National Summit

On Energy Efficiency in MSMEs

October 31–November 1, 2017
New Delhi

SUMMIT PROCEEDINGS

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Swiss Agency for Development and Cooperation SDC

Promoting Energy Efficiency in SMEs
SAMEEEKSHA

teri
The Energy and Resources Institute

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On Energy Efficiency in MSMEs

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Editors

Sachin Kumar | R P Subramanian | Girish Sethi

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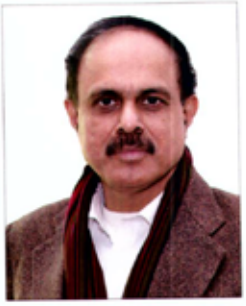

सत्यमेव जयते

MSME
भारत सरकार
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GOVERNMENT OF INDIA
MINISTRY OF MICRO, SMALL AND MEDIUM ENTERPRISES
UDYOG BHAWAN, RAFI MARG, NEW DELHI-110 011

Message

For National Summit (Energy Efficiency in Micro, Small & Medium Enterprises) proceedings

Micro, Small and Medium Enterprises (MSME) sector in India is a unique mix of traditional and modern enterprises. MSMEs are the backbone of the industry sector. They contribute significantly to manufacturing output of the country. Over the time, Indian MSMEs have moved up the value chain from manufacture of simple goods to manufacture of sophisticated products.

Despite its prominent position in country's industrialization strategy and its immense potential for employment generation, the MSME sector confronts several challenges related to technology, finance, skill enhancement and quality. A large number of MSMEs in the country continue to depend on obsolete, low efficiency technologies which results in wasteful energy consumption and reduces profitability and competitiveness. For the MSMEs, adoption of energy efficient technologies is an important step that will eventually contribute in improving their competitiveness.

Given the size and spread of the MSME sector in the country, it is imperative for stakeholders to share the knowledge and experiences gained from the energy-efficiency initiatives that have already been undertaken. Ministry of MSME is working in collaboration with UNIDO to promote awareness & implementation of Energy Efficient Techniques among the MSMEs. However, there is a need to further synergize the efforts of various stakeholders to achieve desired results.

The National Summit on Energy Efficiency in MSMEs, held in New Delhi during 31st October 2017 – 1st November 2017 had deliberated on various technological, financial and skill related aspects related to improvement in energy efficiency among MSMEs. I am happy to learn that the Energy & Resources Institute is publishing the proceedings of this Summit. I hope that the publication will pave the way for greater awareness and understanding of the issues relating the energy security.

(Arun K Panda)

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अभय बाकरे, आईआरएसईई
महानिदेशक
ABHAY BAKRE, IRSEE
Director General

सत्यमेव जयते

ऊर्जा दक्षता ब्यूरो
(भारत सरकार, विद्युत मंत्रालय)
BUREAU OF ENERGY EFFICIENCY
(Government of India, Ministry of Power)

Message

Industry sector plays a vital role in Indian economy due to its close impact on country's overall development. The sector consumes about 45% of the total primary energy supply. The industry sector in India is highly diversified and consists of a mix of large as well as MSME (Micro, Small and Medium Enterprises) sub-sector. There are more than 4000 manufacturing MSME clusters in the country out of which about 200 are energy intensive. Taking cognizance of the energy consumption by industry sector in India, Bureau of Energy Efficiency has taken number of initiatives to improve energy efficiency in both large industries as well as MSMEs.

BEE is undertaking a program to accelerate energy efficiency interventions among MSMEs. Specifically focusing on 25 energy intensive MSME clusters; energy saving potential, energy saving opportunities appropriate technological options and gaps in skill and knowledge for each of the intervening cluster has been identified. To facilitate adoption of identified energy efficient technologies, part financial support is provided to MSMEs in selected MSME clusters. BEE is also implementing two bi-lateral programmes under GEF framework with World Bank and UNIDO to accelerate energy efficiency technology interventions & Renewable Energy deployment in more than 50 energy intensive clusters.

National Summit on Energy Efficiency in Micro, Small and Medium Enterprises (MSMEs) organised during 31st October 2017 – 1st November 2017 provided an appropriate platform to share the knowledge generated among various stakeholders and deliberate on strategies to promote energy efficient technologies and key issues related to technical, financial and capacity building aspects for accelerating energy efficiency interventions among MSMEs.

I congratulate and thank the Ministry of MSME, UNIDO, TERI and SDC for their enthusiastic support to Bureau of Energy Efficiency in successful organisation of the National Summit on Energy Efficiency. Further, I hope that the outcomes and recommendations presented in this report will help decision makers to formulate enabling policies for promotion of energy efficiency in the MSME sector.

(Abhay Bakre)

स्वहित एवं राष्ट्रहित में ऊर्जा बचाएँ Save Energy for Benefit of Self and Nation
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Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

MS MARYLAURE CRETTAZ CORREDOR
Head, Swiss Cooperation Office,
Embassy of Switzerland, India

Message

The Micro, Small and Medium Enterprises (MSME) play a vital role in the Indian economy. It manufactures a vast range of products and employs millions of people thereby providing growth and development, particularly in rural areas and small towns. There are many energy intensive sub-sectors within MSME where energy cost accounts for a major share of the operating cost. MSME face challenges at all stages starting from identifying the right and efficient technologies to implementation and operations of technologies.

The SDC-TERI partnership, which focused on energy intensive MSMEs like glass, bricks and foundries, has established that through energy efficient technologies, there is a potential to save 25-30% of energy. This partnership also led to realize that mere availability of technology is not sufficient, the challenge is to adapt the technology, customize it to local needs through innovation, make its affordable and work with local materials and partners.

The Ministry of MSME, Bureau of energy Efficiency (BEE) and other national and international agencies are continuously developing strategies and implementing interventions to improve the energy efficiency of the MSME sector. Despite all efforts, the uptake of efficient technologies in MSMEs is still lagging. This brings several key questions at forefront of the MSME sector such as 1) why the adoption of energy efficient technologies is slow? 2) what strategy and approaches are needed for up-scaling of energy efficient technologies? and; 3) what shall be the government's role in creating a level playing field in the national context?.

The deliberations during the National Summit on Energy Efficiency in Micro, Small and Medium Enterprises organised on 31st October 2017 – 1st November 2017 focused primarily on these pertinent issues. Discussions were held with regard to technology, finance and capacity building to improve the energy efficiency as well as competitiveness of MSMEs. The main findings of the Summit include the need for simplification and access to government schemes under one umbrella as well as streamlining of banking procedures. It was also felt to have closer engagement between MSME clusters and local academic/technical institutes. Similarly, the need also emerged for developing sector specific and need based training modules on maintenance and best operating practices for equipment/processes.

During the Summit, the MSME Energy Map of India was also launched as a part of the knowledge sharing platform known as SAMEEEKSHA. SDC takes pride to be founding member of SAMEEEKSHA, which we hope will continue to channelize the efforts of various agencies in improving the energy efficiency of the MSME sector of India.

Drawing on its experience in the MSME sector, SDC will continue to engage with the development and implementation of energy efficiency measures in various energy intensive sectors of India.

Marylaure Crettaz Corredor
Head, Swiss Cooperation Office
Embassy of Switzerland, India

RENÉ VAN BERKEL
UNIDO Representative
UNIDO Regional Office in India

Message

Energy Efficiency is at the heart of the mission of the United Nations Industrial Development Organization (UNIDO): to spearhead the realization of inclusive and sustainable industrialization that brings economic competitiveness, shared prosperity and environmental sustainability. This requires an industrial transformation towards factories of the future, that basically were already needed as of yesterday. These are factories that are productive and competitive in national and international markets, that deliver a net benefit to all stakeholders involved and take resource, environment and climate concerns at heart. This starts with using all natural resources, energy as well as water and materials productively so that nothing goes to waste and indeed emissions, effluents and wastes are reduced, which in turn improves quality of life and well being of employees, communities and consumers, which in turn enhances their productivity. This is a truly virtuous cycle, that delivers real time benefits for enterprises, including Micro, Small and Medium Enterprises, MSMEs, through lower input costs, more and better quality products, compliance and organizational efficiency.

MSMEs are typically at a disadvantage to implement energy efficiency, due to unfavourable economies of scale, outdated technology, and gaps in skills, business capacities and financing. Though, small can also be an advantage in terms of flexibility and agility, in particular for start-ups. Indeed selected Indian MSMEs are leading the way with efficiency innovations in areas as diverse as ceiling fans, boilers and cooking appliances. The majority of MSMEs are already overburdened by today's demands. Most have not – yet - set their mind on changing business practices and techniques for energy efficiency. Moreover, we observe deficiencies in the ecosystem for provision of energy efficiency services, be it on technology, human resources or finances. These and related issues were indeed discussed in depth during the National Energy Efficiency Summit as reported here.

René Van Berkel
UNIDO Representative
UNIDO Regional Office in India

DR AJAY MATHUR
Director General
The Energy and Resources Insitute

Message

MSMEs constitute a key pillar of economic growth in India. They manufacture a vast range of products and provide livelihoods to millions of people across the nation. It is hence essential to nurture MSMEs and improve their productivity and competitiveness so as to ensure that India continues to grow at a fast pace, and at the same time provide opportunities for the millions of youth that are entering the job market each year.

Most MSMEs tend to use energy inefficiently, and there are ample opportunities for these enterprises to increase their profits through the adoption of energy efficient technologies and best operating practices. Since 1992, TERI has been actively engaged in initiatives aimed at improvement of energy efficiency among MSMEs. Under a long-term project supported by SDC, TERI has successfully developed, demonstrated and disseminated cost-effective energy efficient technologies in a number of energy intensive MSME sub-sectors/clusters, through a participatory, multi-stakeholder approach entailing intensive action research and the pooling of competencies in diverse fields. The approach followed by the TERI–SDC partnership project has come to be known as RDD&D (research, development, demonstration and dissemination), and its effectiveness has been noted within and outside India by other stakeholders interested in working in the MSME sector.

We are delighted that various stakeholders involved in enhancing energy efficiency in the SME sector got together to form SAMEEEKSHA as a platform to share their experiences, and form new partnerships.

The 2017 National Summit on Energy Efficiency in MSMEs, held in New Delhi during 31st October 2017 – 1st November 2017, was organized under the aegis of SAMEEEKSHA, and as with the first National Summit held in July 2012, this Summit focused on identifying and analysing the principal barriers that continue to thwart the adoption and scaling up of energy efficient technologies among MSMEs; discuss the various initiatives that have been undertaken to address and overcome these barriers, and their outcomes; and outline new/improved strategies and initiatives that must be undertaken in coming years from policy to grassroots levels. Towards this end, the MSME entrepreneurs and other stakeholders who participated in the Summit shared their knowledge, experiences, and ideas in a series of sessions that spanned three broad and overlapping themes relevant to energy efficiency (EE): namely, technology, finance and capacity building.

We look forward to the outcomes of the Summit, as outlined in this document, helping governments, financial institutions, technology developers, and other stakeholders in framing policies and designing initiatives which enhance energy efficiency of MSMEs in India.

Dr Ajay Mathur

ENERGY IS LIFE
BEE
CONSERVE IT

ऊर्जा दक्षता ब्यूरो
(भारत सरकार, विद्युत मंत्रालय)
BUREAU OF ENERGY EFFICIENCY
(Government of India, Ministry of Power)

FOREWORD

MSMEs are a key constituent of the industry sector. 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 110 million in the country. Improvement in energy efficiency is critical not only to improve their profits but also to scale-up their contributions in the global value chain. There are many energy intensive sub-sectors within MSME where energy cost accounts for a major share of the operating cost.

The Ministry of MSME, Bureau of Energy Efficiency (BEE), and other stakeholders are continuously developing strategies and implementing interventions to improve the energy efficiency of the MSME sector. For maximum effectiveness and widespread adoption of the energy efficient technologies in SME sector, during the XII plan, BEE has introduced cluster-specific approach for technology deployment as demonstration projects towards creation of an enabling environment at the cluster level to aid in replications. Also, through bilateral programmes under the GEF framework, BEE is facilitating adoption of energy-efficient technologies and increased use of renewable energy in more than fifty clusters.

The deliberations during the National Summit on Energy Efficiency in Micro, Small and Medium Enterprises organised during 31st October 2017 – 1st November 2017 focused on specific issues in the critical areas of technology, finance, and capacity building. The successful organization of this summit would not have been possible without the support of Ministry of MSME, United Nations International Development Organization (UNIDO), Swiss Agency for Development and Cooperation (SDC), and The Energy and Resources Institute (TERI).

I am sure the outcomes from the summit deliberations, as outlined in the proceedings, will facilitate the drawing up of initiatives to improve energy efficiency of the MSME sector in the country.

(Milind Deore)
Director

IN A NUTSHELL

The Second National Summit on Energy Efficiency in MSMEs was held during 31st October–1st November 2017 in New Delhi. The Summit was organized by Bureau of Energy Efficiency (BEE) and TERI with the support of the Embassy of Switzerland in India, United Nations Industrial Development Organization (UNIDO), and the Ministry of MSME (MoMSME), Government of India. The two-day event drew over 225 participants. They included delegates from 37 industrial associations representing major energy-consuming industrial sub-sectors across the country such as brick, ceramics, chemicals, dairy, engineering, foundry, glass, metallurgy, rice mills and textiles; 30 government departments including a number of State Designated Agencies (SDAs); 15 bilateral/multilateral organizations; academic institutes; banks and financial institutions; energy and technical consultancies; and R&D establishments.

As with the first National Summit held in July 2012, this Summit focused on identifying and analysing the principal barriers that continue to thwart the adoption and scaling up of energy efficient technologies (EETs) among MSMEs; discussing the various initiatives that have been undertaken to address and overcome these barriers, and their outcomes; and outlining the new/improved strategies and initiatives that must be undertaken in coming years from policy to grassroots levels. Towards this end, the MSME entrepreneurs and other stakeholders who participated in the Summit shared their knowledge, experiences, and ideas in a series of sessions that spanned three broad and overlapping themes relevant to energy efficiency (EE): namely, technology, finance and capacity building.

Framing the context

Mr Abhay Bakre, Director General, BEE, underlined the importance of EE in ensuring the growth and competitveness of the MSME sector. Pointing out that about 200 energy intensive MSME clusters together account for almost 25% of the total energy consumed by the MSME sector, he outlined the efforts made by MoMSME, BEE and TERI to promote EE in these 200 clusters in partnership with organizations including Global Environment Facility (GEF), World Bank (WB) and UNIDO. Dr Ajay Mathur, Director General, TERI underlined the point that in an MSME, the entrepreneur finds it extremely difficult to devote time, attention and resources to only one aspect of operations—such as EE improvement—because usually he/she is "the Chief Executive Officer, Chief Financial Officer and Chief Marketing Manager all rolled into one", unlike in large-scale enterprises where these critical functions and responsibilities are divided. Besides, 'off-the-shelf' EET options for MSMEs are rarely available, and even if they are, they usually have to be adapted to suit the local needs and conditions. Under these circumstances, MSMEs require assistance by way of technological support and capacity building in order to enable them to adopt EETs.

Mr Rene Van Berkel, UNIDO Representative and Head of UNIDO Regional Office in India, placed the promotion of EE in India's MSME sector in the context of the UN's Sustainable Development Goal 7: '*Ensure access to affordable, reliable, sustainable and modern energy for all.*' He also mentioned UNIDO's various initiatives towards this end, including the GEF-supported project titled 'Promoting market transformation for energy efficiency in Micro, Small & Medium Enterprises', which is being implemented by UNIDO in 22 MSME clusters in partnership with

MoMSME, BEE, and Energy Efficiency Services Ltd (EESL). Mr Raj Pal, Economic Advisor & Joint Secretary, Ministry of Power, Government of India noted that energy will be the real 'differentiator' in the 21st century; for, the efficiency with which energy is generated, transmitted, distributed and consumed will determine the competitiveness of an economy. Considering the fact that energy consumption in India will increase many-fold in a business-as-usual scenario, energy efficiency provides an important avenue to reduce energy demands as well as strengthen energy security.

Dr Andreas Baum, Ambassador of Switzerland to India, mentioned that 99.7% of all enterprises in Switzerland are SMEs; and of these, nearly 89% are so-called micro-SMEs employing less than nine persons each. Despite their small size, the enabling eco-system in Switzerland demands that each SME be highly efficient in its production processes and energy use. Recounting SDC's 23-year-old partnership with TERI in promoting EE in the MSME sector, he noted that this long-term engagement reflects a 'consistency of purpose' even as India and Switzerland prepare to celebrate 70 years of formal diplomatic relations, friendship and bilateral cooperation in 2018. Dr Baum pointed out that the challenges that confronted MSMEs in 1994—lack of access to clean technology options, information asymmetries about EE, weak capacities, and limited access to finance—are present even today, and suggested that two paths be explored to scale up EE in the MSME sector: (1) drawing up a clear road map for EE by capitalizing on the concept of 'low hanging fruit'; and (2) applying market-based incentives with appropriate policies set in place, using the successful 'LED story' as a guide.

Mr Giriraj Singh, Minister of State (I/C), Ministry of Micro, Small and Medium Enterprises, Government of India delivered the inaugural address, during which he stressed that in addition to promoting EE among MSMEs, efforts should focus on increasing the uptake of renewable energy (RE), particularly solar-based technologies. He said that the challenges confronting the MSME sector will have to be addressed through innovations and out-of-box solutions, which will not only enable energy savings and effective resources utilization, but also generate employment for large numbers of people. In this regard he cited a number of examples from his tenure in the Bihar state government, including an initiative to promote solar-driven *charkhas* (spinning wheels for yarn); a plan to exploit flooded wastelands, oxbow lakes (*mauns*) and other water bodies for creating fisheries as well as generating power by installing solar panels above the water bodies; and the promotion of solar-based milk chilling technology (in place of diesel-based systems) for bulk milk coolers in the dairy industry. Mr Singh stressed that efforts to promote EE and RE should not be focused only to the manufacturing segment in the MSME sector, but be extended to cover other segments of the supply chain as well—such as services, transport, and so on. He also launched the SAMEEEKSHA website in its revamped version; inaugurated the nine Energy Management Centres (EMCs) set up by UNIDO under the GEF-supported project 'Promoting Energy Efficiency and Renewable Energy in Selected MSME Clusters in India'; and presented certificates to the representatives of MSME associations where these ECMs have been established at cluster level.

