



Enabling Finance for Scaling up Energy Efficiency in MSMEs

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Foreword

The continuing growth, competitiveness, and well being of MSME units is intricately related to health and growth of the Indian economy: MSMEs account for about 35% of our exports, and provide employment to more than 59 million in the country. In many of the SME sectors, energy is often the single largest operating cost and consequently energy productivity is key to their competitiveness and survival.

However, large scale increases in energy conservation and increased energy efficiency have been limited in the MSME sector. This is because of a number of reasons, but field-level interventions indicate that there are three major reasons: the limited time available to the entrepreneur to identify contract and finance energy efficiency opportunities in addition to the many other tasks that call for his time; the limited availability of local service providers who can support entrepreneurs in project development, financing & implementation; and the almost complete lack of investment in the development and deployment of new energy-efficient technologies that are suitable for MSMEs and can be adopted in an almost 'plug & play' manner.

These suggest that energy productivity enhancement processes have to be standardized and demonstrated so that transaction costs are minimized, and profitability (for the entrepreneurs, the local service providers, the technology suppliers, and financial institutions) drives large scale replication. Over the years, there have been many small scale interventions which have demonstrated the effectiveness of the more energy efficient technologies and operating practices, the use of finance to enable the development and large-scale deployment of energy-efficient technologies in MSMEs has been extremely limited.

This knowledge paper provides a very useful service by putting together the experience and learning from the financial-model demonstration, and by discussing their appropriateness and relevance. It also points to the importance of the need for synergy between public and bank financing, and especially the imperative of developing appropriate technology-financing business models.

I am sure that the experience and insights presented in this knowledge paper would stimulate greater engagement by government and financial institutions in energy efficiency financing in MSMEs, and enhance a step-increase in the quantum of financing.



(Ajay Mathur)

FOREWORD



The increasing energy deficit in India not only affects production, but also impacts development with livelihood, literacy and health deteriorating. In India, where the peak hour demand deficit ranges between 9% and 13%, this deficit has a direct impact on the energy cost of the industry and increased dependence on alternative sources of power.

Such a scenario has significantly impacted India's MSME sector, which contributes 45% to India's manufacturing output. To achieve desired levels of production, these enterprises now need to invest in processes and procedures that will help them achieve both cost and production efficiencies. India has a huge potential for energy savings through cost-effective investments which are well documented in studies conducted by the ADB, World Bank, Planning Commission of India, CII-IREDA and BEE. For instance, a 2011 report prepared for India's Planning Commission estimated the energy-saving potential to be in the range of 124 to 255 billion kWh.

Energy efficiency (EE) has been a proven method for achieving low cost and low carbon growth. Measures like National Mission for Enhanced Energy Efficiency (NMEEE) by the Indian Government, which aimed to enable INR 75,000 Crores worth of transactions in energy efficiency, and help save 5% energy consumption by 2015, have been underway. Multinational agencies like GIZ, USAID, DFID and JICA too, have pledged to provide technology and financial support for the MSMEs in India.

The MoMSME in association with SIDBI has also launched various schemes aimed towards technology and quality upgradation (CLCSS & TEQUP) by supporting the sector with capital and interest subsidies, subsidies for energy audits etc. While there has been overall traction and funds available, the MSME is yet to realize the full potential of these schemes.

YES BANK, given its in-depth focus on the MSME sector is promoting energy efficiency, and through one on one consultations with stakeholders, comprising of SIDBI, SBI, SDC, EESL and FISME experts, has developed this knowledge paper titled **"Enabling Finance for Scaling up Energy Efficiency in MSMEs"** along with TERI-BCSD. It seeks to highlight the key challenges faced by the sector and provide possible financing solutions for the MSMEs. The report looks into the current technological ability of the MSMEs as well as the bottlenecks preventing scaling up of energy efficiency in their operations. It also provides a critique on the uptake of various Government schemes for financing energy efficiency in MSMEs.

The report draws on the knowledge of the experts to bring in a unique framework to address the issue by focusing on financial solutions tailored for different products/services/interventions to achieve energy efficiency in MSMEs. The report also brings out the need to create awareness on this issue of national interest, starting from an individual level through a structured campaign.

I trust insights drawn here will serve as recommendations to policy makers, MSMEs and the financiers in aligning their approach towards energy efficiency financing to promote sustainable growth and development.

Thank You.

Sincerely,



Rana Kapoor
Managing Director & CEO



MESSAGE



I am happy to see that TERI-BCSD and YES BANK have developed another knowledge paper, focusing on one of the most important segments of the Indian economy—the Micro, Small, Medium Enterprises (MSME) sector. The sector is a significant contributor to the income, output and employment of the country. The sector's importance manifests in almost all aspects of day-to-day life as a majority of the products and services that we use in our daily lives come from MSMEs, directly or indirectly. The sector has the capability to pull India's growth rate to relatively higher levels from the present levels of 6-8%. India's National Manufacturing Policy aims to accelerate India's GDP growth by increasing the sectoral share of Manufacturing in GDP to 25% (from the existing contribution of 16%) over the next decade. It also aims to generate another 100 million jobs in the manufacturing sector. In this scenario, the importance of the MSME sector takes on more significance, since it is the base for manufacturing in India. There are an estimated 44 million MSME units in India providing employment to over 100 million persons; accounting for about 45% of India's overall industrial output and 40% of exports; and producing over 7000 products.

Most of the enterprises in the MSME sector are traditional, micro in size, and deploy inefficient technologies. In many sectors, energy accounts for a major cost in their production mix. The Indian MSME sector is structurally characterized by the presence of industrial clusters. There are over 200 clusters comprising of energy intensive sectors like metallurgy, ceramics, glass, brick, textiles etc.

TERI has been actively engaging itself with the MSME sector for over two decades now. During this period, various initiatives for developing, demonstrating and promoting clean, energy efficient technological solutions in the MSME sector have been undertaken with support from different agencies. The initiatives have resulted in over 900 replications and cumulative energy savings of 2,31,000 tonnes of oil equivalent. Most of the replications were funded by entrepreneurs themselves, without availing loans from Financial Institutions (FIs). The replications would have been far higher if cluster focused financing schemes were available, which could fund adoption of locally fabricated technologies. Given this, the importance of appropriate financing of energy efficient technologies for the MSME sector cannot be neglected.

From TERI's experience, the most important aspect of prompting energy efficiency in the sector is the availability of local technological solutions. These solutions could be referred as 'transformational' as they could bring about major improvements in terms of energy savings, environmental improvement and product quality at the local level. Unfortunately, these technological solutions are usually not readily available for MSMEs. The paper throws light on this aspect, discusses various technology categorizations and financial mechanisms that could facilitate their mass uptake. However, there are many challenges in making the MSME sector energy efficient, which have been elaborated in the paper. These challenges relate to availability/adoption of technologies, better operating practices, skill up-gradation, demand and supply side of financing and so on. There are some emerging models of Energy Efficiency (EE) financing, which have also been discussed in the paper. Though Government has introduced schemes to support uptake of EE technologies in the MSME sector and SIDBI along with other leading national banks are offering credit to the MSMEs, the uptake of EE technologies is still low.

Overall, to have an impact in the MSME sector and tap its enormous energy saving potential, there is a need to focus on the energy-intensive sectors/clusters. In these clusters, the focus needs to be on RDD&D (research, development, demonstration and dissemination) of cost-effective energy efficient technologies. Government and international development agencies should try to come up with programs that encourage development

and customization of technologies for adoption at local level. In this regard, an important lesson from TERI's experience of working in this domain over the last two decades is the need to guard against the tendency of using the 'one size fits all' approach. In order to enable MSMEs to move towards an energy-efficient pathway, it is vital to develop long-term cluster-specific programmes and financing mechanisms for adoption of energy-efficient technologies, tailor-made to suit the needs of the local industry. For success of such programs, financial institutions will have to be involved to design cluster based financing solutions, including for the traditional sectors to provide finance for locally fabricated technologies.



Girish Sethi

Director

Industrial Energy Efficiency Division

TERI

CONTENTS

Executive Summary	01
Section I: Background	03
MSME sector: An overview	04
Key Stakeholders	06
Learnings from recent studies on energy efficiency financing in MSMEs	07
Section II: Business Environment in the MSME sector	09
Regulatory and policy environment	10
Technology Environment	12
International Support	15
Challenges in promoting energy efficiency in MSMEs	17
Section III: Financing Energy efficiency in MSME	19
Institutional finance for MSMEs	20
Understanding financing of energy efficiency	21
Financial Institutions (FIs) perspective on energy efficiency Financing	22
Barriers in selecting energy efficient technologies	23
Section IV: Financial Models to support Energy Efficiency	27
Financing of energy efficiency in India	28
Approach to financing of energy efficiency loans	29
International examples in energy efficiency financing	30
Section V: Way forward	33
Technology Approach to energy efficiency Financing	34
Leveraging MSME- Banking partner relationship	38
Role of the Government	38
Role of other stakeholders	39

CONTENTS

Annexure I: Stakeholder Consultations	40
Annexure II: References	51
Annexure III: Abbreviations	53
Annexure IV: Acknowledgement	56

LIST OF FIGURES

Figure 1: %age contribution of MSME sector in India	4
Figure 2: Issues identified under financing category	7
Figure 3 : Replications, CO2 reduction & Energy Savings from TERISDC intervention in SME sectors	15
Figure 4 : Challenges in promoting energy efficiency among MSMEs	18
Figure 5 : Sources of Finance for Registered MSME Units	20
Figure 6: Typical ESCO models	28
Figure 7: Phased approach to develop and promote new energy efficient technologies among MSMEs	35
Figure 8: Theory vs Observed replication of technologies	37
Figure 9: Proposed Model of EESL for EET implementation in the MSME clusters	50

LIST OF TABLES

Table 1: Major stakeholders in the MSME sector	6
Table 2 : Government schemes for MSME Financing	11
Table 3: Major Energy-efficiency initiatives in the MSME sector	16
Table 4: Typical energy savings and payback period of a CNC machine vs an efficient Air compressor	21

LIST OF EXHIBITS

Exhibit 1: Achievements under BEE-SME program (11th plan)	10
Exhibit 2: Technology demonstration in foundry sector	14
Exhibit 3: Learning from SAMEEEKSHA Summit under financing	27
Exhibit 4 : Need for design and development of EE technological solutions in the MSME sector	35

Executive Summary

Micro, Small and Medium Enterprises (MSMEs) are an important component of India's economy. They contribute 45 % to the country's manufacturing output, 40 % to exports and employ the largest number of people, next only to agriculture. Most of the MSMEs still use conventional technologies and practices that are inefficient and also lead to pollution. Many energy-intensive MSME sectors such as metallurgy, glass and ceramics, food processing, chemicals have not witnessed innovation in energy efficient technology. Reducing the cost of production has thus become a priority for MSMEs especially in manufacturing sector where cheaper alternatives are now available in the Indian market. In the competitive marketplace, adoption of energy efficient technologies by MSMEs will reduce their energy cost as well as carbon emissions. Thus investment in efficient technologies by MSMEs is desirable both from the firm and the national view-points.

Realizing the need to save energy, the Government and several multilateral/bilateral agencies have initiated programmes on energy efficiency in the MSME sector. The Bureau of Energy Efficiency (BEE), has undertaken a 'BEE-SME program' in select energy intensive clusters in India to provide dedicated technology support. The Ministry of MSME offers financial assistance on energy efficient technologies. The Government's efforts to promote energy efficiency in the sector have been complimented by several multilateral/bilateral agencies like World Bank, Global Environment Facility (GEF), UNIDO, UNDP, Swiss Agency for Development and Cooperation (SDC), German Federal Enterprise for International Cooperation (GIZ), Japanese International Cooperation Agency (JICA), KfW (German development Bank) and AfD (the French Development Agency). Some of the commercial banks have been providing concessional energy efficiency loans to MSMEs under different Government schemes and bilateral lines of credits.

Energy efficiency in any enterprise has two dimensions i.e. Technology and Financing. Technologies are available in different stages of commercialization (Pre commercial, Semi commercial and Fully commercial). Financing has to adapt itself to meet the requirement at each stage for scaling-up energy efficiency among MSMEs, given that energy efficient technologies are more expensive in comparison to conventional technologies. Therefore, energy efficiency financing models need to be customized to the specific financing needs of technologies in different stages of commercialization. The paper discusses the financing requirements of technologies in each of the three different stages. The findings presented in the paper are based on extensive consultation with stakeholders and review of literature.

Public finance through the Government and low cost finance from bilateral/multilateral agencies has a crucial role in supporting R&D and innovation of new technological solutions for pre commercial technologies, especially in the context of climate change. Supported bank finance is important for developing the market for commercially available technologies. It is important to note that most new technologies are more efficient compared to existing ones, and it is essential to ensure that the financial assistance for energy efficiency promotion gets channelized properly for correct technologies. One such criterion which has been adopted internationally is to calculate the financial returns (e.g. payback period, IRR) on capital investment fully from energy saving only. The energy saved from the technology needs to be estimated by certified energy professionals or from clearly defined Measurement & Verification (M & V) techniques. The financing can then be made flexible to decide on the amount and terms of lending for such technologies.

