Market Assessment for Partial Risk Guarantee Fund for Energy Efficiency & Venture Capital Fund for Energy Efficiency

May 2016

BUREAU OF ENERGY EFFICIENCY
(Ministry of Power, Government of India)

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ENERGY IS LIFE
BEE
CONSERVE IT
ऊर्जा दक्षता ब्यूरो
(भारत सरकार, विद्युतमंत्रालय)
BUREAU OF ENERGY EFFICIENCY
(Government of India, Ministry of Power)

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FOREWORD

COP21 agreement has set forth the strategy for India to meet the challenge of delivering concrete and measurable results to meet the Intended Nationally Determined Contribution (INDC). This shift towards greener economic model requires sustainable business models, innovative & cost effective technology, mechanisms & best practices for low carbon, resilient, sustainable development models.

In India, there is still immense potential to be realized from large scale implementation of energy efficiency interventions. Energy efficiency market has been estimated to be very huge, out of which only a fraction has been tapped by ESCOs so far. The ESCO industry in India is relatively small and young compared with those in other nations and has so far not been able to succeed in developing a vibrant market for energy saving performance contract projects through ESCO route.

The concept of Energy Service Companies (ESCOs) is being promoted through a number of policy initiatives in order to address barriers relating to institutionalizing energy efficiency services, and of promoting energy efficiency delivery mechanisms. The Partial Risk Guarantee Fund for Energy Efficiency and Venture Capital Fund for Energy Efficiency proposed by BEE, under National Mission for Enhanced Energy Efficiency (NMEEE), are expected to provide a boost to the opportunities for energy efficiency projects in the country. ESCOs provide a business model through which the energy-savings potential in existing facilities can be captured, and the risks faced by facility owners can be addressed through performance-contract based payments for energy savings achieved.

The report on "Market Assessment for Partial Risk Guarantee Fund for Energy Efficiency & Venture Capital Fund for Energy Efficiency" has been prepared under the USAID PACE-D TA Program as one of the key documents that would support the Government of India's initiative for financing energy efficiency and also explores the potential of ESCO market in India.

