volume units, which operate for 2 shifts. Majority of the units in the cluster are manually operated and have a capacity utilization of about 30% only. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.26.1a to 3.26.2b.

3.26.1 Wire drawing units

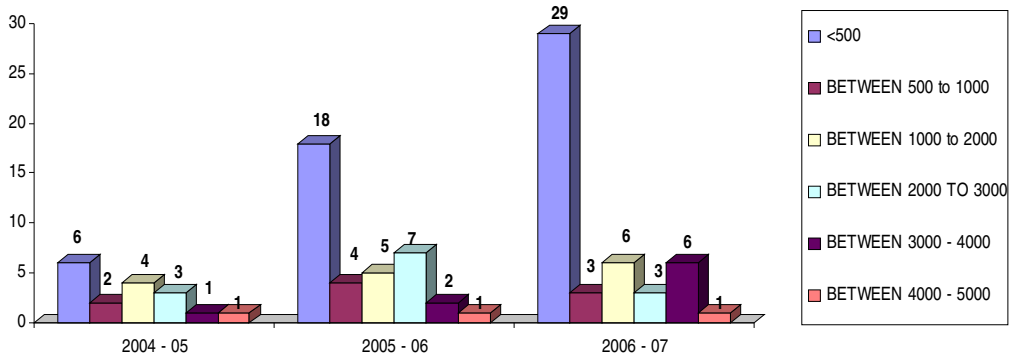

Figure 3.26.1a Annual turnover (lakh) of the units in the wire drawing cluster

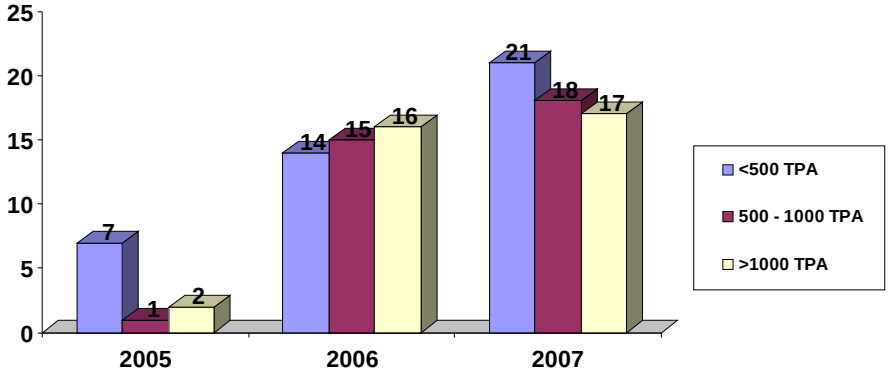

Figure 3.26.1b Annual production (tonnes) off the units in the wire drawing cluster

3.26.2 Galvanizing units

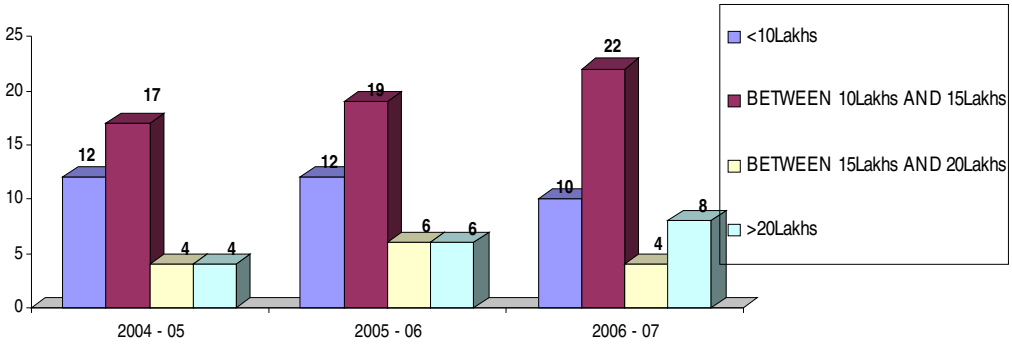

Figure 3.26.2a Annual turnover (lakh) of the units in the galvanizing cluster

Wire drawing units use electricity whereas galvanizing units need fuels (coal/LDO/HSD) and electricity to meet its energy

requirements. Galvanizing units consume about 25000 units per month (without the operation of effluent treatment equipments). The fuel and electricity consumption in both the clusters, for the year 2007-08, is given in the table 3.26.

