

# **Comprehensive report on training need assessment of Local Service Providers (LSPs): Khurja ceramic cluster**

## **Capacity Building of LSPs**

### **GEF-UNIDO-BEE Project Promoting Energy Efficiency and Renewable Energy in selected MSME clusters in India**

*Prepared for:*



Bureau of Energy Efficiency (BEE)

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## Abbreviations

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BEE	Bureau of Energy Efficiency
BOP	Best Operating Practices
CGCRI	Central Glass & Ceramic Research Institute
CFC	Common Facility Centre
DD	Down Draft
EE	Energy Efficient
NG	Natural Gas
HT	High Tension
LSP	Local Service Provider
LT	Low Tension
KKHWS	Khurja Kuttir and Handicraft Welfare Society
KPMA	Khurja Pottery Manufacturers Association
KPRMA	Khurja Pottery Raw Materials Association
MSME	Micro, Small and Medium Enterprises
RE	Renewable Energy
SPV	Solar Photovoltaic
TERI	The Energy and Resources Institute
UNIDO	United Nations Industrial Development Organization



## 1.0 Introduction

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Under the GEF-UNIDO-BEE Project 'Promoting Energy Efficiency (EE) and Renewable Energy (RE) in selected MSME clusters in India', The Energy and Resources Institute (TERI) had submitted a proposal for undertaking Capacity building of Local Service Providers (LSPs) to Bureau of Energy Efficiency (BEE). A contract for providing the consultancy services for the ceramic and foundry sectors was awarded to TERI by BEE in September 2017.

The following clusters were assigned to TERI under the project:

Foundry sector	Ceramic sector
Coimbatore	Thangadh
Belgaum	Morbi
Indore	Khurja

This is the comprehensive report on training needs assessment of LSPs in Khurja ceramic cluster. The report was prepared based on assessment of the training needs through sample survey of both MSMEs and LSPs in the cluster. This report should be read in conjunction with the LSPs mapping report on demand and supply needs of local industries, prepared by TERI under the project.





## 2.0 Assessment of the cluster

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### 2.1 About the cluster

Khurja is located about 100 km east of Delhi in Bulandshahar district, Uttar Pradesh. The Khurja ceramic cluster is one of the oldest ceramic clusters in India. There are more than 200 ceramic units operating in the cluster catering to the domestic market. The cluster, which was using coal-based downdraft (DD) kilns, presently employs mostly tunnel kilns along with shuttle kilns using liquid and gaseous fuels. The cluster is known for the manufacture of stoneware and bone-china crockery products. The produces include table wares, decorative wares, and porcelain insulators, both HT (high tension) and LT (low tension) types. Other products manufactured in the cluster are hospital-ware, chemical porcelain, electro ceramics, kiln furniture, special ceramics, toys and non-china crockery products. The cluster also has a “special purpose vehicle” as a “common facility centre” (CFC) to cater to the micro entrepreneurs.



The major industry association at cluster level is Khurja Pottery Manufacturing Association (KPMA). The KPMA represents both tunnel kiln and shuttle kiln units having about 200 members and is involved in undertaking technology related decisions. The other industry associations in the cluster include the following:

- (i) Khurja Kuttir and Handicraft Welfare Society (KKHWS), which is a “special purpose vehicle” (SPV) as a common facility centre (CFC) for micro entrepreneurs
- (ii) Khurja Pottery Raw Materials Association (KPRMA).

Central Glass and Ceramic Research Institute (CGCRI), a central government supported technical institution exists within the cluster which is closely involved to address the industry needs. CGCRI has significant technical

knowledge in raw material preparation and ceramic processes. It also has a training centre equipped with different testing and experimental facilities. The centre is engaged in skill development and extending technical support to local industries. It also proactively undertakes technology development activities to promote energy efficiency in the cluster. CGCRI was the coordinating institute in the cluster during the project implementation.

## 2.2 Assessment of LSPs

### 2.2.1 Assessment of their training needs through sample survey

Between the period September 2017 to January 2018, TERI conducted sample survey of LSPs and MSMEs in Khurja ceramic industry cluster. The objective of the survey was to assess their training needs for identification of suitable training/ capacity building programs/ topics. The project made assessment of present capacities, strengths, weakness and training needs of the LSPs in the cluster. The assessment was based on one-on-one interactions with a number of LSPs and MSMEs as well as through structured questionnaire surveys. Based on the assessment, areas of improvement and capacity building of different LSPs were identified.