Section 1

Background



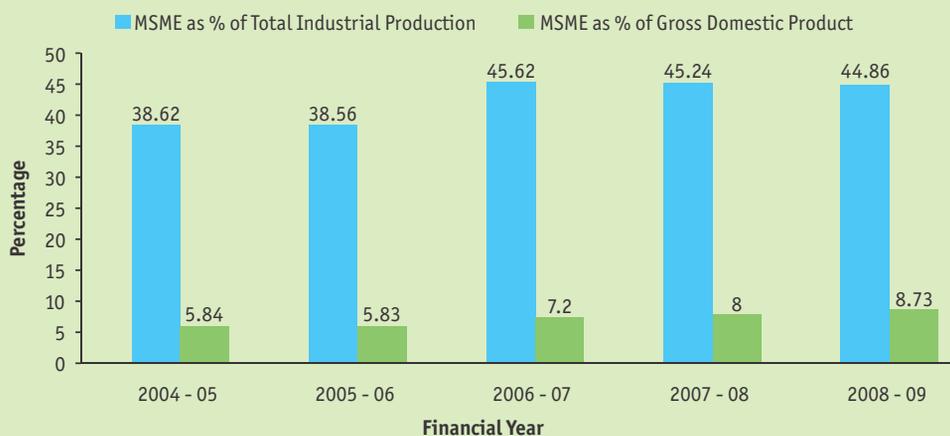
Section I: Background

MSME sector: An overview

The strategic importance of Micro, Small and Medium Enterprises (MSMEs) is today acknowledged across the world. MSMEs are the prime movers of employment and economic growth in both high and low income countries. They are also an integral part of the manufacturing value chain and underpin the ability of large manufacturing enterprises to become competitive and successful. In India too, MSMEs form a critical part of the economy. According to the annual report (2012-13) of Ministry of MSME, there are about 44 million MSMEs in India employing over 100 million people. The sector is the biggest employer in India outside the agriculture sector. In 2010, micro-enterprises accounted for 79 % of non-farm employment in India, suggesting small-scale enterprises would continue to provide the majority of employment in the near future. The inclusiveness of the sector is highlighted by the fact that nearly 50 % of the MSMEs comprise of the micro-enterprises owned by disadvantaged groups of society (MoMSME 2012). Figure 1 highlights the contribution of MSMEs to the nation's overall industrial production as well as GDP and depicts a rising trend in recent years. At present, the MSME sector accounts for close to 45 % of industrial output, 42 % of total exports, and over 8 % of GDP. There are over 7,000 products, ranging from traditional to high-tech, that are manufactured by Indian MSMEs today.

MSMEs account for 45 % of industrial production and employ 100 million people

Figure 1: %age contribution of MSME sector in India



Note: i) Calculated at 1999-2000 prices ii) Data for period up to 2005-2006 is for Small Scale Industries (SSI)
Source: Annual Report 2011-12, Ministry of MSME, Government of India

The Government has constituted many committees (e.g. Prime Minister's task force on MSMEs 2010, Inter ministerial committees on MSMEs 2013) to look into the technology needs of MSMEs. In recent years, the Working Group on MSMEs growth for 12th Five Year Plan period (2012–2017) has recognized that technology and finance are key factors in enhancing the global competitiveness of the Indian MSME Sector. The report of the Prime Minister's Task Force on MSMEs, released in 2010, too identified low technological base and difficulties in accessing finance to be the major reasons for the poor competitiveness of the sector. Capital investment in new and energy efficient technologies (EET) is important for development of the MSME sector. Development of production capacities (plant and equipment, skill development) and technological capacities (e.g. R&D, innovation) are capital intensive. A number of stakeholders (Government agencies, bilateral and multilateral organisations, financial institutions, R&D establishments, local service providers) have thus focused on promoting the energy efficiency in the sector through various interventions.

The Energy Efficiency Imperative

Indian MSME sector is characterized by the presence of many geographical clusters with similar product offerings. There is a great deal of variation in technology and management practices within the MSME sector. While at one end of the MSME spectrum, there are highly innovative and growth oriented enterprises, on the other end there are unregistered units, and enterprises deploying obsolete technologies and practices. Due to wide variation in technology and operating practices, there is a wide variation in their energy

Many MSMEs sectors are energy-intensive, i.e. cost of energy is a significant % of manufacturing cost

performance and GHG emissions as well. There are many energy-intensive sectors where energy costs account for a major share of the operating costs. For example, energy costs account for nearly 35-40 % of the total production cost for a small-scale glass and ceramics unit. As per a preliminary assessment conducted by TERI, there are at least 400 such energy-intensive clusters across the country comprising of castings and forgings, steel rolling, ceramic and glass, textile processing, chemicals and dyes, processed foods etc. Most of the units in these clusters use conventional technologies and practices which are extremely energy (electricity, oil, coal, gas) intensive. The high energy prices in India coupled with use of energy-inefficient technologies is adversely affecting the competitiveness of these energy-intensive MSME clusters. The units in these clusters are facing the threat of extinction due to cheaper and better quality products from countries such as China. To ensure the survival in times of rising energy prices and electricity shortages, it is imperative for these units to reduce their energy costs through the adoption of energy efficient technologies. This can result in energy savings of 20 to 40 % and enhance the cost-competitiveness of Indian MSMEs substantially.

Energy efficiency measures through technology up-gradation and operational improvement are seen as a solution that can ensure both economic and environmental benefit to the Indian MSMEs. Energy conservation addresses many issues such as competitiveness, energy security, environment and supply in one go. This is even more important as the recent global financial crisis created a particularly tough climate for MSMEs, with a reduction in demand for their products.

Key Stakeholders

A number of stakeholders are active in development of the MSME sector in India. Some of the major stakeholders are given in table 1.

Table 1: Major stakeholders in the MSME sector

Stakeholder	Description	Contribution
Government	<p>Ministries: Ministry of MSME, Ministry of Finance, Ministry of Textiles, Ministry of Food Processing Industry, Ministry of Chemicals and Fertilizers, Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Ministry of Steel</p> <p>Government Agencies: Bureau of Energy Efficiency (BEE), Energy Efficiency Services Limited (EESL)</p> <p>State Government: Industries departments of state Governments</p>	Schemes to support energy efficiency, Energy Audit subsidies
Financial Institutions	Small Industries Development Bank of India (SIDBI), National Bank for Agriculture and Rural Development (NABARD), commercial banks(public and private sector), foreign banks, cooperative banks	Execution of Government and bilateral schemes
Multilateral and bilateral agencies	World Bank, Global Environment Facility (GEF), UNIDO, UNDP, UNEP, Japan International Cooperation Agency (JICA), Swiss Agency for Development and Cooperation (SDC), German Development Agency (GIZ), Department for International Development (DFID), French Development Agency (Afd), KfW	Schemes to facilitate adoption of EE technologies and financing
Local service providers	Industry associations, technology suppliers, consulting firms, local consultants, energy auditors, local fabricators, financial intermediaries, Energy Saving Companies (ESCOs)	Scheme facilitators with MSMEs
Developmental organizations	Academic/research institutions, NGOs	Technology support provider
Large manufacturing companies	The corporate sector which sources its components from the SMEs; Automobiles, Electricals & Electronics, Pharmaceuticals etc	Beneficiary of EE products, technology saver

Source: YBL TERI Analysis

A large number of awareness creation and capacity building activities on EE in MSMEs have been undertaken by almost all the stakeholders.

Learning from recent studies on energy efficiency financing in MSMEs

Realizing the importance of creating enabling financing environment for MSMEs and increasing their access to finance, some agencies have, in the recent past, focused their initiatives around this subject. The most recent initiatives include:

1. MSME Energy Efficiency Finance Training (D&B and GIZ 2014)

It has been often found that bankers lack the capacities to evaluate energy efficiency project proposal and thus end up denying loans to MSMEs. Consequently, a need was felt to train bankers on energy efficiency financing. Towards this, bankers' training programs were carried out by D&B under GIZ' MSME Umbrella Programme in partnership with SBI and SIDBI in 50 selected MSME clusters. Over 2000 bankers were trained in these workshops. These training programs highlight the importance of motivating the bankers to finance EETs based on cash flow of the projects. The initiative also highlights the importance of engaging energy auditors in evaluating EET financing.

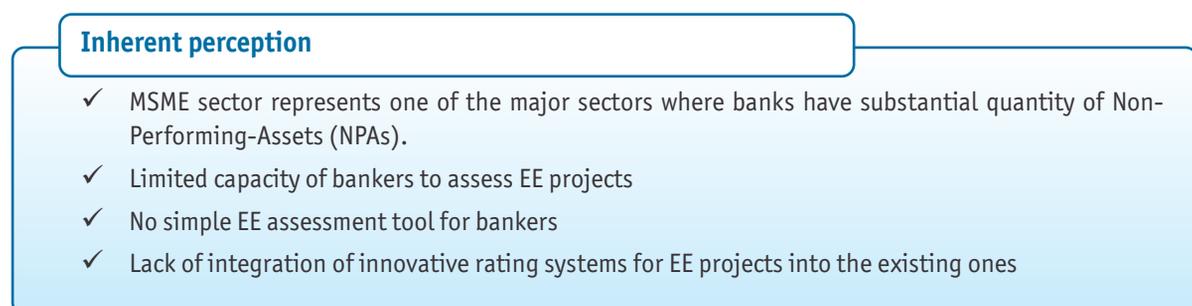
2. Up scaling of energy efficiency initiatives in Indian MSME Sector (EY 2014)

EY with support from SDC has recently conducted a study that looked at the barriers to up scaling of EETs in MSMEs at four broad levels: (1) Policy and Regulatory (2) Technology (3) Financing and (4) Capacity Building. The key recommendations from the paper are as below

- ✓ Project based EE credit lines should be simplified
- ✓ “Responsible financing” to create effective assessment tool for evaluating credit worthiness of MSMEs
- ✓ Promote Energy Service Company (ESCO) financing in MSMEs and establish an authority for “ESCO dispute resolution” for faster dispute resolution

The major issues identified under the financing category are summarized in Figure 2:

Figure 2: Issues identified under financing category



Underutilization of lines of credit

- ✓ The MSMEs generally avoid going through the stringent procedural norms of the banks to obtain credit
- ✓ Many micro units are far less likely than formal businesses to even have existing deposit relationships with FIs
- ✓ Low awareness on the part of the MSME entrepreneurs

Lack of depth in the financing schemes

- ✓ The different Government credit lines do not directly promote EETs
- ✓ Equipment based financing schemes raise questions on the actual energy reduction due to limited M&V opportunities
- ✓ Concerns on real savings compared to the Business As Usual (BAU) scenario

Lack of innovative financing model and transaction cost

- ✓ Penetration of equity financing has been low
- ✓ Lack of activity on group financing (for investing in EE projects/ technology)
- ✓ Lack of project based finance schemes
- ✓ Higher transaction cost for individual EE loans to MSMEs

Source: Up scaling of energy efficiency initiatives in Indian MSME Sector (EY 2014)

The MSME space is very vibrant with many stakeholders and requires careful study of the environment to assess and implement new technologies. Energy Efficiency, being a cost saving as well as carbon saving imperative, needs to be thoroughly understood at the ground level to provide long term and sustainable solutions.

Section 2

Business Environment in the MSME sector



Section II: Business Environment in the MSME sector

Regulatory and Policy environment

During the past few years, the Government, through the Ministry of MSME and BEE, has initiated programs and schemes aimed at improving the energy performance of the MSME sector. The major outputs of the 'BEE-SME program' which was undertaken during the 11th Plan are provided in Exhibit 1.

Exhibit 1: Achievements under BEE-SME program (11th plan)

- ✓ Total energy consumption data of 25 MSME clusters collected
- ✓ 1,250 comprehensive energy audits conducted
- ✓ Cluster specific energy conservation manuals prepared for 25 energy-intensive clusters
- ✓ 390 DPRs on energy efficient technologies prepared and shared with project stakeholders
- ✓ Energy saving potential of 0.82 million tonnes of oil equivalent (mtoe) (about 15% of the total energy consumption) identified for the 25 clusters
- ✓ Total energy saving potential estimated to be INR 1,400 crore in the 25 clusters
- ✓ Total investment required in energy efficient technologies estimated to be INR 3,388 crore. Average simple payback period for the technologies is between 2 to 3 years

Source: Back ground and Objective of BEE SME Program

Under the 12th plan, BEE plans to support demonstration of a few of the energy efficient technologies identified under 11th plan and undertake capacity building activities.

The Ministry of MSME, the nodal ministry for MSMEs, provides upfront subsidy for modernization and technology upgradation of MSMEs in India. One of the oldest schemes of the Ministry is for modernization and technology up-gradation of micro and small scale units called Credit Linked Capital Subsidy Scheme (CLCSS). Under the scheme the Government provides 15% capital subsidy, subject to a maximum of INR 15 lakh for adoption of selected technologies listed under the scheme. The technologies listed under CLCSS are updated periodically. However, the technologies listed under the scheme are not restricted to energy efficient technologies alone but include others related to productivity, quality and environmental improvement. Till March 2014, 28,287 MSMEs had availed a total subsidy of INR 1,620 crore under the scheme¹.

The focus of CLCSS is on modernization and technology up-gradation rather than on energy efficiency improvement

¹ http://www.dcmsme.gov.in/schemes/Credit_link_Scheme.htm

A more recent scheme of the Ministry of MSME specifically for energy efficiency improvements is 'Technology and Quality Up-gradation Support to MSMEs (TEQUP)'. TEQUP is one of 10 schemes aimed at improving the competitiveness of the MSME sector under the National Manufacturing Competitiveness Programme (NMCP) being implemented by the Ministry. The benefits available to MSMEs under TEQUP include—technical assistance for energy audits, preparation of DPRs and capital subsidies on technologies which result in an energy saving of over 15 %. Under the scheme, MSMEs can avail a subsidy of 25 % of the project cost, subject to a maximum of INR 10 lakh. Though the scheme was launched a couple of years back, its uptake has been relatively slow due to limited awareness about the modalities of the scheme among MSMEs and bankers.

