Comprehensive LSPs Mapping Report
Khurja Ceramic Cluster

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

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For more information

Project Monitoring Cell
T E R I
Darbari Seth Block
IHC Complex, Lodhi Road
New Delhi – 110 003
India

Tel. 2468 2100 or 2468 2111
E-mail pmc@teri.res.in
Fax 2468 2144 or 2468 2145
Web www.teriin.org
India +91 • Delhi (0)11

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Abbreviations

BEE	Bureau of Energy Efficiency
BOP	Best Operating Practices
CGCRI	Central Glass & Ceramic Research Institute
CFC	Common Facility Centre
DD	Down Draft
DIC	District Industries Centre
DPR	Detailed Project Report
EE	Energy Efficient
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
SPV	Special Purpose Vehicle
SWOT	Strength, Weakness, Opportunity and Threat
VFDs	Variable Frequency Drives

1.0 Introduction

Bureau of Energy Efficiency (BEE) is Promoting Energy Efficiency and Renewable Energy in selected MSME clusters in India under the GEF-UNIDO-BEE Project. A proposal for capacity building of local service providers (LSPs) was submitted by TERI to BEE under GEF-UNIDO- BEE project.

A contract for providing the consultancy services was awarded to TERI by BEE as per the terms of reference given in the LoI No. 13/GEF-UNIDO-BEE/LSP/14/4561 and 13/GEF-UNIDO-BEE/LSP/14/4562 dated 2nd August, 2017 for the following Ceramic and Foundry clusters on 26th September 2017.

Table 1.0: Focus sectors/ clusters awarded to TERI

Sector	Clusters
Ceramic	• Khurja • Morbi • Thangadh
Foundry	• Belgaum • Coimbatore • Indore

This comprehensive LSPs mapping report of the project outlines the methodology followed for identification and mapping of LSPs based on demand and supply needs of local industries for Khurja ceramic cluster. This report should be read in conjunction with the 'Cluster specific list of LSPs' submitted separately.

The following sections in the report outlines the cluster background, methodology adopted, production process flow-sheet, demand-supply matrix and SWOT analysis for the LSPs in the Khurja ceramic cluster.

2.0 Background of the cluster

2.1 General information

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 domestic market. The cluster, which was using coal based downdraft (DD) kilns, presently employs mostly tunnel kilns along with shuttle kilns using liquid and gas 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” (SPV) as a “common facility centre” (CFC) for micro entrepreneurs.

2.2 Production process

Manufacturing of ceramic item uses a wide range of raw materials to produce different shape, size, design and colour. The manufacturing process primarily consists of mould preparation, body material preparation, shaping, drying and firing. The manufacturing process requires both electrical and thermal energy at different process stages to operate ball mill, casting/ moulding equipment, kiln, cutting & finishing machines and utilities such as motors, pumps, air compressor, etc. A typical process flow chart followed in the cluster is shown in figure 2.2.

