

Promoting Energy Efficiency and Renewable Energy In selected MSME Clusters In India

A Joint Initiative of GEF, UNIDO and BEE



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About the Project

- **Objective:** Introduce energy efficiency and enhance use of renewable energy technologies in process applications in the 12 selected energy-intensive MSME clusters in India
- **Project Value:** GEF Grant 7.17 million US\$/Co-financing 26.2 million US\$

Project Partners:



Cluster Partners:



Sectors & Clusters:

Foundry

Coimbatore
Belgaum
Indore

Brass

Jamnagar

Ceramic

Khurja
Thangadh
Morbi

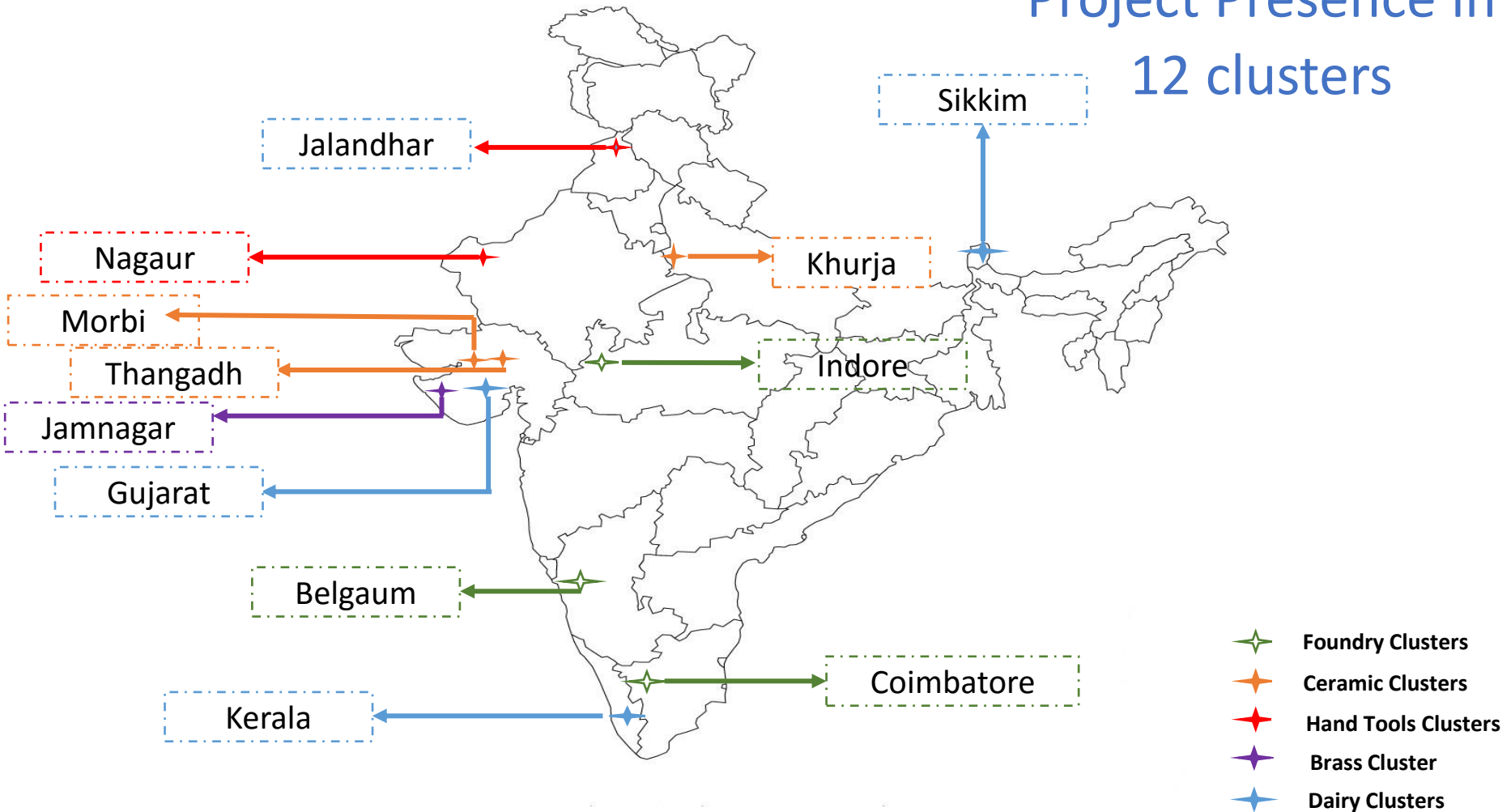
Hand Tools

Nagaur
Jalandhar

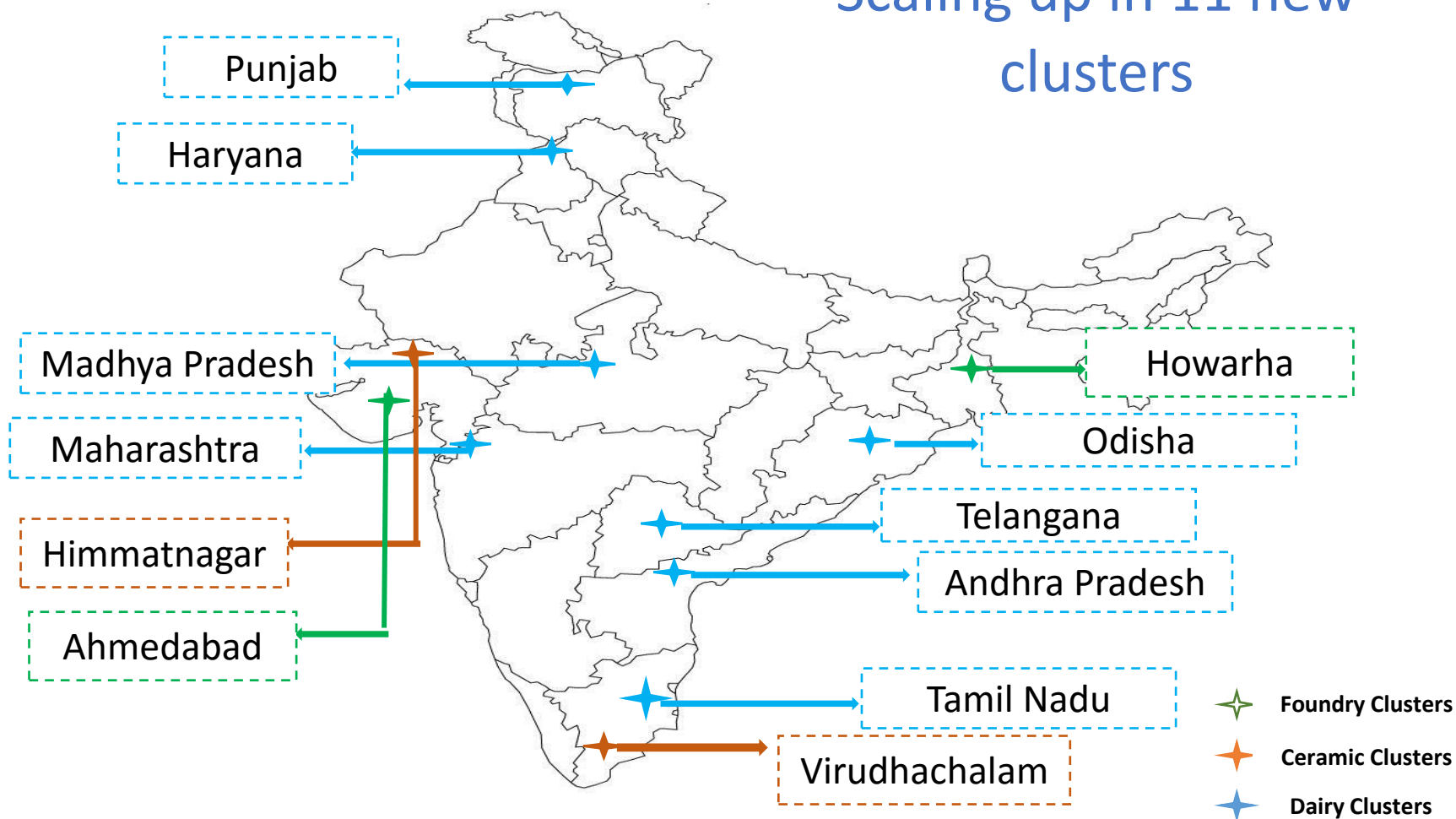
Dairy

Gujarat
Sikkim
Kerala

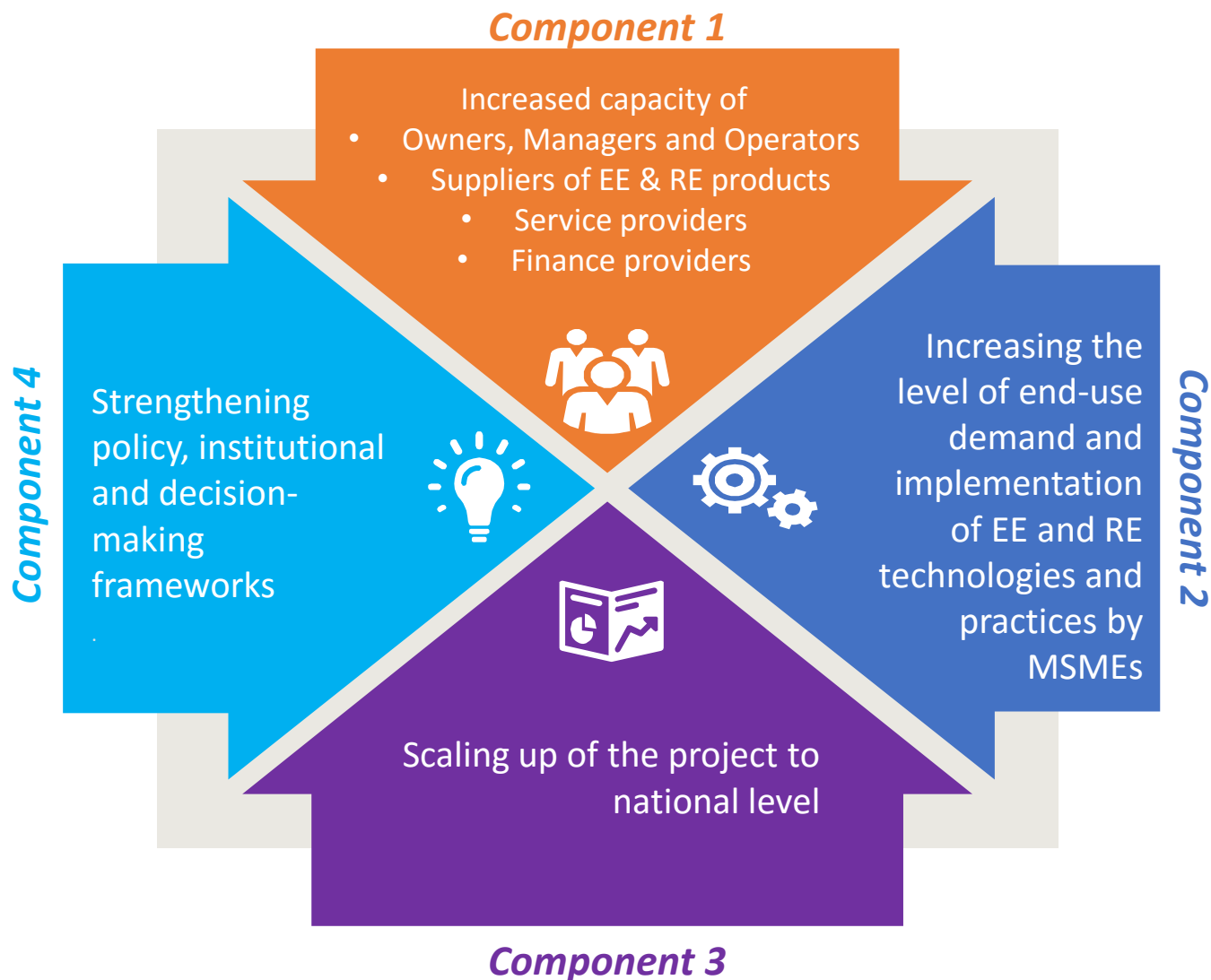
Project Presence in 12 clusters

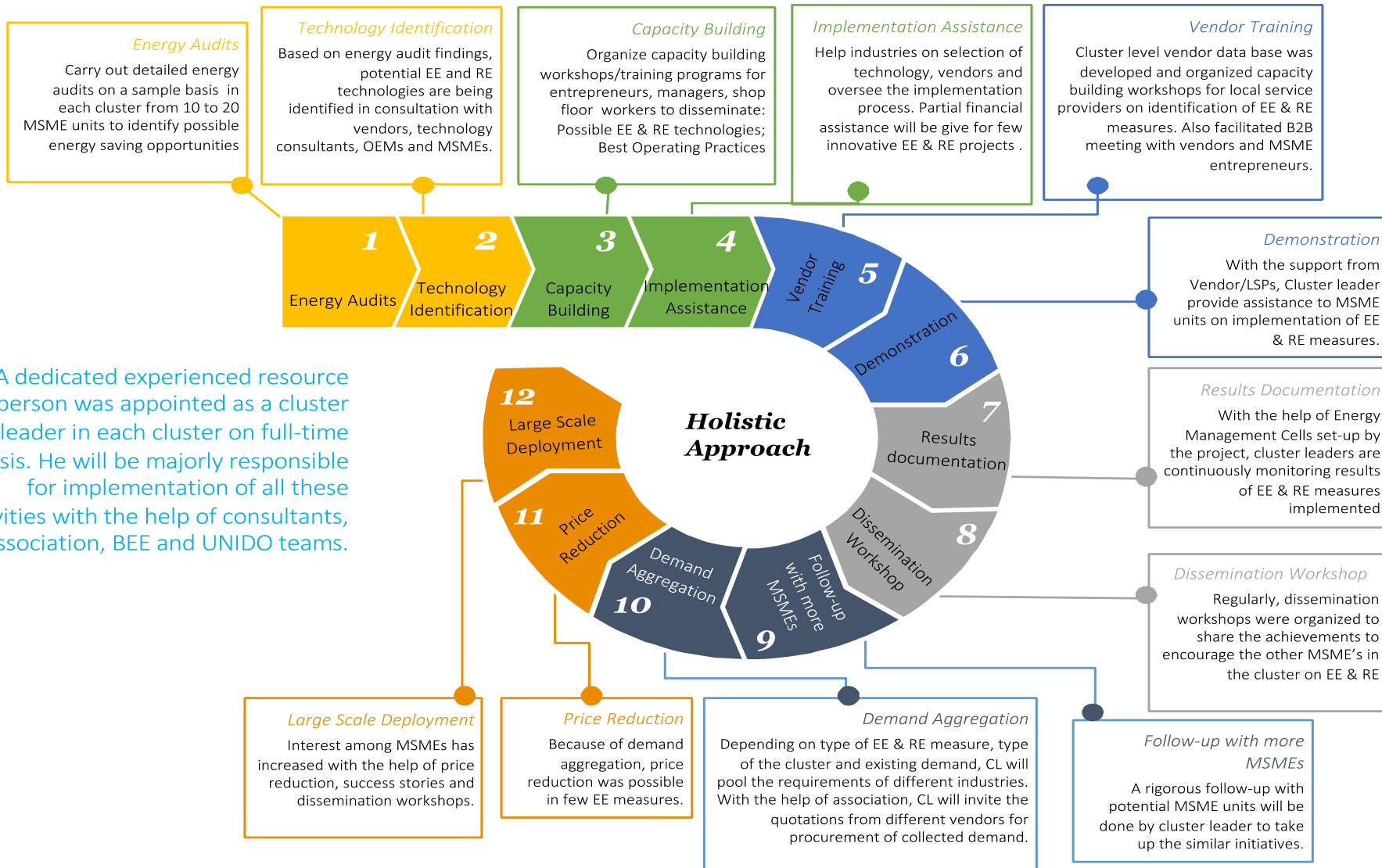


Scaling up in 11 new clusters

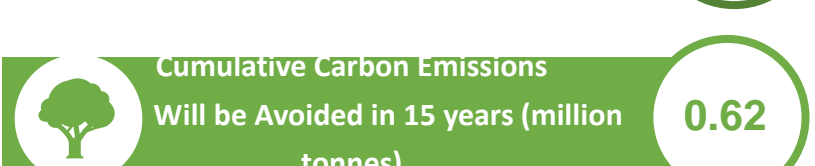
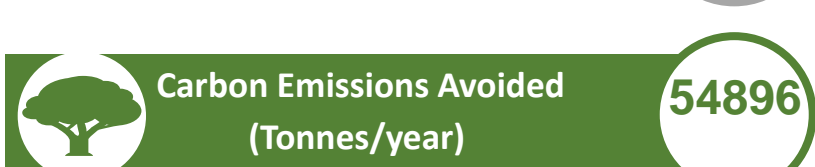
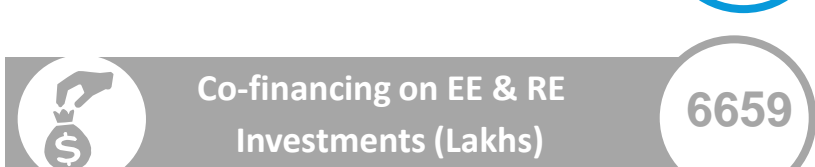
