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OFFICE OF EVALUATION AND INTERNAL OVERSIGHT

INDEPENDENT TERMINAL EVALUATION

GEF-UNIDO-BEE “Promoting energy efficiency and renewable energy in selected micro, small and medium enterprise (MSME) clusters in India”

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## Abbreviations and acronyms

Abbreviation	Definition
ADB	Asian Development Bank
APEC	Asia Pacific Economic Cooperation
AWP	Annual Work Plan
BEE	Bureau of Energy Efficiency
CEO ER	CEO Endorsement Request form
CC	Climate change
CCO	Climate Change Office
CDP	Continuous Development Programme
CII-GBC	Confederation of Indian Industry – Green Business Center
CO <sub>2</sub>	Carbon dioxide
COP	Conference of Parties
CSR	Corporate Social Responsibility
DEA	Detailed Energy Audits
DESL	Development Environenergy Services Ltd., India
DPRs	Detailed Project Reports
ECO	Energy Conservation Officers
EoI	Expression of Interest
EE	Energy efficiency
EMC	Energy Management Cell
EnMS	Energy Management Standard (ISO)
EU	European Union
ESCO	Energy service company
FSP	GEF full-sized project
GW	Gigawatt, 1000 MW
GWh	Gigawatt-hours
GEF	Global Environment Facility
GEF CEO	GEF Chief Executive Officer
GHG	Greenhouse gas
GoI	Government of India
HQ	Headquarters
IFC	International Finance Corporation

<b>Abbreviation</b>	<b>Definition</b>
ISO	International Organization for Standardization
HL	Highly Likely
HS	Highly Satisfactory
HU	Highly Unsatisfactory
IEE	industrial energy efficiency
KPI	key performance indicator
ktoe	kiloton of oil equivalent
kW	kiloWatt
kWh	kiloWatt-hour
LSPs	Local Service Providers
M&E	Monitoring and Evaluation
ML	Moderately Likely
MNRE	Ministry of New and Renewable Energy
MoEFCC	Ministry of Environment, Forests and Climate Change
MoMSME	Ministry of MSME
MS	Moderately Satisfactory
MSME	Micro, Small- and Medium-Enterprises
Mtoe	Million tons of oil equivalent
MTE	Mid-Term Evaluation
MU	Moderately Unlikely
MU	Moderately Unsatisfactory
MW	megawatt (million Watt)
NAPCC	National Action Plan on Climate Change
NCC	National Cluster Coordinator
NGO	Non-Government Organization
NPC	Dr. Ambedkar Institute of Productivity-National Productivity Council
NPD	National Project Director
NPM	National Project Manager
NTC	National Technology Coordinator
PAD	Project Allocation Document
PIR	Project Implementation Review
PMU	Project Management Unit

<b>Abbreviation</b>	<b>Definition</b>
PPG	GEF project preparation grant
PRF	Project Results Framework
PSC	Project Steering Committee
PWC	Price Coopers Waterhouse
RCE	Request for CEO Endorsement
RE	renewable energy
RECP	resource efficient and cleaner production
ROtI	Review of Outcomes to Impacts
RToC	Re-Constructed Theory of Change
SIDBI	Small Industries Development Bank of India
SMART	Specific, Measurable, Achievable, Realistic and Time-Bound
SME	Small-to-Medium Enterprise
SO	System optimization
tCO <sub>2</sub>	tons of carbon dioxide (equivalent)
TE	Terminal Evaluation
TERI	The Energy and Resources Institute
ToC	Theory of Change
ToR	Terms of reference
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
USD	United States Dollar
VFD	Variable Frequency Drive
WB	World Bank
WEEE	Waste from Electrical and Electronic Equipment

## Glossary of evaluation-related terms

Term	Definition
Baseline	The situation, prior to an intervention, against which progress can be assessed.
Effect	Intended or unintended change directly or indirectly due to an intervention.
Effectiveness	The extent to which the development intervention's objectives were achieved or are expected to be achieved.
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
Impact	Positive & negative, intended & non-intended, directly & indirectly, long term effects that represent fundamental durable change in the condition of institutions, people & their environment brought about by the Project.
Indicator	Quantitative or qualitative factors that provide a means to measure the changes caused by an intervention.
Intermediate States	The transitional conditions between the Project's outcomes & impacts which must be achieved in order to deliver the intended impacts.
Lessons learned	Generalizations based on evaluation experiences that abstract from the specific circumstances to broader situations.
Outcomes	The likely or achieved short- to medium-term behavioural or systemic effects to which the Project contributes, which help to achieve its impacts.
Outputs	The products, capital goods, and services that an intervention must deliver to achieve its outcomes.
Project Results Framework approach	Management tool drawing on results-based management principles used to facilitate the planning, implementation and evaluation of an intervention. It involves identifying strategic elements (activities, outputs, outcomes, impacts) and their causal relationships, indicators, and assumptions that may affect project success or failure. The logframe is also referred to in the report as the Project Results Framework (PRF)
Relevance	The extent to which an intervention's objectives are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donor's policies.
Risks	Factors, normally outside the scope of an intervention, which may affect the achievement of an intervention's objectives.
Sustainability	The continuation of benefits from an intervention, after the development assistance has been completed.
Target groups	Specific entities for whose benefit an intervention is undertaken.



# Executive Summary

## Evaluation Background and Methodology

- E-1. An independent terminal evaluation (TE) of the GEF-UNIDO-BEE Project in India entitled “Promoting energy efficiency and renewable energy in selected micro, small and medium enterprises (MSME) clusters in India” (hereafter, MSME Project or Project) was carried out during the period of June-December 2022. The MSME Project was launched in New Delhi on 1 April 2011 at an Inception Workshop by UNIDO with the Bureau of Energy Efficiency (BEE) as executing partners. The terminal date of the MSME Project was scheduled for August 2016, a period of 5.25 years of implementation; after several extensions to the end-of-Project date, the terminal date of the MSME Project was re-scheduled to 31 December 2022. This TE follows UNIDO Evaluation Policy and GEF Monitoring & Evaluation Policy. To deliver an evidence-based evaluation, data and information was sourced from key project documentation, desk studies, literature reviews, meetings with individuals and focus groups, and direct observations. The evaluation employed a participatory approach where key stakeholders were kept informed and consulted throughout the process.
- E-2. The primary challenge of this TE was the Team Leader not being able to visit the institutions and pilot project sites, a limitation mitigated by the presence of an International Energy Efficiency Expert and a National Evaluator who were able to visit pilot projects and interview many of the stakeholders.

## Summary of the Main Evaluation Findings

- E-3. Project results are summarized in Table A against intended outcomes of the Project Results Framework and the Theory of Change for the MSME Project. Project evaluation criteria are summarized in Table B.

**Table A: Comparison of Intended Project Outcomes from the Inception Report to Actual Outcomes**

<b>Intended Outcomes in Project Results Framework of April 2011 and Re-Constructed Theory of Change (see Figure 2)</b>	<b>Actual Outcomes as of December 2022</b>
<p><b>Objective:</b> To develop and promote a market environment for introducing energy efficiencies and enhanced use of RE technologies in process applications in 12 selected energy-intensive MSME clusters in India with expansion to more clusters later, in order to improve the productivity and competitiveness of units as well as to reduce overall carbon emissions and improve the local environment.</p>	<p><b>Actual impact toward objective:</b> The MSME Project was a significant contributor in catalysing interest in Energy Efficiency/Renewable Energy (EE/RE) technologies with overall Greenhouse Gas (GHG) emission reduction and energy savings targets being met, albeit over a longer period of time. The Project connected the various service providers, raising MSME EE/RE investments to US\$34.337 million, well over the targeted amount of US\$5.0 million, and creating excellent business opportunities in the market for EE/RE products and services (Para 125). This is the start of improving the productivity and competitiveness of industrial MSMEs as well as reducing overall carbon emissions and improve the local environment</p>

<b>Intended Outcomes in Project Results Framework of April 2011 and Re-Constructed Theory of Change (see Figure 2)</b>	<b>Actual Outcomes as of December 2022</b>
<b>Outcome 1:</b> The capacity of suppliers of EE/RE product suppliers/ service, providers/ finance providers to support the expansion of EE/RE in the clusters is increased.	<b>Actual Outcome 1:</b> Capacities were built for cluster leaders who evolved into trusted people available to make MSMEs aware of new and more efficient technologies and cluster activities, and for personnel involved with EE/RE technology supply and installation as well as financing EE/RE projects (Para 60).
<b>Outcome 2:</b> The level of end-use demand and implementation of EE and RE technologies and practices by MSMEs increased.	<b>Actual Outcome 2:</b> The level of end-use demand and implementation of EE and RE technologies and practices by MSMEs increased through the training of engineers, service providers, consultants and industries; and by conducting awareness programmes, workshops and hands-on training sessions supervised by industry experts, sessions that have been attended by a diverse group of people from the MSME industrial sub-sector, to consultants and energy experts (Para 0).
<b>Outcome 3:</b> The project is scaled up to a national level.	<b>Actual Outcome 3:</b> The Project scaled-up to the extent of reaching its targets for energy savings and GHG emission reductions notwithstanding the disruptions caused by the COVID-19 pandemic (Para 70).
<b>Outcome 4:</b> Policy, institutional and decision-making frameworks strengthened.	<b>Actual Outcome 4:</b> A cloud-based data analytics and a benchmarking tool has been developed (Para 72, 3 <sup>rd</sup> bullet) and a report on policy and regulatory framework to accelerate the diffusion of energy-efficient and renewable energy technologies in the MSME sectors has been completed. However, no focused work done on biomass (Paras 74 and 87).

**Table B: MSME Project evaluation criteria**

#	Evaluation criteria	Rating
<b>A</b>	<b>Progress to impact</b>	<b>Satisfactory:</b> An increased number of energy professionals, equipment suppliers, and installers in RE and EE, increased confidence of MSMEs to borrow funds to implement RE and EE projects, and an easier permitting process for RE and EE investments for MSMEs should lead to long-term impacts in “reducing fossil-fuel based electricity and GHG emissions through the promotion of energy efficiency and renewable energy in the MSME industrial sector in India” (Paras 90-93).
<b>B</b>	<b>Project design</b>	
1	Overall design	<b>Satisfactory.</b> The MSME Project design aimed to support the reduction of fossil-fueled CO <sub>2</sub> emissions in India’s industry by improving energy efficiency in the MSME industrial sub-sector (Paras 33-36).

#	Evaluation criteria	Rating
2	Logframe	<b>Satisfactory.</b> Project Results Framework (PRF) indicators for impact, outcomes, and outputs meet SMART criteria, including achievability of all targets. The PRF assists MSME Project implementers in managing the Project (Paras 37-41).
<b>C</b>	<b>Project performance</b>	
1	Relevance	<b>Satisfactory.</b> Government of India (GoI) has the XI and XII Five-Year Plans and National Action Plan for Climate Change that includes the National Mission for Enhanced Energy Efficiency (Paras 31 and 46)
2	Effectiveness	<b>Satisfactory.</b> The effectiveness of the Project's awareness raising, capacity building, and technical assistance to MSMEs, their cluster leaders, equipment suppliers and installers, national energy experts and government personnel, has resulted in substantial EE/RE investments made by MSMEs (Paras 54-75).
3	Coherence	<b>Satisfactory.</b> MSME industrial sub-sector is the largest consumer of energy within the Indian economy, carries out energy and emissions-intensive activities in various sectors, has energy costs that account for 20%–30% of costs, and was one of a few projects that significantly address energy consumption and GHG emissions (Para 76).
4	Efficiency	<b>Moderately satisfactory.</b> The Project exceeded its planned timespan from 5.33 to 11.75 years, spending US\$7.0 million out of the total GEF grant of US\$7.17 million (Paras 77-79).
5	Sustainability of benefits	<b>Moderately likely.</b> Many MSMEs are self-financing their EE and RE investments with some MSMEs not having funds available for investment resulting in a slower pace of EE/RE investments. Vendors, consultants, Local Service Providers (LSPs) and Energy Management Cells (EMCs) have developed new services and business models, allowing them to continue providing EE and RE consultancy and support (Para 80).
<b>D</b>	<b>Cross-cutting performance criteria</b>	
1	M&E: ✓ M&E design ✓ M&E implementation	<b>Satisfactory.</b> M&E design can be regarded as reasonably effective for the purposes of monitoring progress of the MSME Project (Paras 94-96). <b>Satisfactory.</b> Project Implementation Reviews (PIRs) for the MSME Project were prepared on an annual basis from 2012 up to 2022. A mid-term evaluation was conducted in April 2018 with the Project receiving a satisfactory assessment (Paras 97-98).
2	Results-based Management (RBM)	<b>Satisfactory.</b> Results-based management was required to adjust the implementation approach of the MSME Project to improve the prospects of meeting targets in the MSME PRF, notably the GHG emission reduction target. This required considerable adaptive management efforts by the PMU through Cluster Leaders and EMCs, to convince MSMEs to

#	Evaluation criteria	Rating
		implement EE/RE investments, which were ultimately successful, notwithstanding delays from the COVID-19 pandemic (Para 116-117).
3	Gender mainstreaming	<b>Gender blind.</b> As a GEF-4 Project, gender mainstreaming has not been a part of Project design nor have there been any gender disaggregated monitoring activities. However, the Project did commit to maintaining gender equality and encouraged women representatives of MSME as well as Local Service Providers to participate in capacity building and knowledge dissemination workshops organized in the clusters (Paras 122-123).
<b>E</b>	<b>Performance of partners</b>	
1	UNIDO	<b>Highly satisfactory.</b> The end result of UNIDO's performance on the MSME Project was that it significantly contributed towards the investments being made by MSMEs into EE and RE systems and measures, and to capacity building of engineering experts, equipment suppliers and installers, cluster leaders, and users of these systems in an effort to reduce fossil fuel and electricity consumption (Para 110).
2	National counterparts	<b>Satisfactory.</b> BEE provided slow but solid support for coordination of demonstrations, the organization of training, and policy papers, enhancing the Project's responsiveness to ensuring appropriate progress. Notwithstanding, BEE's support resulted in the achievement of GHG emission reduction and energy savings targets albeit over an 11.75 years period instead of the original design period of 5.33 years (Para 111).
3	Donor	<b>Satisfactory.</b> There were no issues with funding from the donor.
<b>F</b>	<b>Overall assessment</b>	<b>Satisfactory.</b> The MSME Project exceeded its GHG emission target and energy savings target, volume of EE/RE investments. A study on mainstreaming EE/RE policies for MSME development is complete (Paras 51-53, Tables 6 and 7).

**Image 1:** Finished ceramic products at Morbi Cluster



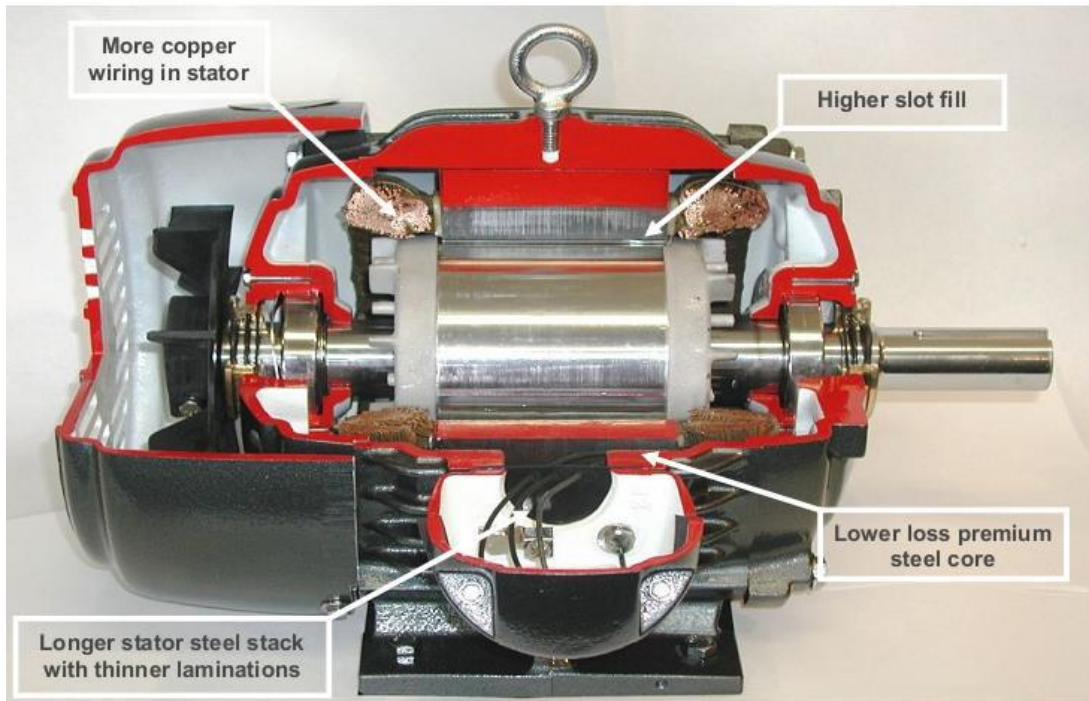
**Image 2:** Slurry mixer at ceramics factory in Morbi Cluster



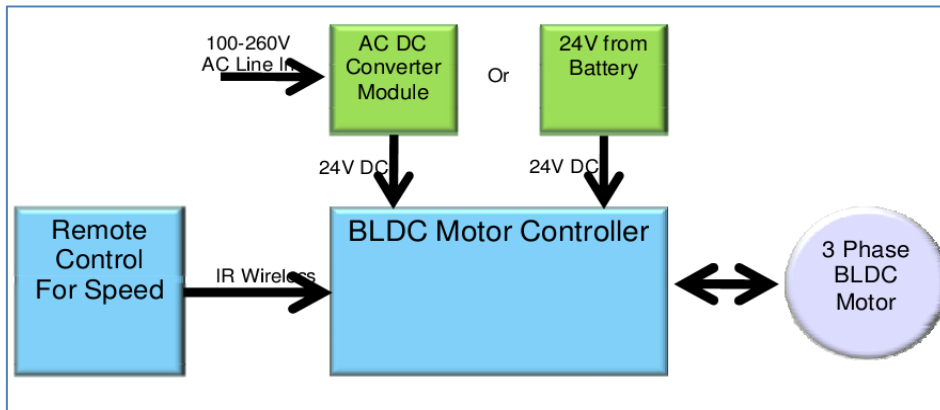
**Image 3:** Chiller compressor at Sikkim Dairy Cluster



**Image 4:** Schematic of energy efficient motor for dairy factory in Kerala Dairy Cluster



**Image 5:** Schematic of brushless DC motor



**Image 6:** Ceiling fan production area at ceramics factory in Morbi Cluster



**Image 7:** Heat recovery from kiln to dryer at ceramics factory in Morbi Cluster



## Summary of Recommendations

**Recommendation #1:** Future projects for the MSME industrial sector should strengthen monitoring of each EE/RE project and work on development of robust mechanism of arriving at the accrued monetary savings with respect to the baseline. This should include other non-energy benefits such as improvement in the workplace environment, reduction in worker fatigue, improvement in quality, which are often related to upgrades in EE technology and translated into savings (Para 132).

**Recommendation #2:** A survey should be conducted together with Small Industries Development Bank of India (SIDBI) or any other local financial bank that has vast knowledge on actual situation in India that is needed to understand how MSMEs are securing financing for EE and RE investment (Para 133).

**Recommendation #3:** Develop a network of service providers and technical experts to support post-installation and recent EE/RE investments needing upgraded and upscaling technologies or layout changes (Para 134).

**Recommendation #4:** MoEFCC should seek technical assistance on international best practices for managing solid waste and Waste from Electrical and Electronic Equipment (WEEE) waste streams (Para 135).

**Recommendation #5:** Ensure a self-sustaining model for the Energy Management Cell and that finance for the benchmarking tool is secured so that its use is common practice for MSMEs (Para 136).



# 1. Evaluation Objectives, Methodology, Process

## 1.1 Introduction and Background on the Terminal Evaluation

1. An independent terminal evaluation of the GEF-UNIDO-BEE Project entitled “Promoting energy efficiency and renewable energy in selected micro, small and medium enterprises (MSME) clusters in India” (hereafter, “MSME Project” or the “Project”) was included as a part of the Project design of 2010. Following UNIDO Evaluation Policy and GEF Monitoring & Evaluation Policy, this report has been prepared as the Terminal Evaluation (TE) for the MSME Project, carried out during the period of June-November 2022 by an independent team including Mr. Roland Wong, team leader, Mr. Stefan Melnitzky, EE specialist, Ms. Moho Chaturvedi, national evaluator.
2. The MSME Project was launched in India in April 2011 by UNIDO, and executed in close collaboration with the Bureau for Energy Efficiency (BEE) with the location of the Project Management Unit (PMU) within BEE. The MSME Project ended on 31 December 2022, a period of 11 years and 9 months.

## 1.2 Objectives and Scope of the Terminal Evaluation

3. Guided by Terms of Reference provided by UNIDO’s Independent Evaluation Division (as provided in ANNEXES:
4. Annex 1), this TE had 3 objectives:
  - assess Project performance in terms of relevance, coherence, effectiveness, efficiency, sustainability of benefits, and progress to impact;
  - drawing lessons and developing recommendations for UNIDO and the GEF that may help for improving the selection, enhancing the design and implementation of similar future projects and activities in the country and on a global scale upon Project completion;
  - develop findings, lessons, and recommendations that could be used to enhance the design of new projects and implementation of ongoing projects of UNIDO.
5. This TE covers the Project’s duration from its start on 1 April 2011 until 31 December 2022, which included several no-cost extensions.
6. In terms of scope, the TE assessed the extent to which the Project achieved its objective of “developing and promoting a market environment for introducing energy efficiencies and enhanced use of RE technologies in process applications in 12 selected energy-intensive MSME clusters in India with expansion to more clusters later, in order to improve the productivity and competitiveness of units as well as to reduce overall carbon emissions and improve the local environment”. The Project was to work at cluster levels as well as policy level to achieve its objective. In this context, this TE considered the extent to which the technical assistance of the Project was effective and assessed the likelihood of sustainability of Project results in achieving 6 intended outcomes: i) increased capacity of suppliers of EE/RE product suppliers/ service providers/ finance providers; ii) increasing the level of end-use demand and implementation of EE and RE technologies and practices by MSMEs; iii) scaling up of the project to a national level; and iv) strengthening policy, institutional and decision-making frameworks.

## 1.3 Evaluation Methodology

7. The TE was carried out by an independent team in accordance with the required guidance<sup>1</sup>

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<sup>1</sup> UNIDO’s 2015 Evaluation Policy, UNIDO’s 2006 Guidelines for the Technical Cooperation Project and Project Cycle, GEF

following criteria elaborated in the evaluation's ToR, which were rated using UNIDO's 6-point scale, with justifications elaborated through the Report's main body and findings.

8. This TE employed a participatory approach where key stakeholders were kept informed and consulted throughout the process. The TE team liaised with UNIDO's Independent Evaluation Division regarding methodological issues and the conduct of the evaluation. A full list of persons interviewed during the Evaluation mission is provided in Annex 2.
9. To deliver evidence-based qualitative and quantitative information, the collection of data and information was sourced from key Project documentation, desk studies, literature reviews, meetings with individuals and focus groups, surveys and direct observations. Documentation was provided by the UNIDO Project Manager based in Vienna, and the Project Management Unit (PMU) housed within BEE in New Delhi that included information from owners and managers who implemented the Project.
10. The evaluation methodology consisted of:
  - a review of Project documents;
  - a re-examination of the Project Results Framework (PRF) through a Theory of Change (ToC) analysis and a Review of Outcomes to Impacts (ROtI), the indicators and targets of which Project performance is evaluated;
  - Zoom discussions in May 2022 with MSME Project personnel located in UNIDO HQ in Vienna prior to interviews and mission travel by the National and International Consultant throughout India;
  - interviews with the PMU in New Delhi, country focal points from key ministries of the Government of India (GoI), national experts, and industry personnel during field visits to various industrial facilities that were beneficiaries of training and technical assistance, all done during the June-October 2022 period;
  - de-briefing with UNIDO HQ staff, PMU staff, and key government stakeholders in New Delhi on 3 October 2022 and 28 March 2023;
  - follow-up phone conversations, emails, data and information analysis from home bases during the November and December 2022; and
  - a period of additional information gathering, validation of findings and editing of draft report to reflect factual accuracy of the findings.
11. Steps were undertaken to enhance stakeholder engagement and the quality of consultation: i) interviewees were informed about the TE's aims and guided in their input through a semi-structured protocol; ii) well-formulated, open-ended questions and further probes were used to promote balanced reflection, generate new insights, and yield higher quality information (as opposed to yes/no questions or an "audit" approach), as it was considered that input to this TE required contextualisation, complex description, and explanation; iii) interviewees were assured of the anonymity and confidentiality of their input whenever deemed appropriate, notably industrial entities, many of who considered that any information disclosed was considered proprietary or sensitive.