Specific attention was paid to understand the existing skill sets of LSPs, their education level, nature of services/ technologies provided in the cluster, availability of EE/RE technologies and cluster (industry) needs and requirements. The LSPs identified in the cluster could be categorized into the following broad groups:

S. No.	Group	Remarks
1.	Technology providers	Process and utility equipment
2.	EE/RE system suppliers	Process and utility equipment
3.	Fabricators and maintenance operators	External fabricators are used, most MSMEs employ their own maintenance staff
4.	Technicians	Most MSMEs employ shop floor technicians to operate the process and utility equipment
5.	Others	Local consultants and energy auditors

There exists a close interaction between MSMEs and LSPs in Khurja ceramic cluster. The interactions further revealed that LSPs such as technicians and maintenance operators are dedicated service providers for one or more MSMEs. These LSPs could be termed as “internal LSPs”. MSMEs usually depend on “external LSPs” for providing services such as procurement of new technologies and equipment. The LSP-MSME distribution matrix is shown in table 2.2.1.

**Table 2.2.1: LSP-MSME distribution matrix**

LSP group	External LSPs (not dedicated to a particular MSME)	Internal LSPs (dedicated to a MSME)
Technology providers	✓	✗
EE/RE system suppliers	✓	✗
Fabricators and maintenance operators	✓	✓
Technicians	✓	✓
Others	✓	✓

The LSPs belong to both external and internal categories. Based on the inputs from CGCRI, it was decided to include both external LSPs and internal LSPs for the purpose of training and capacity building programs that would benefit the cluster as a whole.

### Sample size

About twenty LSPs located in the cluster were randomly selected for the survey. Efforts were made to include LSPs covering all the five groups identified under the program. The project conducted one-to-one Interviews with these LSPs to collate required information related to LSPs.

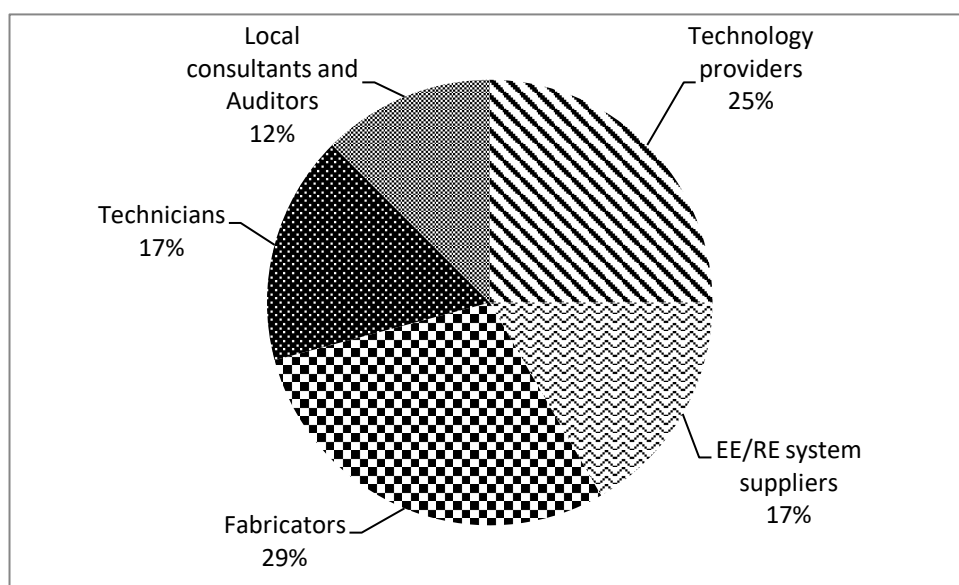
### Study design

A qualitative approach was used to collect the information. The rationale was to profile the LSPs, identify their needs and quantify their demand for capacity building. Structured questionnaire was used to capture their responses. The questionnaire designed for the survey was piloted among 2-3 LSPs initially. The difficulties identified during the pilot were used to modify the questionnaire for completing the survey. Respondents ranged from relatively

organized firms providing EE/RE technologies and systems to MSMEs to relatively smaller partnership/ sole proprietorship firms of local consultants.

