Scaling Up of

Investments through ESCO Mechanism in MSME Clusters by Deploying Standard Energy Efficient Technologies (SEET)

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GGGI

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Abbreviations

Short Form	Full Form
Ias	Industrial Associations
BEA	Baseline Energy Assessment
BLDC	Brushless Direct Current
CEO	Chief Executive Officer
DSM	Demand Side Management
EE	Energy Efficient
EERF	Energy Efficiency Revolving Fund
EESL	Energy Efficiency Services Limited
EMRF	EESL MSME Revolving Fund
EoI	Expressions of Interest
ESCO	Energy Service Company
FIs	Financial Institutions
GEF	Global Environment Facility
GGGI	Green Global Growth Institute
kWh	kilowatt-hour
M&V	Measurement and Verification
MSME	Micro, Small, and Medium Enterprises
NCR	National Capital Region
PFI	Private Financial Institutions
PoC	Proof-of-Concept
SEET	Standard Energy Efficient Technologies
SoPs	Standard operating Procedures
SWOT	Strengths, Weaknesses, Opportunities & Treats
t CO2	Tons of Carbon Dioxide
UNNATEE	Unlocking National Energy Efficiency Potential
VFD	Variable Frequency Drive

Acknowledgements

This project closure report has been prepared by the Global Green Growth Institute (GGGI), Energy Efficiency Services Limited (EESL), and the Federation of Indian Chambers of Commerce & Industry (FICCI) under the SEET Project. GGGI would like to express gratitude to the Industrial Associations and Rice mills / Industrial Units of Panipat, Karnal, and Kundli for providing information, extending their support, and showing their willingness to sign agreements with Energy Services Companies (ESCOs) for the adoption of Standard Energy Efficient Technologies (SEET). A special thanks to industrial entrepreneurs, ESCOs, technology suppliers and other key stakeholders for their valuable time, insights, and support for the execution of the SEET project.

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Executive Summary

The Global Green Growth Institute (GGGI) was established as an intergovernmental organization with the objective of promoting sustainable development in developing and emerging countries, including the least developed countries. Considering the priority of the Government of India, GGGI is expanding its activities in the areas of Energy Efficiency and Demand Side Management (DSM); GGGI is working closely with Energy Efficiency Services Ltd. (EESL), an organisation under the Ministry of Power, Government of India.

In India, the Micro, Small, Medium Enterprises (MSME) segment contributes nearly 30% of the GDP. The estimated number of industrial MSME clusters in India is about 400; about 180 clusters can be categorised as energy intensive; they consume approximately 40% of the total energy consumed by industrial MSMEs, estimated at 68 MTOE in 2017[1]. Traditional, conservative management practices have resulted in persistence of obsolete technologies and operating practices. Low awareness about energy efficient (EE) technologies, absence of Proof-of-Concept (PoC) of technology & business models and investment barriers have resulted in low energy efficiency in this sector. Technology upgradation and adoption of best operating practices can help in significant reduction in energy consumption.

EESL has implemented a Global Environment Facility (GEF) project entitled "Market Transformation of Energy Efficiency in MSMEs", during the period 2017-21, to address the following issues in the MSME sector:

- Low awareness among industry owners about possibilities for improving Energy Efficiency
- Technological barriers for proliferation of Energy Efficient Technologies
- Investment challenges
- Creation of pathways for investments through ESCO mechanism

Under a GEF project, EESL has previously demonstrated about 30 technologies in nine MSME clusters in India, resulting in energy savings in the range of 10% to 25% from the baseline values, with simple payback periods in the range of 1.0 to 2.5 years. The demonstrations were done through suitable business models where the project cost gets recovered from monetised energy saving. However, for large scale implementation in MSMEs across the country, which is one of the prime objectives of GEF, it was felt that presently there is no structured approach for awareness creation, generating serious interest in these technologies and demand aggregation in the MSME clusters for scaling-up. Additionally, instead of EESL making the entire investment as a Super-ESCO, it is intended that, after demonstration of Proof-of-Concept, EESL creates an eco-system for other ESCOs to take this concept forward.

Presently, in the absence of a structured framework to support the proliferation of energy efficient technologies and practices in the MSME sector, this project on *"Scaling Up of Investments through ESCO Mechanism in MSME Clusters by Deploying Standard Energy Efficient Technologies (SEET)"* was conceived with the objective of developing a framework which can enable EESL to create a viable ESCO market in the MSME sector and develop a roadmap for operationalization of the EESL MSME Revolving Fund (EMRF)[2].

Keeping in view the typical nature of MSME clusters around the country, based on products and diversity of technologies, clusters involved in food processing, textiles, engineering & services were deemed appropriate for scaling up the implementation of energy efficient technologies. To foster this project, through deliberations with stakeholders, three MSME clusters in the Delhi National Capital (NCR) region in the state of Haryana, India, were selected, namely:

- Rice Mill Cluster, Karnal
- Textile Cluster, Panipat
- Mixed Industry Cluster, Kundli, Sonipat

All the three clusters are very different in terms of products manufactured or services provided, energy consumption, technologies used, type of manufacturing & utility equipment, work culture, and challenges & opportunities; a brief profile of the clusters is shown in Table 1

[1]Bureau of Energy Efficiency's UNNATEE Report presents the strategy plan towards developing an energy efficient nation (2017-2031) https://beeindia.gov.in/sites/default/files/press_releases/UNNATEE%20Report.pdf

[2]EMRF: EESL has conceptualised EMRF for providing financial support to ESCOs and MSMEs for implementation of energy efficiency projects

Table 1: Brief Profile of Selected MSME Clusters

Particulars	Panipat Cluster	Karnal Cluster	Kundli Cluster
Type of Industries	Textile Process Houses (including Fabric Dyeing & Printing, Yarn Dyeing, etc.)	Rice Mills	Mixed Manufacturing & Service Industries
Product Manufactured	Bedsheets, Blankets, Curtains, Rugs, Towels, Upholstery, etc.	Parboiled Rice, Raw rice, White rice, etc.	Kitchen Appliances, Garments, Bags, Fancy Yarns, Packaging Materials, Auto Components; Services like Cold Stores for Fruits & Spices, etc.
Number of Industries suitable for SEET deployment	300	350	350
Major Energy Consuming Equipment	Boilers, Thermic Fluid Heaters, Electric Motors, Air Compressors, Pumps, Dryers, Dyeing & Printing machines, Stenters, etc.	Boilers, Air Compressors, Motors, Dryers, etc.	Air Compressors, Electric Motors, Fans (for human comfort)
Total Energy Consumption, toe/year	396288	544504	8574
Total CO2 emissions, (t CO2/year)	1282057	590400	95708

Source: *Data from Local Industrial Associations, field surveys and interactions with industrial units.*

This project was conceived with the focus on increasing awareness among the stakeholders, aggregation of demand for the energy efficient technologies, generating serious interest in implementation of energy efficient technologies among MSMEs, eliciting commercial interest among ESCOs and equipment vendors, and finally concluding with agreements between industrial unts and ESCOs/Vendors for implementation. The sequence of activities and outcomes of this project in the three clusters is shown in Table 2.

Table 2: Sequence of Activities in the Three Clusters

	Activity	Objectives	Outcomes
1	Awareness Creation / Brainstorming Sessions	• Project briefing to stakeholders in the three clusters • Primary & secondary data collection • Identification of applicable SEET in each cluster • Preparation of cluster profile reports	• Understood anxieties and perceived barriers in adoption of energy efficient technologies • Identified seven SEET applicable in 3 target clusters
2	Scheme Announcement Workshops	• Launch of Project Schemes • Release of Cluster profile reports • Presentations on identified SEET • Generation of Expression of Interest (EoIs) for Technologies from industrial units	• Rationale of energy savings due to identified SEET explained • 79 industries showed interest in adoption of the technologies • Encouraging deliberations and overwhelming response; received total 212 EoIs from 79 Industries

3	Baseline Energy Assessment (BEA)	• Conduct Baseline Energy Audits (BEA) in selected industries, located in three clusters, covering **minimum 90 generated EoIs** • Identification of energy saving potential in the three clusters through adoption of SEET • Aggregation of demand for SEET in three clusters	• Baseline Energy Assessment (BEA) conducted in 20 industries, covering 94 EoIs • Technical application of the seven SEET was confirmed, with quantification of energy saving potential • Identified Energy Savings potential in the three clusters: US $ 2.6 Million/year • Demand aggregation indicated investment requirement in the three clusters: US $ 3.4 Million
4	Selection of ESCOs/ Vendors to supply SEET	• Inviting EoIs from ESCOs/ Vendors • Briefing on project objectives and discussion of aggregated demand • Obtaining techno-commercial proposals from ESCOs/Vendors • Evaluation of proposals and selection of ESCOs/Vendors	• Eight ESCOs/Vendors participated by sharing techno-economic proposals
5	Signing of "willingness forms" between Industries and ESCOs/Vendors	• Finalization of Baseline Energy Assessment (BEA) reports with industries • Persuade industries to implement SEET • Organise one-to-one meetings between interested industrial units and ESCOs/Vendors for discussions & negotiations • Support signing of "willingness forms" between industrial units & ESCOs/Vendors for implementation the identified SEET	• 26 willingness forms for implementation of SEET were signed between industrial units and ESCOs/Vendors
6	Preparation of Standardized Documentation & Development of IT Tools	• Preparation of standard formats, templates, documents, Standard operating Procedures (SoPs) for use in the present and future similar projects • A dynamic IT platform to showcase project information, standard data collection/collation formats, templates and other relevant documentation.	• More than 14 standard formats, templates, documents, Standard operating procedures (SoPs) prepared

EESL has identified 30 SEET that has already been demonstrated in few MSME clusters across India. During the field surveys in the three target clusters and interactions with local industrial associations, industrial unit owners & other stakeholders, it was heartening to note that some of the Rice Mills had already adopted technologies like energy efficient Paddy Dryers & High Pressure Boilers, and few Textile Process Houses had adopted Premium Efficiency IE3 motors.

However, considering the low level of penetration of energy efficient technologies, a large scope exists for wider implementation of these technologies, identified by EESL, in a larger constituency of MSMEs. After critical review of the likely impact on the energy consumption of the target clusters, seven relevant Standard Energy Efficient Technologies (SEET) vere identified, as shown in Table 3.

Table 3: List of Relevant Standard Energy Efficient Technologies (SEET) in Three Clusters

S. No.	Energy Efficient Technology	Rationale for Energy Savings
1	Variable Speed Screw Air Compressor with Integrated Variable Frequency Drives and Permanent Magnet Motors	• Screw Compressor with VFD & Permanent Magnet Motor avoids unloaded operation of compressors that results in 15%-20% power wastage in reciprocating air compressors and about 30% power wastage in Screw compressors. • Opportunity to replace old inefficient reciprocating & screw compressors.
2	Flash Steam and Steam Condensate Recovery Systems	• Flash steam recovery from high pressure steam condensate reduces steam demand from boilers • Steam condensate recovery reduces boiler fuel consumption and water treatment cost
3	PLC based Automation & Control System for Jet Dyeing Machines	• Reduces process batch time by automatically optimising heating and cooling cycles, with reference process demand, thus also improving productivity.
4	Automation & Control System for Boilers	• Optimizes excess combustion air, based on flue gas parameters, saving fuel. • Reduces fresh make-up water consumption by automatic blow-down control, based on water quality.
5	Low Grade Waste Heat Recovery (from hot process effluents)	• Heat recovery from hot process effluents at about 80oC (in textile processes) and contaminated steam condensate enables preheating of hot water for process or make-up water for boilers.
6	Energy Efficient (IE3) Motors (up to 75 kW)	• Motors, presently in use, are less efficient IE2 motors; the prevailing actual motor efficiencies may often be even lower than standard efficiencies, due to frequent rewinding. • IE3 motors have efficiency values higher by 2% to 5% points.
7	Energy Efficient BLDC Fan (1200mm Sweep, 32-35 Watts)	• BLDC fans have more efficient, permanent magnet DC motor with inherent variable speed capability, consuming maximum 35 Watts, in comparison to 75 Watts in standard ceiling fans.

