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Market Transformation in Energy Efficiency: A Success Story of the MSME Sector in India

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Highlights

- Successful models for scaling up energy efficient technologies in the MSMEs
- Cost reduction- Bulk procurement
- Model for scale-up and replication

Abstract

This paper illustrates successful cases of financing through bulk procurement for the scale-up of standard energy-efficient technologies in the MSME sector via innovative business models. The study analyses success factors and implementation methods seen in the UNIDO-EESL-MoSME programme "Promoting Market Transformation for Energy Efficiency in the MSME Sector" under GEF-5 and will highlight its achievements, with Surat and Jorhat clusters as examples. The authors attempt to highlight the challenges and mitigation mechanisms involved while exploring opportunities for involving private sector ESCOs similarly. Secondary research methods and stakeholder consultations were adopted during paper development. There is potential to scale-up these technologies in MSME clusters pan-India through programmatic models resulting in substantial emission reductions, development of indigenous supply chains, job creation, and creation of green-growth pathways, making it crucial for India's net-zero and NDC targets. A similar model, developed by GGGI with EESL, addressing the barriers for replication and scale-up, is also showcased.

Keywords: MSME sector decarbonization, energy efficient technologies, demand aggregation, innovative business models, bulk procurement

Introduction

India's Micro, Small & Medium Enterprises (MSME) sector is also known as its backbone and growth engine for good reason, contributing 26.83% to its GDP and being responsible for 40% of its exports [1]. While responsible for one-third of the country's total manufacturing output, the sector is also highly emission-intensive owing to the usage of fossil fuels and its unorganized and informal nature of operations, which makes it a regulatory nightmare. Currently, the sector accounts for nearly 25% of the total energy consumption by the industrial sector in India, wherein 15% is consumed as electricity, and the remaining 85% is consumed from thermal energy sources [2].

As part of India's NDCs, the government has committed to a reduction in emissions intensity by 45% by 2030 from 2005 levels and 50% cumulative electric power installed capacity from non-fossil-fuel-based energy resources by 2030, with the help of the transfer of technology and low-cost international finance [3]. Significant reductions in energy consumption and emissions from India's MSMEs, particularly the adoption of newer, more energy-efficient technologies, will be necessary to achieve this. Initially, the states with the highest number of key MSME clusters in India may be targeted for implementation. It can be noted that more than 70% of the MSME clusters are based in the states of Uttar Pradesh, West Bengal, Tamil Nadu, Maharashtra, Karnataka, Bihar, Andhra Pradesh, Gujarat, Rajasthan, and Madhya Pradesh [4]. Various energy audits by leading organizations like BEE, TERI, UNDP, NPC and Industry Associations, etc., have revealed that there are energy savings to the tune of 10-30% with less than 2 years payback period in the MSME sector. It is also observed that maximum energy saving is possible by retrofitting or replacement of conventional technologies with energy efficient technologies. It is interesting to note that many of the technologies are "standardized," i.e., with similar technical specifications that may be applicable to various MSME clusters. This gives us an opportunity for the demand aggregation of these identified Standard Energy Efficient Technologies (SEET) that may be taken for bulk procurement. Such an approach has immense potential for enabling technology cost reduction, the benefit of which may be passed on to the consumers.

The cost reduction through demand aggregation and bulk procurement has been well established in India through national programs like UJALA (Unnat Jyoti affordable LED for all) and LED street light national program (SLNP) implemented by Energy Efficiency Services Limited (EESL) during the last 8 years. Riding on the high success of these 2 programs, wherein a cost reduction of around 50-70% was observed, EESL intended to expand a similar approach to the industrial sector, i.e., MSMEs [5]. Accordingly, EESL, in partnership with UNIDO, initiated a project called “Market Transformation through Energy Efficiency in MSME” in 2017, intending to create an ESCO ecosystem in the sector.

This paper is an attempt to highlight the success stories of the above project in terms of technology identification, deployment, and business model design, thereby creating a possible pathway for scaling up. Further, it highlights the challenges faced during the implementation along with recommendations for possible interventions. A similar project, developed with GGGI’s SEET programme focusing on replication in 3 clusters in Kundli, Panipat, and Karnal, is also explored as a model for addressing the challenges in the scale-up.

Methodology

The study will analyze the key success factors and method of implementation seen in the UNIDO-EESL-MoSME programme “Promoting Market Transformation for Energy Efficiency in the MSME Sector” under GEF-5 and will further highlight the savings achieved under this programme. Recommendations for scaling up and replicating the above programme in a sustainable manner with funding from other sources are explored through GGGI’s existing model.

The study is structured into 3 parts: analysis, results and discussion, and conclusion. The analysis gives a brief introduction to the programme and delves into the description of the clusters, their energy scenarios, the key interventions identified, and an example of technology intervention that was followed in each. The results and discussion look at the energy savings and the overall impact of bulk procurement on the savings. It also delves into the succeeding project developed by Global Green Growth Institute (GGGI) with Energy Efficiency Services Limited (EESL) and how the replication and scale-up may be carried forward.