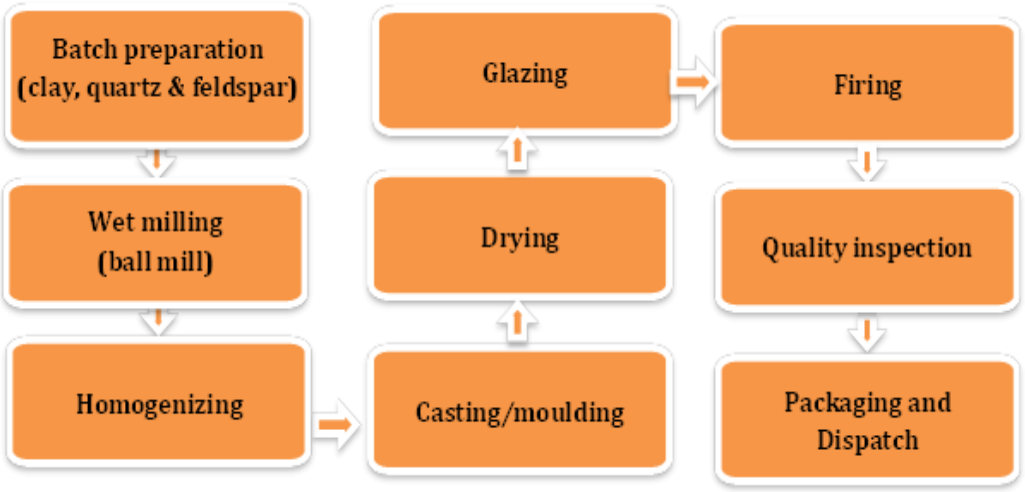

Figure 2.3: Manufacturing process of a typical ceramic unit

2.3 Major stakeholders

The major stakeholders in the cluster include industry associations, training institutions and government support institutions for MSMEs. The roles of key stakeholders are summarized below.

2.3.1. Industry association

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

2.3.2 Training institutions

Central Glass and Ceramic Research Institute (CGCRI) is the technical institution to support ceramic industries in the cluster. CGCRI is located within the industry cluster to address the industry needs. It 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.

2.3.3 Government support institutions

There are relatively few government support institutes for ceramic industry in Khurja cluster. Apart from CGCRI, the “District Industries Centre” (DIC) under the Department of Industries and Commerce, Government of Uttar Pradesh provides administrative support to local ceramic industries.

3.0 Methodology adopted

3.1 Identification and mapping of LSPs

Before identification and mapping of local service providers (LSPs), the project undertook an extensive exercise to understand the process sections/ equipment and equipment in typical ceramic units where LSPs are involved. TERI interacted with key stakeholders like progressive industrial entrepreneurs, cluster-level industry associations and selected LSPs to understand the needs and supply of LSPs in the cluster. In order to understand the sections/ equipment in the plant, a process flow chart was prepared pertaining to Khurja ceramic industry. The identification of the major equipment/ sections and equipment was done in consultation with industry stakeholders. Structured survey questionnaires were prepared separately for MSMEs and LSPs to understand demand supply gaps. The MSME and LSP questionnaires used for the survey are provided in annexure 1 and annexure 2 respectively.

Efforts were made to classify the LSPs keeping in view the major equipment/sections and related services used by the industry. Structured questionnaires were used for discussions with MSMEs and LSPs to understand barriers on demand and supply sides. An extensive survey was carried out under the project covering progressive MSMEs and LSPs towards collection of cluster level information related to LSP needs. The inputs from stakeholders helped in arriving at a holistic view of demand and supply needs of local industries.

The information about the cluster needs was summarized using structured analytical tools like ‘SWOT’ and demand-supply matrix. The SWOT analysis helped to determine the strengths, weaknesses, opportunities and threats pertaining to the LSPs in the cluster. The demand-supply matrix was useful to determine constraints on demand and supply sides with respect to key services at cluster level.

These analyses helped in better understanding of the gaps in services available locally as well as to identify the capacity building needs of the LSPs for promotion of EE & RE in the cluster. There was continuous dialogue with the industry association in the cluster to brief them about the gaps identified and remedial measures. The analyses and interactions further helped in identifying potential EE & RE technologies which can be taken up for preparation of detailed project reports (DPRs) under the assignment.

The cluster study was designed in two parts; quantitative survey of LSPs and MSMEs (through structured questionnaire), and qualitative discussion with focused groups, opinion leaders, and a variety of stakeholders in the cluster.

A questionnaire survey of about 20 MSMEs and LSPs was carried out in the cluster. Some of the MSMEs and LSPs provided response as per the structured questionnaire while some provided feedback through a generic discussion with regard to the demand-supply requirements of services in the cluster. The sample filled in survey questionnaires are enclosed in annexure 3.

4.0 Analysis of LSP segregation based on questionnaire survey

4.1 Type of process/technology and role of LSPs

A questionnaire survey was conducted in the cluster to understand the present status of LSPs and the needs of the local industry. Based on the survey, the LSPs were classified into different categories according to the type of activities e.g. process, utilities and support services. The type of LSPs involved in the cluster is summarized in table 4.1a.