The field studies showed that the selected SEET would reduce electricity & fuel costs and carbon emissions very significantly, and in some cases, provide additional benefits like improved productivity, reduced maintenance cost and reduced air & water pollution. Access to these technologies at discounted prices through bulk procurement and innovative financing mechanisms, evolved by EESL, could surely help improve the overall energy efficiency of the three target clusters.

Based on aggregation of demand for SEET in the three clusters, it is estimated that there is a potential for:

- Reduction in the electrical energy consumption by 12 million kWh per year
- Reduction in biomass fuel consumption by 18 Tons per year
- Reduction in overall manufacturing cost reduction by US $ 2.6 Million per year

The estimated investment required, based on proposals from technology solution providers, equipment vendors and ESCOs, is US $ 3.4 Million, implying an overall simple payback period of 1.3 years.

Techno-commercial proposals were received from eight ESCOs/Vendors to supply & install SEET. The major criteria for evaluation of ESCOs/Vendors included business experience, organisational strength, financial credentials and offered commercial terms; the major criteria and sub-criteria are summarised in Table 4. Appropriate scores were given against the defined criteria to shortlist ESCOs/Vendors for supply of EE equipment.

Table 4: Evaluation Criteria for Selection of ESCOs/Vendors

Criteria	Sub-Criteria	Score Weightage
Business Experience	• Year of commencement of operations • Experience as an ESCO • Coverage of industrial sectors • Local presence, especially after sales service capability • Equipment warranties • Project lead times	40%
Organizational Strength	• Total employee strength, including Energy Auditors and M & V Certified Professionals • Inventory of Energy Audit / ESCO instruments • Number of Audits done in past 3 years	20%
Financial Credentials	• Turnover & Net Worth • Value of ESCO projects in past 3 years • Debt exposure	25%
Commercial Terms	• Pricing • ESCO Financial models offered	15%

After discussions and approval of the baseline energy study reports by the respective industries, ESCOs/Vendors were selected; this was followed by one-to-one consultations between the concerned parties. These sessions facilitated comprehensive discussions, leading to mutual endorsement, and signing of "Willingness Forms" between the industrial units and ESCOs/Vendors, implying an understanding to implement SEET.

This exercise was a success with Twenty-six "Willingness Forms" being signed in the three clusters.

Notably, Premium Efficiency IE3 motors attracted the highest level of interest, with 10 willing industrial units. The other technologies receiving positive responses were Variable Speed Screw Air Compressors (with 5 confirmations) and BLDC fans (with 7 confirmations). Significant interest was also shown in technologies related Automation & Control of Boilers, Flash Steam & Condensate Recovery and Low Grade Process Heat Recovery.

Conclusion

This project has effectively addressed some of the issues with some creative interventions; these are summarised here, along with suggestions and recommendations to sustain it:

- This project demonstrated that complete handholding, involving awareness generation, establishment of energy baselines, scientific presentation of authenticated energy saving technologies and involvement of technically qualified ESCOs with ratified financial models leads to accelerated acceptance by business owners. However, if this model has to eventually become "business as usual" in the over 400 MSME clusters in India, it has to sustain itself with a momentum of its own, with support from EESL, as a super-ESCO.
- One of the impactful achievements of this project is the creation of a "single window" portal that would be a continually evolving tool for awareness creation, information dissemination and live interactions between MSME industrial units and ESCOs/Vendors.

This project, with EESL as a super-ESCO, has laid the groundwork for creating an eco-system for ESCOs/Vendors to invest in the MSME sector, after demonstration of Proof-of-Concept. The various components of this project, especially the standardisation of procedures and documents through the web portal, has significantly simplified the mechanism for participation of smaller ESCOs/Vendors. The MSMEs can also now engage with ease and confidence qualified and approved ESCOs/Vendors with ratified financial models.

To create a true market transformation of Energy Efficiency in the MSME sector, accelerate investment and technology deployment/transfer, a national level organization, working in Energy Efficiency, has to take ownership in creating the ESCO market by engaging SMEs, industry associations, Energy Auditors, ESCOs, Financial Institutions, State level policy makers, etc. EESL is best placed to anchor this "Institutional Framework", along with the proposed EESL MSME Revolving Fund (EMRF).

- Once the EMRF is launched, an information blitz would be required over the next few years to ensure that every MSME industrial unit in the country is aware of the energy efficient technologies, promotional schemes and approved ESCOs/Vendors. Once a critical number of industrial units in each cluster successfully implements these projects and their success stories are publicised, the energy efficiency movement in the MSME sector should surely accelerate to significantly reduce carbon emissions and energy costs.

1 Introduction

1 Introduction

The Global Green Growth Institute (GGGI) was established as an intergovernmental organization with the objective of promoting sustainable development in developing and emerging countries, including the least developed countries. GGGI is dedicated to supporting the creation and diffusion of the model of economic growth known as "green growth". The green growth model integrates economic growth, environmental sustainability, poverty reduction and social inclusion.

In India, GGGI is engaged with the government in the focal areas like Power, Clean Energy (including Renewables, BioCNG and Green Hydrogen), Electric Mobility, Green Buildings, and Sustainable Landscapes. Considering the priority of the Government of India, GGGI is expanding its activities in the areas of Energy Efficiency and Demand Side Management (DSM); GGGI is working closely with Energy Efficiency Services Ltd. (EESL), an organisation under the Ministry of Power, Government of India.

1.1 Project Background

In India, the Micro, Small, Medium Enterprises (MSME) segment contributes nearly 30% of the GDP. The estimated number of industrial MSME clusters in India is about 400; about 180 clusters can be categorised as energy intensive; they consume approximately 40% of the total energy consumed by industrial MSMEs, estimated at 68 MTOE in 2017[3]. This vital and growing economic sector, holds significant potential for steering India towards a low carbon economy. Increase in energy efficiency in this sector can not only help reduce India's carbon emissions but also have concurrent benefits of improving the profitability and employment generation potential of MSMEs. Traditional, conservative management practices have resulted in persistence of obsolete technologies and operating practices. Low awareness about energy efficient (EE) technologies, absence of Proof-of-Concept (PoC) of technology & business models and investment barriers have resulted in low energy efficiency in this sector. Technology upgradation and adoption of best operating practices can help in significant reduction in energy consumption.

EESL implemented a Global Environment Facility (GEF) project entitled "Market Transformation of Energy Efficiency in MSMEs", during the period 2017-21, to address the following issues in the MSME sector:

- Low awareness among industry owners about possibilities for improving Energy Efficiency
- Technological barriers for proliferation of Energy Efficient Technologies
- Investment challenges and
- Creation of pathways for investments through ESCO mechanism

Under a GEF project, EESL has previously demonstrated about 30 technologies in nine MSME clusters in India, resulting in energy savings in the range of 10% to 25% from the baseline values, with simple payback periods in the range of 1.0 to 2.5 years. The demonstrations were done through suitable business models where the project cost gets recovered from monetised energy saving. However, for large scale implementation in MSMEs across the country, which is one of the prime objectives of GEF, it was felt that presently there no structured approach for awareness creation, generating serious interest in these technologies and demand aggregation in the MSME clusters for scaling-up. Additionally, instead of EESL making the entire investment as a Super-ESCO, it is intended that, after demonstration of Proof-of-Concept, EESL creates an eco-system for other ESCOs to take this concept forward.

Presently, in the absence of a structured framework to support the proliferation of energy efficient technologies and practices in the MSME sector, this project on *"Scaling Up of Investments through ESCO Mechanism in MSME Clusters by Deploying Standard Energy Efficient Technologies (SEET)"* was conceived

[3]Bureau of Energy Efficiency's UNNATEE Report presents the strategy plan towards developing an energy efficient nation (2017-2031)

with the objective of developing a framework which can enable EESL to create a viable ESCO market in the MSME sector and develop a roadmap for operationalization of the EESL MSME Revolving Fund (EMRF). Through this project, GGGI has developed an end-to-end ESCO project implementation mechanism through EESL in a selective MSME clusters.

1.2 Project Objectives & Scope

The main objective of this project "Scaling Up of Investments through ESCO Mechanism in MSME Clusters by Deploying Standard Energy Efficient Technologies (SEET)" is to design and scale up the deployment of Energy Efficient technologies by developing a framework which can enable EESL to create a vibrant, sustainable ESCO market in the MSME sector; the learnings from this project would help create a roadmap for operationalization of EMRF.

Keeping in view the typical nature of MSME clusters around the country, based on products and diversity of technologies, clusters involved in food processing, textiles, engineering & services were deemed appropriate for scaling up the implementation of energy efficient technologies. To foster this project, through deliberations with stakeholders, three MSME clusters in the Delhi National Capital (NCR) region in the state of Haryana, India, were selected, namely:

- Rice Mill Cluster, Karnal
- Textile Cluster, Panipat
- Mixed Industry Cluster, Kundli, Sonipat

The scope of work includes the review secondary information on similar institutional structures globally and associated technical, commercial, regulatory and policy framework documents. Review of previous reports of Bureau of Energy Efficiency (BEE, India), EESL and Energy Service Companies (ESCOs) and multilateral agencies is an important component of this exercise.

This project by GGGI envisages evolution of an end-to-end ESCO project implementation mechanism through EESL in the target MSME clusters; this will broadly include:

Establishment of procedures for demand aggregation, baseline estimation, selection of ESCOs, engagement of ESCOs with the MSMEs and FIs, project implementation, M&V and outreach.

Development of standardized documents (EoIs, Baseline Energy Audit reports, agreements, proposals, M&V reports, etc.

Awareness creation and Capacity development of ESCOs, FIs and MSMEs

Handholding of EESL as the national level market transformation agent by engaging private ESCOs and mobilizing investments

Creation of a user-friendly IT platform for ease of program management and ensuring transparency

Create systems to facilitate EESL in linking ESCO investments to EERF

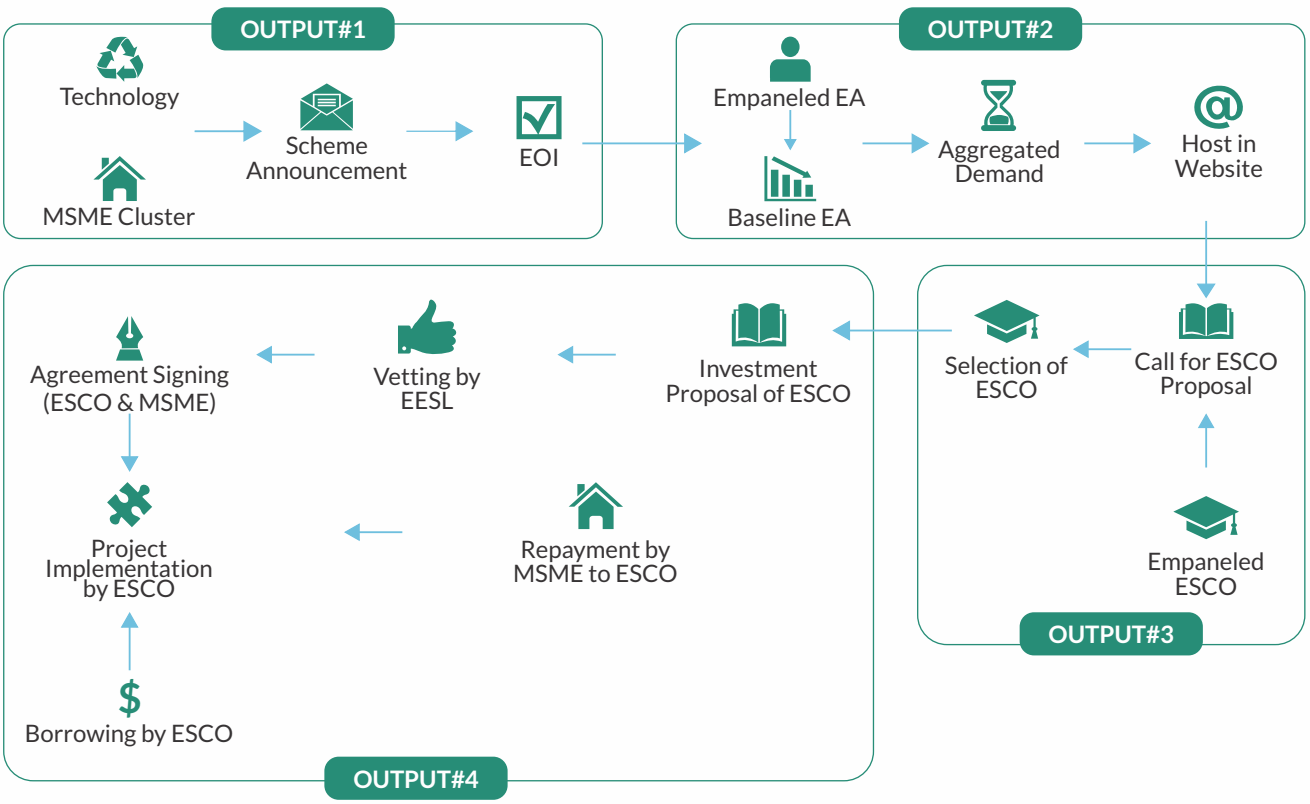
The major deliverables of this project are:

- Technology Identification, Scheme Announcement and Expression of Interest
- Demand Aggregation of the Technologies
- Selection of ESCOs
- Institutional Framework through Standardized Documentation and Resource Support
- Project Implementation by ESCOs
- Developing suitable IT Tools for improving efficacy of program implementation
- Workshops and Awareness Programs

1.3 Project Structure and Outputs

The SEET Project is the first of its kind in India to involve private ESCOs through a demand aggregation approach, in collaboration with EESL. The four major building blocks of the project are shown in Figure 1:

Figure 1: Major Building Blocks of the Project



- **Output 1: Signing of Expressions of Interest by Industries**

  The activities leading to this outcome include identification of relevant energy efficient technologies, awareness generation about technologies and schemes, announcement of schemes and generation of Expressions of Interest (EoIs) to participate in the project.

- **Output 2: Aggregation of Demand for Standard Energy Efficient Technologies (SEET)**

  Baseline Energy Assessment studies to be conducted, followed by aggregation of demand for relevant energy efficient technologies and presentation in an interactive web portal.

- **Output 3: Selection of ESCOs/Vendors for supply and installation of SEET**

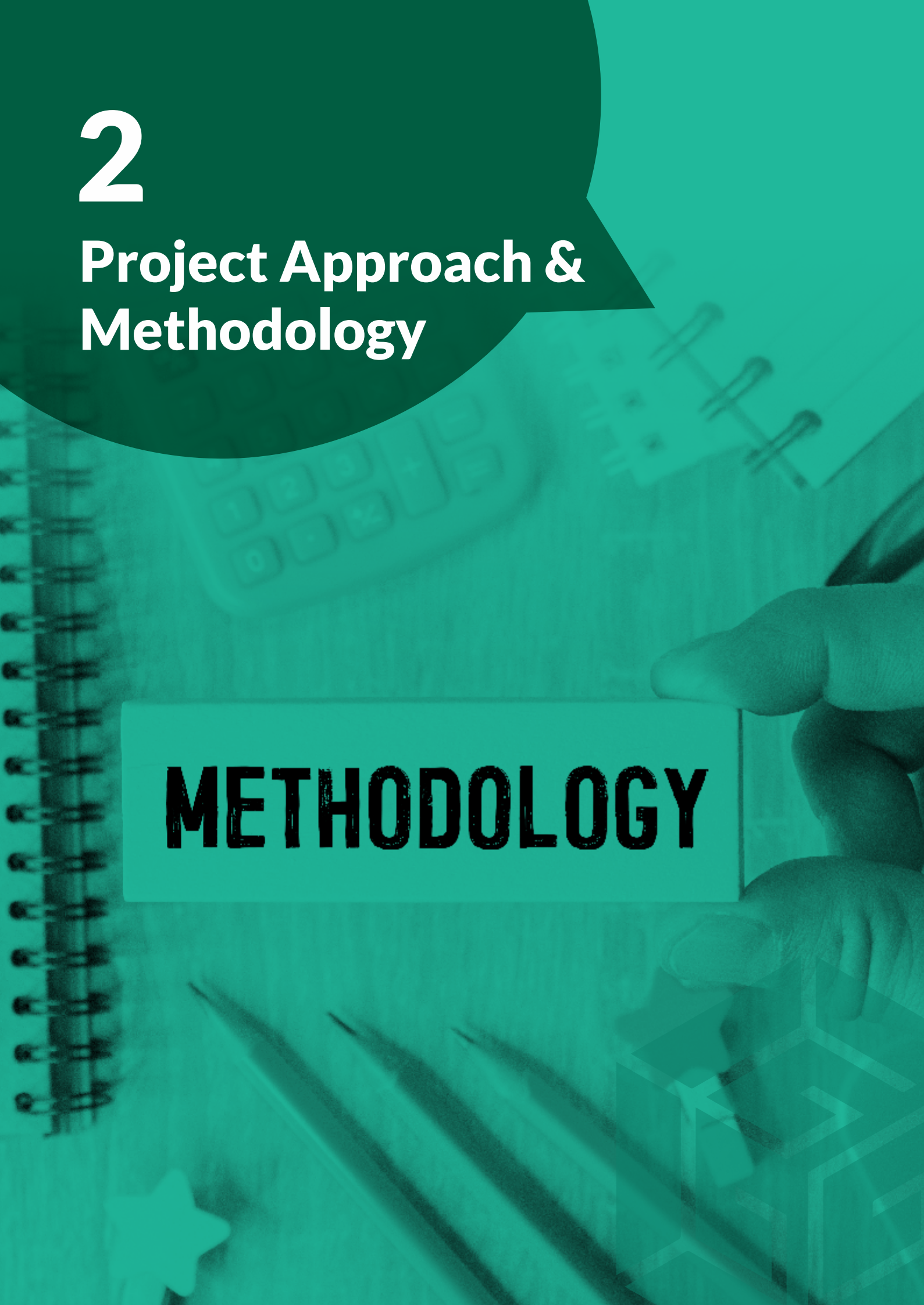
  Prospective ESCOs/Vendors to be apprised about the selected technologies and aggregated demand for these technologies in the three clusters; selection & empanelment of ESCOs/Vendors to be done, based on pre-defined criteria.

- **Output 4: Signing of agreement between industries and ESCOs/Vendors for implementation**

  Investment proposals received from ESCOs/Vendors to be vetted by EESL, and agreements to be signed between MSMEs and ESCOs/Vendors.

2

Project Approach & Methodology



2 Project Approach & Methodology

2.1 Approach & Methodology

The approach and methodology for executing this project is shown in the following activity flowchart:

1. Project Inception

- GGGI signs a Memorandum of Understanding (MoU) with EESL to jointly work on various energy efficiency areas.
- GGGI & EESL agree to collaborate to intervene in the MSME sector.
- Meeting with EESL, Cluster Industrial Associations, and other stakeholders
- Review of Technologies implemented by EESL under GEF 5 Project
- Obtaining cluster specific data through secondary data research

2. Scheme announcement workshops in 3 clusters

- Consultations with EESL & stakehlders for evolving the scheme
- Establishing communication with Industrial Associations (IAs) & other stakeholders
- Preparation of EoIs format, PPTs & documents for Scheme Announcement workshop, Technology-wise schemes & Technology Demostration review
- Meetings with IAs & other stakeholders to spread awareness about the project
- Organise Scheme Announcement workshops in 3 clusters

3. Awareness Workshops & Obtaining EoIs

- Conduct Awareness creation workshops and Brainstorming sessions with interested industries in the clusters to address queries and provide clarifications
- Follow up with IAs & industries for identifying interested project participants
- Meetings with the interested individual industries to generate EoIs
- Obtain signed EoIs from participating industries in the 3 cluster

4. Aggregation of Demand

- Preparation of Demand Aggregation survey questionnaires & Baseline Energy Assessment reports
- Meeting interested industries to persuade them to adopt relevant technologies
- Conduct baseline surveys to assess the demand for the technologies
- Preparation of Demand Aggregation reports, hosting the demand on the web portal

5. Selection of ESCO

- Preparation of formats for ESCO proposals / bids, finalising evaluation criteria & SoPs for technical due diligence of ESCO proposals
- Mapping of suitable BEE empaneled ESCOs and other ESCOs/Vendors
- Identification of suitable Technology providers and Financial institutions
- Interact with ESCOs/Vendors to solicit their participation in the project
- Shortlisitng of ESCOs/Vendors

6. Matchmaking with MSME and ESCO

- Preparation of standardized documents, Service agreements between ESCOs and MSME Units and M&V report formats
- Mobilization meetings to faciliate signing of agreements, demand aggregation, etc.
- Meetings for seeking proposals from ESCO with reference to the cluster requirements
- Developing methodology for technical due diligence and evaluation of the ESCO proposals
- After the evaluation, finalise proposals for each selected technology

7. Facilitating Implementation

- GGGI signs a Memorandum of Understanding (MoU) with EESL to jointly work on various energy efficiency areas.
- GGGI & EESL agree to collaborate to intervene in the MSME sector.
- Meeting with EESL, Cluster Industrial Associations, and other stakeholders
- Review of Technologies implemented by EESL under GEF 5 Project
- Obtaining cluster specific data through secondary data research

2.2 Cluster Profiles

- Keeping in view the typical nature of MSME clusters around the country, based on products and diversity of technologies, clusters involved in food processing, textiles, engineering & services were deemed appropriate for scaling up the implementation of energy efficient technologies. To foster this project, through deliberations with stakeholders, three MSME clusters in the Delhi National Capital (NCR) region in the state of Haryana, India, were selected, namely:

- **Rice Mill Cluster, Karnal**

  Karnal is called the rice bowl of India and is known for Basmati rice, a white rice with a fine aroma. This cluster has about 350 rice mills in operation.

- **Textile Cluster, Panipat**

  Panipat tops the world in the manufacture of shoddy yarn, which is made from recycled wool and rags; the products manufactured include shoddy yarn & fabrics, hosiery yarn, woollen carpets, etc. This cluster has about 8500 industrial units.

- **Mixed Industry Cluster, Kundli, Sonipat**

  The Kundli industrial area has about 3000 industrial units, operating in various business segments like houseware, textiles/garments, printing & packaging, auto components, engineering goods, footwear, food processing, cold stores, etc.

  All the three clusters are very different in terms of products manufactured or services provided, energy consumption, technologies used, type of manufacturing & utility equipment, work culture, and challenges & opportunities; a brief profile of the clusters is shown in Table 5. Detailed surveys of industrial units in these clusters and meetings with the local Industrial Associations and other stakeholders showed that these three clusters had a good potential for energy savings by incorporation of the selected technologies.

Table 5: Profile of Selected MSME Clusters

Particulars	Panipat Cluster	Karnal Cluster	Kundli Cluster
Type of Industries	Textile Process Houses (including Fabric Dyeing & Printing, Yarn Dyeing, etc.)	Rice Mills	Mixed Manufacturing & Service Industries
Product Manufactured	Bedsheets, Blankets, Curtains, Rugs, Towels, Upholstery, etc.	Parboiled Rice, Raw rice, White rice, etc.	Kitchen Appliances, Garments, Bags, Fancy Yarns, Packaging Materials, Auto Components; Services like Cold Stores for Fruits & Spices, etc.
Number of Industries suitable for SEET deployment	300	350	350
Major Energy Consuming Equipment	Boilers, Thermic Fluid Heaters, Electric Motors, Air Compressors, Pumps, Dryers, Dyeing & Printing machines, Stenters, etc.	Boilers, Air Compressors, Motors, Dryers, etc.	Air Compressors, Electric Motors, Fans (for human comfort)
Total Energy Consumption, toe/year	396288	544504	8574
Total CO2 emissions, (t CO2/year)	1282057	590400	95708

Source: *Data from Local Industrial Associations, field surveys and interactions with industrial units.*

Comprehensive cluster profile reports have been prepared for each of these clusters; these reports, based on critical evaluation of accessed data, have captured the unique characteristics of each cluster through SWOT analyses.