#### **1.4 Challenges and Limitations**

12. At the time of this Evaluation, the MSME Project was extended for completion on 31 December

2022. As such, the TE was conducted a bit outside the time period recommended by GEF and UNIDO Evaluation Guidelines for an evaluation. Two members of the Evaluation Team spent a total of 43 person-days traveling throughout India, making efforts to see as many industrial MSME stakeholders and government partners as possible. Most of the MSME industrial stakeholders were located in many areas of India including Howrah, Durgapur, Indore, Ahmedabad, and Gujarat. Though the Evaluation Team was unable to visit some of these cities due to travel restrictions to these areas, many of the institutional partners and government agencies were located in New Delhi (which has its own challenges related to urban mobility limiting the number of stakeholders that could be visited within one day). Notwithstanding, the limitations to this evaluation were somewhat mitigated by the presence of the National Evaluator and the International EE Specialist who visited many of the project sites and had closing discussions of the Project with institutional partners who managed the parts of the MSME Project.

## **2. Country and Project Background**

### **2.1 Country Background**

13. India is one of the largest countries with growing energy usage and CO<sub>2eq</sub> emissions. Within the Indian economy, in terms of primary energy consumption, industry remains the largest consumer of energy, accounting for over 41% of total energy consumption in 2022. Indian industries mostly rely on diverse energy sources including coal, oil and gas for primary energy. Among these, coal continues to be the dominant fuel though there are encouraging indicators in 2022 that renewables such as solar, biomass fuels like wood and bagasse are increasingly being used.
14. There have been recent efforts by the GoI to reduce overall energy intensity of the Indian economy. With MSMEs having fallen behind benchmarks in terms of productivity, technology and end use energy efficiencies, steep increases in fossil fuel prices along with shortages of fuel and electricity and inefficient technologies are potential threats to the sustainability of energy-intensive MSME clusters in India. With India being amongst the most vulnerable nations to climate change, addressing these issues in excessive energy consumption is imperative. Adopting bold measures to transition to clean energy by India's small businesses would not only significantly mitigate the effects of climate change, it would enable them to compete on the global market, as increased awareness about corporate practices is influencing consumer loyalties.
15. India's economy is trending towards further growth in manufacturing, which increases energy consumption. This trend follows recent Indian government initiatives, such as "Make in India," that are designed to increase India's self-reliance for its own goods, and other initiatives that support increasing standards of living which raise demand for food products and household goods. Given these efforts, Indian manufacturing amongst MSMEs has a potential to grow more significantly, and needing to address energy growth as well in a sustainable manner.

### **2.2 Sector-specific issues of concern to the Project**

16. With more than 200 manufacturing clusters in the country, more than 90% comprised of MSMEs. Within the MSME industrial sector, there are energy and emissions-intensive activities such as the metallurgical and metals industry, glass and ceramics industry, food processing, and brick-making. The energy use of MSMEs in India is estimated to be equivalent to 50 million tonnes of oil used per year.
17. For most MSMEs, energy costs account for as much as 20%-30% of production costs. MSMEs in these industrial sectors largely depend on unskilled workers as well as inefficient equipment and technology leading to fuel wastage and substantial CO<sub>2</sub> emissions. MSMEs are characterized as having a lack technological expertise and generally unaware of recent advancements made in

energy efficiency and renewable energy. For example, they predominately use coal-fired small to medium-sized boilers to produce energy. Replacing the small boilers with energy-efficient units would cut fossil fuel usage by 25% and reduce air pollution, improving efficiency and reducing CO<sub>2</sub> emissions. This high demand for energy in the MSME sector has been acknowledged and actions have been initiated by the GoI, starting with the XI Five Year Plan (2007-2012) of the GoI with interventions in 25 selected SME clusters to encourage energy efficient technologies and operational practices in SME sector in India with BEE.

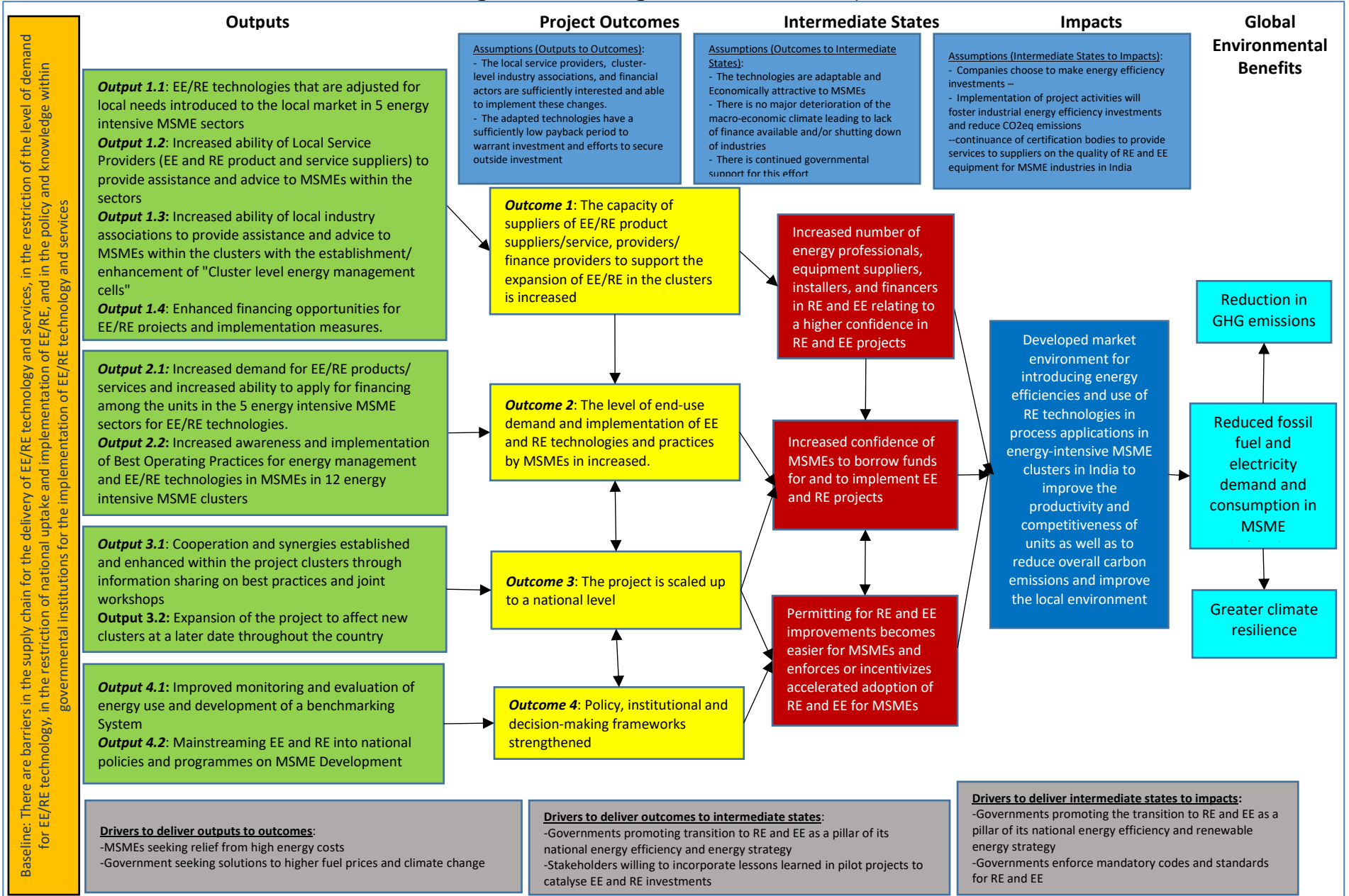
18. There are an estimated 63 million MSMEs currently operating in India contributing around 45% of manufacturing output, producing about 40% of exports and employing more than 117 million people (2015)<sup>2</sup>. MSMEs mobilize local capital and skills and thereby provide the impetus for growth and development, particularly in rural areas and small towns. They are often organized into “clusters, mostly with some form of central organization, which work for the development of the many MSME’s often called units”. These clusters provide the bases for UNIDO to leverage the existing organizational structure to carry out outreach to hundreds of units with limited resources.
19. A latest study commissioned by Bureau of Energy Efficiency (BEE) in 2010 estimated the total potential for electricity saving at 75.36 billion kWh, of which nearly a quarter (18.57 billion kWh) corresponded to the industrial sector as a whole, including small and medium enterprises, representing 3.6% of the entire energy demand in India in 2006. The importance of controlling energy intensity cannot be underscored for industrial MSMEs such as mineral processing (ceramics, tiles, pottery, brick, glass), metallurgical and metal industries (foundries, forging, alloys, heat treatment, steel rerolling) and agro and food processing (bakeries, dairies, rice mills). The MSMEs in these sectors still use significant amounts of fossil-fuel generated electricity as well as large quantities of fossil fuels such as furnace oil, diesel, natural gas and coal and biomass to meet their thermal energy requirements.
20. Barriers to an energy efficient MSME industrial sector are as follows:
  - Supply-side barriers including the lack of technical know-how for producing EE and RE products and services, absence or paucity of local EE/RE service providers, lack of cluster-level knowledge to support the implementation of EE/RE, lack of ability to provide finance and to evaluate applications for finance, and lack of access to appropriate, low-emission and energy efficient fuels;
  - Demand-side barriers including lack of awareness on the benefits of EE/RE technology and services, lack of knowledge of how to access these technologies and services and financing, lack of technical knowledge within MSMEs on how to implement EE/RE technology, and MSMEs having other management priorities;
  - Barriers to national uptake including the lack of partnerships, knowledge sharing and information dissemination among sectors at a nationwide level;
  - Policy barriers including a lack of clear data on technologies, their costs/benefits and use in MSMEs in various clusters in India (includes benchmarking for best practices), the arduous process of receiving permits and other necessary registrations for EE/RE projects, and the lack of “mainstreaming” of EE/RE technologies into the development plans and policies for MSME.
21. The MSME Project was designed to address these barriers in an integrated and holistic approach by combining demonstration projects (with a high replication potential) with training and awareness raising activities to establish a market environment conducive to investments in energy efficiency and renewable energy practices and technologies in MSME industries. A Re-Constructed Theory of Change (RToC) for the MSME Project is provided on Figure 1.

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<sup>2</sup> <https://www.siliconindia.com/news/general/msme-2022-tracing-the-evolution-of-the-msme-sector-in-india-nid-219327-cid-1.html>



**Figure 1: RToC Diagram for the MSME Project**



## 2.3 Project Summary

### 2.3.1 Project Goal, Objective and General Information

22. The UNIDO-GEF-BEE MSME Project was supported by a US\$7,172,097 grant from GEF with co-financing from BEE, Ministry of MSME (MoMSME) and Ministry of New and Renewable Energy (MNRE). The Project was designed to pilot and scale-up the benefits of energy efficiency to the MSME industrial sector, with the overall objective of *“developing and promoting a market environment for introducing energy efficiencies and enhanced use of RE technologies in process applications in 12 selected energy-intensive MSME clusters in India with expansion to more clusters later, in order to improve the productivity and competitiveness of units as well as to reduce overall carbon emissions and improve the local environment.”* The impact of this Project was to be a measurable energy savings target of 276,000 MWh annually and 1,270,000 tCO<sub>2eq</sub> lifetime emission reductions (assumed to be 10 years) over the Project duration. The Project aimed to focus on 5 energy intensive MSME sub-sectors: brass, ceramics, dairy, foundry and hand tools, chosen on the basis of total energy consumption as well as the energy intensity level, and was to address important barriers such as lack of technological capacities at cluster levels and the paucity of reliable data at policy levels. The Project commenced on 1 April 2011 and was designed as a 64-month Project ending July 2016 (according to the Request for CEO Endorsement or RCE document), but is scheduled to be completed 141(!) months later on 31 December 2022.
23. The MSME Project was to:
- Work at the cluster organisation level to reduce energy usage per unit of product, improve the productivity and competitiveness of units, and reduce overall carbon emissions to improve the local environment. The energy savings achieved would result in direct GHG emission reductions of 84,700 tCO<sub>2eq</sub>/yr avoided as a direct result of this Project by Year 3 of the Project (2015), creating a market to enable the replication of EE measures that have been initiated;
  - facilitate investments for the first 100 MSMEs in EE/RE technologies by funding up to 50% of their investments to overcome the issues within the clusters inhibiting MSMEs from wanting to be “first movers” with the technology;
  - Pool available resources from MoMSME, MNRE, the World Bank, UNDP and UNIDO, all of who partner with BEE for undertaking work on EE and RE in the Indian MSME sector, to scale-up replication.
24. The removal of barriers for the dramatic expansion of the EE/RE in the industrial MSMEs market was to focus on 5 sectors and 12 clusters chosen for implementation. One of the primary purposes of the Project was to manage the unique challenges and opportunities of each cluster, making adaptive management and flexible Project implementation mechanisms important. Each cluster was to undertake:
- techno-economic studies at the unit and cluster level to ensure appropriate technologies are applied which would be attractive for the MSMEs;
  - training and awareness workshops to learn from the MSME actors and to share experiences and knowledge on EE/RE measures;
  - detailed planning of the implementation of EE/RE measures;
  - advice in sourcing financial resources and ensuring that the EE/RE measures pay for themselves quickly through reduced energy costs;
  - Operators training on best operating practices.
25. In support of these actions, Project actions were to include:

- “energy management cells” (EMCs) at the cluster level to be strengthened to provide services to the MSMEs within their clusters;
  - capacity building of local service providers to provide EE/RE services and products to the MSMEs;
  - financial assistance provided to “first movers” within the clusters to cover some of the costs of EE/RE implementation;
  - The dissemination of information booklets, pamphlets, web-sites, to assist in information sharing with the other MSMEs.
26. To achieve the overall objective, the Project was structured generate 4 outcomes, each of which were designed to deliver outputs, supported by monitoring and evaluation. The MSME Project design is captured in a PRF, which can be found in Annex 4. The 4 outcomes of the MSME Project are:
- *Outcome 1: The capacity of suppliers of EE/RE product suppliers/service, providers/ finance providers to support the expansion of EE/RE in the clusters is increased.* The purpose of this outcome was to strengthen the capacities of service providers and the financing institutions to create an enabling market for EE/RE technologies for MSMEs;
  - *Outcome 2: The level of end-use demand and implementation of EE and RE technologies and practices by MSMEs in increased.* The purpose of this outcome was to provide assistance to MSME first movers, both technical and financial, towards the use of EE and RE technologies;
  - *Outcome 3: The project is scaled up to a national level.* The purpose of this outcome was to provide the technical and financial assistance to MSMEs who want to adopt EE and RE technologies as a result of the first movers;
  - *Outcome 4: Policy, institutional and decision-making frameworks strengthened.* The purpose of this outcome was to strengthen the overall policy and institutional environment that reinforces the sustainability of MSMEs adopting EE and RE technologies.

General information of the MSME Project is presented in Table 1. Key dates of the Project are provided on Table 2. Project expenditures broken down into Project components and co-financing are provided on Table 3. A listing of stakeholders is provided on Table 4.

### 2.3.2 Key Events in Project Design and Implementation

27. **Error! Reference source not found.**1 documents the key milestones related to project design and implementation.

### 2.3.3 Implementation Arrangements and Project Partners

28. As the GEF Implementing Agency, UNIDO had responsibility for the delivery of planned MSME Project outputs and the achievement of intended outcomes. As agreed with the GoI, UNIDO was also expected to directly execute the MSME Project with its execution partner, BEE, whose profile is provided in Table 4. UNIDO’s responsibilities to the MSME Project included overall management and monitoring, Project performance reporting to GEF, procurement of international expertise to deliver outputs planned under the 4 Project components, providing supplemental technical expertise to ensure technically sound deliverables consistent with Project requirements, and providing investment funds to catalyse the EE/RE market for MSMEs.



**Table 1: General Information on the MSME Project**

Project title	Promoting Energy Efficiency and Renewable Energy in Selected Micro, Small and Medium Enterprises (MSME) Clusters in India
GEF ID number	3553
UNIDO Project ID	103029
Region	EAP
Country(ies)	India
GEF Focal area and operational program:	CC - SP 2: Promoting Energy Efficiency in the Industrial Sector CC - SP 4: Promoting Sustainable Energy Production from Biomass
Co-implementing agency(ies)	n/a
GEF agencies (implementing agency)	UNIDO
Project executing partners	Bureau of Energy Efficiency (BEE), Ministry of Micro, Small and Medium Enterprises (MSME), Ministry of New and Renewable Sources of Energy (MNRE)
Project Size (FSP, MSP, EA)	FSP
Project CEO endorsement/ Approval date	4 January 2010
Project implementation start date	11 April 2011
Original expected implementation end date (indicated in CEO endorsement document)	11 August 2016
Revised expected implementation end date	31 December 2022
Project duration (months)	141 months
GEF grant (USD)	US\$ 7,172,097
GEF PPG (USD) (if any)	US\$ 100,000
Co-financing (USD) at CEO endorsement	US\$ 26,200,000
Total project cost (USD) (GEF grant + co-financing at CEO endorsement)	US\$ 33,472,097

**Table 2: Key dates for the MSME Project**

Milestone	Expected date	Actual date
Project preparations for MSME Project undertaken		2009-2010
Project CEO endorsement / Approval date		1 February 2011
Setup of PMU including a National Coordinator for MSME Project		April 2011
National approval		11 April 2011
Designation of a National Coordinator for MSME Project commenced work		April 2011
Project implementation start date (PAD Issuance Date)		11 April 2011
PMU establishment		August 2014

Milestone	Expected date	Actual date
Cluster activity initiated		Commencing 2014
A 2-year no cost extension requested beyond 31 December 2016		7 December 2016
MTE for MSME Project conducted		January-March 2018
Original expected implementation end date (indicated in CEO endorsement/ approval document)	July 2016	31 December 2022
Revised expected implementation end date (if any)	30 June 2022	31 December 2022
Terminal evaluation completion	30 September 2022	31 March 2023

**Table 3: Summary of MSME Project Results Framework**

Project Component	Activity Type <sup>3</sup>	GEF financing (in USD)		Co-financing (in USD)	
		Approved	Actual <sup>4</sup>	Promised	Actual
1. Increased capacity of EE/RE suppliers and finance providers	a,b	2,501,839	n/a	1,000,000	n/a
2. Increased end-use demand and implementation	a,b	2,133,908	n/a	15,850,000	n/a
3. Scaling up of the project to a national level	a, b, c	1,409,776	n/a	5,140,000	n/a
4. Regulatory and decision-making frameworks	a	706,896	n/a	3,710,000	n/a
Project management	a	419,678	n/a	500,000	n/a
<b>Total</b>		<b>7,172,097</b>	<b>6,751,503</b>	<b>26,200,000</b>	<b>35,676,419</b>

**Table 4: Stakeholders identified at MSME Project design stage**

Stakeholder and Mandate	Role on MSME Project
<p><b>Bureau of Energy Efficiency (BEE)</b> The Bureau of Energy Efficiency (BEE) was set up by GoI in 2002 with the broad framework and legal mandate for promoting energy efficiency in the Indian economy. BEE's mission is to assist in developing policies and strategies to reduce the energy intensity of the Indian economy, and to implement EE measures through designated agencies in each state. BEE has initiated a number of schemes and programmes in several states resulting in energy savings of 23.7 mtoe from 2012 to 2021<sup>5</sup>.</p>	BEE is implementing an MSME Programme to improve the energy performance of 25 selected MSME clusters with a focus on the uptake of EE technologies and practices in energy-intensive clusters. Using market-driven mechanisms, BEE is conducting energy audits and Detailed Project Report (DPR) preparation for clusters such as dairies, brass, and ceramics that are to feed into Project activities.
<p><b>Ministry of Micro, Small, and Medium Enterprises (MoMSME)</b> MoMSME is responsible for the development of the MSME sector and is the nodal ministry of the GoI for</p>	Amongst a number of financial schemes, MoMSME is integrating energy-related aspects into some of their existing schemes, as energy costs (for both electricity and

<sup>3</sup> Activity types are:

a) Experts, researches hired

b) Technical assistance, workshop, meetings or experts consultation scientific and technical analysis

c) Promised co-financing refers to the amount indicated on endorsement/approval.

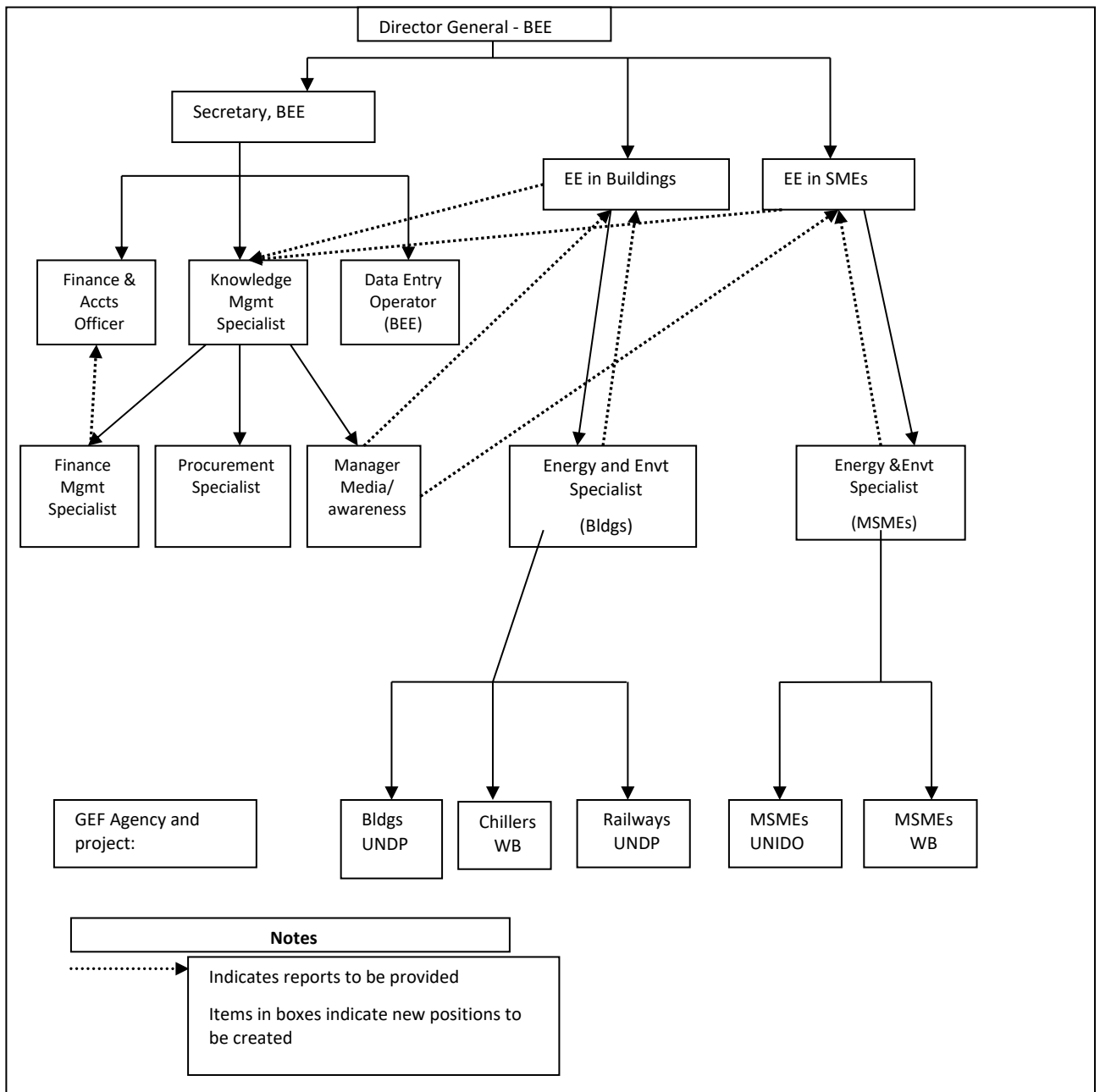
<sup>4</sup> To 31 December 2022

<sup>5</sup> <https://www.beeindia.gov.in/content/pat-read-more>

Stakeholder and Mandate	Role on MSME Project
implementation of the Micro, Small and Medium Enterprises Development Act, 2006 that seeks to facilitate development of MSMEs and enhance their competitiveness through development of specific schemes and programmes.	primary fuels) are sufficiently significant to impact the competitiveness of MSMEs.
<b>Ministry of New and Renewable Energy (MNRE)</b> MNRE is the nodal ministry of GoI for all issues related to new and renewable energy. The broad aim of MNRE is to develop and deploy new and renewable energy to supplement the energy needs of the country, apart from coordinating and intensifying R&D in these fields. MNRE works closely with Indian Renewable Energy Development Agency (IREDA), a non-banking financial institution under the administrative control of MNRE. IREDA provides term loans for RE and EE projects.	MNRE has specific programmes for developing and promoting RE in the industrial sector (including MSMEs) such as solar thermal systems for air heating/steam generating applications. MNRE also has a programme to support R&D initiatives in bio-energy resources, pyrolysis, atmospheric and high-pressure gasification, bio-methanation and biogas.
<b>State Governments</b> State governments provide additional schemes and incentives in varying degrees to augment the MSME sector in addition to GoI National level support in areas including: <ul style="list-style-type: none"> <li>• industrial extension services;</li> <li>• institutional support of credit facilities;</li> <li>• provision of training facilities;</li> <li>• supply of machinery;</li> <li>• assistance for domestic marketing and exports;</li> <li>• special incentives for setting up enterprises in backward areas; and</li> <li>• Technical consultancies and financial assistance for technological upgrades.</li> </ul>	Each state is to have its unique programmes to assist the industrial MSME sector.