In addition to CLCSS and TEQUP, there are other schemes and Government policies to promote new technologies in the MSME sector. Table 2 mentions some of the other schemes and financial incentives. Although these schemes are not specifically intended for energy efficiency improvement, support may be sought for financing efficient technologies under them as well.

Table 2 : Government schemes for MSME Financing

Name of the scheme	Brief Description
Credit Guarantee Fund Scheme for Micro and Small Enterprises	This scheme was launched by Ministry of MSME and SIDBI to provide collateral free loans up to INR 1 crore
Technology Up gradation Fund Scheme (TUFS)	The scheme, offered by Ministry of Textiles, provides interest reimbursement (2-5%) and capital subsidy (10-30%) or margin money subsidy (8-30%) for investment up to INR 5 crores. The interest reimbursement will be for a period of 7 years including 2 years of moratorium period.
Venture Capital	<p>SIDBI Venture Capital Limited (SVCL) provides funding to the sector</p> <ul style="list-style-type: none"> ✓ A venture capital fund 'SME Growth Fund' was registered with Securities and Exchange Board of India (SEBI) to make equity for growth oriented business activities. The fund which had a corpus of INR 500 crore has been fully invested and fund is presently in the divestment stage ✓ The Samridhi Fund was created by Department for International Development (DFID) with SIDBI. It provides equity and equivalent capital to social enterprises which can deliver both financial and social returns across eight low income states of India. Investment between INR 5-25 crores with a term of 7 years can be funded ✓ In 2011, a new India Opportunities Fund with a life of 10 years was established and registered with SEBI

Name of the scheme	Brief Description
Technology Services	India SME Technology Services Ltd. (ISTSL), an associate organization of SIDBI, facilitates commercialization of new and emerging technologies among MSMEs. It has a large computerized database on energy efficient technologies available from different sources/ countries. ISTSL assists MSMEs for finance syndication through banks/FIs covering term loans, foreign currency assistance, venture capital, lines of credit, equity assistance and on selective basis developmental loan to meet initial expenditure in the pre-technology absorption stage. It also offers marketing, technical consultancy and other support services to MSMEs. Recently, it has launched a new program '4E (End to End Energy Efficiency) Solutions' to promote energy efficiency in the MSME sector.
Tax incentives	<ul style="list-style-type: none"> ✓ Accelerated depreciation (up to 80 %) on selected energy efficient technologies² ✓ Concessional rates of duty for CFLs

Source: YBL TERI Analysis

The above schemes provide a basket of opportunities for MSMEs to leverage and implement energy efficiency in their operations. The MSMEs and clusters either have limited awareness about these schemes or are reluctant as it is a cumbersome process to avail such benefits, thus resulting in low uptake.

Technology Environment

Technologies form the base for achieving better efficiencies and creating better state of the art products. New energy efficient technologies are being developed every day for industrial application. It is important to distinguish between technologies that are in different stages of commercialisation. The three major stages of technology commercialisation are the following:

Energy efficient technologies are in different stages of commercialization

- ✓ **Pre-commercial technologies:** These refer to technologies where readymade energy efficient technological solutions are not commercially available for the scale found in Indian MSMEs and hence research and development (R&D) of new energy efficient solutions is necessary. For e.g. Energy efficient technologies like furnaces, driers and waste heat recovery systems for energy-intensive MSME sectors like aluminum, brass, iron and steel, pulp & paper, textiles, chemicals, food processing. These technologies need to be developed.

²<http://www.incometaxindia.gov.in/Pages/charts-and-tables.aspx>

- ✓ **Semi-commercial technologies:** These refer to newly developed energy efficient technologies that have been successfully demonstrated in a few units but have not yet reached commercial maturation or “taken-off” in terms of number of replications. For e.g. Lid mechanism for induction melting furnace, divided blast cupola melting furnace, pressure let-down power generators. These technologies need to be supported by awareness creation, capacity building and replicating pilots.
- ✓ **Fully commercial technologies:** These are energy efficient technologies that are already available commercially in the market but are yet to reach saturation level. For e.g. IE3/IE4 electric motors, inverter air compressors, online energy management system, recuperative burners, improved condensate recovery system. Industry has been slow to adopt these technologies either due to low awareness or higher cost. These can be supported by providing concessional loans or increase effective information dissemination.

The above categorization of technologies helps understand the technology space in terms of financing requirements. Each stage of commercialization requires a different type of financial intervention and some of these options are discussed in subsequent sections.

A vast majority of MSMEs, especially in energy-intensive clusters still use outdated and energy inefficient technologies and practices. Some of the reasons for the poor uptake of energy efficient technologies in this sector have been lack of availability of off-the-shelf cleaner alternatives, low awareness of technologies which are available commercially, lack of attractive financial options, limited in-house technical capacities and poor quality of local service providers and underdeveloped support institutions.

Demonstrations of pre-commercial technologies help in popularizing the technological options among MSMEs. Awareness and capacity building programmes for entrepreneurs, supervisors and operators are important for dissemination of semi-commercial technologies. Appropriate interventions to support identification, financing and implementation need to be formulated for commercial technologies. A typical intervention aimed at development, demonstration and dissemination of new technologies in the SME sector is highlighted below.

Integrated approach to support Technology through RDD&D (TERI-SDC intervention)

SDC adopted an innovative approach to promote energy efficiency of energy-intensive MSME sectors like foundry and glass sectors where technologies and practices have largely remained unchanged for decades. It involves research, development, demonstration and dissemination (RDD&D) of cleaner technologies. For example, the energy efficient furnace—improved Divided Blast Cupola (DBC or twin

blast cupola is a proven technology for improving the energy performance at a modest investment in foundries)—demonstrated in Howrah foundry cluster (refer Exhibit 2). The approach has led to strengthening of the technological capacities of the sector stakeholders (entrepreneurs, supervisors, workers and local service providers) as a whole. (Refer to stakeholder consultation 1 in Annexure)

TERI with support from SDC intervened in selected MSME sub-sectors and clusters. Starting in 1994, TERI successfully developed jointly with international and local experts, demonstrated and disseminated energy efficient technologies in select energy intensive MSME sub-sectors such as glass, foundries, brick and biomass gasifiers applications.

Exhibit 2: TERI-SDC intervention in the MSME sector

There are more than 5000 foundry units in India. There is a considerable potential to save energy and improve their environmental performance. TERI, with support from SDC, designed and developed an improved energy efficient melting furnace technology called the Divided Blast Cupola (DBC) for the foundry sector. The first demonstration of the DBC happened in a foundry unit at Howrah (West Bengal). The demonstrated technology resulted in an energy (coke) saving of 35%, compared to sub-optimally designed DBCs being used in the industry. During dissemination phase, partnerships with nodal industry association – the Institute of Indian Foundrymen (IIF) as well as other associations in the sector were forged. Till date, DBCs have been replicated in various foundry clusters (Coimbatore, Ahmedabad, Rajkot, Howrah, etc.) across the country.

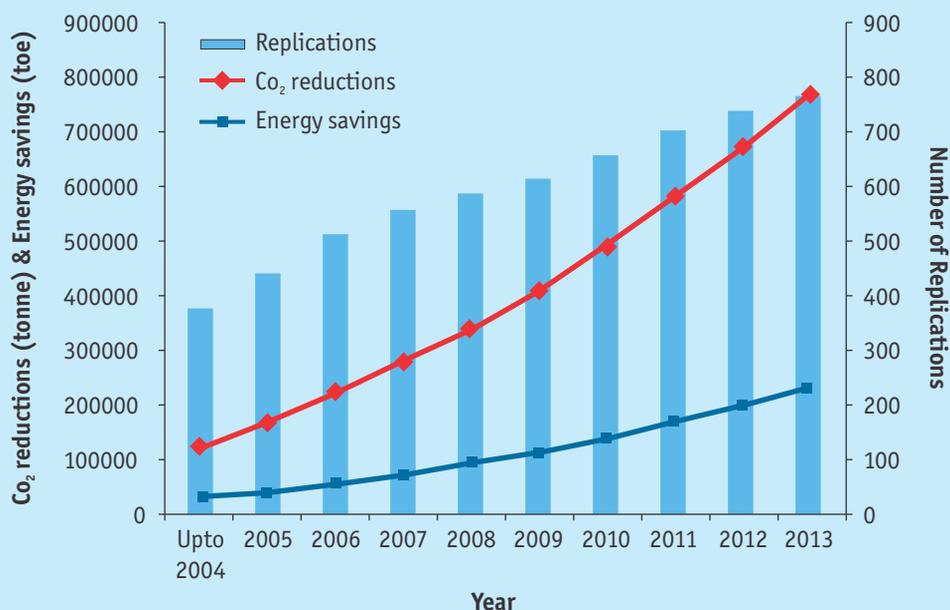


The adoption of improved TERI designed DBCs has brought about significant reduction in energy consumption and GHG reduction. TERI also strengthened the capacities of local service providers (LSPs) in design and fabrication of DBCs. In addition, considerable efforts have been made to provide hands-on training on best operating practices (BOP) to entrepreneurs, supervisors and operators of the foundry units. Thus, SDC-TERI intervention has led to enhancement of the technological capacities (in addition to production capacities) of the foundry sector as a whole.

Source: TERI SDC Program

The replications of cleaner technologies have resulted in cumulative energy savings of 2,31,000 tonnes of oil equivalent (toe) and GHG reduction of 7,70,000 tonnes of CO₂ (Figure 3)

Figure 3 : Replications, CO₂ reduction & Energy Savings from TERI SDC intervention in SME sectors



Source: TERI SDC Program

MSMEs in general do not have either the inherent financial capacity or the technical capacity to undertake research or adaptation activities that would help them improve their energy and environmental performance. The SDC-TERI approach has established that RDD&D programs are important for promoting the uptake of EE technologies in traditional MSME sectors in India. RDD&D initiatives contribute towards increasing the technological capabilities (which needs to be differentiated from enhancing the production capacities) of the MSME. Additionally, there is a need to hand-hold the unit for a considerable period of time after adoption of a new technology. Awareness creation and capacity building activities also accelerate uptake of energy efficient technologies and practices. For greater replication, technology transfer should not take place directly between technology supplier(s) and end users. Rather, it should be routed through an intermediary institution (such as an R&D establishment, consultancy organization), which can act as a facilitator to absorb and disseminate the improved technology.

International Support

Realizing the large scope for energy savings in the sector, all major bilateral and multilateral agencies have also been working actively towards promoting energy efficiency in the MSME sector. Bilateral agencies like JICA, KfW and AfD have been supporting concessional financing of energy efficient equipment among MSMEs, through SIDBI. Other agencies like GIZ have supported awareness generation and capacity building of bankers on financing of energy efficiency projects. Multilateral agencies like GEF, through World Bank and UNIDO are funding projects which support energy audits in selected energy-intensive MSME sub-sectors. (Refer to Stakeholder Consultation 2 in Annexure I)

Adoption of energy efficient technologies commercially available in industrialized countries can play an important role in 'leapfrogging' onto a low carbon energy pathway. TERI with support from JICA demonstrated a couple of commercially mature Japanese technologies - electric heat pump technology (EHP) and gas heat pump technology (GHP) - among MSMEs in India. However, more awareness generation and feasibility studies of different applications of these technologies are needed to create a demand for newly developed EE technologies in India. Some of the major EE initiatives implemented/ongoing in the MSME sector are mentioned in Table 3.

