





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\$/Cofinancing 26.2 million US\$
- Project Partners:











Cluster Partners:

















Coimbatore Belgaum Indore

Brass

Jamnagar

Ceramic

Khurja Thangadh Morhi

Hand Tools

Nagaur Jalandhar

Dairy

Gujarat Sikkim Kerala



















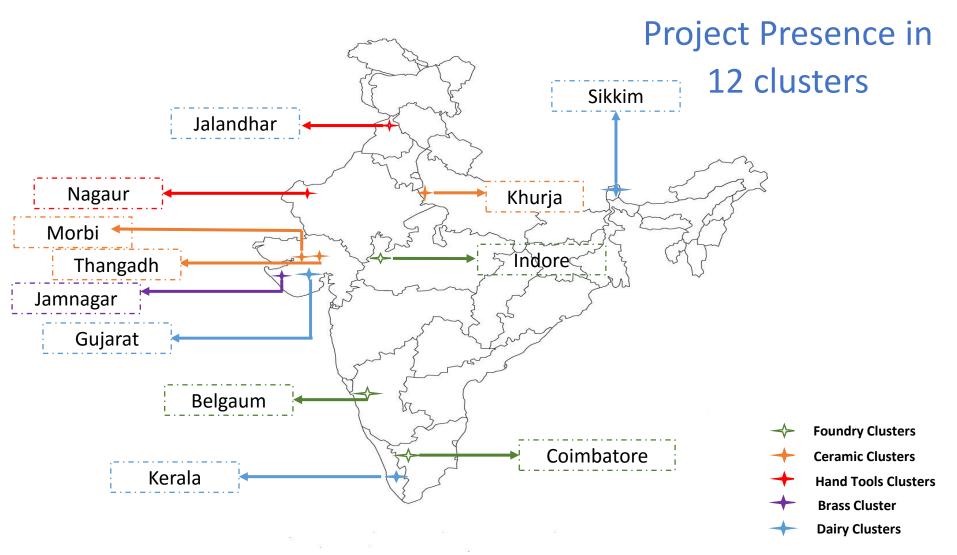


















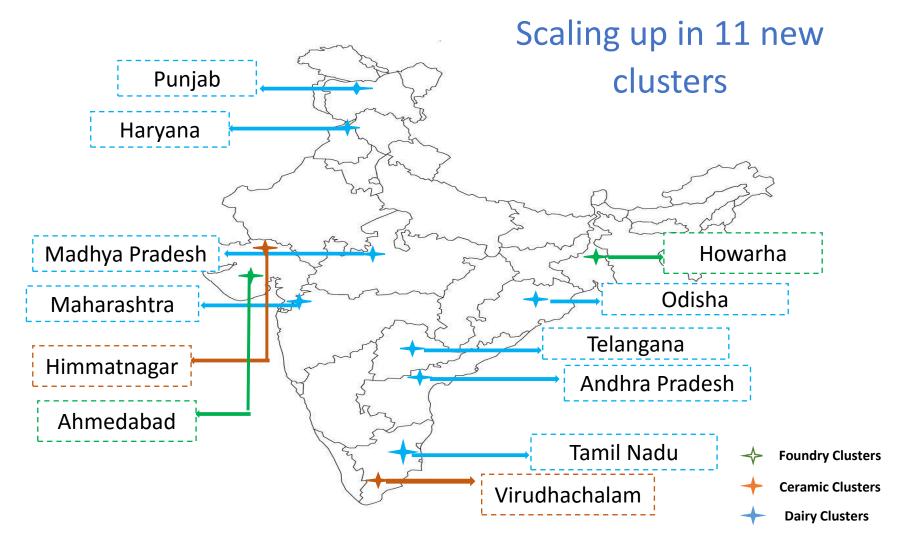






















Project Components





Component 1

Increased capacity of Owners, Managers and Operators Suppliers of EE & RE products

- Service providers
- Finance providers

Strengthening policy, institutional and decisionmaking frameworks

Increasing the level of end-use demand and implementation of EE and RE technologies and practices by **MSMEs**

Component 2

Scaling up of the project to national level

Component 3



Component 4



















A dedicated experienced resource

person was appointed as a cluster

leader in each cluster on full-time

for implementation of all these

basis. He will be majorly responsible

activities with the help of consultants,

association, BEE and UNIDO teams.