Table4.1a: Types of LSPs in Khurja cluster

Sr. No	Type of LSPs	Nos.
1	Firing and process equipment – Grinding, drying, kiln, etc.	25
2	Electrical and mechanical utilities	20
3	Minerals and batch materials	10
4	Renewable energy solutions	2
5	Technical /consultancy services	3
	Total	60

The data on LSPs was further analyzed to categorize them according to the type of main process/technology commonly in use along with their specific roles in the cluster. The detailed classification and the types of LSPs and their role are provided in table 4.1b

Table 4.1b: Detailed classification and roles of LSPs

Category	Section	Equipment/service	Role of LSP
Process equipment	Wet grinding	Ball mill Grinding media	Manufacture/ sales/ service
	Mould preparation	Moulding	
	Firing and baking	Gas/oil fired kilns Burners Insulation & refractory Control & instruments for firing system	
	Testing laboratory	Material testing services	

Category	Section	Equipment/service	Role of LSP
Utility equipment	Electrical equipment	Voltage controllers, stabilizers, lighting, power factor controller, electrical motors	Manufacture/ sales/ service
	Mechanical	Pug mill, filter press, slurry pumps, spares & service	
Other services	Awareness programs and training	Government schemes, energy efficiency and conservation, technical skill	Training and technical consultancy
	Consultants	Financial, energy conservation, technology & process	
	Renewable energy	Solar photovoltaics (SPVs)	

4.2 Mapping needs based on demand and availability of services

Based on the information collected on LSPs, an exercise to analyse demand side and supply side constraints with respect to services available in Khurja ceramic cluster was undertaken. The summary of the analysis is presented in table 4.2.

Table 4.2: Demand and supply side analysis of LSPs in Khurja ceramic cluster

Sr. No.	Area	LSP	
		Demand side constraints	Supply side constraints
1	Fuel switchover	Lack of awareness on gas contract and load assessment	Limited business plan for new gas connections supplier
2	EE/RE technologies	Lack of awareness among MSMEs and service providers on new EE/RE technologies related to low thermal mass material, variable frequency drives (VFDs), automation, solar energy etc.	Lack of local technical experts on EE/RE technologies. Most service providers are located in Delhi and other parts of the country. Low trust level on service providers due to absence of local representatives

Sr. No.	Area	LSP	
		Demand side constraints	Supply side constraints
3	Best operating practices	Lack of basic instrumentation like temperature sensor/ indicator, pressure gauge, automation, flow meter for air and fuel, etc. to monitor the performance and efficient operation of equipment like firing kiln, motors, ball mill, agitators, etc. Improper gas and air train for firing kiln.	Competent service providers and training facilities not available. Lack of awareness on best operating practices relevant to local industries.
4	Kilns construction – burners, automation, WHR etc.	Lack of awareness on energy efficiency improvements in kilns e.g. use of low thermal mass furniture, waste heat recovery system, insulation applications, energy efficient burners, combustion efficiency, fuel to air ratio, automation and so on	Service providers do not have full know-how/ expertise and only focus on low initial cost equipment

5.0 SWOT analysis of LSPs

A SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of LSPs was attempted to understand demand supply gaps of the technical services available in the cluster. The SWOT analysis table is given in table 5.0.

Table 5.0: SWOT analysis of LSPs in Khurja cluster

Current situation		Future	
Strengths	**Weaknesses**	**Opportunities**	**Threats**
Service providers are keen to learn about new technologies and practices	Lack of training/ exposure to latest EE/RE technologies and best operating practices	Industries are active and keen to engage with service providers Good scope to increase the level of automation	Selection of new equipment based on lowest capital cost rather than life-cycle cost
Service providers are flexible and dynamic in nature	Local sale representatives lacks proper technical knowledge on advanced process machineries	Entrepreneurs are keen to implement new EE/RE technologies Interested in adopting gas fired kilns	MSMEs usually do not pay for soft technical support/ services
Presence of active commercial gas agency	Lack of awareness on switch over from oil to gas based furnace	Willingness to acquire new skills	Limited business plan by gas agency to meet surge gas demand
LSPs cater to a diverse range of products/ processes among MSMEs	No formal training institutions available at the cluster level	LSPs are willing to learn/ acquire new skills	Presence of low cost service providers

6.0 Conclusions

A questionnaire survey was conducted in Khurja ceramic cluster during January 2018 to obtain relevant information on services available in the cluster with respect to each of the above categories and assess the perception of the industry on the need to develop these services within the cluster. The exercise helped in analyzing demand side and supply side constraints with respect to local service providers in the cluster. The summary of the demand side and supply side needs of local industries is presented in tables 6.0.

