Factors Influencing the uptake of Energy Efficiency Initiatives by Indian MSMEs

Tirtha Biswas
Karthik Ganesan

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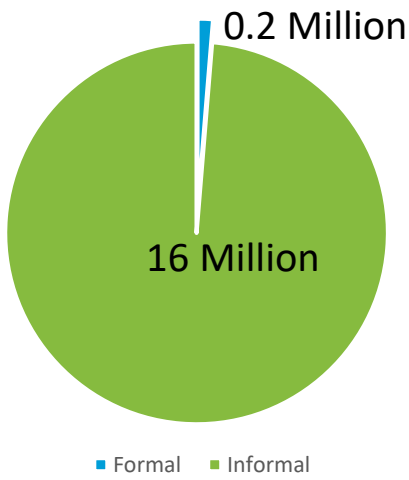
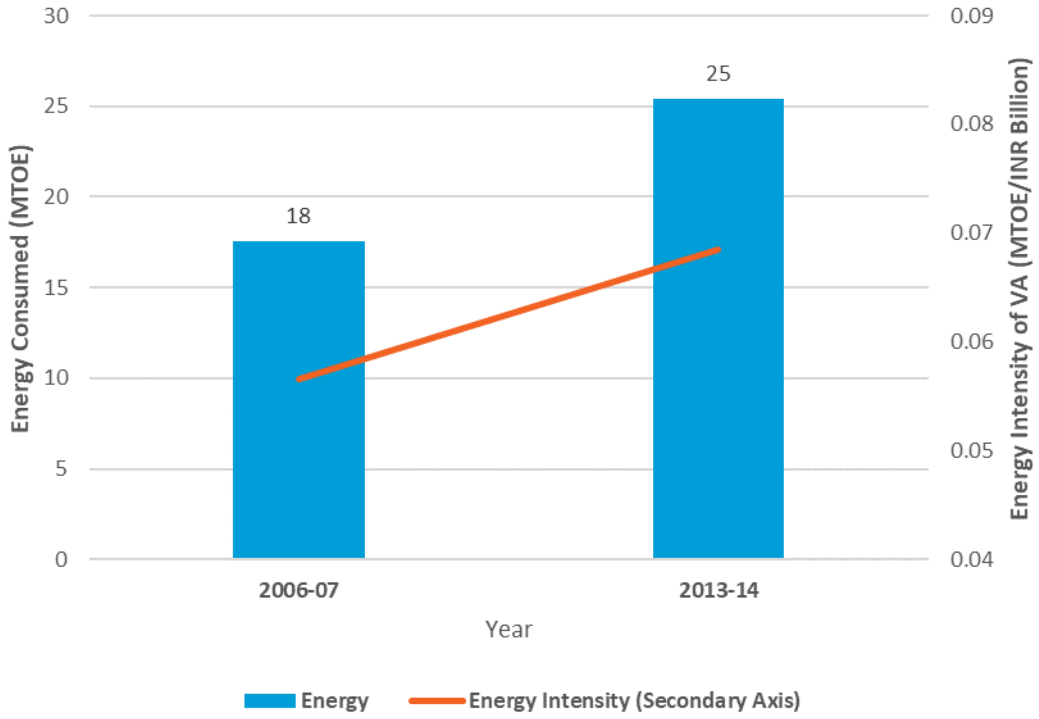
Increasing trend of energy intensity in the MSME sector

- MSMEs contribute to ~ 65% of total formal sector industrial establishments and consume ~ 30% of energy delivered to the sector (ASI)
- MSMEs dominate the informal sector – 38.6 % enterprises don't rely on any power ; 48.2% uses electricity as primary source of energy (MSME 4th Census; NSSO 62nd Round)





No wide-scale uptake of already implemented energy conservation measures

~400 identified energy intensive clusters - only 2 two studies have mapped energy consumption in 96 clusters

~ till date, USD 241 million invested in these clusters (~ 8000 enterprises)

Source: CEEW Analysis

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Low uptake of public schemes/programmes in the sector

Division	12th Plan Outlay	BE During 12th Plan	Actual Expenditure During 12th Plan	Per Cent Unspent Funds
SME	1,535	1,190	886	42 %
ARI	11,705	9,060	7,240	38 %
Office of the DC-MSME	10,884	4,494	3,282	70 %

Low uptake of centrally sponsored energy efficiency schemes and programs - 70% of budget expenditure unspent under TEQUP

- Total unspent funds during XII FYP was higher than annual operating budget of MoMSME

Meagre budgetary support to survey, and research wing of MoMSME

- ~ INR 13 crores allocated for entire XII FYP

States budgetary allocation to village and small scale industries is gradually decreasing

- Gujarat, Maharashtra, and Tamil Nadu spends more on large industries (~ 40:60 ratio)
- Only Karnataka spends more on small scale industries (~ 80:20 ratio)

Source: Report of 280th Parliamentary Standing Committee pertaining to MoMSME

Barriers to Energy Efficiency

Policy: No mandatory rules or regulation to reduce energy and emissions intensity

Market Conditions: Low fuel prices; absence of carbon market; and/or no market recognition from value chain

Awareness: Enterprise do not recognize the need to manage energy. Not aware of where and how they spend energy

Technical: Enterprises are unable to monitor their energy use or/to modify their processes

What are their relative importance from an enterprise owner's perspective?

Source: CEEW Compilation

Understanding your primary stakeholders

Q: What are the important factors influencing the decision of an MSME enterprise owner towards EE investment in India?

A. Presence of Schemes and programmes providing economic benefits

B. Strong demand outlook in short term; market competitors

C. Access to formal financing instruments

D. Having technical know-how of energy monitoring and use of energy efficient appliances

E. Word of mouth from peers and public recognition for outstanding performances

F. Compliances from regulatory and clients

Source: CEEW Compilation

Methodology

- Semi-structured interviews with key members of various industrial associations, key experts from philanthropic institutions
- Semi-structured interviews with various state and central government representatives
- A survey to collect primary data on
  - Operating status of MSMEs
  - Issues identified in initial conversations

Source: CEEW Analysis

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MSME Survey: Cluster Selection and Sampling

A purposive sampling technique was used

Total aggregate energy consumption

Source: Sameeksha Energy Map

Average annual energy intensity of the enterprises within the cluster

Source: Sameeksha Energy Map; BEE-SME Study

Potential for technology upgradation

Source: UNIDO-MoMSME Cluster Map

Number of operational units within the cluster

Source: Sameeksha Energy Map; UNIDO-MoMSME Cluster Map

Access to database on operational enterprises

Source: Cluster Association; DIC Centres; and Online Database (Bargarh and Tirupur)