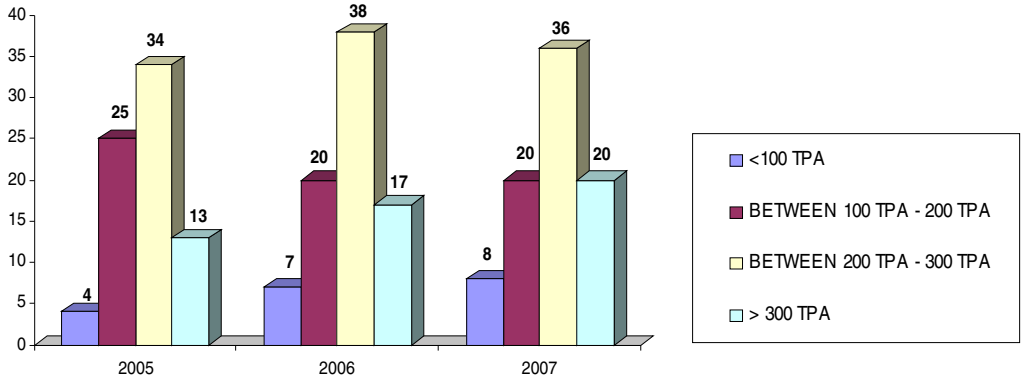

Figure 3.26.2b Annual production (tonnes) of the units in the galvanizing cluster

Table 3.26 Fuel/electricity consumption in wire drawing and galvanizing clusters during 2007-08

	Quantity	
Energy/fuel type	*Wire drawing*	*Galvanizing*
Electricity (million units)	7.5	0.25
Coal (tonnes)	0	90000
HSD/LDO (Kilo Litres)	0	2100

3.27 Jagadhri (Brass and aluminium)

Brass and aluminium cluster in Jagadhri is located in the state of Haryana, northern part of India. The town was earlier very famous for its brassware, aluminium works and stainless steel utensils but the brass work is not in much practice nowadays due to high cost. Subsequently Jagadhri entered into, and made its mark in high quality stainless steel products. In addition to this Jagadhri has also entered into a new business in the last decade like trading timber. The main areas where units are located are Jagadhari Railway road, Jaroda gate, Jesco colony, Gopi Sankar link road, Mukherji Nagar, Nanakpur Industrial area, Hanuman gate, New Chhachhrauli road & Kalyan Nagar etc.

It is also conveyed that this industry is facing a crisis because of the policies of the state and Central Governments. The Central Sales Tax (CST) on this trade is raised from 1 to 4%, affecting the profitability to a large extent. Also, the state government had declared this industry as small scale industry (SSI) whereas

the Central Government did not provide any such facilities under the SSI scheme, as conveyed, and due to this industry is paying heavy duty/tax and not able to compete with the large scale industries.

Earlier there were about 750 small units in and around the Jagadhri town manufacturing brass, aluminium & stainless steel products. Presently there are about 150 units operating only. Maximum units are functioning since 15 to 20 years. Majority of the units function in one shift and the entire process, by and large, is manual. There are a handful of units (4-6 units) in Main Bazar & Gauri Shankar road which are having furnaces and rolling mills for making Aluminum & SS sheets. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.27a and 3.27b.