Table 6.0. Demand and supply side analysis of LSPs Khurja cluster

Sr. No.	Area	LSP	
		Demand side constraints	Supply side constraints
1	Fuel switchover	Lack of awareness on gas contract and load assessment	Limited business plan for new gas connections supplier
2	EE/RE technologies	Lack of awareness among MSMEs and service providers on new EE/RE technologies related to low thermal mass material, variable frequency drives (VFDs), automation, solar energy etc.	Lack of local technical experts on EE/RE technologies. Most service providers are located in Delhi and other parts of the country. Low trust level on service providers due to absence of local representatives
3	Best operating practices	Lack of basic instrumentation like temperature sensor/ indicator, pressure gauge, automation, flow meter for air and fuel, etc. to monitor the performance and efficient operation of equipment like firing kiln, motors, ball mill, agitators, etc. Improper gas and air train for firing kiln.	Competent service providers and training facilities not available. Lack of awareness on best operating practices relevant to local industries.
4	Kilns construction –	Lack of awareness on energy efficiency improvements in	Service providers do not have full know-how/

Sr. No.	Area	LSP	
		Demand side constraints	Supply side constraints
	burners, automation, WHR etc.	kilns e.g. use of low thermal mass furniture, waste heat recovery system, insulation applications, energy efficient burners, combustion efficiency, fuel to air ratio, automation and so on	expertise and only focus on low initial cost equipment

Annexures

Annexure 1: Questionnaire 1: for collecting information of LSPs from Khurja ceramic units

QUESTIONAIRE / DETAILS

1. Company background

- Name of the Company :
- Address :
- Contact Person :
- Mobile / Landline :
- Email ID :
- Product Manufactured :

2. Local Service Providers (LSPs):

Section	Equipment/Service	LSPs
Process Machinery		
Wet Grinding	Ball Mill	
	Grinding Media	
Mould preparation	Moulding	
Firing and Baking	Gas / Oil Fired Tunnel kilns	
	Burners	
	Insulation & Refractory	
	Waste heat recovery	
	Control & Instruments for Firing System	
Utilities		
Induction Motor	Energy Efficient Motors (Distributors)	
	Motor Rewinding Services	
VFD (Variable Frequency Drives)	Suppliers	
Air Compressor	Air Compressor (servicing)	
	Auto Drain Valves/Air guns and Spares supplier	
	Air Piping	

Section	Equipment/Service	LSPs
Pumping	Energy Efficient slurry Pumps	
	AMC/Maintenance	
	Automation	
Fans & Blowers	Energy Efficient Fans	
Belt & Gear System	High-torque cog belts	
Lighting	LED lamps	
Solar	PV Solar	
Energy Monitoring System		
Power factor	Consultants/capacitor suppliers	
Others		
Other Services		
Support services	Process experts/ consultants	
	Energy Audits	
	Lean Manufacturing	
	Environment consultants	
	ISO consultants	

3. Are there any areas where reliable local service providers are not available

Annexure 2: Questionnaire 2 for collecting information about the type of services offered by the LSPs

Questionnaire for EE (Energy Efficiency) /RE (Renewable Energy) Service Providers

Khurja Ceramic cluster

1. General information

Name of the firm		
Nature of firm	Individual/sole proprietorship/Pvt. Limited/Limited/Partnership	
Year of establishment		
Name of the CEO/MD	Dr/Mr./Ms.	
Contact person(s) regional Mobile Email Mailing address		
Factory/H.O. address		
Number of employees	Technical:	Non-technical:

2. Categories of business/service (please tick one or more boxes)

Category	Technology/Service	Please specify
Energy Efficiency (EE)		
	EE Equipment Manufacturer	
	EE Material Manufacturer	
	EE Consultancy	
	EE Fabrication	
	EE O&M services	
	EE Others	
Renewable Energy (RE)		
	RE Equipment Manufacturer	
	RE Material Manufacturer	
	RE Consultancy	
	RE O&M services	
	RE Others	
Other services (Please specify)		

3. Technology features, projects and clients *(Please add additional sheets, if required)*

Technology/Service*	Features and benefits (e.g. key specification, saving (%), investment, payback period)	No. of implementations	Clients

* Please attach technical brochure and detailed case studies, if available

4. Any other information

Annexure 3: Sample survey questionnaires filled during the field surveys

QUESTIONAIRE / DETAILS

1. Company background

- Name of the Company : R S ceramic industries
- Address : Industrial Area, Near Pani Ki Tanki Harshan Villa,

  A-35, Panchwati, Junction Road, Khurja, Near Pani Ki Tanki, GT Road, Khurja-203131, Uttar Pradesh, India
- Contact Person : Mr Rajendra Gumber (Partner)
- Mobile / Landline : +919568574351 / 9837050391
- Email ID : raj2july@yahoo.co.in
- Product Manufactured : Crockery products (mug, tea cup), flower pots

2. Local Service Providers (LSPs):

Section	Equipment/Service	LSPs
Process Machinery		
Wet Grinding	Ball Mill	
	Grinding Media	Nil
Mould preparation	Moulding	Nil
Firing and Baking	Gas / Oil Fired Tunnel klins	
	Burners	Wesman Burners,
	Insulation & Refractory	
	Waste heat recovery	Nil
	Control & Instruments for Firing System	Nil
Utilities		
Induction Motor	Energy Efficient Motors (Distributors)	Local vendor
	Motor Rewinding Services	Heeralal
VFD (Variable Frequency Drives)	Suppliers	Nil

Section	Equipment/Service	LSPs
Air Compressor	Air Compressor (servicing)	Nil
	Auto Drain Valves/Air guns and Spares supplier	Nil
	Air Piping	Nil
Pumping	Energy Efficient slurry Pumps	Nil
	AMC/Maintenance	Nil
	Automation	Nil
Fans & Blowers	Energy Efficient Fans	Local vendor
Belt & Gear System	High-torque cog belts	Local vendor
Lighting	LED lamps	Local vendor
Solar	PV Solar	Nil
Energy Monitoring System		Nil
Power factor	Consultants/capacitor suppliers	Nil
Others		Nil
Other Services		
Support services	Process experts/ consultants	
	Energy Audits	Nil
	Lean Manufacturing	Nil
	Environment consultants	
	ISO consultants	Nil

Questionnaire for EE (Energy Efficiency) /RE (Renewable Energy) Service Providers
(Carrying out Capacity Building of LSPs: GEF-UNIDO-BEE Project)

Khurja Ceramic cluster

1. General information

Name of the firm	M/s M B Engineers	
Nature of firm	Sole proprietorship	
Year of establishment	2008	
Name of the CEO/MD	Mr. Madan Bhati	
Contact person(s) regional Mobile Email Mailing address	Mr. Madan Bhati 9212784121 Bhati.madan@gmail.com madan@mbengineers.com Rajiv colony, Sec – 56A, Ballabgarh, Haryana	
Factory/H.O. address	Rajiv colony, Sec – 56A, Ballabgarh, Haryana	
Number of employees	Technical: 20	Non-technical: 10

2. Categories of business/service (please tick one or more boxes)

Category	Technology/Service	Please specify
Energy Efficiency (EE)		
	EE Equipment Manufacturer/Supplier	
	EE Material Manufacturer	
	EE Consultancy	
	EE Fabrication	Gas and air train piping fabrication
	EE O&M services	Boiler AMC, hot water generator AMC
	EE Others	
Renewable Energy (RE)		
	RE Equipment Manufacturer	
	RE Material Manufacturer	
	RE Consultancy	
	RE O&M services	
	RE Others	
Other services (Please specify): Provides structural fabrication work for custom design		