This study is primarily based on secondary data. The relevant data is collected from various sources, including a number of industry reports, the annual report for 2022-23 of ‘Ministry of Micro, Small and Medium Enterprises’, the official website of the EESL MSME project, and other EESL project reports (including, but not limited to, various detailed project reports, survey reports and statistics on the relevant projects), Ministry of Statistics, research reports on the MSME sector, and GGGI’s annual project reports on SEET.

Analysis

A brief introduction to the programme and methodology adopted for implementation

The programme, “Promoting Market Transformation for Energy Efficiency in the MSME Sector,” was developed under GEF-5 (Global Environment Facility). Implemented under the technical guidance of the United Nations Industrial Development Organization (UNIDO) in collaboration with Energy Efficiency Services Ltd. (EESL) and MoMSME (Ministry of Micro, Small and Medium Enterprises), the project was also co-financed by the Bureau of Energy Efficiency (BEE) and Small Industries Development Bank of India (SIDBI) and aims to deploy selected standard EE technologies in various MSME clusters across India.

As per the survey reports, technology selection was carried out by identifying critical parameters to ensure ease in the implementation, energy-saving potential, availability of indigenous manufacturing and local service providers (LSPs), and potential for replication and eliminating those that did not make the cut. A careful step-by-step process was carried out. This included gap assessment through surveys of LSPs and technology vendors, detailed energy audits for the industries (carried out for a sample of 5% of the representative industries in each cluster), stakeholder consultations, and preparing a benchmarking matrix to identify replicable technologies. A technology toolkit was developed, and a mobilization workshop was carried out in each cluster. This was followed by a unit survey, at the end of which 35 technologies were identified for 10 MSME clusters. The MSME clusters were also selectively chosen based on the potential for maximum energy savings and replicability across the sector.

The preparation for demonstration in the units was carried out in a streamlined manner and included the identification of units for the same. 2 demonstration projects per unit were chosen, and the business model was finalized based on the ESCO (Energy Servicing Company) model, wherein the investment is expected to be recovered through the implementation of a Pay-As-You-Save (PAYS) model, which works by monetizing energy savings through the technology used in the cluster. Baseline energy audits were conducted as part of the demonstration in order to finalize the technical specifications and the monitoring and verification protocol. The procurement of technology and the process of identification of the vendor for implementation of the demonstration will be elucidated in detail through the case studies.

The process was documented to ascertain the benefits. The final stage included the initiation towards replication in other clusters.

Quality control was ensured for the entire process, from decision-making, implementation, the review of the work plan, and the scrutiny of technical details such as technologies and business models to other project-related activities by carrying it out in consultation with and alongside the strategic guidance of a Project Steering Committee and a Working Technical Advisory Committee. Members included representatives from MoMSME, Bureau of Energy Efficiency (BEE), EESL, the Small Industries Development Bank of India (SIDBI), as well as representatives from GEF and other relevant bodies [6].

The Key stakeholders of the project were identified as [6]:

- Global Environmental Agency - Donor Agency
- Bureau of Energy Efficiency - Guiding agency
- MoMSME
- MoEFCC
- United Industrial Development Organization (UNIDO) - Implementing agency
- Energy Efficiency Services Limited (an entity under MoP) - Executive agency
- SIDBI - Financing guide and Partner
- MSME units and their cluster associations

Based on data available from the EESL MSME website, the project was successful despite the COVID-19 pandemic with 24 technologies being demonstrated in various clusters during the period of 2018 to 2022 [6]. Out of these, 2 successful clusters were chosen for analysis in this paper based on the availability of information and the demonstrated energy savings observed. The following section of this paper explains the approach and methodology adopted in 2 clusters, mainly Surat (textile) and Jorhat (tea processing), and the impact created through bulk procurement and the ESCO mechanism.

Surat "Textile" Cluster demonstration

About the cluster: Surat, also known as "the Silk Capital of India", hosts more than 600,000 power looms and is known for its dyeing and printing industries. Its strength lies in the production and export of fabric and fibre, accounting for 40% of India's total man-made fabric production, 28% of its total man-made fibre production, and 18% of its total man-made fibre exports. Along with the presence of nearly 400 printing and dyeing industries in the cluster, the majority of these are concentrated in the industrial area of the city and have been operational for almost 15 to 30 years. Of these, nearly 60% belong to the MSME sector *(Refer to Figure 1)*. The raw material most used is grey polyester which is procured from local producers. The key point to note is the cost of energy, which ranges between 12% and 15% of the total manufacturing cost. This share is due to the fact that the majority of industries apply the wet process, which makes use of a large amount of thermal energy via hot water and steam. Before the UNIDO-EESL-MoMSME programme, the textile industry in Surat, dominated by the processing (dyeing and printing) industries, mainly relied on local technologies, which were generally of poor quality and energy intensive. This was mainly due to the lack of investment initiatives for the same.