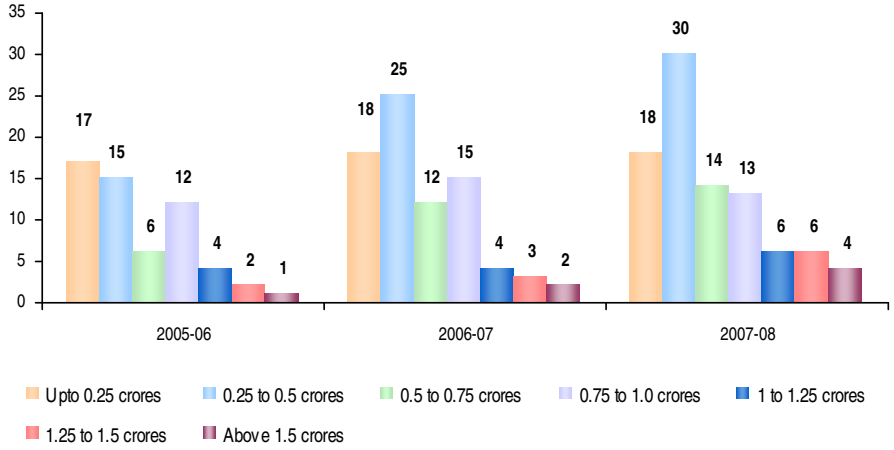

Figure 3.27a Annual turnover (crores) of the units in the cluster

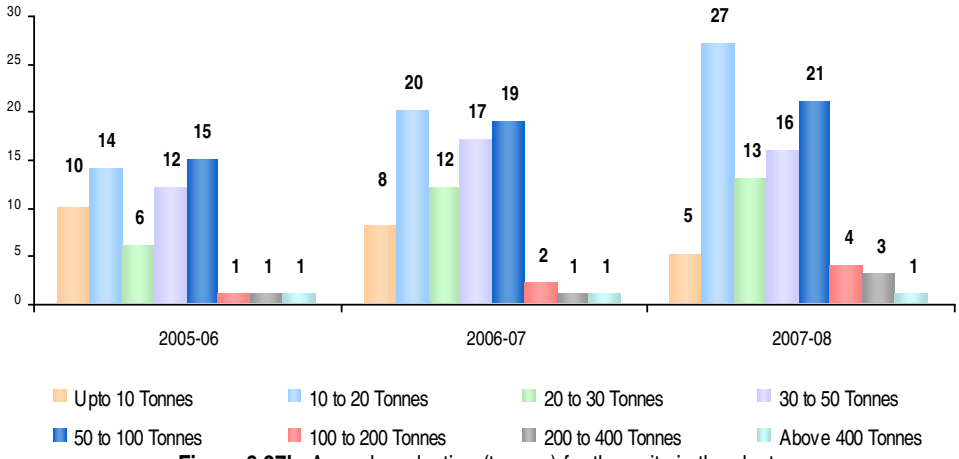

Figure 3.27b Annual production (tonnes) for the units in the cluster

In case of units making utensils, the energy cost is hardly 5% of the total production cost as they are using hand tools and moulds, frames for preparing the utensils of different sizes & shapes. In the units which are making sheets, cost of energy accounts for 12 to 15% of total production cost. Coal/hard coke, HSD, furnace oil, firewood, etc. are the major fuel used by the industry. Electricity is supplied by the state owned distribution company. Major energy consuming equipments are furnaces, rolling machines, motors, etc. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.27.

Table 3.27 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	9.85
Coal / Hard Coke (tonnes)	11533
Firewood (tonnes)	2514
HSD (Kilo Litres)	268.9
Furnace Oil (Kilo Litres)	76.9

3.28 Jodhpur (limestone)

Limestone cluster in Jodhpur is located in the state of Rajasthan, western part of India. The units are spread across Barunda – Gotan road, Pipar city, Jawasia, Pullu road, Gorawat road, Merta road, Ransi & Khejedla, all are falling under Jodhpur district. The end product is manufacture in 2 physical forms, namely; 1) granular- for industrial use, and 2) powder- for white washing.

In all, there are about 79 units spread across the district. All the units are operating in general shift and are non-mechanized in nature. The units are operating, largely, on contract basis (through a contractor) with unskilled labourers. The only equipment used is locally fabricated fire brick furnace of various capacities (10 /12/14 tons). The turnover and the production, for the year 2007-08, of the surveyed units from the cluster are mentioned in the figure 3.28a and 3.28b.

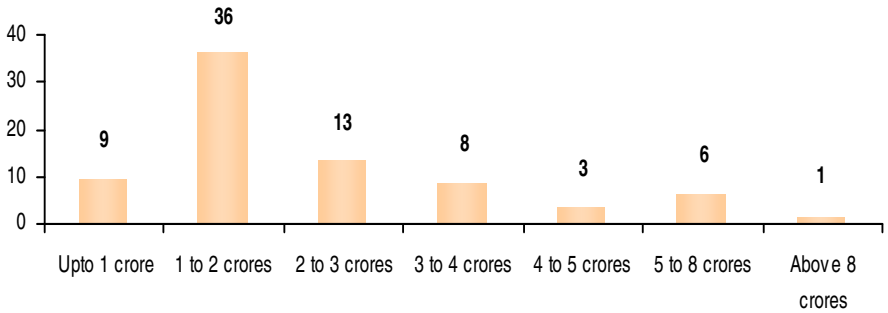

Figure 3.28a Annual turnover (crores) for the units in the cluster (2007-08)

Coal/hard coke is the major fuel used for firing in the kiln. The average energy cost is about 40-45% of the total cost. All the units have also taken the electricity connection from Rajasthan

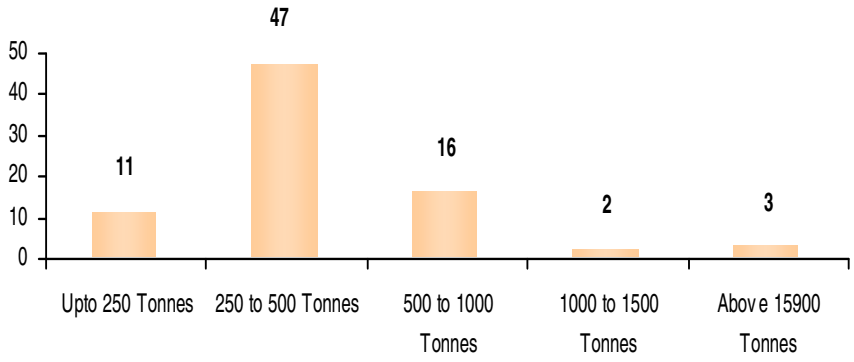

Figure 3.28b Annual production (tonnes) for the units in the cluster (2007-08)

State Electricity Board (RSEB). Quantity of coal/hard coke consumed in the cluster is reported to be about 11142 tons for the year 2007-08.

3.29 Jorhat (Tea processing)

Tea processing cluster at Jorhat is located in the state of Assam, north-eastern part of India. Jorhat is famous for its tea gardens. There are about 55 operating units in the cluster and their processing capacity varies from 200 kg to 1,000 kg per day. The manufacturing process is more or less mechanized & the units are running round the clock. Insurgency is the major problem here and the industry is suffering a lot due to this. The finished products from the cluster are black tea, dust tea and green tea. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.29a and 3.29b.