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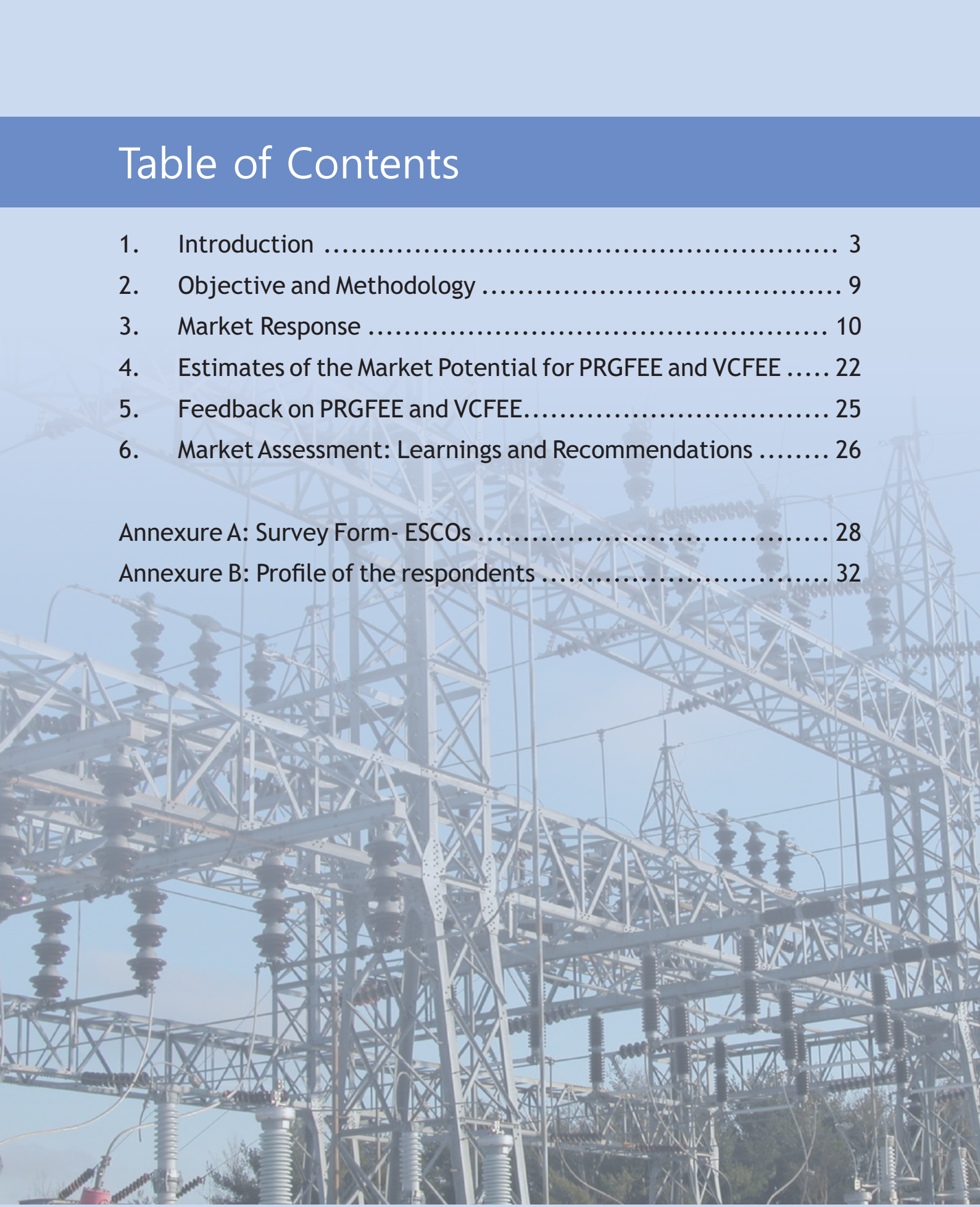

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ACRONYMS

Acronym	Definition
ADB	Asian Development Bank
AEEE	Alliance for an Energy Efficient Economy
BEE	Bureau of Energy Efficiency
CARE	Credit Analysis And Research Ltd
CHP	Combined Heat and Power
CRISIL	Credit Rating Information Services of India Limited
DC	Designated Consumers
DPR	Detailed Project Report
DSM	Demand Side Management
EA	Energy Auditor
EC Act	Energy Conservation Act, 2001
EE	Energy Efficiency
EEFP	Energy Efficiency Financing Platform
EESL	Energy Efficiency Services Limited
EOI	Expression of Interest
EPC	Energy Performance Contract
ESCOs	Energy Service Companies
FEEED	Framework for Energy Efficient Economic Development
GHG	Greenhouse Gases
GOI	Government of India
HVAC	Heating Ventilation and Air-conditioning
ICRA	Investment Credit Rating Agency
IREDA	Indian Renewable Energy Development Agency Limited
M&V	Measurement and Verification
MOP	Ministry of Power
MW	Mega Watts
NAPCC	National Action Plan on Climate Change
NMEEE	National Mission for Enhanced Energy Efficiency
O&M	Operations and Maintenance
PAT	Perform, Achieve and Trade
PFI	Participating Financing Institutions
PRGFEE	Partial Risk Guarantee Fund for Energy Efficiency

PRSF	Partial Risk Sharing Facility
RFP	Request for Proposal
SMEs	Small and Medium Enterprises
USAID	United States Agency for International Development
VCFEE	Venture Capital Fund for Energy Efficiency

EXECUTIVE SUMMARY

In India, the market for Energy Service Companies (ESCOs) is faced with barriers and challenges that have severely hampered the capacity of ESCOs to effectively tap into the vast energy efficiency (EE) potential. This has curbed the growth of young and emerging enterprises as well as mature and developed ESCOs. Some of the issues can be addressed at the project level. These include lack of a mutually agreeable dispute resolution mechanism and credible measurement and verification (M&V) tools to build confidence with clients. The main deterrent to tapping the EE potential market, as cited by the companies surveyed, is the lack of long-term financing from commercial lenders with financing terms that improve the financial attractiveness of the projects. This is a grave concern for small and medium-sized ESCOs as they have very little financial backing and support despite their technical competency.

