

# 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:**





## FOUNDRY

Coimbatore

Belgaum

Ahmedabad

Howrah

Indore, Ujjain,  
Pitampura



## CERAMIC

Khurja

Thangadh

Morbi

Himmatnagar  
& Naroda



## DAIRY

Gujarat

Kerala

Tamil Nadu

AP &  
Telangana

Odisha

Maharashtra

Punjab

Haryana

Madya Pradesh

Sikkim



## HAND TOOL

Jalandhar

Nagaur



## BRASS

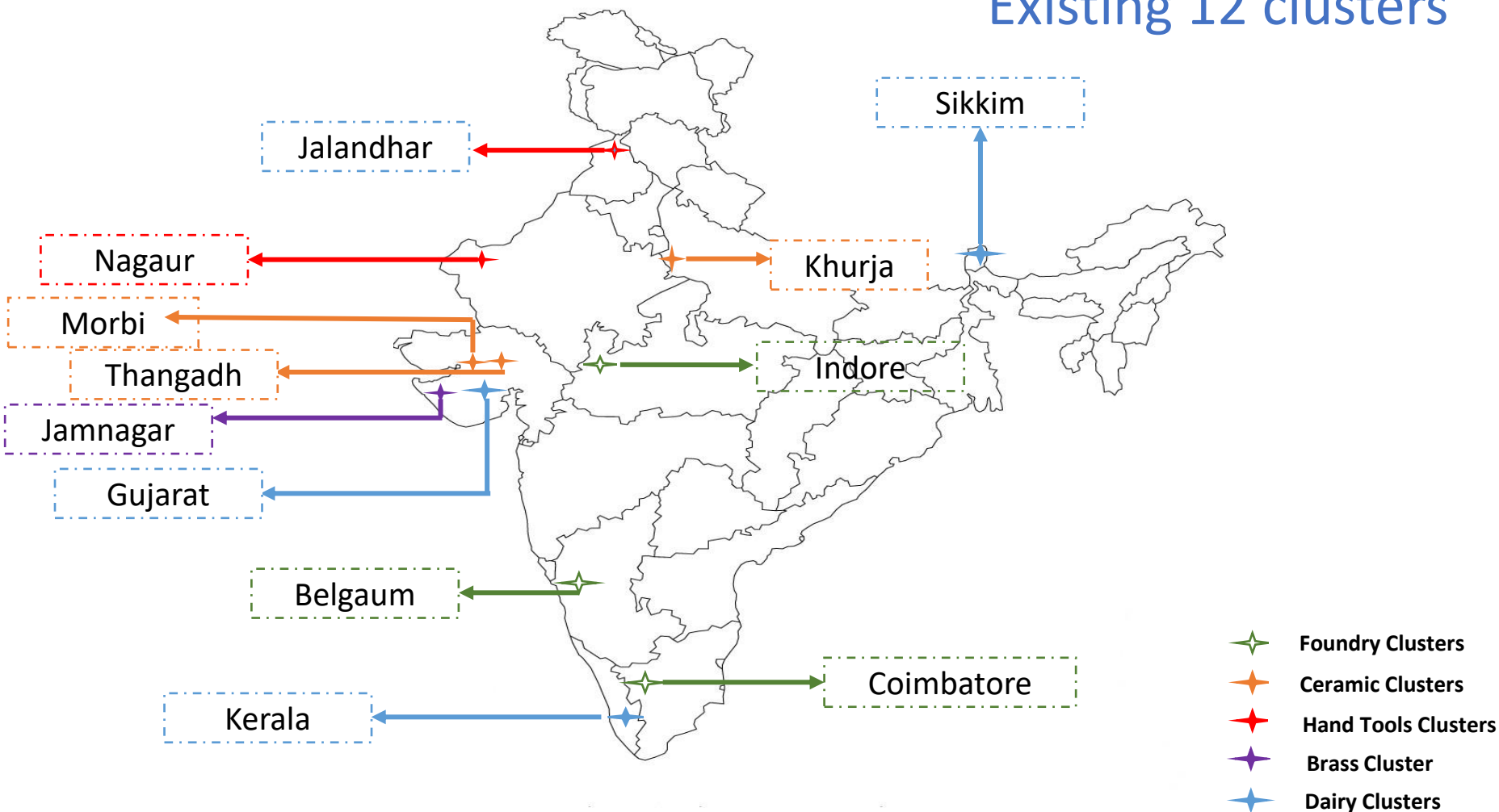
Jamnagar

Existing Clusters

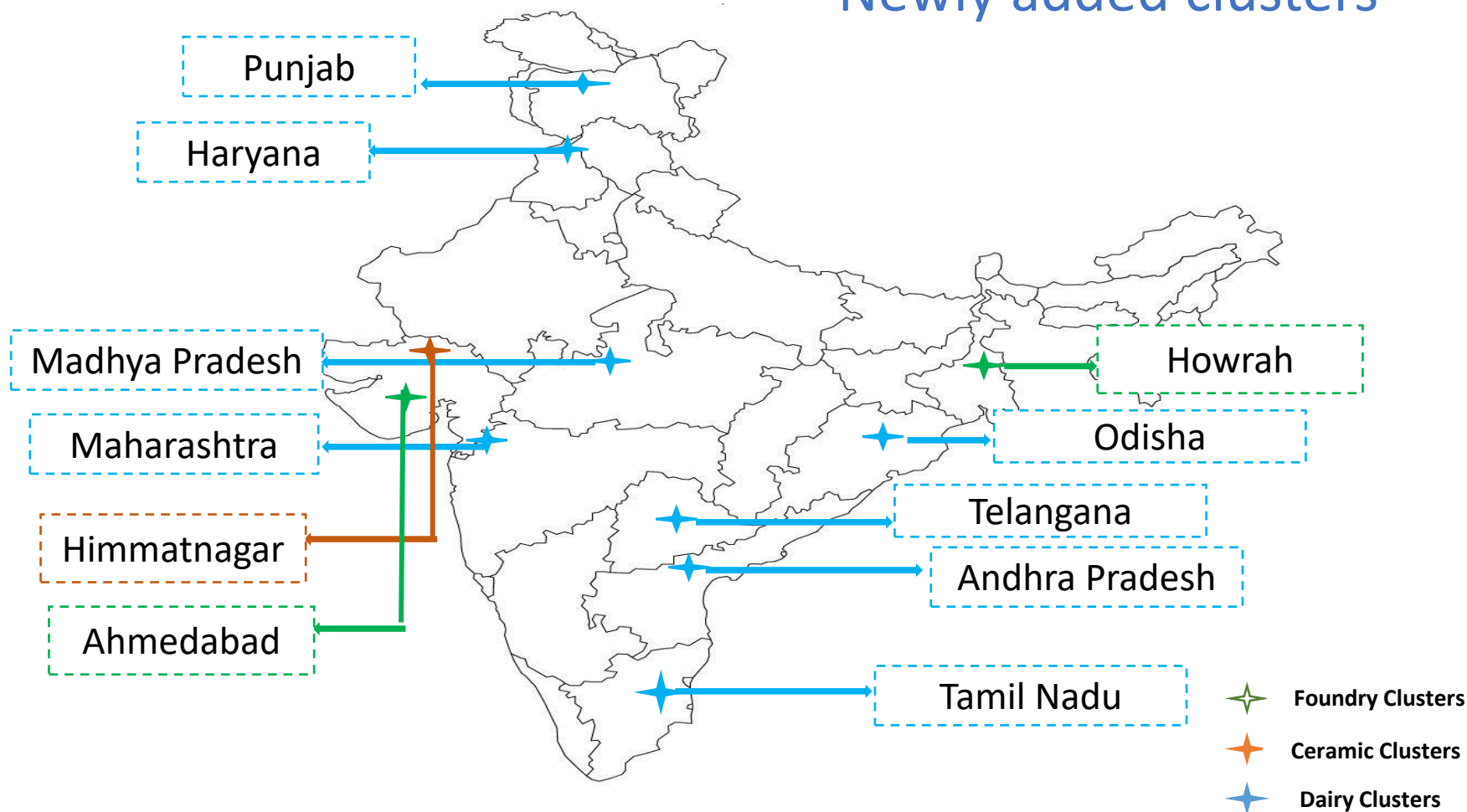
New Clusters

Mixed Clusters

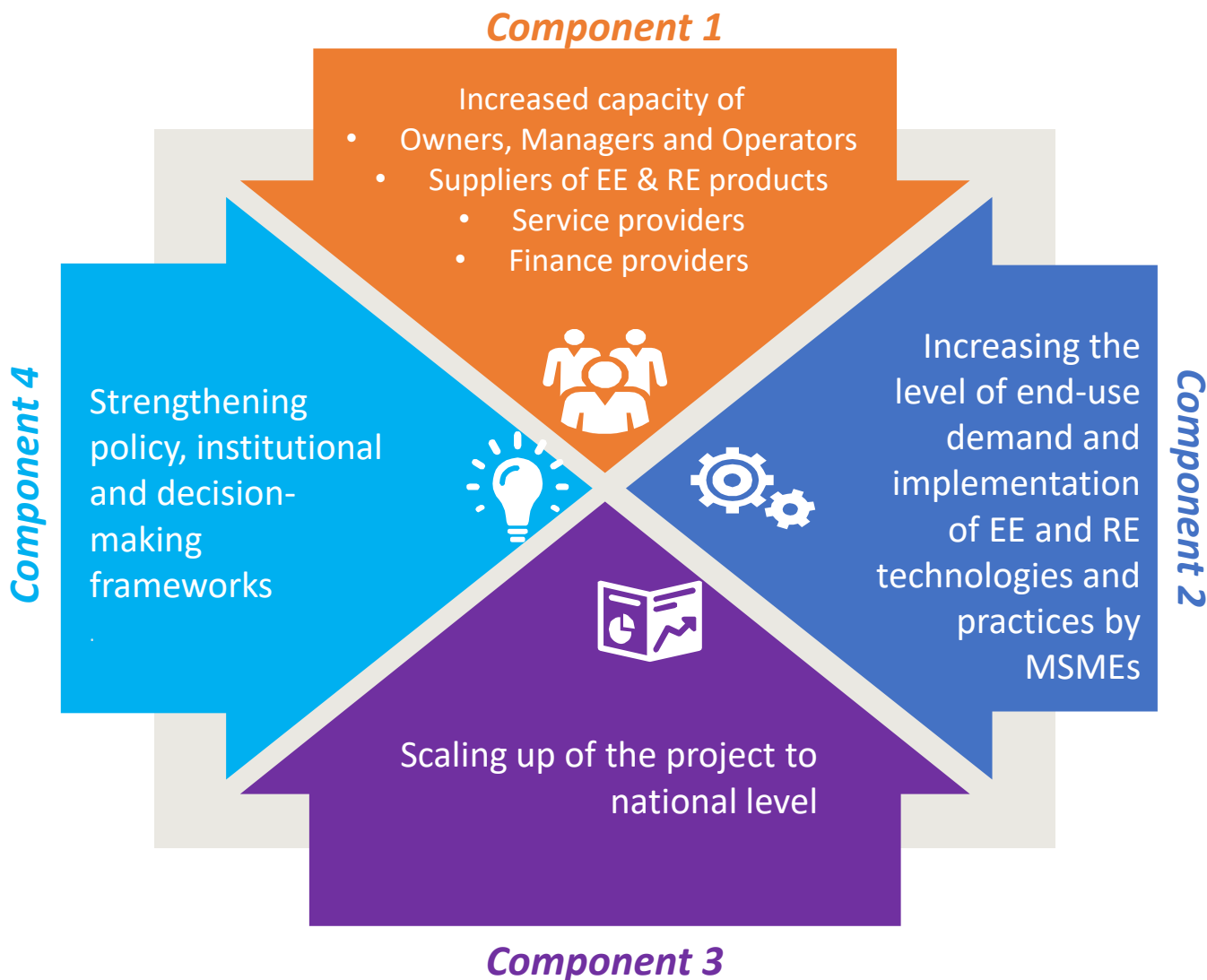
## Existing 12 clusters



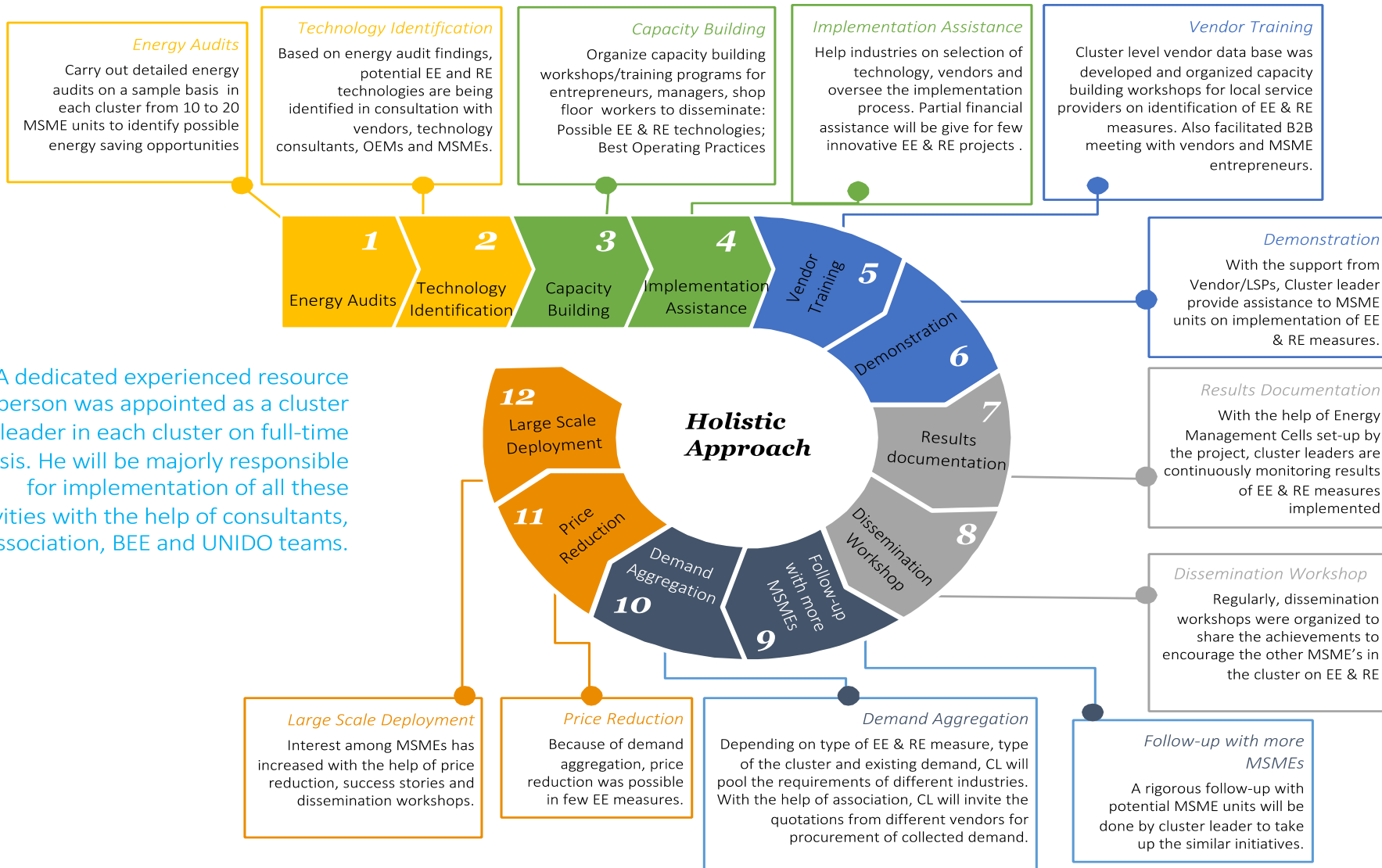