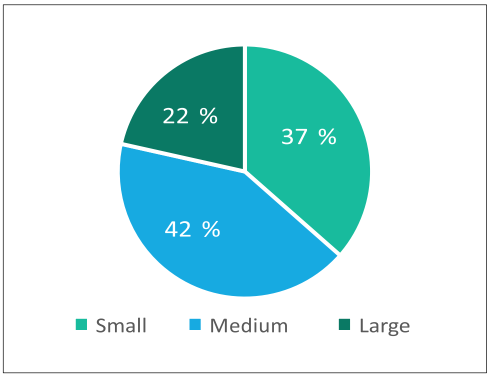

Figure 1: Percentage of textile industries in Surat by scale

The industrial association taking care of the legal and welfare concerns for the Surat cluster is currently the South Gujarat Textile Processors Association (SGTPA), which operates in and around Surat, i.e., in Pandesara, Sachin, Kadodara and Palsana. Part of their mission includes reducing production costs and promoting awareness among the units regarding energy efficient practices and technology. The areas in and around Surat have a number of Common Effluent Treatment Plants (CETPs), making them suitable for textile processing units, which have a significant amount of effluent waste. Major equipment used for wet processing includes jet dyeing machines and jigger machines for dyeing processes, stenter machines for stretching fabrics, heat setting and applying the finishing chemicals, printing machines for colouring patterns, rotary drums, and loop machines. Of the 400 units surveyed based on production facilities, around 65% had both dyeing and printing facilities, while 27% had only dyeing facilities, and the remaining 8% had only printing facilities.

Energy Scenario in the cluster: Energy consumption in the cluster happens through both fuel and electricity. The majority of the fuel consumed was coal, which accounted for nearly 94% of energy consumption, while 6% came from electricity. In contrast, nearly 45% of the total energy cost share came from electricity consumption. The electricity was purchased from Dakshin Gujarat Vij Company Limited (DGVCL) - a state-owned power distribution utility or generated using microturbines or DG sets. An outline of the fuel and electricity use in each stage of the processing is shown in Figure 2.

Energy-intensive equipment and processes: Based on the surveys of 100 units that were conducted (Annexure 1), the major energy-intensive equipment were found to be the stenter machine, the printing machine, the U jet dyeing machine, and the drum machine. These had a connected load of around 60% of the total connected load from equipment. The energy consumption from the textile dyeing and printing units was seen to depend on the production capacity and type of process used. Based on the electricity bills and the equipment being used, a savings potential of up to 10 to 15% per unit could be ascertained. The thermal energy use share was observed to be the biggest from losses during condensate recovery, process drying, heating, the heat released from equipment, and exhaust losses.