Table 3: Major Energy-efficiency Initiatives in the MSME sector

Title	Main features
TERI-SDC Partnership project in the foundry, glass, and brick sectors(1994-2013)	<ul style="list-style-type: none"> ✓ EE technology development, demonstration, and dissemination ✓ Unit/cluster level capacity building; development of knowledge products ✓ Collaborative partnerships with other institutions ✓ Advisory support for policy formulation ✓ Development and support for Small and Medium Enterprises: Energy Efficiency Knowledge Sharing (SAMEEEKSHA) platform
World Bank-GEF Project: Financing energy Efficiency at MSMEs (2010-2014)	<ul style="list-style-type: none"> ✓ Targeted at five selected energy intensive clusters ✓ Capacity and awareness building ✓ Support for walk-through/detailed energy audits and preparation of Investment Grade DPRs ✓ Performance-linked grants to early adopters ✓ Knowledge management and sharing
TERI-IGES Research Partnership for application of low-carbon technologies (2010-2014)	<ul style="list-style-type: none"> ✓ Focused on transfer of low-carbon technologies from Japanese manufacturers for adoption and dissemination among MSMEs in India ✓ Supported by JICA and Japan Science and Technology Agency (JST) ✓ Pilot EE projects implemented at the unit level in select MSME clusters ✓ Technologies included heat pump applications for foundries and dairies (Rajkot, Ahmedabad, and Chandigarh)

Title	Main features
JICA–SIDBI Financing Scheme for Energy Saving Projects in MSME Sector (2008-ongoing)	<ul style="list-style-type: none"> ✓ Line of credit from JICA for financing EE projects ✓ Financial assistance to MSMEs through SIDBI, as well as through refinance to banks and other financial institutions ✓ Provides list of EE equipment eligible for financing
KfW–SIDBI Scheme: Financing Energy Efficiency Projects in the MSME Sector (2009-ongoing)	<ul style="list-style-type: none"> ✓ Line of credit from KfW Development Bank for financing EE projects ✓ Financial assistance to MSMEs through SIDBI ✓ Provides list of EE equipment and measures eligible for financing
GIZ: Indo German Energy Programme (IGEN) (2003-2014)	<ul style="list-style-type: none"> ✓ Support for EE through insulation solutions; collaboration with KAEFER, one of the world's largest provider of complete insulation solutions, under the PPP project 'Moving India's MSMEs towards Energy Efficiency' (MovIEE) ✓ Providing access to advisory services, training, and credit schemes; awareness generation through 'Energy Bus' initiative ✓ Pilot projects in different clusters

Source: YBL TERI Analysis

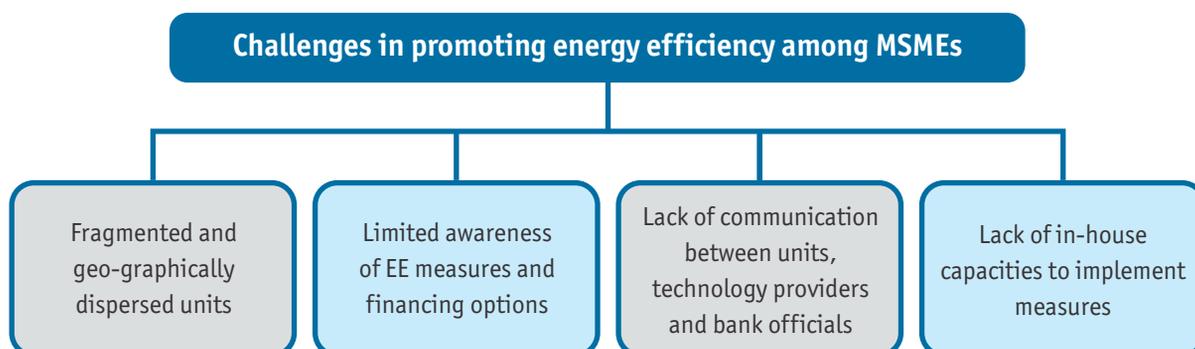
Challenges in promoting energy efficiency in MSMEs

Despite various initiatives of Government and bilateral/multilateral agencies to increase the penetration of EETs in Indian MSME sector, a lot of work still needs to be done. The size and geographical spread of the sector makes it a daunting task. In general, there has been very little focus on the need to development of cleaner technologies for MSMEs in India. One of the key factors for the low uptake of EE financing in the MSMEs, is the lack of awareness about EE technologies and financing options. Other factors include lack of investment in R&D; limited capacity for acquiring new skills to work with new technologies/processes; and limited channels of communication between MSMEs, technology providers and financial institutions (Figure 4). In many of the energy-intensive MSME clusters, the EETs are not available at all. After development, a new technology needs to be supported for a number of years till commercialization. Only after a new technology is commercially mature will an entrepreneur approach a bank for financing.

Lack of focus on R&D of new technologies and distinguishing energy efficiency projects from routine modernization and expansion projects are major challenges

The low level of awareness among MSMEs about concessional financing mechanisms available for them is compounded by the lack of customized banking products for financing energy efficient technologies for MSMEs. The existing credit lines also do not lay clear guidelines to distinguish energy efficiency project proposals from routine expansion and modernization proposals.

Figure 4 : Challenges in promoting energy efficiency among MSMEs



Source: YBL TERI Analysis

Section 3

Financing Energy Efficiency in MSMEs



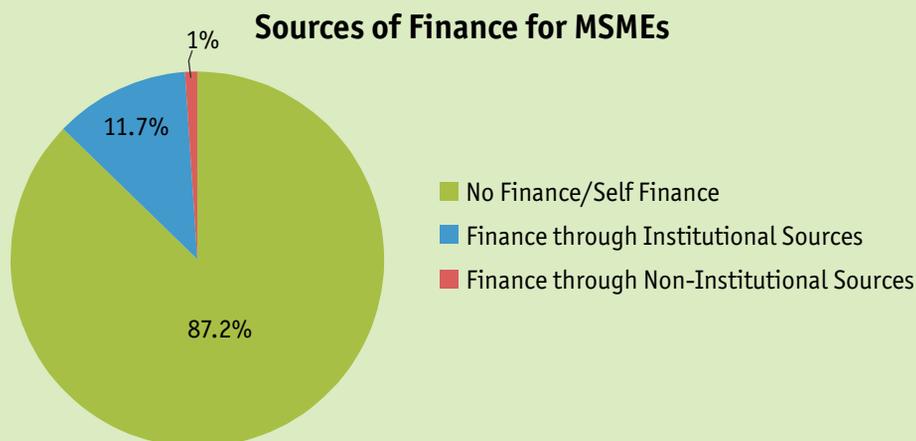
Section III: Financing Energy Efficiency in MSMEs

Institutional finance for MSMEs

M SMEs contribute significantly to Indian economy in terms of their contribution to industrial production, export and employment. Hence, providing finance to the MSME sector has been a priority for the Government. The Reserve Bank of India (RBI) has issued priority sector guidelines to Indian as well as the international banks operating in India to provide considerable amount (40 % and 32 % respectively) of their Adjusted Net Bank Credit (ANBC) as MSME loans (RBI Master Circular, 2013).

Despite Government’s efforts, the %age of MSMEs taking advantage of institutional finance is very small. MSMEs still prefer to undertake renovation and modernizations from either fund generated internally or borrow from informal financing channels. As per the statistics compiled in the fourth census of MSME sector for registered units (April 2011) only about 11.7 % of MSMEs availed finance from institutional sources and about 1 % had taken finance from non-institutional sources. The vast majority of about 87.2 % units had either not borrowed finance or has depended on internal sources (Figure 5).

Figure 5: Sources of Finance for Registered MSME Units



Source: Fourth Census of MSME sector for Registered Units

The major reason for the miniscule credit flow to this sector is that the MSMEs are considered to be a high risk sector by the banks. This is due to several factors such as poor book-keeping practices, weak balance sheets, poor credit history and smaller sizes of MSME loans. Bankers adopt a collateral-based lending approach for MSMEs rather than

Banks use collateral based lending for MSMEs

cash-flow analysis approach which is used for loans to large-scale industries. (Refer to Stakeholder Consultations 3 in Annexure I)

Understanding financing of Energy Efficiency

Most newly installed equipment is more energy efficient compared to the existing one. It is more important to distinguish between investments made for modernisation and expansion with investment decisions based on energy efficiency criteria. The importance of using energy savings based payback period rather than %age of energy savings, as a criterion of energy savings is illustrated by the example given in table 4.

Need to consider payback period on energy savings for analyzing energy efficiency projects

Table 4: Typical energy savings and payback period of a CNC machine vs an efficient Air compressor

Particular	Unit	CNC machine	Air compressor
Capital Cost	INR	40,00,000	14,00,000
Energy consumption	kWh/yr	25,000	1,50,000
Cost of electricity	Rs/kWh	6	6
Annual energy cost	INR / year	1,50,000	9,00,000
Energy savings (Current criteria)	%	60	30
Monetary energy savings	INR / year	90,000	2,70,000
Payback period (Recommended criteria)	Years	45	5.2

Note: 1) Monetary energy savings (INR/year) = Annual energy cost (INR/year) X Energy savings (%); 2) Payback period (Years) = Capital cost (INR) / Monetary energy savings (INR/year)

Source: YBL TERI Analysis

The example shows that for non-energy intensive technologies like CNC machines even with high energy savings of 60 %, may not make the payback period calculated only on the basis of energy saving, attractive enough for choosing it. Obviously, energy savings does not remain the main driver for investment in a new CNC machine. On the contrary, the payback period from energy savings is usually attractive for an energy intensive process. For energy intensive technology like air compressor even low energy savings of 30 %, results in payback period of about 5 years. Here, energy savings could be the main driver for making the investment. Shifting the focus to rupee equivalent of energy savings for calculation of payback period is a simple yet effective tool to differentiate between modernization or expansion viz-a-viz energy efficiency projects.

The following criteria are normally used by international energy efficiency credit lines for providing grants and low interest loans:

- ✓ IRR (on energy savings only): around 10%
- ✓ Payback period (on energy savings only): between 7–8 years³

³ www.iadb.org/projectDocument.cfm?id=37450899 accessed on 03 January, 2015

Financial Institutions (FIs) perspective on energy efficiency Financing

The Government and SIDBI have initiated various schemes like CLCSS & TEQUP to promote EE financing by providing incentives to the MSMEs for adopting energy efficient technologies. But the actual uptake of such schemes has been very limited. The FIs highlight the following factors (Refer to Stakeholder Consultations 4 in Annexure I)

- ✓ Limited demand from the MSMEs: The banks have been promoting new products and also providing incentives to the MSMEs to undertake energy audits as a first step to achieve energy efficiency. But the overall uptake for the schemes by the MSMEs has not been very encouraging despite having many incentives and clear benefits from the adoption of EE. The major reason being the various procedural requirements (process to ascertain exact energy saving) that are associated with EE schemes. MSMEs are reluctant to undertake subsidized energy audits at their plants as they do not find enough successful examples of implementation. It has been proven (as in case of Japan) that the adoption of EE technology depends critically on bridging the gap between information on EE technology and actual demand for technology by MSMEs. However, marketing of EE to MSMEs is not easy as EE investments are not typically high on MSMEs' list of priorities.

In Japan, JICA has come up with a list of EE technologies accompanied by a description of their technology and cost-benefit analysis, which helps MSMEs in making informed decisions on technology adoption. Once an MSME has decided on the EE technology option, finance is easier to secure.
- ✓ The concept of Energy Efficiency: The concept of EE itself remains very confusing (refer section to above). At the same time, the savings offered by the EE are not exactly guaranteed and have to be ascertained by Monitoring & Verification (M & V) processes post implementation of the project. However, special training programs have been designed for the bankers to apprise them the EE concept. The various EE suppliers and observer agencies have also started talking about the minimum guaranteed savings which can be used as a benchmark for the expected future cash flows from the project.
- ✓ Small ticket size for EE interventions: EE is not limited to major changes in the plant and machinery of the MSMEs, huge savings can be achieved just by changing to best operating practices (BOPs), regular maintenance and many such small interventions. These changes can be implemented internally by the MSME and its technical staff only and require very limited or no financial interventions. Even the medium investment interventions provide a payback in about a year's time and are not eligible for any kind of term financing. EE can also be achieved from incremental interventions like avoiding heat loss through insulations and redirecting the exhaust gases to preheat the inputs. These small changes might require large investments sometimes but as such there are no assets created which can be charged at the bankers end. In such scenarios, the risks from the bankers' point of view become prohibitively high.

- ✓ New risks: The EE financing is also associated by newer risks which are different from the basic financial risk that bank finance is equipped to handle. These risks directly impact the repayment capacity of the client (MSME as well as ESCO). The risks can be listed as
 - a) Technical Risk: The risk from the technical effectiveness of the new technology
 - b) Commissioning Risk: The implementation is often carried by a third party like ESCO and the actual energy savings depend a lot on commissioning of the project
 - c) Performance Risk: The difference between the promised savings and the realized saving after the actual installation of the equipment.

Barriers in selecting energy efficient technologies

MSMEs are usually keen to adopt new and efficient technologies. However, poor uptake of EE from the MSMEs can be attributed to (Refer to Stakeholder Consultation 5 in Annexure I):

- ✓ Technology and Awareness roadblocks:
 - o Awareness of the right technology: New technologies themselves draw apprehension in terms of applicability and benefits. It is even more difficult to find the right technology for any given enterprise as the space is so diverse.
 - o Adoption and configuration of technologies at plant level: EE technologies are often very new technologies which are not supported by the in-house technical staff which is well versed with the older technologies. The technical staff may not always support the new technologies. The entrepreneur also seems reluctant to provide the requisite training to the technical staff which comes at an additional cost of implementation
 - o Awareness about the benefits: The benefits accrued from EE are not direct and therefore it is difficult to assign the saving of energy on a particular aspect of production. The actual realized savings may be lower than the claims. The energy audits pre and post implementation and implementation itself come at a considerable cost.
 - o Lack of sufficient replicable cases: The MSMEs also complain of lack of successful case studies which are easily replicable at the individual plant level. The customizations required for each technology do not provide the confidence of definite cost savings.
- ✓ Financing roadblocks
 - o Lack of available capital for investment / implementation: EE interventions, being small may not get financed through FIs as they do not qualify as term loans. Technologies which qualify for a term loan attract heavy MSME interest rates that discourages entrepreneurs from availing loans for the adoption of EE technologies even when such loans are available.
 - o Clarity on repayment mechanism and complexity of structures: ESCO financing involves new kind of payment plans which require specific energy valuation techniques. The clarity on exact savings and payments do not link directly to the current monitoring and accounting parlance. This creates confusion.