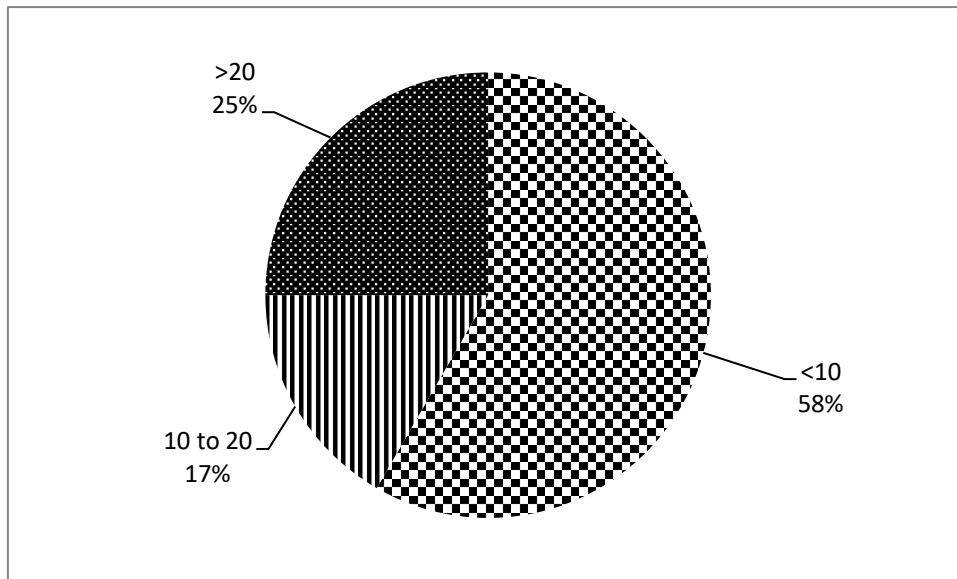
## Results

The distribution of LSPs shows that more than half of the LSPs belong to two categories namely fabricators and technology providers. The survey further confirmed that while the major EE suppliers are present within the cluster, the RE suppliers are located outside the cluster e.g. Delhi, Faridabad, etc. Their services ranged from fabrication of kilns to equipment pertaining to raw material preparation.



**Figure 2.2.1a: Distribution of LSPs surveyed by categories**

A further analysis of the type of LSPs showed that only 25% of LSPs operate with more than 20 employees. More than half of the LSPs surveyed (58%) had less than 10 numbers of employees, which was followed by LSPs having 10-20 employees (17%).



**Figure 2.2.1b: Distribution of LSPs surveyed by number of people employed**

### **Maintaining sustainable market linkages**

The cluster level survey of LSPs revealed some of the common dissemination approaches of various technologies adopted by different categories of LSPs to reach out to the MSMEs in the cluster and maintain sustainable market linkages. These approaches include the following:

- One-to-one meetings
- Newsletters/ product brochures/fliers/catalogues/video films
- Direct mailers/telephone calls
- Organizing group visits to demonstration plants
- Awareness workshops/ training programs
- Stalls at national/regional level exhibitions/conferences
- Advertisements in trade magazines/journals/directory

Interactions with MSMEs during the needs assessment further provided insights into the major factors which generally influence the adoption of EE/RE technologies, which are listed below:

- Communication skills of the LSP
- Cost of equipment or system

- Advantages or salient features of the EE/RE technology as compared to the existing technology used in the unit. For example energy & monetary savings, return on investment etc.
- Servicing aspects of the technology especially from a local source e.g. after sales maintenance, and
- Financing options available for procurement and commissioning of the equipment

Further, the specific needs of LSPs were assessed based on qualitative criteria such as the following.

- Existing skill set
- Education level
- Type of service/technology
- Available EE/RE technologies
- Cluster need and requirements

The findings under each of the above mentioned criteria are discussed below.