Discerning ground realities

Setting the tone

During the next session, speakers underlined the importance of making the MSME sector more energy efficient and productive in the context of overall national development; summarized some of the recent/ongoing initiatives undertaken in this direction; and highlighted the lessons learned and challenges that remain. The speakers comprised Mr Girish Sethi, Senior Director, TERI; Mr Abhay Bakre, Director General, BEE; and Mr Sanjay Bisariya, Joint Development Commissioner, MoMSME. The following salient points were made:

- Studies by TERI estimate that of the total energy consumed in industry, almost 80 million tonnes of oil equivalent (Mtoe) remains outside the purview of PAT; of this, a very large portion is accounted for by seven or eight energy-intensive MSME sub-sectors. Also, the MSME sector will be third largest sector in terms of opportunities for EE even after 25 years (in 2041).
- The EE drive has to cover an estimated 26 million MSME units in over 180 energy-

intensive clusters. Such a 'mass transformation' can be acquired only if various EE initiatives are synergized through the sharing of knowledge and experiences among stakeholders.

- There are persistent challenges and opportunities in promoting EE in the MSME sector, manifesting in the domains of technology, finance and capacity.

Three parallel thematic breakaway sessions followed, during which MSME entrepreneurs and other stakeholders at unit/cluster level voiced their perspectives and ideas on the three broad and interlinked themes of finance, technology, and capacity building. The discussions were intense and highly interactive, facilitated by professional moderators. Some important insights from the breakaway sessions are summarized below.

Voices from the ground

Theme	Insights (needs, challenges, ideas)
Finance	▪ Have fewer schemes and place them under a single umbrella to reduce confusion ▪ Simplify and streamline procedures in banks; train bank personnel in EE finance appraisal ▪ There is need for comprehensive schemes that extend beyond financial support to cover technical support too (e.g., '4E') ▪ Create a database of energy use benchmarks at system/ process/ industry level, for banks/FIs to use as yardsticks while assessing proposals ▪ Financial Assistance programs of bilaterals/ multilaterals/ government should be accompanied by a strong Technical Assistance competent to support and hand-hold MSMEs in adopting best available technologies ▪ Identify EETs where a price advantage can be achieved from mass procurement and deemed savings (e.g. IE4 motors etc.) ▪ Design schemes for SME sector that cover ESCOs (as current schemes only address manufacturing SMEs) ▪ Try out the 'Dubai business model' for ESCOs, where a 'super-ESCO' competitively selects ESCOs for actual implementation
Technology	▪ For MSMEs, the primary barriers to adoption of EETs are fluctuating market conditions (making production the top priority); the high capital costs of EETs; and the lack of in-house capacities, including skilled labour, for any new technologies ▪ To generate skilled workforce, industry experts should be involved in academia at two levels, i.e. ITIs and higher education institutions ▪ EETs will be accepted more readily if these are demonstrated/verified in the field ▪ R&D on technologies/products should be carried out jointly by academia and industry ▪ Awareness and knowledge on EETs can be disseminated through innovative use of IT (e.g., help-desks for EETs/BOP, mobile apps)
Capacity	▪ There is need for closer engagement between MSME clusters and local academic/ technical institutes, and for the latter to include EE in their curricula ▪ Representation of local industries associations in the governing bodies of training institutions will help communicate the need of the cluster/industries ▪ Identify sector-specific trainers and certify them; local service providers (LSPs) can be strengthened (via 'train-the-trainer' courses by certified trainers) to meet cluster-level training/capacity building needs ▪ Develop sector-specific and need-based training modules on operation, maintenance and BOPs for equipment /processes ▪ Periodic feedback from industrial associations is required for upgrading the quality of training programs

Pointers to the way forward

The insights provided by the breakaway sessions fed into, and formed the basis for, the deliberations in the three plenary sessions that followed. For each plenary session, the key points from the corresponding breakaway session were presented as field realities and inputs from the ground. Thereafter, experts made background presentations that helped deepen understanding on relevant issues, following which a panel of 'Respondents' discussed possible solutions and outlined the way forward. The key suggestions and recommendations are summarized below for each of the three themes.

Finance

- EE finance can work successfully only by following a holistic approach that overcomes barriers at different levels, from policy to grassroots, using a mix of 'carrots' (economic instruments, incentives), 'sticks' (legislation, rules and regulations, technical standards) and 'sermons' (information, advertising instruments)
- Aggregation of demand, to create 'many takers for one technology', offers the best way to achieve large-scale financing and adoption of EETs (as banks/FIs will not be interested in financing small ticket-size investments).
- Corporates can drive EE among their vendor-MSMEs, i.e., down their supply chains
- Green Bonds offer a good source of funds for banks/FIs to drive EE projects; especially if a multilateral participates, in which case the cost of funds becomes cheaper.
- ESCO finance
  - » Calculation of energy savings can be a conflict area between host and ESCO, as there is often considerable inconsistency in the results worked out by different energy audits (EAs) due to the numerous variables and baseline changes. The need is for strong M&V systems, and also for standardization of energy audit protocols.
  - » ESCOs are also associated with collateral risks, as often the cost of EE equipment, or even of retrofitting across the plant, would be much *less* than the savings from EE. This implies higher return on investment for the host; but if for some reason the host does not make payment to the ESCO, the collateral alone may not be enough for the bank/FI to recover its principal.
  - » The 'deemed savings' approach works better than the 'guaranteed savings' approach in the case of ESCO finance; because the former is based on pre-determined estimates of the energy savings from EETs that have been established through pilots. Energy savings could be established through pilots for a few cross-cutting technologies such as waste heat recovery (WHR) systems making it easier for banks/FIs to finance these technologies via ESCOs.

Technology

- EE efforts should focus on the manufacturers/ suppliers of machinery/equipment to MSMEs. A portal could be created, listing EET suppliers, so as to create a market among MSMEs for EE machinery /equipment.
- A major reason why EETs do not percolate in an MSME cluster is that the initial demonstration of the EET usually takes place in a 'progressive' unit, which rarely shares its knowledge with other units in the cluster. Interventions should therefore aim at carrying out at least 3 EET demonstrations per cluster.
- Strengthen cluster-level energy services for MSMEs; for instance, just as Designated Consumers have dedicated 'Energy Managers', cluster specific Energy Managers can be identified for MSMEs.
- There is need for a single national policy for EE in the MSME sector, with a clear roadmap

on how EE targets will be achieved. Also, the government should develop sector-specific 'Vision Documents' with regard to technologies, fuels and products. This will ensure that the achievements of EE interventions are not lost because of sudden changes in policies or regulations.

- A clear roadmap for improving EE in MSME sector should be created. For instance, a number of CO_2 emissions-intensive MSME sub-sectors could be selected, and then supported in achieving EE through comprehensive interventions that cover baseline mapping; customizing EE solutions through continuous innovation; technical assistance; handholding (including working with vendors and local service providers at field level); and post-implementation assessments.

Capacity

- Training of plant operators on best operating practices (BOP) enables an MSME to achieve significant energy savings at low or no cost.
- Skills training centres should focus their courses primarily on meeting the capacity needs of the local MSME clusters/sub-sectors.
- Replication of EETs often requires technology adaptation for each and every replicating MSME unit. EE interventions must therefore factor in this reality, and ensure that capacity building and handholding continue beyond the initial demonstration(s) of EETs.
- EE can be given additional thrust from the demand side, i.e., if clean ('CO_2 free') products and services are demanded by consumers through awareness creation. Germany provides examples of how this approach can succeed (e.g. German Rail, Deutsche Post)

Summing up

The valedictory session of the Summit was moderated by Dr Ajay Mathur, Director General, TERI. He reiterated the vital role played by the MSME sector in India's economic development, and the consequent importance of improving the productivity of MSMEs through increasing their energy efficiency. Mr Girish Sethi, Senior Director, TERI summarized the outcomes of the deliberations at the Summit. Mr Rene Van Berkel, UNIDO, outlined the features of UNIDO's Cleantech Innovation Program, being implemented in partnership with MoMSME, under which over 80 innovations have been supported, including EE ceiling fans (over 10,000 ceiling fans deployed in ceramic clusters for drying applications) and innovative commercial cookstoves that bring over 30% savings in fuel costs.

Delivering the valedictory address, Mr Ajay Kumar Bhalla, Secretary (Power), Ministry of Power, Government of India appreciated the efforts made by the different stakeholders in promoting EE in India's MSME sector. In his closing remarks, Mr Abhay Bakre, Director General, BEE remarked that the discussions at the Summit had helped in highlighting new issues confronting the MSME sector, as well as pointed to the way forward in addressing these issues.

THE SUMMIT

Background

The Micro, Small and Medium Enterprises (MSME) sector is a critical component of India's growth story, making significant contributions to GDP, employment and exports. According to estimates, there are over 51 million MSMEs providing employment to more than 111 million people in the country. While one end of the MSME spectrum comprises highly innovative and high-growth enterprises, over 90% of the MSMEs are unregistered, with a large number established in the informal or unorganized sector. Despite the MSME sector's prominent position in country's industrialization strategy and its immense potential for employment generation, MSMEs confront several challenges in their operation. Among the major challenges are: technological obsolescence; inadequate infrastructure facilities (lack of good quality power, water, roads, etc.); difficulties in accessing adequate and timely credit at a reasonable cost; lack of in-house capacities, in terms of deficits in personnel with the expertise and skill-sets required for manufacturing, marketing, servicing, etc.; and limited access to global markets. These challenges persist despite a number of initiatives that have been undertaken by the government and other agencies to foster the development of MSMEs.

Against this backdrop, and to discuss and find solutions to the various relevant issues, the second National Summit on Energy Efficiency in MSMEs was held during 31st October–1st November 2017 in New Delhi. The Summit was organized by Bureau of Energy Efficiency (BEE), United Nations Industrial Development Organization (UNIDO), and TERI with the support of the Embassy of Switzerland in India, Global Environment Facility (GEF), and the Ministry of MSME (MoMSME), Government of India. The two-day event drew over 225 participants. They included delegates from 37 industrial associations representing major energy-consuming industrial sub-sectors across the country such as brick, ceramics, chemicals, dairy, engineering, foundry, glass, metallurgy, rice mills and textiles; 30 government departments including a number of State Designated Agencies (SDAs); 15 bilateral/multilateral agencies; academic establishments; banks and financial institutions; energy and technical consultancies; and R&D establishments.

As with the first National Summit held in July 2012, this Summit focused on identifying and analysing the principal barriers that continue to thwart the adoption and scaling up of energy efficient technologies (EETs) among MSMEs; discussing the various initiatives that have been undertaken to address and overcome these barriers, and their outcomes; and outlining the new/improved strategies and initiatives that must be undertaken in coming years from policy to grassroots levels. Towards this end, the MSME entrepreneurs and other stakeholders who participated in the Summit shared their knowledge, experiences, and ideas in a series of intense and interactive sessions that spanned three broad and overlapping themes relevant to energy efficiency (EE): namely, technology, finance and capacity building.

Objectives

The specific objectives of the Summit were to:

- Seek the views of ground-level stakeholders on possible strategies to promote EE
- Encourage experience-sharing by the various stakeholders on current initiatives to improve EE in the MSME sector, and explore possibilities of synergizing actions
- Identify future opportunities and actions required for promoting EE in the MSME sector

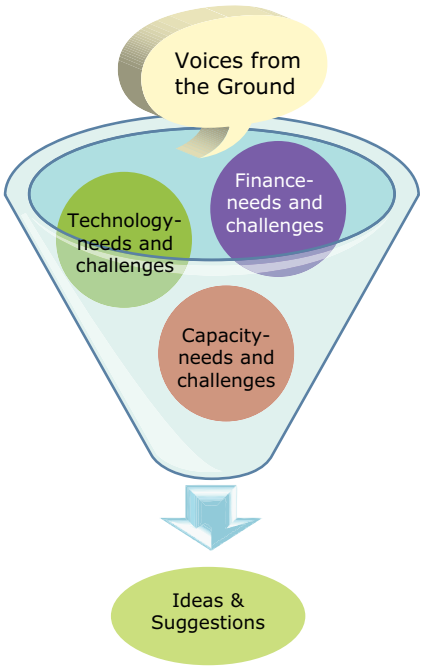
Structure

The discussions were structured to take place in two phases, enabling the participants to: (i) understand the perspectives of MSMEs and other unit/cluster-level stakeholders on key issues related to EE; and (ii) use these perspectives as the bases on which to highlight the policies and supportive mechanisms that are required to promote EE. The two phases comprised the following:

- *Phase 1*: Breakaway discussions that elicited the views and perspectives of MSMEs and other stakeholders at unit/cluster level on EE under the three broad and interlinked themes of technology, finance and capacity building.
- *Phase 2*: Plenary sessions on each of these three themes. Each plenary session was anchored around the salient views and perspectives of MSMEs from the corresponding breakaway session. Together, the plenary sessions provided a set of guidelines and actions to promote EE in the MSME sector.

Voices from the ground

In order to enable MSMEs and other ground-level stakeholders to articulate their needs and concerns, the participants were divided into three breakaway groups to deliberate on the three broad themes that critically influence the uptake of energy efficiency in the MSME sector: (*i*) finance, (*ii*) technology, and (*iii*) capacity. The breakaway sessions were conducted on the first day of the Summit, and the insights obtained from these 'voices from the ground' formed the basis for discussions during the plenary sessions on the second day. Each breakaway session focused on challenges and opportunities at the cluster and sector-specific levels. In each case, the salient points from the session were summarized by the group leader and presented at the start of the respective thematic (plenary) session that followed.



Plenary Sessions

Approaches to financing of energy efficiency for MSMEs

This session focused on the different financing approaches for EE that are commonly adopted to improve the energy efficiency of the MSME sector. After background presentations by private and public sector bankers, a panel deliberated on the different approaches and provided their perspectives on their effectiveness.

Adoption of energy efficient technologies – challenges & opportunities

The session deliberated on the challenges to the adoption of EETs (technology availability, technology selection, technology development, technology implementation, etc.) with an aim to evolve strategies for up-scaling demonstration and deployment of these technologies. An overview of successful technological interventions was also provided. The discussants attempted to focus on process improvements and Research, Development, Demonstration & Dissemination (RDD&D) efforts for promoting EETs.

Developing capacities of MSMEs on energy efficiency

The session deliberated on building the capacities of MSMEs to adopt EE measures. An overview of the key capacity building initiatives was provided, and the discussants focused on the challenges being faced by MSMEs in adopting EE initiatives and options.

INAUGURAL SESSION

Inaugural session

Speakers in the inaugural session outlined the context in which the Summit was being held, and shared their views on the three critical areas of technology, finance and capacity building so as to provide direction and perspective for the discussions that ensued. As a highlight of the session, Mr Giriraj Singh, Minister of State (I/C), Ministry of Micro, Small and Medium Enterprises, Government of India launched the SAMEEEKSHA website in its revamped version, and formally inaugurated the nine Energy Management Centres (EMCs) set up by UNIDO under the GEF-supported project 'Promoting Energy Efficiency and Renewable Energy in Selected MSME Clusters in India'. He also presented certificates to the nine representatives of MSME associations where these ECMs have been established at cluster level.

Welcome address

Mr Abhay Bakre, Director General, BEE, underlined the importance of EE in ensuring the growth and competitveness of the MSME sector, particularly because energy cost makes up a sizeable portion of product cost. He recalled that when MoMSME began to work on MSME clusters from 2010, about 500–800 clusters were short-listed for study; from them, about 200 MSME clusters were identified as energy intensive, together accounting for almost 25% of the total energy consumed by the MSME sector. He outlined the efforts made by MoMSME, BEE and TERI to promote EE in these clusters, in partnership with organizations including GEF, SDC, World Bank and UNIDO. The results have been shared with stakeholders through creation of the SAMEEEKSHA website.

Setting the scene

Dr Ajay Mathur, Director General, TERI underlined the point that in an MSME, the entrepreneur is "the Chief Executive Officer, Chief Financial Officer and Chief Marketing Manager all rolled into one"; unlike in large-scale enterprises, where these critical functions and responsibilities are divided among many executives. Saddled with so many roles merely to ensure the day-to-day operations of their units, MSMEs entrepreneurs find it extremely difficult to devote time, attention

and resources to only one aspect of operations—such as EE improvement. Another challenge is the lack of readily available 'off-the-shelf' EET options for MSMEs. Even where improved technologies are available, they usually have to be adapted to suit the local (cluster-level and unit-level) needs and conditions. Dr Mathur cited, as an example, the energy-efficient divided blast cupola (DBC) that was adapted to meet the requirements of the Indian foundry industry and promoted in various foundry clusters by TERI under the SDC-supported program, through an approach entailing research, development, demonstration and dissemination (RDD&D). .

Introductory remarks

Mr. Rene Van Berkel, UNIDO Representative and Head of UNIDO Regional Office in India, placed the promotion of EE in India's MSME sector in the context of the UN's Sustainable Energy Goal 7: 'Ensure access to affordable, reliable, sustainable and modern energy for all.' He outlined UNIDO's 'Global Cleantech and Innovation Program' being implemented in India in partnership with MoMSME, under which 80 innovators have been assisted to launch their products. Among them are energy-efficient ceiling fans, that save about 60% energy compared to ordinary fans, and alternative gas cooking plates that save about 30% energy and are also safer and easier to operate than conventional models. He outlined the GEF-supported project titled 'Promoting market transformation for energy efficiency in Micro, Small & Medium Enterprises',

> "We require industrial transformation, towards factories of the future...that were needed yesterday! These are factories that are productive in national and international markets, deliver benefits to all stakeholders, and take resources, environmental and climate concerns to heart."
>
> **— Mr Rene van Berkel, UNIDO**

which is being implemented by UNIDO in 22 MSME clusters in partnership with MoMSME, BEE, and Energy Efficiency Services Ltd (EESL). It aims at standardizing and aggregating demand for high-cost EETs, driving their price down through market aggregation, and spurring their replication through a revolving finance mechanism. He also referred to the project titled 'Promoting Energy Efficiency and Renewable Energy in Selected MSME Clusters in India' being implemented in 12 MSME clusters, under which cluster-level experts have been trained to implement the EE measures recommended through energy audits; and Energy Management Centres (EMCs) have been set up in 9 of the 12 clusters. Each EMC has been provided with energy-monitoring equipment worth about 30 lakh rupees (USD 45,000) such as power analysers, flue gas analysers, ultrasonic

flow meters, anemometers, hygrometers, thermometers, flux meters and so on. These equipments help units to understand their own energy use; locate sources of inefficiency and quantify the energy losses; and in due course, undertake improvements and monitor the results.