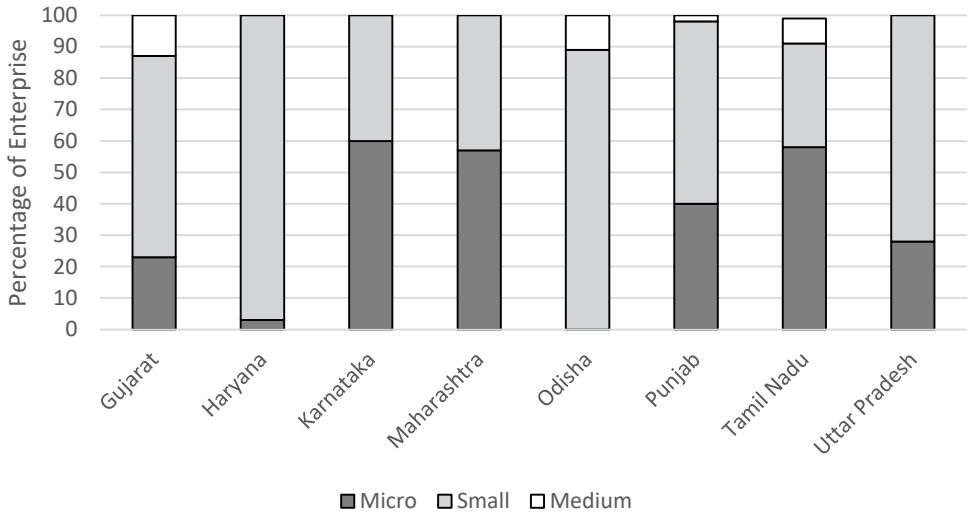
Source: CEEW Analysis

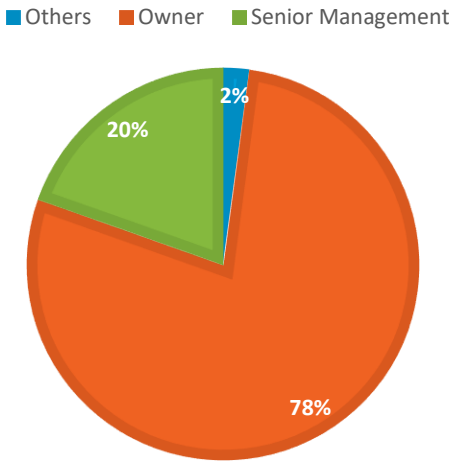
MSME Survey: Sample Characteristics (1/2)

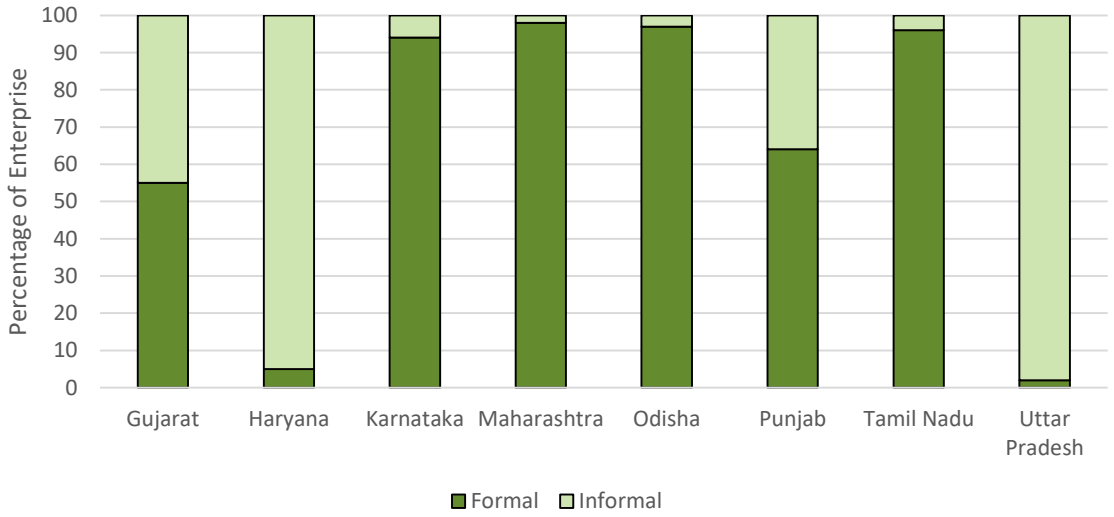
State	District	Cluster Name	Industry Sector	Enterprise Surveyed
Gujarat	Morbi	Morbi ceramics	Glass and ceramics	51
Gujarat	Jamnagar	Jamnagar brass	Foundry and forging	49
Gujarat	Surat	Surat textile	Textile	30
Haryana	Jhajjar, Bahadurgarh	Haryana clay fired brick-making	Brick	39
Karnataka	Belgaum	Belgavi foundry	Foundry and forging	52
Odisha	Bargarh	Bargarh rice mills	Food processing	35
Punjab	Ludhiana	Ludhiana forging	Foundry and forging	50
Tamil Nadu	Tirupur	Tirupur dyeing	Textiles	24
Maharashtra	Nasik	Malegaon textile	Textiles	49
Uttar Pradesh	Varanasi	Varanasi brick	Brick	50

Source: CEEW Analysis

Sample Characteristics - 18% micro, 73% small , and 9% medium







Source: CEEW Analysis

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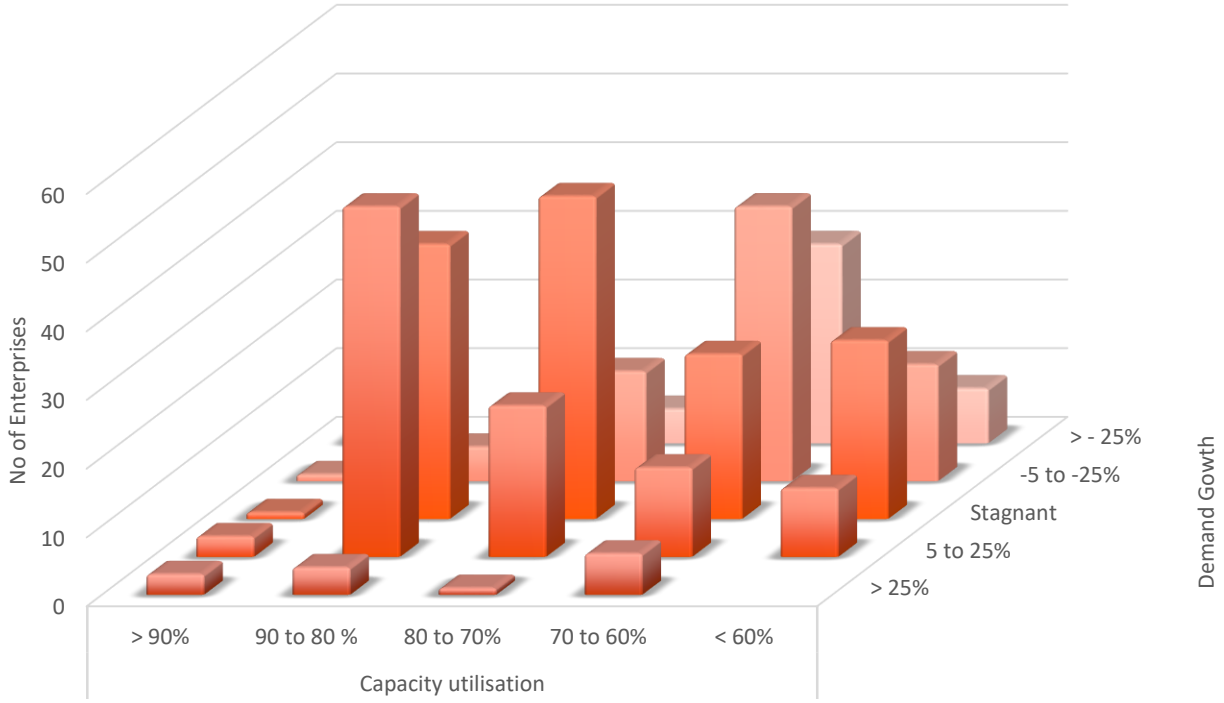
Presence of over-capacity in the sector