Carry out detailed energy audits on a sample basis in each cluster from 10 to 20 MSME units to identify possible energy saving opportunities

Based on energy audit findings, potential EE and RE technologies are being identified in consultation with vendors, technology consultants, OEMs and MSMEs.

Energy Audits

Capacity Building

Organize capacity building workshops/training programs for entrepreneurs, managers, shop floor workers to disseminate: Possible EE & RE technologies; **Best Operating Practices**

Implementation Assistance

Help industries on selection of technology, vendors and oversee the implementation process. Partial financial assistance will be give for few innovative EE & RE projects

Vendor Training

Cluster level vendor data base was developed and organized capacity building workshops for local service providers on identification of EE & RE measures. Also facilitated B2B meeting with vendors and MSME entrepreneurs.

Technology

Identification

12

11

Large Scale

Deployment

Capacity Building

3

 $D_{em_{and}}$

Aggregation

mplementation Assistance

Holistic

Approach

Vendor Training 5

Demonstration

Vendor/LSPs, Cluster leader provide assistance to MSME units on implementation of EE & RE measures

Results Documentation

Demonstration

With the support from

With the help of Energy Management Cells set-up by the project, cluster leaders are continuously monitoring results of EE & RE measures implemented

Dissemination Workshop

Regularly, dissemination workshops were organized to share the achievements to encourage the other MSME's in the cluster on EE & RE

Large Scale Deployment

Interest among MSMEs has increased with the help of price reduction, success stories and dissemination workshops.

Price Reduction

10

Because of demand aggregation, price reduction was possible in few EE measures

Demand Aggregation

6

Results

documentation

Dissemination

Workshop

FOllow-up with more

MSMES

Depending on type of EE & RE measure, type of the cluster and existing demand, CL will pool the requirements of different industries. With the help of association, CL will invite the quotations from different vendors for procurement of collected demand.

Follow-up with more **MSMEs**

A rigorous follow-up with potential MSME units will be done by cluster leader to take up the similar initiatives.























EE & RE Measures Implemented



Energy Savings Achieved (TOE/Year)

9894



Monetary Savings Achieved (Lakhs/year)

5062



Co-financing on EE & RE **Investments (Lakhs)**

6659



Carbon Emissions Avoided (Tonnes/year)

54896



Cumulative Carbon Emissions Will be Avoided in 15 years (million tonnes)