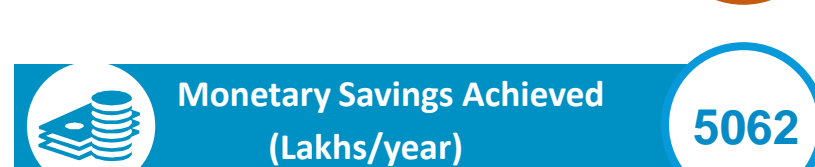
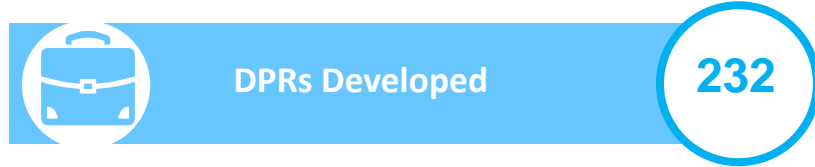
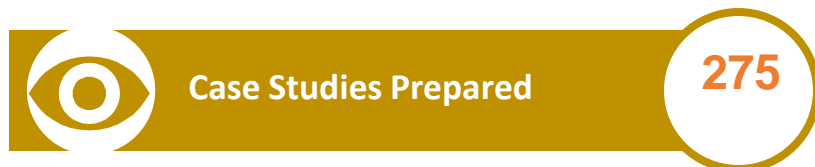
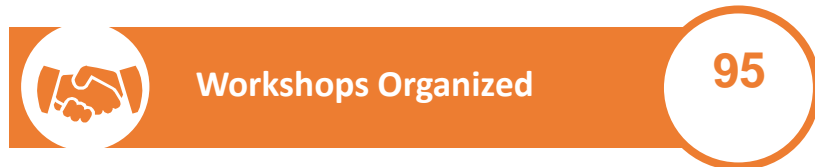
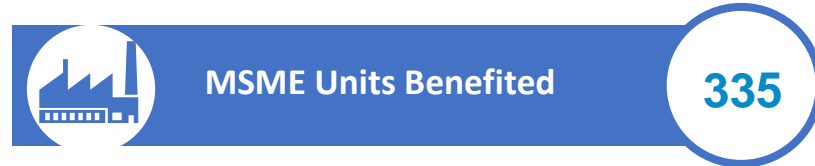


Project Components





A dedicated experienced resource person was appointed as a cluster leader in each cluster on full-time basis. He will be majorly responsible for implementation of all these activities with the help of consultants, association, BEE and UNIDO teams.



EE and RE projects Implemented

Cluster Name	Small Scale Projects	Energy Savings (TOE/year)	CO ₂ Reduction (Tonnes/year)	Monetary Savings (Lakh ₹ /year)	Investment (Lakh ₹)
Jalandhar	58	247	1892	179	119
Coimbatore	50	190	1843	227	160
Nagaur	48	24	235	25	8
Jamnagar	38	113	667	137	270
Khurja	9	383	1495	75	28
Indore	20	130	821	71	52
Gujarat	110	5799	32484	2935	4047
Belgaum	83	393	3079	272	349
Thangadh	90	1967	10414	1046	1547
Morbi	14	564	1739	71	49
Kerala	3	84	227	24	30
Total	523	9894	54896	5062	6659