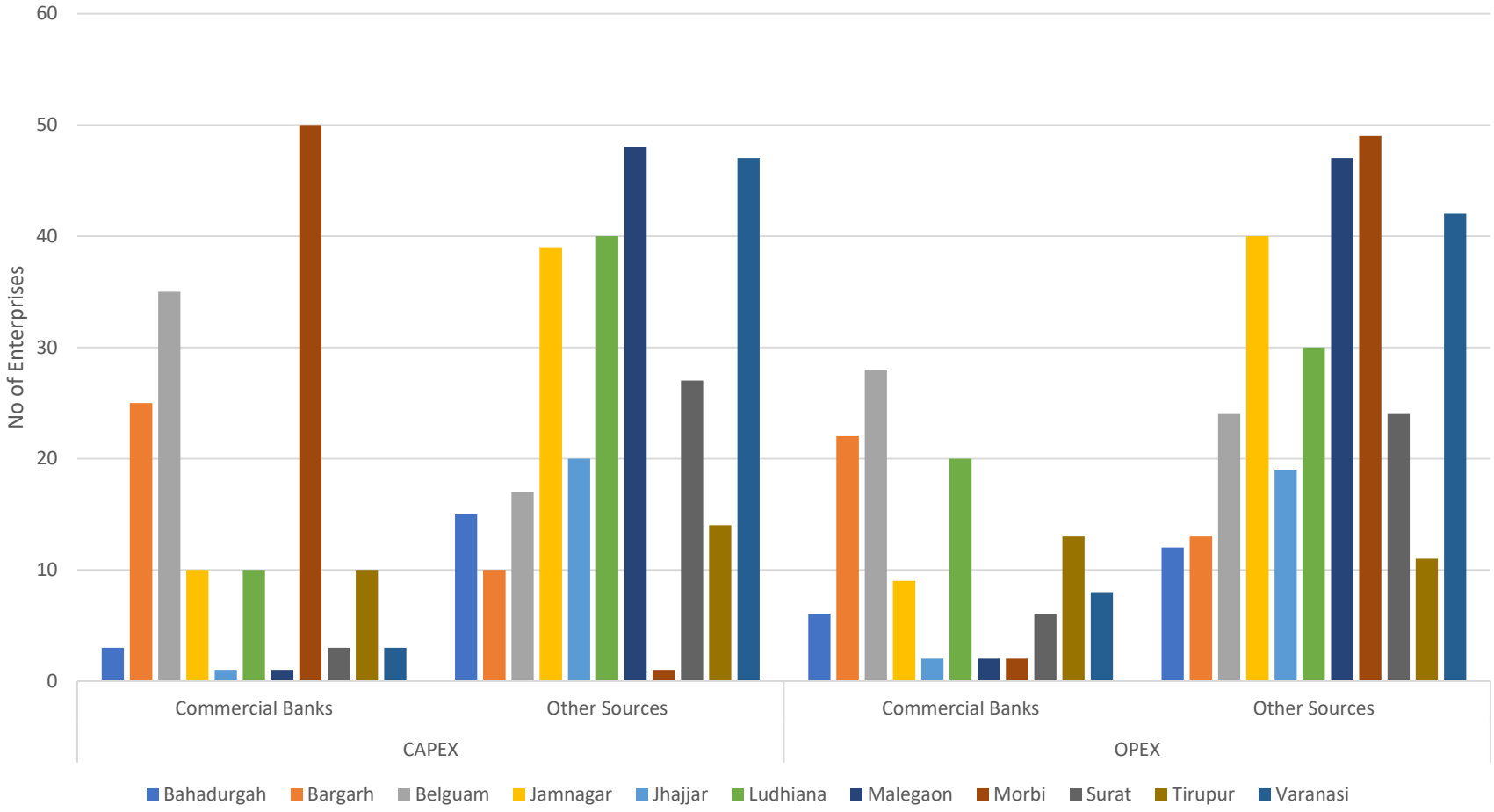
- More than 70% of enterprises reported that the demand for their products is either stagnant or decreasing
- Similarly, the capacity utilisation for these enterprises also stayed below 70%
- Only 2.4% of the enterprises had a capacity utilisation of more than 90%



Source: CEEW Analysis

Majority of the enterprises rely on informal sources/self for funds

- CAPEX: 56% rely on self-financing; 35% took loans from commercial banks
- OPEX: 63% rely on self-financing; 28% took loans from commercial banks