0.62

















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









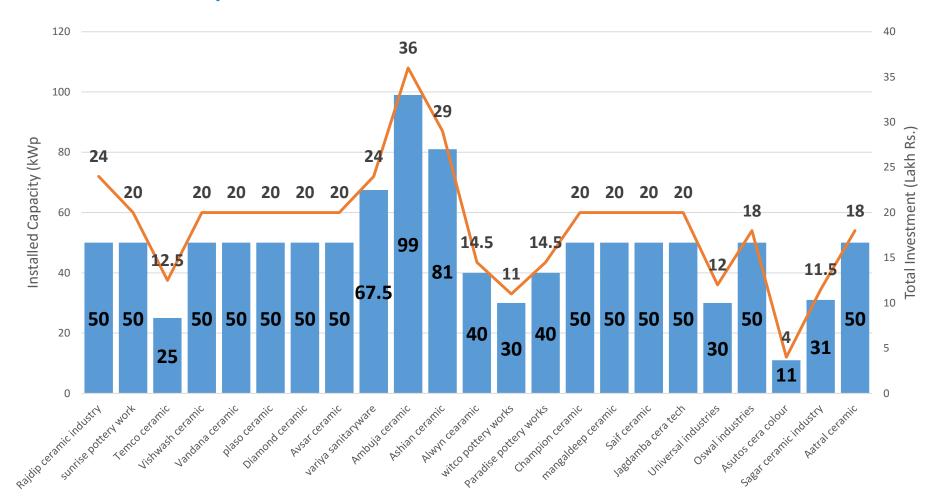








Roof Top Solar PV Installations and Investment









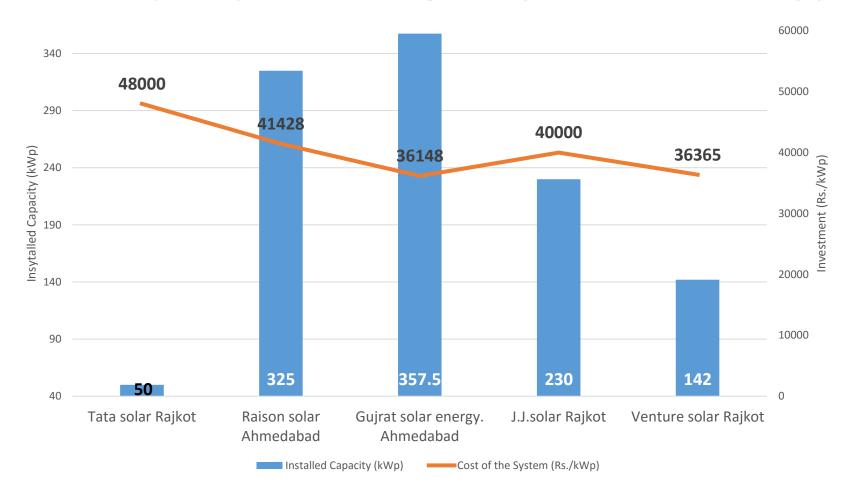








Installed Capacity and Average kWp cost of each Supplier























Leave 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.

Demand Aggregation Model



66% Energy Efficient

Warranty

kWh Annual Savings

















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













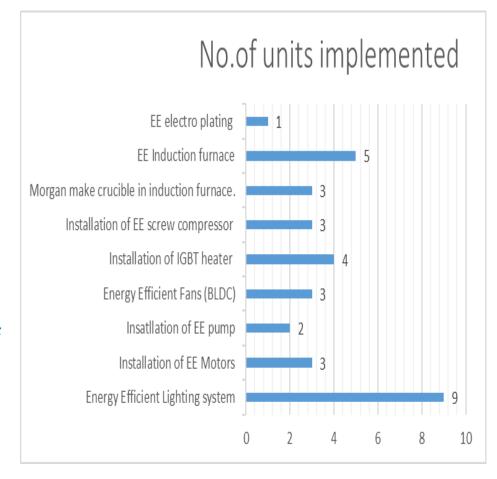






Jamnagar Brass Cluster

- 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















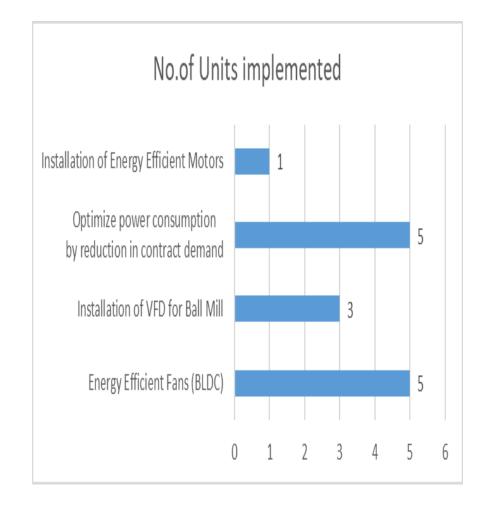






Morbi Ceramic Cluster

- 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



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



















- Compressors Gujarat Dairy Cluster
- 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

- 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.







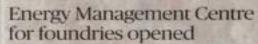












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Pilot Projects

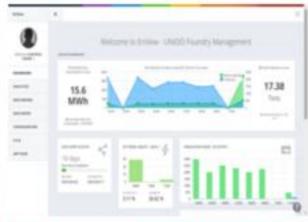
Solar Thermal Steam Generation at Amulfed Dairy

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





Jalandhar

Gujarat Dairy





Sikkim

Morbi





Nagaur





















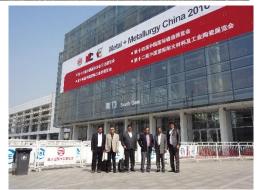
International Study Tours

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





Foundries to get more pilot projects on energy efficiency

S. STERBARDS PROFESSA

the the foundries in County tore, numbering more than 500, и корчесть ресумст оп mengy efficiency and others ables is bringing in better swareness, new technologles, and systems for better energy efficiency.

Most 100 femilies. one of these senall and nordiversecule, are part of the Global Environment Facility (GEF) should project on 'energy efficiency and exconsider energy to make cheery in inda', implemented by LIVERO (Linear) Notions Industrial Develop metal Depositorions and MEX Burney of Rosegy Efficient

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The total project cost was It's Million \$ and 50 % of it was spent, An many as 30 plant projects had been aster tioned so far and 20 more were in the pipeline. The in-dustries had pooled in 19 errors inventment so for our



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Thank you

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