Implementing SEET in these clusters will help the industrial units improve their energy efficiency, reduce GHG emissions, energy consumption & costs, improve productivity and allow access to technologies at discounted prices.

2.3 Identified technologies Under SEET

Under a previous GEF project, EESL has previously demonstrated about 30 Standard Energy Efficient Technologies (SEET) in nine MSME clusters in India, resulting in energy savings in the range of 10% to 25% from the baseline values, with simple payback periods in the range of 1.0 to 2.5 years. The demonstrations were done through suitable business models where the project cost gets recovered from monetised energy savings.

Based on the findings of the surveys and meetings with local industrial associations and stakeholders, the SEET, relevant to the three clusters, were selected. It may be observed that the energy savings potential for various SEET are in the range of 5% to 40%, with simple payback periods are all very attractive in the range of 1.0 to 2.5 years. The relevant SEET for the three clusters with energy saving potential and expected simple payback periods are shown in Table 6

Table 6: Relevant SEET for the Target Clusters: Energy Saving Potential & Expected pay Back Period

S. No.	Energy Efficient Technology	Estimated Energy Saving Potential, %	Expected Payback Period, years	Rice Cluster (Karnal)	Textile Cluster (Panipat)	Mixed Cluster (Kundli)
1	Variable Speed Screw Air Compressor with Integrated Variable Frequency Drives and Permanent Magnet Motors	20-25%	1.5 – 2.0	✓	✓	✓
2	Flash Steam and Condensate Recovery Systems	20-25%	1.5 – 2.0	✓	✓	
3	PLC based Automation & Control System for Jet Dyeing Machines	15-20%	1.5 – 2.0		✓	
4	Automation & Control System for Boilers	15-20%	1.5 – 2.0	✓	✓	
5	Low Grade Waste Heat Recovery (from hot process effluents)	10-15%	2.0 - 2.5	✓	✓	✓
6	Energy Efficient (IE3) Motors (up to 75 kW)	5-15%	1.5 – 2.0	✓	✓	✓
7	Energy Efficient BLDC Fan (1200mm Sweep, 32-35 Watts)	>40 %	1.0 - 1.5	✓	✓	✓

The studies showed that the selected SEET would certainly reduce electricity & fuel costs and carbon emissions, and in some cases, provide additional benefits like improved productivity, reduced maintenance cost and reduced pollution. Access to these technologies at discounted prices through the innovative financing mechanism, already demonstrated by EESL in other MSME clusters, could be replicated in these three clusters. The rationale for energy savings from the selected SEET is shown in Table 7

Table 7: The rationale for energy savings from the selected SEET

S. No.	Energy Efficient Technology	Rationale for Energy Savings
1	Variable Speed Screw Air Compressor with Integrated Variable Frequency Drives and Permanent Magnet Motors	• Screw Compressor with VFD & Permanent Magnet Motor avoids unloaded operation of compressors that results in 15%-20% power wastage in reciprocating air compressors and about 30% power wastage in Screw compressors. • Opportunity to replace old inefficient reciprocating & screw compressors.
2	Flash Steam and Condensate Recovery Systems	• Flash steam recovery from high pressure steam condensate reduces steam demand from boilers. • Steam condensate recovery reduces boiler fuel consumption and water treatment cost
3	PLC based Automation & Control System for Jet Dyeing Machines	• Reduces process batch time by automatically optimising heating and cooling cycles, with reference process requirement, thus also improving productivity.
4	Automation & Control System for Boilers	• Optimizes excess combustion air, based on flue gas parameters, saving fuel. • Reduces fresh make-up water consumption by automatic blow-down control, based on water quality.
5	Low Grade Waste Heat Recovery (from hot process effluents)	• Heat recovery from hot process effluents at about 80°C (in textile processes) and contaminated steam condensate enables preheating of hot water for process or make-up water for boilers.
6	Energy Efficient (IE3) Motors (up to 75 kW)	• Motors, presently in use, are less efficient IE2 motors; the prevailing actual motor efficiencies may often be even lower than standard efficiencies, due to frequent rewinding. • IE3 motors have efficiency values higher by 2% to 5% points.
7	Energy Efficient BLDC Fan (1200mm Sweep, 32-35 Watts)	• BLDC fans have more efficient, permanent magnet Direct Current (DC) motors with inherent variable speed capability, consuming maximum 35 Watts, in comparison to 75 Watts in standard ceiling fans.

2.4 Cluster Workshops & Outreach Activities

The project was kicked off with a meeting of GGGI, EESL & FICCI. The GGGI team highlighted the program design, operational modalities, activity timelines, project outcomes, etc. The EESL team provided a brief on SEET demonstrated in nine clusters, ESCO models and expectations from the project. FICCI, being the project execution partner, presented its approach & methodology and work plan.

Project Kick-off Meeting with GGGI, EESL, FICCI

The MSME industrial units, equipment vendors, and other stakeholders of the project, were engaged through a comprehensive array of strategic initiatives. A series of awareness creation / brainstorming sessions, mobilization workshops, and scheme announcement programs across the target clusters were undertaken between January to June 2023.

g. Awareness Creation / Brainstorming Sessions:

The FICCI team under SEET performed individual consultations within the selected clusters in Panipat, Karnal, and Kundli. The primary aim of the consultations was to get a deep insight into the operations of these industries. The responses and comments received from them were used to develop a plan for smooth implementation of the identified technologies in the industries.

The consultations with industrial associations and industrial unit owners/managers in the Panipat, Karnal, and Kundli clusters provided an insight into the operations, vintage of technologies in use and work culture. The responses and feedback from them were used to identify relevant technologies and develop the action plan for the project. Follow-up meetings were conducted with Industrial. Associations for eliciting participation and getting confirmations. Separate one-to-one meetings were held with the interested industrial units to generate Expressions of Interest (EoIs) for SEET.

Meeting with Unit Head

Discussions with Mr. Subhash Gupta, President, Kundli Industrial Association

h. Scheme Announcement Workshops:

Scheme Announcement workshops were conducted to provide more detailed information about the project to prospective participants, with the objective of generating Expressions of Interest (EOIs). Office bearers of local industrial associations, industrial unit owners, senior plant representatives, government officials and other stakeholders participated in these workshops. The officials from GGGI, EESL & FICCI presented the objectives of the project, overview of technologies, ESCO financing models, etc. The dignitaries highlighted benefits of the project and urged industries to participate.

The Cluster Profile Reports were also released; these reports included information on the Energy Scenario in the clusters, major energy intensive equipment, Standard Energy Efficiency Technology (SEET) Adoption Potential and SWOT Analyses of the Clusters.

Release of Cluster Profile Report for Panipat

Scheme Announcement Workshop at Panipat

Address by Mr. Bhim Rana, President, Panipat Dyers Association

Release of Cluster Profile Report for Karnal

Ms. Renu Bala Gupta, Mayor of Karnal, addressing the Workshop participants

Address by Mr. Sanjay Bhatia, Member of Parliament from Karnal

Local Media coverage of "Scheme Announcement" Workshops

i. Mobilization Workshops:

Mobilization workshops were organized in all three clusters for more detailed discussions on the project, especially issues related to identified SEET, demand aggregation and facilitation of agreements between MSMEs and ESCOs/Vendors.

Assessment of Boiler Performance

Study Visit to Kitchen Utensils Manufacturer

Assessment of Textile Dyeing Process

Rice Mill Study Visit at Karnal

3 Implementation of SEET

3 Implementation of SEET

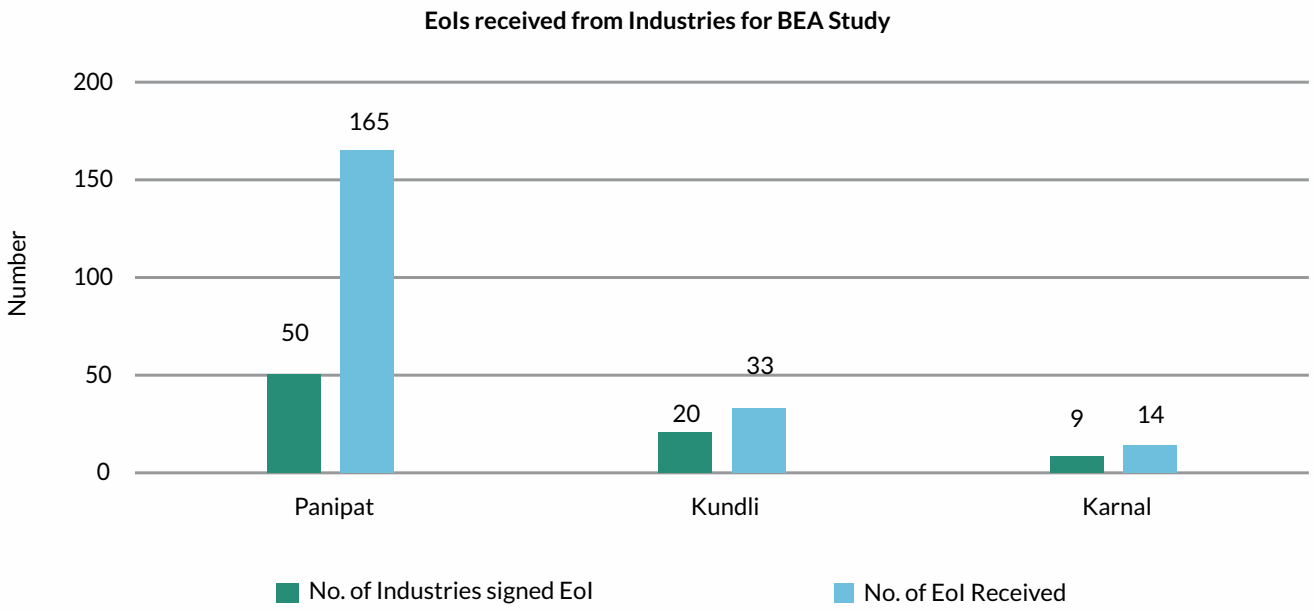
3.1 MSME EOIs & Baseline Energy Assessment Studies in Industrial Units

During the Scheme Announcement workshops and subsequent cluster visits, Expressions of Interest (EoIs) were obtained from industrial units with relevant SEET that could be adopted by them. An overwhelming response was received with 212 EoIs from 79 industrial units in three clusters as show in Table 8 & Figure 2. Baseline Energy Assessment studies were conducted in selected sample industrial units for assessment of the existing energy consumption, understand the vintage and operation of equipment like boilers, compressors, electric motors, process equipment, etc., estimation of operating energy efficiencies and quantification of energy saving potential by adoption of SEET.