Source: CEEW Analysis

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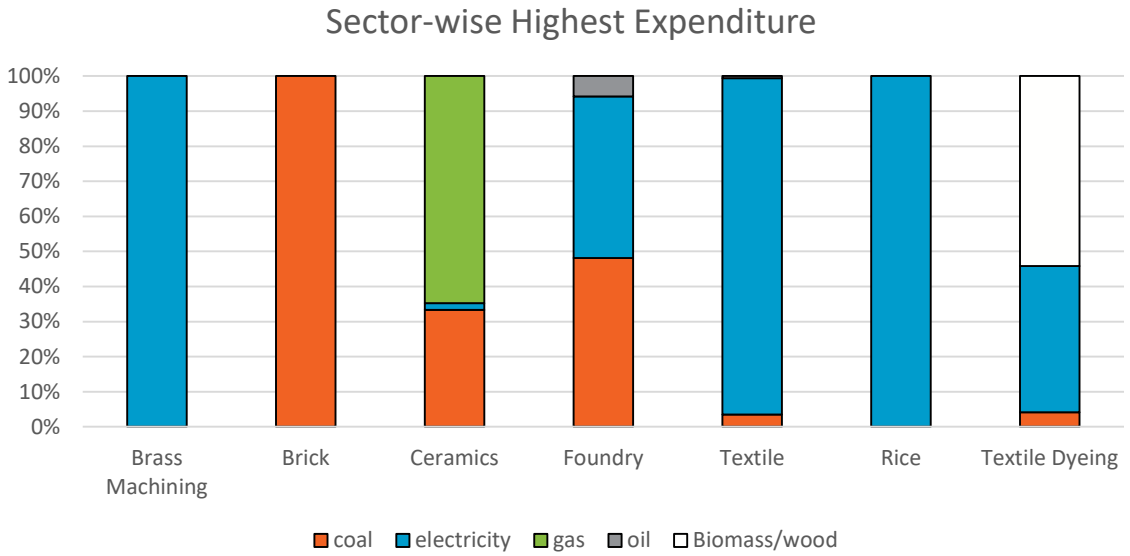
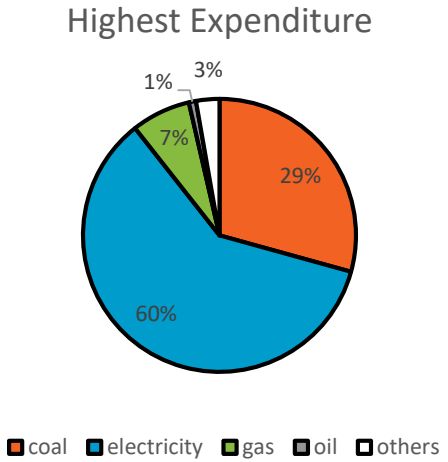
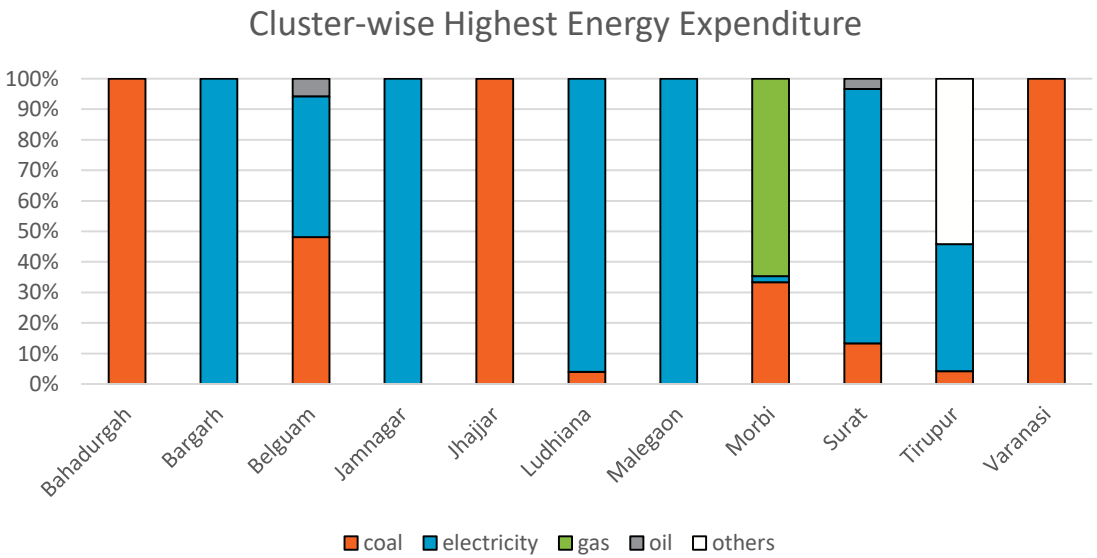
Energy consumption profiles







Source: CEEW Analysis

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Data Analysis - Logistic Regression

Efforts to conserve energy were broadly categorised into three -

- Investments in energy audits
- Investments in energy efficiency equipment/ technology
- Investments in process modifications

Key variables chosen to characterise a unit were -

- Age of the enterprise***
- Primary market competitors***
- Access to formal financing
- Presence of regulatory and client driven compliances
- Drivers for fuel selection – compliance/efficiency
- Relative energy efficiency of the enterprise w.r.t to cluster mean***
- Participation in workshops***
- Awareness on schemes EETs***
- Awareness on TEQUP/Audit subsidies
- Primary source of information on EE decisions***
- Level of energy monitoring***

**** : Significant at 95% confidence intervals*

Source: CEEW Analysis

Results

Variable Name	Odds Ratio		
	Enterprises Conducting Energy Audit	Enterprises Investing In EETs	Enterprises Carrying Out Process Modifications
age of the enterprise	0.4 ***	0.5	0.4 ***
turnover	1.3	1.2	0.7
competition_large industries	2.9 ***	3.5***	1.5
capacity_utilisation	0.9	1.5	1.2
access_formal_finance	1.0	1.6 (CAPEX)	0.6
driver_compliance	0.8	0.6	1.4
driver_fuelefficiency	0.5	0.9	0.7
energy_inefficiency	1.33	0.4 ***	1
eeworkshop	2.2 ***	0.7	0.9
awareness_subsidised_EA	1.0		
awareness_TEQUP		0.7	
awareness_EETs		1.9 ***	
source of information: Other Enterprise	3.4 ***	7.3 ***	1.85**
equipment-level monitoring			5.6 ***

Model 1: $\chi 2 = 59.92$; p ($\chi 2$) = 0.000, n = 429
Model 2: $\chi 2 = 75.59$; p ($\chi 2$) = 0.000, n = 429
Model 3: $\chi 2 = 54.18$; p ($\chi 2$) = 0.000, n = 429
***: Significant at 95 per cent confidence; **: Significant at 90 per cent confidence**

Source: CEEW Analysis

Understanding your primary stakeholders

Q: What are the important factors influencing the decision of an MSME enterprise owner towards EE investment in India?

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B. Strong demand outlook in short term; market competitors