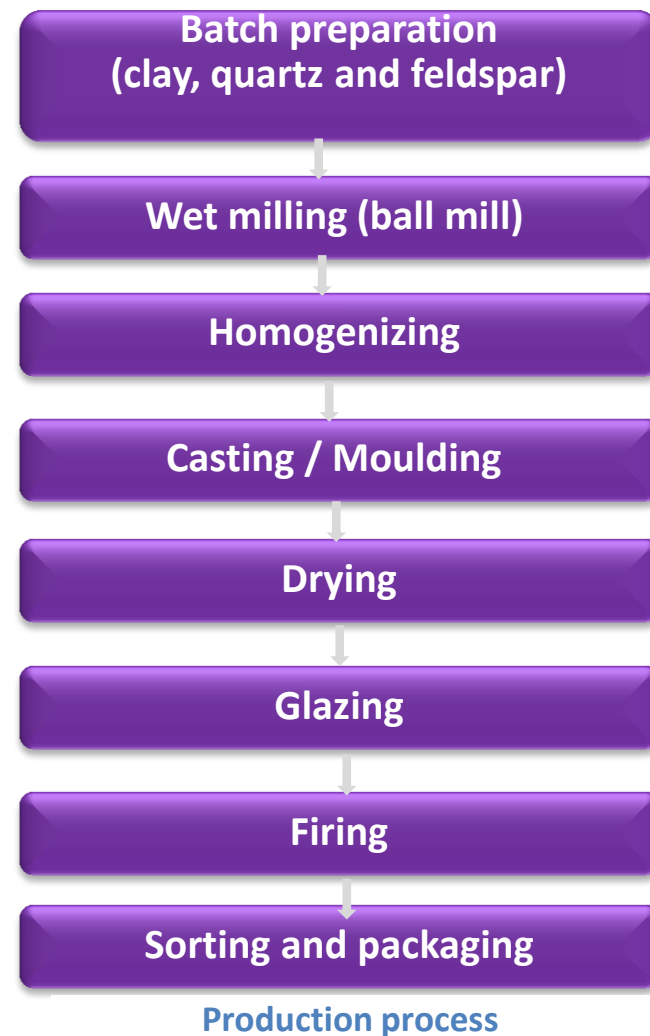
115
technologies
have been
identified and
some of them
replicated
multiple times

Project interventions in MSME Clusters in Saurashtra



Thangadh Ceramic Cluster

- Located near Rajkot and there are about 225 ceramic units in the cluster fall under three distinct types based on their primary products: pottery, insulators, and sanitary ware.
- The project activities initiated in the Thangadh cluster in 2014.