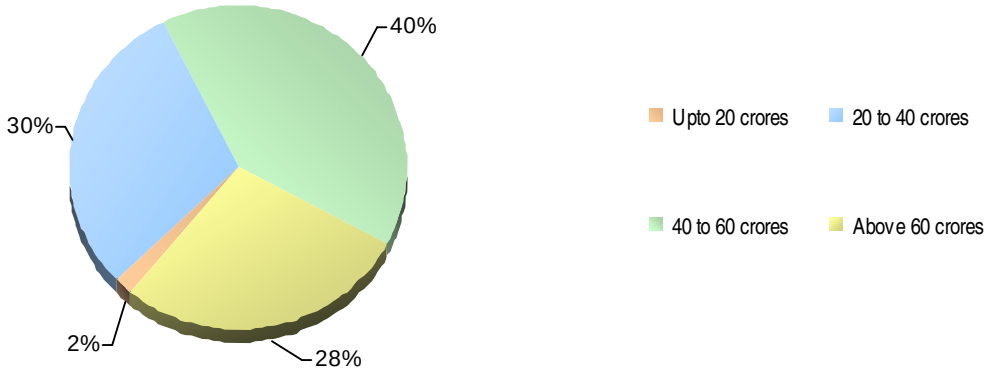

Figure 3.29a Annual turnover (crores) for the units in the cluster (2007-08)

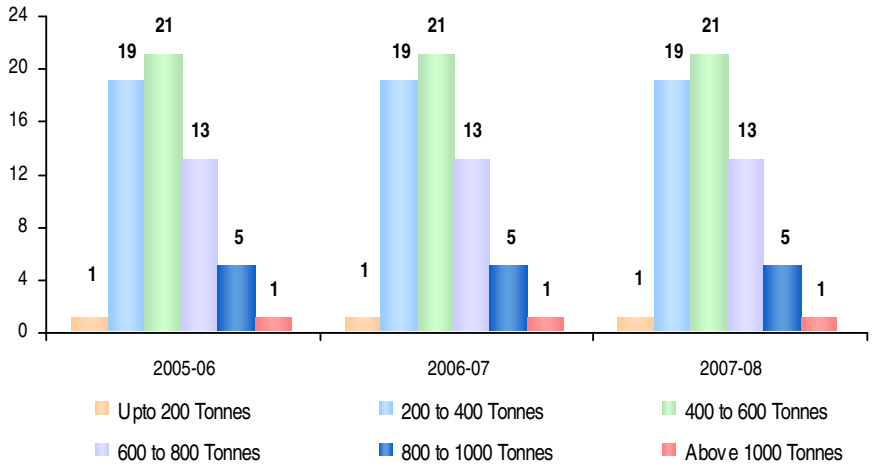

Figure 3.29b Annual production (tonnes) for the units in the cluster

The total energy cost is about 20% of the total production cost. Major energy consuming equipment is drier used for drying the tea leaves. The units get electricity supply from Assam State Electricity Board. Some units also have backup power source i.e. DG sets. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.29.

Table 3.29 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	40.0
Coal / Hard Coke (tonnes)	8460
HSD (Kilo Litres)	5235.6
LPG (tonnes)	95.19

3.30 Cochin (Sea food processing)

Seafood processing cluster in Cochin is located in the state of Kerala, southern part of India. Seafood business is one of the front line businesses in Cochin. There are about 45 sea food processing units and most of them are exporting their products. This industry is seasonal in nature and August, September and October are the high business months. All the units are partially mechanized. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.30a and 3.30b.