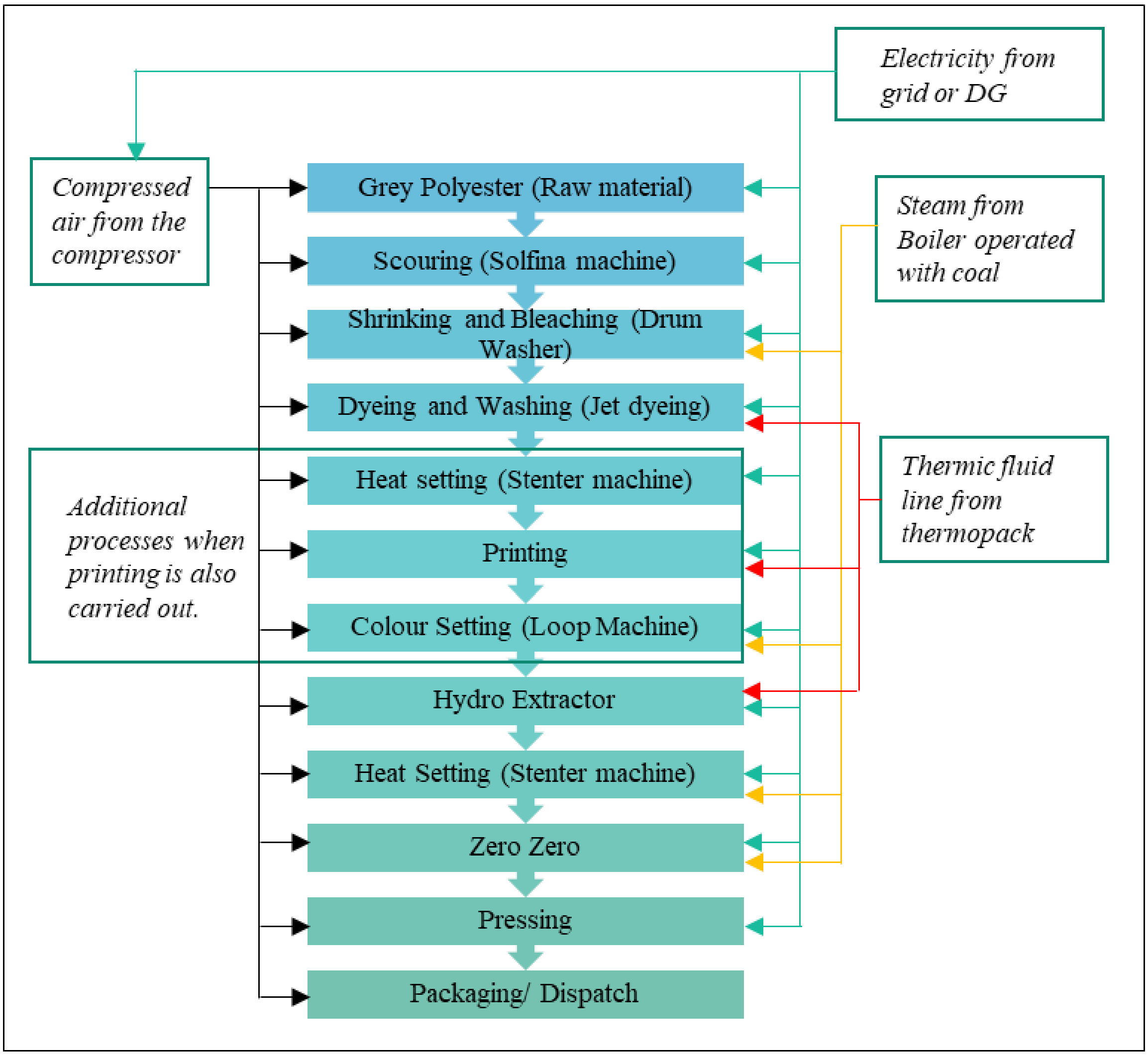

Figure 2: Process flow diagram (Textile dyeing and printing) and energy consumed

Critical equipment and processes identified: These include boilers for producing steam, thermic fluid heaters, jet machines wherein the amount of water and chemical depends on the manual operation, and air compressors such as reciprocating and screw compressors. Based on the energy audits and stakeholder consultations, 5 technological interventions were identified for implementation in the Surat cluster:

1. Replacement of existing reciprocating compressors with a VFD-enabled screw compressor with a Permanent magnet (PM) motor
2. PLC based automation system in Jet Dying machine
3. Steam Condensate Recovery System for indirect heating system

4. PLC based automation and control system for boilers and thermic-fluid heaters
5. Installation of Micro Turbine for power generation (Parallel to PRV system)

Technology willingness was determined for the above, and the replication potential was assessed.

EE Technology chosen for bulk procurement in Surat: Jet dyeing was one of the processes identified for targeted energy efficiency interventions. The process involves pressurized dyeing of the raw cloth in an even manner. The key here is to use a relatively small amount of chemicals without damaging the cloth. It is a water-intensive process and depends on manual control, which may lead to an excessive use of water and steam if not done right. The project thus envisaged savings by introducing automated control of the Jet Dyeing Process. A PLC system was introduced to operate the jet based on a logic programme, allowing it to optimize the water intake during the cycles, reducing the overall batch time as well as the amount of steam required to raise the temperature if required. This ultimately reduced fuel consumption and enhanced the overall production capacity of the jet dyeing machines.

Jorhat "Tea" Cluster demonstration

About the cluster: Jorhat, a town in the state of Assam, which is globally known for its teas, has a cluster of tea gardens with in-house factories for tea leaf processing. A lot of these factories were set up prior to independence and are owned and inherited by families or by group companies like APPL Williamson & Magor. It also has several 'bought leaf tea factories' (BLTF), which aggregates tea leaves from various gardens and process it together. These factories are newer and owned by first generation entrepreneurs. Overall, Jorhat has around 150 tea factories which produce more than 100,000 tonnes of tea annually. Manufactured products include black tea varieties made either by orthodox or CTC tea processing methods. CTC, in general, is less energy-consuming than orthodox methods and accounts for 44% of the production units, while orthodox methods account for 55%. The remaining 1% are dual-based units. It is important to note that tea production is seasonal, and tea is usually plucked and processed in the factories, often round-the-clock (RTC) during the peak season, i.e., from spring (March- April) to autumn (October- November). The CTC process generally involves the manual plucking of soft top leaves and buds during this period, followed by withering to remove surface moisture and break down the tea juices. The tea leaves are then crushed, torn, and curled (CTC) with cylindrical rollers, fermented, dried further, sorted, packed, and then dispatched. Based on the quantity of tea produced yearly, nearly 70% of Jorhat's industries fall into the MSME sector classification.

Jorhat's tea industries have formed four associations to support tea processing, i.e., the Assam Branch of Indian Tea Association (ABITA), Tea Association of India (TAI), Assam Tea Planters Association (ATPA) and North-east Tea Association (NETA). Part of their mission includes the reduction of production costs for tea, energy conservation, and the implementation of energy efficiency measures. However, the dearth of local technology providers makes this difficult, with most of the upgraded technology being sourced from LSPs in Kolkata, Tinsukia, and Dibrugarh.