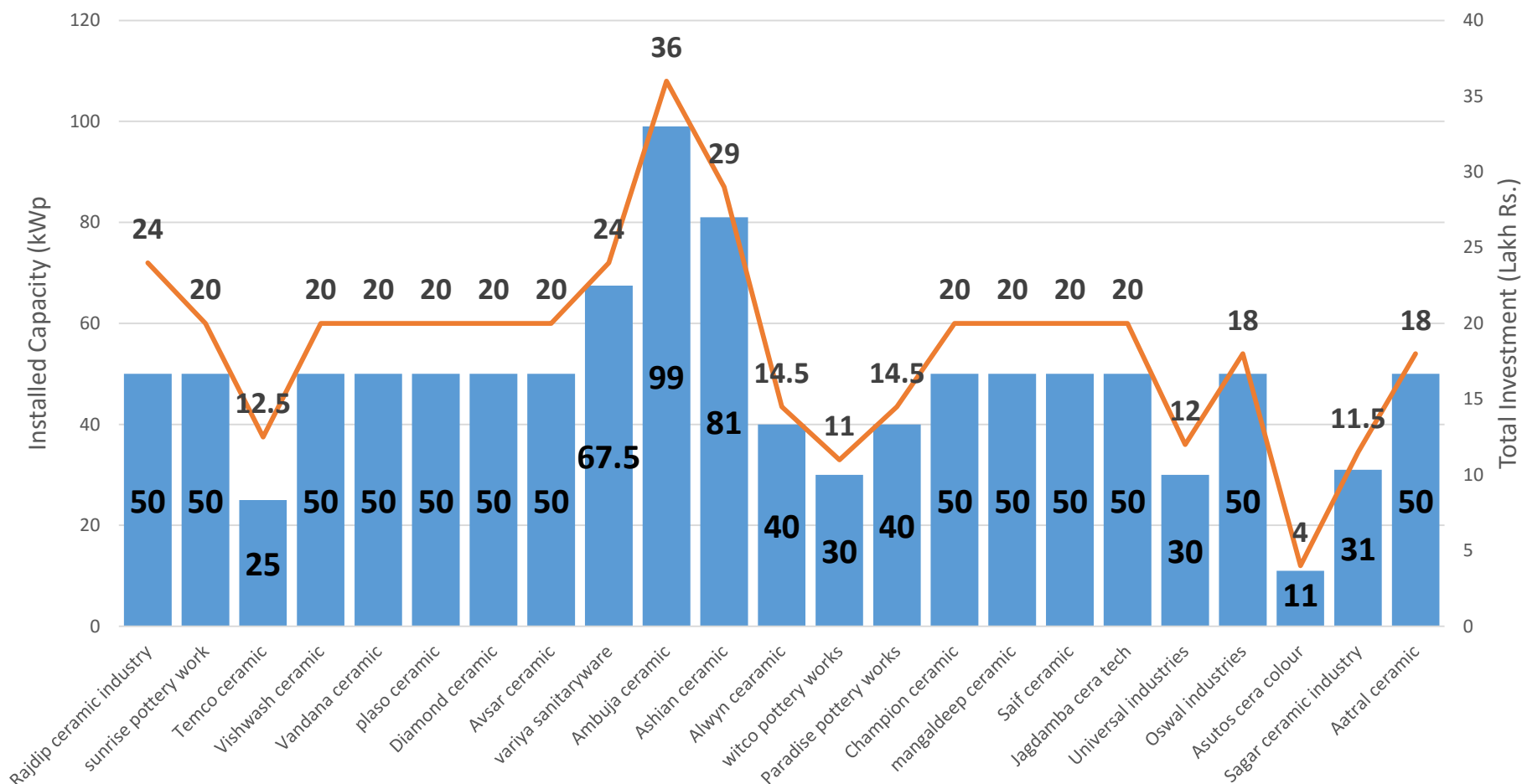
Roof Top Solar Photovoltaic Project

- Till date, 23 industries have installed grid connected roof-top solar photovoltaic systems
- The capacity of the system is varying from 11 kWp to 99 kWp
- Commutatively, 1.1 MWp solar rooftop PV system was installed with an investment of around 4.29 crores
- Total five service providers have supplied the systems
- All are polycrystalline silica plants with panel warrantee of 20 years and inverter warrantee for 5 years
- Average per unit cost of electricity from the Grid is about Rs. 7/kWh