C. Access to formal financing instruments

D. Having technical know-how of energy monitoring and use of energy efficient appliances

E. Word of mouth from peers and public recognition for outstanding performances

F. Compliances from regulatory and clients

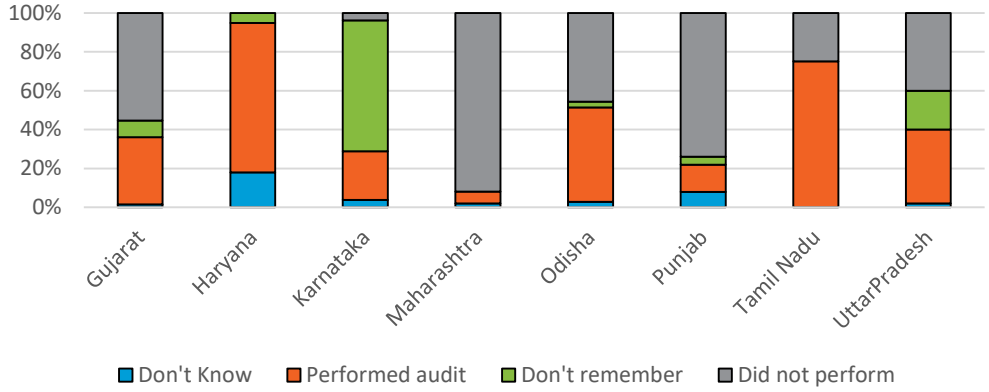
Source: CEEW Compilation

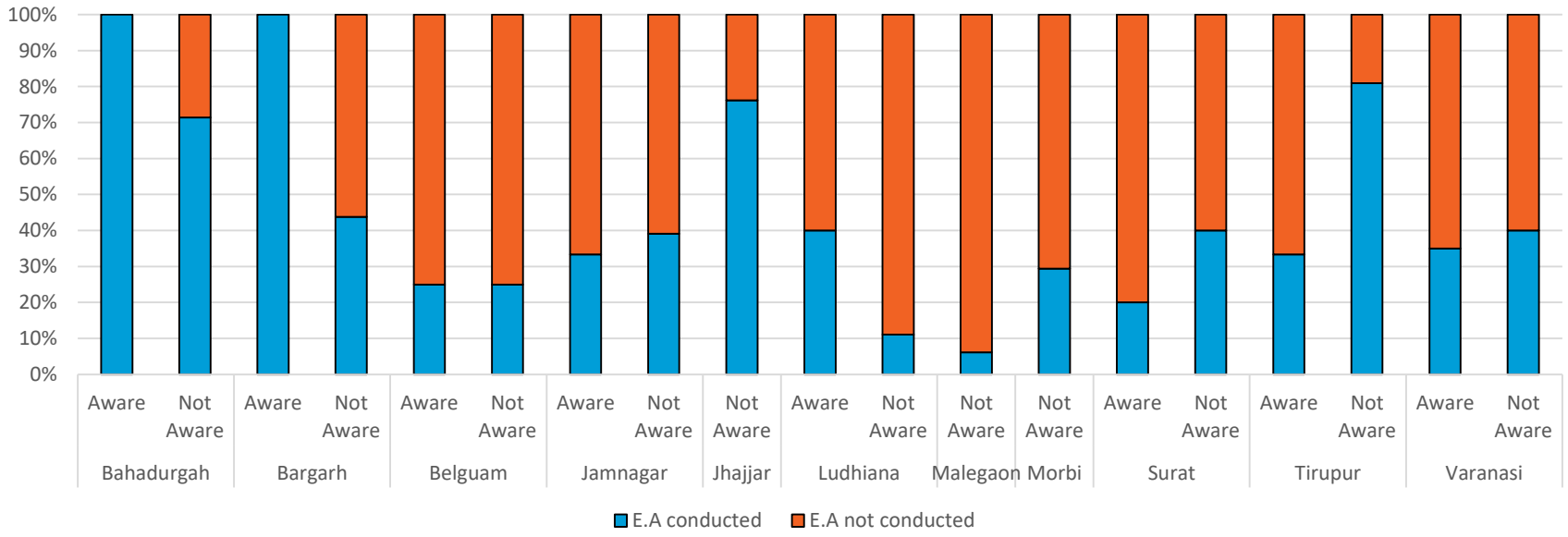
Key Takeaway 1

Units carrying out an energy audit are more likely to have participated in an EE workshop

~ 81% of enterprises never participated in a workshop – citing lack of information as the primary reason

State governments provide subsidies for energy audit from their respective Energy Conservation Fund





Subsidies alone cannot drive the conduct of energy audits

Source: CEEW Analysis

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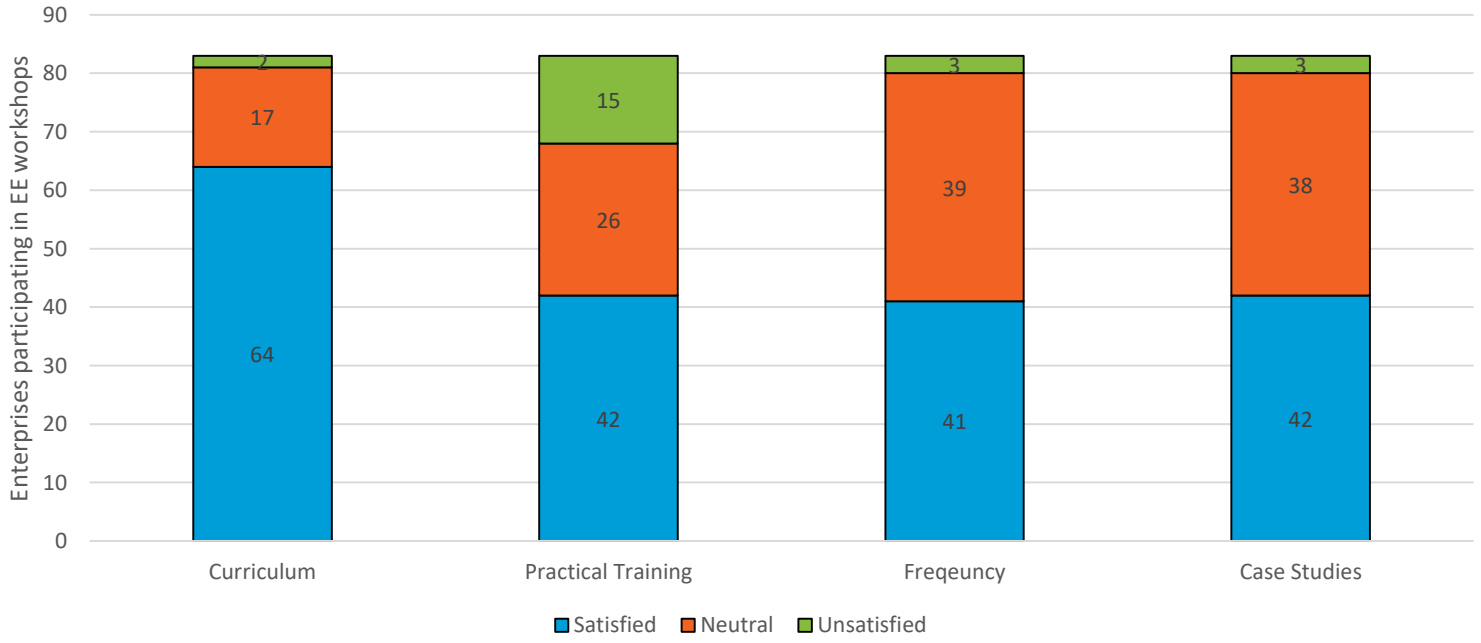
Key Takeaway 2

Peers influence EE investment decisions – the information passed by them increases the odds of investment in EETs by more than 7 fold

Limited awareness and poor perception of gains from EE

- Only 45% enterprises are aware of EETs relevant to their sector
- Poor satisfaction levels (50% - practical training) in energy efficiency workshops
- Absence of data on performance benchmarks of EETs used across varied industrial processes
    - Scepticism amongst the owners
    - Poor appraisal of EE projects



Each cluster must have an EE ambassador who spreads awareness and increases acceptance