Mr Raj Pal, Economic Advisor & Joint Secretary, Ministry of Power, Government of India, noted that energy will be the real 'differentiator' in the 21st century; for, the competitiveness of an economy is determined by the efficiency with which energy is generated, transmitted, distributed and consumed. Considering the fact that energy consumption in India will increase many-fold in a business-as-usual scenario, energy efficiency provides an important avenue to reduce energy demands as well as strengthen energy security. He said that the main challenges in scaling up the adoption of EETs among MSMEs continue to be the wide geographical distribution of units/clusters; limited awareness regarding EE; lack of communication between technology providers and financiers; and the lack of in-house capacities among MSMEs.

Address by the Ambassador of Switzerland

Dr Andreas Baum, Ambassador of Switzerland to India, stressed the importance of SMEs in driving job creation and economic growth worldwide. As an example, he cited the fact that 99.7% of all enterprises in Switzerland are SMEs; and of these, nearly 89% are so-called micro-SMEs employing less than nine persons each. Despite the small size of SMEs, however, the enabling eco-system in Switzerland demands that each enterprise be highly efficient in its production processes and energy use. Mentioning that in 2018 India and Switzerland will celebrate 70 years of formal

> "As India continues to grow as one of the fastest developing economies of the world, MSMEs will continue to be an important chapter in the growth story...the sector thus takes an important position in 'Make in India'."
>
> **— Dr Andreas Baum, Ambassador of Switzerland to India**

Global Cleantech Innovation Programme

UNIDO has partnered with the Global Environment Facility (GEF) to launch the 'Global Cleantech Innovation Programme' (GCIP), which supports small-scale entrepreneurs to operationalize their innovative business ideas for clean technologies (cleantech) and attract investment capital from the public and private sectors. GCIP also focuses on building capacities to establish an enabling policy and regulatory framework for cleantech innovators. GCIP was launched in India by UNIDO in 2013 in partnership with the Ministry of MSME, with the Federation of Indian Chambers of Commerce and Industry (FICCI) as implementing partner.

A key component of the GCIP is the annual competition-based 'Accelerator', which identifies the most promising innovators and entrepreneurs across a country. Under this, a selected number of startups participate in a rigorous, competitive national acceleration programme that trains, mentors, promotes, and connects them to potential investors, customers and partners. As the best cleantech companies progress, they are continuously developed and assessed. GCIP also supports identification and development of demand-driven solutions that can address the most pressing environmental challenges at the national levels. Through National Innovation Challenges, innovators are invited to propose technology innovations that can address a particular problem with high-impact potential. This approach allows direct market access for the technologies, ensuring efficiency and effectiveness in impact scaling.

diplomatic relations, friendship and bilateral cooperation, Dr Baum expressed satisfaction that about one-third of this period has been devoted to promoting energy efficiency in India's MSME sector—reflecting 'consistency of purpose'! He summarized the initiatives taken in this direction under the 23-year-long partnership between SDC and TERI, through which EETs have successfully been demonstrated in a number of energy-intensive clusters across the country. However, with the exception of the glass industry cluster in Firozabad, efforts to scale up the adoption of these EETs have achieved limited success. Noting that the challenges that confronted MSMEs in 1994—lack of access to clean technology options, information asymmetries about EE, weak capacities, and limited access to finance—are present even today, he requested the participants to explore two paths to scale up energy efficiency in the MSME sector:

- Come up with a clear road map for achieving EE across the MSME sector by capitalizing on the concept of EE as 'low hanging fruit'; and
- Using the successful 'LED story' as a guide, deliberate on how market-based incentives could be applied for promoting and scaling up EE, and identify the enabling policy environment that is needed.

In conclusion, Dr Baum reiterated that Switzerland is fully committed to promoting energy efficiency, through its national policies as well as through international cooperation.

Energy Management Centres

UNIDO is the executing agency for the GEF-funded project titled 'Promoting Energy Efficiency (EE) and Renewable Energy (RE) in Selected MSME Clusters in India', with BEE as the executing partner. The main objective of the project is to develop and promote a marketed environment for introducing EE and enhanced use of renewable energy technologies (RETs) in process applications in 12 selected energy intensive MSME clusters. The sectors and clusters involved are: foundry (Coimbatore, Belgaum and Indore); brassware (Jamnagar); ceramic (Khurja, Thangadh, and Morbi); hand tools (Nagaur and Jalandhar); and dairy (Gujarat; Sikkim; and Kerala). So far, over 300 measures have been implemented in the 12 clusters.

A key achievement of the project is the establishment of nine Energy Management Centres (EMCs) at cluster-level to help MSME units to study and understand their own energy use patterns through energy audits, and to undertake EE measures. The EMCs have been established in the following clusters: (1) Belgaum foundry; (2) Coimbatore foundry; (3) Gujarat dairy; (4) Indore foundry; (5) Jalandhar handtools; (6) Jamnagar brassware; (7) Khurja ceramics; (8) Nagaur hand tools; and (9) Thangadh ceramics. Each EMC has been equipped with energy monitoring equipment worth about 30 lakh rupees (USD 45,000). Setting up of three more EMC at newly added clusters in the states of Gujarat, Kerala and Sikkim is under way.

Inaugural address

Mr Giriraj Singh, Minister of State (I/C), MoMSME, highlighted the need to become more energy efficient in every sector of the economy in the context of India's burgeoning energy demands. He pointed out that the installed electricity generation capacity has grown from barely 1500 MW at Independence to about 330 GW today, and that a single metropolitan city now demands over 6000 MW during peak season. India is the third largest generator and the fourth largest consumer of electricity in the world; however, the distribution losses across the country are very high. Besides promoting EE, there is need to switch to renewable energy (RE), particularly solar-based technologies. For the MSME sector, the challenges will be in terms of technology as well as capacities; these challenges will have to be addressed through innovations and 'out-of-box' solutions, which will not only enable energy savings and effective resources utilization, but also generate employment for large numbers of people. In this regard Mr Singh cited a number of examples from his tenure in the Bihar state government. These include:

- an initiative to promote solar-driven *charkhas* (spinning wheels for yarn)
- a plan titled '*Niche Machli Upar Bijli*' (literally, 'Fish Below, Electricity Above') that envisages exploiting the flooded wastelands, oxbow lakes (*mauns*) and other water bodies that stretch across vast areas of Bihar for twin purposes: the creation of canals and lakes for freshwater fisheries (thereby bridging the state's demand for fish which presently far exceeds supply); and the installation of solar panels above these lakes/canals to generate power
- promoting solar-based milk chilling technology for bulk milk coolers in the dairy industry, which has not only replaced the erstwhile diesel-based systems but also reduced the cost of chilling

Mr Singh stressed that efforts to promote EE and RE should not be focused only on the manufacturing segment in the MSME sector, but be extended to cover other segments of the supply chain as well—such as services, transport, and so on.

Vote of thanks

Mr Milind Deore, Director, BEE concluded the inaugural session by proposing a vote of thanks to the Minister, MoMSME, and to the other distinguished speakers at the inaugural session. He mentioned a path-breaking initiative launched by MoMSME, 'Udyog Aadhar Memorandum', which will help MSMEs with 'ease of doing business' in India. He also referred to SDC's support for EE initiatives in the MSME sector since the mid-1990s, with one of its outcomes being the SAMEEEKSHA knowledge-sharing platform.

MSME Energy map

A key feature of the SAMEEEKSHA website (www.sameeeksha.org) is the 'MSME Energy Map', conceptualized and developed under the EESE partnership between SDC and TERI. The Map is a dynamic tool that provides insights into the energy intensive MSME clusters across the country on which detailed energy related information and data are available. It allows access to useful information on the hosted MSME clusters at a number of levels. The location of each individual MSME cluster is shown on the Map by a 'place marker', through which the visitor can access and explore information on that MSME cluster at deeper levels. The information includes an overview of the cluster, summarizing information such as cluster level energy consumption, number of MSME units, the types of fuels used, leading industry associations at cluster level, and so on. Hyperlinks are provided to enable the visitors to access the main cluster profile report, and wherever possible, to navigate directly to other information/entities relevant to the cluster.

The Map can also be explored with an easy-to-use search tool, based on search criteria such as industrial sub-sector; state; and energy consumption (low/medium/high). This gives a holistic view of the sub-sector concerned, highlighting contrasts as well as common aspects among clusters and offering potential for comparative studies, cross-learning, and so on.

MICRO, SMALL AND MEDIUM ENTERPRISES: INITIATIVES OF BEE AND MINISTRY OF MSME

The next session, moderated by Mr Girish Sethi, Senior Director, TERI, underlined the importance of making the MSME sector more energy efficient and productive in the context of overall national development, and summarized the results and lessons drawn from some of the initiatives undertaken in this direction by BEE and MoMSME.

Initiating the session, Mr Sethi referred to the fact that the industry sector, comprising large industries as well as MSMEs, accounts for 45–50% of total energy consumption in India. While large industries have an excellent incentive for EE in the form of the Perform, Achieve and Trade (PAT) scheme, MSMEs have no such scheme. A study undertaken by TERI estimated that of the energy consumed in industry, almost 80 million tonnes of oil equivalent (Mtoe) remains outside the purview of PAT. Of this 80 Mtoe, a very large portion is accounted for by seven or eight energy-intensive sub-sectors (categorized on the SAMEEEKSHA website) including brick; glass and ceramics; foundry and forging; food processing; and light engineering. TERI also conducted an energy modelling study that assessed current energy consumption levels and patterns in every sector of the Indian economy, as well as projected sector-wise energy demands 25 years hence (in 2041). The study clearly reveals that even in 2041, the non-PAT Sectors, which includes MSME sector will be the third largest group/sector in terms of opportunities for EE (after steel and transport). This establishes the importance of targeting the MSME sector in all initiatives to promote EE in the Indian economy over the next 25 years.

Mr Abhay Bakre, Director General, BEE recalled the fact that MSMEs did not get priority in the initial years of the implementation of the Energy Conservation Act (2001): the focus was mainly on large industry. The first major EE initiative focused on MSMEs was the SME Program conceptualized by BEE; soon thereafter, MoMSME launched the complementary National Manufacturing Competitiveness Program (NMCP) which included a number of initiatives such as lean manufacturing to increase productivity; improving the quality of products and so on. He outlined the challenges and opportunities related to promoting EE in the MSME sector through a summary of strengths, weaknesses, opportunities and threats that manifest in the domains of technology, finance and capacity (**Figure 1**). Thereafter, he outlined the key features and outcomes of some of the major ongoing EE

Strengths
- Accounts for 8% of GDP, contributes 45% of manufacturing output and 40% of total exports
- Spread across the country
- Growth rate projected tobe 6% annually
- Employs over 40 million people

Weaknesses:
- 180 out of 400 clusters are characterised as energy intensive
- Most units uses outdated technology
- Lack of knowledge and skilled manpower
- Lack of access to new technologies
- Lack of caital for investment

Opportunities
- Huge potential for becoming energy efficient and cost competitive
- Enhanced credit support
- Potential for technology upgradation
- Increasing marketing assistance

Threats
- Lack of international quality production standards
- Units using older technology lacks to compete
- Lacks of support from Banks and Financial institutes
- Scarcity of skills manpower to run new technologies

Figure 1: MSMEs in India—strengths, weaknesses, opportunities, threats (Source: BEE)

initiatives in the MSME sector such as BEE SME Program (implementation support extended to 5 clusters); GEF-UNIDO-BEE Program (over 300 EE/RE projects implemented in 12 clusters); GEF-WB-BEE-SIDBI program (10 clusters targeted for increasing demand for EE investments); GEF-UNDP-Ministry of Steel initiative to promote EE in steel rolling mills (over 300 units supported so far); and SIDBI's various schemes to finance EETs in MSMEs. Although these EE initiatives have achieved some success, with about 1000 MSME units directly benefiting from them so far, the enormity of the task ahead can be gauged from the fact that the EE drive has to be extended to cover an estimated 26 million MSME units in over 180 energy-intensive clusters. Such a 'mass transformation' can be acquired only if various EE initiatives are synergized through the sharing of knowledge and experiences among stakeholders. The SAMEEEKSHA platform is a step in this direction. Mr Bakre also felt that there should be a high-level forum, such as an Inter-Ministerial Group, where MSME associations and other cluster-level entities can interface with policy makers and government departments to help formulate the right policies for MSME development. Mr Sanjay Bisariya, Joint Development Commissioner, MoMSME, described the features of the NMCP and its seven component-schemes. He explained how, in essence, an MSME can move directly towards implementing EETs via the TEQUP scheme; and thereafter, through the other six schemes, make step-by-step improvements in its productivity, profits and competitiveness. The following are some of the achievements and challenges he highlighted:

- **TEQUP**: As of 2016–17, over 450 MSMEs had been assisted in adopting EETs; currently, over 1500 proposals from MSMEs are under consideration for financial support.
- **Incubator**: Around 235 incubation centres have been opened to help students and entrepreneurs give shape to about 745 innovative business improvement ideas with the support of mentors.
- **Design Clinic**: The scheme envisages the establishment of Design Clinic Centres at various locations, which will help MSMEs in implementing their(incubated) ideas for product/process design improvements with the assistance of design experts (chosen from a list of over 1600 empanelled designers) and grant of 15–40 lakh rupees from Government of India. However, the response to this scheme has been lukewarm; one major challenge is the relatively disadvantageous location of many MSME clusters.

Breakaway sessions

Voices and perspectives from the ground

With the theme and general direction for the Summit having been set, the participants were divided into three groups so as to carry out three parallel thematic breakaway group discussions—one each on the overlapping themes of finance, technology and capacity. The focus of each group was on articulating ideas and outlining possible solutions to the challenges and issues related to energy efficiency under the relevant theme.

For each group, a set of key questions were formulated to initiate the discussions, which were facilitated by professional moderators. These three thematic breakaway sessions were intense and highly interactive; each captured insights that were summarized in a set of points. These points, in turn, formed the basis for the deliberations in the three subsequent thematic plenary sessions.

GROUP 1

Approaches to financing of energy efficiency for MSMEs

The objective of the discussions in this Group was to identify financing barriers that hinder the adoption of EE technologies by MSMEs, and to find possible solutions to address and overcome these barriers. There were about 70 discussants, comprising MSME entrepreneurs as well as representatives from prominent industry associations such as Indian Machine Tools Manufacturers Association, Indian Transformer Manufacturers Association and Int Nirmata Parishad; apex industrial and trade bodies like Institute for Indian Foundrymen (IIF) and PHD Chamber of Commerce and Industry; bilateral/multilateral agencies like GIZ, UNDP and UNIDO; banks and financial institutions including Axis Bank, IDFC Bank, Punjab & Sind Bank and SIDBI; government agencies and organizations such as BEE, EESL, Energy Management Centre (Kerala), MoMSME, state designated agencies (CREDA and UREDA) and MSME Development Institutes; power utilities (BSES Rajdhani Power); technology and financial consultancies; and equipment manufacturers/suppliers.

This session was moderated by Ms Nisha Menon, Development Environergy Services Limited. Presentations were made by Mr K M Dharesan Unnithan, Director, Energy Management Centre, Kerala; Mr Vinay Adlakha, Dy Director, MoMSME; and Mr Maulik Siyani, Representative, IIF (West Region).

The key finance-related questions introduced to initiate the discussions among the participants were:

- MSMEs prefer to raise funds, required by them, through savings, or through family or friends, or borrowing from market and only a small portion of MSMEs approach banks to avail financial assistance. How can we improve the overall situation wherein the MSMEs follow formal banking route for their financial needs?
- As a practice, the financial institutes assess the credit-worthiness of MSMEs instead of benefit of energy efficient technology or equipment. In such a scenario, what are your views to enhance credit flow for energy efficient equipment financing?
- How do we address the issue of high overall transaction costs for promoting energy efficiency in MSME sector? Is dedicated energy efficiency financing the right way forward? Should energy efficiency financing be a component of a larger basket of credit to reduce transaction costs and risk?
- What are your specific suggestions on promoting uptake of energy efficient technologies for the government, financial institutions and other international agencies? What kind of innovations can be done to make the financial schemes attractive to MSMEs?
- EESL has been fairly successful in promoting LEDs, ceiling fans and air-conditioners in the residential sector using a bulk procurement model to drive down costs. Do you think similar programs can be launched for MSMEs at the cluster level? If so, what are the challenges

> "Consider an EE project, a new one, for which the DPR is made and also approved; for which even the finance is available at a good interest rate. The question then is, if there is a viable DPR prepared by experts, why is the entrepreneur being asked for security?"
>
> **— Mr Paresh Vadhar, Jamnagar Factory Owner's Association**

that you foresee? How can ESCOs be involved in such programs? Suggest specific business models in this regard.

The important points and recommendations that emerged from the discussions are summarized below.

- Simplification of the transaction process (tax-related) is required to ensure a cash turnaround cycle of 3 months
- The need is for fewer schemes and simpler procedures
- Banking services should shift from lending role to financial services provider. Bank should find a simpler way to do the footwork for obtaining adequate collateral (allowing the unit owner to focus on running the business)
- Comprehensive schemes are needed that address technical support and financial support (rather than only financial support), e.g. 4 E
- BEE can play a role in making available information to SMEs
- Government-engaged EE technology providers could be twinning partners for disseminating their schemes at factory level
- Change the process management in public sector banks – so that there are different departments for processing different types of borrowers or loan sizes
- Banks can have regional-level technical personnel for appraising energy efficiency projects
- The 'Kerala Model'— where the EMC Kerala ensures time-bound appraisal of projects against requests received for financing by KFC— can be be replicated in other states
- Due diligence of technology and technology providers— proposed database by ISTSL, where it is incumbent on the registered vendor to update related information
- There should be consensus among bankers on master list of technologies and savings achievable
- Create a database of energy use benchmarks at system/ process/ industry level, to help lenders check where the proposals that are received stand as compared to the prevailing norms for the intervention in the sector; this can help energy conservation measures to be included along with energy efficiency
- While both dedicated EE financing, and EE financing as a component of a larger basket of credit, are prevalent, anecdotal evidence indicates that off-take of the latter is higher
- EE financing schemes offer the advantage of reducing transaction costs. However, they have the limitation of not providing any check on whether target efficiency levels are achieved (e.g., the JICA scheme, which led to migration to 4E scheme). The 4E scheme requires more time (due to requirement of energy audit), as compared to a scheme like SMILE, which also covers EE)
- Knowledge of schemes within large banks is low; therefore, dedicated efforts are required for training branch level staff on concept selling
- In promoting financing schemes for EETs among MSMEs, the field approach—where there is larger face time between MSME and intermediate agency (e.g., consultant)—works better than workshops

- While designing a scheme, make sure that it complements or supplements an existing scheme rather than compete with it
- Financial Assistance programs of bilaterals/ multilaterals/ government should be accompanied by a strong Technical Assistance competent to support and hand- hold MSMEs in adopting best available technologies
- A fund could be created (by MoMSME or BEE) to buy down cost of EE loans
- Target a scheme with zero cost loan + technical assistance (as in Kerala)
- Allow tax credit on EE investment (as was in wind power generation)
- Identify technology interventions (e.g. IE4 motors etc.), where a price advantage can be achieved from mass procurement and deemed savings
- Consider adopting the Dubai business model, where the Super ESCO competitively selects ESCOs for actual implementation
- Design schemes for SME sector to cover ESCOs – currently most schemes only address manufacturing SMEs and not service SMEs (ESCOs)

GROUP 2

ADOPTION OF ENERGY EFFICIENT TECHNOLOGIES—CHALLENGES & OPPORTUNITIES

The discussions in this group focused on identifying and elaborating on the ground-level barriers to the adoption of EE technologies by MSMEs, and outlining possible strategies and solutions to address these barriers. There were about 70 discussants, comprising MSME entrepreneurs as well as representatives from prominent industry associations such as Indian Electrical and Electronics Manufacturers' Association (IEEMA), Indian Transformer Manufacturers Association, International Copper Association India, Int Nirmata Parishad and Rajkot Engineering Association; apex industrial and trade bodies like PHD Chamber of Commerce and Industry; bilateral/multilateral agencies like GIZ, IFC, Shakti Sustainable Energy Foundation, UNDP and UNIDO; government agencies like BEE, Bureau of Indian Standards, Energy Management Centre (Kerala), EESL, MoMSME, Punjab State Council for Science & Technology, state designated agencies (MEDA, TEDA)and MSME Development Institutes (Chennai, Karnal); banks and financial institutions including Axis Bank, Punjab & Sind Bank and SIDBI; research organizations like Northern India Textiles Research Association (NITRA); power utilities (BSES Rajdhani Power and West Bengal State Electricity Distribution Company Limited); the Embassy of Japan in India; technology and financial consultancies; ESCOs; and equipment manufacturers/suppliers.