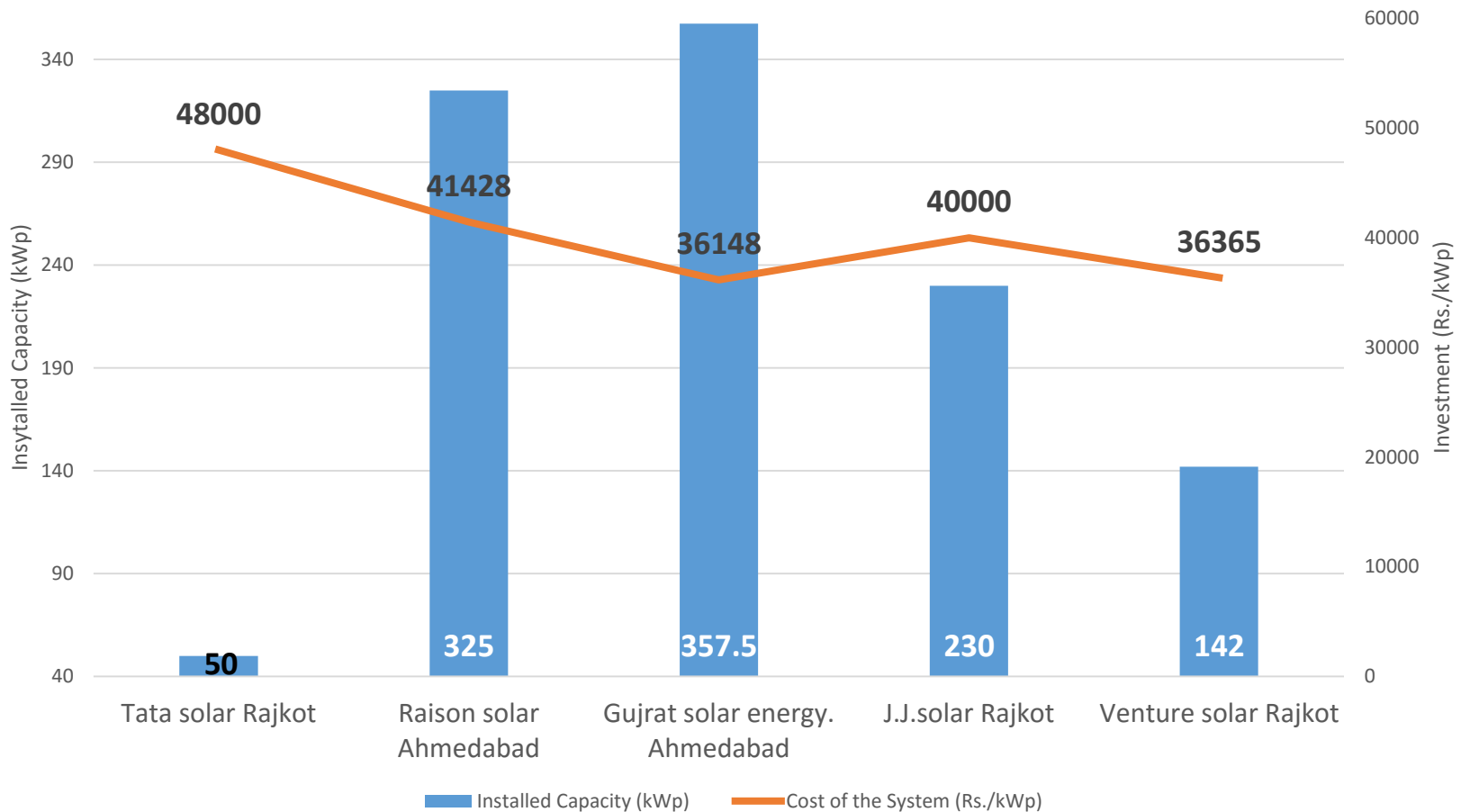


42 to 60
Months
Simple payback
period

Roof Top Solar PV Installations and Investment



Installed Capacity and Average kWp cost of each Supplier





Energy Efficient 28W BLDC Ceiling Fans

- The moulds have to be completely dried in 24 hours so that the shaped ware can be cast the following day.
- Typically, one ceiling fan is required for every four moulds, and each unit has about 400–800 fans which run for almost 20 hours a day (depending on ambient weather conditions).
- Energy audits showed that the conventional fans consuming 70–75W at full speed and the performance was poor due to age
- Typically, a unit incurred monthly expenditure of 5000–8000 rupees on maintenance and repair of fans.
- More than **120 sanitary ware units** are already replaced about **16000 conventional fans with 28W energy efficient BLDC fans**
- A total investment of about 3.52 crore rupees, against which they are saving an estimated 3.15 crore rupees annually in energy cost. This measure is saving over 4.51 million kWh of electricity and avoiding 3700 tonnes of CO₂ emissions each year.



66%
Energy Efficient

3 year
Warranty

45 Lakh
kWh Annual Savings

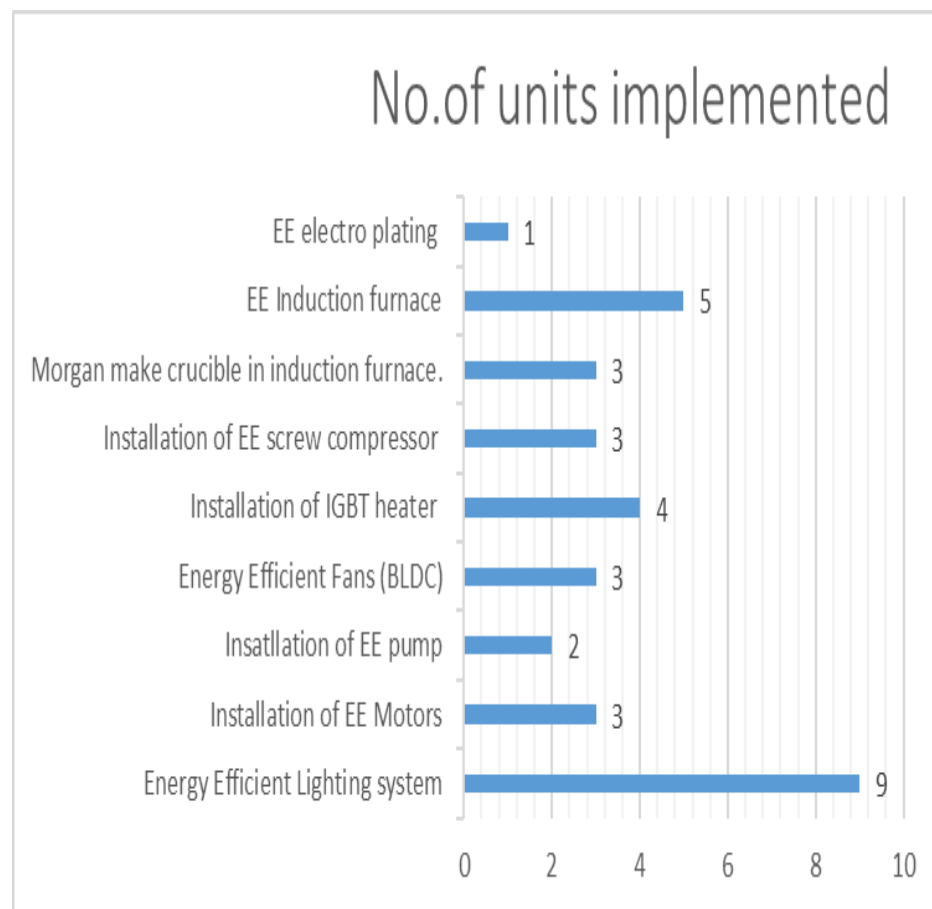
Demand Aggregation Model

Other Energy Conservation Interventions

Energy Conservation Measure	Implemented units	Estimated Annual Energy Savings
Low thermal mass car in tunnel kiln	15	43200 SCM of PNG
High alumina media /lining in glaze ball mill in place of natural lining	20	22 Lakh kWh
VFD screw air compressor system in place of fixed motor compressor (30 HP and 20 HP systems)	35	3.86 Lakh kWh
Modification in existing tunnel kiln design—double deck system and shortening of firing zone	3	810000 SCM of PNG
Replacing old compressed air pipeline with seamless (joint-less) pipe line to avoid air leakages	10	7000 kWh
Waste heat recovery from exit flue gas	4	15960 SCM of PNG