- o Lack of useful customized products: There is a lack of specialized credit products geared to meet the EE needs of MSMEs (refer section to above). Credit lines and dedicated products offered for EE have a very cumbersome procedure. The entrepreneurs have to take regular secured/un-secured loans even when they are adopting EE technology.
- o Lower awareness with respect to EE technologies: Relationship managers from banks who deal with MSME entrepreneurs on a day-to-day basis lack sufficient awareness about the distinction between regular technology upgradation and EE technologies. Therefore, they are unable to appreciate the uniqueness of EE finance over other traditional financial products. The customized or locally fabricated technologies also do not meet the necessary risk criteria at the banks' end.

GiZ held a training on EE finance for 70 MSME bankers in Pune where points relevant for EE financing like cash flows based assessments (as against balance sheet appraisal) and information on ratios relevant for assessment of EE projects were covered.

National Summit on Energy Efficiency in MSMEs organized under SAMEEEKSHA

To discuss and find solutions to various issues related to promotion of energy efficiency in MSMEs, a first-of-its-kind National Summit on Energy Efficiency in MSMEs was organized under the aegis of SAMEEEKSHA during 2012 in New Delhi. The two-day Summit drew more than 200 participants who represented 40 cluster-level industry associations from various MSME sub-sectors across India including brick, ceramics, chemicals, dairy, engineering, foundry, metallurgy, rice mills, tea, and textiles; 30 Government departments; 16 bilateral/multilateral agencies; 7 financial institutions; 9 academic institutions; and 20 energy consulting firms. The deliberations at the Summit focused on finding an answer to one key question: *How can we enable MSMEs to become more energy efficient?* In their efforts to find an answer and to define directions for further actions in the MSME sector, the MSME entrepreneurs and other stakeholders shared their knowledge, experiences, and ideas in a series of intense and interactive sessions that spanned the three broad and inter-related themes of policy, technology, and finance (Exhibit 3).

Exhibit 3: Learning from SAMEEEKSHA Summit under financing

Financing Energy Efficiency Investments in MSMEs



- ✓ For MSMEs, the issue of finance for adoption of EE technologies is of secondary importance. The primary issue is low awareness about EE technologies and their suppliers. Also, entrepreneurs often doubt the credibility of claims related to EE technologies.
- ✓ MSME finance is viewed as involving low-value loans that carry as much processing costs as those incurred on high-value loans (i.e., the transaction costs are nearly the same for both low-value and high-value loans).
- ✓ The MSME sector is termed as ‘priority sector’. However, being a high risk sector, the rates of interest charged on loans to MSMEs are much higher than those charged on loans to large industries/businesses. This discourages entrepreneurs from availing loans for the adoption of EE technologies even when such loans are available.
- ✓ Customized EE technologies often require the fabrication of machinery/equipment by local fabricators. However, banks often do not provide loans for fabricated equipment as they have higher perceived risk. To address this barrier, awareness/capacity building is required.
- ✓ There is a need to quantify and evaluate the results of various financing mechanisms, such as lines of credit, offered by bilateral donors for adoption of EE technologies.
- ✓ There is need to build the capacities of bankers to enhance their understanding of EE technologies as well as their ability to assess the credit-worthiness of EE projects
- ✓ Micro level units with small loan requirements could group together and aggregate their individual loan requirements for EE technologies; as a group, they could then approach the bank for finance.

Source: SAMEEEKSHA website

Section 4

Financial Models to support Energy Efficiency



Section IV: Financial Models to support Energy Efficiency

Financing of energy efficiency in India

Higher up-front costs and long pay-back periods are typical of most energy efficient technologies. The Government has a role in providing the right macroeconomic and environmental framework to attract more public and private sector investments in energy efficient technologies. In India, there are several Government schemes to support MSMEs. For example, the MoMSME has the CLCSS scheme and the Ministry of Textiles has the TUF scheme (refer Section II). SIDBI has been the leading FI in executing credit lines for supporting energy-efficient technologies with the support of major multilateral and bilateral organizations agencies like JICA, KfW, AfD etc. Through these lines of credit, MSME units are provided loans at concessional rates of interest for undertaking energy saving investments. The reach of such schemes (Government and multilateral) remains restricted to select MSMEs as they are channelled through select list of banks. The problem is augmented by the restricted list of technologies which is applicable to avail such benefits. Public finance is important for the development and dissemination of new cleaner technologies especially for MSME sector since the sector cannot invest in R&D activities on its own.

Schemes target modernization and technology upgradation rather than energy efficiency improvements.

Due to several barriers in conventional financing of energy efficient technologies among MSMEs, a new form of technology and financing intermediation called Energy Service Company (ESCO) has been receiving a lot of attention. An ESCO is a company that offers energy efficient technologies/services to a company with guaranteed savings. An ESCO typically can be either a technology manufacturer/supplier or a consultancy/service oriented firm. Two most common ESCO approaches as summarized in Figure 6 are commonly adopted.

Figure 6: Typical ESCO models

ESCO Models	Salient features
Guaranteed Savings	<ul style="list-style-type: none"> ✓ MSME purchases the equipment on loan ✓ ESCO guarantees the energy savings; If guaranteed savings is exceeded, ESCO receives a %age of excess savings ✓ ESCO pays for shortfall, if any, from guaranteed savings ✓ ESCO assumes the performance risk while the bank/equipment supplier takes the credit risk

ESCO Models	Salient features
Shared Savings	<ul style="list-style-type: none"> ✓ ESCO finances the capital investment cost with its own funds or on loan ✓ The asset is retained in the books of ESCO ✓ ESCO retains a larger share of energy savings ✓ The ESCO assumes both performance risk and the credit risk

Source: YBL TERI Analysis

Although ESCO mechanism has been successful in many developed countries but their success in India has been mixed. The Government has recently incorporated a new entity, Energy Efficiency Services Limited (EESL) to promote ESCO financing in India. Many of EESL's ESCO project are in the municipal sector like water pumping and street lighting and agricultural demand side management like energy efficient water pumps. There have been relatively few successful cases in ESCO financing of energy efficient technologies in the MSME sector. Most large manufacturers are not interested to execute ESCO projects among MSMEs due to high transaction costs. (Refer to Stakeholder Consultation 6 in Annexure I)

BEE has proposed two financing schemes to promote energy efficiency in the industry sector - Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE) and Venture Capital Fund for Energy Efficiency (VCFEE) to provide equity support to ESCOs which enables them to raise their capital base through both equity and debt financing.

Approach to financing of energy efficiency loans

Financing is an important dimension of promoting new energy efficient technologies. Realizing the need to improve the energy efficiency of the MSME sector, the Government has launched several schemes for the MSME sector. However, since subsidy under the Government schemes are normally available to MSMEs who avail bank finance, the outreach of Government schemes has been limited. (Refer to Stakeholder Consultations 4 in Annexure I)

The following approaches can be adopted for financing of energy efficiency loans:

- ✓ Loan amounts for energy efficient technologies are not big. For small loans, a List-Based Approach, as used by JICA's credit line to SIDBI, is suitable. However, it is important to restrict the technologies in such a list to the ones where energy savings is certain. As an example, a restricted list of equipment is followed under Turkey Energy Finance Facility (TurSEFF)⁴.

A List Based Approach is usually suitable for small ticket investments to reduce transaction costs

⁴<http://www.ebrd.com/work-with-us/projects/psd/turkish-sustainable-energy-financing-facility-tseff.html>

- ✓ Loans to larger energy efficiency projects need to be analysed carefully on a case-by-case basis. The evaluation should be based on clear criteria that correlates energy saving and investment instead of %age energy savings alone. This is important for distinguishing between new technologies purchased for routine modernisation and expansion projects from those purchased because of energy efficiency benefits. The bank must seek technical assistance from skilled energy auditors for evaluating the energy savings through M&V in relation to the baseline. The energy auditor needs to take actual measurements wherever possible. The evaluation of energy savings in expansion and greenfield projects can be more complex in the absence of baseline data. It is important to verify the assumptions and source of the baseline data, like supplier documentation, in such cases.

It is important to evaluate larger projects on a case-to-case basis with help from a skilled energy professional

International examples in energy efficiency financing

Governments have played an important role in financing of energy efficiency investments in many countries. For example in Mexico, the Government and state electricity utility have supported energy efficiency in Government buildings, municipal services like street lighting and water pumping and domestic sector. The Government of Thailand has supported creation of an Energy Conservation Fund and Demand Side Management (DSM) programs on commercial and industrial sectors.

Official Development Assistance (ODA) has also been a major source of investment in energy efficient technologies. For example, in the Baltic States, the Swedish Government aid agency NUTEK promoted conversion of heating boilers to biomass by providing financial and technical assistance to boiler manufacturers and supporting training of boiler operators. Credit lines for energy efficiency improvements have been common to promote energy efficiency investments among MSMEs.

Some international schemes for promoting energy efficiencies in developing countries are highlighted here.

- ✓ European Bank for Reconstruction and Development's (EBRD) Sustainable Energy Financing Facilities (SEFFs)

Recognizing that high energy intensity is a major challenge in countries in transition, EBRD established a specialized energy efficiency team in 1994. The bank initiated SEFFs in 15 countries including Moldova, Bulgaria, Turkey and Romania. The highlights of the financing scheme are given in the Box.

- ✓ Technical and financial evaluation of each project before loan disbursement
- ✓ Grant component range between 5-20% of the loan
- ✓ Higher grant is provided for projects that employ Best Available Technology (BAT) or an advanced technology
- ✓ Technical assistance is provided through a leading consulting/engineering company
- ✓ Independent verification of actual energy savings is conducted after the project is implemented

✓ IFC's Hungary Energy Efficiency Co-Financing Program

The primary financing tool under the IFC program is partial risk guarantee to the FIs. Eligible transactions of the FIs are covered by a partial guarantee by IFC, for which it charges a guarantee fee. In case of a default, the payment is released by IFC to the FI, which then needs to begin the recovery process. As only partial guarantees were used and project financing derives from the FIs' own funds, the FIs had incentives to originate sound transactions and pursue all collection remedies. The preferred borrowers from FI under this program were project developers - ESCOs, leasing companies, and SMEs that are involved in delivering energy efficiency equipment, projects, and services. Thus the FIs were able to avoid high transaction costs of dealing with a multitude of small projects proposed by individual borrowers.

✓ World Bank Loan Financing to the Energy Efficiency Project in China

World Bank provided a loan to Minsheng Bank, China for lending to industrial enterprises or ESCOs for energy efficiency investments. Lending to SMEs was encouraged under the loan. The major categories of energy efficiency projects which were eligible for financing under the project are provided in the Box:

- ✓ Replacement of inefficient industrial technologies with energy saving technologies such as more efficient industrial boilers, kilns, and heat exchange systems
- ✓ Recovery and utilization of by-product gas, waste heat and pressure
- ✓ Installation of highly efficient mechanical and electrical equipment, including motors, pumps, heating and ventilation equipment; and
- ✓ Industrial system optimization to reduce energy use

✓ GEF-World Bank Energy Efficiency Project in Poland

The project includes two modes of financing energy efficiency projects - partial risk guarantee and capital grant. A partial guarantee facility was established with GEF funds as a risk-sharing mechanism to provide commercial banks with partial coverage of risk exposure against loans made for energy efficiency projects for buildings. A %age of the GEF grant was used for providing capital grant for energy efficiency projects consisting of 'high cost measures', i.e. measures with paybacks in excess of 6 years. A flat partial grant, equivalent to 30% of total project cost, is payable to an ESCO upon completion of the project, for higher-payback projects (over 10 years).

Section 5 Way Forward



Section V: Way Forward

Financing of energy efficiency cannot be treated as business as usual by MSME stakeholders viz. banks, Government institutions, multilateral and bilateral agencies. There needs to be greater realization among these stakeholders that climate change, and hence energy efficiency, is in the larger public interest and needs to be given the same priority as to any mega project. While this realization has come to a large extent for renewable energy, energy efficiency in general is given lower priority. Enhancing the competitiveness of the MSME sector through energy efficiency improvements is important as the MSME sector contributes 45 % of industrial production and is one of the major employers in India. Although some steps have been taken to address this in the recent past by Government and other stakeholders there is still a huge scope to promote energy efficient technologies among MSMEs.

Technology Approach to energy efficiency Financing

Financing for energy efficiency technologies could be customized basis their stages of commercialization.

1. Financing of pre-commercial technologies

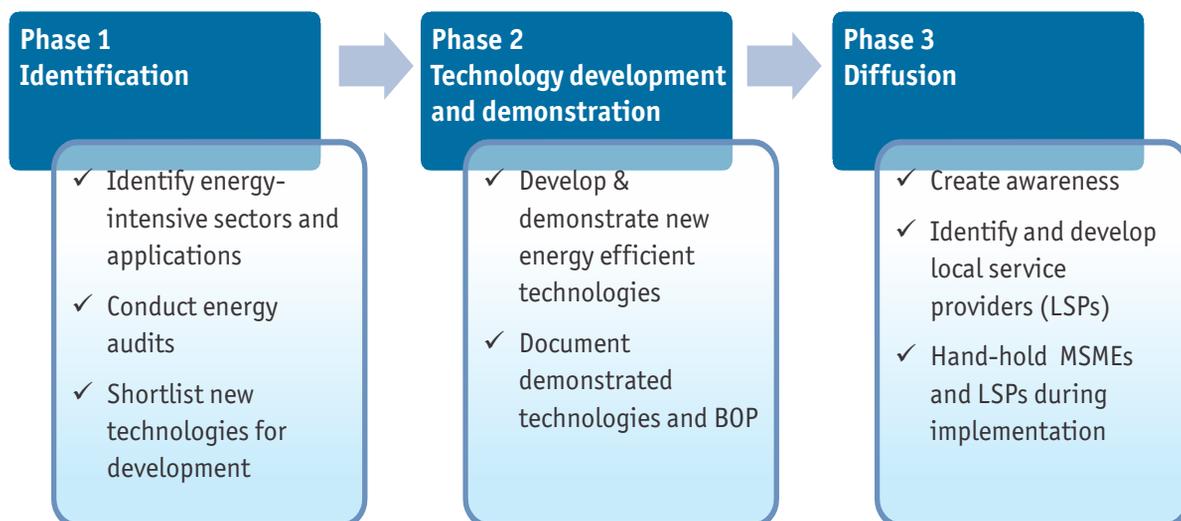
Many MSME sectors use outmoded and inefficient process technologies that have been developed decades ago. Efficient technological solutions that are commercially available in developed countries often cannot be used by MSMEs in India due to their high upfront cost and scale of operation. Development of cleaner processes for MSMEs is not commercially attractive for large engineering firms and consultancies in the private sector in India due to high costs and risk factors.