The session was moderated by Ms Nisha Jayaram, Counsellor, Confederation of Indian Industry. Presentations were made by Mr A Chandra Sekhara Reddy, CEO, Andhra Pradesh State Energy Conservation Mission; Mr V M Jha, Dy Director (I/C), MSME-DI, Agra; and Dr L K Sharma, Scientist-in-Charge, CGCRI, Khurja.
The key questions discussed, and the salient points from the discussions around them, are summarized below.
The key technology-related questions introduced to initiate the discussions among the participants were:

- Demonstration of energy efficient technologies in a few energy intensive sectors has been done in India. However, their uptake is still low. In many clusters, no such demonstration projects have been undertaken. What are the (non-financial) barriers and how these barriers can be overcome?
- There is a perception among many experts that

energy efficient technologies for MSME sector are available but problem lies with availability of finance. Many others feel that technological solutions are not readily available. They need to be developed/ customized to suit specific needs. What are your views?

- Do you think that sufficient R&D and innovation is happening in the country to develop technological solutions that are needed by MSMEs? How can the industry–academia interfaces be strengthened for development of energy efficient technologies? Are there sufficient programs/channels (government or international) available that can be sourced for developing innovations that are needed at the cluster/sector levels?
- Role of local service providers is considered very important in promotion of energy efficient technological solutions and best operating practices among MSMEs. What are your views? How can their role be strengthened in clusters?
- MSME sector is widely dispersed and highly fragmented. The energy consumption figures in the sector are not readily available. This acts as a barrier for a technology developing organization/large consultants to understand the scale and market size. What should be done to draw the attention of decision makers to energy savings and carbon reduction potential in energy intensive MSME sectors?

The important points, ideas and recommendations that emerged from the discussions are summarized below.

- The main non-financial barriers to the adoption of EETs are:
  - » Fluctuating market conditions
  - » Production takes most priority
  - » Lack of customized technologies
  - » Non-availability of skilled labour for operating new technologies
  - » Lack of in-house capability to assess the performance of technology
  - » Risk associated with loss in production on adoption of new technology
  - » Majority of small and micro units lack interest to attend awareness programmes
- EETs typically come at higher capital cost
- Non-availability of ESCO model for bulk buying is a barrier
- Academic research does not cater to applied research (it is not demand-driven)
- Industry experts should be involved in academia at two levels, i.e. , ITI and higher education levels, to groom skilled manpower
- Academic syllabus should be tuned to industry needs
- R&D lab-scale trial results of new technologies should be verified in industrial environment;

for, this will lead to better acceptance of technology

- There is need for joint R&D cells comprising industry and academia (target-based)
- The availability of cluster-specific energy managers will help promote adoption and replication of EETs
- Develop multiple energy ambassadors at cluster-level
- There is need for training of trainers (TOT) on EETs and BOPs
- International exposure visits for MSME entrepreneurs, LSPs and other cluster-level entities will help increase awareness levels on EETs
- Call centers/Help-desks for EETs and BOPs may be considered
- Consider the development of common platforms for EET information (e.g., Mobile

GROUP 3

Developing capacities of MSMEs on energy efficiency

APPs/Webpages)

- An EET alone does not attract MSMEs; they prefer complete integrated solutions

The discussions in this group aimed at identifying the principal capacity-related barriers among MSMEs as well as other stakeholders that prevent or hinder the adoption of EETs by MSMEs, and on outlining strategies and solutions for overcoming these barriers. There were about 80 discussants, comprising MSME entrepreneurs as well as representatives from prominent industry associations such as All India Plastic Manufacturers Association (AIPMA), Indian Electrical and Electronics Manufacturers' Association (IEEMA), Indian Transformer Manufacturers Association, Int Nirmata Parishad, Jamnagar Factory Manager Association and Rajkot Engineering Association; apex industrial and trade bodies like Coimbatore Industrial Infrastructure Association (COINDIA), Federation of Indian Micro and Small & Medium Enterprises (FISME) and PHD Chamber of Commerce and Industry; bilateral/multilateral agencies like GIZ and Shakti Sustainable Energy Foundation; government agencies like BEE, Energy Management Centre

(Kerala), PCRA, Quality Council of India, state designated agencies (KREDA, TEDA)and MSME

> "PSG College of Technology has a novel scheme, the 'Sandwich Program', for students who attend theoretical and practical classes on campus in the evenings (when the regular day classes are over and classrooms and labs free). During the day, these students, in shifts, are provided with hands-on technical training at shop-floor level in the local industrial clusters. Thus, the Sandwich Program not only puts the campus infrastructure to optimal use through evening classes; it provides a large number of youngsters with employment opportunities by equipping them with technical skillsets that find ready application in local industries, and also provides the local industries with a dependable pool of technically trained personnel..."
>
> **— Mr Kuppusamy Sellappa, President, COINDIA**

Development Institutes (Chennai, Delhi, Karnal); banks and financial institutions including Axis Bank and SIDBI; not-for-profit advocacy and research organizations such as Alliance for an Energy Efficient Economy (AEEE) and Institute for Sustainable Communities (ISC); technology and financial consultancies; and equipment manufacturers/suppliers.

The session was moderated by Dr. Indrajit Bhattacharya, Director, Quality Council of India. Presentations were made by Mr Kuppusamy Sellappa, President, COINDIA; Mr Deepak Chechi, Assistant Director, MSME-DI, Karnal; and Mr Paresh Vadhar, Jamnagar Factory Manager Association.

The key capacity-related questions introduced to initiate the discussions among the participants were:

- India is a labour-surplus country. However, MSMEs find it difficult to get the labour with required skill sets. To address this challenge, what are your views on the strategies that are needed to promote linkages between MSMEs and skill development schemes of Government of India?
- What in your view are the best ways to inculcate knowledge on best operating practices for improving energy efficiency in various equipment/processes used in MSMEs amongst (i) existing workers/operators and (ii) new recruits joining the work force?
- Training of trainer concept has been tried out under some projects. Do you feel this concept can be scaled-up at the cluster level and how?
- The Ministry of MSME operates many Technology Centres to provide technical support and training to MSMEs. How could linkages between MSMEs and Technology Centres be strengthened and how can energy efficiency aspects be built into the existing programs and schemes?
- There are various schemes being implemented by National Skill Development Corporation (NSDC), Industrial Training Institutes (ITIs), National Apprenticeship Promotion Scheme (NAPS), etc. under the Ministry of Skill Development and Entrepreneurship in partnership with the states. How do you foresee utilizing such programs towards promoting energy efficiency concepts in MSMEs? What role can cluster-level industry associations play in this regard?

The key points and recommendations that emerged from the discussions are summarized below.

- The primary need is to enhance the skills of existing manpower among MSMEs
- Skill development programs are also needed for local service providers/vendors (i.e., in addition

to plant personnel)

- There is need to improve the existing work culture
- Trainers should develop short training modules for the existing work force in association with local SMEs
- Training programs need to penetrate villages and *talukas*
- Effective and result-oriented programs are required with appropriate protocols
- There is need to develop and disseminate proper Standard Operating Procedures (SOPs) in local languages
- Technology-specific audio visuals can be prepared on Operation & Maintenance (O&M) and BOPs
- Training of existing operators by certified trainers is required
- It is essential to Involve local technical training institutes for incorporating energy efficiency in their existing curricula
- Identification of sector-specific trainers is needed
- Trainers need to undergo some certification programs
- Proper allocation of experts must be done for specific result-oriented and need-based training programs
- Training programs should have both on- and off-field components
- Periodic feedback from industrial associations is required for upgrading the quality of training programs
- Technology Centres can be strengthened and made more effective by ensuring the representation of local association(s) in the governing body of such training institutions. The associations can communicate the needs of the cluster/industries
- Technology Centres should develop sector-specific and need-based training modules on operation, maintenance and BOPs for equipment /processes
- Periodic review is required for upgrading and strengthening the existing Technology Centres
- In regard to utilizing the various training schemes and programs being implemented by NSDC, industry associations must channelize the right candidates to the right MSMEs. They may also introduce periodic short-term refresher programs with the help of national apprentice schemes
- Sector-specific, on-field training programs should be introduced in the curricula for new recruits
- There is need for capacity building of LSPs and development of O&M protocols for respective trades, e.g., capacity building of motor rewinders

Plenary Sessions

The insights provided by the breakaway sessions fed into, and formed the basis for, the deliberations in each of the three thematic plenary sessions on the second day of the Summit. For each plenary session, the key points from the corresponding breakaway session were presented by a group leader as field realities and inputs from the ground. Thereafter, experts made background presentations that helped deepen understanding on relevant issues, following which a panel of 'Respondents' discussed possible solutions and outlined the way forward.

PLENARY 1

FINANCE

Chair

MrAbhay Bakre, Director General, BEE.

Background presentations

- Mr Chandan Bhavnani, Executive Vice President, YES Bank—'Private sector banker's perspective'
- Mr Sanjay Goyal, General Manager, SIDBI—' Public sector banker's perspective'
- Mr Stefan Hediger, Head - Energy Cell, KfW —'Bilateral /Multilateral perspective'
- Mr Rajaram Mane, Director General, Maharashtra Energy Development Agency (MEDA)

Respondents

- Dr Winfried Damm, Director, GIZ
- Mr S C Dugar, Past Chairman, Indian Foundry Association
- Mr Atul Gautam, Senior Advisor, Indian Banks Association
- Mr S P Garnaik, Chief General Manager, EESL.

Background presentations

Mr Milind Chittawar, CEO, See-Tech Solutions Pvt. Ltd, presented the points and recommendations from the breakaway session on Finance. He emphasized the need for fewer, more focused schemes for EE, for, with so many schemes as at present, it is very difficult for MSMEs to identify the scheme most suitable for meetings their own specific requirements. He also underlined the point that while the majority of EE schemes are targeted at manufacturers, ESCOs should be eligible for benefits of EE schemes (such as capital-linked subsidy scheme) as they too are MSMEs and enablers of energy efficiency.

Mr Chandan Bhavnani, Executive Vice President, YES Bank, made a detailed presentation on the work done by YES Bank in the field of energy efficiency, mentioning that it was the first bank to come out with Green Bonds, and also the first to sign MOUs with BEE under the Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE), and with SIDBI under the Partial Risk Sharing Facility for Energy Efficiency (PRSF). He described the many challenges faced in EE financing, including those through the ESCO route, and

underlined the need for standardization of energy audits as well as strong monitoring and verification (M&V) systems to address possible disputes over energy savings and payment assurance doubts between host and ESCO. As the way forward, he suggested that demand aggregation for EE investments is a must; for, banks/FIs will not be interested in individual EE projects if the ticket size is too small. EE could also be given a push through innovative financing mechanisms like Green Bonds, Green Climate Fund, and warehousing of EE assets; and by leveraging the bank–corporate–MSME relationship, with corporates driving EE among their vendor-MSMEs (i.e. down their supply chains).

Mr Sanjay Goyal, General Manager, SIDBI, stressed the need for financiers as well as MSMEs to understand the two major challenges related to EE financing. First, unlike in 'normal' project lending where funds are provided for setting up a new plant, expansion, modernization, diversification, and so on (i.e., growth-driven projects), in EE lending the funds are provided for cost reduction. In other words, the funds are not meant to increase production or turnover, but to increase overall resources efficiency and profitability. Second, unlike in normal lending which is security-based, EE lending is based on net/incremental cash accruals (i.e., savings on energy costs that result in reduced expenses and increase in profit). Mr Goyal described SIDBI's role as a development bank that focuses on 'filling in the gaps in the ecosystem related to MSME financing'. In essence, SIDBI works as a laboratory for innovative financial products for MSMEs, that it develops and test-markets before making them available to the larger banking community. SIDBI also develops various schemes

> "In EE financing we are not targeting production or turnover enhancement; instead we are financing costs reduction! This perspective has to dawn, among financiers as well as MSMEs."
>
> **—Mr Sanjay Goel,General Manager, SIDBI**

and mechanisms to address institutional-level gaps: for instance, the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTSME) and the Micro Units Development and Refinance Agency (MUDRA) Bank, which are aimed at overcoming the collateral security challenges that act as a barrier to MSME financing. Mr Goyal outlined SIDBI's two-pronged approach to provide EE solutions for MSMEs: (1) financial assistance through focused lines of credit, that enable banks to provide concessional finance for sustainable development projects in MSMEs; and (2) developmental support to MSMEs, through initiatives such as the WB–GEF project on 'Financing energy efficiency at SMEs', End-to-End Energy Efficiency (4E)scheme, PRSF, and cluster-focused awareness and capacity building programs

for banks, MSME entrepreneurs, ESCOs and other stakeholders.

Mr Stefan Hediger, Head - Energy Cell, KfW, underlined the central role that EE plays during the 'transition' of an energy system toward less dependence on fossil fuels. While there are good reasons to consider options based on renewable energy (RE) such as wind, solar, etc., during energy transition, it is important to recognize that RE is also costly. EE must therefore become a priority at every level of society, and play a central role in future energy planning. He summarized a few major lessons drawn by KfW from its engagements with the energy sector, in India as well as globally. Broadly, an EE finance program has to be embedded in a supportive environment to be successful. The foundations of this environment are legislations, rules and regulations ('sticks'); these form the basis for developing and promoting financial incentives and technical assistance programs ('carrots'), along with initiatives to spread awareness and build capacities ('sermons) that pave the way for scaling up EE. Mr Hediger outlined KfW's activities in India aimed at promoting EE, in partnership with (1) National Housing Bank (NHB) under which EE improvements of about 22% average have been achieved in buildings through active and passive measures; (2) SIDBI, under which KfW has provided a line of credit to support EE investments by SMEs ; and (3) EESL, under which LEDs have been promoted nationwide through bulk procurement, resulting in significant price reduction and facilitating market transformation.

Mr Rajaram Mane, Director General, Maharashtra Energy Development Agency (MEDA), presented the initiatives undertaken for energy conservation among MSMEs in Maharashtra—the first state in India to have a separate Energy Conservation Policy. He elaborated on the aims of the Policy in regard to improving EE, and on the various measures and schemes launched by MEDA to achieve these aims in the industrial, commercial, municipal and agricultural sectors, as well as in electricity generation and distribution. Among its many initiatives, MEDA is developing a scheme to promote the implementation of EE projects on ESCO basis, wherein banks will come forward to finance such projects among SMEs as well as large-scale industries, and for residential and commercial buildings. MEDA will empanel the ESCO firms and issue guidelines for the implementation of projects under the scheme.

Respondents' perspectives

Dr Winfried Damm, Director, GIZ, appreciated the various initiatives that have been launched by different agencies to improve EE and reduce CO_2 emissions, but wondered whether progress is too slow—particularly in the light of the fact that across the world, countries are in on the edge of failing to meet the commitments they have made (to control CO_2 emissions) under the Paris Agreement. He said there is need to invest more resources and to achieve more in the pursuit of EE. He also emphasized that the goal of EE cannot be attained as a 'one-time-shot', but requires continuous and sustained efforts by various agencies along with sharing of knowledge and experiences. He noted that while subsidies may be necessary at times (to push EETs), they should not be needed when the technology is good, the payback is attractive, and finances are available; rather, the EETs should be pushed through the 'sticks' of regulation accompanied by strong promotional programs. He added that EE can also be given a 'pull' from the consumer side through demand for clean, EE products. As examples, he cited German Rail and German Post (Deutsche Post), which now offer 'CO_2 free transport' and 'CO_2 free delivery' respectively based on public demand for green products and services.

Mr S C Dugar, Past Chairman, Indian Foundry Association, briefly described his experiences, as a foundry entrepreneur, with an EET—the divided blast cupola (DBC) melting furnace—that was installed and demonstrated in his foundry plant in the mid-1990s under the TERI–SDC partnership project. **At that time, the DBC yielded an estimated 20% energy savings in terms of hard coke, with a payback on investment of 2½ years; currently, the DBC is bringing about 40% energy savings**. Mr Dugar added that with increased awareness regarding EE and its benefits in terms of reduced energy costs and improved profits, he has invested in upgrading various other machinery and equipment in his plant, with satisfactory results. Emphasizing that all these EE measures were undertaken without availing bank finance, he pointed out that awareness regarding EE finance continues to remain low among bank personnel, and therefore poses a major barrier for MSMEs interested in acquiring EE technologies.

Mr Atul Gautam, Senior Advisor, Indian Banks Association (IBA), recounted his experiences as an officer with Oriental Bank of Commerce, where he worked till his retirement in 2015. He stressed the need for bankers to be proactive in understanding the businesses of their clients, and to take swift decisions based on this knowledge. Soon after joining IBA, he became involved in finalizing a report on EE financing that IBA was developing in association with BEE. He added that BEE and IBA have conducted a large number of awareness programs on EE financing for bankers across the country.