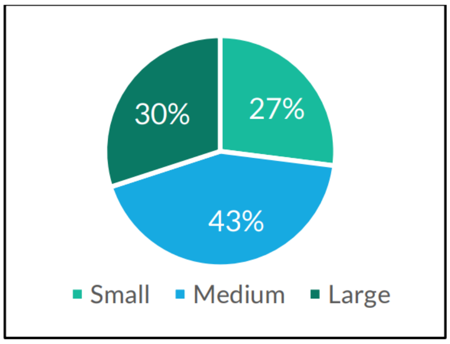

Figure 3: Percentage of tea industries in Jorhat by scale

Energy Scenario in the cluster: Energy consumption in the cluster largely depends on the supply of electricity from the grid for the electrical equipment and the use of coal or natural gas for their thermal energy needs. 85% of this energy comes from thermal energy, making it the dominant source of energy. However, electricity accounts for a larger share of 59% in terms of costs. The electricity is sourced from the Assam State Electricity Board (ASEB) grid. However, due to a lack of stable supply, the actual availability is only 70% of the time, leading to a dependence on DG sets. Thermal energy is consumed during the drying and withering processes. Currently, the cost of energy ranges between 12% - 15% of the manufacturing cost. Further, since most units are over 40 years old, they use old machinery and equipment, making them more inefficient. An outline of the fuel and electricity use in each stage of the processing is shown below.

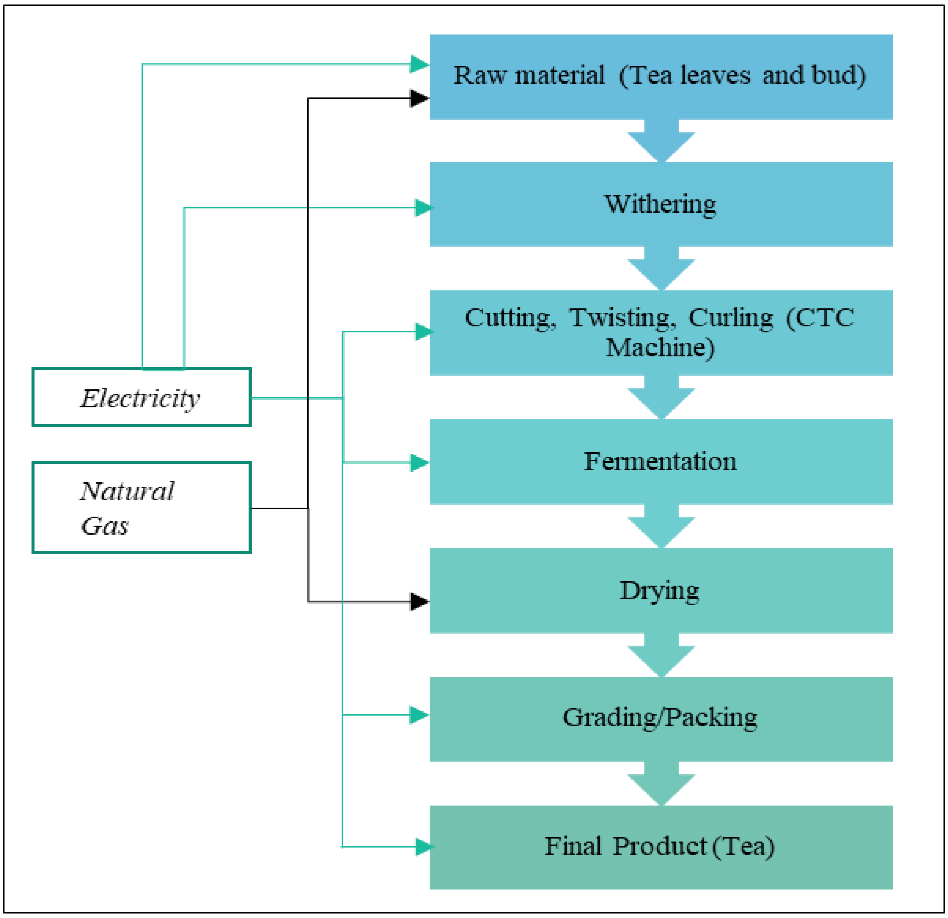

Figure 4: Process flow diagram (Tea processing) and energy consumed

Energy-intensive equipment and processes: Surveys of 100 units were conducted, and the major energy-intensive equipment was found to be the CTC machine with a connected load accounting for 60% of the total. The rest of the connected load included the withering machine, the fermentation machine, the sorting and dispatch processes, and the dryer FD/ID fan. The energy consumption from the tea units was seen to depend on the production capacity and type of process used. Based on the electricity bills and the equipment being used, a savings potential of up to 10 to 15% per unit could be ascertained. The thermal energy was seen to be largely sourced from coal and natural gas to generate hot air for the drying and withering of tea leaves.

Critical equipment and processes identified: These include the withering machine, CTC machine, and dryers. Based on the energy audits and stakeholder consultations, 4 technological interventions were identified for implementation in the Jorhat cluster:

1. Withering Process Automation with PLC
2. Installation of Temperature based Modulating Burner
3. Replacement of CI/AL with FRP-based withering fan having VFD-driven PM motor
4. PLC based Dryer Automation and Control System

Technology willingness surveys were carried out, and the replication potential was assessed and extrapolated for the entire cluster.