Table 8: Number of Expression of Interests Received for BEA Study

Cluster	Number of Participating Industries	Number of EoIs Received
Panipat	50	165
Kundli	20	33
Karnal	9	14
Total	79	212

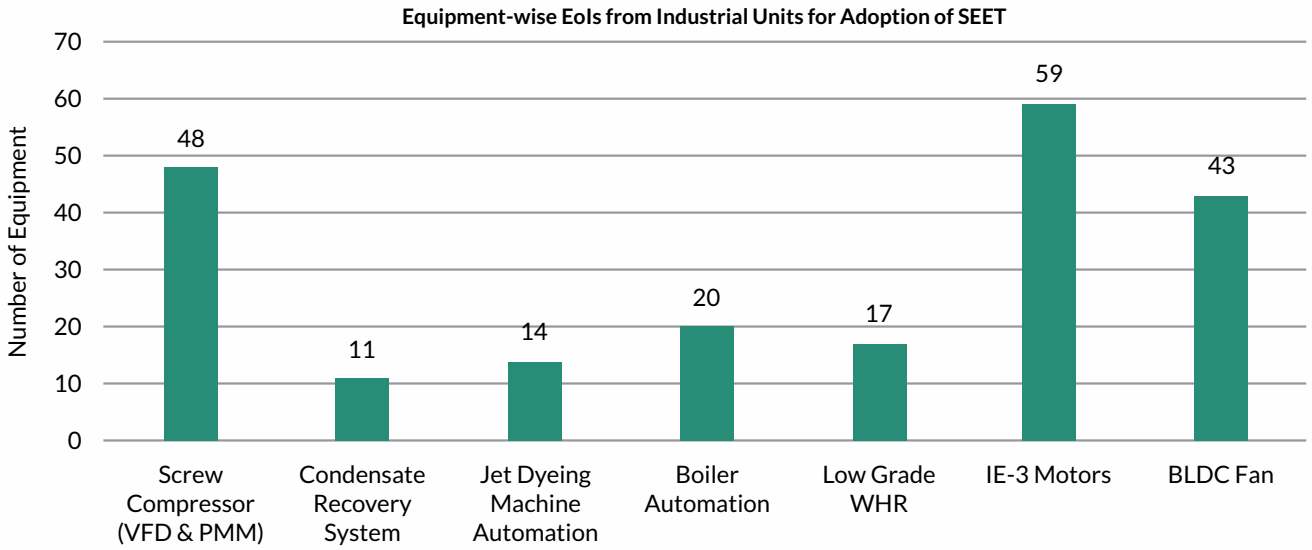
Figure 2: Number of Expression of Interests Received for BEA Study



Premium Efficiency IE3 Electric Motors generated the highest interest with 59 industries signing EoIs; Variable Speed Screw Air Compressors were next with 48 industries signing EoIs; BLDC fans were close with 43 EoIs; Boiler Control & Automation, Low Grade Waste Heat Recovery, Jet Dyeing Machine Automation and Flash & Condensate Recovery Systems followed with 20, 17, 14 and 11 EoIs respectively.

The EoIs received form industries for adoption of different SEET is shown in Figure 3.

Figure 3: Expressions of Interest (EoIs) from Industrial Units for Adoption of various SEET



4

Demand Aggregation for SEET

4 Demand Aggregation for SEET

Based on Expressions of Interest (EOIs) received, Baseline Energy Assessment (BEA) studies were conducted in 20 selected sample industries to identify the scope for replacement of existing equipment with Standard Energy Efficient Technologies (SEET), along with energy saving potential. The aggregated demand for SEET in 20 selected sample industries is shown in Table 9.

Table 9: Aggregated Demand for SEET in Interested Industries

S. No.	Details of SEET	Number of Equipment/ System Studies conducted	Number of industrial units with Energy Saving Potential	Aggregated Demand for SEET (Number of Equipment)
1	Variable Speed Screw Air Compressor with Integrated Variable Frequency Drives and Permanent Magnet Motors	20	8	10
2	Energy Efficient (IE3) Motors (up to 75 kW)	20	16	545
3	Automation & Control System for Boilers	9	6	6
4	Energy Efficient BLDC Fan (1200mm Sweep, 32-35 Watts)	20	18	423
5	PLC based Automation & Control System for Jet Dyeing Machines	8	3	8
6	Flash Steam and Condensate Recovery Systems	9	2	2
7	Low Grade Waste Heat Recovery (from hot process effluents)	8	3	3

The total demand for each SEET in 20 sample industries is extrapolated to the cluster level to arrive at the potential for energy saving and investment requirements. Based on aggregation of demand for SEET in the three clusters, it is estimated that there is a potential for:

- Reduction in the electrical energy consumption by 12 million kWh per year
- Reduction in biomass fuel consumption by 18 Tons per year
- Reduction in overall manufacturing cost reduction by US $ 2.6 Million per year

The estimated investment required, based on proposals from technology solution providers, equipment vendors and ESCOs, is US $ 3.4 Million, implying an overall simple payback period of 1.3 years. The estimated saving potential and investment required for each SEET in the three clusters is shown in Table 10

Table 10: Identified Energy Saving Potential in Three Clusters

Standard Energy Efficient Technologies	Number of Industries where SEET can be Implemented	Estimated Energy Consumption by potential equipment that can be replaced with SEET		Identified Energy Saving Potential				Investment Required
	No.	Million kWh/ year	Tons of fuel/ year	%	Million kWh/ year	Tons of fuel/ year	USD Million/ year	US $ (Million)
Variable Speed Screw Air Compressor with Integrated Variable Frequency Drives and Permanent Magnet Motors	150	17.59	-	29.8%	5.24	-	0.42	0.81
Energy Efficient (IE3) Motors (up to 75 kW)	200	135.78	-	5.0%	6.79	-	0.54	1.42
Energy Efficient BLDC Fan (1200mm Sweep, 32-35 Watts)	100	0.84	-	36.6%	0.31	-	0.04	0.06
Automation & Control System for Boilers	50	-	233.65	4.3%	-	10.11	0.91	0.25
Flash Steam and Condensate Recovery Systems	25	-	80.63	5.2%	-	4.19	0.32	0.29
Low Grade Waste Heat Recovery (from hot process effluents)	25	-	55.82	4.6%	-	2.57	0.24	0.20
PLC based Automation & Control System for Jet Dyeing Machines	25	-	55.82	1.4%	-	0.78	0.07	0.39
Total		**154.21**	**425.91**		**12.34**	**17.64**	**2.55**	**3.40**

5

Energy Service Companies / Vendors

5 Energy Service Companies / Vendors

5.1 Selection of ESCOs/Vendors

Mapping of ESCOs/Vendors with energy efficient products, relevant to the clusters, was done with reference to BEE's list of empanelled ESCOs. In discussion with the local industrial associations, other suitable vendors, already active in these clusters, were also identified. Meetings were organised with prospective ESCOs/Vendors to apprise them about the project and the aggregated demand for energy saving technologies in the three clusters. The selection procedure for ESCOs/Vendors for implementation of SEET comprised the following steps:

STEP 1
Mapping and inviting EoIs from interested ESCOs/Vendors through a standardized format

STEP 2
Request for Techno-commercial proposals from ESCOs/Vendors for implementation of SEET through standard formats.

STEP 3
Evaluation of proposals from ESCOs/Vendors based on pre-defined criteria.

STEP 4
Selection of ESCOs/Vendors for further discussions with industrial units for negotiations and signing of "willingness forms".

The processes adopted in each of the steps and related outcomes were as follows:

Inviting Expressions of Interest (EoIs) from ESCOs/Vendors

- Mapping of ESCOs/ Vendors, relevant to the clusters
- Online EoIs invited in standard formats
- Good response received from 12 ESCOs/Vendors, four of them were already empanelled with BEE

Call for Proposals from ESCOs/Vendors

- Techno-commercial proposals were invited from ESCOs/Vendors in pre-defined, standard formats
- Proposals were received from eight ESCOs/Vendors
- Three vendors for IE3 motors & BLDC fans
- Two vendors each for screw air compressors with integrated VFDs or Permanent Magnet Motors and Jet Dyeing machine automation
- For the remaining three SEET, one vendor was selected

Evaluation of Proposals from ESCOs/Vendors

- Proposals were evaluated based on four major categories as provided in below table
- Each major category is further sub-categorised with appropriate weightage scores
- Based on the evaluation of the submitted proposals, the recommeded list of ESCOs/Vendors was prepared

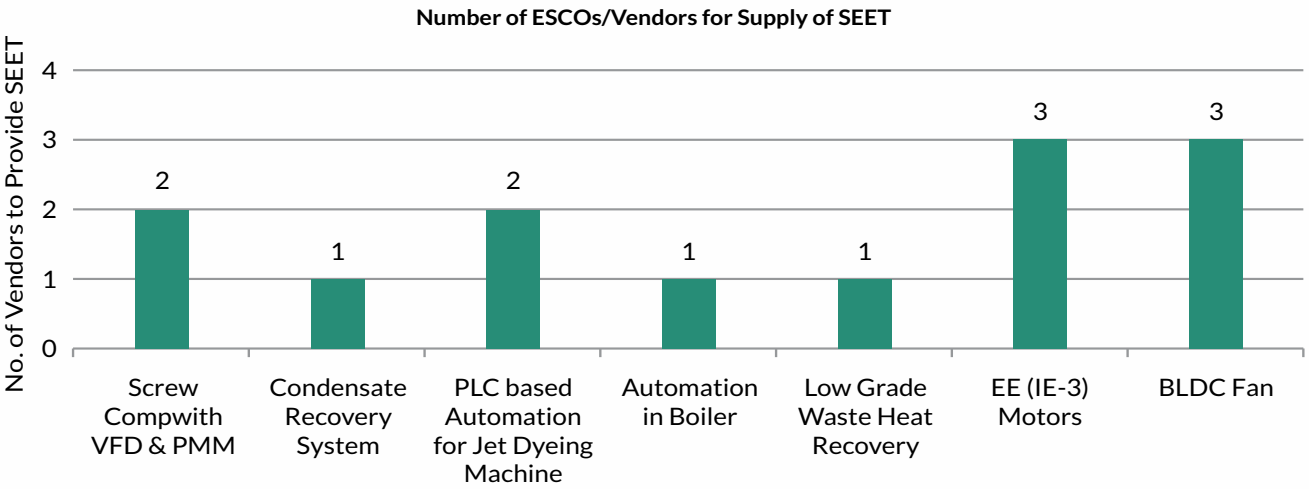
Techno-commercial proposals were received from eight ESCOs/Vendors. The major criteria for evaluation of ESCOs/Vendors included business experience, organisational strength, financial credentials and offered commercial terms; the major criteria and sub-criteria are summarised in Table 11. Scoring was done against the defined criteria to shortlist ESCOs/Vendors for supply of EE equipment.

Table 11: Evaluation Criteria for Selection of ESCOs/Vendors to Provide SEET

Criteria	Sub-Criteria	Score Weightage
Business Experience	• Year of commencement of operations • Experience as an ESCO • Coverage of industrial sectors • Local presence, especially after sales service capability • Equipment warranties • Project lead times	40%
Organizational Strength	• Total employee strength, including Energy Auditors and M & V Certified Professionals • Inventory of Energy Audit / ESCO instruments • Number of Audits done in past 3 years	20%
Financial Credentials	• Turnover & Net Worth • Value of ESCO projects in past 3 years • Debt exposure	25%
Commercial Terms	• Pricing • ESCO Financial models offered	15%

Three vendors were selected for IE3 motors and BLDC fans; two vendors for Variable Speed Screw Air Compressors with integrated VFD or Permanent Magnet Motors; two vendors for Automation of Jet Dyeing machines; for remaining SEET i.e. Boiler Automation, Flash Steam & Condensate Recovery System, Low Temperature Waste Heat Recovery System and Jet Dyeing Machine Automation. , one vendor was selected. The number of proposals received from ESCOs/Vendors is shown in Table 4.