> "As a financier, take decisions fast...while you are thinking the client is sinking! You should also own your client's balance sheet!"
>
> **—Mr Atul Gautam, Senior Advisor, Indian Banks Association**

Mr S P Garnaik, Chief General Manager, EESL, cited the complexities on the part of MSMEs on the one hand, as well as among banks/FIs on the other, that prevent easy financing of EETs. These complexities take the form of low awareness levels, lack of capacities, even inertia. He stressed that the time for seeking 'low hanging fruit' (i.e. low-cost EE measures) is gone; the need now is for giant steps towards EE. Taking up the barrier posed by the relatively high cost of EETs, he described the model adopted by EESL to bulk-procure LEDs at low cost for nationwide dissemination, and stressed that this model of demand aggregation—with one technology having many recipients—offers the best solution to reduce the price of EETs and promote them on a wide scale in the MSME sector.

Mr Garnaik explained the two broad approaches that can be adopted to promote an EET after reducing its cost through bulk procurement and demand aggregation. One is the '*shared savings*' approach, under which part of the monetized energy savings derived from the EET goes to repaying its cost. As an example, he cited a program under which EESL

> "You are promoting a technology; not a manufacturer or vendor. So...put the technical specifications down in a very good and acceptable way, put that into procurement channels and you'll get the price reduction. The LED case is testimony to the success of this model: it is simply demand aggregation to obtain reduction in price—no rocket science involved in that!"

Mr S P Garnaik, Chief Gen. Manager, EESL

undertook the task of retrofitting LEDs in 18 plants of Mahindra & Mahindra (M&M) across India. The results were so satisfactory that M&M has decided to extend the LED retrofitting project to its 400 MSME partners. EESL is implementing this project, under which each MSME will repay its respective LED implementation costs in quarterly instalments, drawing on its savings in energy costs. The other approach is based on '*deemed savings*', i.e., on pre-determined estimates of the energy savings from EETs that have been established through pilots. He cited, as example, the National Motor Replacement Program drawn up by EESL, under which it will bulk-purchase EE motors (IE3 rated) and install them free of upfront costs in MSMEs to replace the low efficiency motors that are currently in use. In order to establish the energy savings from IE3 motors, EESL tested 50 IE3 motors under actual field conditions in MSME clusters such as Surat, Jamnagar, etc., and obtained a bandwidth of energy savings through their use—ranging from 5% to 20%. EESL will recover its upfront bulk purchase costs on the IE3 motors from the savings in energy costs that the MSMEs realize, over a 12–18 month period. In order to incentivize MSMEs to participate in the program, EESL will also offer an extended warranty of 3–4 years on the IE3 motors (against the 18 months warranty offered by the motor manufacturers).

In conclusion, Mr Garnaik mentioned the project titled 'Promoting Market Transformation for Energy Efficiency in Micro, Small & Medium Enterprises', a joint initiative of UNIDO and MoMSME being implemented by EESL in 10 MSME clusters. In each cluster, EESL will select and promote a few EETs that have already been proven to some extent; the idea is not to demonstrate the EET, but rather to demonstrate the mechanisms for procuring the EET, financing the EET, and recovering the EET costs.

Pointers for the way forward

- EE finance can work successfully only by following a holistic approach that overcomes barriers at different levels, from policy to grassroots, using a mix of 'carrots' (economic instruments, incentives), 'sticks' (legislation, rules and regulations, technical standards) and 'sermons' (information, advertising instruments).
- The need is for schemes that address both technical and financial aspects together.
- Within banks, the primary challenge is a lack of understanding and expertise related to EE financing. The need, therefore, is for training bankers on relevant aspects of EE finance.
- EE can be given additional thrust from the demand side, i.e., if clean ('CO_2 free') products and services are demanded by consumers through awareness creation. Germany provides examples of how this approach can succeed (e.g. German Rail, Deutsche Post).
- With ESCO finance, calculation of energy savings can be a conflict area between host and ESCO, as there is often considerable inconsistency in calculations of energy savings between different energy audits (EAs) due to the numerous variables and baseline changes. The need is for strong M&V systems, and also for standardization of energy audit (EA) protocols.
- Aggregation of demand to create 'many takers for one technology' offers the best way to achieve large-scale financing and adoption of EETs (as banks/FIs will not be interested in financing small ticket-size investments).
- A cluster-approach should be adopted by banks for financing EETs
- Corporates can drive EE among their vendor-MSMEs, i.e., down their supply chains
- Green Bonds offer a good source of funds for

banks/FIs to drive EE projects; especially if a multilateral participates, for then the cost of funds becomes cheaper.

- Financial assistance programs of bilaterals/ multilaterals /government should be accompanied by a strong Technical Assistance component to support and handhold MSMEs in adopting best available technologies.
- Funding support for EE should extend to cover adaptation/customization of the EE technologies post-demonstration, as this phase is essential for ensuring replications.

PLENARY 2

TECHNOLOGY

Chair

- Ms Marylaure Crettaz, Head of Swiss Cooperation Office and Counsellor, SDC

Background presentations

- Mr Sanjaya Shrestha, Industrial Development Officer, UNIDO
- Mr Anil Bhardwaj, Secretary General, FISME
- Mr Sameer Pandita, Joint Director, BEE & Mr Niranjan Rao Deevela, National Technology Coordinator, UNIDO
- Mr Prosanto Pal, Senior Fellow, TERI

Respondents

- Dr Rabhi Abdessalem, Senior Policy Researcher & Task Manager, Institute for Global Environmental Strategies (IGES), Japan
- Dr S N Srinivas, Program Analyst, UNDP
- Mr Pritpal Singh, Senior Engineer, Punjab State Council for Science and Technology

Background presentations

Mr Hemant Latthe, Vice-Chairman, Belgaum Foundry Cluster, presented the points and recommendations related to EE from the breakaway session on Technology. He underlined the point that MSMEs are constantly under pressure from fluctuating market conditions: for, when the markets are up, they are too busy with production to think about EE, and when the markets are down, low resources and low morale make EE a low priority! He stressed that another major barrier to EE is the relatively higher costs of EETs and added that while this often leads the MSME entrepreneur to opt for low-efficiency technologies due to their lower upfront costs, in the long term he incurs financial losses due to higher energy bills. He illustrated the point by saying that an MSME entrepreneur may buy a locally fabricated induction furnace because it costs him only about 15 lakh rupees compared to 25–30 lakh rupees for a high-efficiency IGBT induction furnace; yet, he ends up paying 15 lakh rupees or more annually on higher energy costs!

> "It is very important to note that MSMEs pay the highest cost for power! Large companies typically have captive power generation, and they have very competitive rates. MSMEs often depend on (diesel based) generators, where energy costs could as high as 10–12 rupees per unit ..."
>
> **—Mr Anil Bhardwaj, Secretary General, FISME**

Mr Sanjaya Shrestha, Industrial Development Officer, UNIDO, provided a background of the various GEF-funded projects being implemented in India by UNIDO, and summarized some of the EETs demonstrated under the projects 'Promoting Energy Efficiency and Renewable Energy in selected MSME clusters in India' (implemented in 12 clusters covering 5 industrial sub-sectors) and 'Promoting market transformation for EE in MSMEs', implemented in 10 MSME clusters. He described a number of MSME entrepreneurs with innovative ideas for clean technologies ('cleantech'), who were supported and mentored under the project 'Cleantech innovation program for SMEs in India'. The cleantech products include a commercial cookstove from Agnisumukh; a waste heat recovery system from Promethean Energy; EE ceiling fan from Atomberg; and stand-alone high pressure moulding machines from Rhino Machines. Drawing on the project experiences, he summarized the many challenges faced by entrepreneurs in the domain of technology, finance and market. These include: lack of data and non-availability of technical guidance; lack of customized technologies; low capacities on the part of entrepreneurs and plant personnel; lack of innovation and R&D; and difficulties faced by entrepreneurs in validation of innovative technologies (innovators need technical mentoring and financial support for the purpose).

Mr Anil Bhardwaj, Secretary General, FISME, underlined the often-ignored fact that MSMEs face the highest prices for power. While large companies usually have captive power plants and also access power at very competitive rates, MSMEs typically depend on DG sets for power, in which case energy costs can be as high as 10–12 rupees per unit. As a major challenge to the adoption of EE by MSME entrepreneurs, he cited the sheer heterogeneity of the MSME sector: at one end are self-employed people deploying make-shift (*'jugaad'*) technologies, while at the other are highly developed units that form part of global supply chains in sectors such as automotive, aviation, defense, electronics, and others. Also, there are sectorial disparities; regional disparities; and disparities related to the markets being catered to by MSMEs. Therefore, all MSMEs cannot be tarred with the same brush while considering initiatives to promote EE. Another major challenge

he cited is that most of the technologies that an MSME uses are embedded with the plant and machinery it buys—and so, if the plant and machinery are inefficient, the MSME has to live with it! To respond to this challenge, we must focus EE initiatives on the manufacturers/ suppliers of machinery and equipment to MSMEs. He suggested that a portal could be created for listing manufacturers and suppliers of EE plants/ machinery. He also voiced the need for a single national policy for EE, as at present different ministries and departments each have different policies for EE, resulting in confusion.

Mr Sameer Pandita, Joint Director, BEE, outlined the three major EE initiatives by BEE in the MSME sector, namely: (1) BEE SME Program; (2) GEF–UNIDO–BEE program; and (3) GEF–WB–BEE program. Under the Energy Conservation Act, 2001, there are no provisions for making any mandatory policies for the MSME sector. Hence, all the initiatives by BEE in the MSME sector are essentially voluntary, and driven primarily by the recognition of the MSME sector's importance to India's economic development, considering its 8% share of GDP and 45% contribution to India's total manufacturing output. BEE has been working in coordination with the Ministry of MSME since 2012 (i.e. during the 12th Plan, 2012–17); till then, both entities had largely worked in silos. Under the SME Program, BEE has synergized its efforts with the DC-MSME in five clusters: Varanasi (brick), Indore (food), Kochi (seafood), Ludhiana (forging), and Pali (textiles). The relevant MSME

Development Institutes (MSME-DI) support BEE in its EE initiatives among MSMEs, while BEE promotes the TEQUP Scheme among MSMEs in its workshops. The presenter summarized the EETs identified and promoted initiatives in each of the five clusters, along with results and experiences. The most important achievement has been the identification, *and empanelment with BEE*, of 70 local service providers (LSPs) who supply and provide support services for the relevant EETs. Mr Pandita outlined BEE's roadmap for the future in the MSME sector, which broadly comprises: (1) nationwide awareness and capacity building programs on EE focused on MSMEs as well as banks/FIs; (2) constitution of technology-specific forums to promote specific, already-identified EETs (e.g., 'Waste Heat Recovery Alliance'); (3) engaging banks/FIs from the very genesis of an EE project to instill confidence among both MSMEs and financiers; and (4) promoting EE via the ESCO route through demand aggregation.

Mr Niranjan Rao Deevela, UNIDO summarized the activities and results of the GEF–UNIDO–BEE project titled 'Promoting energy efficiency and renewable energy in selected micro, small and medium enterprises (MSME) clusters in India', being implemented in 12 MSME clusters covering five sub-sectors. The project works at cluster level as well as policy level. Its focus areas include capacity building of EE/RE product suppliers and finance providers; project implementations; and strengthening policy and decision-making frameworks. Besides the establishment of 9 energy management centres (EMCs), the project has enabled the implementation of over 300 EE/RE projects. He cited a number of examples, such as the successful installation, through demand aggregation, of over 7500 EE fans (28W) for cooling applications in ceramic units in the Thangadh ceramic cluster, resulting in electricity savings of about 1.4 million units annually in the cluster.

Mr Prosanto Pal, Senior Fellow, TERI drew on experiences and lessons from the TERI-SDC project to outline how technology interventions to promote EE in MSMEs may be designed. He explained that in essence, external interventions are required for promoting EETs among MSMEs because the new (EE) technologies are more expensive than the existing (low efficiency)

technologies; awareness regarding EE is low among cluster-level stakeholders, and there are no customized technological solutions available at cluster level; and also, there is lack of support at local level (i.e., LSPs) for technology adoption. The major EE interventions therefore follow one among the following approaches: (1) financial concessions (e.g., government schemes, initiatives of donors like JICA, KfW)—essentially targeted at bridging the gaps between higher-cost EETs and the cheaper conventional technologies; (2) training/awareness creation; (3) energy audits and implementation assistance (e.g., the GEF–WB–UNIDO project), where the EA helps an MSME identify the EE measures that it can adopt, after which vendors are identified to provide the necessary equipment/services; and (4) technology innovation/research, development, demonstration and dissemination (RDD&D)—in cases where EETs are not available off-the-shelf and/or at the scale required. He stressed that for maximum effectiveness, an EE intervention should have clear focus on one of the two broad areas that offer scope for EE improvements: (1) process areas which consume most of the energy in the plant (e.g. melting/heating furnace, dryer, kiln, etc.), or (2) auxiliaries (e.g. boilers, pumps/fans/compressors, motors, etc.). The intervention can then be carried out at one or more of three levels: (1) best operating practices (BOP) which yield relatively low energy savings (1–2%) at little or no investment (e.g., reducing leakages of oil, air, steam; cleaning light fixtures; etc.); (2) retrofit, where the existing equipment is modified to make it more efficient, entailing some expenditure but offering a good return on investment (e.g., furnace insulation, VFD installation); and/or (3) install new EE equipment (e.g. install new furnace, install new screw compressor with in-built VFD), entailing relatively high capital expenditure but promising highest energy savings. Mr Pal reiterated the point that in the case of new EE equipment, while technologies may be available off the shelf, it is often the case that R&D is necessary in order to adapt the EET to suit the needs and conditions of the MSME(s) concerned. He stressed the 'ripple effect' that technological capacity building can have in disseminating an EET beyond the MSME unit in which it is implemented. He explained how capacity building, and the resultant ripple effect, played a vital role in the successful RDD&D interventions under the TERI–SDC project in the foundry and glass sub-sectors. Each intervention involved (1) conducting R&D to develop innovative EE technologies for MSMEs; (2) demonstrating the EETs in MSMEs; and (3) disseminating the EETs by developing LSPs, providing financial support (tailored to meet the requirements of the concerned MSMEs), and spreading awareness.

Respondents' perspectives

Dr Rabhi Abdessalem, Senior Policy Researcher & Task Manager, IGES, observed that the discussions during the Summit had dwelt on the challenges and opportunities related to EE; and just as there are numerous opportunities everywhere, equally numerous are the challenges. Drawing on the experiences of IGES and TERI in successfully transferring and implementing Japanese EETs among end-users in India, he suggested business-to-business (B2B) 'matchmaking' as the approach through which potential EET manufacturers/suppliers can be identified to meet the technological needs of an end-user. Thereafter, on-site feasibility studies may be conducted, together with capacity building initiatives—not only via in-house workshops but at the site itself. Demonstrations of the EET follow. For up-scaling, it will be necessary to involve more stakeholders at different levels—such as finance and policy—and the nature of linkages will therefore widen from B2B matchmaking to

include business-to-finance (B2F) and business-to-policy (B2P) matchmaking. Broadly, therefore, EE opportunities can be seized by the identification and involvement of the appropriate stakeholders in the domains of technology, finance, capacity and policy, and the deployment of the necessary knowledge. The challenge is to *integrate* these various elements to carry out a successful EET implementation and scale it up. The answer is a 'matchmaking platform' that synergizes the knowledge and capabilities of stakeholders in different domains of expertise, from both demand and supply sides. Such a matchmaking platform will, in essence, enable a 'synergy of interventions'— with different entities each playing clear and distinct roles. Thus, the platform will be far more efficient at promoting EE than the numerous, separate EE interventions that are being undertaken by different agencies as at present.

Dr S N Srinivas, Program Analyst, UNDP, spoke on the importance of finding ways to scale up EE quickly—because despite there being millions of units in India's MSME sector, the combined efforts of numerous agencies over decades have only resulted in a few hundred replications of EETs. He cited the example of UNDP's work to promote EE in the secondary steel sector in India in partnership with the Ministry of Steel. In the first 10 years, only 34 steel mills were covered—out of a total of about 3500 steel mills. The project then set itself a 'challenge': to cover 300 steel mills in the next 30 months. Simultaneously, the project reduced the level of the grants it was receiving by one-fifth (20%). The project's proposal was accepted, with the Ministry of Steel remarking that it would be satisfied if the project achieved even half of its ambitious target. As it turned out, the project was able to cover 287 units in 30 months!

The success of the project was founded on the following approaches and measures: (1) speedy sign-off with units—the project engaged with associations, vendors, banks and sectorial experts, and succeeded in getting about 400 units to sign up; (2) increasing the number of experts—the project expanded its pool of experts from an initial 4–5 to around 50 experts; (3) aiming at achieving payback on investments of no more than 12–14 months; and (4) providing a variety of EET packages (numbering over 50), to suit the different pocket sizes of MSMEs. Along with these measures, the project conducted baseline audits, provided implementation support, and verified the post-implementation results. Buoyed by these successful results, UNDP and Ministry of Steel are now aiming at covering 1200 steel mills in the next 3–5 years. As the way forward, Dr Srinivas suggested the following stepwise approach:

Create a roadmap. There are hundreds of MSME sub-sectors (categories). Take about 100 categories, each contributing (say) 5 million tonnes of CO_2 emissions annually. From among them, select about 200–300 clusters for interventions.

Do baseline mapping. Customize solutions with innovation, which is a continuous process.

Provide technical assistance and handholding during and after implementations. Work with vendors, LSPs and other cluster-level stakeholders, and close with post-implementation assessments.