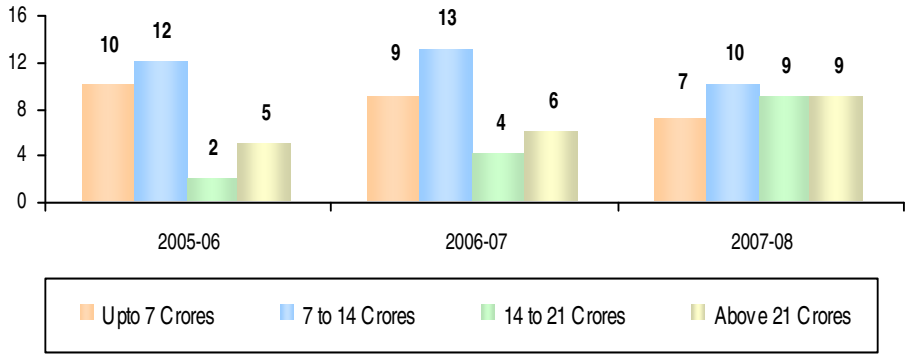

Figure 3.30a Annual turnover (crores) for the units in the cluster

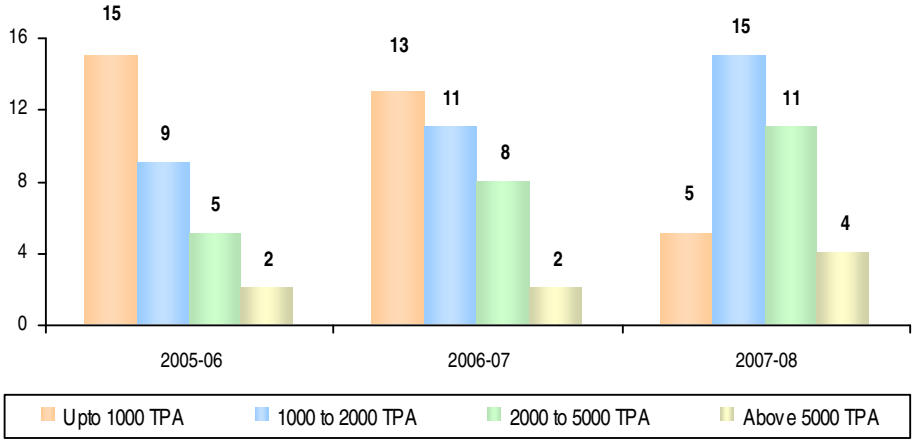

Figure 3.30b Annual production (tonnes) for the units in the cluster

The energy cost is about 5% of the total production cost compared to raw material cost which is about70%. The major energy consuming equipment is refrigeration compressors used for freezing the products. Electricity is purchased from the local grid. Other than electricity, HSD and LDO are also used in the cluster. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.30.

Table 3.30 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	24.51
LDO (Kilo Litres)	2255.1
HSD (Kilo Litres)	60

3.31 Muzaffernagar (Paper making)

Agro based paper making cluster at Muzaffernagar is located in the state of Uttar Pradesh, northern part of India. This paper cluster here has about 22 - 25 units but all are large scale units and don't fall under the SME category, as the investments in

plant & machinery is Rs. 10 crores or more. Majority of the paper mills are located at Bhopa road & Jansath road, within a radius of 8 to 10 kms from the main city. All the units are fully mechanized and operate round the clock. The turnover and the production, for the year 2007-08, of the surveyed units from the cluster are mentioned in the figure 3.31a and 3.31b.

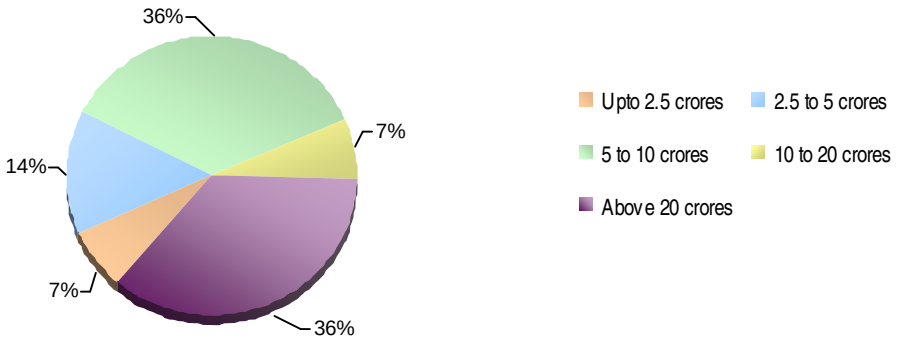

Figure 3.31a Annual turnover (crores) for the units in the cluster (2007-08)

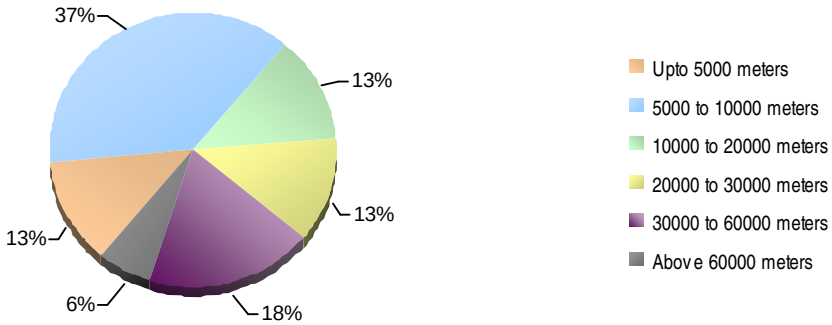

Figure 3.31b Annual production (meters) for the units in the cluster (2007-08)

The energy cost in paper mills in this cluster represents 25 to 30% share of total production cost. Major energy consuming equipments are boiler, drier, pulper, etc. Many of the units have captive power plants (CPP) of 5 MW with cogeneration system. Biomass such as rice husk, bagasse, wheat straw, wood, etc and coal are used for power generation in the CPP. Units have also taken power connection from the U.P. State Electricity Board (UPSEB) for catering to their electricity requirement. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.31.

Table 3.31 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	32.5
Rice husk/Bagasse/Wheat/ Straw/Firewood (tonnes)	115240

3.32 Orissa (Sponge iron)

State of Orissa is also known for its sponge iron industry. There are about 130 units in the sponge iron cluster of the state and out of these only 45 are in operation. These units are spread in Mayurbhanj, Keonjhar, Jharsuguda, Sundergarh, etc districts. Since the investment in plant and machinery is more than 20 crores, these units can not be considered small scale units. Sponge iron also known as direct reduced iron, extracted from iron ore, is used in the making of long steel products such as ingots and billets.