Figure 4: ESCOs/Vendors for Supply of SEET



The list of recommended ESCOs/vendors for supply of Standard Energy Efficient (SEET) in the target clusters is shown in Table 12

Table 12: Recommended vendors for Supply of SEET

S. No.	Vendor	Type of Organisation	Score	Screw Compressor with VFD & Permanent Magnet Motor	Flash Steam and Condensate Recovery Systems	PLC based Automation & Control System for Jet Dyeing Machine	Automation & Control System for Boilers	Low Grade Waste Heat Recovery	Energy Efficient (IE3) Motors (up to 75 kW)	Energy Efficient BLDC Fan (1200mm Sweep, 32-35 Watts)
				1	2	3	4	5	6	7
1	Atomberg Technologies	OEM	53%							
2	Singla Motors	OEM	44%							
3	USHA International	OEM	31%							
4	Alien Group of Companies	ESCO	72%							
5	Electra Automation	OEM	27%							
6	SGS Industrial Controls and Solutions	ESCO	70%							
7	Venus Compressors	OEM	43%							
8	Bharat Bijlee	OEM	50%							

5.2 Interactions with ESCOs/ Vendors

On 22nd May 2023, a virtual meeting was organized to apprise the ESCOs/ Vendors about the project. Representatives from GGGI, EESL & FICCI made presentations to explain different aspects of the project. Twelve ESCOs/Vendors also attended the meeting; the requested information and clarifications were provided.

a) Ms. Neha Sharma, Energy Specialist, GGGI, briefed the audience on the role of Global Green Growth Institute (GGGI), GGGI's vision & mission, global footprint, GGGI's value chain & thematic areas. She spoke about the project objectives, stakeholders, target clusters, other project details & activities and deliverables.

b) Mr. Surender Kumar Verma, Additional Director, FICCI, & Mr. Pushpendra Nayak, Additional Director, FICCI, made a presentation on the seven selected technologies, relevant to the three clusters. He also presented the results of the demand aggregation exercise, that is

quantification of the demand for SEET in the clusters, along with energy saving potential.

c) Mr. M.A. Patil, Asst. Secretary General, FICCI, requested the ESCOs participate actively in the project and benefit from bulk orders.

d) Mr. S.P. Garnaik, Specialist & Communities of Practice Lead (GB&I), GGGI, discussed the project objectives, methodology and role of different stakeholders, including EESL's role as a facilitator between MSMEs & ESCOs/Vendors. He reiterated that EESL will help create awareness even among industrial units in the other clusters, empanel agencies for baseline energy assessment studies, aggregate the demand for SEET, invite proposals from ESCOs/Vendors, and facilitate agreements after technical due diligence and commercial evaluation.

e) Mr. Girja Shankar, Head (CDP), EESL, informed participants about the funding mechanism, demand aggregation, nature of agreements, empanelment of ESCOs, and working of the proposed EMRF.

f) Mr. Milind Chittawar, CEO of SeeTech, a successful ESCO in the commercial buildings space, especially the Hotels industry, shared his views on the likely challenges, and congratulated the project team for creating a working ecosystem to encourage the ESCO market in MSMEs.

6

Agreements between Industries & ESCOs/Vendors

6 Agreements between Industries & ESCOs/Vendors

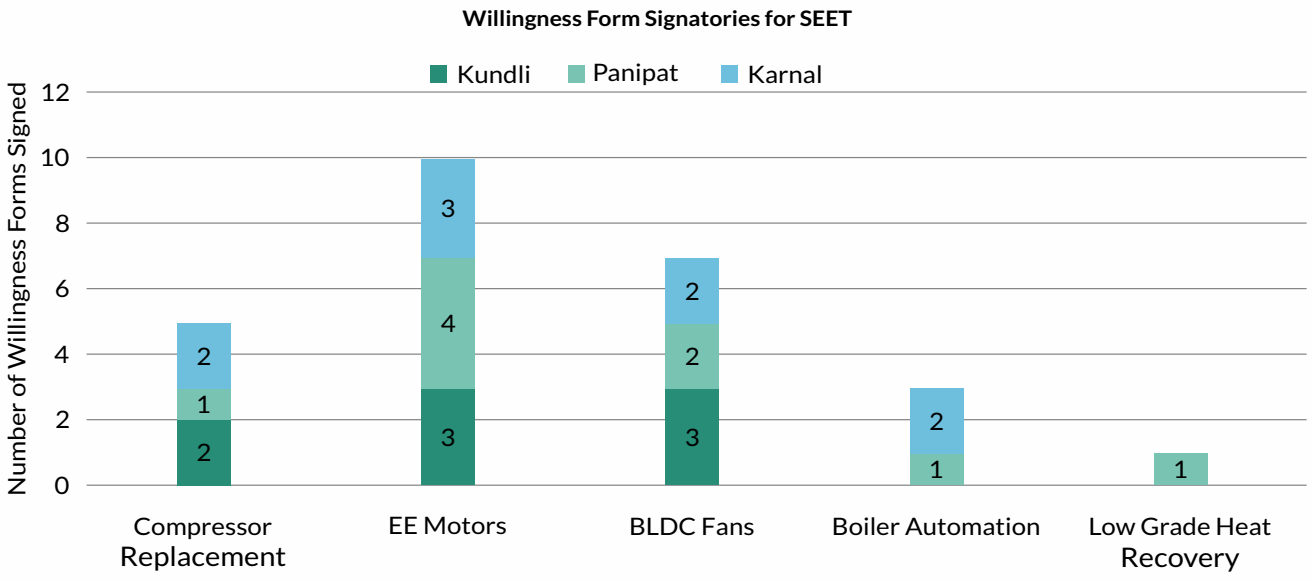
After discussions and approval of the baseline energy study reports by the respective industries, ESCOs/Vendors were selected; this was followed by one-to-one consultations between the concerned parties. These sessions facilitated comprehensive discussions, leading to mutual endorsement, and signing of "Willingness Forms" between the industrial units and ESCOs/Vendors, implying an understanding to implement SEET.

This exercise was a success with Twenty-six "Willingness Forms" being signed in the three clusters. Notably, Premium Efficiency IE3 motors attracted the highest level of interest, with 10 willing industrial units. The other technologies receiving positive responses were Variable Speed Screw Air Compressors (with 5 confirmations) and BLDC fans (with 7 confirmations). Significant interest was also shown in technologies related to Automation & Control of Boilers, Flash Steam & Condensate Recovery and Low Grade Process Heat Recovery. The details of willingness forms signed between ESCOs and industries in three clusters is shown in Table 13 and Figure 5

Table 13: Willingness Forms signed for Implementation of SEET

Name of SEET	Kundli	Panipat	Karnal	Total
Variable Speed Screw Air Compressor with Integrated Variable Frequency Drives and Permanent Magnet Motors	2	1	2	5
Energy Efficient (IE3) Motors (up to 75 kW)	3	4	3	10
Energy Efficient BLDC Fan (1200mm Sweep, 32-35 Watts)	3	2	2	7
Automation & Control System for Boilers		1	2	3
Flash Steam and Condensate Recovery Systems		1		1
Total Willingness Forms signed	8	9	9	26

Figure 5: Willingness Form Signatories for Implementation of SEET

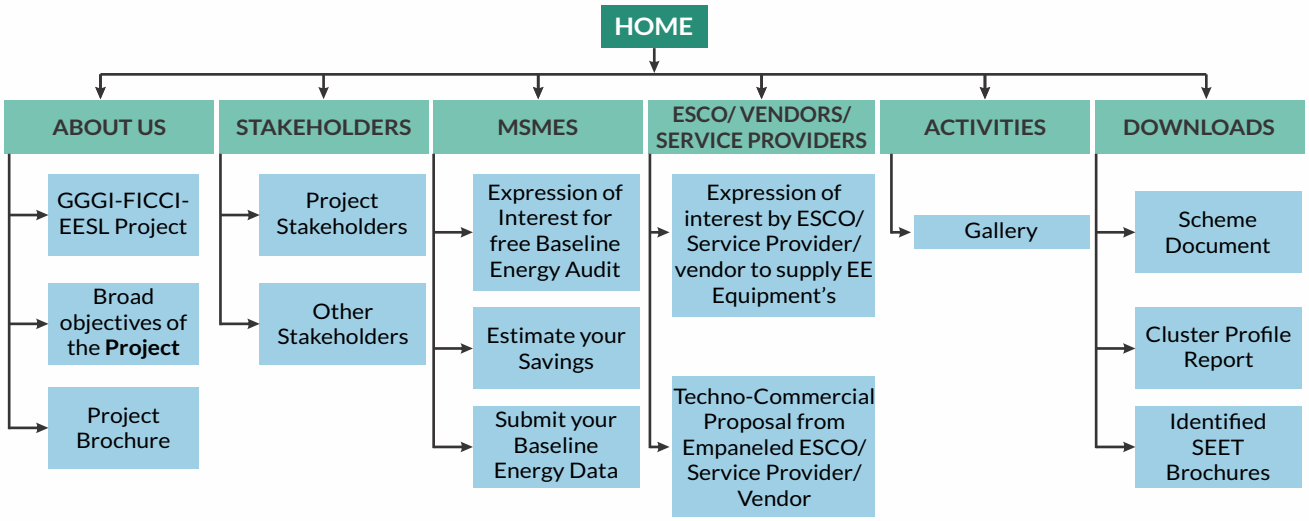


7
Project Portal & IT Tools

7 Project Portal & IT Tools

An interactive web portal (http://seet.ficci.in/) has been developed where in information about the project is provided, including details of stakeholders, information on MSME clusters, baseline information, SEET details, EoI formats for MSMEs & ESCOs/Vendors and techno-commercial proposals. It is a dynamic platform which can be accessed easily and used interactively. The web portal map is shown in Figure 6.

Figure 6: Web Portal / Site Map

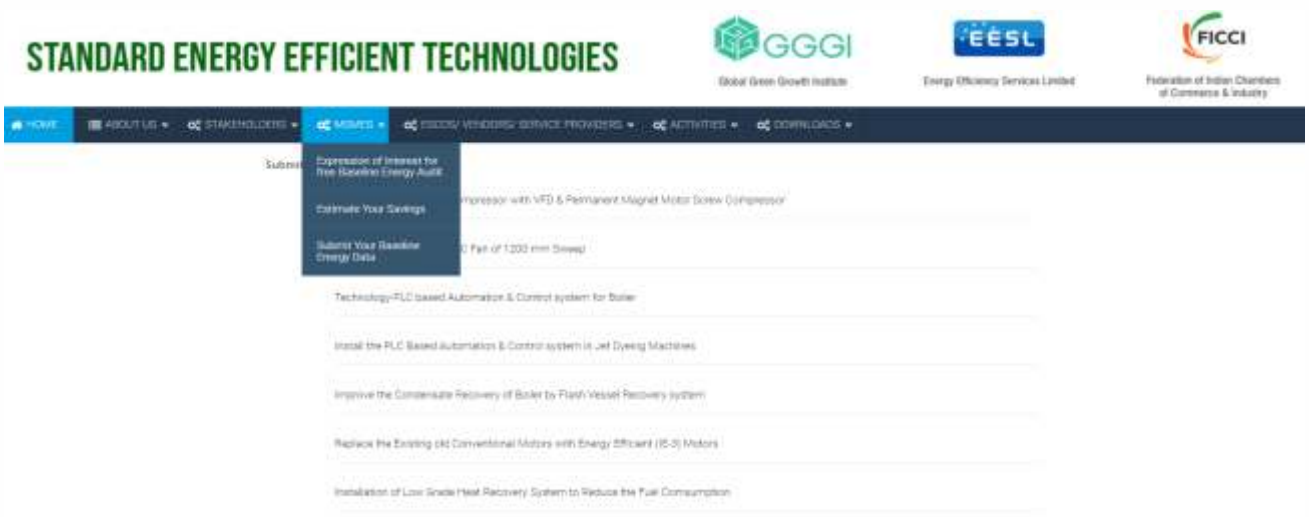


The availability of standardized formats, templates and documents on the web portal surely helps in the acceleration of the scaling up process, due to ease of communication between prospective project beneficiaries and ESCOs/Vendors; EESL and project associates like FICCI can remotely monitor the progress of the project, and if required, offer any mid-course corrections.

Some of important interactive web pages are described here:

7.1 WebSite: MSME - SEET Project

The "MSME" page can be accessed here http://seet.ficci.in/baseline_energy_data.html; the dropdown menu leads the user to the following pages:



- **EoIs for Free Baseline Energy Audit**: This is a standard format wherein MSMEs can submit their Expressions of Interest (EoIs) to participate in the project by opting for a free baseline Energy Assessment studies. At the backend, EESL will receive this information to initiate the baseline energy audit activities.
- **Estimate Your Savings**: This page links the user to another portal of EESL (https://eecalculator.eeslindia.org/) with standard energy and cost savings calculators wherein the user can feed in basic specifications and operating parameters of the equipment to estimate the potential for energy cost savings, investment and payback periods.
- **Submit your Baseline Energy Data**: This page (http://seet.ficci.in/baseline_energy_data.html) contains forms for data submission wherein the user can enter the equipment specifications and operating parameters of the equipment for performance assessment, estimation of the baseline specific energy consumption and potential energy savings by adoption of SEET.