Public finance through Government and low cost finance from bilateral/multilateral agencies, has a crucial role in supporting R&D and innovation of energy efficient technological solutions for MSMEs, especially in the context of climate change. The funding can be provided as grant support or as venture capital. Whatever the model of funding, there is little doubt that a substantial increase in public funding is needed for R&D and demonstration of new and more energy efficient processes for a large number of energy-intensive MSME clusters in India. It will help in reducing the greenhouse gases and improving the competitiveness of the sector.

Here, it is very important to take the RDD&D in a phased manner. The first step is identification of energy intensive sectors and processes to prioritise areas where investment in R&D is required. Large

energy saving opportunities are typically found in energy intensive MSME clusters where energy cost accounts for a major share of the operating cost. Within the sector there may be applications which are more energy intensive than others. For example, in the textile sector, dyeing is much more energy intensive than stitching. Secondly, development and demonstration projects aimed at providing off-the-shelf efficient technological systems have to be undertaken. Academic/R&D institutions and technical NGOs can play an important role in undertaking collaborative research, development, demonstration and dissemination (RDD&D) projects with local and international experts. Knowledge products like design drawings, operation manuals, best operating practices (BOP) and so on needs to be documented and widely distributed. In order to create a delivery system for the developed technology it is important to identify and develop a network of local service providers (LSPs). The LSPs who can be consultants, fabricators or consultancy organisations, can play an important intermediary role in hand-holding of the units to successfully implement the technology. The LSPs can be developed as project promoters for providing services such as technical assistance, financial intermediation and ESCO services. Hand-holding of MSMEs and LSPs for a few years during technology replications is required to build their capacities and ensure smooth operation of the technology. This phased RDD&D approach is shown in Figure 7.

Figure 7: Phased approach to develop and promote new energy efficient technologies among MSMEs



Source: YBL TERI Analysis

Exhibit 4 : Need for design and development of EE technological solutions in the MSME sector

**Mr Hanuman Prasad Garg,
Director, Glass industry Syndicate, Firozabad**

Almost the entire small-scale glass industry in India is located in a single cluster in Firozabad, near Agra. Each day, the small units here produce about 2500 tonnes of glass products, including 150 million bangles, and employ over 250,000 people. Until the mid-1990s, the firms used traditional and high energy-intensity technologies. TERI-SDC, developed and promoted EE technologies for this sector, focusing on the coal-fired pot furnace. Their efforts took on new urgency when the

firms were pressured to switch from coal to natural gas. In 2001, TERI demonstrated a gas-based recuperative pot furnace that reduced energy use by half over the traditional coal-fired pot furnace and 30–35 % over the local gas-fired pot furnace. By 2012, the entire operating pot furnace firms in Firozabad had switched to the new recuperative furnace.

The specific technological solution (the NG-fired pot furnace) brought major improvements in terms of energy savings, and product quality. But these solutions are often not readily available for the small scale units. It took over four years of extensive R&D (by TERI-SDC) to develop one such solution in Firozabad. Even today, there is immense scope for EE improvements in Firozabad small-scale units, particularly in the bangle making units. Other than the pot furnaces, which are now efficiently operating, major future areas for technological intervention in our industry include the re-heating furnace ('*sekai-bhatti*'), bangle making furnace, and the pot itself which is used for melting.

But sadly, it appears that the Government and other agencies are not interested in investing resources for developing customized technological solutions in these areas. This is probably because the scale of resources (time and money) required is huge and the result is not spontaneous. We urge the Government or bilateral/multilateral agencies to initiate efforts in this regard, by introducing programs to support R&D for sector/cluster specific technological solutions, particularly in the traditional small scale sector like ours.

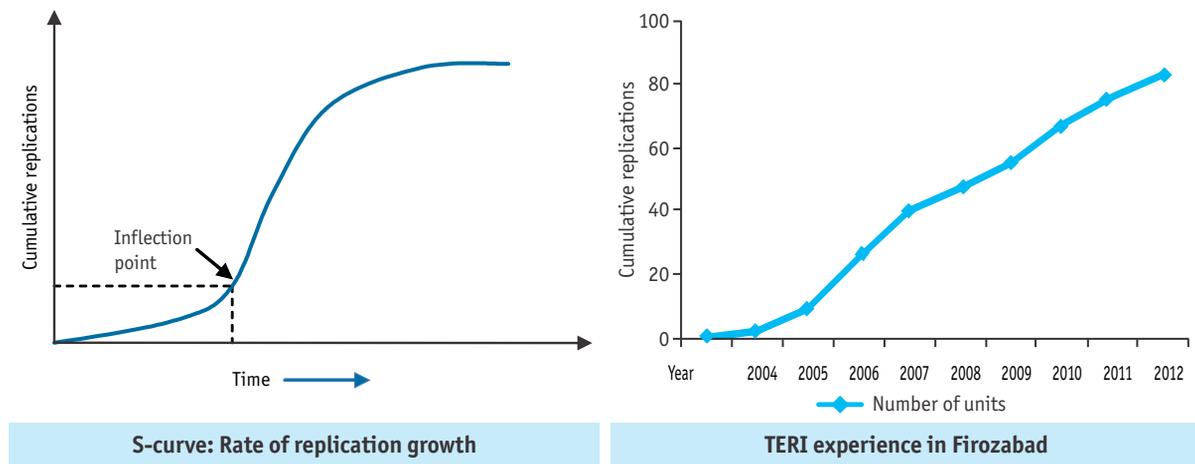
2. Financing of semi-commercial technologies

Financial support is needed for a number of years even after the development and demonstration of a new technology. This is due to several barriers faced by new technologies in early stages of commercialization like higher cost, poor awareness, skepticism about performance, higher perceived risk and lack of local delivery and service network. Therefore, it is crucial to support a new technology till it has been adopted by the market. A support from public finance is required for providing capital subsidies and concessional interest rates for new technologies. It should be significant enough to make the technological choice attractive enough in comparison to conventional inefficient technologies available in the market.

Commercialization of new technologies requires financial support to mitigate risks

TERI's experience of promoting semi-commercial technologies has reaffirmed the conclusions of various researches on diffusion of new technologies. The experience indicated that the rate of diffusion usually follows what is called the 'S-shaped curve' (Figure 8). As the figure indicates, replication initially occurred at a fairly slow rate, till a point where a large number of replications took place in a very short interval. This point is appropriately called the 'take-off' or inflection point. Interpersonal networks became activated only after a certain 'critical mass' of the market (between 10% and 25% of units) had adopted the technology.

Figure 8: Theory vs Observed replication of technologies



Source: YBL TERI Analysis

For instance, in the Firozabad cluster this ‘critical mass’ (about 15 units—around 20% of total) was achieved in 2006, while the first replication happened in 2002. In this case, the technology took about 4 years to reach the ‘take-off’ stage. Finance, in this case through SDC, was available for providing technical support to the MSMEs. After 2006, the rate of replications gained pace and by 2012 the entire cluster (about 90 units) had adopted the energy efficient pot furnace designed by TERI.

3. Financing of commercial technologies

Commercial technologies have proven records and just need to be pushed through various incentives like concessional lines of credit for energy efficiency equipment financing. While such credit lines are useful for building the capacity of bankers on energy efficiency financing during initial stages, better guidelines to evaluate technologies need to be developed. It is important here to focus on the energy efficiency for any kind of concessional financing rather than conventional technology. As discussed in the earlier sections, it must be understood that energy savings, in absolute or %age terms may not be the best way to evaluate energy efficiency. A simple but effective check point is to correlate the investment with energy savings by calculating either the IRR or payback period of the project on energy savings alone (Refer Table 4).

Often huge energy savings can be achieved just by changing simple operating procedures (e.g. optimizing the pressure setting of air compressors) and low investment measures (e.g. using nozzles for compressed air used for cleaning practices). These practices can be implemented in-house by MSMEs after they are identified through energy audits. For improving many such operating practices, MSMEs require larger financial assistance mainly to get their units energy audited. Therefore, it is recommended to integrate technical assistance for energy auditing of existing unit and evaluation of proposed plant and equipment along with project financing especially in all large-ticket energy efficiency investments.

ESCO model of financing has achieved limited success for energy efficient equipment financing among MSMEs. For kick-starting the ESCO model, funding from an outside agency is required. The funding can be used to develop and support project promoters at the local level (LSPs) who can do financial as well as technical mediation between the equipment manufacturer and the MSME unit. The roles of technology implementation, performance monitoring and collection of payments from individual units can be done by this the local project promoter. Partial risk guarantee funding will be useful to support the development of more ESCOs and project promoters for energy efficiency promotion among MSMEs.

Leveraging MSME- Banking partner relationship

MSMEs generally hold one banking relationship for all their needs. This relation is based on long term understanding of business and risks by the banking partner. The bankers are also comfortable in giving large size loans based on overall collaterals hypothecated with the bank. This mutual business and risk evaluation needs to be leveraged to push new technologies amongst the MSMEs.

MSMEs have strong existing relationships with their local banking partners, including hypothecation of their existing assets for current term loans. Therefore obtaining loans from other FIs can sometimes prove difficult especially with new assets being integrated in current setups. Smaller EE projects identified for the MSME sector are best financed by their current banking partners. The new equipment /machinery for EE should also be financed through the banking partner.

It is essential here that the Government schemes to support EE technologies should be channeled through all the commercial banks who are engaged in MSME financing. This would allow the MSMEs to get their financing done from their own banking partner and avoid any kind of conflicts on the hypothecation of any assets among two or more banks. This will provide the depth to all the Government schemes to all the MSMEs that are banking with one or the other FI. This will also allow all the banks to understand and be aware of Government schemes that can be suggested to other MSME clients.

Role of the Government

The Government being a very important stakeholder and the owner of the NMEEE should take prudent steps to make energy efficiency a motto of every Indian. The Government interventions are required on three aspects.

Awareness: The Government should launch mass awareness campaigns that would involve everyone to save energy in their own right. The simple housekeeping measures have to be implemented right at the level of individuals to be most effective. Promoting Energy as a national asset will help improve efficiency not only in the industry through employees but also in other sectors like agriculture, households and transportation achieving a larger overall impact on EE.

Promotion and Marketing of EE schemes: In order to increase the impact of the Government schemes; effectively use EE credit lines; and support more projects with high energy savings in relation with the

investment cost, a marketing approach could be developed towards energy intensive clusters (for instance foundry, ceramics, glass, food, textile: dyeing, etc.). These clusters could be targeted as they would offer a substantial scope for energy savings. Local branches of FIs should play an active role towards this promotion exercise.

Schemes: The different schemes launched by the Government to increase the uptake of EE should be made more inclusive than exclusive. A list of technologies that the Government allows subsidies on should be made broader by including the semi-commercial technologies / instruments which deliver higher energy savings than listed ones. The onus of energy saving should be put on the entrepreneur beyond the stipulated list of technologies to allow for such inclusions on case to case basis. The banks should be advised to provide financing irrespective of the scheme approval / rejection and subsidies could be designed on an actual saving basis.

Additionally, the operational guidelines for these schemes need to be improved. The scheme should include clear definition based on energy savings rate of returns.

Promotion of innovative financial models: The Government should allow the banks to innovate and learn new financing techniques and models which are in line with technological developments.

Additionally, Governments need to strengthen the local institutions within which the MSMEs operate, as these institutions strongly influence the development of the sector. Studies have shown that general improvements in physical and financial infrastructure can contribute significantly to the growth and efficiency of the MSME sector than merely providing financial subsidies.

Role of other stakeholders

MSMEs form the supply partners to many large corporates and it is their imperative to reduce ecological impact of their supply chains also. These companies can act in two ways to achieve the overall EE mission. First, large companies being technologically advanced and having the technical expertise should support their suppliers in upgradation of their technologies/ processes/ manpower to increase their competitiveness. Second, they can also penalize their suppliers for not adhering to the technical guidelines.

The equipment manufacturers and the technology providers, who act as intermediaries should develop EE technologies which are friendly for the MSMEs. The technologies should be able to adapt to the local conditions. But the most important role for the technology providers is to provide the right feedback for the implementation of the technology in the right fashion and support network of spare parts & repair personnel for long lasting system.

Annexure I: Stakeholder Consultations

Stakeholder Consultation 1:

Dr Veena Joshi, Formerly Senior Thematic Advisor, Swiss Agency for Development and Cooperation, India and an expert in the MSME EE domain

Technology environment in the MSME sector

“The technology environment in Indian MSME sector is not very well developed. There is not enough Government support for development of technology solutions. It seems that the sector’s technology needs are not well understood”.