### **Existing skill set**

Majority of LSPs surveyed were having high level of skill sets in their core business domains which have been acquired over time through work experience as well as academic qualifications. Although having high level of skill-sets in their trade, the LSPs were keen towards acquiring new knowledge especially on energy and environment aspects as it was felt by them that the energy and environment related issues are gaining more importance owing to the facts such as rising energy costs and stricter enforcement of environmental norms. The LSPs were quite keen on new technologies and practices for switching over from oil firing system to natural gas (NG) based firing technologies and the corresponding benefits such as energy savings and pollution control. Therefore, the LSPs who were contacted during the survey, expressed their interest in enhancing their capacities through training programs related to efficient operation and maintenance of various energy intensive equipment e.g. NG based kiln technologies, air compressors, ball mill, auto jiggers, and energy efficient motors and so on.

### **Education level**

There is a mix of education level across the LSPs. For example LSPs of NG based kiln, RE technologies have higher educational qualifications, whereas the education level was observed to be quite low for LSPs belonging to fabricators and technicians categories.

### **Type of service/technology**

Most of the MSMEs and LSPs conveyed that they were satisfied with the presently available services and technology providers in the cluster. Hence there were no major requirements for any additional services in the cluster. A number of MSMEs surveyed indicated requirements of additional services for switching over to NG based kiln system and better ball milling equipment. Some of the MSMEs felt that LSPs should also extend their support for proper operation & maintenance of various equipment being used in the unit rather than only on selling new equipment. Thus there is a keen interest shown by the MSMEs towards focusing on best operation and maintenance aspects of the equipment. Therefore, there is a good scope to build capacities of the LSPs on best operating practices (BOP) of various energy intensive equipment which are usually neglected area.

### **Available EE/RE technologies**

When respondents were asked about the EE/RE technologies used by them, the most common response was EE lights i.e. LED lamps. Most of the respondents had shown interest in solar photovoltaic (SPV) systems to meet part or full of their electricity demands. Although LSPs are available, there is a knowledge gap among MSMEs on EE technologies such as energy efficient motors, energy efficient ball mills, safety & fault diagnosis system for NG fired kilns, etc. A large number of MSMEs in Khurja cluster were interested in enhancing knowledge on low/no cost based energy saving options, system design of natural gas based firing kiln, fault diagnosis and trouble shooting of kiln operation. It was suggested by the MSMEs to devote more focus on improved technologies and best operating practices in energy intensive areas in the unit under the planned capacity building programs.

### 2.2.2 Cluster need and requirements

One of the major on-going issues or needs of the clusters was fuel shift i.e. to meet the environmental norms, the industry has got an option to shift from oil firing to NG firing. However, there are number of issues and challenges being faced by the industry during this process. The industry has also not fully understood about the benefits that it could reap from fuel shift. Still there are a large number of kilns are awaiting pipeline connection for NG followed by modifications required in kiln system. Thus, fuel shift assumes one of the most important topics to obtain more clarity for the industry for shifting from oil firing to NG based firing systems.

The interactions during field survey further revealed that the industry is operating at sub-optimal energy performance, owing to the use of inefficient equipment and poor operating practices. Replacing the existing inefficient equipment with energy efficient equipment and adoption of 'best operating practices' (BOP) would lead to significant energy saving in ceramic industries in Khurja cluster. Thus, the second topic identified for improvement of energy performance was energy conservation in ceramic industries focusing on energy efficient equipment and BOP.

Although a large number of industries in Khurja cluster have adopted tunnel kiln for firing ceramic products, a close interaction with the units and LSPs revealed that the tunnel kilns adopted local design and there is a substantial scope for improving energy performance. Tunnel kiln being the major energy consuming centre in a ceramic unit, its energy efficiency improvements will have a large impact on the overall energy performance of the ceramic units. Therefore, it was agreed by the units and LSPs that one training program would mainly focus on construction and commissioning of energy efficient tunnel kilns.

The ceramic industries in Khurja completely agree with the fact that in order to be competitive the industries should become energy efficient that includes advanced and state of the art technologies. The industry should be made aware of such technologies which are available in the market and are



economically viable. Hence, it was agreed that one training program should solely discuss about the advanced technologies relevant for Khurja ceramic industries.