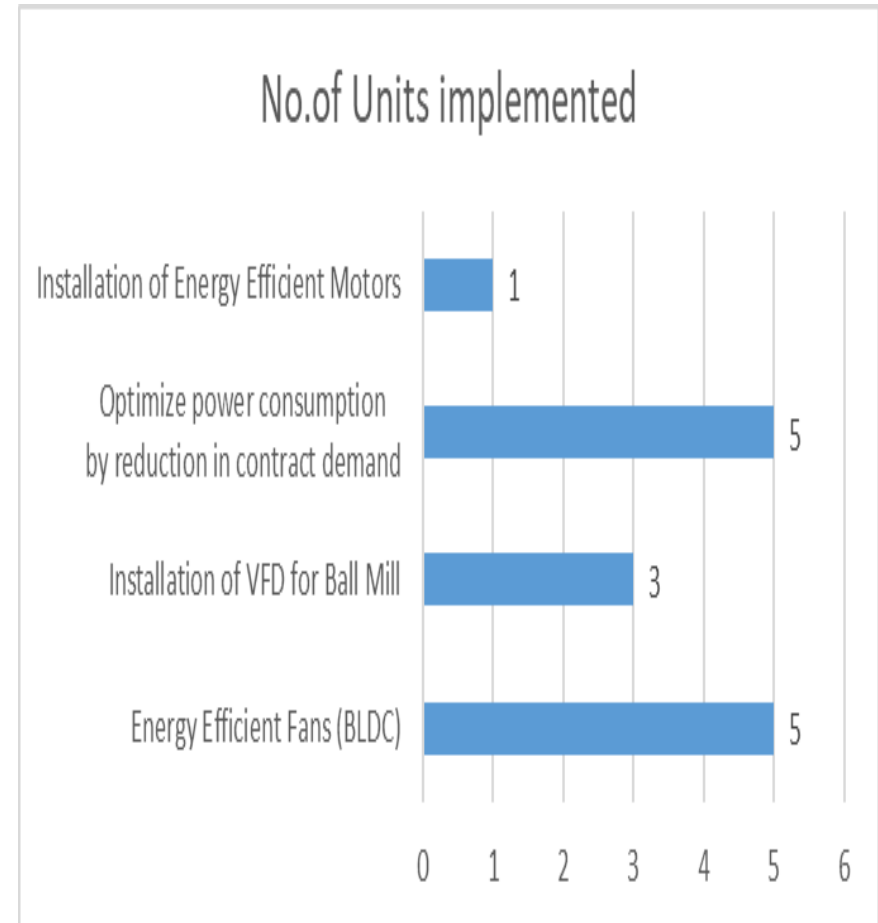
Jamnagar Brass Cluster

- In Jamnagar brass cluster, about 100 brass units are targeted under the project.
- 38 EE/RE projects implemented like IGBT billet heater, EE furnace, EE pumps, EE fans , EE Compressors & lighting systems
- Overall achieved a energy saving of 113 toe per year and avoided 667 tonnes of Carbon dioxide emissions per year



Morbi Ceramic Cluster

- In Morbi Ceramic Cluster, about 200 units are targeted under the project.
- 14 EE/RE projects implemented like EE motors, VFD for ball mill, EE fans etc..
- Overall achieved a energy saving of 564 toe per year and avoided 1739 tonnes of Carbon dioxide emissions per year



Gujarat Dairy Cluster



Concentrated Solar Thermal Steam Generation system



MBR+ICR technology in effluent treatment plant



250 TR Freon package chiller

More than 110 EE/RE measures were implemented and resulted annual energy savings of **5799** toe which in turn reduced **32484** tonnes of carbon dioxide emissions

Gujarat Dairy Cluster

- Premium Efficiency Air Compressors
- Variable Frequency Drives for various applications
- Condensate Recovery
- Waste Heat Recovery from Boilers and Powder Plant
- Energy Efficient Lighting
- Solar PV and Thermal Applications
- Installation of High Efficiency Screw Compressors
- Heat Pump
- Back Pressure Turbine
- Methane capture from dairy effluent
- De-superheaters at Refrigeration systems
- Energy Efficient Bulk Milk Coolers
- Energy Efficiency Motors, Fans and Pumps
- Replace of evaporator condensing system with PHE system
- Ring-main system for compressor air distribution system
- Replaced spray pond type cooling tower system with Induced draft cooling tower for Chilling Centre
- Replaced existing condensing system with new condensing chiller system (Falling Film Chiller)
- Installation of Biomass fired boilers

Other Project Activities

Energy Management Centers

Twelve energy management centers are established and functioning successfully.



Pilot Projects

Solar Thermal Steam Generation
at Amulfed Dairy



Biomass Gasifier for Sand Drying
at Belgaum Foundry Cluster



Cloud Based Data Analytics
for Foundries



Cluster Level Workshops



LSP Training Programs

Trained around 1000 LSPs as well as unit owners through 43 capacity building workshops in 12 clusters.

Thangadh



Gujarat Dairy



Morbi



Jalandhar



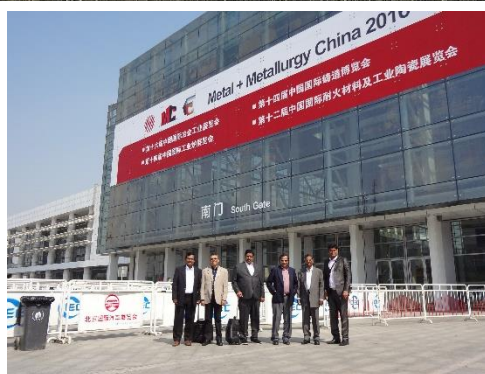
Sikkim



Nagaur

International Study Tours

Organized 4 International Study tours to China, Japan & New Zealand



In-house Training Programs at AIP-NPC, Chennai

Twelve (3-days) residential training programs were completed on “Best Operating Procedures for Energy Management in MSMEs” and trained more than 240 entrepreneurs and cluster leaders.



Outreach



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Project to Promote
Energy Efficiency and Renewable
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"Promoting Energy Efficiency and Renewable
Energy in Selected MSME Clusters in India"

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