7.2 Format for ESCOs/Vendors/ Service Providers

The "ESCOs/Vendors/Service Providers" page (http://seet.ficci.in/baseline_energy_data.html) leads the user, through the dropdown menu, to the following pages:

- **EoIs by ESCOs/Vendors**: This is a standard format (https://seet.ficci.in/venderinfo.php), wherein ESCOs/Vendors can submit their EoIs to participate in the project to promote their technology solutions. At the backend, FICCI accesses the ESCOs/Vendors' details and facilitates submission of techno-commercial proposals.
- **Techno-Commercial Proposals**: The format for techno-commercial proposals is provided, based on demand aggregation report, which can be used by ESCOs/Vendors to provide commercial offers.

8

Conclusions & Way Forward

8 Conclusions & Way Forward

Numerous studies for promotion of Energy Efficiency projects have been conducted in the MSME sector in India in the past three decades. Progress has been slow, due to the very traditional, conservative style of business operations in MSMEs. The focus of business owners has always been on production at acceptable quality, while ensuring profitability, in a highly competitive, price sensitive market. While regulations on air and water pollution are followed to ensure mandatory compliance, energy efficiency and good operating practices are rarely on their serious business agenda.

This project has attempted to break away from stereotype studies by going beyond mere identification of technologies and energy saving potential, and actually linking MSMEs with ESCOs, who would cover the technology and commercial risks of the projects, thus finding greater acceptability among MSMEs and accelerating implementation; some of the salient points of this project are:

- MSMEs were approached with defined basket of energy efficient technologies, followed by studies to shortlist technologies, relevant to the clusters.
- Prospective beneficiaries were made aware of the rationale of energy savings by use of energy efficient technologies.
- Addressed queries and anxieties of MSME business owners and managers through brainstorming sessions and mobilisation workshops.
- Formally elicited the interest of MSMEs in energy efficient technologies through Expressions of Interest.
- Conducted energy baseline assessment studies to confirm the relevance of the recommended technologies and quantification of energy cost savings and investments required.
- Formally received confirmations on the willingness of business owners to invest in the technologies.
- Aggregation of demand for energy efficient technologies in the clusters for bulk procurement helped generate interest in ESCOs and equipment vendors.
- Selection of ESCOs and vendors, based on defined criteria, added to confidence of the MSME technology buyers.
- Negotiated commercial arrangements that are a Win-Win for both the MSMEs and ESCOs/Vendors, finally resulting in the formal agreements to invest in the technologies.
- The availability of standardized formats, templates and documents on the web portal surely helps in the acceleration of the scaling up process, due to ease of communication between prospective project beneficiaries and ESCOs/Vendors; it also helps EESL's project managers to continually keep a tab on the progress of the project and quantify the achievements more accurately. The portal can easily be extended to implement similar projects in other MSME clusters.

Learnings & Way Forward:

- MSMEs offer a huge opportunity for improvement in energy efficiency and reduction in Carbon emissions; however, in spite of significant energy costs and an understanding that it can be reduced if addressed scientifically, routine business pressures related to production and marketing of products in a very competitive market leaves little time for retaining a continual focus on energy efficiency; it is only on the agenda for short periods when there is a spurt in energy prices.
- The major challenges are lack of awareness about energy efficient technologies and confidence that it can make a major dent in reducing energy cost. Most industrial units were not aware of previously demonstrated projects in other MSME clusters. There also appeared to be a need for authentication of technologies and equipment vendors for warranties related to the quality of their products, quantum of energy savings and return of investment.
- Generating confidence is a slow process that extends beyond seminars and workshops; numerous across the table discussions with business owners are needed to drive home the

rationale behind energy efficient technologies. Their concerns on surety of energy savings, reliability of equipment, after sales service, cost of spare parts, scope for local servicing, etc. need to be addressed realistically. MSME business owners often have great trust in their process & operations managers, often persons with limited educational qualifications, but with long years of "hands on" work experience; to gain acceptance, their concerns about the recommended technologies need to be aptly addressed.

- Having a pre-defined basket of relevant technologies helps avoid ambiguity in the minds of both energy professionals and prospective buyers, and surely speeds up decision making. Energy assessment studies and demonstration projects surely help in building conviction among prospective users about new technologies.
- The image of ESCOs and vendors need transformation from being viewed as mere equipment vendors to serious technology solution providers, with good technical understanding of their products, providing fair, risk neutral, financial packages. ESCOs need to understand the importance of incorporating instrumentation in their equipment or project package to enable the users to easily monitor, verify and quantify the energy savings on a routine basis. The importance of after sales service and availability of spares at reasonable prices is important, as projections of energy savings would be meaningful only if reliable operation of equipment is ensured.
- Promotion of energy efficiency projects in MSME clusters optimises the efforts and costs for awareness generation and marketing. The oft prevailing "do what your neighbour does" attitude in MSME clusters helps in amplifying the marketing efforts to achieve wider, faster proliferation of energy efficient technologies.
- Considering the low level of penetration of energy saving technologies in the MSME sector, ESCOs have a huge opportunity; however, the financial models offered by ESCOs/Vendors should realistically address the risks and total ownership cost of the technologies to MSMEs. EESL, through authentication of technologies, and empanelment of genuine ESCOs with ratified financial models, enables bulk procurement for meeting the aggregated demand in industrial clusters, which ensures a risk-free, technical and commercial Win-Win for both MSMEs and ESCOs.

The positives from this project that can have a bearing at the national level for the entire MSME sector are:

a. Replication in other MSME clusters:

The encouraging response for the implementation of SEET, shown by the industries in the three target clusters, indicates that there is a strong case to promote this concept and methodology in MSMEs in other clusters across India; it is reasonable to assume that other MSMEs may also be ready to adopt Energy Efficient technologies, through awareness creation and addressing issues related technological barriers and investment challenges at the micro level.

EESL has identified 35 standard energy efficient technologies. Successful implementation of seven of these technologies in the three target clusters will give the confidence to scale up these technologies in other MSME clusters too, with some tweaking in methodology, depending on cluster types, locations, relevance of technologies, etc.

b. Development of Private ESCO market:

There are about 140 empanelled ESCOs in India, but only very few projects have been implemented in ESCO mode for a variety of reasons. However, the methodology adopted in this project, wherein demand aggregation for EE equipment was achieved through baseline energy assessment studies in the clusters, resulting in the possibility of bulk orders, with minimal marketing efforts, encourages ESCOs and other equipment vendors to offer attractive prices at discounted rates; MSMEs also get encouraged, as they see other similar industrial units opting for the energy efficient technologies; the EoIs signed by the ESCOs/Vendors and MSMEs in the final B2B meetings are testimony to success of this project methodology.

The presence of a neutral agency like EESL adds to the confidence in the process; in future, many more private ESCOs may come forward with innovative financing models to provide Energy Efficiency technologies.

c. Single Window for Dissemination of information on schemes related to Energy Efficiency Technologies

There are various schemes, programs and financial schemes being provided by the Central government, State governments, Banks, Financial Institutions (Fis), Power Distribution Companies (DISCOMs), etc. for conducting energy audits, implementation of energy efficiency projects and renewable energy technologies, Demand Side Management (DSM) programs, etc. Multilateral agencies like World Bank (WB), Global Green Growth Institute (GGGI), UNIDO, etc. also have various programs for MSME clusters. However, there is an absence of a single window for dissemination of such information. The online common interactive platform, developed under this project, can be expanded to allow access to all these programs.

d. Expanding the Web Portal for Scaling up Projects in Other Clusters

This project has helped in standardisation of documents and formats like EoIs from industries &

ESCOs, Baseline energy audit templates, demand aggregation templates, selection criteria of ESCOs, templates for project implementation, Monitoring & Verification, etc. The online IT platform (http://seet.ficci.in/), developed under this project, wherein industries can submit their EoIs, baseline data, assess equipment performance, etc., and similarly, ESCOs can submit their EoIs, price quotations, etc.; this can easily be expanded for the entire MSME sector.

A system may be developed to ensure continuous updating of the portal and enlarging the canvas of energy efficient products. Demonstrated projects and case studies may be presented through video animations. Updates may be transmitted at regular intervals through notifications on the mobile phones of MSME business owners and managers to create more awareness and sustain their interest in energy efficiency.

e. Increased Engagement with National Level Industrial Associations

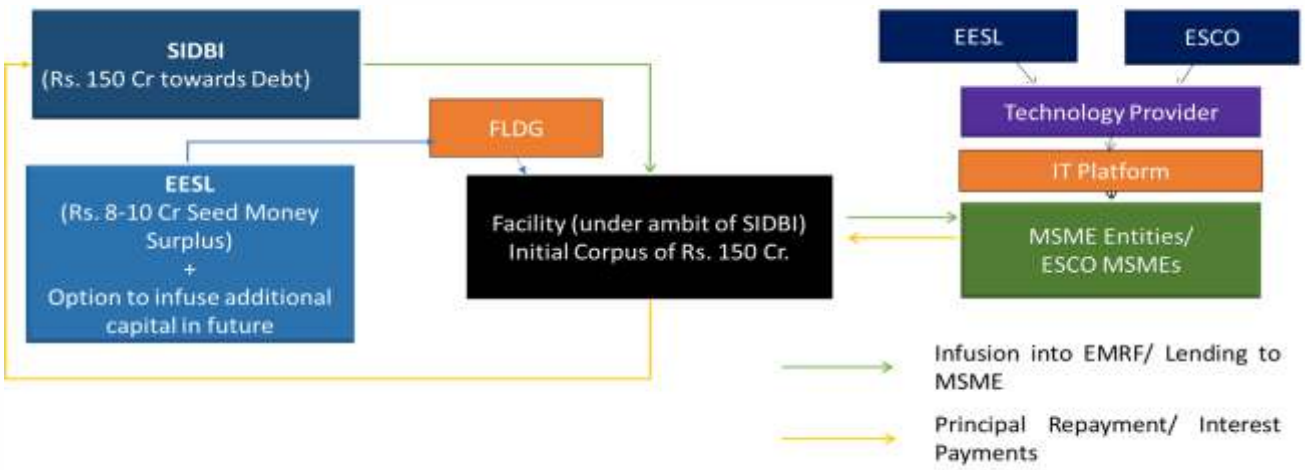
National Level Industrial Associations (like FICCI and other industry representative organisations-bodies) have a direct connect with various government bodies, local industrial associations and members from the industry; this can be leveraged further for proliferating Energy Efficiency projects across MSME clusters. FICCI and other similar organisations can also influence government policies to promote energy efficiency. National Level Industrial Associations also provide a good platform to bring different stakeholders, namely, MSMEs, ESCOs, Vendors, Financial Institutions, Consultants, Government bodies and other stakeholders on a common platform for creating the right climate for encouraging investment in energy efficiency.

f. Linkage of Standard Energy Efficient Technology (SEET) with EMRF Operationalization

Concept and Design of EMRF

EMRF is conceptualized as a separate financing framework to promote the ESCO market in the MSME sector. In this framework it was proposed that separate entities like a Special Purpose Vehicle (SPV)) may be created which will lend for the implementation of energy efficiency projects to any ESCO in India. Institutionally, this structure shall be managed jointly by the Small Industries Development Bank of India (SIDBI) and EESL. SIDBI is a national financing institution mandated to promote the productivity of the MSME sector through a structured financing model. In EERF, it is proposed that around USD 20 million (INR 150 Cr) would be put by EESL and SIDBI as initial corpus. The debt financing shall be done to any ESCO with commercial arrangement with typically less interest rate compared to the prevailing market rate. The broad structure and guiding principle of EMRF are presented below. The proposed EMRF structure has also the flexibility or options to infuse additional capital in the future by EESL.