The sector is still struggling with obsolete technologies and there is not enough focus on making the technology environment more attractive. Limited efforts have been made by some agencies to develop specific technology solutions for the MSME sector. Barring a few, not many interventions have focused on technology design and development in the MSME domain. In fact, most of the technology innovations in the MSME sector happen by MSMEs/clusters themselves. The institutional environment is such that there is no encouragement for innovation. There is no setting of agenda to develop technology solutions for either sectors or clusters.

Though best available technologies (BATs) could be a good starting point, but to overall make an impact in the energy efficiency domain in the MSME sector, we need to develop customized technological solutions. This should be done either sector by sector, cluster by cluster or a combination of both. Government agencies (BEE/MoMSME/CSIR) should make efforts to map and to identify technological needs of the MSME sector and see how these could be addressed.

Can technology transfer (international technologies) help?

Considering the scale at which MSMEs operate, there has to be a significant effort at the national level to develop cost-effective technological solutions customized to local conditions. However, if we take a technology from outside, it should not be merely a ‘black box’, but technology know-how. Technology transfer needs to be understood not only as a process of capital equipment supply from one firm to another but also one that includes the transfer of skills and know-how for operating and maintaining technology hardware, and knowledge for understanding the technology. Accordingly, appropriate mechanisms are needed to ensure that technology transfer is not restricted to the transfer of hardware, but builds technical capacity and promotes indigenous innovation. For instance, under the SDC-TERI intervention in various MSME sectors, international technologies were studied and analyzed. The technologies were customized to suit the operating conditions of Indian industries and were then demonstrated in India.

Nevertheless, focus should be on developing cost-effective cutting-edge technologies in our own soil, customized to the needs of each sub-sector/cluster. Local units should be engaged in this process.

How can we scale up energy efficiency interventions in the MSME sector?

It is best to start with both EE products (boilers, motors, pumps etc.) and available sector-specific technologies (process furnaces etc.). As was highlighted under the AfD-BEE-TERI study, there is immense energy saving potential through adoption of sector-specific technologies and cross-cutting technologies.

In order to scale up energy efficiency interventions in the MSME sector, projects/interventions have to focus on the following three dimensions:

1. Housekeeping measures/best operating practices—these include practices such as better insulation, reducing leakages, optimization of air/fuel ratio, recycling etc.
2. Adoption of EE products—these include cross-cutting technologies such as EE motors, pumps, boilers, cogeneration etc.
3. Development of sector/cluster specific technological solutions—a similar approach as was followed under the TERI-SDC project e.g. recuperator for waste heat recovery in glass melting furnaces.

This could be done at various stages of an energy efficiency engagement with an MSME unit. Housekeeping measures could be suggested at the stage of walk through audit which would be no cost measures with some savings, then EE products can be implemented that would lead to comparatively large savings, and finally the most important component of developing a specific technology solution which would lead to huge savings and consequent saturation.

In addition to developing specific technology solutions, which has been central to the SDC agenda in the MSME sector, the next phase of TERI-SDC project will also focus on handholding units in various clusters to adopt housekeeping measures as well as EE products. In fact, during the last three years, various projects have focused on developing a saturation approach whereby specific clusters are targeted to cover a large number of units for small and big measures that would reduce energy consumption. We could also refer to these select clusters as ‘designated clusters’ and monitor them closely for results and further programme design insights.

The need of the day seems to be to put in place systems to collect and establish robust baselines for energy consumption. This would allow us to link financial incentives with possible savings that can be realised. This would also encourage entrepreneurs to monitor the energy consumption in a systematic manner. Hence, we are moving in the right direction, but very slowly and there is a

possibility of consolidating and capitalizing on what has already happened and then further the initiatives for scaling up energy efficiency in the MSME sector under the 12th plan and beyond.

What kind of financial models can work?

Some recommendations that could work towards furthering the financing side of EE technologies:

- ✓ Banks need to develop customized solutions to finance fabricated technologies at a cluster level.
- ✓ There is a need to develop financing models based upon different category of EE products and services.
- ✓ M&E of the EE projects is crucial to build credibility about the technologies and the institutes implementing such techniques. Though, the bilateral lines of credit have been successfully used by SIDBI/other public sector banks for financing technologies in the MSME, its impact in terms of energy savings is still not clearly established.
- ✓ The ESCO model of implementing EE projects can only work in the MSME sector, if the ESCO/or the vendor also organizes for the fuel. This way we can also promote non-power based EE technologies which are much needed in the MSME sector. This could be done by piloting at a cluster level in well-organized clusters having active industry associations.

Stakeholder Consultation 2:

Mr Daniel Ziegerer, Director of Cooperation, Swiss Agency for Development and Cooperation (SDC)

MSME EE domain

There is a large need for the MSME sector as a whole to move towards more energy efficient technologies. However, the structure and often informal nature of the sector makes it very difficult to accelerate the adoption of EETs. The sector comprises of traditional sub-sectors where obsolete technologies are deployed leading to huge energy and material wastages. In such sub-sectors, external agencies can play an important role in assisting the identification and introduction of appropriate EE technological solutions.

Experience of implementing projects in the MSME EE domain

When SDC started work in the sector over two decades back, it focused on working in energy intensive traditional sectors such as glass, foundry and brick. The idea was to choose sectors where a major impact for development and the environment could be achieved simultaneously through technological interventions. The approach was to develop customized solutions by combining the know-how of local, national and international experts. Till today, SDC is engaged in these sectors

and through partners such as TERI have made a considerable impact in many clusters. The technological solutions developed and disseminated under SDC supported interventions have led to substantial energy savings, GHG reduction, and improved working conditions of thousands of workers. SDC has always believed in a long term engagement approach which involves building the capacities of local service providers who continue to support the cluster units beyond the project term.

Some of the important lessons of our engagement in the MSME sector are:

- ✓ Need to develop customized technological solutions that are adapted to the working realities of the targeted MSMEs;
- ✓ Leveraging through international expertise and experience in order to customize the technology to Indian conditions and to create knowledge and technical know-how;
- ✓ Engage local (cluster) level stakeholders—industry associations, fabricators, technical experts – in order to ensure that the intervention has a long term effect;
- ✓ The regulatory framework conditions are crucial for adoption solutions on a large scale and convincing the end-users (units) to move away from business as usual;
- ✓ Energy prices greatly influence the willingness of the entrepreneurs to adopt EE technological solutions;
- ✓ For an intervention to be truly effective, the three dimensions of a conducive policy/regulatory framework, dynamic market forces (energy/material prices) and adapted technological solution need to come together.

SDC's focus in future will be to remain engaged in the existing sub-sectors/clusters and focus on further disseminating the technological solutions, including through the SAMEEEKSHA platform. The major sectors with which we will be engaging in the next years are foundry and aluminum, which are among the most energy-intensive sub-sectors.

Financing EE in MSMEs

In our interactions with MSMEs, we have observed that there exists a lot of skepticism regarding availing bank finance during technology replication. They are normally wary of the documentation formalities involved and are hence not often consider applying for a loan. For the financing schemes to work in these contexts, streamlined procedures with limited and simple documentation need to be introduced. Financing in MSME sector also needs awareness generation among the financing agencies and the development of bankable energy efficiency models. Additionally, standardized schemes to support cluster level technological intervention should be formulated and offered.

Stakeholder Consultation 3:

Mr Pradeep Sharma, Chief Manager, Consultancy Services Cell, State Bank of India

SBI has been constantly creating assets products for MSMEs to cater to their needs and helping them grow. Under energy efficiency initiatives, SBI has come up with various schemes to finance MSMEs for implementation of EETs at unit level as well as at cluster level. As part of its endeavor, SBI launched “Project Up-tech – Energy Efficiency” at PAN India level in the year 2003. Under “Project Up-tech”, SBI entered into tie ups with energy companies like TERI, DSCL Energy, ENERCON and WINROCK. SBI provided grant of INR 50,000 each to the units for conducting energy audit as well as preparation of Detailed Project Report. In addition to that, SBI also offered an option of term loan finance to the units to the tune of 90% of project cost at 11% rate of interest per annum for implementation of the Energy Efficiency measures.

In Delhi circle, walkthrough audit of around 40-45 SME units were conducted with the help of energy companies. During walkthrough audit, promoters of the SMEs were made aware about the level of energy consumption in their units as well as scope of saving energy.

On the basis of our experience with SMEs and as part of Project Uptech, the Energy Efficiency measures could be categorized under three broad categories which are as follows:

1. Zero or very low cost & immediate saving measure: This can be implemented as part of the business and does not require any finance.
2. Medium cost & short term saving measures: This can also be implemented by own sources of the promoters.
3. Equipment upgrades: This includes installation of specialized equipment which achieves substantial energy savings. Due to higher investment cost it requires support from the financiers.

Majority of the units in which walkthrough audit were conducted, they implemented low cost and immediate saving measures by investing their own funds. Whereas, only three units expressed interest in conducting detailed energy audit. Consequently, energy audits were conducted and DPRs were prepared for the interested units. However, none of the SME unit turned up for availing the finance.

We observed from our experiences that the barrier for implementing EE measures is not due to non-availability of finance but due to lack of willingness from the side of promoters of the MSME units. The MSME units had many apprehensions towards success of EE projects. The reasons may be summarized as under:

- ✓ Promoters have doubt on efficacy of Energy Audits which are also costly.

- ✓ Promoters are reluctant to share actual production data with Energy Auditors.
- ✓ Internal Technical employees of SMEs feel insecure to implement EE projects.
- ✓ Lack of available replicable projects/models to convince promoters.

SBI has also been undertaking extensive training programs for spreading awareness about energy efficiency among their Credit offices. Recently, SBI has conducted training programmes for Credit officers dealing with SMEs in Delhi circle. In training programmes, the Credit officers were informed about details of TEQUP scheme and purpose of conducting Energy Audit. The officers were sensitized about benefits of implementing Energy Efficiency measures in SME units. The Credit officers were also advised to educate their existing SME clients about Energy Efficiency measures as well as benefits of adopting Energy Efficiency like reduction in cost of production, increase in profitability and improvement in competitiveness of the product.

Stakeholder Consultation 4:

Mr Rajiv Kumar, DGM, Energy Efficiency Centre, SIDBI

SIDBI is the principal development financial institution for promotion, development and financing of the MSME sector. It has been playing a major role for the sector's growth, promotion and sustainable development. SIDBI has been a pioneer in introducing diverse schemes for financing energy efficiency and cleaner production projects in the MSME sector. It has forged strategic partnerships with BEE, World Bank, UNIDO, JICA, KfW, GIZ & AfD for promoting/financing EE investments in the MSME sector and has also received multiple lines of credit from some of these international agencies. SIDBI is the first FI to set up a separate vertical for energy efficiency enhancements in the MSME sector. The "Energy Efficiency Centre" at SIDBI is implementing several projects for promoting energy efficiency in the MSME sector.

One of the major programs' that SIDBI is implementing is the World Bank-GEF funded project titled "Financing Energy Efficiency at MSMEs". The project is targeted at five energy-intensive clusters—Kolhapur (Foundry), Pune (Forging), Ankleshwar (Chemical), Faridabad (Mixed), and Tirunelveli (Limekilns). The project objective is to increase demand for EE investments in these clusters and to build MSMEs capacity to access commercial finance. The project has focused on providing technical assistance to MSME units through support for energy audits, preparation of DPRs and implementation of identified energy conservation measures. In addition, support is provided to mobilize financing from FIs to ensure that the identified EE measures are implemented. The project is also creating mass awareness through workshops/ training to MSMEs, vendors, equipment manufacturers, industrial associations, bankers, Local service providers etc. It is estimated that the project will lead to an investment of over INR 100 crore in energy saving options and GHG emission reduction of 1.2 million tonnes of CO₂.

Lessons from WB-GEF project implementation

Initially, not many MSME entrepreneurs were forthcoming for getting energy audits done and were skeptical about the benefits they can derive from investing in ECMs. This was primarily because there were not enough success stories / case studies to showcase in their own sectors/clusters. We soon observed that for MSMEs, 'seeing is believing' and they had to be shown some actual examples of successful adoption of EETs, which happened courtesy some visionary entrepreneurs (though with lot of trust building efforts) who offered initial participation. Since, the project had a dedicated implementation cum third-party measurement and evaluation approach, soon case studies on energy savings started emerging in the clusters. The project has an outreach component under which we started capturing these initial case studies and disseminating them in respective cluster. This helped enormously and many units started participating in the project. At present, around 150 MSME units have already implemented all ECMs recommended to them by the Project. Of these, third party M&V has been completed in around 100 MSME units and the results are highly encouraging. Another 300 MSME units are in various stages of implementations. We expect that by the end of the project period, around 500 MSME units in these 5 clusters shall have adopted ECMs. Consequently, the WB-GEF project is in the process of creation of a pool of case studies on successful adoption of energy savings measures that can instill confidence in unit owners to take an EE investment decision.

A knowledge platform in the form of an interactive website is also being developed under the project to share case studies, success stories and short films with the MSMEs. The success of the WB-GEF project has encouraged SIDBI to launch a new program called 'End to End Energy Efficiency (4E) Solutions' which will be implemented in collaboration with "India SME Technology Services Ltd." (ISTSL). Over 3000 MSME units in selected clusters (starting with the Northern region) will be offered support for audits, DPR preparation, selection of suitable vendors and subsequent implementation—the same approach as that of WB-GEF project.