## Newly added clusters



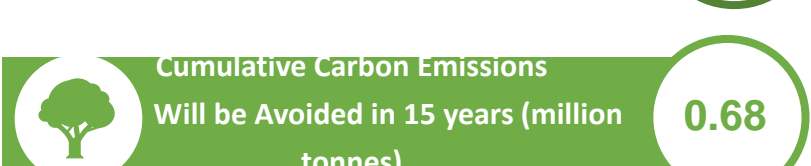
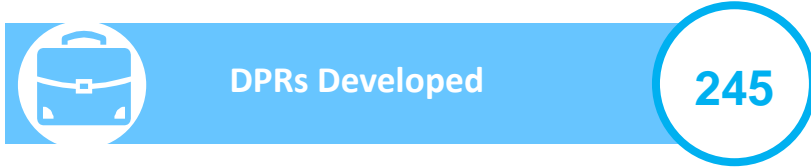
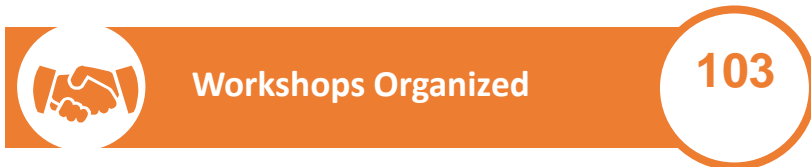
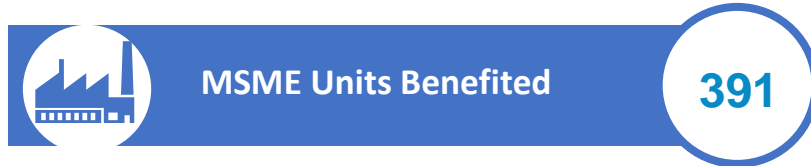
# Project Components







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 Implementation

Cluster Name	Small Scale Projects	Energy Savings (TOE/year)	CO <sub>2</sub> Reduction (Tonnes/year)	Monetary Savings (Lakh ₹ /year)	Investment (Lakh ₹)	Average Investment in Each Project (Lakh ₹ /year)
Jalandhar	58	247	1892	179	119	2.05
Coimbatore	69	255	2408	293	252	3.65
Nagaur	57	30	295	32	15	0.26
Jamnagar	38	113	667	137	270	7.11
Khurja	9	383	1495	75	28	3.11
Indore	20	130	821	71	52	2.60
Gujarat	121	5900	33144	3022	4852	40.10
Belgaum	90	393	3576	305	452	5.02
Thangadh	90	1967	10414	1046	1547	17.19
Morbi	14	564	1739	71	49	3.50
Kerala	8	112	250	35	57	7.13
Total	574	10094	56701	5266	7693	13.40