29. A Project Management Unit (PMU) was established within BEE. The PMU was staffed with a National Project Manager (NPM), National Technology Coordinator (NTC), National Cluster Coordinators (NCCs), Project Engineers, and a Project Assistant. PMU responsibilities to the MSME Project included day-to-day management, monitoring and evaluation of Project activities as per approved work plans, and coordination of all Project activities being carried out by national experts and partners, in close collaboration with BEE. UNIDO was to provide the PMU with GEF funds as required to execute work plans and to support the necessary management and monitoring of the Project. Execution arrangements for the MSME Project are illustrated on Figure 2.

**Figure 2: MSME Management Arrangement**



30. The Project management arrangements also included a Project Steering Committee (PSC). The PSC's main role was the coordination and input by participating agencies consisting of UNIDO representatives and representatives of the following ministries of the GoI: Bureau of Energy Efficiency (BEE); Ministry of Environment, Forest and Climate Change (MoEFCC); Ministry of New and Renewable Energy (MNRE); and Ministry of Micro, Small and Medium Enterprises (MoMSME).
31. Detailed working plans for the entire MSME Project implementation period were to be developed by UNIDO in collaboration with BEE. The work plans were to clearly define roles and responsibilities for execution of Project activities, as well as M&E, and to set milestones for deliverables and outputs. The working plan would be used as a basis for advancing funds to the PMU, and as a management and monitoring tool by UNIDO and the PMU to be reviewed and updated as appropriate on a biannual basis.

#### 2.3.4 Positioning of the UNIDO Project

32. The MSME Project was positioned at the time of its design in 2009-2010 to support the reduction of CO<sub>2</sub> emissions in India's industrial sector, and in particular, the MSME industrial sub-sectors, by reducing energy intensity through energy efficiency and renewable energy whenever applicable and feasible. As a result of the MSME Project, India was to have improved regulations and financial incentive mechanisms (grant and non-grant instruments) and strengthened technical and institutional capabilities for the development, financing and implementation of renewable energy and energy efficiency improvements in the MSME industrial sub-sector on a sustainable basis. The MSME Project was positioned to support achievement of objectives and clear targets that reflect national priorities and plans for both MSME and climate change. These GoI plans and institutions to service MSMEs include:

- The **XI Five Year Plan (2007-2012)** of the GoI as a first linkage to government-supported EE schemes to the MSME Project. This Plan envisaged a savings of 10,000 MW that was supported by the Credit Linked Capital Subsidy Scheme to provide subsidies up to US\$68 million that ended in August 2009;
- The **XII Five Year Plan (2012-2017)** which had more overlap with the Project, undertaking interventions in 25 selected SME clusters to encourage energy efficient technologies and operational practices in SME sector in India. This Plan was executed through BEE where more than 100 technologies were planned for 5 selected SME sectors with a vision to facilitate upscaling;
- The **National Action Plan on Climate Change (NAPCC)** was prepared by the Prime Minister's Council on Climate Change in June 2008 outlining steps to be taken to address both development and climate-related objectives. It is being implemented through 8 National Missions, one of which is the "National Mission for Enhanced Energy Efficiency" that focuses on energy efficiency and renewable as well as improved energy efficiencies and their technologies in the MSME sector. In the context of the MSME sector, the Mission recognizes the need to address the "knowledge gap" that exists among small-scale industries by building local capacities, develop and promote EE technologies, ensure their optimal performance through training in best operating practices, and the need for special financing mechanisms that would enable MSMEs to acquire improved technologies.

There has been no updated legislation, policies or plans on EE/RE by the GoI since 2017.

33. The MSME Project was also positioned amongst other past and current baseline projects related to the GoI's drive to improve the energy performance of the MSME industrial sub-sector. A sampling of some of these projects included:

- **UNIDO projects** in SME cluster development in India since 1997 where 16 clusters have been upgraded using a proven 6-step strategy. With the goal of the strategy to boost a competitive private sector and contribute to poverty reduction by building sustainable linkages between stakeholders, it became clear that energy was a key cost component in certain clusters for which a special development programme was established to enhance MSME competitiveness through the realization of economies of scale;
- "**Financing energy efficiency in SMEs**" with the World Bank serving as the GEF agency for 5 clusters started in May 2010. This project provides the strengthening of the knowledge base on the MSME sector; increasing the capabilities of BEE-certified energy auditors through training programmes; and capacity building of MSME finance and development institutions in programme knowledge management and project management;
- "**India Energy Efficiency project**" with the World Bank serving as the GEF agency for a grant of US\$5.19 million in 2016 to increase demand for energy efficiency investments in select

MSMEs to build their capacity to access commercial finance. The project is being implemented by BEE, MoP and SIDBI. Through a cluster approach, the project was to increase demand for energy efficiency products and financing solutions in 5 targeted industry clusters. It was also to help build the capacity of organizations to assist MSME units in identifying future EE projects. It is also a part of World Bank's Programmatic Framework for financing energy efficiency for MSMEs in India.

## 3. Project Assessment

### 3.1 Project Design

#### 3.1.1 Overall Design

34. The MSME Project design was assessed against the 2010 baseline scenario and barriers to widespread adoption of energy efficiency in the industrial sector in India as described in Paras 31-32. The original 2010 design is still relevant to the country context and has definitively created the market for EE/RE products and services. The MSME Project design was aimed at supporting the reduction of fossil-fueled CO<sub>2</sub> emissions in India's industry by improving energy efficiency in the MSME industrial sub-sector. Just prior to the MSME PPG in June 2008, the GoI released its NAPCC outlining the steps to be taken to address both development and climate-related objectives. It is being implemented through the 8 National Missions, one of which is the NMEEE mentioned in Para 31.
35. Design of the MSME Project was to assist the GoI in creating an enabling framework for the promotion of EE/RE in the MSME sector. This has led to policies put in place at central and state levels to encourage the development of new and improved EE and RE technology and practices, also leading support of COP-26 objectives for India of CO<sub>2</sub> emission reductions at 45% to 2030. The process of permitting to access the state support for EE and RE technologies, however, is daunting and often prevents MSMEs from utilising available resources. In general, it remains a challenge to translate government policies into actual action at the cluster and individual MSME unit level. This Project sought to dismantle the barriers, which keep this action from occurring in spite of general government support for action. The Project components and activities were well targeted, clear and consistent.
36. Complementing these aims was the sharing of information on best practices at joint workshops within clusters to establish and enhance cooperation and synergies. This was designed to facilitate further investments into EE/RE in the clusters at the latter stages of the Project throughout the country. There was also supposed to be the development of a benchmarking system to improve the monitoring of energy use, designed to increase confidence in EE/RE deployment. Finally, training courses were to be continued to raise awareness and to overcome the current lack of specific expertise amongst energy professionals and service providers.
37. With regards to these GHG emission targets, the Evaluation Team appreciates the uncertainties of estimating *global environmental benefits of the MSME Project*. The indicators and targets for energy savings and GHG emission reductions generally meet SMART criteria although the "achievability" is questionable considering the difficulties in forecasting what EE and RE measures may be financed and undertaken for each factory.

***The rating for overall design is "satisfactory"***

#### 3.1.2 Logframe and Reconstructed Theory of Change

38. The PRF for the MSME Project was assessed to obtain a comprehensive understanding of intended outcomes in comparison with actual outcomes achieved. This involved the assessment of quality of SMART indicators and targets in the PRF for its effectiveness in monitoring progress. The full MSME

Project PRF is provided in Annex 4. Table 5 is a condensed version of the PRF with no suggested amendments to the description of outputs in the PRF as described on pages 51-55 of the RCE Document.

39. While overall 2010 design of the MSME Project appears responsive to the needs of Indian MSME stakeholders, the general quality of the PRF in the context of best practices for its preparation, is **satisfactory** with indicators for impact, outcomes, and outputs meeting SMART criteria, including achievability of all targets; none of the targets needs re-adjustment. Most importantly, the PRF assists MSME Project implementers in managing the Project.

**Table 5: MSME Project Results Framework**

<b>Components</b>	<b>Outcomes</b>	<b>Outputs (in 2014 PRF)</b>	<b>Revised Outputs (for ToC analysis)</b>
Project Objective	To develop and promote a market environment for introducing energy efficient (EE) technologies and enhancing the use of renewable energy (RE) technologies in process applications in 5 sectors		No changes proposed
C1: Increased capacity of EE/RE suppliers, service providers and finance providers	Capacity of EE/RE suppliers, service providers and finance providers to support the expansion of EE/RE in clusters is increased	<p>O1.1: EE/RE technologies introduced to the local market in 5 energy intensive MSME sectors</p> <p>O1.2: Increased ability of Local Service Providers (EE and RE product and service suppliers)</p> <p>O1.3: Increased ability of local industry associations to provide assistance and advice to MSMEs</p> <p>O1.4: Enhanced financing opportunities for EE/RE projects and implementation measures</p>	No changes proposed
C2: Increased end-use demand and implementation of EE and RE by MSMEs	The level of end-use demand and implementation of EE and RE technologies and practices by MSMEs is increased	<p>O2.1: Increased demand for EE/RE products/ services and increased ability to apply for financing.</p> <p>O2.2: Increased awareness and implementation of Best Operating Practices for energy management and EE/RE technologies in MSMEs</p>	No changes proposed

Components	Outcomes	Outputs (in 2014 PRF)	Revised Outputs (for ToC analysis)
C3: Scaling up of the project to a national level	The project is scaled up to a national level	<p>O3.1: Cooperation and synergies established and enhanced within the project clusters</p> <p>O3.2: Expansion of the project to affect new clusters at a later date throughout the country</p>	No changes proposed
C4: Strengthening policy, institutional and decision-making frameworks	Policy, institutional and decision-making frameworks strengthened	<p>O4.1: Improved monitoring and evaluation of energy use and development of a benchmarking system</p> <p>O4.2: Mainstreaming EE and RE into national policies and programmes on MSME Development</p>	No changes proposed

40. The MSME PRF was re-examined on the basis of the RToC in Figure 1 that is closely linked to the MSME Project PRF in Annex 4 and using UNIDO’s “Generic Theory of Change for UNIDO Energy Efficiency Programs” with slight changes to reflect conditions in India. The RToC essentially describes the Project as a roadmap of pathways driven by regulatory or market drivers in combination with Project activities to reach intended outcomes and long-term outcomes; this would enable a more effective assessment of the MSME Project sustainability. No changes were proposed for the impact, outcomes, or outputs.
41. The logic of the RToC diagram in Figure 1 flows in a horizontal direction (left to right) from component activities and outputs (green boxes) to long term Project impacts (dark blue box) of the MSME Project. The ToC includes Project pathways to direct outcomes (yellow boxes), and intermediate states (maroon boxes) that leads to the intended long-term impact of the MSME Project of “reduced fossil-fuel based electricity and GHG emissions through the promotion of Renewable Energy and Energy Efficiency in MSME industrial sector in India”.
42. The initial assessment of the MSME Project PRF led to no adjustments to the language of the outputs in the ToC (as described in Table 5) and the addition of drivers to the RToC. The RToC analysis confirms the intended outcomes of the MSME Project would generate long-term impacts after the EOP that would need to be driven by:
- MSMEs seeking relief from high energy costs;
  - Government seeking solutions to higher fuel prices and climate change;
  - Government promoting transition to EE and RE as a pillar of its national energy efficiency and energy strategy;
  - stakeholders willing to incorporate lessons learned in pilot projects to catalyse EE and RE investments; and
  - Governments enforcing mandatory codes and standards for EE and RE.
43. In this RToC visualisation, success of the MSME Project to achieve its intended direct outcomes was predicated on the following assumptions (some of which are mentioned in the PRF) that are somewhat beyond the control of the MSME Project:



- the local service providers, cluster-level industry associations, and financial actors are sufficiently interested and able to implement these changes;
  - the adapted technologies have a low payback period to warrant investment and efforts to secure outside investment;
  - technologies are adaptable and economically attractive to MSMEs;
  - there is no major deterioration of the macro-economic climate that may lead to lack of finance available and/or shutting down of industries; and
  - There is continued government support for this effort.
44. In the ROTI, pathways from direct outcomes to achieve MSME Project (long term) impacts include intermediate states of:
- increased number of energy professionals, equipment suppliers, installers and financiers in EE and RE related to higher confidence in EE and RE projects;
  - increased confidence of MSMEs to borrow funds for EE and RE projects and to implement EE and RE projects; and
  - Permitting for EE and RE improvements becomes easier for MSMEs and enforces or incentivizes accelerated adoption of EE and RE for MSMEs.
45. Assumptions that will increase the likelihood of achieving long term impacts includes:
- companies choose to make EE and RE investments;
  - implementation of Project activities will foster industrial EE and RE investments and reduce CO<sub>2eq</sub> emissions; and
  - Continuance of certification bodies to provide services to suppliers on the quality of EE and RE equipment for MSME industries in India.
46. In summary, the overall design of the MSME Project is **satisfactory** due to its clarity in strengthening the supply chain and financing for EE and RE technologies and solar thermal, increasing demand for EE and RE technologies within MSMEs to a national level, and mainstreaming national EE and RE policies and programmes on MSME development with an improved monitoring and evaluation.

***The rating for the log frame is “satisfactory”***

## 3.2 Project Performance

### 3.2.1 Relevance

47. The relevance of the MSME Project is reflected in its linkages with the XI and XII five-year plans as well as the NAPCC that include the National Mission for Enhanced Energy Efficiency, all described in Para 31.
48. The Project is also fully in line with UNIDO’s focus, SDG 8 on inclusive industrial development and SDG 9: “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”, for which UNIDO has taken primary responsibility.
49. The MSME Project also supports:
- GEF-4 SP-2: Promoting Energy Efficiency in the Industrial Sector, to promote energy efficiency in the industrial sector, deployment and diffusion of energy-efficient technologies and practices

in industrial production and manufacturing processes;

- GEF-4 SP-3: Promoting Market Approaches for Renewable Energy, for market approaches for the supply of and demand for renewable electricity in grid-based systems, and growth in markets for renewable heat power in participating program countries;
- GEF-4 SP-4: Promoting Sustainable Energy Production from Biomass that includes the adoption of modern and sustainable practices in biomass production, conversion, and use as energy.
- GEF-5 CCM 2: “Promote market transformation for energy efficiency in industry and building sector – c) GHG emissions avoided” by addressing key existing barriers on information, technical capacity and market barriers for EE/RE in MSMEs in India;
- GEF-5 CCM 3: “Promote investment in renewable energy technologies – a) Appropriate policy, legal and regulatory frameworks adopted and enforced; and b) Sustainable financing and delivery mechanisms established and operational”. The MSME Project implementation included improvement of policy and regulatory frameworks; awareness raising and capacity building on EE/RE technologies for MSMEs, and the demonstration and national scale-up of the application of EE/RE technologies for MSMEs.

50. The MSME Project is also fully in line with UNIDO’s mandate, core competences and benefits that were provided from UNIDO’s comparative advantage as a GEF implementing agency in the sustainable energy and climate change domain. The UNIDO Energy Programme is structured around four core thematic areas: (1) Industrial Energy Efficiency; (2) Renewable Energy for Productive Uses; (3) Low-carbon technologies; and (4) Benchmarking, Monitoring and Verification. UNIDO’s mandate is to support inclusive and sustainable industrial development, having strong core competences in the field of green industry, cleaner production, and sustainable energy. UNIDO has made significant contributions and was well placed to implement the MSME Project due to its expertise in dealing with MSME industrial sub-sector in India and building on the experience obtained under the GEF-supported “Programmatic Framework for Energy Efficiency in India” where BEE was the executing agency on 5 EE projects. Combining the provision of policy and normative development support services and capacity building for all market players, UNIDO aims to remove key barriers to the continuous improvement of energy efficiency in MSME industries and the increased adoption of renewable energy for productive uses.

***The rating for relevance is “satisfactory”***

### 3.2.2 Effectiveness

51. The effectiveness of the MSME Project was assessed by examining the extent to which targets against the outcomes and outputs in the PRF and RToC were achieved, or are expected to be achieved in the near future. Accordingly, the results of these analyses are provided in Tables 6, 8 to 10 where the “status as of November 2022” is color-coded according to the following color-coding scheme:

Green: Completed, indicator shows successful achievements	Yellow: Indicator shows expected completion by the EOP	Red: Indicator shows poor achievement – unlikely to be completed by Project closure
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52. Table 6 provides the status and effectiveness of achieving impact-level targets. The MSME Project was a significant contributor in catalysing interest in EE/RE technologies with overall GHG emission reduction and energy saved targets being exceeded, albeit over a longer period of time.

With a focus on energy intensive cluster, clusters were well selected including those with little or no previous similar activities. Furthermore, the profile of the MSME clusters on the Project is representative of typical Indian industrial MSME clusters, and the profile of the service providers represents various sizes and types of services. The Project connected the various service providers, creating excellent business opportunities in the market for EE/RE products and services. The Project raised the investment in EE/RE alone from MSMEs to US\$34.337 million, well over the targeted amount of US\$5.0 million.

**Table 6: Summary of the Project's Success in Achievement of Impact**

<b>Objective: To develop and promote a market environment for introducing energy efficiencies and enhanced use of RE technologies in process applications in 12 selected energy-intensive MSME clusters in India with expansion to more clusters later, in order to improve the productivity and competitiveness of units as well as to reduce overall carbon emissions and improve the local environment</b>	
<i>Target/Indicators</i>	<i>Status as of December 2022</i>
Total CO <sub>2eq</sub> emission reductions as a result of the investments in industrial energy efficiency – target 1,270,500 million tonnes (over 10 year lifetimes) by 2014	<i>2,189,025 tonnes of CO<sub>2</sub> achieved over 15-year lifetime of EE and RE measures introduced</i>
Total energy saved – target 276,600 MWh annually by 2015	<i>Achieved an energy savings of 280,000 MWh annually</i>
Contribution to the enabling policy environment – target of 4 out of 4 with the complete achievement of all the steps in facilitating the implementation of biomass as a fuel source and in mainstreaming EE/RE policies for MSME development.	<i>Developed report on policy and regulatory framework for MSME sector in India, with recommendations on improving profitability, competitiveness along with wider policy objectives including market transformation, employment generation, energy security and GHG emissions reductions.</i>
Volume of investment – target 5 million USD by 2014	<i>Achieved a monetary investment of US\$ 34.337 million</i>

53. However, one target that was not met was the target for 4 enabling policies that would mainstream EE/RE for MSME development as well as facilitating the implementation of biomass as a fuel source. The Project has awarded PricewaterhouseCoopers to execute policy and regulatory framework needed to accelerate the diffusion of energy-efficient and renewable energy technologies in the MSME sectors; there has been no mention of biomass in these discussions. Table 7 provides a summary of the number of MSME projects on a yearly basis with energy savings, GHG emission reductions and investments made.

**Component 1: Increased capacity of suppliers of EE/RE product suppliers/ service providers/ finance providers**

54. Component 1 was designed primarily to provide an enabling environment for MSMEs to access resources that will result in EE/RE technologies being applied to MSME operations. This Component was to provide technical assistance with energy audits, establishment of incubators, increased ability of Local Service Providers to provide EE and RE products and services to MSMEs, and improved access to EE/RE finance for MSMEs.

**Table 7: Summary of MSME projects by year**

Year	MSME Projects	Energy Savings/yr (MWh)	CO <sub>2</sub> reduction/yr (Tonnes)	Investment (million US\$)
2015-16	62	4,518	2,067	0.273
2016-17	271	70,241	31,999	2.956
2017-18	141	19,208	8,452	4.830
2018-19	198	21,990	9,613	2.991
2019-20	133	11,831	10,823	2.005
2020-21	494	81,560	40,327	9.471
2021-22	544	70,910	42,654	11.811
<b>Total</b>	<b>1,843</b>	<b>280,258</b>	<b>145,935</b>	<b>34.337</b>

55. To address these aforementioned issues, Component 1 was set up to deliver the following outputs (mirroring the output wording of Component 1 in the RToc in Figure 1 and summarized in Table 8):

- *Output 1.1: EE/RE technologies that are adjusted for local needs introduced to the local market in 5 energy-intensive MSME sectors.* This was designed to support studies and energy audits and to strengthen the capacity of energy experts to commission studies and energy audits that would to reveal potential for energy savings through EE and RE, and to identify suitable options;
- *Output 1.2: Increased ability of Local Service Providers (EE and RE product and service suppliers) to provide assistance and advice to MSMEs within the sectors.* This was designed to strengthen the capacities of Local Service Providers (LSPs) to promote the adoption of EE/RE systems. This was to be done through facilitating linkages between the established technology providers and EE/RE technology suppliers through joint ventures;
- *Output 1.3: Increased ability of local industry associations to provide assistance and advice to MSMEs within the clusters with the establishment/enhancement of "Cluster level energy management cells".* This was designed to strengthen cluster representative organisations and local industry associations which already provide assistance and advice to MSMEs within the cluster;
- *Output 1.4: Enhanced financing opportunities for EE/RE projects and implementation measures.* This was designed to improve MSME access to loans from banks to acquire capital assets related to these EE/RE technologies.