Limited bank finance cases:

Though the project has led to huge investments, most of these have been funded by the entrepreneurs themselves. Out of 500 expected implementations, we believe, bank finance cases would be under 10-15%. "We expected the number of bank finance cases to be low, as the entrepreneurs in these clusters were not confident of realizing the committed savings from adopting recommended ECMs and hence were not willing to further burden their outflows by obtaining a loan and increasing their cost of capital. In a way they wanted to limit their risk. But now, under the 4E financing project, we expect the number of bank finance cases to be a lot more."

Suggestions for increasing MSMEs access to finance:

- ✓ EE implementation should be sequential. First an entrepreneur should be shown the benefits of low-hanging fruits (low-cost investments). This can instill confidence in him to invest in hi-cost EETs.

- ✓ Financing EE in SMEs has to be a 'top-down approach' in FIs. The branch managers will only focus more on financing EE projects in SMEs, if the top management has a keen interest and pushes for it.
- ✓ Though, the banks have started to realize that the energy efficiency investments result in enhancing the credit quality of their portfolio, it is often felt that the banker's understanding of EE projects is limited. Programs to build capacities of bankers on evaluating EE projects need to undertaken at a wider scale.
- ✓ Consultancy market for EE in India is very much fragmented with a lot of disparities in the consultancy fees charged and quality of services delivered. Given this scenario, selection of a consultant/energy auditor becomes difficult for an entrepreneur. Some sort of standardization in fees as well as quality benchmarking for energy audits needs to be evolved.
- ✓ Need to create market for ESCOs. EE projects in MSME clusters can be implemented at a larger scale through the ESCO route. FIs should explore the option of financing ESCOs.

Stakeholder Consultation 5:

Mr Anil Bhardwaj, Secretary General, Federation of Indian Micro and Small & Medium Enterprises

FISME is a premier MSME body in India which primarily focuses on three thematic areas: market access, advocacy for reforms and implementation of MSME development projects. Assisting MSMEs acquire sustainable competitiveness has been an important sub-component of market access and MSME development initiatives of FISME. It has always tried to make a case for energy efficiency in MSMEs through on ground technical support to facilitate pilot projects as well as providing policy advocacy support at various pertinent forums.

It is not usual among MSMEs that Energy efficiency initiatives are taken consciously. The Government schemes also have not been able to make large inroads despite providing various financial incentives. The overall uptake of the Energy Efficiency Concept itself has not been very well understood. In Indian context the awareness is in general about energy efficiency is low. One of the major reasons is that energy prices are suppressed and do not reflect the market prices due to subsidies whether in petroleum products or electricity of gas. A tendency to waste is ubiquitous. MSMEs are part of the same milieu and suffer from the same maladies.

However, there are a few specific reasons which exacerbate the situation in MSMEs:

- ✓ Besides the low sensitization of energy efficiency, both employees and employers of MSMEs lack the appreciation of the 'causal link' between the manufacturing practices and the results in terms of loss or saving of energy. They may have a vague idea about it but it is neither specific nor quantifiable.

- ✓ MSMEs face a critical information gap about benchmarking of available technologies / equipment in terms of their energy efficiency. There is no equivalent 'star' marking for capital goods for example. They neither have the competency nor resources for comparing technologies on energy efficiency.
- ✓ Higher cost of energy efficient capital goods is yet another major reason for MSMEs' inability to adopt efficient manufacturing. The entrepreneur may be aware of energy efficient equipment but would still use an energy guzzler because that is what he could afford. Difficulty in accessing loans and also higher cost of finance- which can make repayments difficult, acts as big impediment in accessing

The Government schemes to support MSMEs had their own limitations that restricted them to be applicable to some pilot projects or a few clusters at most. The process of approvals to adopt new technologies at individual MSME level turned out to be too time consuming. The JICA list of technologies eligible for subsidy under CLCSS scheme always turned out to be limiting as the latest technologies took time to be updated in the list. The initial limitation of the scheme to only a few selected financial institutions created problems with multiple bank transactions between the scheme provider and the bank with which the MSME banks with. All these factors led MSMEs away from these very lucrative subsidy options which in turn made the adoption of EE technologies grow at a slower rate.

FISME has been advocating a fresher perspective to look at the Government schemes (mainly CLCSS and TEQUP) to increase the acceptability of the EE through various policy interventions

- ✓ Opening the schemes to all commercial banks which deal with MSMEs enabling each bank to leverage its existing relationship to push the EE agenda to SMEs
- ✓ Having a –ve list of technologies / upgrades which should not be financed under these schemes e.g. gensets. The decision of technologies should be better left to the entrepreneur as they are the final risk takers on the business.
- ✓ Creating an audit mechanism to check the effectiveness of the scheme and thus updating the –ve list on the experiences
- ✓ Allowing alternative technologies (2nd hand machines and self- fabricated technologies) with certain checks and balances to be considered under the schemes to increase the depth and indigenization of the systems.

However the biggest impacts can be achieved through a mass campaign on the relevance of Energy efficiency in every one's life which ultimately adds up at the country level. This would not only make every one aware of the cause but will also help MSMEs to implement zero cost measures to achieve energy saving through employee behavior change which is often the hardest to get. The process that should be followed introduce any such changes is

Awareness generation → **Handholding in implementation** → **Financial support**

Stakeholder Consultation 6:

Mr Saurabh Kumar, Managing Director, Energy Efficiency Services Limited

Unlocking EE potential in the MSME sector through ESCO mode—EESL approach

Energy efficiency in MSME sector is poised for a big gain with the involvement of Energy Efficiency Services Limited (EESL) intending to execute projects across various clusters. EESL, created under the aegis of Ministry of Power (MoP) as a joint venture of PSUs of MOP, is the first Government owned ESCO in India. EESL, which can also be considered as 'Super ESCO' has a mandate to implement energy efficiency projects in various sectors such as agriculture, municipal functions, industry etc. on ESCO mode aiding BEE in meeting the targets of National Mission on Enhanced Energy Efficiency (NMEEE) and enhancing the penetration of EC Act.

EESL is now ushering to undertake a variety of energy efficiency projects in the MSME sector through ESCO mode and will focus on a cluster based approach for this. It aims to target energy-intensive SME clusters and will capitalize on the ground work done by BEE under its BEE-SME program.

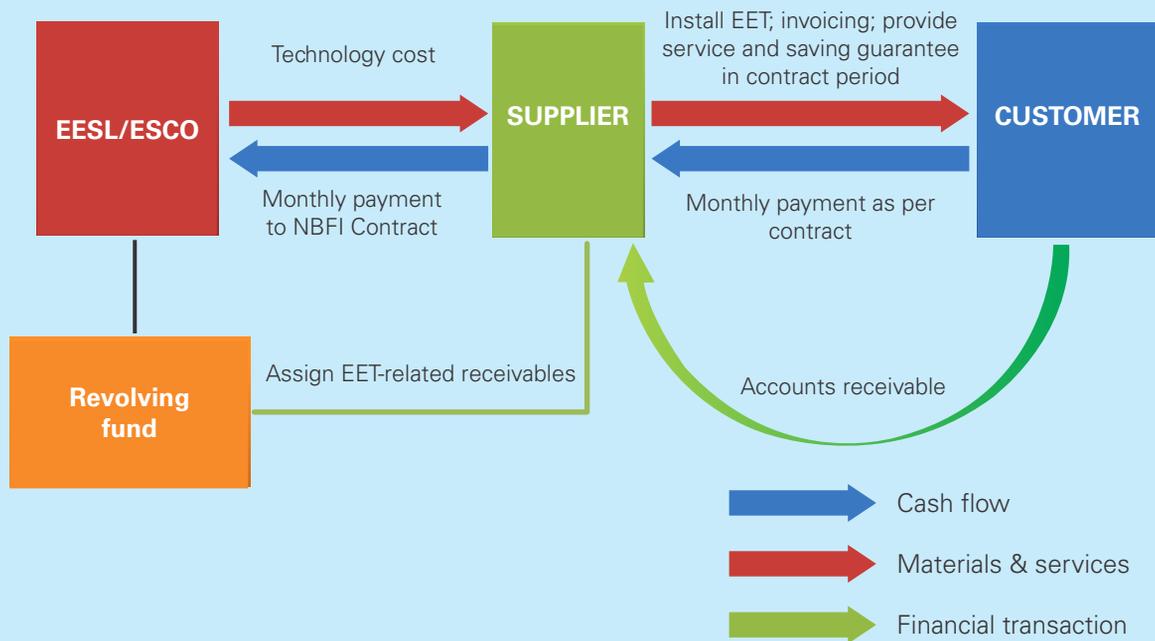
"EESL, in collaboration with other key stakeholders, intends to vigorously pursue efforts for wide scale adoption of EETs in the MSME clusters. The principal stakeholder group we shall engage to achieve this is the technology providers/vendors, who will be the key link between EESL and the unit owner".

EESL shall do initial studies, audits in the units to identify commonly replicable technological interventions. In case of clusters under BEE-SME program, the technologies already identified will be taken up for wide implementation. EESL will then aggregate the demand of identified EETs in the cluster and will extend upfront capital cost of replacement of inefficient technologies to the vendor, who will in turn implement the EETs in MSME units. The unit will share the savings which will accrue after the installation of EETs with the vendor, who in turn will share a part of it with EESL/ESCO, all in the form of monthly payouts. The project cost and intended ROI will be recovered from the unit through the savings achieved. EESL also intends to rope in Banks/other FIs in this arrangement that can extend funds to vendors and can have EMI (monthly payouts) arrangements. Adequate contractual arrangements shall be made to ensure that all the stakeholders discharge their responsibility properly, especially to ensure the technical performance of the project. Adequate protocols for M&V will be developed that could ensure validation of savings.

Once the total project cost along with RoI is retrieved, the installed EET shall remain the property of the plant owner. Thus, in a way the plant owners will get the EETs without any upfront cost to them and shall also reap benefits of reduced energy consumption thereafter. In order to ensure sustainability of the intervention in the cluster and make sure that all the units in the cluster adopt the EETs, EESL intends to create a revolving fund in which portion of returns from the vendor will be continuously credited.

Presently, EESL is inviting partnerships from vendors, cluster-level industry associations, local fabricators, research agencies etc. to give direction and put in action its vision for energy conservation in the MSME sector. The model of EESL for EET implementation in the MSME clusters is displayed below (Figure 9):

Figure 9: Proposed Model of EESL for EET implementation in the MSME clusters



Source: EESL

Annexure II: References

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Annexure III: Abbreviations

ADB	Asian Development Bank
AfD	Agence Française de Développement (French Development Agency)
ANBC	Adjusted Net Bank Credit
BATs	best available technologies
BAU	Business As Usual
BEE	Bureau of Energy Efficiency
BoPs	Best Operating Practices
CGTMSE	Credit Guarantee Fund Scheme for Micro and small Enterprises
CII	Confederation of Indian Industry
CLCSS	Credit Linked Capital Subsidy Scheme
DFID	Department for International Development
DIC	District Industries Centre
DIPP	Department of Industrial Policy & Promotion
DPRs	Detailed Project Reports
EC Act	The Energy Conservation Act, 2001
EE	Energy Efficiency
EESL	Energy Efficiency Services Limited
EET	Energy Efficient Technologies
EHP	Electric Heat Pump technology
ESCO	Energy Service Company
FI	Financial Institutions
FISME	Federation of Indian Micro and Small & Medium Enterprises
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gases

GHP	Gas Heat Pump Technology
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (German Development Agency)
GIZ	German Development Agency
IFC	International Finance Corporation
IGDPRs	Investment Grade Detailed Project Reports
IGEN	Indo German Energy Programme
ODA	Official Development Assistance
EBRD	European Bank for Reconstruction and Development's
IGES	Institute for Global Environmental Strategies
IREDA	Indian Renewable Energy Development Agency Limited
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau (a German Financial institution)
LSPs	Local Service Provider
M&V	Measurement and Verification
MoMSME	Ministry of MSME
MoP	Ministry of Power
MSME	Micro, Small and Medium Enterprises
MSME-DI	MSME Development Institutes
Mtoe	Million tonnes of oil equivalent
NGO	Non-Governmental Organizations
NMCP	National Manufacturing Competitiveness Programme
NMEEE	National Mission for Enhanced Energy Efficiency
NPAs	Non-Performing-Assets
PRGFEE	Partial Risk Guarantee Fund for Energy Efficiency
R&D	Research and Development
RDD&D	Research, Development, Demonstration and Dissemination
SBI	State Bank of India

SDC	Swiss Agency for Development and Cooperation
SIDBI	Small Industries Development Bank of India
TEQUP	Technology and Quality Up-gradation Support to MSMEs
TERI	The Energy and Resources Institute
TUFS	Technology Up gradation Fund Scheme
UNDP	United Nations Development Program
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
VCFEE	Venture Capital Fund for Energy Efficiency
WB	World Bank
TurSEFF	Turkey Energy Finance Facility
SEFF	Sustainable Energy Financing Facilities

Annexure IV: Acknowledgement

We would like to thank the esteemed panel of stakeholders who took time to provide their feedback for developing this knowledge paper

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- ✓ **Mr Anil Bhardwaj**, Secretary General, Federation of Indian Micro and Small & Medium Enterprises

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