EE Technology chosen for bulk procurement in Jorhat: Withering of tea leaves, the first step in the tea manufacturing process, involves the reduction of moisture in the leaves by 30%. The axial fan used for this process provides the necessary airflow for this. Currently, most of the units use non-IE-3 motors, and CI/CS/A1 bladed withering fans in enclosed/ open withering troughs. It was proposed that this be replaced with fibre glass reinforced plastic (FRP) fans instead. FRP fans are more energy efficient due to their designed aerodynamic properties and thus allow more air flow with less power consumption. Lighter and smoother than CI/CS/A1 fans, this provides leeway for greater savings. Added to this, since withering fans are run on electrical energy but operate 12-14 hours per day, this intervention would deliver immense savings.

Results and discussion

Stakeholder workshops regarding energy efficient technologies and meetings with the association were conducted to get the expression of interest (EOI) for the identified technologies. Based on the number of EOIs received, as well as the aggregated demand from the MSME unit, procurement was initiated through a tendering process. Bulk procurement was identified as the method to achieve economies of scale. Savings results were also found to be very encouraging in terms of potential for showcasing to other potential clusters as well as other MSMEs. In this manner, the market for local technology providers was enabled, and it further encouraged them to drastically reduce their prices to match the tendered price.

Results of bulk procurement in Surat cluster:

One of the major contributing factors to the success of the implementation was the delivery of a well-organized bulk procurement strategy, wherein a 32% reduction in cost was achieved in comparison to the market price, i.e., from a cost of Rs. 2.95 lakhs per unit to Rs. 2.28 per unit. Demand aggregation was carried out for 500 PLCs, and the procurement process was carried out via a single tender. The successful process can be largely attributed to the standardization of specification in the tender, along with the provision of an additional warranty of 3 years, as well as a careful quality control process. Some of the major challenges included developing the technology standardization and selection criteria in such a manner as to ensure quality while avoiding alienation of the local vendors.

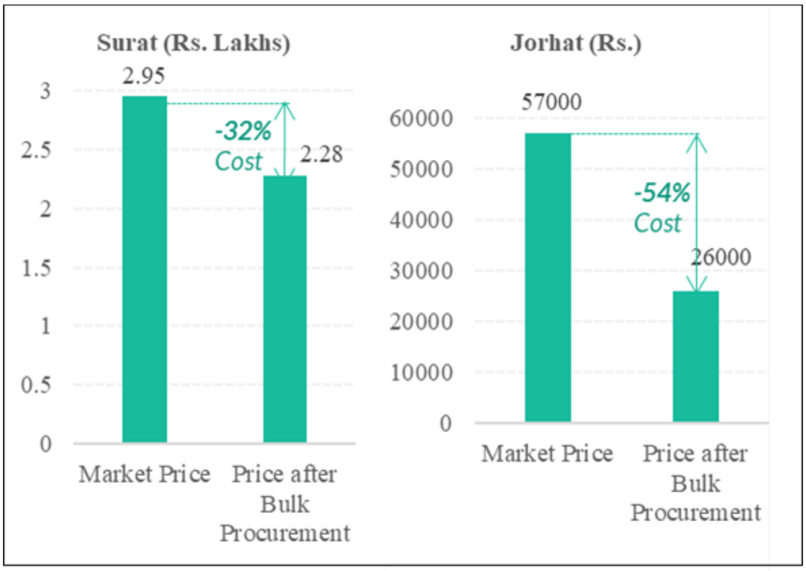

Figure 5: Price reduction as a result of bulk procurement in Surat and Jorhat clusters

Results of bulk procurement in Jorhat cluster:

During the demonstration, the unit replaced 39 CI-based fans with FRP withering fans instead. Once again, a well-organized bulk procurement strategy was a key contributing factor that allowed a 54% reduction in cost compared to the market price, i.e., from a cost of Rs. 57,000 per unit to Rs. 26,000 per unit. Demand aggregation was carried out for 600 fans through a single tender procurement process. A standardization of tender specifications and an additional warranty of 3 years was ensured, along with strict quality control procedures.

Challenges and way forward:

The procurement process was a success despite the difficulty of standardizing the technical specifications. Once specifications were set, the next issue was that local vendors reduced their prices to compete with the tender outside the tendering process. While this was not as big a concern since energy efficient technologies were adopted, convincing units to share their data while risking their monopoly in the local area and concerns about losing jobs due to automation were also brought up. However, this situation varied across the industries.

Scaling up of investments through the ESCO mechanism by deploying standard energy-efficient technologies (SEET): Although the technology demonstration was successful in the programme, several challenges thwarted the scale-up, mainly a lack of awareness, structured and effective demand aggregation, and a lack of investments to carry it forward. Keeping this in mind, GGGI developed a project, "Scaling up of investments through the ESCO mechanism by deploying standard energy-efficient technologies (SEET)", to support EESL's efforts. Additional funding from the Korean Green New Deal Fund (KGNDF) was obtained to facilitate this. The project was envisioned with the goal of transforming the MSME sector to be energy efficient by means of technology deployment/ transfer while creating a sustainable ecosystem for all relevant stakeholders, be it ESCOs, MSMEs, industry associations, financial institutions, technology providers, governmental institutions or energy auditors. It further aims to establish a National Framework for Implementation (NFFI) of standard energy efficiency solutions in MSMEs through proof-of-concept leading, with the intention of accelerating investments and setting up an Energy Efficiency Revolving Fund (EERF) to mobilize investments. Furthermore, in the 10 clusters chosen by EESL, having 2 successfully completed demonstrations, it was observed that an estimated investment potential of 30 million USD could be translated into a larger investment if scaled up to other MSME clusters as well. While the EERF was proposed by UNIDO and EESL under GEF-5 with the intention of mobilizing investments with SIDBI as the fund managing entity, it has yet to be formally institutionalized. However, EESL cannot be the sole investor capturing the entire market. Hence it was proposed that proof of concept would be necessary in order to get other ESCOs to invest, thus achieving the target of opening up the ESCO market to MSMEs. This would have to go parallel with awareness building for financial institutions, which will make financing easier for both MSMEs and ESCOs.