**Table 8: Summary of the MSME Project Progress in delivering outputs under Component 1**

Expected Outcome 1: The capacity of suppliers of EE/RE product suppliers/service providers/finance providers to support the expansion of EE/RE in the clusters is increased		
Programmed Outputs	Target/Indicators	Status as at December 2022
1.1 EE/RE technologies that are adjusted for	<ul style="list-style-type: none"> <li>Detailed techno-economic studies at the unit (MSME) level to determine feasible options for EE and RE through improvements in</li> </ul>	<ul style="list-style-type: none"> <li>Over 300 detailed techno-economic studies done at the MSME level determined feasible options for EE and RE through</li> </ul>

Expected Outcome 1: The capacity of suppliers of EE/RE product suppliers/service providers/finance providers to support the expansion of EE/RE in the clusters is increased		
<i>Programmed Outputs</i>	<i>Target/Indicators</i>	<i>Status as at December 2022</i>
local needs introduced to the local market in 5 energy intensive MSME sectors	<p>technologies and operating practices.</p> <ul style="list-style-type: none"> <li>• Adjustment of existing technologies for the introduction of at least 12 emerging/ improved EE/RE technologies and/or Best Operating Practices to be introduced.</li> <li>• Documentation of the benefits (energy savings, quality improvement, GHG reduction etc) in the demonstration and replication units (prepare one case study for each sector).</li> <li>• At least 16 awareness workshops to showcase the results of technology demonstrations (conduct at least 2 awareness workshops per cluster in the Foundries and Brass clusters, and 2 total awareness workshops in each of the other sectors – Hand tools, Ceramics, and Dairy).</li> </ul>	<p>improvements in technologies and operating practices</p> <ul style="list-style-type: none"> <li>• Over 300 adjustments were made to introduce 12 emerging and improved EE/RE technologies and Best Operating Practices</li> <li>• Over 300 case studies were documented on the energy savings benefits, quality improvement, GHG reduction on demonstration and replication units</li> <li>• 46 technology demonstration workshops were organized</li> </ul>
1.2 Increased ability of Local Service Providers (EE and RE product and service suppliers) to provide assistance and advice to MSMEs within the sectors	<ul style="list-style-type: none"> <li>• 15 Local Service Providers/industry associations in 12 clusters identified for training and assistance in implementing the new technologies/Best Operating Practices.</li> <li>• 200 Detailed Project Reports prepared for MSMEs by Local Service Providers in 12 clusters.</li> <li>• 24 product and service providers operating in each cluster actively marketing EE/RE products. (up from 4 currently).</li> </ul>	<ul style="list-style-type: none"> <li>• 800 Local Service Providers in 12 clusters were identified for training and assistance in implementing the new technologies/Best Operating Practices</li> <li>• 245 DPRs developed (120 bankable DPRs by consultants and 125 DPRs by Cluster Leaders) on EE technologies</li> <li>• 23 B2B Exhibition and vendor interfacing events were organized in the clusters</li> </ul>
1.3 Increased ability of local industry associations to provide assistance and advice to MSMEs within the clusters with the establishment	<ul style="list-style-type: none"> <li>• Implementation of 12 “Energy Management Cells” within cluster-level industry associations/other cluster-level institutions for carrying out EE/RE assistance in their respective clusters.</li> <li>• Needs assessments carried out for these 12 institutions for the implementation of Energy Management Cells within them.</li> <li>• Strengthening of these 12 “Energy Management Cells” by providing</li> </ul>	<ul style="list-style-type: none"> <li>• Established one Energy Management Cell (EMC) for each of the 12 clusters;</li> <li>• Needs assessment done for 12 institutions in the 12 EMCs</li> <li>• Strengthened 12 EMCs through training cluster leaders, association representatives and MSME unit personnel on</li> </ul>

Expected Outcome 1: The capacity of suppliers of EE/RE product suppliers/service providers/finance providers to support the expansion of EE/RE in the clusters is increased		
<i>Programmed Outputs</i>	<i>Target/Indicators</i>	<i>Status as at December 2022</i>
/enhancement of "Cluster level energy management cells"	material support (energy audit tools) and soft support (knowledge and training)	handling energy audit instruments and identification of energy conservation measures
1.4 Enhanced financing opportunities for EE/RE projects and implementation measures.	<ul style="list-style-type: none"> <li>• Templates and examples for financial assessment of EE/RE projects developed for use in training and dissemination</li> <li>• Banking/investor experts in 5 banks/ financial institutions trained in the assessment of bankable projects and support mechanisms</li> </ul>	<ul style="list-style-type: none"> <li>• Templates and examples for financial assessment of EE/RE projects were developed with Green Tree Global;</li> <li>• 25 banker training programs were organized in selected clusters for providing awareness on the EE/RE technologies and to provide a platform for interactive sessions between bankers and MSMEs</li> </ul>

56. *Output 1.1 (EE/RE technologies that are adjusted for local needs introduced to the local market in 5 energy-intensive MSME sectors) has progressed as follows:*

- From 2016 to 2018, 20 energy audits were completed in 12 clusters by expert energy audit agencies recruited by BEE under the Project with information on more than 400 other projects being initiated and 9 awareness workshops were conducted at Coimbatore, Belgaum, Gujarat, Khurja, Jalandhar and Thangand to showcase the results of technology demonstrations;
- By 2018, more than 500 potential projects in 12 clusters were identified. This was done with 300 walk-through audits, 150 detailed energy audits (DEAs), development of 300 case studies, and 46 awareness workshops in 12 clusters to disseminate knowledge. From 2019 to 2022, the Project upscaled to 11 more clusters which resulted in identification of 65 EE technologies across the 12 clusters, implementation of 1,843 EE and RE measures in 750 MSME;
- During the initial phase of the Project between 2016 and 2018, 16 technology demonstration workshops<sup>6</sup> organized in 12 different clusters;
- Contracts were handed out to PWC, CII-GBC, TERI, InspIRE, and DESL totalling approximately US\$228,600 to organize this stage of the process of implementing EE and RE measures for MSMEs.

57. In conclusion, a number of EE/RE technologies have been introduced to the local market for 5 energy-intensive MSME sectors complete with training for operators and supervisors, including

<sup>6</sup> Four of these workshops were in Foundry sector (Coimbatore (2), Belgaum (2)), 4 workshops in Dairy sector (Gujarat (2) Kerala (2)), 4 workshops in Ceramic sector (Thangadh (2) & Morbi (2)), 2 workshops in Hand Tool sector (Jalandhar (2)) and 2 workshops in Brass sector (Jamnagar (2)).

the following technologies and processes:

- improved Cupola furnace and use of IGBT-based furnaces in ferrous foundries;
- energy recuperator for furnace, furnace automation;
- energy efficient compressors, compressor operations, pipeline layout, VFD;
- energy efficient and/or natural lightning, energy efficient fans;
- improvement in induction furnaces (operations, technology, software);
- solar PV;
- kiln practices including heat reuse, surface insulation, low mass kiln car, double decker kiln car;
- changes in material grinding drums for ceramic industry
- steam condensate recovery
- centralized chillers and improved VFD chiller operations;
- improved boiler operations including flue gas, and oil to gas;
- improved harmonics and power factor management;
- efficient foundry operations including sand mixer automation, coal washing, and compression of material for foundry raw material;
- Ceramic blanket to reduce radiation losses at foundry and use of pneumatic line.

58. *Output 1.2 (Increased ability of Local Service Providers (EE and RE product and service suppliers) to provide assistance and advice to MSMEs within the sectors) has progressed as follows:*

- From 2018 to 2019, training on Best Operating Practices was delivered in 9 clusters through 27 workshops to unit owners, employees, operators and industrial associations. More than 60 DPRs were prepared by cluster leaders in consultation with unit owners with 30 DPRs implemented, an LSP list developed, and 46 capacity building workshops for LSPs completed;
- From 2018 to 2019, equipment and technology mapping of 800 LSPs was completed along with 38 capacity building training programmes that trained 800 LSPs on latest technologies and machines, and more than 200 DPRs on EE technologies;
- By 2019, 245 DPRs on EE technologies were developed of which 120 were bankable DPRs and 125 DPRs were completed by cluster leaders.

In conclusion, there was increased capacity and ability of LSPs to provide assistance and advice to MSMEs considering the number of successful EE/RE projects implemented by MSMEs.

59. *Output 1.3 (Increased ability of local industry associations to provide assistance and advice to MSMEs within the clusters with the establishment/enhancement of "Cluster level energy management cells") has progressed as follows:*

- In 2018, 12 EMCs were established and functioning successfully with 9 3-day residential training programs for industry representatives organized at AIP-NPC;
- The strengthening of these 12 EMCs was done through provision of material support (energy audit tools) and soft support (knowledge and training).

This has resulted in cluster leaders gradually conducting regular energy audits at various

industries with the energy audit instruments to assist in identification of energy conservation measures at the EMC. Work has been initiated for the development of possible sustainable models for EMCs in the 12 clusters. This included a round table consultation meeting with the feasibility report finalized, and sustainability models for the EMCs submitted<sup>7</sup>.

60. *Output 1.4 (Enhanced financing opportunities for EE/RE projects and implementation measures)* has progressed as follows:

- In 2019, discussions were initiated with SIDBI, WB, IFC and other stakeholders on their past experience with similar trainings and trying to identify the requirements of the banking industry. The result was 12 different projects were being financed by banks;
- In 2020 and 2021, 12 applications on different EE/RE projects were submitted for bank financial assistance, which was not approved. Banker's training was delayed due to the COVID-19 pandemic;
- In 2022, banking and investor experts from 5 financial institutions were trained in the assessment of bankable projects and support mechanisms.

In conclusion, financing opportunities were being enhanced for medium MSMEs but not micro to small MSMEs who still have issues of collateral and liquidity to access financing opportunities. Capacities are being built for personnel from 5 financial institutions for the assessment of bankable projects and support mechanisms.

61. In summary, MSME Project activities delivered the intended outputs of this component that includes cluster leaders evolving into trusted people who are available to make MSMEs aware of new and more efficient technologies and cluster activities, provide advice and good strategic thinking that improves MSME decision-making when funds are available. There were also contributions to the capacity building of personnel involved with EE/RE technology supply and installation as well as financing EE/RE projects. However, energy professionals, consultants and LSPs would prefer expert training sessions that includes hands-on or practical sessions that come with Continuous Development Programme (CDP) points. As such, Component 1 is assessed as *satisfactory*.

## **Component 2: Increasing the level of end-use demand and implementation of EE and RE technologies and practices by MSMEs**

62. Component 2 was designed to increase MSME demand for EE/RE technologies through awareness raising and training programmes. To address activities of this Component, the following Outputs were to be delivered (mirroring the output wording of Component 2 in the RToc in Figure 1 and summarized on Table 9):

- *Output 2.1: Increased demand for EE/RE products/services and increased ability to apply for financing among the units in the 5 energy-intensive MSME sectors for EE/RE technologies.* This was designed to provide awareness and training programmes for MSME entrepreneurs, existing and prospective, to publicize the benefits of improved EE/RE technologies, and to facilitate EE/RE investments;

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<sup>7</sup> At the time of the writing of this TE report, a study entitled "Development of Sustainable Cluster Models for Energy Management Centre in MSME Clusters" was being conducted with only draft report available and no presentation yet done.



**Table 9: Summary of the MSME Project Progress in delivering outputs under Component 2**

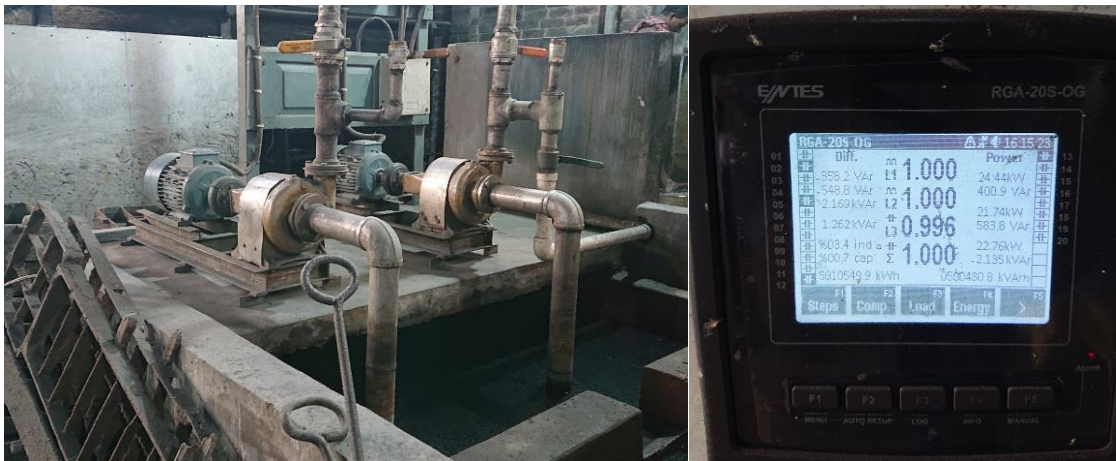
Expected Outcome 2: The level of end-use demand and implementation of EE and RE technologies and practices by MSMEs is increased		
Programmed Outputs	Target/Indicators	Status as at March 2019
2.1 Increased demand for EE/RE products/ services and increased ability to apply for financing among the units in the 5 energy intensive MSME sectors for EE/RE technologies	<ul style="list-style-type: none"> <li>• Ongoing awareness generation/ training programmes for entrepreneurs – at least 50 awareness workshops conducted to reach 1200 or more entrepreneurs as well as four national-level project conferences conducted.</li> <li>• In consultation with industry associations, choosing MSMEs and implementing joint partnerships including adapted technologies and Best Operating Practices (“case studies”) in each of the 5 sectors with local producers of EE/RE technologies (Local Service Providers) and MSMEs – 29 total projects implemented with handholding of these 29 units to ensure optimal deployment of improved technologies and to build confidence and capabilities.</li> <li>• The development of around 200 bankable Detailed Project Reports, which can be used for investment decisions.</li> <li>• A total of 120 EE/RE projects implemented in the 12 clusters, based on the DPRs (on top of the 29 demonstration projects).</li> <li>• At least 100 applications for financial assistance (loans/investments) submitted by MSMEs with 36 funded (additional to the 29 pilot projects and the 120 expected from the DPRs).</li> </ul>	<ul style="list-style-type: none"> <li>• 2 National workshops, 1 stakeholder consultation meeting, and 98 capacity building workshops for MSME enterprises on various aspects of energy efficiency in the 12 clusters with more than 2,650 participants;</li> <li>• 27 pilot demonstration projects identified and approved; 21 projects have been successfully implemented</li> <li>• 120 bankable DPRs on EE technologies</li> <li>• 603 EE/RE projects implemented in 345 industries in 12 clusters</li> <li>• 12 applications for financial assistance for solar PV by MSMEs were submitted to banks. These applications did not materialized due to various factors such as collateral issues and the government’s decreasing interest due to decreasing capital costs of solar panels. The reduction in solar PV costs with a demand aggregation approach made solar PV investment costs much attractive for MSMEs to invest their own funds.</li> </ul>
2.2 Training programme on solar thermal technology conducted for equipment/ component suppliers, service providers, consultants and	At least 500 experts, engineers, and staff trained in RE/EE technology basics and Best Operating Practices and at least 250 implementing Best Operating Practices during the complete project cycle.	Up to 2019, 12 cluster-specific 3-days residential training workshops at NPC-Chennai were conducted where 230 cluster level enterprise representatives were trained on "Best operating procedures for energy management in MSMEs and handling of energy audit Instruments".

Expected Outcome 2: The level of end-use demand and implementation of EE and RE technologies and practices by MSMEs is increased		
<i>Programmed Outputs</i>	<i>Target/Indicators</i>	<i>Status as at March 2019</i>
industries in selected sub-sectors		

- Output 2.2: An increase in the awareness and implementation of Best Operating Procedures for energy management in MSMEs in 12 energy-intensive MSME clusters. This was designed to complete the knowledge base of unit owners and LSPs of proper operation and maintenance (O&M) of the EE/RE technologies.
63. *Output 2.1 (Increased demand for EE/RE products/services and increased ability to apply for financing among the units in the 5 energy-intensive MSME sectors for EE/RE technologies)* has progressed as of 2021 as follows:
- 2 national workshops and 1 stakeholder consultation meeting;
  - 98 capacity building workshops for MSME enterprises on various aspects of energy efficiency with more than 2,650 participants in 12 clusters that have been ‘politically neglected’ making the commencement of Project activities more difficult and causing delays and setbacks. This included 2018 activities of 35 awareness and training workshops, training of more than 500 entrepreneurs;
  - 27 pilot demonstration projects identified with 21 having been successfully implemented including MSMEs who were unaware of the energy audits and benefits achievable through adoption or upgrading to energy efficient technologies;
  - From 2016 to 2018, 120 bankable DPRs on EE technologies and implementation of 603 EE/RE measures in 345 industries in 12 clusters.
64. *Output 2.2 (An increase in the awareness and implementation of Best Operating Procedures for energy management in MSMEs in 12 energy-intensive MSME clusters)* has progressed as follows:
- 500 experts, engineers, and staff were trained in 2018 on RE/EE technology basics and Best Operating Practices;
  - 250 were implementing Best Operating Practices after 2018;
  - From 2017 to 2019, 12 cluster-specific 3-days residential capacity building training workshops were held at the Centre of Excellence for Training in Energy Efficiency located in the Dr. Ambedkar Institute of Productivity-National Productivity Council (NPC) in Chennai for 230 cluster level enterprise representatives on "Best Operating Procedures for Energy management in MSMEs and handling of Energy audit Instruments". These workshops targeted entrepreneurs, factory operators and supervisors with a focus on 5 sectors. The workshops consisted of classroom lectures on energy efficiency in various thermal and electrical utilities, energy management and auditing, EE in electrical systems, and performance evaluation of equipment;
  - Hands-on training between 2017 and 2019 on various industrial energy issues to demonstrate various energy efficiency opportunities, understanding of performance assessment methodology and mapping of energy performance. Hands-on training was extended to compressed air systems, and lighting performance. Figure 3 depicts some of the works done by the Project.

65. The awareness raising and training needed to include an analysis of life-cycle ownership to break down the investment barriers. With MSMEs needing to finance technologies especially when they need replacement with low availability of funds, there will be a preference for least-cost technologies, even if less efficient. Understanding the long-term (life-cycle) cost savings of EE/RE measures will provide incentives for an MSME to implement more efficient technologies. In addition, the most effective means of training MSME personnel was the practical hands-on training offered at NPC Chennai, as it helped MSMEs visualise what needs to be done.

**Figure 3: EE motors and the monitoring of power factor**



66. In summary, the delivery of outputs of Component 2 is assessed as satisfactory. To this end, the MSME Project has made substantial contributions to the training of engineers, service providers, consultants and industries on energy savings based on EE and RE technologies. The Project has made significant progress by conducting awareness programmes, workshops and hands-on training sessions supervised by industry experts, sessions that have been attended by a diverse group of people from the MSME industrial sub-sector, to consultants and energy experts. While the Project delivered most of the outputs, the processing of applications for financial assistance was not successful, of which zero were approved; the demand for financial assistance to access EE/RE technologies was severely overestimated with all participating MSMEs self-financing EE/RE technologies.

### **Component 3: Scaling up of the project to a national level**

67. Component 3 was designed to achieve the outcome of “the Project is scaled up to a national level”. To achieve this outcome, the delivery of 3 outputs was proposed (mirroring the output wording of Component 3 in the RToc in Figure 1 and summarized in Table 10):
- Output 3.1: Cooperation and synergies established and enhanced within the project clusters through information sharing on best practices and joint workshops. This output was designed to facilitate sharing of lessons and outcomes from other interventions in the MSME sector, augmented by study tours and exchange visits for entrepreneurs, LSPs and other stakeholders under a knowledge exchange program;
  - Output 3.2: Expansion of the project to affect new clusters at a later date throughout the country. This output was designed to generate interest from other clusters in adopting EE/RE measures through information collected in DPRs;
  - Output 3.3: Dissemination of best practices on improved EE and RE technologies and standards in all related MSME clusters in the country. This output was designed to publicize the benefits

of the improved EE/RE technologies through cluster leaders, local industries associations and lead entrepreneurs.

68. Output 3.1 (Cooperation and synergies established and enhanced within the project clusters through information sharing on best practices and joint workshops) has progressed as follows:

- 4 international exposure visit study tours were made in 2017 and 2018 to Japan, China (Guangzhou and Beijing), and in 2019 to New Zealand (6 persons) for the foundry, hand tools, ceramic, and dairy sectors;
- 4 inter-cluster exposure visits for Belgaum to Coimbatore & Rajkot, Indore to Coimbatore, and Nagaur to Jalandhar clusters;
- case studies and brochures posted on the SIDHEEE website which is owned by BEE with a page for Project activities for all clusters, developed case studies, DPRs, DEA reports, and information on vendors information, all designed to build synergies. This includes strengthened web-sites in foundry and dairy sectors to include more information on EE/RE technologies and Best Operating Practices;

**Table 10: Summary of the MSME Project Progress in delivering outputs under Component 3**

Expected Outcome 3: The project is scaled up to a national level		
Outputs	Target/Indicators	Status as of November 2022
3.1: Cooperation and synergies established and enhanced within the project clusters through information sharing on best practices and joint workshops	<ul style="list-style-type: none"> <li>• At least 7 study tours/exchange visits carried out under a 'knowledge exchange program to share lessons and experiences among the various clusters</li> <li>• Existing websites in foundry and dairy sectors strengthened to include more information on EE/RE technologies and Best Operating Practices.</li> </ul>	<ul style="list-style-type: none"> <li>• 4 international study tours and 4 inter-cluster visits were conducted under a 'knowledge exchange program to share lessons and experiences among the various clusters</li> <li>• Project has developed a portal in the name of SIDHEE for Project activities for all sectors and clusters, developed case studies, DPRs, DEA reports, and information on vendors information.</li> </ul>
3.2: Expansion of the project to affect new clusters at a later date throughout the country	<ul style="list-style-type: none"> <li>• Preparation of Project Proposals for EE/RE projects (similar to this one) in MSME clusters not covered in this project. (4 new Foundry clusters, the Ludhiana Hand Tools cluster, 1 more Ceramics cluster in India, 1 more Brass cluster, 1 more Dairy cluster)</li> <li>• Preparation of more detailed information material (brochures, booklets) for the new sectors and new clusters related to technologies, returns on investment, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Upscaling activities in the 23 clusters are being executed by CII-GBC and DESL with the development of a significant number of DPRs for the industries to fast-track the decision-making process.</li> <li>• Developed 25 cluster specific EE and RE based technology compendiums covering 20 - 30 major energy saving measures possible in the clusters for the 5 sectors. This was accompanied by 24 awareness workshops organized to generate interest among the MSME units.</li> </ul>

- Project initiated development of a knowledge-based portal<sup>8</sup> to showcase Project activities, developed case studies, DPRs, DEA reports, and information on vendors;

<sup>8</sup> [http://sidhiee.beeindia.gov.in/ProjectComponent/GEF\\_UNIDO](http://sidhiee.beeindia.gov.in/ProjectComponent/GEF_UNIDO)

- Cluster specific WhatsApp groups created for regular sharing of the information among MSME unit members.

Cross sector and cross cluster learning fosters implementation. While cross cluster exposure tours to China, New Zealand and other clusters in India was important, exposure visits needed to include same-sized industries in other clusters, and not just larger industrial entities in China and New Zealand. The visit to Chinese foundries was made more effective by visits to small and tiny Coimbatore foundries. The same can be said for the visit to New Zealand dairies which were much larger than any dairies in India.

69. Output 3.2 (Expansion of the project to affect new clusters at a later date throughout the country) has progressed as follows:

- In 2019, Project scaled-up and expanded its activities to 12 clusters and 11 new clusters<sup>9</sup>. To manage these MSMEs at the national level, contracts totalling US\$1.611 million were issued to DESL (foundry, hand tools and brass) and the CII GBC (foundry, ceramic and dairy). These contracts were based on performance where payments were made based on the number of industries that implement EE and RE with a focus on medium and smaller MSMEs and their respective investments in resource efficient and cleaner production (RECP) measures. This was deemed to be an efficient approach;
- From 2020 to June 2022, Project implementation activities in some of the 23 clusters was disrupted while others flourished<sup>10</sup>. Despite these delays, contractors were in the process of submitting implementation progress reports, the PMU was in the process of conducting random physical verification and validating and verifying the submitted IPRs, and final reports for each project was being prepared. In total, achievements on upscaling includes 1,250 EoIs submitted by MSME units from all clusters, 24 awareness workshops conducted in different clusters, 25 technology-based compendiums finalized for each cluster and distributed to units for adoption, 695 implementation plans submitted to MSME units, with 521 EE projects and 174 RE projects implemented in MSMEs across 23 clusters, which resulted in energy savings of 152,410 MWh and emission reductions of 82,980 tCO<sub>2eq</sub> achieved during the national scale-up phase from 2021 to 2022. Figure 4 depicts some of the EE work done in Howrah and Thangadh.