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

# Success Stories

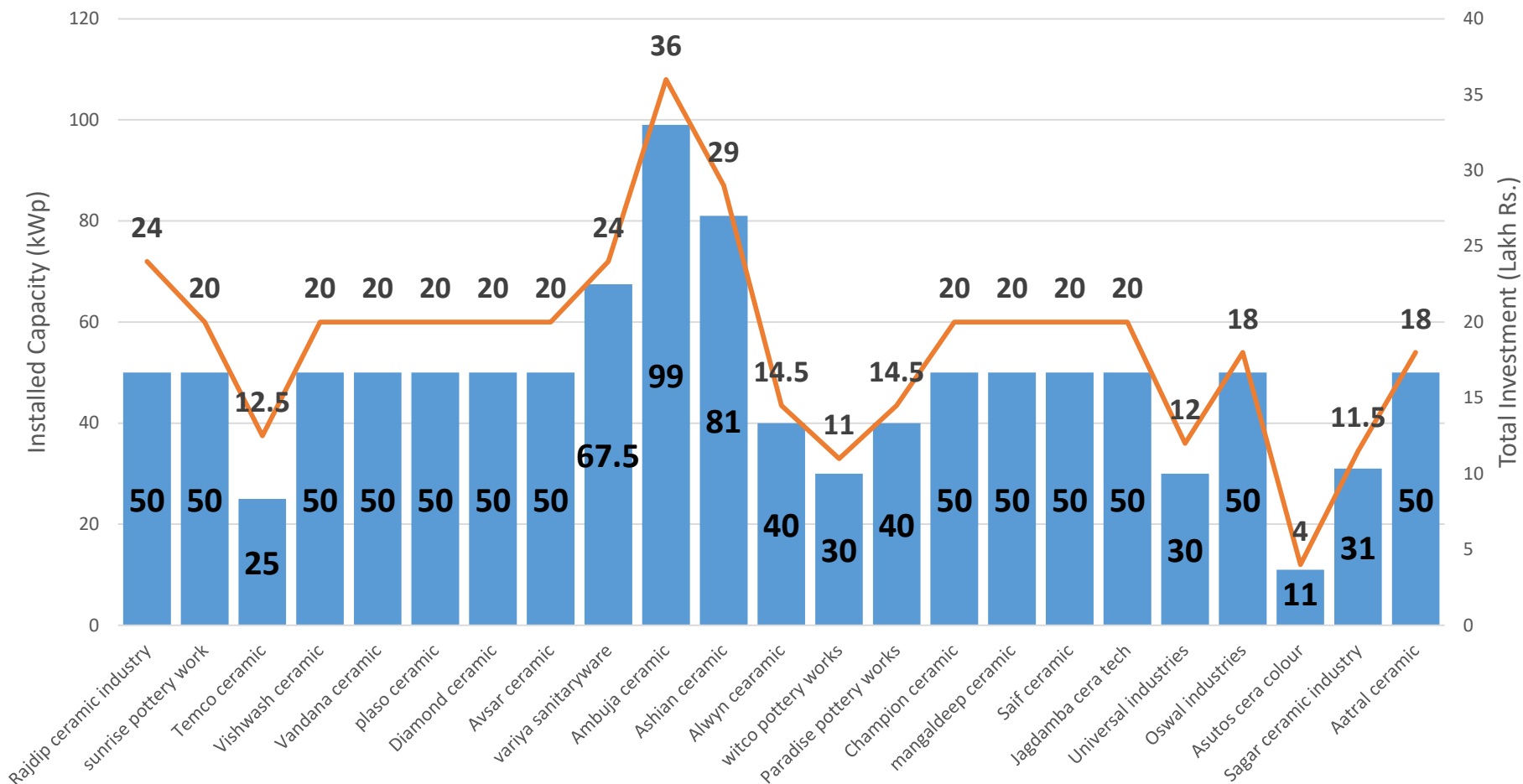
# Roof Top Solar Photovoltaic Project

- 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





# 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 **17600 conventional fans with 28W energy efficient BLDC fans**
- A total investment of about 3.82 crore rupees, against which they are saving an estimated 3.35 crore rupees annually in energy cost. This measure is saving over 4.82 million kWh of electricity and avoiding 4120 tonnes of CO<sub>2</sub> emissions each year.



**66%**  
*Energy Efficient*

**3** year  
*Warranty*

**48** 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



# 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

## Success Story – Coimbatore Foundry cluster



**Cupola Furnace  
Modification**



**Core Modification  
Process through Cold  
box core shooter**



**State of the art energy  
efficient compressed  
air system**

More than 50 EE/RE measures were implemented and resulted energy savings of 189 toe which in turn reduced 1843 tonnes of carbon dioxide emissions

# Success Story - Foundry Cluster

- PF improvement
- Power Quality Improvement by Installing Harmonics Filter
- Induction furnace refractory lining optimization to increase the life and more yield.
- De-slagger is added to the molten metals to reduce the slag formation.
- Furnace cooling tower energy optimization
- Harmonics mitigation through 12 pulse rectifier with Phase shift transformer
- Shot blast machine dust collector pulley modification
- Ring-main system for compressor air distribution system
- Cupola Furnace modification
- Premium Efficiency Air Compressors
- Variable Frequency Drives for various applications
- Energy Efficient Lighting
- Solar PV
- Installation of High Efficiency Screw Compressors
- Energy Efficiency Motors, Fans and Pumps
- Change in Shell core making process
- Minimize Radiation Losses from Induction Furnace