### 2.2.3 Present capacity, strengths, weakness and training needs

The project made an in-depth assessment of present capacity, strengths, weakness and training needs for the LSPs. The objective of the activity was to undertake an assessment of expertise available with the LSPs with regard to providing technical assistance and advice to MSMEs pertaining to EE/RE technologies as well as maintaining sustainable market linkages. A summary of the analysis is given in table 2.2.3.

**Table 2.2.3: Summary of present capacity, strengths, weakness and training needs for the LSPs in Khurja cluster**

Present capacity	Strengths	Weaknesses	Training needs
LSPs such as technology providers provide services mainly for oil-fired kilns. The MSME units have apprehension towards shifting to NG.	Presence of active commercial gas agency supplying NG through piped network	Lack of awareness on switch over from oil to gas based furnace	Fuel shift and related challenges, issues and benefits
Technicians and maintenance operators are engaged in day to day functioning of the ceramic units. Energy conservation is of little focus.	Service providers are keen to learn about new technologies and practices	Lack of training/ exposure to latest EE/RE technologies and best operating practices	Energy conservation opportunities in ceramic units
Fabricators and technology providers construct and commission tunnel kilns mainly based on oil firing.	The local service providers are willing to learn and acquire new skills	The local service providers and MSME units do not have experience pertaining to gas based firing technologies	Construction of gas based tunnel kiln system

Present capacity	Strengths	Weaknesses	Training needs
Technology providers supply equipment and system which have significant scope for improvements through advanced or modern technologies	The local service providers are willing to learn and acquire new skills, whereas MSME units are interested in adopting advanced technologies	The local service providers and MSME units do not have experience pertaining to advanced technologies in ceramic manufacturing	Advanced technologies for ceramic industries

#### 2.2.4 Areas of improvisation required for LSPs

The major energy consuming areas in a ceramic industry includes kiln – either tunnel or shuttle kiln. The raw material section manual processes as well as inefficient equipment and system, which generally results in lower productivity, higher rejections and higher energy consumption.

Based on the assessment of the capacity, strengths, weakness and training needs for the LSPs, the project had identified relevant topics for the purpose of training which would cover the whole range of LSPs and the ceramic units in the cluster so that it could target all the major energy consuming areas in the industry. The topics identified for training are as follows:

- Fuel shift and related challenges, issues and benefits
- Energy conservation opportunities in ceramic units
- Construction of gas based tunnel kiln system
- Advanced technologies for ceramic industries

#### 2.2.5 Inter-linkage between training topics and LSP categories

The topics identified for training under the project are quite relevant for both LSPs and the MSME units. The inter-linkages between the identified training topics and the LSP categories are summarized in table 2.2.5.

**Table 2.2.5: Training topics and LSP category inter linkage**

LSP category → Training area ↓	Technology Providers	EE/RE system suppliers	Fabricators and maintenance operators	Technicians	Local consultants and auditors
Fuel shift and related challenges, issues and benefits	✓ ✓	✗	✓ ✓	X	X
Energy conservation opportunities in ceramic units	✗	✓ ✓	✓	✓ ✓	✓
Construction of gas based tunnel kiln system	✗	✗	✓ ✓	✓	X
Advanced technologies for ceramic industries	✓	✓ ✓	X	✓	✓