Mr Pritpal Singh, Senior Engineer, PSCST, presented a profile of PSCST, its activities and the experiences and results in various thrust areas. Turning to the challenges in promoting EETs, he said that from an MSME unit's perspective, the credentials and experience of the implementing agency is a major concern—particularly because the unit is entrusting the implementing agency with its own confidential production-related data, and also undertaking significant risks in investing time and resources in the EET demonstration project. As a consequence, demonstration of the EET usually happens only in a 'progressive' unit; and such a unit rarely shares knowledge and experience regarding the EET with other units. This is a primary reason why EETs do not percolate beyond the demo unit to other units in a cluster. In order to overcome this challenge, Mr Singh suggested that EET projects should aim at setting up at least three demo projects per cluster, covering different categories of units. He also underlined the need for continuous upgrading of workforce skills through training programs, as the attrition rate is high among workers in the MSME sector. He added that the supportive government schemes and policies have to be continuous; at present, they are usually close-ended at 3–4 year, after which subsidies and other forms of support cease. From an implementing agency's perspective, Mr Singh said that a major challenge is the lack of clear, sector-specific vision documents with respect to technologies, products, etc. He cited, as an example, PSCST's work with UNDP in promoting EETs among steel rolling mills and brick kilns in the Punjab region. EETs were identified and promoted with good results; but then came a message from the government—for the MSMEs to switch over their technologies from coal-based to gas-based. At a stroke, all the earlier work came to naught. Also, the credibility of the implementing agency suffers in such circumstances. As another example he cited the brick industry, for which there are conflicting and confusing views in different policy documents. A notification by Ministry of Environment and Forests states that only bricks based on fly-ash can be used in construction, which implies that no traditional (clay-based solid brick) kilns can operate! At the same time, brick kilns are being asked to switch from natural draft to zig-zag firing. The answer, Mr Singh suggested, is to come out with a clear and comprehensive vision document for each sub-sector: one that says, for instance, that "after 10 years, we shall have no more solid bricks; we should be using only perforated bricks, hollow blocks or fly-ash bricks." With such clear vision documents, a roadmap can be drawn for each sub-sector to achieve the goals set out through interventions covering the domains

of technology, finance, capacity, etc. He also stressed that EET solutions must be integrated with the pollution control requirements and end-of-pipe (EOP) schemes of regulatory agencies.

Pointers to the way forward

- External interventions are extremely important in promoting EETs among MSMEs because:
  - » New (EE) technologies are more expensive than the conventional (low efficiency) technologies
  - » There is lack of customized technological solutions at cluster level
  - » There is lack of support at local level for technology adoption (i.e., local service providers)
- The major EE interventions normally follow one among the following approaches:
  - » Financial concessions (e.g. government schemes, initiatives of donors like JICA, KfW)—essentially targeted at bridging the gaps between higher-cost EETs and the cheaper conventional technologies
  - » Training/awareness creation
  - » Energy audits and implementation assistance (e.g., the GEF–WB–UNIDO projects): here, the EA helps an MSME identify the EE measures that it can adopt; and then, vendors are identified to provide the necessary equipment/services
  - » Technology innovation/research, development, demonstration and dissemination (RDD&D)—in cases where EETs are not available off-the-shelf and/or at the scale required

From the technology perspective, it is extremely important to develop projects focusing on (i) energy audits and implementation assistance, and (ii) RDD&D

- Cluster-level energy services for MSMEs should be strengthened—for instance, through the identification of cluster-specific Energy Managers, on the lines of those identified for/ appointed by Designated Consumers.
- EE efforts should also focus on the manufacturers/suppliers of machinery/ equipment to MSMEs. A portal could be created, listing EET suppliers, so as to create a market among MSMEs for EE machinery / equipment.
- A major reason why EETs do not percolate in an MSME cluster is that the initial demonstration of the EET usually takes place in a 'progressive' unit, which rarely shares its knowledge with other units in the cluster. Interventions should therefore aim at carrying out at least 3 EET demonstrations per cluster.
- For scaling up EETs, we need to involve more stakeholders that are engaged with the MSME sector at different levels: policy, technology, finance, capacity. In essence, the need is for a 'synergy of EE interventions'.
- There is need for a single national policy for EE in the MSME sector as a whole. At present, different ministries and government departments have different policies for promoting EETs, resulting in confusion on the part of entrepreneurs and other stakeholders. Also, the government policies and schemes must be continuous (at present, they are usually 'close-ended' at 3–4 years, after which support ceases)
- The government should also develop specific 'Vision Documents' for each major MSME sub-sector (such as brick) with regard to technologies, fuels and products. This will ensure that the achievements of EE interventions are not lost because of sudden changes in policies or regulations.
- A clear roadmap for improving EE in MSME sector should be created. For instance, a number of CO_2 emissions-intensive MSME sub-sectors could be selected, and then supported in achieving EE through comprehensive interventions that cover baseline mapping; customizing EE solutions through continuous innovation; technical assistance; handholding (including working with vendors and local service providers at field level); and post-implementation assessments.
- Business to Business (B2B) 'matchmaking' should be organised at cluster/regional levels through which potential energy efficient equipment manufacturers can interact with the end-users.

PLENARY 3

Capacity

Chair

- Mr Rene Van Berkel, UNIDO Representative and Head of Regional Office in India

Background presentations

- Mr Pradeep Sand, Secretary, Rajasthan Textile Processing Association, Pali
- Mr Abhishek Dhupar, Program Manager, International Copper Association India (ICAI)
- Mr Balkar Singh, Asst. General Manager, Punjab Energy Development Agency

Respondents

- Mr M A Patil, Director, Federation of Indian Chambers of Commerce & Industry
- Dr A K Asthana, Senior Technical Expert, GIZ
- Mr Arvinder Singh Chamak, Past President, All India Brick & Tile Manufacturers Federation

Background presentations

Mr Mithilesh Raghuvanshi, Deputy Secretary, PHD Chamber of Commerce and Industry, presented the points and recommendations related to EE from the breakaway session on Capacity. Stressing the need for skilling of the existing workforce in MSMEs at the shop-floor level, he suggested that short-term training modules should be developed for the purpose. To maximize their effectiveness, the training programs should be anchored at local level—preferably with the industry association(s), whose suggestions and feedback should be incorporated into the programs—and extended to cover not only the workforce but also LSPs and vendors. There is need for sector-specific training of trainers (TOT), for which the trainers concerned should have undergone some kind of certification programs in order to ensure the quality and impacts of the training imparted. Besides, the training programs should have both on-field and off-field components. Also, technical institutions in the region such as ITIs and engineering colleges should incorporate EE aspects in their curricula so as to equip their students with awareness and knowledge on EE. In regard to promoting best operating practices (BOP) among the workers/ operators, he said that standard operating procedures (SOP) should be developed in the local languages for easy comprehension and use of the workforce.

Mr Pradeep Sand, Secretary, Rajasthan Textile Processing Association (RTPA), Pali, stressed the importance of the MSME sector in general, in terms of its overall energy consumption as well as its providing employment to an estimated 111 million people. He provided an overview of the textiles cluster located in Pali, which has about 650 units and production capacity of over 5.5 million metres per day. During the 11th Plan, BEE and PCRA launched an Energy Efficiency Program in the Pali textiles cluster, and conducted studies that helped establish energy consumption requirements (i.e. benchmarks) for the machinery/ equipment used in different process areas such as scouring, bleaching, dyeing, etc. During the 12th Plan, under the BEE SME Program, baseline

> A major challenge (in workforce skilling) is the drastic change from conventional method to newer technology. For instance, in the Pali textiles cluster, all the Masters who work on jiggers are 50–55 years old. They are experts in choosing colours and in dyeing; but they don't know how to use VFDs on jiggers, they need training for that!
>
> **—Mr Pradeep Sand, Secretary, Rajasthan Textile Processing Association, Pali**

energy audits were undertaken; several EETs were identified for the cluster; and a number of EE implementations took place. Emphasizing the challenges faced in capacity building of the workforce on operating the new/improved technologies—which often present a drastic change from the conventional technologies—Mr Sand mentioned that less than 5% of the workforce in Pali has undergone formal skills training. There is need to build stronger links between MSMEs and skills training centres. Also, the skills training centres should focus on meeting the capacity needs of the particular industrial sub-sectors located in their vicinity. In this connection Mr Sand mentioned that while there are a number of ITIs in the vicinity of Pali offering training courses for trades like fitter, electrician and so on, none of the ITIs provide courses specific to the textiles industry—despite their being located in a textiles industry hub!

Mr Abhishek Dhupar, Program Manager, International Copper Association (ICAI), focused on the topic of increasing EE in electric motors, which are used in diverse applications across all industrial sub-sectors and account for about 70% of the total power consumed in India's industrial sector. Analysing the lifetime cost of running an electric motor, he pointed out that energy cost is about 20 times the purchase cost of the motor. This underlines the need for industries to ensure that they use only EE motors. Mr Dhupar explained that in India, there were no mandatory orders for the use of EE motors till January 2017, when the Department of Industrial Policy & Promotion (DIPP) issued a quality control order stipulating IE2 as the minimum EE performance standard for motors. This order was to become effective in October 2017, but has been deferred till January 2018. ICAI conducts awareness and training workshops on EE for industrial end-users (MSMEs as well as large industries) covering EE motors as well as other equipment/components such as transformers, electric cables, and so on. ICAI also conducts capacity building workshops for energy auditors and consultants, in association with organizations including SIDBI, CII, TERI, EESL, etc. He described two useful tools developed by ICAI for assessing and monitoring the energy usage and efficiency of existing motors: (1) a 'motor energy savings calculator' (which can be downloaded at www.copperindia.org); and (2) an excel-based 'desktop audit' software. He also highlighted the key features of the National Motor Replacement Program, which include: (1) much lower price of EE motors (through high volumes—EESL is targeting 10 million motor replacements in 3 years); (2) easy loans to finance motor replacement (EESL can provide up to 100% hassle-free loans, i.e. without collateral, at special interest rates for EE interventions); (3) flexible terms for repaying loans from the energy savings (the EMI will essentially be about 60% of the monetized energy saved through the use of the EE motors); (4)

assurance of high quality and extended warranty on motors; and (5) value addition support (EESL will support walk-through audits and share best practices; this will extend beyond motors).

Mr Balkar Singh, Asst. General Manager, Punjab Energy Development Agency, summarized the initiatives and activities undertaken by PEDA to promote EE as well as RE in various sectors (industry, residential and commercial buildings, agriculture, etc.) along with some of the achievements and results. In regard to capacity building, he mentioned that PEDA in association with National Institute of Secondary Steel Technology organized two 'Theory-cum-Practice Oriented Training, Skill Up-gradation and Refresher Training' programs on EE for boiler and furnace operators in the Ludhiana and Mandi–Gobindgarh clusters. PEDA also prepared study material on BOP for use by the boiler and furnace operators. Other capacity building interventions by PEDA include the preparation of instructional material and lab manuals for Energy Conservation under the ITI curriculum, as well as for the Diploma Program and ITI Program of the National Institute of Technical Teachers Training and Research, Chandigarh. PEDA has also conducted capacity building workshops for ITI instructors on EE.

Respondents' perspectives

Mr M A Patil, Director, FICCI remarked that in most projects there is a lack of post-demonstration engagement with MSMEs and other stakeholders in what he called 'Phase 4', i.e., the handholding phase that should follow (1) baseline survey, identifying demo units, planning the kind of interventions are required etc.; (2) carrying out the technological interventions; and (3) demonstration of the success stories in a few units. He said most projects end in the third phase, and that this is a primary reason why replications do not happen. He pointed out that adaptation of technology is unit-specific, and thus has to continue with handholding by the project for each additional installation of an EET; this ongoing process requires, in each instance, not only funding support but also the engagement of experts. To illustrate the point, he narrated how three 'good' EETs were demonstrated in the Jamnagar brass foundry cluster under the GEF–UNIDO Program: waste heat recovery (WHR) systems, clean stacks, and clean sheds (i.e., dust-free working environment). The project demonstrated that the dust particles generated by the foundry units could be captured by the use of bag filter systems. Initially, the collected dust was discarded as waste material. However, chemical analysis revealed that the dust contained a significant proportion of metallic oxides, primarily copper oxide and zinc oxide, which on the one hand are very toxic, and on the other, useful raw materials for a range of chemical industries including the fertiliser industry. The project approached a small-scale fertiliser unit in Mehsana, which agreed to buy the dust generated by the demo unit. With this, the expectation was that the savings in energy

costs from the bag filter system, coupled with the earnings from sale of dust, would enable quick payback on the costs of this bag filter system and spur its replication. However, the expected replications did not occur. The project discovered the reason: local fabricators had copied the design of the bag filter system and installed it in about 10–15 units, but in the absence of handholding by the project, they had severely compromised the design parameters in efforts to cut down on costs. As a result, the bag filter systems performed poorly and even failed, as a result of which the technology itself got a bad name in the cluster. FICCI thereupon worked to redesign the installed bag filter systems with the support of the Gujarat government, and succeeded in restoring their performance efficiency to 70–80% of optimal levels, thus paving the way for fresh, optimal quality replications.

Dr A K Asthana, Senior Technical Expert, GIZ referred to his long experience as a trainer and energy auditor to make the point that in engaging with MSMEs, the 'advisory' approach that is adopted (by project personnel) while engaging with large-scale industries is not suitable; the language and approach should be different with MSMEs. To illustrate the point, he cited the aluminium die casting industry, where, typically, the question put to units during an energy audit is: what is the oil consumption per tonne of melting? Units may respond with figures like 130 litres, 110 litres, 90 litres and so on; based on these responses the auditors will conclude that the problem is in combustion. Dr Asthana pointed out that this approach is wrong; because the meaning and significance of EE is different, and must be understood as such, for an MSME whose finished product costs (say) 150,000 rupees and which deploys a crucible of 10 tonnes melting capacity. Instead of trying to ascertain the energy intensity of melting in terms of litres of oil consumed per tonne of melting, we must focus on the extent of burning losses—which can be as high as 3–4% in MSMEs in the absence of temperature controls (compared to less than 1% in large-scale industries). He underlined the point that in almost all the small-scale aluminium die casting units, the crucibles lack temperature controls; and because temperature is a critical parameter in determining the quality of product, the absence of temperature controls not only leads to high burning losses but also results in higher rejections—representing further losses to the unit. By introduction of temperature controls to reduce burning losses by even 1%, a unit melting 10 tonnes daily can achieve savings of about 15,000 rupees daily—far more than could be achieved through any other EET! Dr Asthana also cited the example of rolling mills, where the reduction of scale losses can extend the life of rollers and lead to considerable energy and cost savings because it reduces the down time of the unit. He summed up by stressing that much higher energy and monetary savings can be achieved in MSMEs by enhancing the productivity of the machine, i.e., getting more out of the same machine with the same energy consumption, and by reducing rejection losses. This is the language that MSMEs can understand very well.

Mr Arvinder Singh Chamak, Past President, AIBTMF, voiced deep concern at the future of the Indian brick industry—a largely unorganized MSME sub-sector that provides nearly 35 million jobs. He emphasized that in the absence of a cohesive and comprehensive policy for the brick industry, the commendable EE initiatives undertaken for brick kilns by agencies such as CBRI, PSCST and TERI would be futile. He said that often, uncertainty and confusion results when there are a large number of policies under control of different ministries and departments. He called for a single vision on a single platform for the MSME sector as a whole. He underlined the point that an old and established MSME sub-sector like

the traditional clay-fired brick industry requires a 'cushion' mechanism—comprising supportive policies along with technological, financial and capacity interventions—in order to enable the brick kiln units to adapt to the current-day scenario and remain competitive. He also suggested that EE be included as a subject in the school curricula to enhance awareness on its importance.

Pointers to the way forward

- Training of plant operators on best operating practices (BOP) enables an MSME to achieve significant energy savings at low or no cost.
- Standard Operating Practices (SOP) must be developed and disseminated in local languages using various media including audiovisual.
- Skills training centres such as Industrial Training Institutes (ITIs) should be linked to local MSME clusters, and should focus their curricula and courses primarily on meeting the capacity needs of the local MSME clusters/sub-sectors.
- Replication of EETs often requires technology adaptation for each and every replicating MSME unit. EE interventions must therefore factor in this reality, and ensure that capacity building and handholding continue beyond the initial demonstration(s) of EETs.
- Awareness programs on EE, including best operating practices, must be conducted with the active involvement of the local industry association(s): for, this will enhance the credibility and impact of the programs.
- There is a need to develop vision document for different MSME sub-sectors that also addresses the issue of capacity building of workers, apart from laying out the larger vision of the sector in terms of technologies and products.
- Energy audit services to MSMEs should go beyond the traditional audits and cover other aspects like reducing rejection losses and improving overall productivity.

Valedictory session

VALEDICTORY SESSION

The valedictory session of the Summit was moderated by Dr Ajay Mathur, Director General, TERI. He reiterated the vital role played by the MSME sector in India's economic development, and the consequent importance of improving the productivity of MSMEs through increasing their energy efficiency. Mr Girish Sethi, Senior Director, TERI summarized the outcomes of the deliberations at the Summit on the three thematic areas of finance, technology and capacity.

Mr Rene Van Berkel, UNIDO Representative and Head of Regional Office, emphasized that innovation promises the most exciting results in achieving clean production in the long term. He outlined UNIDO's project titled 'Facility for Low Carbon Technology Deployment' (FLCTD), aimed at production, adoption and scaling up of low carbon innovations. He also announced the first 'challenge' under FLCTD—innovations for WHR—and invited nominations for the same.

Delivering the valedictory address, Mr Ajay Kumar Bhalla, Secretary (Power), Ministry of Power, Government of India appreciated the efforts made by the different stakeholders in promoting EE in India's MSME sector. In his closing remarks, Mr Abhay Bakre, Director General, BEE remarked that the discussions at the Summit had helped in highlighting new issues confronting the MSME sector, as well as pointed to the way forward in addressing these issues.