# Past 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



# Project Workshops in Coimbatore, Delhi and Sikkim





# 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



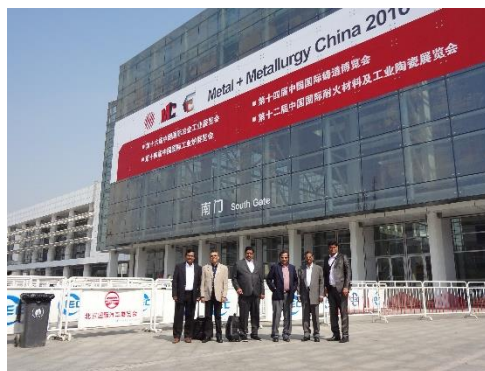
Sikkim



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



GEF - UNIDO - BEE  
Project to Promote  
Energy Efficiency and  
Renewable  
Energy  
Create Page Username

## "Promoting Energy Efficiency and Renewable Energy in Selected MSME Clusters in India"

Like Follow Share

Write a post... Photo Album Live video  
Write a post...  
Photo/Video Feeding/Info... Write text

Government organisation in IN

## Foundries to get more pilot projects on energy efficiency

N. SUNDARARAJ PRASAD

For the foundries in Coimbatore, inaugurating more than 100, a long-term project on energy efficiency and renewable energy intervention, energy audits, awareness programmes and industrial visits, an energy management centre was commissioned here last March. So far, 26 energy audits were conducted. An awareness programme was conducted on Tuesday for local startup providers to the foundries. Five pilot projects were recently sanctioned for Coimbatore foundries for technical demonstration.

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5. Supremacy, president of Coimbatore Industrial Association,

and Niranjana Rao Dorais, national technology co-ordinator of CRISO, told The Hindu that under the project, which includes technical intervention, energy audits, awareness programmes and industrial visits, an energy management centre was commissioned here last March. So far, 26 energy audits were conducted.

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trial projects to generate big gas for several applications at the units.

**Objective**  
Mr. Dorais said the project, which was launched in 2010 and will end by December next year, was implemented at 11 clusters in the country for five sectors - ceramics, fast tools, dairy, foundries, and brass. The aim was to promote energy efficiency and to integrate renewable energy.

**Project cost**  
The total project cost was 1.3 billion and 30 % of it was spent. As many as 30 pilot projects had been sanctioned so far and 20 more were in the pipeline. The foundries had provided for 15 crore investment so far under this project.



## ઇડાઆઇમા 'સ્કાપ આફ અનજી એફિશિયન્સી' વિષય પર વર્કશોપ





# Ongoing Project Activities Phase-II

Technical Assistance in 22 clusters

***Targeted Industries : 1100***

***Targeted Investments : 71.60 cr***

***Targeted Savings: 10 to 12 kilo TOE***

***Appointed consultants to provide technical assistance (Energy audits, technology identification and implementation support) to increase the uptake of energy efficiency and renewable energy investments in MSME's in existing as well as new clusters***

## Capacity Building Workshops

# *Organizing about 64 Capacity Building Workshops*

## Cloud-based Data Analytics Benchmarking Tool

*Appointed consultants to develop a cloud-based data analytics energy management as well as benchmarking tool for 5 sectors (Ceramic, Foundry, Dairy, Hand tools and Brass)*

## Regional Conclaves

*Organizing **3** Regional Conclaves*  
*(Dairy, Ceramic and Foundry – one for each)*

## Residential Training Programs

*Organizing **20** residential 5 day training program at AIP-NPC*  
*Targeted to train 200 representatives from 22 clusters*

# Thank you

[www.unido.org](http://www.unido.org)



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