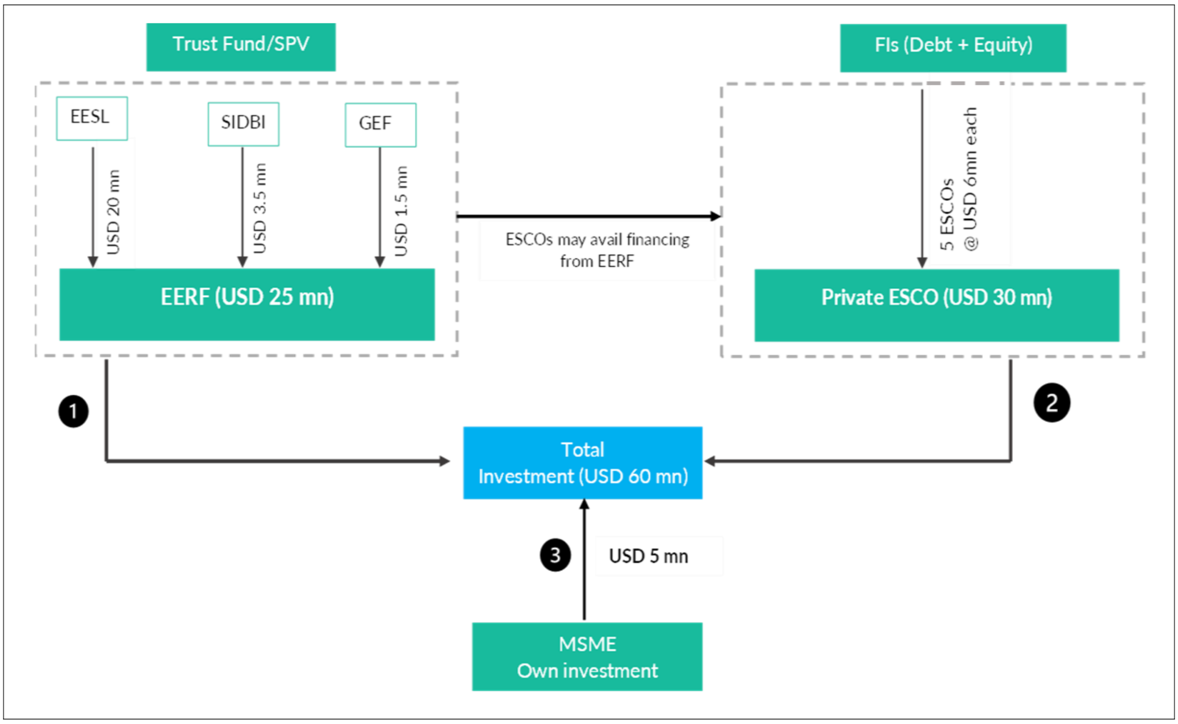

Figure 6: Investment Mobilization expected to be achieved before 2025 under SEET

As an extension of the earlier programme, 3 clusters- the Karnal rice cluster, the Panipat textile cluster, and the Kundli mixed cluster were selected under SEET. Studies were performed to identify energy efficient technologies, and based on the EOIs received from the industries, 7 technologies were identified with the potential for increased energy efficiency, scale-up, and replication. In terms of investments alone, a potential 0.4 to 0.5 million USD of investment was ascertained from baseline surveys conducted in around 20 initial industries in the chosen clusters *(Refer to Table 1 for calculation)*. Having assessed the demand, the next step is to raise awareness for financial institutions and ESCOs. SIDBI was chosen to be the primary financial institution to set up the EERF, and the next step is the empanelment of ESCOs, technology providers, and the mapped financial institutions and lenders by means of an IT platform in order to ensure that the data and matchmaking is easier overall. Overall, SEET is expected to be followed as a model for future replications of the UNIDOEESL-GEF programme in other MSME clusters across India.

Table 1: Technologies identified for replication potential based on EoIs received under SEET and the total investment.