Figure 7: Broad Structure of EMRF



Initially, SIDBI and EESL agreed to initiate a funding facility of INR 150 Crore for EMRF to be contributed by SIDBI. The seed money surplus is to be utilized for setting up for creating a *First Loss Default Guarantee (FLDG)*, IT platform, and interest subvention on customized technologies which may help SIDBI offer better terms of lending to MSMEs.The collaboration between EESL and SIDBI is to address the identified challenges through their domain expertise in the implementation of ESCO-based projects and EE financing to MSMEs. ***EESL will act as a market enabler and create a market for other agencies like ESCOs, MSMEs, and vendors. Management of EMRF and payment securities will be taken care of by SIDBI.***

Revenue Stream for EESL: EESL would have broadly two revenue streams from the EMRF fund. One would

be the principal repayments from MSMEs which would account against the seed money. The other revenue stream would be from the Project Administration Charges (PAC) towards MSMEs accounting for project administration and management expenses incurred by EESL in the implementation of the energy efficiency projects.

Revenue Stream for SIDBI: The funding from SIDBI will be in the form of debt and therefore, it will receive a proportional share with respect to its disbursements from MSMEs' principal and interest payments. The rate of financing of SIDBI would be equal or lower as compared to the overall rate of interest of blended funds owing to its lower cost of capital for financing projects at MSMEs.

Revenue Stream for ESCOs: ESCOs will be financed by EMRF to implement EE technologies at MSME units and provide relevant technical support. The major revenue stream for ESCOs would be the "Project Management Charges (PMC)" which is assumed to be between 3-5% from MSME units. Also, ESCOs will receive payments from MSMEs for the deployment of energy-efficient technologies. Apart from these direct revenue streams, ESCOs will receive other indirect benefits as demand aggregation at cluster levels will drastically reduce the procurement costs of selected technologies for ESCOs which would reduce their overall expenses and thus, increase the profit realization by ESCOs. EESL's empanelment of technology vendors would lead to standardization of EE technologies, coupled with demand aggregation which would result in lower initial costs and higher economies of scale.

Revenue Stream for MSMEs: There will be indirect revenue streams for MSME units with the adoption of energy-efficient technologies and competitive interest rates offered by EMRF. Firstly, the monthly energy savings from these technologies would allow the MSMEs to pay back the costs of installed technologies to EMRF or to the ESCO without any other capital allocation. Secondly, the lower interest rates offered under EMRF would reduce the interest payments made by MSMEs, thus unlocking additional capital to be used for other business purposes. Additionally, the reduced cost on account of economies of scale and services will provide cost-effective technology upgradation. In the coming years, MSMEs can earn additional revenue from carbon markets in India by reducing their GHG emissions through the implementation of EE technologies.

The draft operationalization of EMRF has been completed by EESL & SIDBI and is in the process of internal approval. It is believed that this mechanism shall create the necessary market transformation for ESCO in MSME Sector.

Initiative by GGGI to Support EMRF

GGGI, an international intergovernmental organization, conceptualised a project *"Scaling up of Investment through ESCO mechanism in MSEM Sector by deploying Standard Energy Efficient Technologies (SEET).* As explained earlier, EESL demonstrated 20 technologies successfully under GEF, however, to scale up the technologies in pan India basis, a structured approach was missing for awareness creation, generating Expression of Interest (EoI) & demand aggregation, and market enabler role of EESL (being super ESCO).

To address this issue, GGGI implemented the SEET project supported by Korean Green New Deal Fund (KGNDF) during 2023 with EESL. The project aimed to demonstrate a mechanism to engage private ESCOs while transforming the ESCO market for the MSME sector in India and correspondingly establishing a National Framework for Implementation (NFFI) of Standard Energy Efficient Technologies through Proof-of-Concept that will lead to accelerated investments and use of the EESL MSME Revolving Fund (EMRF).

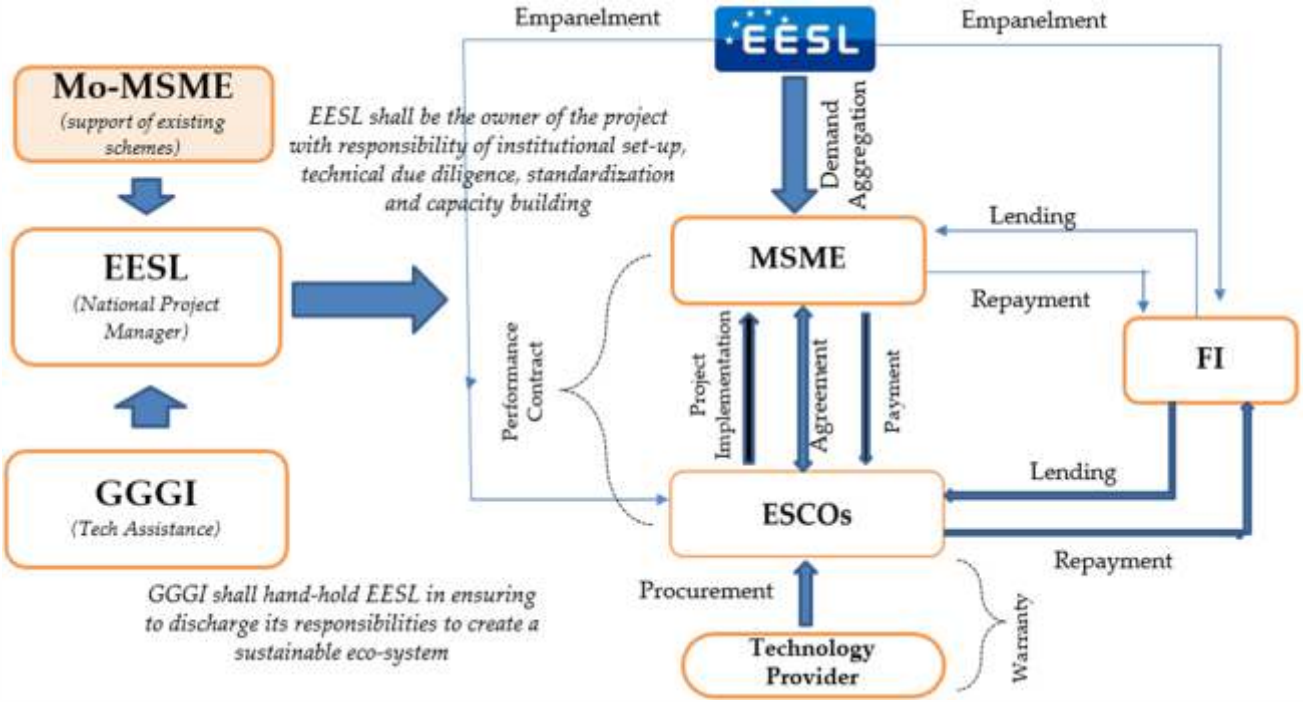
As successful outcomes, this project demonstrated the proof of concept that can be adopted in pan India during replication phase by EESL. Few of the highlights as mentioned below.

- 3 clusters identified: Karnal (Rice cluster), Panipat (Textile cluster), Kundli (Mixed cluster)
- 7 Standard Energy Efficient technologies identified with applicability in all three clusters.
- IT tools developed for the identified technologies for demand aggregation.
- Mobilisation/awareness workshops conducted in the identified clusters.
- 12 standard documents and 26 reports developed.
- Match making with 12 ESCOs to deploy the technologies in interested MSMEs.
- 7 ESCOs participated for proposal submission.
- Criteria for Financial & Technical evaluation developed for ESCOs
- Based on evaluation 4 ESCOs finalised to initiate the discussion with MSMEs
- 26 willingness form signed between ESCO and MSME

More details about the project is given in https://seet.ficci.in/

The broad framework of SEET project is presented below :

Figure 8: Broad framework of SEET project



Linkage of SEET Project with EMRF:

As explained earlier, the learnings in 3 different clusters in the north India region highlight that the MSME units and the Pvt ESCOs are quite interested for improving /optimizing energy consumption of their facilities. To do so, the best possible option should be deploying standard energy-efficient technologies where the benefits of bulk procurement through demand aggregation can be achieved. The SEET project also highlighted how standard methodologies in demand aggregation involving quick energy audits baseline estimation and DPR preparation etc. may be streamlined. In the same way, EESL may utilize this standard methodology as a national institution to catalyse the ESCO market. In principle, EESL is not encouraged to do the investment here but facilitates to creation of demand for SEET and support in implementation through Private ESCOs.

The above-proposed structure of EMRF seems to be a vital vehicle in this endeavour. If properly operationalized, EMRF has the potential to harness the entire ESCO market of over 100mn USD in a quick time on pan India basis. GGGI envisages the following to operationalise the EMRF

1. **Development of user-friendly IT platform:** A suitable user-friendly IT platform will be the key to interface with all stakeholders like MSME units, ESCOs, Technology providers, EMRF project management units (in SIDBI) & and EESL (for Technical due diligence). The IT platform will not only fast-track the implementation but create transparency in the system.
2. **Handholding of EESL:** EESL will play as the super ESCO or national institution to operationalize EMRF. This will require a dedicated project management unit to be established in EESL to discharge the due diligence process. The standardized methodologies/Templates developed under the SEET project may be used.
3. **Aggressive campaign about EMRF:** This is one of the important links for the success of EMRF, SIDBI & ESSL should develop a suitable mechanism to reach out to all stakeholders regarding the benefit, usability, and participation procedure in EMRF. The existing channels of SIDBI, EESL, MoMSME, and BEE may be utilized to create maximum impact on the initiative.
4. **Pilot Model of operationalization of EMRF:** It is important that the EMRF scheme once approved by SIDBI & EESL Management should go through a full cycle from demand aggregation to project implementation by leveraging EMRF in any cluster(s) in India. This pilot project will create confidence amongst all and result in important learnings to further fine-tune the EMRF schemes.

The above points to operationalize the EMRF shall involve a different set of activities. SIDBI & EESL may avail of technical assistance support from

developmental agencies for the same. It is believed that the successful operationalization of EMRF would result in energy savings in the MSME sector making them competitive and profitable in addition to supporting India's NDC goals. The EMRF may also create separate revenue streams for SIDBI, EESL, ESCOs and MSME units as explained earlier. GGGI with its mandate to promote energy efficiency in the industrial sector may extend necessary technical assistance support to SIDBI & EESL in a mutually agreed mechanism to operationalize EMRF.

Concluding Remarks

This project has effectively addressed some of the issues with some creative interventions; these are summarised here, along with suggestions and recommendations to sustain it:

- This project demonstrated that complete handholding, involving awareness generation, establishment of energy baselines, scientific presentation of authenticated energy saving technologies and involvement of technically qualified ESCOs with ratified financial models leads to accelerated acceptance by business owners. However, if this model has to eventually become "business as usual" in the over 400 MSME clusters in India, it has to sustain itself with a momentum of its own, with support from EESL, as a super-ESCO.
- One of the impactful achievements of this project is the creation of a "single window" portal that would be a continually evolving tool for awareness creation, information dissemination and live interactions between MSME industrial units and ESCOs/Vendors.

This project, with EESL as a super-ESCO, has laid the groundwork for creating an eco-system for ESCOs/Vendors to invest in the MSME sector, after demonstration of Proof-of-Concept. The various components of this project, especially the standardisation of procedures and documents through the web portal, has significantly simplified the mechanism for participation of smaller ESCOs/Vendors. The MSMEs can also now engage with ease and confidence qualified and approved ESCOs/Vendors with ratified financial models.

To create a true market transformation of Energy Efficiency in the MSME sector, accelerate investment and technology deployment/transfer, a national level organization, working in Energy Efficiency, has to take ownership in creating the ESCO market by engaging SMEs, industry associations, Energy Auditors, ESCOs, Financial Institutions, State level policy makers, etc. EESL is best placed to anchor this "Institutional Framework", along with the proposed EESL MSME Revolving Fund (EMRF).

- Once the EMRF is launched, an information blitz would be required over the next few years to ensure that every MSME industrial unit in the country is aware of the energy efficient technologies, promotional schemes and approved ESCOs/Vendors. Once a critical number of industrial units in each cluster successfully implements these projects and their success stories are publicised, the energy efficiency movement in the MSME sector should surely accelerate to significantly reduce carbon emissions and energy costs.

NOTE

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