Resources

ABBREVIATIONS

AEEE	Alliance for an Energy Efficient Economy
AIBTMF	All India Brick & Tile Manufacturers Federation
BOP	Best Operating Practices
BEE	Bureau of Energy Efficiency
CBRI	Central Building Research Institute
CGCRI	Central Glass & Ceramic Research Institute
CFC	Common Facility Centre
CGTMSE	Credit Guarantee Fund Trust for Micro and Small Enterprises
CLCSS	Credit Linked Capital Subsidy Scheme
CII	Confederation of Indian Industry
COINDIA	Coimbatore Industrial Infrastructure Association
CO_2	Carbon dioxide
CREDA	Chhattisgarh State Renewable Energy Development Agency
DIPP	Department of Industrial Policy & Promotion
DSM	Demand Side Management
DPR	Detailed Project Report
4E	End-to-End Energy Efficiency Scheme
GIZ	German Development Agency
DIC	District Industries Centre
DBC	Divided Blast Cupola
EE	Energy efficiency
EET	Energy efficient technology
EESL	Energy Efficiency Services Limited
EMC	Energy Management Centre
EMS	Energy management system
ESCO	Energy Services Company
FI	Financial Institution
FICCI	Federation of Indian Chambers of Commerce and Industry
FISME	Federation of Indian Micro and Small and Medium Enterprises
FLCTD	Facility for Low Carbon Technology Deployment
GCIP	Global Cleantech Innovation Programme
GEF	Global Environment Facility
GoI	Government of India
GDP	Gross Domestic Product
IBA	Indian Banks Association
ICAI	International Copper Association India
IIF	Institute of Indian Foundrymen
IGES	Institute for Global Environmental Strategies
ISC	Institute for Sustainable Communities
ITI	Industrial Training Institute

JICA	Japan International Cooperation Agency
JST	Japanese Science and Technology Agency
LED	Light-emitting diode
LSP	Local Service Provider
MEDA	Maharashtra Energy Development Agency
MSME	Micro Small and Medium Enterprise(s)
MSME-DI	MSME Development Institute
Mtoe	Million tonnes of oil equivalent
MoMSME	Ministry of MSME
MUDRA	Micro Units Development and Refinance Agency
M&V	Monitoring & Verification
NAPS	National Apprenticeship Promotion Scheme
NHB	National Housing Bank
NSDC	National Skill Development Corporation
NITRA	Northern India Textiles Research Association
NMCP	National Manufacturing Competitiveness Program
O&M	Operation & Maintenance
PAT	Perform, Achieve and Trade
PCRA	Petroleum Conservation Research Association
PEDA	Punjab Energy Development Agency
PRSF	Partial Risk Sharing Facility for Energy Efficiency
PSCST	Punjab State Council for Science and Technology
QCI	Quality Council of India
RBI	Reserve Bank of India
R&D	Research and Development
RDD&D	Research, Development, Demonstration, and Dissemination
RE	Renewable energy
RTPA	Rajasthan Textile Processing Association
SEC	Specific energy consumption
SAMEEEKSHA	Small and Medium Enterprises Energy Efficiency Knowledge Sharing
SBI	State Bank of India
SDA	State Designated Agency
SDC	Swiss Agency for Development and Cooperation
SIDBI	Small Industries Development Bank of India
SMILE	SIDBI Make in India Soft Loan Fund for Micro, Small & Medium Enterprises
SOP	Standard Operating Procedures
SSEF	Shakti Sustainable Energy Foundation
TEDA	Tamil Nadu Energy Development Agency
TEQUP	Technology and Quality Upgradation Support to MSMEs
TT	Technology Transfer
TERI	The Energy and Resources Institute
Toe	Tonnes of oil equivalent
TOT	Training of trainer(s)
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
UREDA	Uttarakhand State Renewable Energy Development Agency
USD	United States dollar
VFD	Variable frequency drive
WB	World Bank
WHR	Waste heat recovery

AGENDA

NATIONAL SUMMIT

"Energy Efficiency in Micro, Small and Medium Enterprises (MSMEs)"

31 October– 01 November 2017, Hotel Ashok, Chanakyapuri, New Delhi

Day 1	
10.00 – 10.30	**Registration**
10.30 – 11.30	**Inaugural session** **Welcome address** ▪ Shri Abhay Bakre, Director General, Bureau of Energy Efficiency **Summit theme: setting the scene** ▪ Dr. Ajay Mathur, Director General, The Energy and Resources Institute **Introductory remarks** ▪ Mr. Rene Van Berkel, UNIDO Representative and Head of Regional Office in India ▪ Shri Raj Pal, Economic Advisor & Joint Secretary, Ministry of Power, Government of India **Address by the Ambassador of Switzerland** ▪ Dr. Andreas Baum **Launch of new SAMEEEKSHA web-site** **Inauguration of Energy Management Centres set-up under the UNIDO-BEE-GEF project** **Inaugural address** ▪ Shri Giriraj Singh, Minister of State (I/C), Ministry of Micro, Small and Medium Enterprises, Government of India **Vote of thanks** ▪ Shri Milind Deore, Director, Bureau of Energy Efficiency
11.30 – 12:00	**Tea/Coffee break**
12.00 – 13.00	**Micro, Small and Medium Enterprises: Initiatives of BEE and Ministry of MSME** **Session Moderation**: Mr. Girish Sethi, Senior Director, TERI ▪ Shri Abhay Bakre, Director General, Bureau of Energy Efficiency ▪ Shri Sanjay Bisariya, Joint Development Commissioner, Ministry of Micro, Small and Medium Enterprises
13.00 – 13.15	**Objectives, composition and arrangements for the breakaway sessions**
13.15 – 14.15	**Lunch break**
14.15 - 18.00	***Breakaway sessions***

	The session will focus on mobilizing 'voices from the ground' i.e. industry representatives, office bearers of cluster/national level industry associations, technology suppliers and local consultants. The participants will deliberate on effective policies/ programs, accelerated adoption of EE technologies, improved access to finance and other related issues. The session will provide a platform to entrepreneurs to share their success stories. ***Group-1: Approaches to financing of energy efficiency for MSMEs*** Moderator- Ms. Nisha Menon, Development Environergy Services Limited ▪ Shri K.M. Dharesan Unnithan, Director, Energy Mangement Centre, Kerala ▪ Shri Vinay Adlakha, Dy. Director, Ministry of MSME ▪ Shri Maulik Siyani, Representative IIF (West Region) ***Group-2:*** **Adoption of energy efficient technologies – challenges & opportunities** Moderator- Ms Nisha Jayaram, Counsellor, Confederation of Indian Industry ▪ Shri A Chandra Sekhara Reddy, CEO, Andhra Pradesh State Energy Conservation Mission ▪ Shri V.M. Jha, Dy. Director (I/C), MSME-DI, Agra ▪ Dr. L.K. Sharma, Scientist-in-charge, CGCRI, Khurja ***Group-3:*** **Developing capacities of MSMEs on energy efficiency** Moderator- Dr. Indrajit Bhattacharya, Director, Quality Council of India ▪ Shri Kuppusamy Sellappa, President, COINDIA ▪ Shri Major Singh, Director, MSME-DI, Karnal ▪ Shri Paresh Vadhar, Jamnagar Factory Manager Association The team leaders of each session will prepare a short summary of the discussions in their respective groups. These summary reports will be presented to the chairpersons of the subsequent technical sessions as field realities and inputs from the ground. The three parallel sessions will be moderated by experienced professionals.
18.30 onwards	**Networking dinner**
Day 2	
09.30 – 11.30	**Session 1: *Approaches to financing of energy efficiency for MSMEs*** This session will focus on different financing approaches for energy efficiency that are commonly adopted to improve the energy efficiency of the MSME sector. After background presentations by private and public sector bankers, a panel will deliberate on the different approaches and provide their perspectives on their effectiveness. ***Chairperson:*** Shri Abhay Bakre, Director General, Bureau of Energy Efficiency ***Breakaway session summary***: Team leader of Group-1

09.30 – 11.30	**Background presentations:** Private sector banker's perspective – Mr Chandan Bhavnani, Executive Vice President, Yes Bank ▪ Public sector banker's perspective – Shri Sanjay Goyal, General Manager,SIDBI ▪ Bi-lateral / Multilateral perspective – Mr. Stefan Hediger, Head - Energy Cell, KfW **Respondents:** ▪ Dr. Winfried Damm, Director, GIZ ▪ Shri Sharad Chandra Dugar, Past Chairman, Indian Foundry Association ▪ Shri Atul Gautam, Senior Advisor, Indian Banks Association ▪ Shri S P Garnaik, Chief General Manager, Energy Efficiency Services Limited
11.30 – 12.00	**Tea / coffee break**
12.00 – 13.30	**Session 2: Adoption of energy efficient technologies – challenges & opportunities** The session will deliberate on challenges to adoption of energy efficient technologies (technology availability, technology selection, technology development, technology implementation etc.) with an aim to evolve strategies for up-scaling demonstration and deployment of these technologies. An overview of successful technological interventions will also be provided. The discussants will attempt to focus on process improvements and Research Development, Demonstration & Dissemination (RDD&D) efforts for promoting EETs. ***Chairperson:*** Ms Marylaure Crettaz, Head of Swiss Cooperation Office and Counsellor, SDC ***Breakaway session summary***: Team leader of Group-2 **Background presentations:** ▪ Shri Sanjaya Shrestha, Industrial Development Officer, UNIDO ▪ Shri Anil Bhardwaj, Secretary General, Federation of Indian Micro and Small & Medium Enterprises ▪ Shri Sameer Pandita, Joint Director,Bureau of Energy Efficiency ▪ Shri Niranjan Rao Deevela, National Technology Coordinator, UNIDO ▪ Shri Prosanto Pal, Senior Fellow, The Energy and Resources Institute
	Respondents: ▪ Dr. Rabhi Abdessalem, Senior Policy Researcher & Task Manager, Institute for Global Environmental Strategies (IGES), Japan ▪ Dr. S N Srinivas, Programme Officer (Climate Change), UNDP ▪ Shri Pritpal Singh, Senior Engineer, Punjab State Council for Science and Technology
13.30 – 14.30	**Lunch**

14.30 – 16.30	**Session 3: Developing capacities of MSMEs on energy efficiency** The session will deliberate on building capacities of MSMEs to adopt energy efficiency initiatives. An overview of the key initiatives will be provided. The discussants will focus on challenges being faced by MSMEs in adopting EE initiatives. ***Chairperson:*** Mr. Rene Van Berkel, UNIDO Representative and Head of Regional Office in India ***Breakaway session summary***: Team leader of Group-3 **Background presentations:** ▪ Shri Pradeep Sand, Secretary, Rajasthan Textile Processing Association, Pali ▪ Shri Mr Abhishek Dhupar, Program Manager, International Copper Association (ICAI) ▪ Shri Balkar Singh, Asstt. General Manager, Punjab Energy Development Agency **Respondents:** ▪ Shri M.A. Patil, Director, Federation of Indian Chambers of Commerce & Industry ▪ Dr. A. K. Asthana, Senior Technical Expert, GIZ ▪ Shri Rajiv Chawla, Chairperson, IamSME of India ▪ Shri Arvinder Singh Chamak, Past President, All India Brick & Tile Manufacturers Federation
16.30 – 17.00	**Tea / coffee break**
17.00 –17.30	***Valedictory session***
	Session Moderation: Dr. Ajay Mathur, Director General, The Energy and Resources Institute **Summit summary:** Mr. Girish Sethi, Senior Director, TERI **Launch of First Innovation Challenge under FLCTD project of UNIDO-BEE-GEF** **Special Address** ▪ Mr. Rene Van Berkel, UNIDO Representative and Head of Regional Office in India **Valedictory Address** ▪ Shri Ajay Kumar Bhalla, Secretary (Power), Ministry of Power, Government of India **Open Q & A** **Closing Remarks:** Shri Abhay Bakre, Director General, Bureau of Energy Efficiency

BACKGROUND PAPER

Abstract

The paper intends to set-up the context for deliberations at the National Summit on Energy Efficiency in Micro, Small and Medium Enterprises (MSMEs). The paper provides a brief background of the MSME landscape in India and poses a few relevant questions related to the three key domains of MSME – finance, technology and capacities. These initial set of questions are primarily aimed at stimulating the process of discussion on promoting energy efficiency in the MSME sector in the three break-away sessions on the Day 1 of the Summit. The deliberations in these sessions will feed into the panel discussions scheduled on Day 2. It is expected that the deliberations at the break-away sessions will help in framing out the actionable points that can help MSMEs tackle the challenges on outlined three key domains. The summit output will also assist policy makers in taking informed decisions on policy aspects.

Structure of the paper

To help understand the context and facilitate meaningful discussions, the background paper is divided into three sub-sections.

- MSME Sector in India
- Key Initiatives to promote energy efficiency among MSMEs
- Specific issues related to three selected MSME domains

1.0 MSME Sector in India

The Micro, Small and Medium Enterprises (MSME) sector is a critical component of India's growth story, making significant contributions to GDP, employment and exports. With micro businesses traditionally known as village and cottage industries, Indian MSMEs boast of ancient heritage. The sector plays a crucial role in providing large-scale employment opportunities at relatively low capital cost, and helps in the industrialization of rural and under-developed areas of the country. The sector is a blend of tradition and modern with a significantly high level of informal sector enterprises at the bottom of 'MSME Pyramid'. Since the opening up of Indian economy in the early 1990s, MSMEs have grown in significance, not only due to their continuing contribution to local income growth, job generation and export earnings, but also due to their unique ability to be responsive to changes in market and innovation, whether in the domestic or global spheres. The process of liberalization and global market integration has opened up wide opportunities and introduced new challenges for the sector. While one end of the MSME spectrum comprises highly innovative and high growth enterprises, more than 94 percent of the MSMEs are unregistered, with a large number established in the informal or unorganized sector (Government of India, 2010).

Many MSMEs are complimentary to large industries as ancillary units and the sector contributes significantly to socio-economic development of the country. MSMEs lead

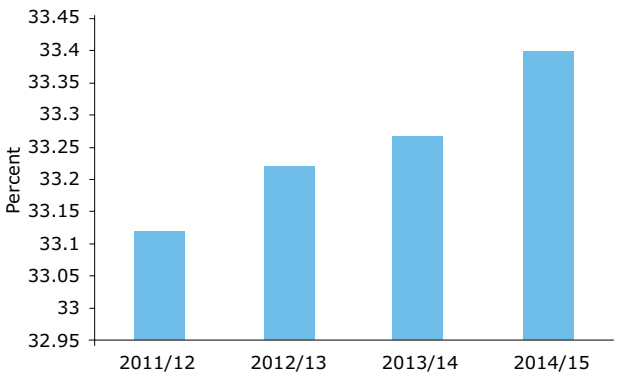


Figure 1.0: MSME share in total manufacturing output

to entrepreneurial development and the diversification of the industrial sector. They also provide depth to the industrial base of the economy. It is estimated that over 51 million MSMEs provide employment to more than 111 million people in the country (MSME, 2017). Indian MSMEs have moved up the value chain from manufacture of simple goods to manufacture of sophisticated products. In line with the overall growth in Indian economy, SMEs have entered the services sector as well. MSMEs are contributing significantly to manufacturing output of the country (Figure 1.0).

It has been recognized that the MSME sector forms the bedrock of Indian entrepreneurship, and needs to be nurtured appropriately. MSMEs have always been one of the focus areas for the government and this has been reflected in the various measures taken, bodies created, and schemes launched for MSMEs in India. The scale of the MSME sector in India is vast, and there are several programs and schemes created by the central government under the Ministry of Micro, Small and Medium Enterprises as well as by other Ministries of the Government of India. Similarly, to cater to the needs of MSMEs, various schemes have been launched by individual states.

1.1 Major issues concerning MSMEs

Despite its prominent position in country's industrialization strategy and its immense potential for employment generation, the MSME sector in India confronts several challenges. They face problems at every stage of their operation, whether it is buying of raw materials, manufacture of products, marketing of goods or raising of finance. Although MSMEs in India is a heterogeneous group, some of the common challenges faced by them are briefly described below:

- *Technological obsolescence*: The MSME sector in India, with some exceptions, is characterized by use of near obsolete technology levels. The technologies currently being used are resource intensive and in many cases polluting in nature.
- *High cost of credit*: Access to adequate and timely credit at a reasonable cost is the most critical problem faced by this sector. The major reason for this has been the high risk perception among the banks about this sector and the high transaction costs for loan appraisal. Further, players in MSME sector are not in a position to provide collateral in order to avail loans from banks and hence do not get easy access to credit.
- *Lack of in-house capacity*: Although India has the advantage of a large pool of human resources, the industry continues to face deficit in manpower with skills set required for manufacturing, marketing, servicing, etc. With globalization, small manufacturing units are facing pressure of factors like innovation, restructuring of operations and problem in achieving production efficiencies. Limited access to global markets: With the liberalization and globalization of the Indian economy, the small enterprises in India are provided with unprecedented opportunities to grow and expand their business. However, their current scale of operation coupled with technological levels and in-house marketing capabilities limit their potential to exploit global markets.
- *Procurement of raw materials at competitive cost*: This is a growing challenge faced by this sector as procurement for raw materials is carried out within local territory due to financial constraints. The scales of procurement are also much smaller as compared to industry at large.
- *Inadequate infrastructure facilities*: To ensure competitiveness of the MSMEs, it is essential that the availability of infrastructure, technology and skilled manpower are in tune with the global trends. MSMEs in the country are either located in industrial estates set up many decades ago or are functioning within urban areas or have come up in an unorganized manner in rural areas. The state of infrastructure, including power, water, roads, etc. in such areas is poor and unreliable in many cases.

A holistic and integrated focus on various facets of MSME operations are of paramount importance to ensure overall growth of the MSME sector in India.

2.0 Key Initiatives to Promote Energy Efficiency among MSMEs

Considering the MSME share in total manufacturing output of the country and their technology levels, it is expected that MSME sector

has a significant share in India's overall industrial energy consumption. MSMEs are generally located in clusters and many of such clusters are highly energy intensive in their operations. Foundry, brick, brass, refractories, forging, food processing, chemicals, ceramics, glass, aluminium, and textiles are examples of sub-sectors where energy costs are a large share of the input costs to the entrepreneur. To reduce input costs, MSMEs need to focus on economizing on energy use. Several studies by national and international agencies have indicated that a potential of 10-20 per cent energy savings exist in many energy-intensive MSME units. However, lack of data on energy consumption in MSMEs and other operational parameters on a national scale limits undertaking focused initiatives on improving their energy efficiency.

The MSME sector is drawing significant interest from various agencies in India and beyond. Efforts for improving the performance of the MSME sector are ongoing. Many programmes on energy efficiency, clean energy, and capacity building in the MSME sector have been initiated. Some of these programs are:

- Ministry of MSME-Technology Centre System Program
- BEE-SME program on energy efficiency and GEF programs in various SME clusters
- TEQUP and CLCSS schemes of Ministry of Micro Small and Medium Enterprises
- TERI-SDC partnership program on energy efficiency in Small and Medium Enterprises
- GEF projects on energy efficiency in Indian MSMEs being executed through World Bank, UNIDO etc.
- Special line of credits for low interest loans for energy efficient projects by JICA, AfD and JICA through SIDBI

A brief highlight of some of these programs has been provided in the following section.

2.1 Ministry of MSME- Technology Centre System Program

Despite a strong potential, India's manufacturing performance has not been encouraging. The share of manufacturing in India's GDP has stagnated at around 16 percent, compared to more than 30 percent (and growing) in some of the other Asian countries. India's manufacturing sector has had to face other challenges, such as low value addition, low productivity, and less-than desirable up scaling. However, there also exist world-class production units that compete in the international market, as observed in the automotive sector. To realize this potential, the Government of India has set the objective of enhancing the share of manufacturing in India's GDP from its current level of 16 to 25 percent and create 100 million additional jobs in the National Manufacturing Policy 2011. MSME sector is expected to play a key role in realizing the National Manufacturing Policy goal. For this, the MSMEs need to become more competitive by acquiring improved technologies and operational skills.