It has also been reported that many units are also operating illegally in the state without having NOCs and clearances from the respected agencies. There is also unrest among the local population against sponge iron units and the reason cited for this is large scale air and water pollution which is affecting not only their health but also that of their livestock, agriculture and land. Due to these reasons local population have managed to get many plants to withdraw or stop construction in Sundergarh district.

All the sponge iron units are highly mechanized in nature. Many units are using technology sourced from Lurgi and operating continuously for 3 shifts per day. The production of the surveyed units from the cluster are mentioned in the figure 3.32.

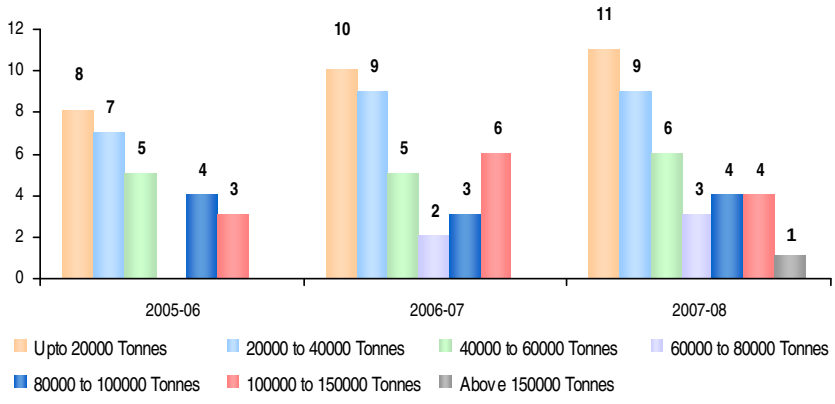

Figure 3.32 Annual production (tonnes) for the units in the cluster

The energy cost in sponge iron units is 30 to 35% and the raw material cost is 60% of total production cost. All units have taken HT connection from the local grid for electricity need. Some units also have captive power plants (CPP). Major energy consumers are furnaces in the plants. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.32.

Table 3.32 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	40
Coal / Hard Coke (tonnes)	3781560
HSD (Kilo Litres)	644

3.33 Vapi (Chemicals & dyes)

Chemicals and dyes cluster in Vapi is located in the state of Gujarat, western part of India. About 70% of the industries in the Vapi are chemical or related industries such as dyes & dyes intermediates, pigments, pesticides, fine chemicals and pharmaceuticals etc. These products are finally used by polymer processing, pharmaceutical, textile, chemicals, etc.

There are about 600 units in the cluster. The turnover and the production of the surveyed units from the cluster are mentioned in the figure 3.33a and 3.33b.

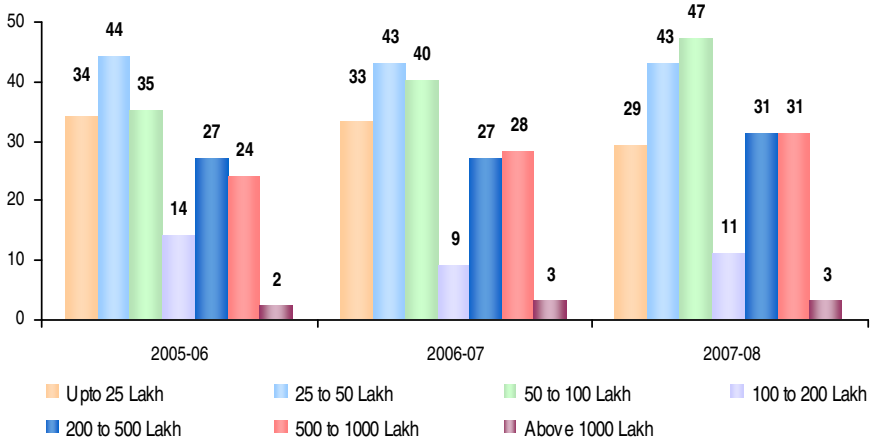

Figure 3.33a Annual turnover (Lakhs) for the units in the

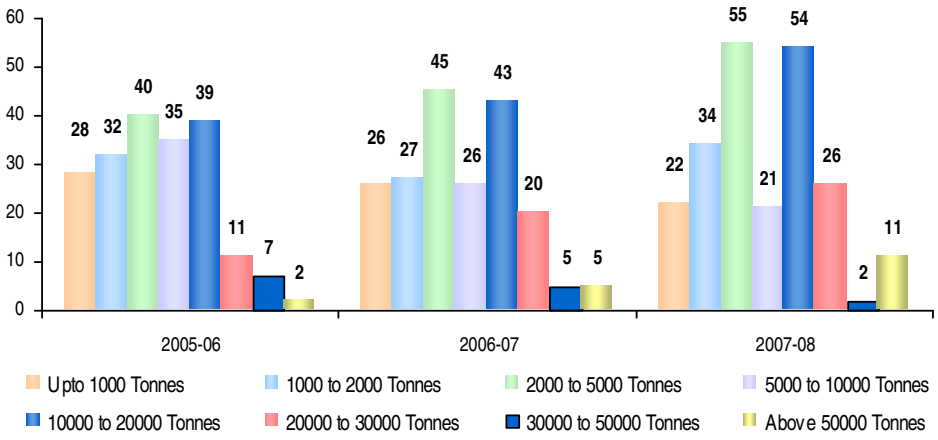

Figure 3.33b Annual production (tonnes) for the units in the cluster

Fuels used in the cluster are firewood/husk, HSD, LDO, FO, etc. Wood is consumed in large quantities due to cheaper price. Natural gas was also used in the cluster till recent and stopped currently due to the short supply. Electricity is supplied by local grid. Main energy consuming equipments in the plants include boiler, ball mill, blender, dryer, etc. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.33.