Source: CEEW Analysis

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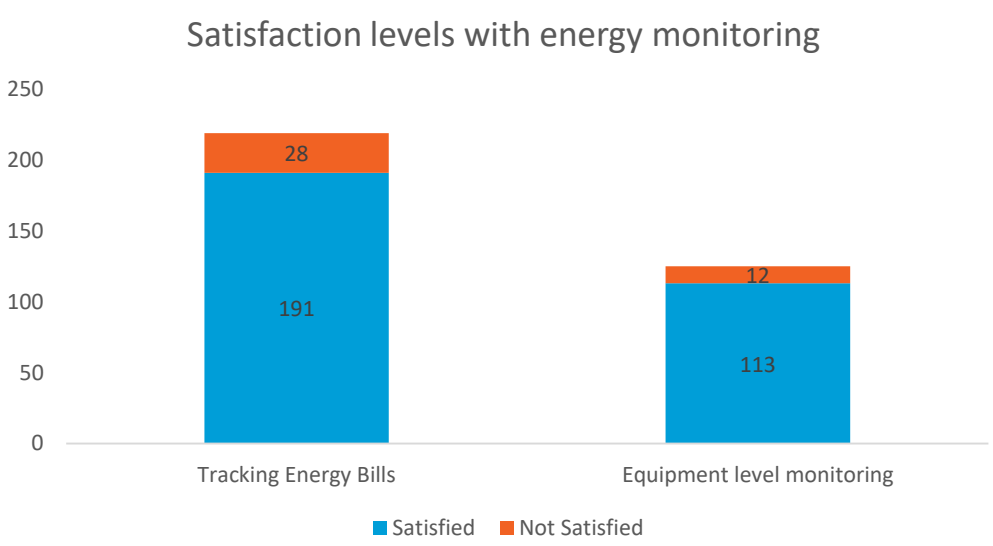
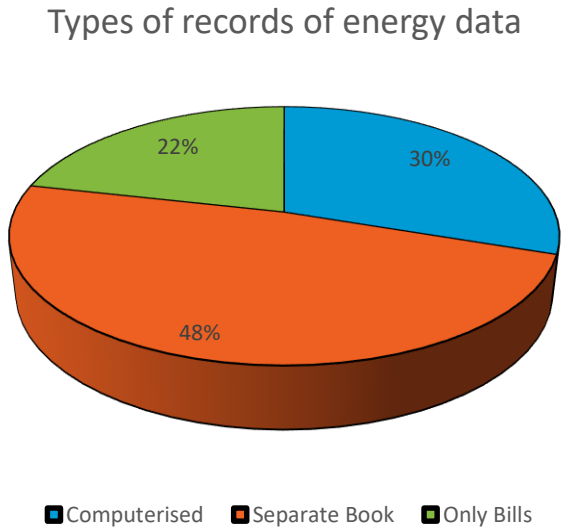
Key Takeaway 3

Precise measurement of energy consumption increases the odds of investments in EETs nearly six fold

Tracking of energy bills is the predominant method to monitor energy

- 56% enterprises only track energy bills; 20% enterprises track energy bills, and carry out equipment level monitoring
- Majority (~80%) of enterprises are satisfied with tracking of energy bills
- 88% of enterprises are recording energy consumption data **(mostly in expenditure terms)**: Potential for creating a nation-wide database of energy consumption in MSME sector





Source: CEEW Analysis

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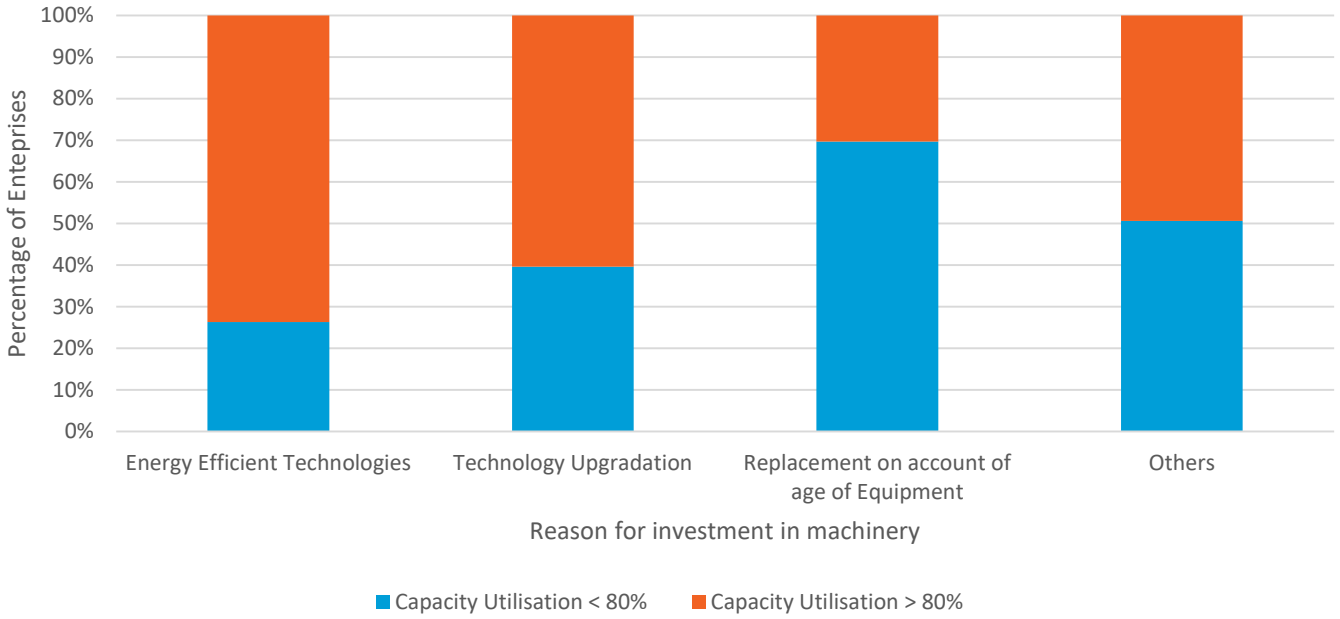
Key Takeaway 4

Units competing with larger enterprises for the market, are more likely to carry out an audit (three fold) and invest in EETs (3.5 fold)

~ 90% enterprises compete with other MSMEs and have low demand for their products

- More than 77% of enterprises reported that the demand for their products is either stagnant or decreasing

- Higher capacity utilisation is more likely to drive investments in energy conservation measures



Targeting energy efficiency in clusters which see high capacity utilisation could result in better adoption