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<sup>9</sup> Namely Dairy (Tamil Nadu, Orissa, Madhya Pradesh, Andhra Pradesh & Telangana, Kerala, Haryana, Punjab & Maharashtra), Foundry (Ahmedabad & Howrah), Ceramic (Virudhachlam & Himmatnagar) Mixed Cluster (Indore, Sikkim, Ujjain and Pithampur).

<sup>10</sup> In some clusters such as Thangarh and Jannager, there has been a lot of work done only after the 2018 MTR, and therefore mainly during the pandemic. This is partially due to the Project employing consultant to assist with upscaling with a coordinator placed within the area, resulting focused and continuous attention, even during the pandemic period. However, there were other clusters, such as the micro and small industries in the Ahmedabad ceramics cluster, that have not been able to do well due to the lockdowns and complete disruption of activities.

**Figure 4: Induction furnace at Howrah and double decker kiln loading at ceramics factor in Thangadh**



70. Project has an overlap with GEF 4893 in Howrah and Durgapur. This happened by coincidence as Howrah was not part of the original project clusters. Both projects have a similar objective but use a different approach and cooperate with the same cluster expert, DESL. Work with MSME industries and their results could build upon each other, with interest in exploring synergies and differences in approach and outcomes to draw some lessons learned for these 2 projects.
71. In summary, the delivery of outputs within Component 3 is assessed as *satisfactory* with the Project reaching its targets for energy savings and GHG emission reductions notwithstanding the disruptions caused by the COVID-19 pandemic.

**Component 4: Strengthening policy, institutional and decision-making frameworks**

72. Component 4 was designed to achieve the outcome of “policy, institutional and decision-making frameworks strengthened”. To achieve this outcome, the delivery of 2 outputs was proposed (mirroring the output wording of Component 4 in the RToC in Figure 1 and Table 11):
  - Output 4.1: Improved monitoring and evaluation of energy use and development of a benchmarking system. This output was designed address the lack of information about current levels of energy use, the benchmarks for quality, and what RE technology inputs are available;
  - Output 4.2: Mainstreaming EE and RE into national policies and programmes on MSME Development. This output was designed to develop development and setting in place of policy incentives to promote EE and RE, through detailed review of the policy and regulatory framework on end-use and supply-side energy efficiency in the 5 MSME sectors.

**Table 11: Summary of the MSME Project Progress in delivering outputs under Component 4**

Intended Outcome 4: Policy, institutional and decision-making frameworks strengthened		
Outputs	Target/Indicators	Status as at November 2022
4.1: Improved monitoring and evaluation of energy use and development of a benchmarking system	<ul style="list-style-type: none"> <li>• At least 24 detailed energy audits conducted in various sectors including investment options, payback periods, current barriers to implementation, and energy use/CO2eq emissions prevented from the technologies/practices.</li> <li>• At least 12 detailed cluster-level energy use database prepared (one</li> </ul>	<ul style="list-style-type: none"> <li>• 150 DEAs conducted from 2019 to 2021</li> <li>• Project has developed more than 12 detailed cluster level/unit level cloud-based data analytics tool for energy-use database and benchmarking;</li> </ul>

Intended Outcome 4: Policy, institutional and decision-making frameworks strengthened		
Outputs	Target/Indicators	Status as at November 2022
	<p>for each cluster); these would form the basis of benchmarking systems</p> <ul style="list-style-type: none"> <li>• A survey conducted on locally available biomass resources and sustainability of biomass supply determined. (<i>In the Foundry and Brass Sectors</i>)</li> <li>• Sustainability standards developed for biomass use.</li> </ul>	<ul style="list-style-type: none"> <li>• Project has done a survey on the usage of biomass as a fuel in MSME units in foundry and brass sectors cluster in Coimbatore and Belgaum<sup>11</sup>;</li> <li>• Project did not develop sustainability standards for biomass use. MNRE informed in the 10<sup>th</sup> PSC meeting that they had already initiated a national survey report on state-wise availability and type of biomass. Based upon the survey, MNRE may decide on developing sustainability standards for biomass usage by MSME sector.</li> </ul>
4.2: Mainstreaming EE and RE into national policies and programmes on MSMES Development	<ul style="list-style-type: none"> <li>• Detailed report prepared on the policy and regulatory framework needed to accelerate the diffusion of energy-efficient and renewable energy technologies in the 5 MSME sectors. The report will also discuss improved RE options and related policy issues, and issues related to supply of piped NG in the clusters;</li> <li>• Roadmap prepared for strengthening energy efficiency on end use and supply side, based on interactions with existing cluster level associations, other institutions at the cluster level with BEE, MoMSME &amp; MNRE. The roadmap will specifically relate to state level programs where these clusters are located.</li> </ul>	<ul style="list-style-type: none"> <li>• Project has completed a report on policy and regulatory framework needed to accelerate the diffusion of energy-efficient and renewable energy technologies in the MSME sectors. Report is nearing completion;</li> <li>• Sustainability plan (Exit Strategy) is based on the success of Project activities in the clusters and sectors that BEE would like to replicate, adopting a similar cluster-based approach in promoting EE/RE technologies in other MSME clusters and other energy intensive sectors. BEE is also establishing 17 more EMCs with State Designated Agencies in other states to help MSMEs identify energy savings opportunities through energy audits and implementation.</li> </ul>

73. Output 4.1 (Improved monitoring and evaluation of energy use and development of a benchmarking system) has progressed as follows:

- In 2018, cluster leaders have done surveys in respective clusters and regular upkeep of records. In Morbi ceramic cluster, more than 80 units were surveyed with collected baseline information;
- DESL and CII-GBC collected energy and production data from the MSME units in the clusters during scaling-up activities. DESL collated the information and subsequently developed cluster level/unit level cloud-based data analytics tool for energy-use database and benchmarking system that provides MSMEs with a simple way to keep round-the-clock track of the energy consumption of the unit;
- Cloud based data analytics and a benchmarking tool is operational. The web-based tool has

<sup>11</sup> Conducted through CII-GBC and DESL during up-scaling.

been hosted in Government's server at the National Informatics Center<sup>12</sup>, to encourage MSME units to utilize the tool and to conduct energy monitoring of their units with inter and intra-cluster comparisons. MSME units in the clusters have shown keen interest to use the tool. Awareness raising programs regarding the features, usage and benefits of the cloud-based tool have been organized in the clusters;

- There is a primary concern for many MSMEs who lack monitored energy data. Despite all complaints about high energy prices, several MSME units do not even monitor their energy consumption and are not aware of potential savings. This is a gap to be filled in on subsequent projects.
74. For work done on Output 4.2, the Project in June 2022 awarded PWC to prepare a report on policy and regulatory framework needed to accelerate the diffusion of energy-efficient and renewable energy technologies in the MSME sectors. The report is complete.
75. In summary, the delivery of outputs within Component 4 is assessed as ***moderately satisfactory*** due to a report being completed on policy and regulatory framework needed to accelerate the diffusion of energy-efficient and renewable energy technologies in the MSME sectors. No roadmap for strengthening energy efficiency on end use and supply side has been prepared. There was also no focused work done on biomass.
76. Overall effectiveness of the MSME Project in achieving objectives and outcomes has been ***satisfactory*** in consideration of the effectiveness of awareness raising, capacity building, and technical assistance to MSMEs, their cluster leaders, equipment suppliers and installers, national energy experts and government personnel, all resulting in substantial EE/RE investments made by MSMEs.

***The rating for project effectiveness is "satisfactory"***

### 3.2.3 Coherence

77. The MSME Project with its interventions with energy-intensive industrial MSMEs is compatible with the mandates of BEE to improve the energy performance of selected MSME clusters, and MoMSME who are responsible for the development of the MSME sector under the Micro, Small and Medium Enterprises Development Act, 2006 that seeks to facilitate the development of MSMEs and enhance their competitiveness through the development of specific schemes and programmes. The MSME Project:
- covers the largest consumption of energy within the Indian economy coming from MSME industries with over 30% of the total energy consumption in the country;
  - is conducted for MSME energy and emissions-intensive activities in sectors such as the metallurgical and metals industry, glass and ceramics industry, agricultural activities, and brick-making where coal is a dominant fuel;
  - tries to reduce energy costs that account for as much as 20%–30% of the total cost of production;
  - is consistent with international norms and standards for EE/RE measures which are supported by BEE, MoMSME and MNRE;
  - is consistent with the World Bank's 2016 Programmatic Framework for financing energy efficiency for MSMEs in India (see Para 33, 3<sup>rd</sup> bullet). The MSME Project is adding value to the improvement of MSME energy performance through the provision of GEF grants for EE and RE

<sup>12</sup> <http://benchmarkingtool.beeindia.gov.in>



measures to catalyze the greening of MSME industrial entities. No other projects are doing this.

For these reasons, coherence of the MSME Project was deemed **satisfactory**.

### 3.2.4 Efficiency

78. Up to 31 December 2022, 94% of the MSME Project-GEF resources or US\$7 million (out of a total of US\$ 7.172 million) was expended over an 11.75-year period for undertaking MSME Project activities. While the original Project duration was 64 months, the MSME Project was completed in just under 141 months with its terminal date of 31 December 2022. Table 12 provides an overview of GEF-UNIDO-BEE budget expenditures up to 31 December 2022. In this table, the accounting of the expenditures of the individual components was lacking due to changes in the financial system during Project execution complicated by the amendment of contract with the BEE.
79. With the MSME Project having exceeded its planned timespan from 5.33 to 11.75 years, the efficiency of the expended US\$7.172 million of the GEF grant funds has been assessed as ***moderately satisfactory*** considering delivery of most outputs accompanied by:
- US\$420,794 remains unspent from the entire budget of US\$7,172,097;
  - A 2-year delay in starting the Project can be connected to a design flaw related to fund transfers and contract arrangement that resulted in neither UNIDO or BEE being prepared for contracting arrangements in 2011 to 2013. There is currently a more flexible contract arrangement that is being used now and in the future;
  - absence of an NPD from BEE during the second half of the MSME Project;
  - The extra time and effort required to convince many of the MSMEs to invest in EE and RE with 98% of the MSMEs self-financing their own EE and RE investments, some of which were offset by 20-35% grant support from UNIDO (which was not accounted for in Table 12). Once an industrial MSME has understood the value of EE/RE with technical support to implement, they find a way to finance it. Despite all the Project work with financial institutes, many MSMEs borrow funds from informal lending sources (such as private entities with high interest rates) without an adequate understanding of the system. Many projects had simple payback periods of 2 to 6 years, leaving many of the entities to debate whether or not to implement these investments;
  - Significant co-financing from involved MSMEs with the co-financing target having been exceeded. With MSMEs investing their own funds on EE/RE projects without approaching Government Ministries for scheme-based funds, this precluded the need for co-financing from MoMSME, MNRE and other states as originally planned;
  - Some MSMEs industries require technical persons to manage and run the system in a post-setup scenario for some of the more complex systems. Where there are insufficient technical persons available for operations or maintenance, the issue could become a barrier to adoption of EE/RE measures;

**Table 12: MSME Project Disbursements**

MSME Outcomes	Budget (from RCE Doc)	2011 <sup>13</sup>	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022 <sup>14</sup>	Total disburse d	Total remaining
Outcome 1: The capacity of suppliers of EE/RE product suppliers/service providers/finance providers ..... is increased	2,501,839	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Outcome 2: The level of end-use demand and implementation of EE and RE technologies and practices by MSMEs is increased	2,133,908	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Outcome 3: The project is scaled up to a national level	1,409,776	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Outcome 4: Policy, institutional and decision-making frameworks strengthened	706,896	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Project Management	419,678	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Monitoring and Evaluation		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total (Actual)	7,172,097	0	4,549,616	74,243	1,172,193	164,500	386,098	127,295	(2,558,649)	2,043,210	322,378	195,567	275,053	6,751,503	420,594
Total (Cumulative Actual)		0	4,549,616	4,623,860	5,796,052	5,960,552	6,346,650	6,473,945	3,915,295	5,958,505	6,280,883	6,476,450	6,751,503		

<sup>13</sup> Commencing 11 April 2011

<sup>14</sup> Up to 31 December 2022

**Table 13: Summary of MSME projects by clusters with energy savings, GHG emission reductions and investments**

Sector	Cluster	Small Scale Projects	Energy Savings/yr (MWh)	CO <sub>2</sub> reduction/yr (Tonnes)	Investment (million US\$)
Ceramic	Thangadh	308	21,082	13,155	2.93
	Morbi	63	23,138	9,066	2.24
	Ahmedabad	18	4,186	1,367	0.34
	Khurja	59	7,567	2,099	0.21
Hand Tool	Jalandhar	208	8,881	4,415	1.57
	Nagaur	104	1,761	659	0.15
Dairy	Gujarat	159	88,349	45,629	10.42
	Kerala	28	4,839	2,032	0.69
	AP & Telangana	16	2,974	1,222	0.64
	Maharashtra	7	5,468	2,766	0.99
	Tamil Nadu	24	3,358	1,175	1.06
	Punjab	9	2,590	1,396	0.68
	Haryana	5	200	180	0.06
Foundry	Madhya Pradesh	7	1,352	696	0.25
	Coimbatore	253	18,422	15,563	4.31
	Belgaum	145	10,245	7,746	1.99
	Ahmedabad	38	3,156	1,038	0.39
Brass	Eastern Zone	153	48,376	26,363	1.66
	Jamnagar	146	12,231	4,030	2.05
Mixed Cluster	Indore	61	6,321	2,819	1.19
	Sikkim	32	5,760	2,518	0.52
<b>Total</b>		<b>1,843</b>	<b>280,258</b>	<b>145,935</b>	<b>34.34</b>

**Table 14: MSME Project Resource use breakdown up to 31 December 2022**

UNIDO Cost Code	Amount (US\$)
1100 - International Experts	73,159
1500 - Project Travel	220,112
1700 - National Experts	1,077,236
2100 - Subcontracts	4,672,657
3000 - Trainings/Fellowships/Study Tours	192,261
4300 - Premises	34,237
3500 - International Meetings	5,386
4500 - Equipment	382,629
5100 - Sundries	93,827
<b>Total</b>	<b>6,751,503</b>

- Overcoming delays caused by the COVID-19 pandemic.

This resulted in all the scale-up Outputs of Outcome 3 being delivered with substantial EE and RE

investments being made starting in 2020, as shown on Table 13.

80. Table 14 shows that almost 70% of the budget was expended mostly on local subcontractors for technical assistance provided to design and deliver training programs for EE, RE and financing, followed by expenditures on national experts.

**The rating for project efficiency is “moderately satisfactory”**

### 3.2.5 Sustainability of Benefits

81. Sustainability of the MSME Project has been assessed as *moderately likely (ML)* due to:
- Many MSMEs self-financing their EE and RE investments with some MSMEs not having funds available for investment or there is a shortage of equipment suppliers and installers. This may result in a slower pace of EE/RE investments (Paras **Error! Reference source not found.-3.2.5.1**);
  - An increasing number of MSMEs with the advantage of making EE and RE investments, is placing pressure on those MSME without these investments, to make EE/RE investments or go out of business. However, vendors, consultants, LSPs and EMCs have developed new services and business models, allowing them to continue providing EE and RE consultancy and support (Paras 84-86);
  - deployment of EE/RE should lead to decreased operational costs and increased profitability leading to long-term sustainability of the industrial enterprise, reduced operational costs for MSMEs and improved environmental conditions (Para 90);
  - strategies need to be considered for waste disposal or re-cycling of old and discarded technology by the MoEFCC to reduce the filling of landfills in India (Para 90).

#### 3.2.5.1 Financial Risks

82. In the early years of the MSME Project, financial risks to EE/RE investments were mitigated by 20-35% grant support from UNIDO. This was done to improve return on investments for early adopters of EE and RE, and as a setup of demonstrations for other MSMEs. When the scale-up of EE and RE investments occurred around 2019, many MSMEs had secured their own financing for these investments. No applications were submitted to financing institutions for financial assistance for EE and RE investments.
83. There are still a large number of MSMEs that have not invested in EE/RE measures for their businesses. There is still a possibility that a significant number of these MSMEs seek financial assistance from financing institutions. However, the majority will probably seek their own sources of financing, or there is a shortage of equipment suppliers and installers, resulting in a slower pace of EE/RE investments. Some MSMEs may even go out of business. This means that the pace of greening the MSME industrial sector will take a longer period of time. Financial risks to sustainability is rated as *moderately likely*.

**The rating for financial risks is “moderately likely”.**

#### 3.2.5.2 Socio-political Risks

84. The demonstrations for EE and RE investments have been disseminated to a greater audience. While larger MSMEs have been more responsive towards EE/RE investments and green technology in general, there are still a large number of MSMEs still unaware of green technologies. However, it appears that awareness raising information and capacity building of EE/RE technologies to MSMEs are generally spread by word-of-mouth as well as credible and easy to implement showcases and dissemination programmes by the Project. This has resulted in significant market demand for EE and RE measures.

85. Vendors, consultants, LSPs and EMCs have also extended their business portfolios by developing new services and business models, allowing them to continue providing EE and RE consultancy and support. They are now present in most of the clusters. Smaller MSMEs, however, seem to be reluctant to pay for energy auditing, metering, monitoring, and other similar services. There is also the question of whether or not EMCs and other cluster activities will continue to be supported by cluster leaders after the EOP.
86. However, socio-political risks to MSME Project sustainability is assessed as *likely (L)* in consideration of the increasing number of MSMEs with the economic advantage of making EE/RE investments, placing pressure on MSMEs without these investments, to make EE/RE investments or go out of business.

***The rating for socio-political risks is “likely”.***

#### 3.2.5.3 Institutional Framework and Government Risks

87. The Project prepared report on policy and regulatory framework needed to accelerate the diffusion of energy-efficient and renewable energy technologies in the MSME sectors. One can assume that a roadmap to strengthen EE and RE on end uses and supply sides would be prepared. Furthermore, the Project was located in BEE in close cooperation with other ministries to support EE/RE activities. This bodes well for sustainability as EE and RE measure and investments are likely to be government-supported after the EOP.
88. In addition, the current global energy crisis is making gas, diesel, electricity, coal and even furnace costlier. This makes EE/RE and green technology investments more attractive. However, a shift to biomass might be also problematic as there is very limited availability.
89. The institutional and governance risks to sustainability of the MSME Project is assessed as *likely (L)*.

***The rating for institutional framework and government risks is “likely”.***

#### 3.2.5.4 Environmental Risks

90. The MSME Project is aimed at achieving an impact of positive global environmental benefits, including improvements in energy efficiency, and the deployment of renewable energy to reduce primary fuel consumption and electricity that would lead to substantial GHG emission reductions. The general perception within the MSME industrial sector in India is that efficiency of consumption of resources and the deployment of RE should lead to decreased operational costs of production and increased profitability provided that good economic conditions persist in the country that would lead to long-term sustainability of the industrial enterprise, reduced operational costs for MSMEs and improved environmental conditions. However, strategies need to be considered for waste disposal or re-cycling of old and discarded technology by the Ministry of Environment, to reduce the filling of landfills in India. As such, the environmental risks of the MSME Project are assessed as *moderately likely (ML)*.

***The rating for environmental risks is “moderately likely”***

***The rating for sustainability of the MSME Project benefits is “moderately likely”***

### 3.3 Progress to Impact

91. In reference to the RToC for the MSME Project as illustrated in Figure 1, the TE can conclude that of the intended impact and 4 intended outcomes of the MSME Project:
- 3 out of the 4 impact-level targets were achieved, namely:
    - 1,459,350 tonnes of CO<sub>2</sub> emissions avoided against a target of 1,270,500 tonnes of CO<sub>2</sub> emissions;

- energy savings of 280,000 MWh annually versus a target of 276,600 MWh annually by 2015;
- volume of investment reaching US\$ 34.337 million against a target of US\$5 million by 2014;
- Study is underway for policy and regulatory framework needed to accelerate the diffusion of energy-efficient and renewable energy technologies in the MSME sectors.
- Outcome 1 (The capacity of suppliers of EE/RE product suppliers/service, providers/ finance providers to support the expansion of EE/RE in the clusters is increased) was achieved;
- Outcome 2 (The level of end-use demand and implementation of EE and RE technologies and practices by MSMEs in increased) was partially achieved with no successful applications for financial assistance;
- Outcome 3 (The project is scaled up to a national level) was achieved; and
- Outcome 4 (Policy, institutional and decision-making frameworks strengthened), was only partially achieved with no sustainability standards developed for biomass use.

92. Key sub-impacts include:

- the placement of the EMCs with Cluster Leaders that has created awareness and demand for EE/RE within industries;
- the networking between the MSMEs, the service provider, vendors and the Project team that has led to an enabling environment for EE/RE demand; and
- The adoption of technologies fitted to local MSME needs that has created the market environment.

93. With the MSME Project achieving most of these outcomes, there has been the impact of:

- a substantial number of energy professionals, equipment suppliers, and installers in RE and EE with greater capacities to manage increased workloads in RE and EE projects, leading to a higher confidence in EE/RE projects by MSMEs, as well as energy professionals, equipment suppliers, and installers;
- Increased confidence of MSMEs to borrow funds to implement RE and EE projects. These funds, however, are not from financial institutes. There is also the issue of some MSMEs not being able to borrow funds, preventing them from accessing EE/RE technologies that, in the long term, threatens their business;
- An easier permitting process for RE and EE investments for MSMEs that enforces or incentivizes accelerated adoption of RE and EE for MSMEs. RE and EE investments safeguard the environment, advance economic competitiveness of MSMEs, and to a limited extent, creates shared prosperity amongst MSMEs (to the extent of passing on information regarding greening of their energy sources by word-of-mouth);
- The spreading by word-of-mouth of the RE and EE benefits to other MSMEs that has created a high demand for RE/EE services and installations. To a large extent, RE/EE investments are becoming mainstreamed, ensuring replication and scale-up of RE/EE investments in the MSME industrial sub-sector. MSMEs who cannot borrow funds for RE/EE investments will be less competitive, with threats to their businesses. The only issue appears to be exposure of RE/EE benefits and investments to other industrial clusters in India. This exposure, however, appears to be addressed by word-of-mouth information from clusters exposed to RE/EE investments. Hence, the greening of the MSME industrial sub-sector appears bright for now.

94. In addition, there are several other positive impacts, which are not monitored. Examples include

pollution reduction, dust prevention, improved product quality due to better process controls, and improved health and safety for workers. Notwithstanding, the progress to achieving long-term impacts of “reducing fossil-fuel based electricity and GHG emissions through the promotion of energy efficiency and renewable energy in the MSME industrial sector in India” in the MSME Project, can be assessed as **satisfactory**.

***The rating for Progress to Impact is “satisfactory”***

### 3.4 M&E System

#### 3.4.1.1 M & E Design

95. M&E design is rated as **satisfactory**. This was based on an M&E system plan as specified in Section H of the RCE document, stating the importance of the M&E plan to developing a sustainable market for industrial energy efficiency through tracking and reviewing Project activities, identifying issues to allow the PMU to take early corrective action if performance deviates significantly from original plans, and adaptively managing the Project through adjustments and updating of the Project strategy and implementation plan in tandem with changes on the ground and actual results achieved.
96. The M&E design makes reference to the PRF in Annex 4 in providing performance and impact indicators for Project implementation along with their corresponding means of verification. The M&E Plan uses these indicators to track, report and review Project activities and accomplishments in relation to:
- technology compendiums that will lead to the establishment and adoption of MSME policy papers;
  - capacity building and awareness raising; and
  - implementing demonstration and scaling-up projects.
97. With the discussion in Para 38 on the issue SMART quality of MSME Project indicators, the M&E design can be regarded as reasonably effective for the purposes of monitoring progress of the MSME Project. The PRF was never revised since Project start in 2011.