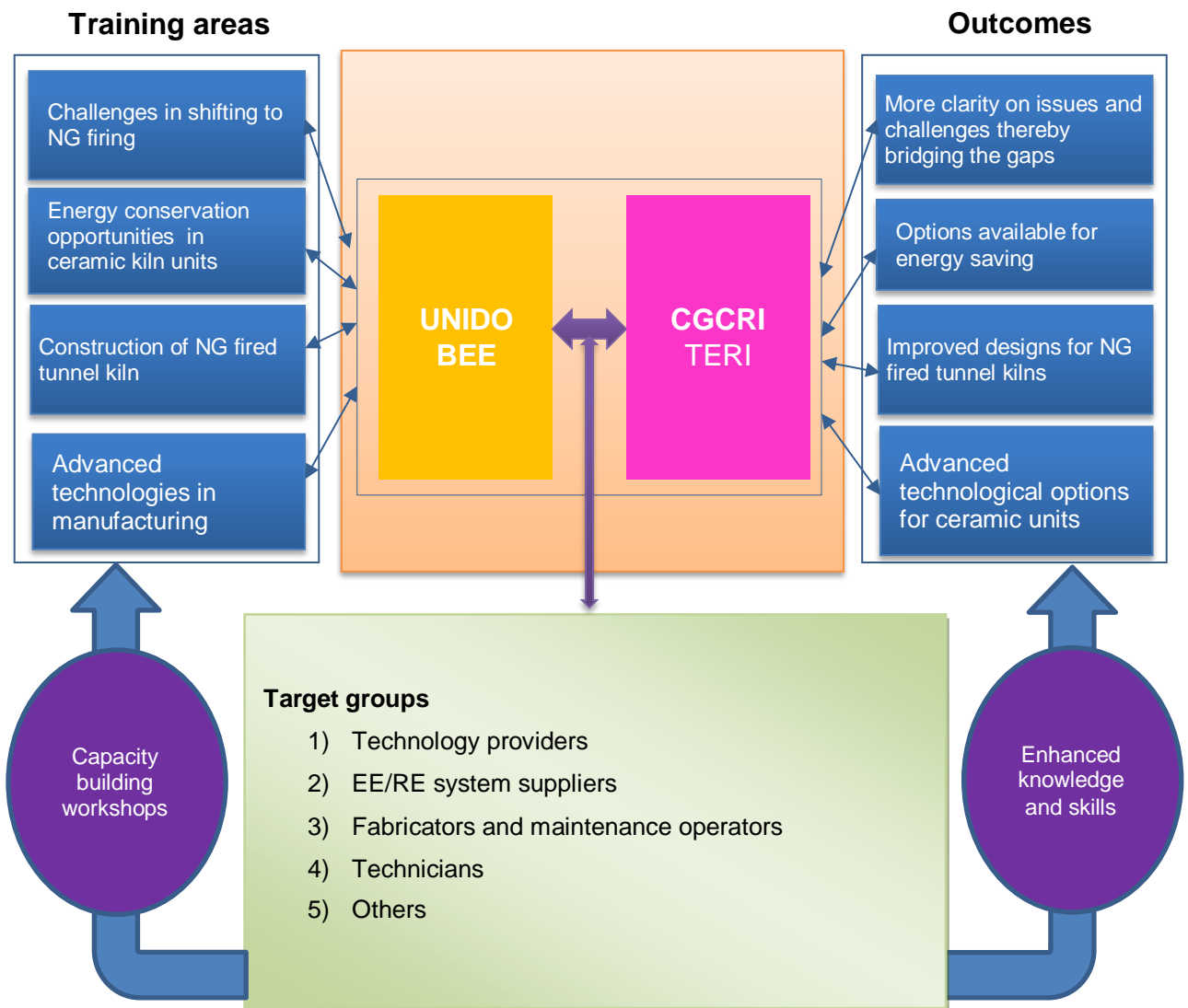
✓ ✓ Very high; ✓ High; ✗ Low

As can be seen from the matrix, most of the topics identified for the training are relevant to different categories of LSPs. Subsequently, a total of five customized training materials for each of the LSP categories, keeping in view the topics relevant to them, were prepared. As some of the training topics were relevant across more than one LSP category, it was discussed with the CGCRI (local coordinating institute) and UNIDO-PMU for organizing the capacity building workshops around four broad themes. Considering cross-cutting theme across the LSPs categories, the idea received support and hence four training programmes were organized on four training themes.



### 3.0 Conclusions

Based on the training needs assessment undertaken in Khurja ceramic cluster, the training needs of the key cluster-level service providers were identified. The training areas identified of Khurja ceramic cluster and the anticipated outcomes are summarized in figure 3.0.



**Figure 3.0: Customized training programs to enhance skills and knowledge of LSPs at cluster level**

MSMEs are keen to reduce their cost of operation and improve profitability through adoption of techno-economically viable new technologies and practices. The

proposed training areas will build the capacities of LSPs in promoting EE/RE technologies among MSMEs and maintaining sustainable market linkages with them. The capacity building programs will equip LSPs to communicate the cost-benefit of the new technologies through energy as well as resource savings in an effective manner