Table 3.33 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	30.85
LDO (Kilo Litres)	2207.2
Firewood / Husk (tonnes)	4086
FO (Kilo Litres)	1108.9
HSD (Kilo Litres)	181.2

3.34 Varanasi (Brick making)

Varansi, located in the state of Uttar Pradesh, is popular for brick manufacturing because of suitable top soil. Brick kilns are scattered in and around the district and located mainly at Munari (18 km from Varanasi), Hariharpur (15 km from Varanasi), Rohania (8 km from Varanasi). It is a seasonal industry and operates about 5-7 months in a year.

There are approximately 226 brick kilns in this cluster who are engaged in manufacturing of various types of bricks and tiles. Brick manufacturing is a labour intensive process and mechanization has still to penetrate in to this industry. However, some progressive units have already taken the steps in this direction. Annual turnover for this cluster during the year 2007-08 is shown in the figure 3.34.

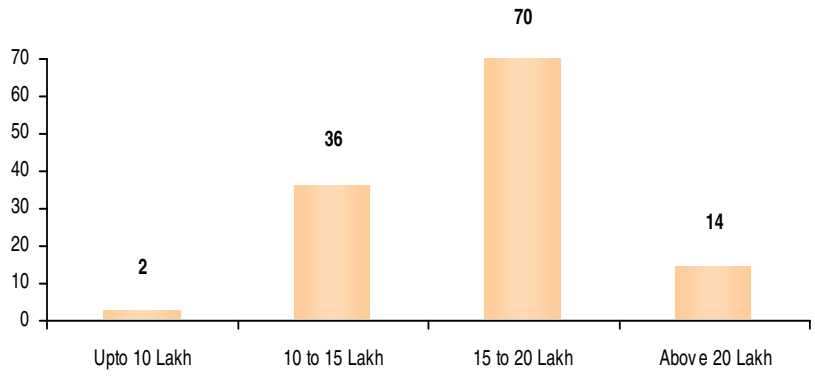

Figure 3.34 Annual turnover (lakhs) for the units in the cluster (2007-08)

Coal is the source of energy used for brick burning in the kiln. Coal consumption for the year 2007-08 for the cluster is estimated to be 426900 tonnes. Other fuels used are agri-residue and waste fuels.

3.35 Vellore (Rice milling)

Rice milling cluster at Vellore is located in the state of Tamilnadu, southern part of India. Majority of the units are located outside the city and spread in the Arcot and Arni areas. There are more than 150 rice milling units in this cluster. The characteristics of the units are different in terms of end products. In Arni modern technology is being used wherein plants use color sorter as well as whitener to polish the rice which fetches them a premium compared to Arcot. All the units are operating single shift per day. The turnover and the production, for the year 2006-07, of the surveyed units from the cluster are mentioned in the figure 3.35a and 3.35b.

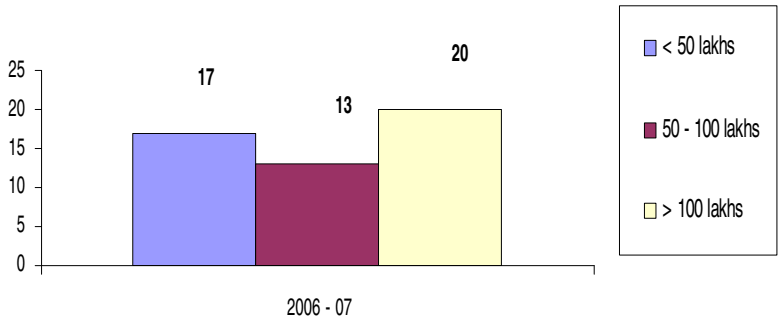

Figure 3.35a Annual turnover (lakhs) for the units in the cluster (2006-07)

The major sources of energy are electricity and firewood. The main energy consuming equipments in the plants are boilers, dryers, hullers, color sorters, polishers, etc. The fuel and electricity consumption in the cluster, for the year 2007-08, is given in the table 3.35.