Source: CEEW Analysis

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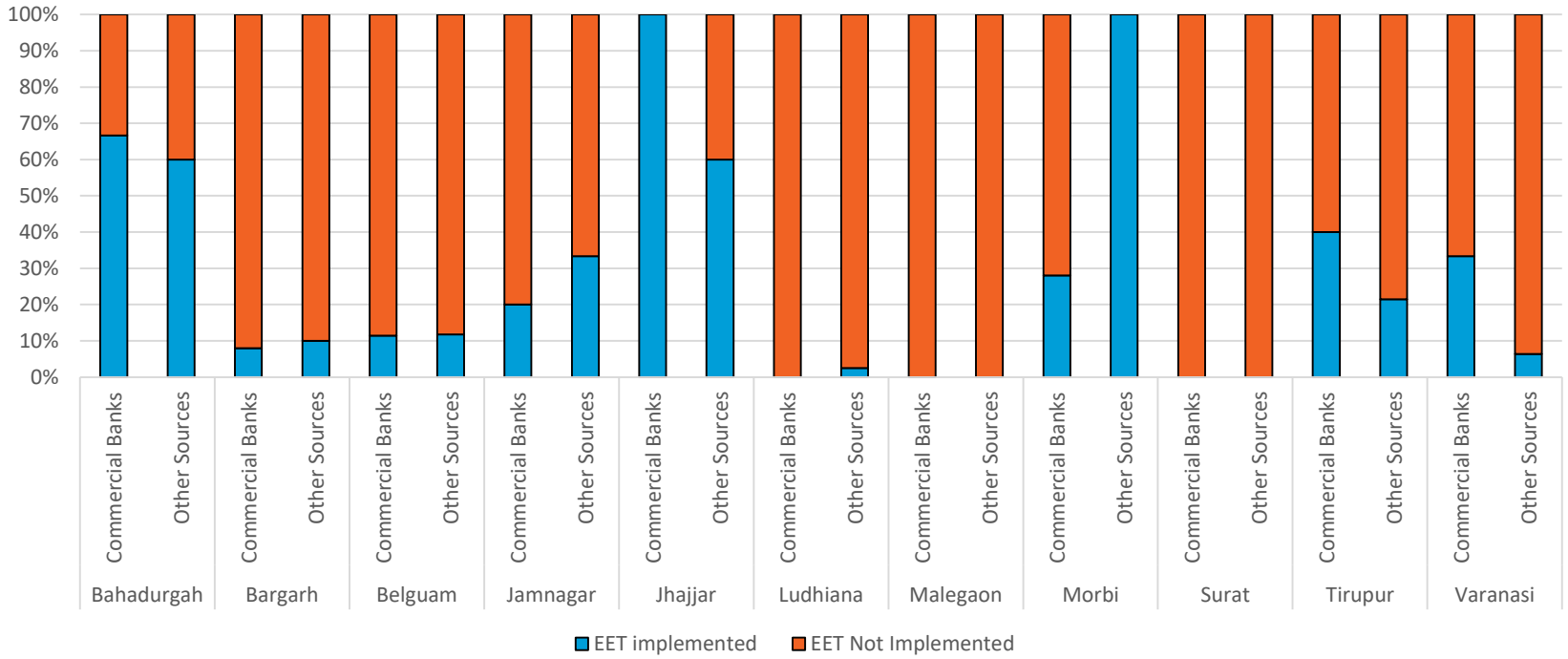
Key Takeaway 5

Access to formal financing instruments does not influence the decision to invest in energy efficiency

Informal sources are equally attractive for financing EE investments



Large share of investment in EE, using formal financing is not sourced as an EE loan

- Only 1% of investments in EE are from funds ear-marked for EE loans

Financial Institutions must be incentivised to create more dedicated products for EE investing and promote those who seek funds for EE investing

Source: CEEW Analysis

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Developing the Roadmap

Recommended measures	Short-term	Medium-term	Long-term	Key stakeholders
Pilot and technology demonstration	▪ Identifying and creating implementing agencies with budgetary support for pilot and technology demonstration ▪ Creating linkages between agencies, TDI/TDC and other R&D labs to act on the feedback from MSMEs and provide relevant technical inputs on EE ▪ Tie up with financial institutions and technology providers for commercially scalable projects	▪ Review of the programme considering the number of projects demonstrated, uptake of such processes and technologies by MSMEs ▪ Creation of an online resource pool of information on performance benchmarks for various technologies across different processes; successful case studies of enterprises implementing EE technologies ▪ Creation of more such bodies or affiliates (not limited to government), at the state level enabling higher outreach to cluster associations and MSMEs	▪ Seamless access to R&D labs/technology support centres for major industrial clusters	MoMSME; DST; SIDBI; Research institutions#
Energy benchmarking for MSMEs	▪ Promote voluntary energy data reporting through MSME Databank by offering soft-incentives ▪ Strengthening of survey, studies and policy-research division of MoMSME in conducting studies to evaluate the performance of the sector with respect to energy use and processes ▪ Enabling co-ordination and resource sharing with MOSPI in establishing best practices in data gathering and validation	▪ Review of voluntary energy data reporting measure and its cost benefit analysis ▪ Mandating energy data reporting to MSME databank ▪ Creation of additional reporting channels through states for wider reach and more effective implementation	▪ Review of the energy consumption data reporting programme ▪ Revising benchmarks so as to reflect the actual state of technology and setting of energy saving targets	MoMSME; MoSPI; BEE
Targeted energy audit programme	▪ Linking energy audits to the availability of support from public funded programmes (interest rate subventions, capital subsidies) to provide a soft-push for energy audits targeting energy intensive manufacturing enterprises having annual turnover above INR 25 crore ▪ Creation of sector specific, standardised energy audit reporting formats	▪ Extending the programme to all enterprises having annual turnover above INR 25 crore ▪ Voluntary energy audits for enterprises having turnover below INR 25 crores ▪ Financial assistance towards implementation of energy audit recommendations with a sunset clause	▪ Assess quality of energy audits, and adopt a mechanism for independent verification of quality of audits and recommendations provided and follow up from audits	MoMSME; BEE; State Ministry of Industries; and State Ministry of Energy/Power
Energy savings targets programme	▪ Adoption of MEPS at equipment level and phasing out of manufacturing of less efficient equipment through regulations ▪ Clubbing energy efficient equipment loans with existing CAPEX loans taken by the MSMEs. Thus, reducing the additional transaction costs associated with smaller energy efficiency loans	▪ Roll out of energy savings targets programme in energy intensive processes and clusters as identified through energy benchmarking programme ▪ Mandating disclosure of energy consumption across the vendor chain for large companies towards "Greening the Supply Chain" initiative ▪ Creation of a savings trading platform linking ESCerts from PAT and ESCerts from MSMEs ▪ Allowing clubbing of smaller savings credits between different MSMEs to enable registry of such saving certificates easily and effectively thereby reducing registry costs	▪ Review of effectiveness of the programme for effective implementation and setting of targets for immediately next target period	MoMSME; BEE; SIDBI
Addressing risks associated with financing of EE in MSMEs	▪ Capacity building of financial institutions in evaluating EE investment proposals ▪ Supporting public sector banks to adopt innovative mechanisms (by leveraging utility payment mechanisms, GST filings etc.) to evaluate the credit worthiness of an enterprise ▪ Regulatory framework to enable partnership between fintech companies and traditional financing institutions	▪ Innovative financial instruments allowing aggregation of small ticket size loans	▪ Assess impact of lending to MSME on asset quality of FIs. Identifying vulnerable sectors with risky exposure and create safeguards for lenders	MoF; BEE
Institutional reforms	▪ Creation of linkages between State Designated Agencies, MSME-DI and DIC ▪ Increasing levels of funding to be commensurate to the goals described in Centre and State government schemes ▪ Capacity building of DIC officials for Energy Efficiency in MSME with a focus on technical up-skilling		▪ Review and overhaul (as necessitated) of the effectiveness of these linkages in programme implementation	MoMSME; State Ministry of Industries; and State Ministry of Energy/Power
Creating awareness and training on energy efficiency and energy monitoring	▪ Increase in budgetary allocation for EE workshops for MSMEs towards wider outreach in the sector ▪ Setting of targets/KRAs/KPIs for bodies consulting such trainings and workshops ▪ Use of ICTs for effective implementation of such workshops ▪ Review of EE workshop and training programmes			MoMSME; BEE; State Ministry of Industries; and State Ministry of Energy/Power