#### 3.4.1.2 M & E Implementation

98. M&E implementation for the MSME Project was assessed as **satisfactory**. PIRs for the MSME Project were prepared on an annual basis, using an Excel or Word format from 2012 up to 2022. PIRs and progress reports:
- were drafted by the PMU with PIRs reporting on outcome and output level results that are regularly monitored with minutes and attendance sheets available against overall objectives;
  - were being evaluated and results crosschecked by the NPM;
  - were further screened at PSC meetings scheduled annually and or more frequently;
  - were reflective of a well-functioning M&E system with activities reported based on cluster leaders;
  - contained calculations for GHG reductions that are reasonable and traceable. However, metering of ‘real’ savings has not yet been done;
  - were cleared by the UNIDO Regional Office in New Delhi;
  - were cleared by the GEF Coordination Division within the UNIDO HQ in Vienna, Austria.

99. In addition, a mid-term evaluation (MTE) was conducted for the MSME Project in April 2018. With the Project receiving a satisfactory assessment in the MTE<sup>15</sup>, several conclusions were drawn to characterize the MSME Project including:

- the Project has had a number of successful showcases and activities performed where the Project has not only achieved its targets but will most likely exceed them before the EOP;
- selection of clusters has been done well, going to political neglected clusters, catalysing interest among many cluster members to take up EE activities;
- timeline to get MSMEs to understand energy management and invest was unrealistic, requiring a longer gestation period and causing a delay in EE/RE investments from 2011 to 2013;
- given the high variability of the different clusters, best-operating practices are tailor-made to the needs of beneficiaries;
- the key to creating awareness of a market for EE/RE is to have an impactful demonstration that results in the spread of improved energy efficiencies and deployment of renewable energy in cluster industries. This includes exposure visits where similar actions have been implemented by other industries, increasing MSME understanding of the value of EE/RE technologies in a faster way;
- use of a 'leader' to showcase technologies and systems to reduce energy consumption who can be shared with other stakeholders, is an efficient way to highlight the benefits of green technologies. The leader should also be willing to try new technologies, take on financial risk, and willing to share their information with others clusters members. However, most of these MSMEs are larger enterprises with more manpower to devote to funds and activities and have a rather long planning horizon that includes corporate social responsibility (CSR) strategies;
- getting smaller MSMEs involved in EE/RE activities is a challenge. While MSMEs are all interested in reducing costs, many often do not have the time or capacity to undertake or even consider any activity beyond the day-to-day running of their enterprise. They also often have limited financial resources. To engage smaller industrial MSMEs, it is necessary to have very specific targets appropriate timelines in working with these MSMEs;
- members of the MSME clusters are unlikely to share their information and results of actions after energy audits as they might fear a loss in competitive advantage. Therefore, monitoring outcomes and impacts might be a challenge, as will the ability to learn lessons and replicating good practices from all activities under the Project; and
- industrial MSMEs in the clusters are unlikely to take a loan for EE activities from a financial institute. Loans are generally secured from the MSME's private own sources.

#### 3.4.1.3 Budgeting and Funding for M&E Activities

100. Budgeting and funding of M&E activities has been rated as **moderately satisfactory**. The M&E budget in the RCE Document was estimated at an indicative amount of US\$80,000. Though considered to be small, this amount is considered a normal amount for a GEF Project of this size. However, this amount only included the cost of the measurement of GEF Tracking Tool specific indicators, monitoring of Project impact indicators as per PRF, and preparation of the mid-term and terminal evaluations. The budget did include the PMU cost of monitoring and tracking progress and preparing the PIRs, a key documentation tool for reporting progress and proposing adaptive management measures as well as the Project terminal report. To make up for the shortfall, some M&E funds were probably taken from the work components.

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<sup>15</sup> A rating was not provided but assumed to be MS based on the commentary.



101. The Evaluation Team reviewed MSME Project PIRs/AWPs since 2012 that provide the basis for fund requests from the field office to UNIDO HQ for funds for specific field activities. None of these fund requests included M&E activities such as tracking and reviewing Project activities and implementation progress, preparing detailed monitoring plans, and outsourcing services to monitor specific Project activities. This may possibly be due to the staffing of the PMU which only included an NPD, a Technical Advisor, an NCC and a Project assistant.

***The rating for M&E implementation is “satisfactory”***

### **3.5 Monitoring Long Term Changes**

102. The MSME Project was designed to support the legislation and capacity building of engineers, installers and vendors to design, supply and install EE and RE measures for India’s MSME industrial sectors. A significant proportion of MSME Project resources were utilized to monitor the adoption of best practices for installing EE and RE measures by participating MSMEs. The monitoring of these entities was undertaken mainly by management firms under the supervision of the PMU and who were recruited in late 2018 to undertake surveys to monitor energy savings and GHG emission reduction impacts of the Project. This has led to the MSME Project facilitating a set up for monitoring long term changes:
- the Project has developed more than 12 detailed cluster level/unit level cloud-based data analytics tool for energy-use database and a benchmarking system;
  - given the difficulty of obtaining energy savings information from most MSMEs, BEE may have difficulty obtaining accurate energy savings information in future.

### **3.6 Processes affecting achievement of project results**

#### **3.6.1 Preparation and readiness / quality at entry**

103. The PPG phase of the MSME Project was undertaken in 2009, led by a Project Manager from UNIDO HQ with strong support from BEE. PPG activities included:
- a consultant who compiled data from different MSME clusters. The result was a document that was informative to the extent that the RCE document was prepared accordingly;
  - multiple workshops in Delhi and in different clusters as outreach to industrial MSMEs, and government stakeholders at the end of the PPG phase, to gauge MSME willingness to take up EE and RE investment projects;
  - signing of the RCE document on 4 January 2010.

After the signing of the RCE document, the Project commenced operations on 11 April 2011 with the MSME Project inception workshop conducted on 1 September 2011.

***The rating for quality at entry/preparation and readiness is “satisfactory”***

#### **3.6.2 Country Ownership**

104. Three institutions were involved with energy consumption in the MSME industrial sub-sector: BEE, MoMSME, and MNRE. State governments also provided additional schemes and incentives in varying degrees as assistance to the MSME industrial sub-sector in addition to GoI National level support. This is detailed in Table 4.
105. There is also the NAPCC that was prepared by the Prime Minister’s Council on Climate Change in June 2008 outlining steps to be taken to address both development and climate-related objectives. It is being implemented through 8 National Missions, one of which is the “National Mission for

Enhanced Energy Efficiency” that focuses on energy efficiency and renewable as well as improved energy efficiencies and their technologies in the MSME sector.

106. There has been no updated legislation, policies or plans on EE/RE by the GoI since 2017. More details of these GoI plans are provided in Para 32.

### 3.6.3 Stakeholder Involvement

107. Stakeholder engagement on the MSME Project activities has been highly effective. The Project engaged the following stakeholders:
- During the 2009 PPG phase of the Project, all relevant stakeholders as mentioned in Para 103 were consulted to provide MSME Project designers with information on the willingness of MSMEs to make EE/RE investments on which incremental GEF activities would be based upon;
  - BEE, MoMSME and MoNRE who were initially engaged by the PMU during the initial stages of Project implementation, to organize and manage awareness raising events, capacity building training sessions and management of demonstration projects;
  - Cluster Leaders who were engaged in the setup of EMCs for clustered MSMEs. EMCs were to provide technical assistance in EE and RE deployment experience and expertise in industrial research and technology development;
  - Energy professionals who provided preparatory energy services to MSMEs including walk-through audits, detailed energy audits, development of case studies, and awareness workshops to disseminate knowledge;
  - Local service providers for products and services on EE and RE;
  - Management firms with national experts: PWC, CII-GBC, TERI, InSPIRE, and DESL, who managed the process of implementing EE and RE measures for MSMEs, first the demonstration projects, and then the scaled-up program for EE/RE measures.
108. The outcome of the Project’s stakeholder engagement strategy was **highly satisfactory** in consideration of the strong interest and commitment from all MSME Project stakeholders, creating considerable interest in EE and RE technologies at the EOP.

### 3.6.4 Financial Planning

109. The MSME Project PIRs (which contained the AWP) were to provide the estimated required funding for the upcoming year, the flow of funds of which were triggered by requests from PMU, and approved by HQ on a continuous basis through UNIDO’s ERP/ Database system. Typically, low value procurement was approved by the HQ’s PM in the ERP with higher value procurement (>US\$40,000) requiring the involvement of UNIDO’s Procurement Department. The operational cash advances for the operations of the MSME Project’s PMU were released on an “as-needed basis”, released in €2000 tranches. All other expenditures such as procurement and travel, first obtain approval from the HQ Project Manager. Financial planning of the MSME Project was based primarily on the PIRs/AWPs prepared by the PMU in close collaboration with UNIDO HQ.
110. With the delivery of funds to the PMU in New Delhi, a total of 31 missions from UNIDO HQ were made to India between 2011 and 2022 to attend PSC meetings, conduct due diligence on the expenditure of the Project funds, to monitor the progress on the preparation of policy papers, awareness raising campaigns, capacity building programmes, and investments into EE and RE systems within MSMEs. Co-financing of the MSME Project reached US\$35.676 million, exceeding its target of US\$5 million in the RCE document, deemed highly satisfactory (see Table 3).

### **3.6.5 Support of UNIDO, national counterparts and donor**

111. As GEF's implementing agency, UNIDO had responsibility for timely implementation of the Project, delivery of planned outputs, technical backstopping, and monitoring achievement of expected outcomes. UNIDO was also accountable to the GEF grant and other funding resources provided by the Indian government. UNIDO's performance in undertaking these responsibilities was conducted in a manner that was responsive to the requests and needs of the PMU, the GoI, energy professionals, management consultants, equipment suppliers and installers, cluster leaders, and stakeholders from the MSME industrial stakeholders. The end result of UNIDO's support for the MSME Project was that it significantly contributed towards the investments being made by MSMEs into EE and RE systems and measures, and to capacity building of engineering experts, equipment suppliers and installers, cluster leaders, and users of these systems in an effort to reduce fossil fuel and electricity consumption. All stakeholders interviewed during the Terminal Evaluation mission highly valued the participation of UNIDO. They expressed confidence in the technical assistance provided by international consultants of UNIDO, all experts and vendors mentioning the great potential of EE and RE investments into the MSME industrial sub-sector, mentioning the energy savings benefits to these businesses. All stakeholder participants overwhelmingly expressed their support for UNIDO's continuation of these trainings.
112. Similarly, the MSME Project's institutional partner, BEE, provided slow but solid support for coordination of demonstrations, the organization of training, and policy papers, enhancing the Project's responsiveness to ensuring appropriate progress. Even with the COVID-19 pandemic, there were a number of delays from the side of BEE, resulting in some of the activities going slowly such as banker's training which delayed until June 2022 as a part of the BEE activities. As a consequence, actual outreach and loans from the banks has not happened during the Project period itself. Notwithstanding, BEE's support resulted in the achievement of GHG emission reduction and energy savings targets albeit over an 11.75 years period instead of the original design period of 5.33 years.

***The rating for UNIDO's support is "highly satisfactory"***

***The rating for the national counterpart, BEE, is "satisfactory"***

***The rating for the donor GEF is "satisfactory"***

### **3.6.6 Co-Financing on Project Outcomes and Sustainability**

113. Overall MSME Project co-financing reached US\$35.676 million, exceeding its target of US\$5 million, notwithstanding the negative impact of the COVID-19 pandemic which resulted in a slowdown of EE/RE deployment. Co-financing is shown on Table 3 and in Annex 3.
114. Co-financing from the MSME establishments on this Project is likely to be sustained in India due to these entities finding fiscal resources for EE/RE investments. However, co-financing from smaller entities may consume more time as they try to find the fiscal resources or resort to financing institutes for loans. There have been issues tied to the familiarity with EE and RE technology, the quality of EE and RE installations and the functionality of these technologies. While this somewhat affects the demand for EE and RE technologies and systems, these smaller MSMEs must compete with healthier businesses with EE/RE investments (by converting themselves into an EE/RE systems) or go out of business.

### **3.6.7 Delays of Project Outcomes and Sustainability**

115. There were delays from 2011 to 2014 in the Project being able to convince MSME stakeholders to invest in EE and RE measures and systems. This was exacerbated by the lack of readiness by UNIDO and BEE to issue contracts on energy auditing and demonstration projects (Para 99, 2<sup>nd</sup> bullet).
116. MSMEs eventually understood the benefits of EE and RE measures and systems by 2015 and 2016 with demonstration investments. Even with the COVID-19 pandemic disrupting some of the

installations in 2020 and 2021, EE/RE investments continued to grow during that period, boding well for the sustainability of the Project interventions.

### **3.6.8 Results-based management (implementation) approach**

117. The key approach of the MSME Project implementation was to focus on raising awareness and training of engineers, experts, vendors and installers on EE and RE measures and systems. The strengthened capacity of these stakeholders was deemed to be sufficient to convince a critical number of MSMEs as well as suppliers and installers to implement EE and RE measures given the potential for cost savings and additional profitability. To improve the adoption of EE and RE measures by a greater proportion of MSME establishments, the MSME Project implementation approach also included assistance to financing sector personnel to improve their capacities to more efficiently approve loan finance for EE and RE measures and systems. However, all MSMEs participating on the Project have arranged financing through their own budgets, leaving capacities of Project trained financing personnel underutilized (Para 0, 81, 82 and 92).
118. Results-based management was required to adjust the implementation approach of the MSME Project to improve the prospects of meeting targets in the MSME PRF, notably the GHG emission reduction target. While the assumption that building capacity itself would be sufficient to catalyze interest and investment into RE and EE, time was required from 2011 to 2014 to familiarize MSMEs with EE and RE measures and systems and convince them to invest. This required considerable adaptive management efforts by the PMU through Cluster Leaders and EMCs, to convince MSMEs to implement EE/RE investments, which were ultimately successful, notwithstanding delays from the COVID-19 pandemic.

*The rating for results-based implementation approach is “satisfactory”*

## **3.7 Project coordination and management**

119. Day-to-day management and coordination of the MSME Project in New Delhi was undertaken by the PMU worked closely with BEE. Though the offices were not in BEE, the PMU and BEE sought to maximize the opportunities and stakeholder cooperation. Informal PMU meetings with BEE was possible under this arrangement that led to AWP's containing considerable inputs from BEE, sharing its network of MSMEs, national experts, suppliers, and installers for follow-up by the PMU, and subsequent relationships with several entities, and other institutional partners. One of the primary reasons, however, for the completion of the Project over an 11.75-year period instead of the designed 5-year period was related to the Project's long period of familiarizing MSMEs in EE and RE technologies and investment.
120. The MSME Project was managed by:
  - the PSC that was established to coordinate inputs by participating agencies. It consisted of representatives of the 4 involved ministries and UNIDO representative. The PSC was tasked to review and evaluate progress and provide broad policy guidelines for implementation of the 4 Project components;
  - BEE who focused the uptake of EE technologies and practices in energy-intensive clusters to improve the energy performance of 25 selected MSME clusters. BEE used market-driven mechanisms such as energy audits and DPR preparation for clusters such as dairies, brass, and ceramics that feed into Project activities. BEE, however, had some issues filling in the NPD position during the second half of the Project;
  - the PMU responsible for the daily management of Project activities or execution, and to act as the PSC Secretariat. The PMU provided advice on the execution of each Project component in accordance with the Project document and fully in line with government priorities, rules, and regulations and that all local inputs and participation in Project implementation are timely and

adequate. Though the PMU was staffed by an NPD, a Technical Advisor, 2 NCCs and a Project Assistant, no one was with the Project for its full duration with several positions being unmanned for quite some time.

121. Contributions of MoMSME and MNRE as well as MoEFCC was limited to their participation at PSC meetings where they were kept up to date on Project activities and progress. In addition, there was no reported activity from MoMSME on integrating energy-related aspects into some of their existing schemes (for both electricity and primary fuels), and MNRE on integrating their specific programmes for developing and promoting RE in the MSME industrial sub-sector (this would have included solar thermal systems for air heating and steam generating applications).
122. Management and coordination of the MSME Project has led to the Project achieving most of its intended outcomes, and its GHG emission reduction target. These results are a reflection of the appropriate management of the Project notwithstanding the staffing difficulties and difficulties related to the COVID-19 pandemic, which drew out the achievement of the GHG emission reduction targets over a longer period of time. More technical assistance from UNIDO in the form of international inputs and financial support to Indian-based activities is desirable.

***The rating for Project coordination and management is “satisfactory”***

### **3.8 Gender Mainstreaming**

123. The UN has a mandate to address human rights and gender equality in all interventions to promote social justice and equality<sup>16</sup>. As a GEF-4 Project, gender mainstreaming on the MSME Project has not been a part of Project design nor have there been any gender disaggregated monitoring activities. At entry, the Project was assigned Gender Marker 1, meaning that its expected contribution to gender equality was limited<sup>17</sup>. Though UNIDO’s gender policy was issued in 2015 and updated in 2019, gender mainstreaming has not been retrofitted sufficiently into Project activities.
124. Though India has some clusters with a large female workforce, there is limited female participation (maybe except for ceramics cluster in Khurja) in the MSME industrial sub-sector, making gender mainstreaming activities challenging. The Project did commit to maintaining gender equality at later stages of implementation with the encouragement of women representatives of MSME as well as LSPs to participate in capacity building and knowledge dissemination workshops organized in the clusters. Though there were reports of MSME units encouraging women participation on investment projects, the TE team does not have any evidence that these issues were discussed.

***The rating for gender mainstreaming is “gender blind”***

### **3.9 Overall Rating of the MSME Project**

125. Overall performance of the MSME Project is rated as *satisfactory*. An overall summary of these evaluation ratings<sup>18</sup> and findings is provided in Table 15.

<sup>16</sup> Guidance Document: Integrating Human Rights and Gender Equality in Evaluations, UN Evaluation Group, Aug 2014, pg 19

<sup>17</sup> Since 2015 all UNIDO technical assistance projects have been assigned a gender marker and their design are screened based on a gender mainstreaming check-list before approval. UNIDO’s gender marker is in line with UN System-wide action plan (SWAP) requirements, with four categories: 0 — no attention to gender, 1 — some/limited attention to gender, 2a — significant attention to gender, 2b — gender is the principal objective (<https://www.unido.org/sites/default/files/files/2019-11/UNIDO%20Gender%20Strategy%20ebook.pdf>)

<sup>18</sup> Highly Satisfactory (HS); Satisfactory (S); Moderately Satisfactory (MS); Moderately Unsatisfactory (MU); Unsatisfactory (U); Highly Unsatisfactory (HU). Sustainability is rated from Highly Likely (HL) to Highly Unlikely (HU)

**Table 15: Summary of Findings and Ratings by Evaluation Criteria for the MSME Project**

Criterion	Summarized Assessment of the Findings	Rating
<b>Attainment of project objectives and results (overall rating)</b>	The MSME Project exceeded its GHG emission target, energy saved target, volume of EE/RE investments. A study was completed on mainstreaming EE/RE policies for MSME development (Paras 51-53, Table 7)	S
Relevance	GoI has its the XI and XII Five-Year Plans and National Action Plan for Climate Change that includes the National Mission for Enhanced Energy Efficiency (Paras 32 and 47)	S
Effectiveness	The effectiveness of the Project's awareness raising, capacity building, and technical assistance to MSMEs, their cluster leaders, equipment suppliers and installers, national energy experts and government personnel, has resulted in substantial EE/RE investments made by MSMEs (Paras 55-76).	S
Coherence	MSME industrial sub-sector is the largest consumer of energy within the Indian economy, carries out energy and emissions-intensive activities in various sectors, has energy costs that account for 20%–30% of costs, and has no other projects that significantly address energy consumption and GHG emissions (Para 77)	S
Efficiency	The Project exceeded its planned timespan from 5.33 to 11.75 years, spending US\$7.0 million out of the total GEF grant of US\$7.17 million (Paras 78-80).	MS
Progress to Impact	An increased number of energy professionals, equipment suppliers, and installers in RE and EE, increased confidence of MSMEs to borrow funds to implement RE and EE projects, and an easier permitting process for RE and EE investments for MSMEs should lead to long-term impacts in “reducing fossil-fuel based electricity and GHG emissions through the promotion of energy efficiency and renewable energy in the MSME industrial sector in India” (Paras 91-94).	S
<b>Sustainability of project outcomes (overall rating)</b>	Many MSMEs are self-financing their EE and RE investments with some MSMEs not having funds available for investment resulting in a slower pace of EE/RE investments. Vendors, consultants, LSPs and EMCs have developed new services and business models, allowing them to continue providing EE and RE consultancy and support (Para 81).	ML
Financial Risks	Many MSMEs had secured their own financing for EE and RE investments. However, no applications were submitted to financing institutions for financial assistance for EE and RE investments (Paras 82-83)	ML
Socio-political Risks	An increasing number of MSMEs with the economic advantage of making EE and RE investments, is placing pressure on those MSME without these investments, to make EE/RE investments or go out of business (Paras 84-86)	L
Institutional framework and governance risks	Project has prepared a report on policy and regulatory framework needed to accelerate the diffusion of energy-efficient and renewable energy technologies in the MSME sectors, likely leading to the preparation of a roadmap for strengthening EE and RE on end use and supply side (Paras 87-89).	L

<b>Criterion</b>	<b>Summarized Assessment of the Findings</b>	<b>Rating</b>
Environmental risks	General perception within the MSME industrial sector is that efficiency of consumption of resources and the deployment of RE should lead to decreased operational costs of production, increased profitability, and improved environmental conditions (Para 90).	ML
<b>Monitoring and evaluation</b>		
M&E design	M&E design can be regarded as reasonably effective for the purposes of monitoring progress of the MSME Project (Paras 95-97).	S
M&E plan implementation	PIRs for the MSME Project were prepared on an annual basis from 2012 up to 2022. A mid-term evaluation was conducted in April 2018 with the Project receiving a satisfactory assessment (Paras 98-99)	S
Budgeting and funding for M&E activities	The M&E budget in the RCE Document was estimated at an indicative amount of US\$80,000. However, PIRs/AWPs since 2012 provided requests from the field office to UNIDO HQ for funds for specific field activities. None of these fund requests included M&E activities (Paras 100-101)	MS
<b>UNIDO specific ratings</b>		
Quality at entry/Preparation and Readiness	Preparations included a document on data from different MSME clusters, multiple workshops as outreach to industrial MSMEs, and government stakeholders, and a Project inception workshop on 1 September 2011 (Para 103).	S
Results-based management Approach	Results-based management was required to adjust the implementation approach of the MSME Project to improve the prospects of meeting targets in the MSME PRF, notably the GHG emission reduction target. This required considerable adaptive management efforts by the PMU through Cluster Leaders and EMCs, to convince MSMEs to implement EE/RE investments, which were ultimately successful, notwithstanding delays from the COVID-19 pandemic (Para 117-118).	S
UNIDO Supervision and Backstopping	The end result of UNIDO's performance on the MSME Project was that it significantly contributed towards the investments being made by MSMEs into EE and RE systems and measures, and to capacity building of engineering experts, equipment suppliers and installers, cluster leaders, and users of these systems in an effort to reduce fossil fuel and electricity consumption (Paras 111-111).	HS
Gender Mainstreaming	As a GEF-4 Project, gender mainstreaming has not been a part of Project design nor have there been any gender disaggregated monitoring activities. However, the Project did commit to maintaining gender equality and encouraged women representatives of MSME as well as Local Service Providers to participate in capacity building and knowledge dissemination workshops organized in the clusters (Paras 123-124).	Gender blind
<b>Overall rating</b>		<b>S</b>

## 4. Conclusions, Lessons Learned, Recommendations

### 4.1 Conclusions

126. The MSME Project was a significant contributor in catalysing interest in energy efficiency and renewable energy that resulted in significant Project investments being made into awareness raising of EE/RE technology measures, capacity building and training activities, compiling compendiums on EE/RE measures, and policy papers being prepared for the MSME industrial sub-sector. The result is overall GHG emission reduction targets of the MSME Project were exceeded, notwithstanding delays caused by the COVID-19 pandemic.
127. There are a few issues with regards to the conclusion of the MSME Project:
- While co-financing from MSMEs was significant, co-financing from other ministries (MoMSME, MNRE and other states) did not materialize as originally planned with MSMEs investing their own funds on EE/RE projects precluding the need for co-financing from MoMSME, MNRE and other states (Paras 79, 5<sup>th</sup> bullet and 121);
  - Cloud based data analytics and a benchmarking tool is being hosted in the Government's server at the National Informatics Center<sup>19</sup>, to encourage MSME units to utilize the tool and to conduct energy monitoring of their units with inter and intra-cluster comparisons (Para 73, 3<sup>rd</sup> bullet);
  - The lack of monitored energy data is a concern for many MSMEs. Despite all complaints about high energy prices, several MSME units do not even monitor their energy consumption and are not aware of potential savings (Para **Error! Reference source not found.**, 4<sup>th</sup> bullet);
  - Some MSMEs industries require technical persons to manage and run the system in a post-setup scenario of some of the more complex systems. Where there are insufficient technical persons available for operations or maintenance, the issue could become a barrier to adoption of EE/RE measures. Therefore, the setup of a network of system managers may need to be developed to support upscaling of technologies (Para 79, 4<sup>th</sup> bullet);
  - Strategies for waste disposal or re-cycling of old and discarded technology needs consideration by the Ministry of Environment (Para 90);
  - Once an industrial MSME has understood the value of EE/RE with technical support to implement, they will find a way to finance it. Despite all the Project work with financial institutes, many MSMEs borrow funds from informal lending sources (such as private entities with high interest rates) without an adequate understanding of the system (Para **Error! Reference source not found.**, 4<sup>th</sup> bullet). There is the perception amongst financial institutions that MSMEs are high risk industries with:
    - most MSMEs not having the required collateral (with many MSMEs being on leased land);
    - loans associated with higher interest rates;
    - MSMEs having to do plenty of paperwork for these loans that they are not interested in doing due to limited human resources and limited education.