3. Technology features, projects and clients *(Please add additional sheets, if required)*

Technology/Service*	**Features and benefits (e.g. key specification, saving (%), investment, payback period)**	**No. of implementations**	**Clients**
Accredited vendor of Adani gas agency for leak-proof piping fabrication work for gas distribution network	Fire safety in gas distribution network	100	Adani gas agency, pottery industries in Khurja,

* Please attach technical brochure and detailed case studies, if available

4. Any other information

Questionnaire for EE (Energy Efficiency) /RE (Renewable Energy) Service Providers
(Carrying out Capacity Building of LSPs: GEF-UNIDO-BEE Project)

Khurja ceramic cluster

1. General information

Name of the firm	Raj Engineering Works	
Nature of firm	Sole proprietorship	
Year of establishment	1990	
Name of the CEO/MD	Mr. Raj Kumar	
Contact person(s) regional Mobile Email Mailing address	Mr Raj Kumar 7830188926 / 9719196175 Nil Nehrupur Chungi, G T Road, Khurja - 203131	
Factory/H.O. address	Nehrupur Chungi, G T Road, Khurja - 203131	
Number of employees	Technical: 3	Non-technical: 2

2. Categories of business/service (please tick one or more boxes)

Category	Technology/Service	Please specify
Energy Efficiency (EE)		
	EE Equipment Manufacturer/Supplier	Filter press, pug mill, ball mill, firing kiln, etc.
	EE Material Manufacturer	
	EE Consultancy	Yes
	EE Fabrication	Yes
	EE O&M services	Yes
	EE Others	
Renewable Energy (RE)		
	RE Equipment Manufacturer	
	RE Material Manufacturer	
	RE Consultancy	
	RE O&M services	
	RE Others	
Other services (Please specify): Undertakes custom design job work for fabrication of machineries for pottery industries and kiln construction		

3. Technology features, projects and clients *(Please add additional sheets, if required)*

Technology/Service*	Features and benefits (e.g. key specification, saving (%), investment, payback period)	No. of implementations	Clients
Pug mill, filter press, ball mill and firing kiln	Less than 3 years	More than 25	Pottery industries across India (Khurja, Morbi, Kolkata, etc.). Indian Railways, Terracotta industries in Calicut and Darjeeling.

* Please attach technical brochure and detailed case studies, if available

4. Any other information

Questionnaire for EE (Energy Efficiency) /RE (Renewable Energy) Service Providers
(Carrying out Capacity Building of LSPs: GEF-UNIDO-BEE Project)

Khurja ceramic cluster

1.General information

Name of the firm	Anas Engineering Works	
Nature of firm	Sole proprietorship	
Year of establishment	1996	
Name of the CEO/MD	Mohd Sharafat Ali	
Contact person(s) regional Mobile Email Mailing address	Mohd. Sarafat Ali 9837510606 / 8439857805 anasew786@gmail.com Lohe Ki Tanki, Subhash road, Khurja – 203131	
Factory/H.O. address	Lohe Ki Tanki, Subhash road, Khurja – 203131	
Number of employees	Technical: 10	Non-technical: 10

2.Categories of business/service (please tick one or more boxes)

Category	Technology/Service	Please specify
Energy Efficiency (EE)		
	EEquipment Manufacturer/Supplier	Burner, filter press, pug mill, ball mill, firing kiln, etc.
	EE Material Manufacturer	
	EE Consultancy	Yes
	EE Fabrication	Yes
	EE O&M services	Yes
	EE Others	
Renewable Energy (RE)		
	RE Equipment Manufacturer	
	RE Material Manufacturer	
	RE Consultancy	
	RE O&M services	
	RE Others	
Other services (Please specify): Undertakes custom designed fabrication work.		

4. Technology features, projects and clients *(Please add additional sheets, if required)*

Technology/Service*	Features and benefits (e.g. key specification, saving (%), investment, payback period)	No. of implementations	Clients
Burner, pug mill, filter press, ball mill and firing kiln	Less than 3 years	More than 100	Pottery industries across India (Khurja, Morbi. Kolkata, etc.). Supplied customised firing kiln in Nepal, Bangladesh and Sri Lanka.

* Please attach technical brochure and detailed case studies, if available

4. Any other information