Source: CEEW Analysis

Identifying the objectives (1/2)

Creation of dedicated pilots and technology demonstration platform

- Initial budgetary support to create an institutional arrangement consisting of – technology developers, key research agencies, and financial institutions
- Targeting commercially scalable projects for subsequent revenue generation
- Creation of performance benchmarks for various technologies across the prevalent industrial processes – better appraisal of EE proposals/projects

Benchmarking energy consumption in the sector

- Absence of energy consumption baseline – lack of access to energy records, non-standardised energy audit reports
- Strengthening the survey and research capability of the ministry
- Creation of suitable mechanisms for triangulation of data using ASI, NSSO, GST filings, environmental compliance statements etc.
- Encouraging voluntary disclosures of energy consumption by the enterprises
- Developing database on sector specific SECs through targeted energy audit programs
  - 1st phase – Medium and small enterprises having annual turnover more than INR 25 crores
  - 2nd Phase – Remaining medium and small enterprises

Source: CEEW Analysis

Identifying the objectives (2/2)

Market mechanisms to drive down SECs of the sector

- Adoption of MEPS – motors, pumps, blowers, compressors
- Extending PAT to the vendor MSMEs– '*greening the supply chain initiative*'
- Growth of fintech companies and potential improvement of access to finance - the missing middle
  - clubbing existing EE loans with technology upgradation loans
  - Regulatory support towards penetration of fintech services
  - Instruments allowing aggregation of smaller ticket sized loans

Institutional reforms towards efficient program implementation

- Review and overhaul of program implementation linkages – INR 241 crores was allocated towards developing linkages for PMEGP program
- Increase in budgetary allocation for EE workshops for MSMEs towards wider outreach in the sector
- Setting of targets/KRAs/KPIs for bodies consulting such trainings and workshops

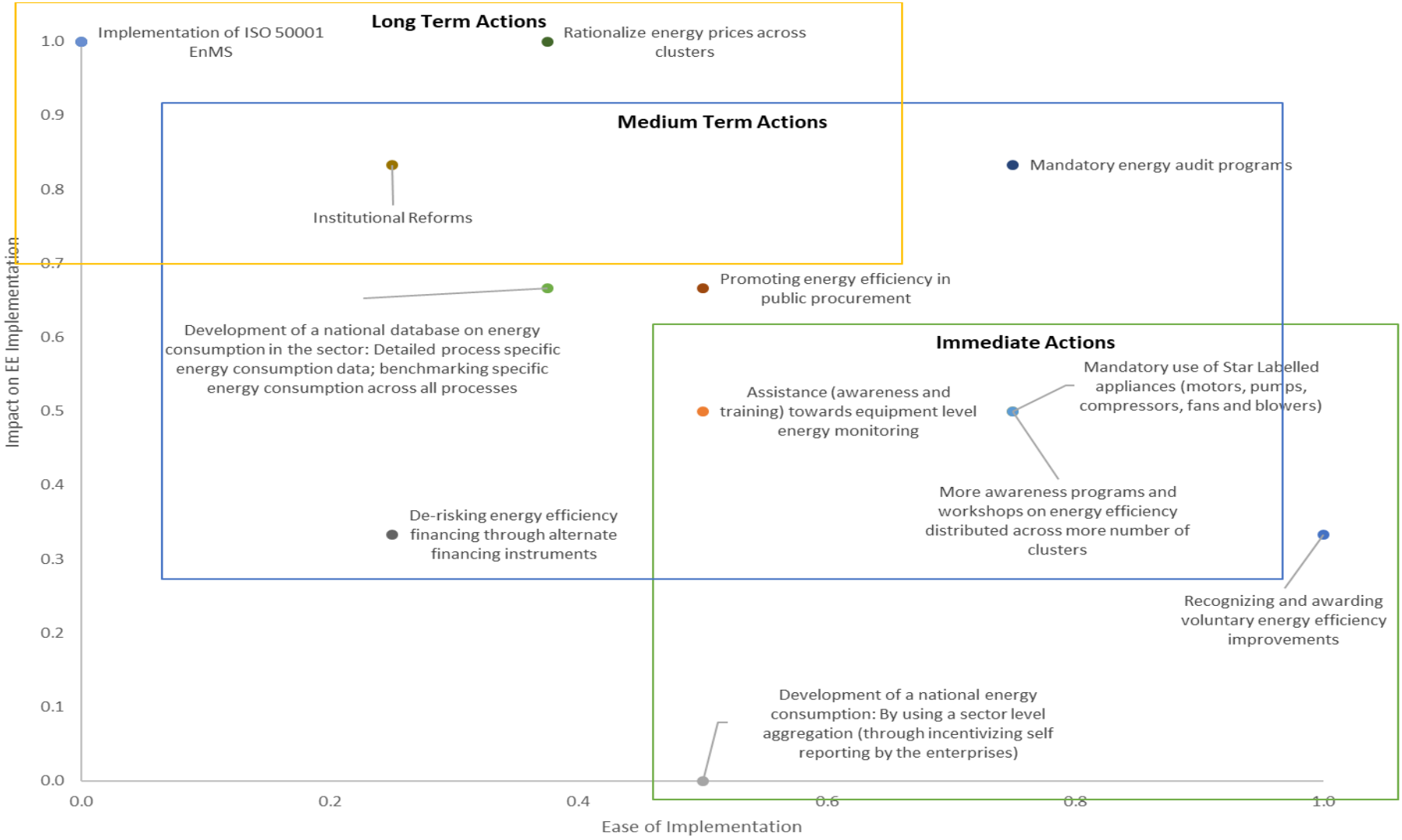
Source: CEEW Analysis

Identifying the key implementing agencies

Recommended Measures	Key implementing agencies
Institutional Reforms	MoMSME; State Ministry of Industries; and State Ministry of Energy/Power
Pilot and Technology Demonstration	MoMSME; DST; SIDBI; Research institutions[#]
Energy Benchmarking for MSMEs	MoMSME; MoSPI; BEE
Targeted Energy Audit Programme	MoMSME; BEE; State Ministry of Industries; and State Ministry of Energy/Power
Energy Savings Targets Programme	MoMSME; BEE; SIDBI
Creating Awareness and training on Energy Efficiency and Energy monitoring	MoMSME; BEE; State Ministry of Industries; and State Ministry of Energy/Power
Addressing risks associated with financing of EE in MSMEs	MoF; BEE

Source: CEEW Analysis

The action plan



Source: CEEW Analysis

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