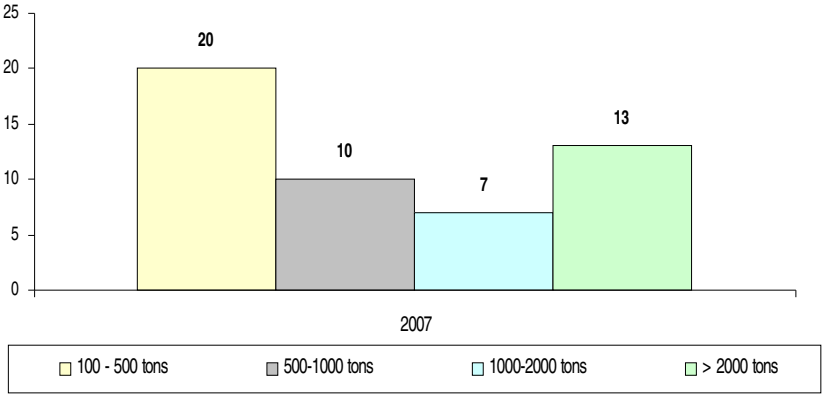

Figure 3.35b Annual production (tonnes) for the units in the cluster (2007)

Table 3.35 Fuel/electricity consumption in the cluster during 2007-08

Energy/fuel type	*Quantity*
Electricity (million units)	5.28
Firewood (tonnes)	11830

CHAPTER 4 Cluster identification

There have been many interventions in small & medium enterprises sector over the years. Various interventions have made different levels of progress in different areas and in their own unique ways. Short listing, from the original list of 35, has to be done to arrive at the list of most promising 25 clusters with the help of some additional considerations, as mentioned below.

4.1 Modifications in the original list of 35 clusters

Subsequent to the start of the phase 1 (10 clusters) and before initiation of the phase 2 (25 clusters) a number of modifications were proposed and accepted in the list.

These modifications were required due to a number of factors:

a. The original list of 35 clusters was derived more or less from the list existing in the BEE workplan for the XI Plan period and the first additions were made mostly from the MSME survey 2001-2002. However, the list per se was not of energy intensive sectors, and a little more focused on some similar clusters (like rice milling).
b. Since the MSME survey 2001-2002, and the definition of the cluster apparently requires a minimum number of 100 units in a cluster, making selection a little more difficult
c. Some clusters, although essentially the same, required changes due to some special circumstances, like the Mangalore district is now divided into Mangalore and Udupi, with the brick & tile industry , obviously existing in now both districts.

4.2 Selection of energy intensive SME clusters

The criteria to finalise 25 clusters was made based on the following factors. The list below is in no particular order of priority:

a. The amount of energy usage in the cluster
b. The production or the supply chain, like ice making and sea food processing, like both parboiled rice and white rice clusters
c. The existence of other interventions in the cluster affecting the need of the cluster to have more – like (exclusion of) Tirupur textiles cluster, and
d. The need , as in c above, like exclusion of some foundry and glass clusters (Rajkot, Coimbatore, Belgaum and Firozabad)- the reason being that there are already good

solutions on ground to do work more directly on propagation of these technologies.

Table 4.2 gives the list of 35 clusters wherein the situational analysis has been conducted, with comments against the same.

Table 4.2 Clusters surveyed and recommendations

	Cluster Location	Product	Remarks
1	Ahmedabad	Chemicals & Dyes	Recommended for intervention
2	Jamnagar	Brass	Recommended for intervention
3	Morvi	Ceramics	Recommended for intervention
4	Pali	Textiles	Recommended for intervention
5	Surat	Textiles	Recommended for intervention
6	Solapur	Textiles	Recommended for intervention
7	Warangal	Rice Milling	Recommended for intervention
8	Alwar	Oil Milling	Recommended for intervention
9	Bangalore	Machine Tools	Recommended for intervention
10	Batala, Jalandhar & Ludhiana	Foundry	Recommended for intervention
11	Bhimavarm	Ice Making	Recommended for intervention
12	Bhubaneshwar	Brass	Recommended for intervention
13	E&W Godavari	Refractories	Recommended for intervention
14	Ganjam	Rice Milling	Recommended for intervention
15	Gujarat	Dairy	Recommended for intervention
16	Howrah	Galvanizing	Recommended for intervention
17	Jagadhri	Brass & Aluminium	Recommended for intervention
18	Jodhpur	Limestone	Recommended for intervention
19	Jorhat	Tea	Recommended for intervention
20	Kochi	Sea Food Processing	Recommended for intervention
21	Muzaffarnagar	Paper	Recommended for intervention
22	Orissa	Sponge Iron	Recommended for intervention
23	Vapi	Chemicals & Dyes	Recommended for intervention
24	Varanasi	Brick	Recommended for intervention
25	Vellore	Rice Milling	Recommended for intervention
26	Belgaum	Foundry	Recommended for intervention through focussed programmes on delivery of technologies
27	Coimbatore	Foundry	
28	Firozabad	Glass	
29	Rajkot	Foundry	
30	Alleppey	Coir	May be tried elsewhere
31	Dewas Ujjain	Oil Milling	May be tried elsewhere
32	Mangalore	Tiles	May be tried elsewhere
33	Meerut	Khandsari	May be tried elsewhere
34	Ratnagiri	Food Processing	May be tried elsewhere
35	Tirupur	Textiles	May be tried elsewhere