Technology Centre (TCs) - earlier known as Tool Rooms & Technology Development Centres (TDCs), provides both technical support and training to MSMEs. TCs facilitate MSMEs in becoming more competitive by acquiring improved technology (latest and innovative technologies) and providing training to create a pool of easily employable and better skilled workers.

In order to upgrade and expand the network of MSME Technology Centres, a Programme titled "Technology Centre Systems Programme (TCSP)" is being implemented by the Ministry of MSME, Government of India. It is a National Program that seeks to develop the technological and skill base of MSMEs and increase their business opportunities through new market linkages in selected manufacturing industries, through upgrading existing TCs and establishing 15 new TCs. It is planned to locate TCs in various parts of the country to cater to the needs of small and medium firms by improving their access to technologies and providing technical advisory support to entrepreneurs in the given industry cluster they serve. TCs are also expected to serve workers and youth by offering opportunities for hands-on technical training and skill development.

2.2 BEE-SME Program

To encourage adoption of energy efficient technologies and operational practices in SME sectors in India, BEE initiated the energy efficiency interventions in selected 25 SMEs clusters during the 11th Five Year Plan. A study was conducted

to assess energy use and technology gap at unit level in the intervening clusters. Building upon this, cluster specific energy efficiency manuals and detailed project reports (DPRs) on energy efficient technologies were prepared. The program also focused upon the capacity building and knowledge enhancement of work-force involved in SMEs. Presently, implementations of 100 technology demonstration projects in 5 SME sectors [Pali (Textile), Varanasi (Brick), Ludhiana (Forging), Indore (Food) and Kochi (Sea food cluster)] is being undertaken to facilitate large scale replication. Baseline Energy Audits in selected units of all the 5 clusters is complete and best energy efficiency technologies are identified for implementation. Implementation of identified energy efficient technologies and post implementation energy audit has also been completed in 2 units of Varanasi (Brick) cluster, 7 units of Ludhiana (Forging) cluster and 7 units of Indore (Food) cluster.

In addition to the above program, BEE is also implementing a few GEF projects in partnership with UNIDO and World Bank in various MSME clusters in India. Energy Management Centers having state of the art instrument facilities for undertaking energy audits have been set up in these clusters under the UNIDO-GEF program and these will be launched in the MSME Energy Efficiency Summit.

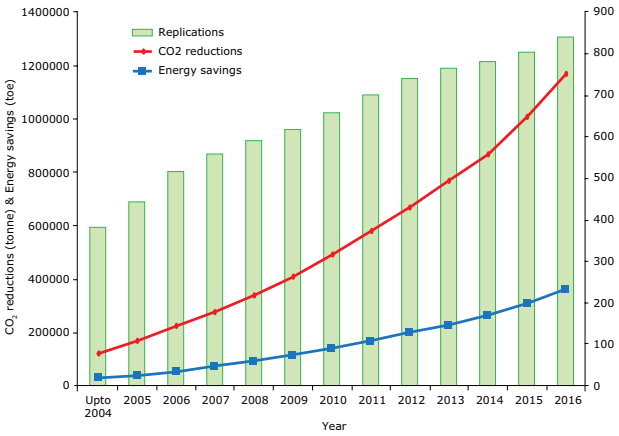
2.3 Ministry of MSME- TEQUP scheme

The Ministry of Micro, Small and Medium Enterprises (MoMSME) launched the scheme 'Technology and Quality Upgradation Support to MSMEs (TEQUP)' during May 2010. The main objective of the scheme is to sensitize MSMEs on energy efficiency, encourage and support adoption of energy efficient technologies in the MSME sector. The scheme also offers financial assistance to MSMEs in acquiring International/ National Product Quality Certification and subsidy for adoption of energy efficient technologies.

2.4 TERI–SDC partnership project

The TERI-SDC interventions was initiated in the year 1994 and focused on energy intensive MSME sub-sectors foundry, glass and brick along with application of biomass gasifier for thermal applications. The intervention focused on development, demonstration and dissemination of cleaner technologies and best practices along with capacity building and knowledge sharing. The TERI-SDC partnership interventions (for the period 1994-2016) in Indian MSME sector (including biomass sector) has resulted in a cumulative estimated energy saving of 310,000 toe (tonne of oil equivalent), which is equivalent to a reduction of about 1 million tonne of CO_2. The current focus of the program is on Howrah and Rajkot foundry clusters.

To strength the knowledge sharing, a platform SAMEEEKSHA—Small and medium Enterprises:



Physical achievement of TEQUP scheme

2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Product Certification reimbursement -120 nos.	Product Certification reimbursement -353 nos.	MSMEs assisted for EETs- 138 nos. Product Certificate Reimbursed – 201 nos.	Product Certification reimbursement -194 nos.	MSMEs assisted for EETs- 56 nos. Product Certificate Reimbursed – 135 nos.	MSMEs assisted for EETs- 105 nos. Product Certificate Reimbursed – 70 nos.

Energy Efficiency Knowledge Sharing—was formed by TERI along with BEE, MoMSME and SDC. A dedicated web-site (http://sameeeksha.org/) has been created that hosts a number of knowledge products such as books, technology related videos, cluster profiles, newsletters etc. The new web-site that also hosts '*MSME Energy map of India'*, a dynamic tool that provides data and insights into a host of energy intensive MSME clusters across the country, will be launched during the MSME Energy Efficiency Summit.

3.0 Specific issues related to three selected MSME Domains

Despite the pivotal role and strategic importance in the context of industrial development and economic growth of the country, the MSME sector experiences numerous constraints and challenges. Several key issues remain to be addressed properly and measures yet to be taken in the interest of sustainable industrial development. The following section highlights the specific issues related to three key selected aspects – finance, technology and capacities, relevant for growth of MSME sector in the country.

3.1 MSME: Finance-related issues

Availability of finance is a key enabler for economic activity and the growth of entrepreneurship. In the MSME context, finance encompasses equity capital, loans for fixed asset investment, and working capital for meeting cash flow gaps. Many of the MSMEs do not prefer to obtain financial assistance through formal banking route. Instead they rely on internal funds, or cash from friends and family, to launch and initially run their enterprises. About half of formal SMEs don't have access to formal credit. The financing gap is even larger when micro and informal enterprises are taken into account. Overall, approximately 70% of all micro, small and medium-sized enterprises (MSMEs) in emerging markets lack access to credit. As per World Bank (2015), globally, the credit gap for formal SMEs is estimated to be US$1.2 trillion; the total credit gap for both formal and informal SMEs is as high as US$2.6 trillion.

The financing of energy efficiency (EE) in the SME sector presents many barriers and challenges to the SME entrepreneurs who wish to adopt EE technologies (EETs) and seek loans to support the adoption process, as well as to the banks and financial institutions (FIs) that have to appraise the EE loan applications and monitor the loans post-sanction. With regard to financing energy efficiency investments, it has been seen that 'easy to implement' energy efficiency investments in the MSME sector are low-cost measures. As a result, the lending amount required for energy efficiency is usually a small amount. However, the transaction costs for energy efficiency financing are high. In reality, the transaction fees, documentation required, risk assessment, manpower, time required, and follow-ups to process small loans for energy efficiency are similar to the requirements for regular large amounts. From the perspective of a banker, energy efficiency financing, i.e. large amounts of small loans, may not appear as lucrative as providing loans for improving production capacity, mechanization etc. Further, many of the bank officials are not equipped to undertake complete assessment of energy efficiency proposals. There is a gap between the requirement of bank and need of MSME.

Developing a supportive eco-system for MSMEs to avail financial assistance from banks is important for developing the market for commercially available energy – efficient technologies. 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.

The committee on financial architecture of MSME sector (2015) has highlighted that equity as a source of financing is underutilized and the prevalence of investment by venture capital and angel investors is low among MSMEs. The

committee has also noted that MSMEs face the problem of delayed payments from their buyers and it adversely impacts their working capital as well as their next cycle of production.

Several policy, regulatory & institutional initiatives have been taken to promote availability of finance to MSMEs. These include, among others, credit support mechanisms administered by government institutions, sourcing from MSMEs and mandating timely payments to MSMEs. Easing access to finance for the MSME sector is critical to job creation, export growth and development of a manufacturing base, as envisaged in the Government of India's "Make in India" initiative.

The Reserve Bank of India in their July 2016 Master direction for lending to MSMEs has mentioned that bank loans to Micro, Small and Medium Enterprises, for both Manufacturing and Service sectors are eligible to be classified under the Priority Sector. As per RBI, advances to MSME sector shall be reckoned in computing achievement under the overall Priority Sector target of 40 percent of Adjusted Net Bank Credit (ANBC) or credit equivalent amount of Off-Balance Sheet Exposure, whichever is higher, as per the extant guidelines on priority sector lending. Below is an initial list of issues/questions that can be deliberated by participants in the Summit:

Finance-related questions

- MSMEs prefers to raise funds, required by them, through savings, or through family or friends, or borrowing from market and only a small portion of MSMEs approach banks to avail financial assistance. How can we improve the overall situation wherein the MSMEs follow formal banking route for their financial needs?
- As a practice, the financial institutes assess the credit-worthiness of MSMEs instead of benefit of energy efficient technology or equipment. In such a scenario, what are your views to enhance credit flow for energy efficient equipment financing?
- How do we address the issue of high overall transaction costs for promoting energy efficiency in MSME sector? Is dedicated energy efficiency financing the right way forward? Should energy efficiency financing be a component of a larger basket of credit to reduce transaction costs and risk?
- What are your specific suggestions on promoting uptake of energy efficient technologies for the government, financial institutions and other international agencies? What kind of innovations can be done to make the financial schemes attractive to MSMEs?
- EESL has been fairly successful in promoting LEDs, ceiling fans and air-conditioners in the residential sector using a bulk procurement model to drive down costs. Do you think similar programs can be launched for MSMEs at the cluster level? If so, what are the challenges that you foresee? How can ESCOs be involved in such programs? Suggest specific business models in this regard.

3.2 MSME: Technology-related issues

It is a well-known fact that many MSMEs operate using energy inefficient technologies. The units typically rely on conventional technologies and shy away from adopting new innovations. Many energy-intensive MSME sectors such as metallurgy, glass, brick and ceramics, food processing, chemicals etc. have not witnessed innovation in their manufacturing practices for years. The high energy prices in India coupled with use of energy-inefficient technologies is adversely affecting the competitiveness of these energy-intensive MSME sectors. It is imperative for these units to reduce their energy costs through the adoption of energy efficient technologies and best operating practices.

In a competitive market-place, adoption of energy efficient technologies by MSMEs will help in reducing energy cost as well as carbon emissions. Different studies by Government and donor agencies have highlighted that there is enormous scope for improving the energy efficiency of MSMEs by upgrading the existing technology level as well as by adopting best operating practices. TERI's experience of working in the MSME sector shows that there is a large variation in the energy consumption levels across different clusters as well as within a cluster. This necessitates designing and promoting cluster-level and unit-level technological solutions. These solutions can bring major improvements in terms of energy savings, environmental improvement and product quality at local level. Unfortunately,

these local level technological solutions are not readily available for MSMEs.

BEE under their SME program (please refer section 2.2) is providing technical as well as financial back-up support for the identified units to adopt energy efficient technologies. The Ministry of MSME in association with SIDBI and other lead national banks is also implementing various schemes aimed towards technology and quality up-gradation (CLCSS, TEQUP) by supporting the sector with capital subsidies. Many state governments have schemes of subsidizing energy audits. Similarly, many bi-lateral and multilateral initiatives are also focusing on improving the energy efficiency of Indian MSME sector. In-spite of all these supportive initiatives, the uptake of EE technologies is still low.

The outmoded and inefficient process technologies being used by MSMES 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 energy efficient technological solutions 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. Therefore, to have an impact in the MSME sector and to improve its energy efficiency, there is a need to focus on Research, Development, Demonstration and Dissemination (RDD&D) of cost-effective technologies in the energy-intensive sectors/ clusters. 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 undertaken for a few energy intensive sectors like glass and foundry has established that RDD&D programs are important for promoting the uptake of EE technologies in traditional MSME sectors in India.

Some of the key questions with regard to the theme of technology are highlighted below:

Technology-related questions

- Demonstration of energy efficient technologies in a few energy-intensive sectors has been done in India. However, their uptake is still low. In many clusters, no such demonstration projects have been undertaken. What are the (non-financial) barriers and how these barriers can be overcome?
- There is a perception among many experts that energy efficient technologies for MSME sector are available but problem lies with availability of finance. Many others feel that technological solutions are not readily available. They need to be developed/ customized to suit specific needs. What are your views?
- Do you think that sufficient R&D and innovation is happening in the country to develop technological solutions that are needed by MSMEs? How the industry-academia interfaces can be strengthened for development of energy efficient technologies? Are there sufficient government or international programs/channels available that can be sourced for developing innovations that are needed at the cluster/sector levels ?
- Role of local service providers is considered very important in promotion of energy efficient technological solutions and best operating practices among MSMEs. What are your views? How can their role be strengthened in clusters?
- MSME sector is widely dispersed and highly fragmented. The energy consumption figures in the sector are not readily available. This acts as a barrier for a technology developing organization/large consultants to understand the scale and market size. What should be done to draw the attention of decision makers to energy savings and carbon reduction potential in energy intensive MSME sectors?

3.3 MSME: Capacity-related issues

Globalization and trade liberalization have ushered in new opportunities as well as challenges for MSMEs. At present only a handful of MSME units are able to identify and exploit these opportunities. One of the key barriers faced by SMEs while adopting new technologies or improving their existing practices is the lack of skilled man-power. It is estimated that only 4.69% of the total workforce in India has undergone formal skill training as compared to 68% in UK, 75% in Germany, 52% in USA, 80% in

Japan and 96% in South Korea (NPSDE, 2015). MSMEs continue to operate with conventional technologies and find it difficult to adopt energy efficient technologies due to non-availability of skilled man-power.

The MSME sector in the country has the potential to shoulder the national economic growth and take advantage from the available opportunities. However, in order to operate at its true capacity, and to leverage the humongous national and international opportunities, one of the important aspects that need to be focused upon is – skill development and training. According to a skill gap study conducted by National Skill Development Corporation (NSDC) over 2010-2014, there is an additional net incremental requirement of 109.73 million skilled manpower by 2022 in twenty four key sectors.

Lack of skilled manpower and information as well as lack of reach to modern technology are key issues affecting the growth of MSME sector. Prime Minister's Task Force on MSME has identified lack of skilled manpower as a road block for the growth of the MSME Sector. It is often said that India enjoys a "demographic dividend" compared to rest of the world due to its huge population in productive age group[1]. Most of the other developed as well as developing countries face the threat of an aging population. If this comparative advantage can be augmented with adequate skill development, India can become the global supplier of quality manpower (MoMSME, 2012).

Although India has the advantage of a large pool of human resources, the industry continues to face deficit in manpower possessing the right skills for manufacturing, service, marketing, etc. There is a need for skilled human resources for competitive enterprises and for aligning skill development and training initiatives with industry requirements. Employment generation along with productivity of labour is crucial in our labour surplus and capital scare economy. However, one of the biggest challenges of skill development in our country is that 93% of the workforce is in informal/unorganised sector. The MSMEs need to be educated and informed of the latest developments taking place globally and helped to acquire skills necessary to keep pace with the global developments. It is very important to empower the MSME sector to utilize the available limited resources (human & economic) in an optimum manner.

Recognizing that skills and knowledge are driving forces of economic growth and social development and the imperative need for skill development in the country, Government of India has taken number of initiatives in this direction. The first National Policy on Skill Development was notified in 2009. In the aftermath of this policy, National Skill Development Corporation (NSDC) was established in 2009 to promote private sector participation via innovative funding models. National Skills Development Agency (NSDA) was created in June 2013. The NSDA has been working with State governments to rejuvenate and synergise skilling efforts in the States. The National Skill Development Policy was superseded in 2015 with the objective to meet the challenge of skilling at scale with speed, standard (quality) and sustainability. Prime Minister's Kaushal Vikas Yojana was launched with the aim to provide skill training to youth and to bridge skill gap through up- skilling/re-skilling. Some of the questions in this domain in the context of this Summit that can be addressed by the participants are given below:

Capacity-related questions

- India is labour surplus country. However, MSMEs find it difficult to get the labour with required skill sets. To address this challenge, what are your views on the strategies that are needed to promote linkages between MSMEs and skill development schemes of Government of India?
- What in your view are the best ways to inculcate knowledge on best operating practices for improving energy efficiency in various equipment/processes used in MSMEs amongst (i) existing workers/operators and (ii) new recruits joining the work force?
- Training of trainer concept has been tried out under some projects. Do you feel this concept can be scaled-up at the cluster level and how?

[1] India is one of the youngest nations in the world with more than 62% of its population in the working age group (15-59 years), and more than 54% of its total population below 25 years of age. Its population pyramid is expected to "bulge" across the 15-59 age group over the next decade. In fact, during the next 20 years the labour force in the industrialized world is expected to decline by 4%, while in India it will increase by 32% (National Policy for Skill Development and Entrepreneurship 2015).

- The Ministry of MSME operates many Technology Centres to provide technical support and training to MSMEs. How could linkages between MSMEs and Technology Centres be strengthened and how can energy efficiency aspects be built into the existing programs and schemes?
- There are various schemes being implemented by National Skill Development Corporation (NSDC), Industrial Training Institutes (ITIs), National Apprenticeship Promotion Scheme (NAPS) etc under the Ministry of Skill Development and Entrepreneurship in partnership with the states. How do you foresee utilising such programs towards promoting energy efficiency concepts in MSMEs? What role can cluster level industry associations' play in this regard?

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SAMEEEKSHA

A PLATFORM FOR KNOWLEDGE SHARING IN THE MSME SECTOR

SAMEEEKSHA is a collaborative platform set up with the aim of pooling knowledge and synergizing the efforts of various organizations and institutions—Indian and international, public and private—that are working towards the development of the MSME sector in India through the promotion and adoption of clean, energy-efficient technologies and practices. SAMEEEKSHA provides a unique forum where MSME entrepreneurs and other cluster-level stakeholders may interface with funding agencies, R&D institutions, technology development specialists, government bodies,training institutes and academia, so as to facilitate cross-learning and increase the efficacy of the energy efficiency initiatives taken in the MSME sector.

The plans and activities of SAMEEEKSHA are administered by a Core Committee comprising the following:

- **Bureau of Energy Efficiency (BEE)**
- **Climate Change and Development Division, Embassy of Switzerland, India**
- **Ministry of MSME, Government of India**
- **The Energy and Resources Institute (TERI)**

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