Technology Name	Interest (no)	Technology Cost (INR Lakhs)	Total Investment (INR Lakhs)
EE Screw compressor	10	9.34	93.4
IE3 Motors	545	0.21	114.46
Boiler automation	6	11.3	68
BLDC Ceiling fan	423	0.045	19
Jet dyeing machine automation	8	6	48
Flash steam condensate recovery	2	5	10
Low grade waste heat recovery	3	5	15
Total	997	36.895	367.86

Conclusion

Altogether, this paper focused on the case studies conducted in 2 clusters among the 10 identified clusters, but the overall aim of this paper is to look into recent developments and strategies for transforming the market for energy efficiency in the MSME sector by adopting the best practices and by replicating the proven tested business models under this paper on a pan-India basis that could help in achieving India's NDC and net-zero targets. This paper will assist policymakers in developing new policies for opening up the MSME sector to energy efficiency and aiding the increased penetration of the identified energy efficient technology in the MSMEs, subsequently increasing demand for the technology in the clusters. The barriers identified for the implementation of energy efficient technologies, like a lack of financing options for the MSME sector, a lack of after sales service support from suppliers, and the lack of institutional support for MSMEs were mainly mitigated by providing easy financing through the ESCO mode and by enhancing the competitive market by means of demand aggregation thus leading the creation of cluster level technology support centres in the form of ESCOs and technology suppliers/local service providers, and also by creating peer-to-peer networks between units, association, suppliers, governments, etc. and enabling enhanced support from Central/ State governments to MSMEs, LSPs, and ESCOs.

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Annexure 1

Table 2: Unit Survey Formats for identifying energy-intensive technologies

Sl.No.	Parameter	Details		
1	Name of the unit :			
2	Address of the unit :			
3	Contact details :			
	Name:			
	Designation :			
	Mobile:	Email :		
5	Year of Establishment :			
6	Registered under MSME Act (Please Tick) : Yes	No		
7	UAM No. / MSME Reg No. :			
8	Annual audited turn-over (last financial year) :			
9	Whether the company is profitable in last 3 financial years : Yes	No		
10	Current profit margin (range) :			
11	Total Investment on plant and machinery:			
12	Process (Please Tick) : Dye[illegible]g	Printing	Both	
13	Raw Material :		Finished Product :	
14	Electricity Consumption			
a	Average monthly electricity consumption (kWh/month):			
b	Average monthly expense towards electricity (Rs in lakhs /month) :			
15	Fuel consumption			
	Type of Fuel	Average monthly consumption	Average monthly expenses (Rs in lakh/ month)	
	Coal (Imported)	t/month		
	Coal (Indian)	t/month		
	Diesel	l/month		
	Natural Gas	Nm^3/month		
	Others ( )			
16	Monthly production (meters / month) :			
17	Specific energy consumption per ton of textile processed:			

18	Major Utilities			
a	Boiler	Make:	Nos.:	Type:
		Capacity (t/h) :	Fuel:	
		FD Fan (hp) :	ID Fan (hp):	
		Fuel Consumption (tpd) :	Operating hours per day :	
b	Thermic Fluid Heater (TFH)	Make:	Nos.:	Type:
		Capacity (t/h) :	Fuel:	
		FD Fan (hp) :	ID Fan (hp):	
		Fuel Consumption (tpd) :	Operating hours per day :	
c	VFD in Boiler / TFH : Yes	No		
d	Automation & Control system in Boiler / TFH : Yes	No		
e	Steam System	Steam Consumption (tph) :	Process Pressure (kg/cm^2):	
f	Condesate Recovery : Yes	No		
g	Condesate Recovery pump :	Type (Reciprocating / Pressurized) :		
		Percentage of condensate recovery (%) :		
h	Steam Traps :	Yes	No	
		No. of TD Trap:	No. of float trap:	

i	Compressor								
	Make	Type	Motor (hp)	VFD (Y/N)	CFM	Operating hours per day	Design Pressure (kg/cm^2)	Receiver Pressure (kg/cm^2)	SPC (kW/cfm)

19	Process Equipment			
a	Drum Washer	No. of units:	Make:	Capacity:
		PLC based system :	Yes	No
b	Stenter	No. of units :	Make:	Capacity:
		No. of batches:		
c	Soflina	No. of units:	Make:	Capacity:
		No. of batches:		
d	Jet Dyeing	No. of units:	Make:	Capacity:
		PLC based system :	Yes	No
		No. of batches:		
e	Zero-Zero	No. of units :	Make:	Capacity:
		No. of batches:		
f	Printing	No. of units:	Make:	Capacity:
		No. of batches:		
g	Loop Ager	No. of units:	Make:	Capacity:
		No. of batches:	Fuel Used:	

20	Willingness for technology implementation	
	Please rate the following technologies (1 to 5) based on your willingness to adopt the same	
	Technology	**Rating**
	Automation & Control System in Boiler / TFH	
	Condensate Recovery system	
	Replacement of reciprocating compressor with screw compressor with VFD	
	PLC based automation system in Jet Dyeing Machine	
	Installation of back pressure turbo-generator for power generation	
	Any other technology (please mention)	
21	Any potential risk the unit foresee in the above technologies:	
21	Willingness for Business Model	
	I certify that the business model (tentative) for financing under ESCO mode has been explained to me.	
a	I have understood the business model and am interested to participate under the project, as per its terms and objectives	
b	______________________________	
c	I am not interested to participate in the project	