### 4.2 Lessons Learned

128. *Lesson #1: A lot of time is required to earn the trust and cooperation of clustered MSMEs in the process to familiarize them with EE and RE measures and systems. Most MSME personnel prefer practical hands-on training, as it helps them to visualise what needs to be done.* Consequently the physical

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<sup>19</sup> <http://benchmarkingtool.beeindia.gov.in>



presence of cluster experts and continuity of personnel for a period of 1 to 2 years are required (See Chapter 3.4; M&E Implementation, 7th bullet, pg 45) (Para 99, 4<sup>th</sup> bullet). Hands-on training was done at the NPC training activity in Chennai. Classroom training for shop-floor in-charge or short audio-visual training activities may not be sufficient to garner interest of MSME personnel (See Chapter 3.2.2 Output 2.2, 4th bullet, pg. 23) (Para 64, 4<sup>th</sup> bullet).

129. *Lesson #2: Cluster leaders are essential for technical and financial advice to MSMEs.* With MSMEs mainly concentrating on their profits, a cluster leader is a trusted person who is available to make MSMEs aware of new and more efficient technologies, is familiar with cluster activities, and provides regular updates, advice and good strategic thinking to improve decision-making when funds are available (See Chapter 3.2.2 Output 1.4, para starting "In summary..") (Para 61). These types of persons were present in many clusters. However, contracted cluster experts are likely to focus on larger MSMEs which can be a disadvantage smaller MSMEs where there are smaller investments.
130. *Lesson #3: Exposure visits must be tailored to specific industrial needs.* Cross sector and cross cluster learning fosters implementation. While cross cluster exposure tours to China, New Zealand and other cluster in India was an important and appreciated activity, the visits needed to include same-sized industries in other clusters, and not just larger industrial entities in China and New Zealand. For example, the visit to Chinese foundries was made more effective by visits to small and tiny Coimbatore foundries. The same can be said for the visit to New Zealand dairies which were much larger than any dairies in India (See Chapter 3.2.2 Component 3; output 3.1) (Paras 68 and [Chapter 3.4 - M&E System; M&E implementation (7th bullet)] 99, 6<sup>th</sup> bullet),
131. *Lesson #4: EE and RE training and awareness raising needs to include total cost of ownership that includes life cycle and consumption costs.* MSMEs need to understand all costs of EE/RE measures to break down the investment barrier. With MSMEs needing to finance technologies especially when they need replacement and due to lower availability of funds, there will be a preference for least-cost technologies, even if less efficient. Understanding the long-term cost savings of EE/RE measures will provide possible incentives for an MSME to implement more efficient technologies (Para 65).
132. *Lesson #5: Project went to the regions where MSMEs were unaware of the energy audits and benefits achievable through adoption or upgrading to energy efficient technologies.* During initial stages, the Project faced challenges to convince industry associations as well as MSMEs in clusters to participate in the Project. As a result, the Project suffered delays and setbacks while bridging the gap between industry associations, MSMEs and the GoI's outreach particularly on energy efficiency initiatives for MSMEs. Wherever more than one industry associations were dominant in a cluster, the Project facilitated collaboration between different industry associations to reach a consensus on participation in Project activities. Notwithstanding these delays, this helped the Project in extending its activities and outreach to good cross-section of MSMEs associated with different industrial associations, having a different scale of operations and manufacturing practices.

### 4.3 Recommendations

133. *Recommendation #1: Future projects for the MSME industrial sector should strengthen monitoring of each EE/RE project and work on development of robust mechanism of arriving at the accrued monetary savings with respect to the baseline. This should include other non-energy benefits such as improvement in the workplace environment, reduction in worker fatigue, improvement in quality, which are often related to upgrades in EE technology and translated into savings.* Aside from the technical details of the investment, the only important issue for owners and top management is the amount of money that can be saved through EE and RE measures and systems. Though not mentioned in technology compendia, the potential investment can also have multiple positive impacts, which has not been well monitored by the Project. For example, automation of some of the processes has an impact on pollution reduction and dust prevention, health and safety, reduced

waste, improved productivity, and product quality due to better process controls (such as steel rerolling mills with improved temperature monitoring). Though these impacts are not used to calculate the RoI, monitoring of EE/RE investments should try to capture these impacts and somehow, be included with the RoI.

134. Recommendation #2: A survey should be conducted together with Small Industries Development Bank of India (SIDBI) or any other local financial bank that has vast knowledge on actual situation in India that is needed to understand how MSMEs are securing financing for EE and RE investment. Many MSMEs are reportedly sourcing finance from informal sources though this has not been documented. There is also the issue that many EE measures need only small investments and are done during replacements with the payback period being rather short, precluding the need for extra finance. If most MSMEs are to be transformed into green industries, research needs to be done on where MSMEs are financing their EE/RE investments. This should be done to estimate the time horizon for getting most, if not all, MSMEs to make EE/RE investments, and to fully engage the MSME industrial sector into EE/RE investments. There would also be interest in learning how MSMEs do RoI calculations in terms of what parameters are included to improve productivity.
135. Recommendation #3: Develop a network of service providers and technical experts to support post-installation and recent EE/RE investments needing upgraded and upscaling technologies or layout changes. This applies to:
- Post installation management as a part of the installation package. This includes clear guidance on regular operation and maintenance to keeping maintenance logs, maintain registers and records, and ensuring any maintenance deficiencies are managed with actions. For example, in the Jamnagar brass cluster, Coimbatore foundry cluster and the Jalandhar hand tool cluster, solar PV systems were really poorly maintained requiring regular maintenance; and
  - MSMEs that have recently made EE/RE investments into complex systems, requiring technical persons to manage the system to either adjust or fine-tuning technologies, or make layout changes for more appropriate solutions. Additional technical support is likely required to ensure these adjustments are sustainable for the full-service life of the technology. An example includes sand mixer automation in Ahmedabad-based foundry enterprise where there were insufficient technical persons available for maintenance and upgrades, serving as a barrier to faster adoption and replication of a few particular technologies at the cluster level, or the recent installation of a gas-based furnace from coal where the MSME decided not to continue with fine-tuning due to the loss of working days and affordability.
136. Recommendation #4: MoEFCC should seek technical assistance from an international agency, such as UNIDO, on international best practices for managing solid waste and Waste from Electrical and Electronic Equipment (WEEE) waste streams. This pertains to waste management of outdated and discarded equipment which should be re-cycled and kept out of landfills which are already reaching their capacities. The MoEFCC should seek a linkage for the provision of international best practices for managing other WEEE waste streams, similar to the MSME Project approach to building local capacity for national and cluster leaders for inefficient energy consumption (see Chapter 3.2.5- Environmental risks) (Para 89). With local initiatives being improved for WEEE management by entities such as the Chintan Environmental Research and Action Group (based in New Delhi), MoEFCC can work with these entities on the disposal of equipment waste from MSMEs who have recently invested in EE and RE measures. The demonstration of best practices for managing WEEE and other waste streams can improve the capacities of MoEFCC to enact the environmental laws in waste disposal and re-cycled in an integrated manner possibly requiring international expertise, and to identify desired approaches for technical assistance of environmentally sound management of a wider range of WEEE and other waste streams
137. Recommendation #5: Ensure a self-sustaining model for the Energy Management Cell and that finance

*for the benchmarking tool is secured so that its use is common practice for MSMEs.*<sup>20</sup> One sustainability measure was to ensure that EMCs work and provide local support after the end-of-Project. Specific focus could be on more direct handholding support for MSMEs to foster implementation. For smaller and micro MSMEs. There can be ready-made packages by LSPs (such as an offer on EE motors that would include support to apply, loan options, and a funding scheme that includes operational costs). There could also be a plan where there is joint and efficient use of infrastructure and raw materials to promote sustainability of mixed clusters. There is a strong likelihood that MSMEs are not willing to pay the full cost of such a service; therefore, local EMCs need “functioning business plans” to become self-sustaining including support from local clusters, larger customers, or co-financing from interested stakeholders. The Deloitte study should have an elaboration of the self-sustaining model. The benchmarking tool is hosted and maintained by BEE<sup>21</sup>.

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<sup>20</sup> During TE mission in September 2022, the draft study by Deloitte was ready to be utilized. The important activity to prepare for a self-sustaining model was ongoing and was completed in early 2023..

<sup>21</sup> <http://benchmarkingtool.beeindia.gov.in>

## **ANNEXES:**

### **Annex 1. List of documents reviewed**

#### **Project Documents and Other Relevant Documentation**

- CEO Endorsement Document for the MSME Project, UNIDO, January 2011
- Annual Project Implementation Reports (PIRs), UNIDO/PMU, 2012 to 2022
- Mid Term Evaluation of MSME Project, India, UNIDO, April 2018
- Project Steering Committee Meeting Minutes for July 2015 to December 2021
- BOP Best Operating Practices for 9 Clusters and 5 sectors, 2015
- 7 case studies, 2015
- Common Monitorable Parameters (CMPs) for 9 clusters
- Demo Projects and DPRs for 6 clusters
- 28 Projects in the pipeline, December 2017
- Energy audits for 9 cluster by 4 Service providers
- Energy Management Cells Background and Contracting
- Minutes of Review Meetings from 2015 and 2017
- RfPs for cluster Level Services, work orders, 2017
- List of training programmes and workshops
- DEA reports done by cluster leaders

#### **Guidance Documents Consulted**

- Evaluation Manual (draft), UNIDO Independent Evaluation Division, August 2017
- Evaluation Report Format Guidance, UNIDO Independent Evaluation Division, September 2017
- Introduction to Theory of Change / Impact Pathways, the ROTl Method and the ROTl Results Score Sheet (UNEP, last updated December 2015)

## Annex 2. List of consulted project stakeholders

Related to UN Agencies

Name	Organisation	Position	Role in MSME Project	Location
Sanjaya Shrestha	UNIDO	Industrial Development Officer, Energy Systems and Industrial De-Carbonization Unit	MSME Project Manager	Vienna, Austria
Suresh Kennit	UNIDO	National Project Manager	PMU	Delhi, India
S. Vamsi Krishna	UNIDO	National Cluster Coordinator	PMU	Delhi, India
Munish Bagan	UNIDO	National Cluster Coordination	PMU	Delhi, India
Rene Van Berkel	UNIDO	UNIDO Representative, UNIDO Regional Office in India	UNIDO Representative	Delhi, India

Related to National Agencies

Name	Organisation	Position	Role in MSME Project	Location
Abhay Bakre	BEE	Director General	Partner National Agency	Delhi, India
R. K. Rai	BEE	Secretary	Partner National Agency	Delhi, India
Milind Deore	BEE	Director	Partner National Agency	Delhi, India
Shyam Sundar	BEE	Joint Director	Partner National Agency	Delhi, India

Related to Project beneficiaries

Name	Organisation	Position	Role in MSME Project	Location
Ashwani Bhai	Ahmedabad Engineering Manufacturer's Association	Associate Director	Cluster Association	Ahmedabad, India
Jitender D Panchal	Ahmedabad Engineering Manufacturer's Association	Additional Director	Cluster Association	Ahmedabad, India

Name	Organisation	Position	Role in MSME Project	Location
Bipin Sharma	Rakesh Moulding foundry	Owner	MSME implementing EE activities	Ahmedabad, India
Kaushal	Jai Hind Group	Mechanic	MSME implementing EE activities	Ahmedabad, India
Ramesh	Shiv Shankti Ceramics	Owner	MSME implementing EE activities	Narora/Ahmedabad, India
Prashant Sheth	Amul Milkfed	AGM (Utility & ETP)	MSME implementing EE activities	Ahmedabad, India
P K Sarkar	Amul Milkfed	Officer on Special Duty, Utilities and Projects	MSME implementing EE activities	Ahmedabad, India
K D Chaudhari	Banas Dairy, Amul Milkfed	Boiler in-charge and In-charge of Energy Unit	MSME implementing EE activities	Mehasana, India
Falgun Pandya	Cluster Leader	Cluster Leader	Cluster Leader	Ahmedabad, India
Niriv	Dhameshwar Brass Foundry	Manager	MSME implementing EE activities	Jamnagar, India
Disaing	Dhameshwar Brass Foundry, management	Management	MSME implementing EE activities	Jamnagar, India
Nishil Shan	Accord Global,	Owner	MSME implementing EE activities	Jamnagar, India
Wasim	Cluster Leader	Cluster Leader	Cluster Leader	Jamnagar, India
Sagar Dormadaya	Abhay Extrusion	Management	MSME implementing EE activities	Jamnagar, India
Mr. Pandeye	Jamnagar Industrial Association	Officer Bearer	MSME implementing EE activities	Jamnagar, India
Mr. Vohra	Thangadh Ceramic Association	Cluster Leader	Cluster Leader	Thangadh, India
Mr. T. D. Majetha	Supreme Ceramics	Owner	MSME implementing EE activities	Thangadh, India
Mr. Hardik Prajapati	Receipt Enterprises, and Trusty of Panchal Ceramic Association, Thangadh	Owner MSME & Office Bearer of Association	MSME implementing EE activities, and Ceramic Association, Thangadh	Thangadh, India
Sureshchandra Sompura	Owner, Aestoria Ceramics, President of the Association	Owner, & President of Association	MSME implementing EE activities, and Ceramic Association, Thangadh	Thangadh, India

Name	Organisation	Position	Role in MSME Project	Location
Vijay Songara	Aestoria Ceramics	Management	MSME implementing EE activities	Thangadh, India
Sanjay Dhawaria	Simndhar Ceramics	Owner	MSME implementing EE activities	Thangadh, India
Ravi Maru	Sunrise Pottery Work	Owner	MSME implementing EE activities	Thangadh, India
Sukhdev Raj	Victor Forging and Victor Tools Pvt) ltd,	Owner of MSME, and Association President, Jalandhar Hand tools Manufacturers Association	MSME implementing EE activities, and President of Association	Jalandhar, India
Ashwani Kumar	Victor Forging	Management	MSME implementing EE activities	Jalandhar, India
Ashish Kumar	Victor Forging	Management	MSME implementing EE activities	Jalandhar, India
Ashok Bathla	Cluster Leader	Jalandhar Hand tools Cluster leader	Cluster Leader	Jalandhar, India
Munish Kakkar	Solar First Energy Pvt Ltd. Tata Power Solar	Marketing Officer	Service Provider, Solar Systems	Jalandhar, India
A K Goswami	Ajay Industries	Owner Ajay Industries, and President Tool Exports and Manufacturer's Association	MSME implementing EE activities	Jalandhar, India
Jyoti Prakash	Vishal Tools and Forging (p) Ltd.	Manging Director	MSME implementing EE activities	Jalandhar, India
Mr. Parmanasivanm	Aavin Dairy, Erode	Assistant General Manager	MSME implementing EE activities	Erode, India
Mr. Subramanian	Aavin dairy, Erode	Technical specialist	MSME implementing EE activities	Erode, India
N Visvanathan	Ammuran Foundries	Managing Partner and CEO	MSME implementing EE activities	Coimbatore, India
A Sriva Shanmugha Kumar	Coimbatore Tiny and Small Owners Association	President	MSME implementing EE activities	Coimbatore, India

Name	Organisation	Position	Role in MSME Project	Location
Er. Shekar	Sri Ramakrishna Industries Unit 1	Vice President of Operations	MSME implementing EE activities	Coimbatore, India
Jai Kumar Ramdas	COINDIA	President	MSME implementing EE activities	Coimbatore, India
K V Kartik	COINDIA	Vice president	MSME implementing EE activities	Coimbatore, India
Shiv Kumar	COINDIA	Cluster Leader	Cluster Leader, COINDIA	Coimbatore, India
R Ragupathy	PSG Institutes	Group Senior Manager	MSME implementing EE activities	Coimbatore, India
S Balraj	Bright Casting	Managing Director of Unit	MSME implementing EE activities	Coimbatore, India
Aayush Jain	PwC	Consultant	Study Consultants	Delhi, India
Saachi Singla	PwC	Consultant	Study Consultants	Delhi, India
Amit Seth	PwC	Consultant	Study Consultants	Delhi, India
Nishant Verma	PwC	Consultant	Study Consultants	Delhi, India
Niley Srivastava	PwC	Consultant	Study Consultants	Delhi, India
Rajmohan Rangarajan	DESL	CEO and Project Leader	Consultants, Scaling up	Delhi, India
Dipanjraj Roy	DESL	Consultant Scaling up	Consultants, Scaling up	Delhi, India
Sachin Sharma	DESL	Associate Consultant, Scaling up	Consultants, Scaling up	Delhi, India
Srikant Kasturi	Benchmarking, DESL		Consultants, Scaling up	Delhi, India
Subroto Pal	MoEFCC (GEF)	Consultant	GEF, and Ministry - MoEFCC	Delhi, India
Rishi Kaushik	MoEFCC, Joint Secretary	GEF Focal Point	GEF, and Ministry - MoEFCC	Delhi, India
Shailaja Pahirwal	MoEFCC	Coordinator GEF	GEF, and Ministry - MoEFCC	Delhi, India
Rakesh Kumar, and colleague	MSME Ministry	Joint Director	Ministry of Government of India for MSMEs	Delhi, India
Kiran Ananth	CII-GBC	Management	Consultants for Upscaling	Hyderabad, India



<b>Name</b>	<b>Organisation</b>	<b>Position</b>	<b>Role in MSME Project</b>	<b>Location</b>
Pemba Lapcha	Officer	State Development Authority, Sikkim	State Development Authority, Government Agency in Implementing State	Gangtok, India
Subojeet Bagchi	Handpump unit	Owner	MSME implementing EE activities	Howarah, India
J Chaudhary	Om Steel Shapes	Management	MSME implementing EE activities	Howrah, India
Sunil Agarwal	Giriraj Ispat Pvt Ltd	Management	MSME implementing EE activities	Howrah, India
Toni Babu	Griraj Ispat Pvt Ltd	Owner	MSME implementing EE Activities	Howrah, India
Ramesh Gupta	Giriraj Ispat Pvt Ltd	Consultant	MSME implementing EE activities	Howrah, India
R M Pandey	Shree Sataya Metal and Alloys Pvt Ltd	Assistant Director	MSME implementing EE activities	Durgapur, India
Mr Kheto	Ma-Tara Forging and Engineering Works	Management	MSME implementing EE activities	Durgapur, India
Mukesh Sharma	Venki Hi-tech Ispat Ltd	Management	MSME implementing EE activities	Durgapur, India
Manager	SBGE Consultants	Manager	MSME implementing EE activities	Bankura, India
Mr. Garg	Puneet Apparel Pvt Ltd	Owner	MSME implementing EE activities	Indore, India
Mitesh Raghuvanshi	Mangal Enterprises and Chair IIF Indore Chapter	CEO	MSME implementing EE activities	Dewas, India
Arindam Mukherjee	Deloitte	Consultant, and previously with DESL implementing project	Consultant implementing project	Delhi, India
Suparno Ranjan Majumdar	DESL, West Bengal	Consultant	Consultants, Scaling up, implementing in West Bengal	Calcutta, India
Mr. S Pal	DESL, West Bengal	Consultant	Consultants, Scaling up, implementing in West Bengal	Calcutta, India

## Annex 3. Summary of project identification and financial data

### Project Factsheet

Milestone	Expected date	Actual date
Project CEO endorsement/approval date	25 March 2011	1 February 2011
Project implementation start date (PAD issuance date)		11 April 2011
Original expected implementation end date (indicated in CEO endorsement/approval document)	July 2016	31 December 2022
Revised expected implementation end date	30 June 2022	31 December 2022
Terminal evaluation completion	30 September 2022	31 March 2023

### Project budget

#### Financing plan summary

	Project Preparation	Project	Total (US\$)
Financing (GEF / others)	100,000	7,172,097	7,272,097
Co-financing (cash and in-kind)	100,000	26,200,000	26,300,000
<b>Total (USD \$)</b>	<b>200,000</b>	<b>33,372,097</b>	<b>33,572,097</b>

#### Financing plan summary - Component breakdown

Project components	Donor (GEF) (US\$)	Co-Financing (US\$)	Total (US\$)
1. Increased capacity of EE/RE suppliers and finance providers	2,501,839	1,000,000	3,501,839
2. Increased end-use demand and implementation	2,133,908	15,850,000	17,983,908
3. Scaling up of the project to a national level	1,409,776	5,140,000	6,549,776
4. Regulatory and decision-making frameworks	706,896	3,710,000	4,416,896
Project management	419,678	500,000	919,678
<b>Total</b>	<b>7,172,097</b>	<b>26,200,000</b>	<b>33,372,097</b>

### Co-Financing sources, breakdown and actual co-financing realized

<b>Name of Co-financier (source)</b>	<b>Classification</b>	<b>Type</b>	<b>Amount committed at design (US\$)</b>	<b>Actual amount realized (US\$)</b>
UNIDO	Partner agency	Grant and In-kind	500,000	525,000
Bureau of Energy Efficiency	Government	Grant and In-kind	2,000,000	814,419
Ministry of New and Renewable Energy	Government	Grant and In-kind	6,700,000	
Ministry of Small and Medium Enterprises	Government	Grant and In-kind	17,000,000	
Industry	Private sector	Cash		34,337,000
Others		In-kind		
<b>Total Co-Financing (US\$)</b>			<b>26,200,000</b>	<b>35,676,419</b>

## Annex 4. Project Results Framework

Project Strategy	Objectively Verifiable Indicators	Sources of Verification	Assumptions
<b>Impact</b>			
<p><i>GEF Strategic Priorities:</i> Strategic Program 2: Promoting energy efficiency in the industrial sector</p> <p>Strategic Program 4: Promoting Sustainable Energy Production from Biomass</p>	<p>Total CO<sub>2eq</sub> emission reductions as a result of the investments in industrial energy efficiency – target 1,270,500 million tonnes (over 10 year lifetimes) by 2014</p> <p>Total energy saved – target 276,600 MWh annually by 2015</p> <p>Contribution to the enabling policy environment – target of 4 out of 4 with the complete achievement of all the steps in facilitating the implementation of biomass as a fuel source and in main-streaming EE/RE policies for MSME development.</p> <p>Volume of investment – target 5 million USD by 2014</p> <p>See Annex F in RCE document for details of how the GHG and MWh targets have been estimated</p>	<p>For all indicators: Reporting from project sites, data from feasibility studies, verification of savings for all or a representative sample of projects</p>	<p>Companies choose to make energy efficiency investments</p> <p>Implementation of project activities will foster industrial energy efficiency investments and reduce CO<sub>2eq</sub> emissions</p>
<b>Outcomes</b>			
<p>Outcome 1: The capacity of suppliers of EE/RE product suppliers/service providers/finance providers to support the expansion of EE/RE in the clusters is increased</p> <p>Outcome 2: The level of end-use demand and implementation of EE and RE technologies and practices by MSMEs is increased.</p>	<p>Number of technologies and practices adapted for local MSMEs – target 12 adapted technologies or practices being offered by local service providers.</p> <p>Investment facilitated into EE/RE technologies in MSMEs – target USD 16 million.</p> <p>Number of clusters and MSMEs implementing EE/RE technologies/practices – target 12 + clusters and 190 MSMEs.</p>	<p>Reporting from the Project Management Unit, the MSME cluster-level organisations, the MSMEs themselves, and local service providers of EE/RE technology.</p>	<p>The technologies are adaptable and economically attractive to MSMEs.</p> <p>The barriers identified are indeed the principle barriers to growth.</p> <p>There is no major</p>

Project Strategy	Objectively Verifiable Indicators	Sources of Verification	Assumptions
<p>Outcome 3: The project is scaled up to a national level</p> <p>Outcome 4 Policy, institutional and decision-making frameworks strengthened</p>	<p>Establishment of nation-wide information frameworks for EE/RE.</p>		<p>deterioration of the macro-economic climate leading to lack of finance available and/or shutting down of industries.</p>
<p><b>Component 1:</b> Increased capacity of suppliers of EE/RE product suppliers/ service providers/ finance providers</p>			
<p><b>Output 1.1</b> EE/RE technologies that are adjusted for local needs introduced to the local market in 5 energy intensive MSME sectors.</p>	<ul style="list-style-type: none"> <li>➤ Detailed techno-economic studies at the unit (MSME) level to determine feasible options for EE and RE through improvements in technologies and operating practices.</li> <li>➤ Adjustment of existing technologies for the introduction of at least 12 emerging/ improved EE/RE technologies and/or Best Operating Practices to be introduced.</li> <li>➤ Documentation of the benefits (energy savings, quality improvement, GHG reduction etc) in the demonstration and replication units (prepare one case study for each sector).</li> <li>➤ At least 16 awareness workshops to showcase the results of technology demonstrations (conduct at least 2 awareness workshops per cluster in the Foundries and Brass clusters, and 2 total awareness workshops in each of the other sectors – Hand tools, Ceramics, and Dairy).</li> </ul>	<p>Reports from technology adaptation experts.</p> <p>Survey of local service providers shows a change in availability of products and information.</p> <p>Survey of local industry associations shows a change in availability of information and services.</p>	<p>The technologies can be adapted to the local, smaller MSME markets.</p> <p>The local service providers, cluster-level industry associations, and financial actors are sufficiently interested and able to implement these changes.</p>
<p><b>Output 1.2.</b> Increased ability of Local Service Providers (EE and RE product and service suppliers) to provide assistance and advice to MSMEs within the sectors.</p>	<ul style="list-style-type: none"> <li>➤ 15 Local Service Providers/industry associations in 12 clusters identified for training and assistance in implementing the new technologies/Best Operating Practices.</li> <li>➤ 200 Detailed Project Reports prepared for MSMEs by Local Service Providers in 12 clusters.</li> <li>➤ 24 product and service providers operating in each cluster actively marketing EE/RE products. (up from 4 currently).</li> </ul>	<p>Survey of MSMEs on financing availability (within the MSME and from finance</p>	

Project Strategy	Objectively Verifiable Indicators	Sources of Verification	Assumptions
<p><b>Output 1.3</b> Increased ability of local industry associations to provide assistance and advice to MSMEs within the clusters with the establishment/enhancement of "Cluster level energy management cells".</p>	<ul style="list-style-type: none"> <li>➤ Implementation of 12 "Energy Management Cells" within cluster-level industry associations/other cluster-level institutions for carrying out EE/RE assistance in their respective clusters.</li> <li>➤ Needs assessments for these 12 institutions for the implementation of Energy Management Cells within them.</li> <li>➤ Strengthening of these 12 "Energy Management Cells" by providing material support (energy audit tools) and soft support (knowledge and training)</li> </ul>	<p>institutions).</p>	
<p><b>Output 1.4</b> Enhanced financing opportunities for EE/RE projects and implementation measures.</p>	<ul style="list-style-type: none"> <li>➤ Templates and examples for financial assessment of EE/RE projects developed for use in training and dissemination</li> <li>➤ Banking/investor experts in 5 banks/financial institutions trained in the assessment of bankable projects and support mechanisms</li> </ul>		
<p><b>Component 2:</b> Increased end-use demand and implementation of EE and RE by MSMEs</p>			
<p><b>Output 2.1</b> Increased demand for EE/RE products/services and increased ability to apply for financing among the units in the 5 energy intensive MSME sectors for EE/RE technologies.</p>	<ul style="list-style-type: none"> <li>➤ Ongoing awareness generation/ training programmes for entrepreneurs – at least 50 awareness workshops conducted to reach 1200 or more entrepreneurs as well as four national-level project conferences conducted.</li> <li>➤ In consultation with industry associations, choosing MSMEs and implementing joint partnerships including adapted technologies and Best Operating Practices ("case studies") in each of the 5 sectors with local producers of EE/RE technologies (Local Service Providers) and MSMEs – 29 total projects implemented with handholding of these 29 units to ensure optimal deployment of improved technologies and to build confidence and capabilities.</li> <li>➤ The development of around 200 bankable Detailed Project Reports which can be used for investment decisions.</li> <li>➤ A total of 120 EE/RE measures implemented in the 12 clusters.</li> </ul>	<p>Number of Developed Project Reports tracked during the project, including those applying for outside financing.</p> <p>Responses to marketing efforts in terms of enquiries and requests for information will be tracked throughout the project.</p>	<p>The adapted technologies have a sufficiently low payback period to warrant investment and efforts to secure outside investment.</p> <p>Macroeconomic conditions do not drastically alter prices/outputs from the industry.</p> <p>The implementing</p>

Project Strategy	Objectively Verifiable Indicators	Sources of Verification	Assumptions
	<ul style="list-style-type: none"> <li>➤ At least 100 applications for financial assistance (loans/investments) submitted by MSMEs with 36 additional funded.</li> </ul>	<p>Follow up surveys will be carried out for those MSMEs involved in workshops to build capacity.</p>	<p>MSMEs will be able to Best Operating Practices consistently over time.</p>
<p><b>Output 2.2</b> Increased awareness and implementation of Best Operating Practices for energy management and EE/RE technologies in MSMEs in 12 energy intensive MSME clusters</p>	<ul style="list-style-type: none"> <li>➤ At least 500 experts, engineers, and staff trained in RE/EE technology basics and Best Operating Practices and at least 250 implementing Best Operating Practices during the complete project cycle.</li> </ul>		
<p><b>Component 3: Scaling up of the project to a national level</b></p>			
<p><b>Output 3.1</b> Cooperation and synergies established and enhanced within the project clusters through information sharing on best practices and joint workshops</p>	<ul style="list-style-type: none"> <li>➤ At least 7 study tours/exchange visits carried out under a 'knowledge exchange program to share lessons and experiences among the various clusters.</li> <li>➤ Existing web-sites in foundry and dairy sectors strengthened to include more information on EE/RE technologies and Best Operating Practices.</li> </ul>	<p>Monitoring reports on events and knowledge sharing activities.</p> <p>The number of cluster-based new projects developed will be tracked.</p>	<p>Other cluster-based organisations will be interested in this project.</p>
<p><b>Output 3.2</b> Expansion of the project to affect new clusters at a later date throughout the country</p>	<ul style="list-style-type: none"> <li>➤ Preparation of Project Proposals for EE/RE projects (similar to this one) in MSME clusters not covered in this project. (4 new Foundry clusters, the Ludhiana Hand Tools cluster, 1 more Ceramics cluster in India, 1 more Brass cluster, 1 more Dairy cluster)</li> </ul>	<p>The number of brochures, booklets distributed and the web-site hits will be tracked.</p>	
<p><b>Output 3.3</b> Dissemination of best practices on improved EE and RE technologies and standards in all related MSME clusters in the country</p>	<ul style="list-style-type: none"> <li>➤ Preparation of at least 9 pamphlets in the 5 different sectors on the technologies, returns on investment, etc. published in local languages (one pamphlet for each technology).</li> <li>➤ Preparation of more detailed information booklets for each of the 5 sectors on the technologies, returns on investment, etc.</li> <li>➤ Quarterly newsletter published on EE/RE technologies and practices in the industrial MSME sector.</li> </ul>		

Project Strategy	Objectively Verifiable Indicators	Sources of Verification	Assumptions
<b>Component 4:</b> Strengthening policy, institutional and decision-making frameworks			
<b>Output 4.1</b> Improved monitoring and evaluation of energy use and development of a benchmarking system	<ul style="list-style-type: none"> <li>➤ At least 24 detailed energy audits conducted in various sectors including investment options, payback periods, current barriers to implementation, and energy use/CO<sub>2</sub>eq emissions prevented from the technologies/practices.</li> <li>➤ At least 12 detailed cluster-level energy use database prepared (one for each cluster); these would form the basis of benchmarking systems</li> <li>➤ A survey conducted on locally available biomass resources and sustainability of biomass supply determined. (In the Foundry and Brass Sectors)</li> <li>➤ Sustainability standards developed for biomass use.</li> </ul>	<p>The benchmarking system will be available for public use.</p> <p>The report will be available and submitted to project partners.</p> <p>The roadmap will be completed and submitted to project partners.</p>	<p>There is continued governmental support for this effort.</p>
<b>Output 4.2</b> Mainstreaming EE and RE into national policies and programmes on MSMEs Development	<ul style="list-style-type: none"> <li>➤ Detailed report prepared on the policy and regulatory framework needed to accelerate the diffusion of energy-efficient and renewable energy technologies in the 5 MSME sectors. The report will also discuss improved RE options and related policy issues, and issues related to supply of piped NG in the clusters.</li> <li>➤ Roadmap prepared for strengthening energy efficiency on end use and supply side, based on interactions with existing cluster level associations, other institutions at the cluster level with BEE, MoMSME &amp; MNRE. The roadmap will specifically relate to state level programs where these clusters are located.</li> </ul>		



## Annex 5. GEF Tracking Tool

SUMMARY OF RESULTS		
Project Title	Promoting Energy Efficiency and Renewable Energy in Selected MSME Clusters in India	
Implementation of EE&RE technologies started in Year	2016	
Project End in Year	2022	
Results : Energy Savings, GHG Emissions reduction and Investment on EE/RE Technologies		
Direct Energy Saved by end of the Project (MWh)	280000	
Direct GHG reduction achieved by end of the project (tCO2)	145935	
Direct GHG Emissions Reduction (tCO2) over 15 Years lifetime	2189025	
Volume of investments in EE/RE technologies by MSME units(Million USD)	34.37	
Particulars	CEO endorsement	Terminal Evaluation
Annual GHG emission reductions (CO <sub>2</sub> eq)	84,700 tonnes saved per year as a direct result of this project	145,935 tonnes saved per year by the end of the project
Cumulative GHG emissions reduction (CO <sub>2</sub> eq)	12,70,500 tonnes saved over a 15- year lifetime of the EE measures introduced	21,89,025 tonnes achieved over 15-year lifetime of EE& RE measures introduced
Quantity of energy saved	276,600 MWh per year as a direct result of this project.	280,000 MWh per year was achieved by the end of the project
Volume of investments in EE/RE technologies	USD 16 million	USD 34.37 million
Contribution to the enabling policy environment	Complete achievement of all the steps in facilitating the implementation of biomass as a fuel source and in mainstreaming EE/RE policies for MSME development	Developed Report on Policy & Regulatory framework for MSME sector in India, with recommendations on improving profitability, competitiveness along with wider policy objectives including market transformation, employment generation, energy security and GHG emissions reduction.

## Total Cumulative GHG Emissions Reduction Over 15 years of Lifetime of EE/RE Measures Implemented

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21			
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036			
GHG Reduction (tCO2)	2067	2067	2067	2067	2067	2067	2067	2067	2067	2067	2067	2067	2067	2067	2067									
		31999	31999	31999	31999	31999	31999	31999	31999	31999	31999	31999	31999	31999	31999	31999								
			8452	8452	8452	8452	8452	8452	8452	8452	8452	8452	8452	8452	8452	8452	8452	8452						
				9613	9613	9613	9613	9613	9613	9613	9613	9613	9613	9613	9613	9613	9613	9613	9613					
					10823	10823	10823	10823	10823	10823	10823	10823	10823	10823	10823	10823	10823	10823	10823	10823				
						44807	44807	44807	44807	44807	44807	44807	44807	44807	44807	44807	44807	44807	44807	44807	44807			
							38174	38174	38174	38174	38174	38174	38174	38174	38174	38174	38174	38174	38174	38174	38174	38174	38174	38174
<b>Total</b>	2067	34066	42518	52131	62954	107761	145935	145935	145935	145935	145935	145935	145935	145935	145935	143868	111869	103417	93804	82981	38174			
<b>Grand Total</b>	<b>2189025</b>	<b>tCO2</b>																						

**Note :- GHG emission reduction estimations are done considering savings due to EE/RE measures introduced remains constant for over a period of 15 years**

## Year-wise Energy Savings, GHG emissions reduction and Investment on EE/RE Technologies

Sector	Cluster	2016			2017			2018			2019			2020			2021			2022		
		Energy Savings (MWh)	GHG emissions reduction (tCO2)	Volume of investments in EE/RE technologies (Million USD)	Energy Savings (MWh)	GHG emissions reduction (tCO2)	Volume of investments in EE/RE technologies (Million USD)	Energy Savings (MWh)	GHG emissions reduction (tCO2)	Volume of investments in EE/RE technologies (Million USD)	Energy Savings (MWh)	GHG emissions reduction (tCO2)	Volume of investments in EE/RE technologies (Million USD)	Energy Savings (MWh)	GHG emissions reduction (tCO2)	Volume of investments in EE/RE technologies (Million USD)	Energy Savings (MWh)	GHG emissions reduction (tCO2)	Volume of investments in EE/RE technologies (Million USD)	Energy Savings (MWh)	GHG emissions reduction (tCO2)	Volume of investments in EE/RE technologies (Million USD)
Ceramic	Thangadh				1458.0	1181.0	0.1456	5012.6	2319.9	0.4141	7664.3	3828.0	0.8630	1071.4	931.3	0.2358	3143.6	2452.0	0.4156	2735.8	2443.1	0.8817
	Morbi							6563.4	1404.0	0.0291	616.2	478.0	0.0532				557.0	295.1	0.0499	15405.3	6888.8	2.0226
	Ahmedabad																3288.8	1059.5	0.2050	897.7	307.0	0.1262
	Khurja	998.6	207.1	0.0059				3161.0	1063.9	0.0161	280.3	75.7	0.0099				1555.4	352.5	0.0593	1573.5	400.1	0.1139
Hand Tool	Jalandhar	526.5	442.2	0.0224	2331.7	1436.2	0.1516				16.2	13.6	0.0014				1863.1	1138.8	0.7119	4145.4	1384.6	0.6463
	Nagaur	34.5	28.9	0.0009	191.5	160.9	0.0056				46.5	38.6	0.0041	123.7	105.9	0.0150	317.2	62.3	0.0140	1048.3	262.8	0.1060
Dairy	Gujarat	877.8	516.0	0.1234	61824.0	26878.9	2.1487	2505.6	2147.4	3.9930	9998.0	2943.3	1.7177	6495.4	6149.9	1.2724	1393.3	1228.9	0.6679	5270.5	5764.8	1.0312
	Kerala										980.4	228.0	0.0436	1264.8	1235.3	0.2239	422.5	378.2	0.1595	2172.5	190.3	0.2562
	AP & Telangana																1837.1	401.2	0.3697	1137.4	820.4	0.2498
	Maharashtra																3863.5	1321.8	0.2253	1605.5	1444.7	0.7285
	Tamil Nadu																1136.1	445.0	0.4610	2222.5	729.7	0.5657
	Punjab																1810.4	1036.8	0.5457	780.5	359.1	0.1176
	Haryana																48.6	43.7	0.0117	151.7	136.5	0.0430
	Madhya Pradesh																410.5	172.0	0.0889	942.0	524.0	0.1546
Foundry	Coimbatore	358.3	300.9	0.0201	374.1	314.2	0.0368	563.2	464.0	0.0635	963.4	814.8	0.1269	1536.0	1294.3	0.0958	6155.6	5278.3	1.5227	8474.5	7096.8	2.3101
	Belgaum	242.2	203.4	0.0340	2563.6	1418.8	0.2442	1159.4	950.9	0.1454	650.1	535.1	0.1155	1349.7	1106.6	0.1620	1299.7	1065.0	0.5177	2982.5	2466.5	0.7554
	Ahmedabad																1214.3	421.0	0.1231	1942.4	616.8	0.2487
	Eastern Zone																42985.5	22548.9	1.1433	5399.0	3814.0	0.4617
Brass	Jamnagar	1451.7	341.1	0.0658	861.1	472.7	0.2026	259.9	102.2	0.1688							4105.7	1849.2	0.8802	5555.0	1264.7	0.7054
Mixed Cluster	Indore	32.3	27.1	0.0005	697.3	136.3	0.0209				793.5	658.0	0.0554				4020.6	1575.8	0.9131	778.3	421.9	0.1703
	Sikkim																4714.2	1680.7	0.3853	1046.9	837.3	0.1154
<b>Total</b>		<b>4521.9</b>	<b>2066.8</b>	<b>0.2730</b>	<b>70301.3</b>	<b>31998.9</b>	<b>2.9561</b>	<b>19225.0</b>	<b>8452.3</b>	<b>4.8300</b>	<b>22008.9</b>	<b>9613.1</b>	<b>2.9908</b>	<b>11840.9</b>	<b>10823.2</b>	<b>2.0050</b>	<b>86142.9</b>	<b>44806.6</b>	<b>9.4710</b>	<b>66267.3</b>	<b>38173.9</b>	<b>11.8103</b>

## PPROJECT ACTIVITIES TRACKING

Project Component and Output	Target Level	2015		2016		2017		2018		2019		2020		2021		2022		Actual Cumulative Achieved	Unit of Measurement
		Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual		
<b>Component 1: Increasing the capacity of suppliers of EE/RE product suppliers/service providers/finance providers to support the expansion of EE/RE in the clusters</b>																			
Output 1.1 EE/RE technologies that are adjusted for local needs	Detailed techno-economic studies at the unit (MSME) level	0	0	50	40	50	55	50	55	0	0	0	0	0	0	0	0	150	No. of Energy Audits
	Introduction of at least 12 emerging/improved EE/RE technologies	0	0	12	15	12	30	12	20	0	0	0	0	0	0	0	0	65	No. of Technologies identified
	Documentation of the benefits (energy savings, quality improvement, GHG reduction etc.)	0	0	200	150	200	190	150	110	200	180	350	190	200	400	500	623	1843	No. of implementations of EE/RE measures
	At least 16 awareness workshops to showcase the results of technology demonstrations	0	0	0	0	20	26	30	20	0	0	0	0	0	0	0	0	46	No. of awareness workshops
Output 1.2. Increased ability of Local Service Providers	15 Local Service Providers/industry associations in 12 clusters	0	0	0	0	0	0	400	350	500	450	0	0	0	0	0	0	800	Nos. of LSPs trained
	200 Detailed Project Reports	0	0	0	0	100	78	100	107	50	60	0	0	0	0	0	0	245	Nos. of DPRs developed
	24 product and service providers operating	0	0	0	0	0	0	200	150	150	100	0	0	0	0	180	150	400	Nos. of Technolgy providers trained
Output 1.3 Increased ability of local industry associations	Implementation of 12 "Energy Management Cells"	0	0	3	3	3	3	2	2	4	4	0	0	0	0	17	17	29	Nos. of Energy Management Centers set-up
	Needs assessments of 12 institutions for the implementation of EMC	0	0	3	3	3	3	2	2	4	4	0	0	0	0	0	0	12	Training organized in clusters where EMC was set-up
	Strengthening of these 12 "Energy Management Cells"	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	1	Developed report of Sustainability of EMCs
Output 1.4 Enhanced financing opportunities	Templates and examples for the financial assessment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Templates developed for financial assessment
	Banking/investor experts in 5 banks/financial institutions training	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25	25	Bankers Training Programmes organized
<b>Component 2: Increasing the level of end-use demand and implementation of EE and RE technologies and practices by MSMEs</b>																			
Output 2.1 Increased demand for EE/RE products/services and increased ability to apply for financing among the MSME	Ongoing awareness generation/ training programmes for entrepreneurs at least 50 awareness workshops to reach 1200 participants	0	0	0	0	25	22	50	40	40	36	0	0	0	0	0	0	98	No. of Capacity building workshops organized
	29 total Pilot Demo Projects	0	0	5	5	0	0	22	16	0	0	0	0	0	0	0	0	21	No. of pilot demonstration projects implemented
	200 bankable Detailed Project Reports	0	0	0	0	100	50	100	70	0	0	0	0	0	0	0	0	120	No. of Bankable DPRs developed
Output 2.2 An increase in the awareness and implementation of Best Operating Procedures for energy management in MSMEs	At least 500 experts, engineers, and staff trained in RE/EE technology basics	0	0	0	0	50	30	100	100	100	100	0	0	0	0	300	200	430	Nos. of engineers/staff trained in Energy Audit & ISO:50001
<b>Component 3: Scaling up of the project to a national level</b>																			
Output 3.1 Cooperation and synergies established and enhanced within the project clusters through information sharing on best practices and joint workshops.	At least 7 study tours/exchange visits	0	0	2	2	3	3	2	2	1	1	0	0	0	0	0	0	8	Nos. of International study tours & Inter-cluster visits
	Web-sites	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	Number of Project website developed
Output 3.2 Expansion of the project to affect new clusters at a later date throughout the country	Preparation of Project Proposals for EE/RE projects (similar to this one) in MSME	0	0	0	0	0	0	0	0	11	11	0	0	0	0	3	3	14	Expansion of project to additional new clusters
	Preparation of more detailed information material (brochures, booklets)	0	0	0	0	0	0	0	0	0	0	0	0	25	25	3	3	28	No. of Technolgy Compendiums developed
<b>Component 4: Strengthening policy, institutional and decision-making frameworks</b>																			
Output 4.1 Improved monitoring and evaluation of energy use and development of a benchmarking system	At least 12 detailed cluster-level energy use database and Benchmarking	0	0	0	0	0	0	0	68	1	0	1	0	1	0	1	1	1	No. of web-based energy data and benchmarking tool developed for 12 MSME clusters
Output 4.2 Mainstreaming EE and RE into national policies and programmes on MSMEs Development	Detailed report prepared on the policy and regulatory framework	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	No. of report prepared for Policy & regulatory Framework

PROJECT CORE INDICATOR WORKSHEET					
<b>Core Indicator 6</b>					
	<b>Greenhouse Gas Emissions mitigated (Metric Tons of CO<sub>2e</sub> per Year)</b>				
			Endorsement	MTR	TE
	Expected tCO <sub>2e</sub> (Direct)		84,700	34,049	145,935
	Expected tCO <sub>2e</sub> (Indirect)				
<b>Indicator 6.3</b>	<b>Energy Saved (MWh/year)</b>				
			Expected	Achieved	
			Endorsement	MTR	TE
			276,600	75,897	280,000

## **Annex 6. Evaluation Terms of Reference (link):**

See link at: [https://www.unido.org/sites/default/files/files/2022-07/GFIND-103029\\_TOR\\_220317.pdf](https://www.unido.org/sites/default/files/files/2022-07/GFIND-103029_TOR_220317.pdf)