In recognition of the existing EE potential in the country, the Government of India (GOI) has planned to launch two financial instruments: the Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE) and Venture Capital for Energy Efficiency (VCFEE). These instruments are designed to increase access to EE financing across the country. Broadly speaking, the PRGFEE is a risk sharing mechanism that provides commercial banks with a partial coverage of risks involved in extending loans for EE projects. The VCFEE, on the other hand, is designed to leverage private venture investments in the EE sector by identifying possible co-investment opportunities.

Objective

This study was carried out with the broad objective of assisting the Bureau of Energy Efficiency (BEE) and other relevant Indian policy makers to increase the market opportunities for ESCOs and to provide inputs to the existing fiscal instruments - PRGFEE and VCFEE. The study was carried out as a part of the ongoing initiatives in the area of EE finance under the USAID Partnership to Advance Clean Energy-Deployment Technical Assistance (PACE-D TA) Program.

The market study was primarily designed to identify a potential pipeline of EE projects that would help estimate the demand for BEE's two financing instruments. A pipeline of projects was collated based on the data supplied by ESCOs. The secondary objective of the survey was to identify potential issues that ESCOs see as constraining the growth of the industry.

Methodology

The market assessment was carried out through a survey of ESCOs who provided their perspective and insight into the financing situation for their ongoing and future projects.

The Program prepared a survey questionnaire and the study findings were derived mainly through data collected from the extensive survey which was carried out through emails along with one-to-one interviews with the ESCOs.

Market characteristics

The key findings of the market survey are:

- The lighting sector seems to be promising prospect for ESCOs, especially in commercial buildings and street lighting.
- The opportunities in the industrial sector have been steadily increasing, while the focus still remains on commercial buildings as the primary target market.
- Most of the projects are observed to be smaller in size, mostly in the category of less than INR 1 crore. This trend is expected to continue in the future as well.
- ESCOs response to the need for external financing was found to be lukewarm; only 10 percent had applied for financing in the past. But the need for attractive external funding has been raised by many ESCOs for projects in the future.
- The ESCOs preferred to seek debt financing over equity financing.

Conclusions and recommendations

The survey questionnaires were sent to all 137 empanelled ESCOs. Responses were received after intensive follow-up from 55 ESCOs. It was also found that 25-30 ESCOs had either closed operations or were new to the sector.

The results of the present study have indicated several broad trends and they confirm that the potential for ESCO business is immense in India in the coming years. This finding is further confirmed when compared with findings from past studies on the Indian ESCO market. Key recommendations based on this study include:

- The major beneficiaries of the schemes are expected to be Grade 3, 4, 5 ESCOs due to their small size, lack of collaterals, or provisions to provide bank guarantees.
- It must be ensured that the benefits of the guarantee support provided by the GOI to the participating institutions percolate down to the ESCOs.
- Provision of low-interest rate loans for EE projects would facilitate greater EE investments.
- Commercial banks require specific techno-commercial expertise on EE to develop appraisal procedures.
- Keeping in mind the needs and characteristics of the small and medium sized enterprises (SME) industry in India, the schemes must accommodate smaller value engineering procurement construction (EPC) projects (less than INR 1 crore).
- The PRGFEE and VCFEE should have a stand-alone component to help financial institutions (FIs) to understand technical intricacies of the project and ESCOs to develop financial cash-flow models to secure loans and ensure timely paybacks.
- Projects must document M&V plans and systems as a risk mitigation tool for its success.

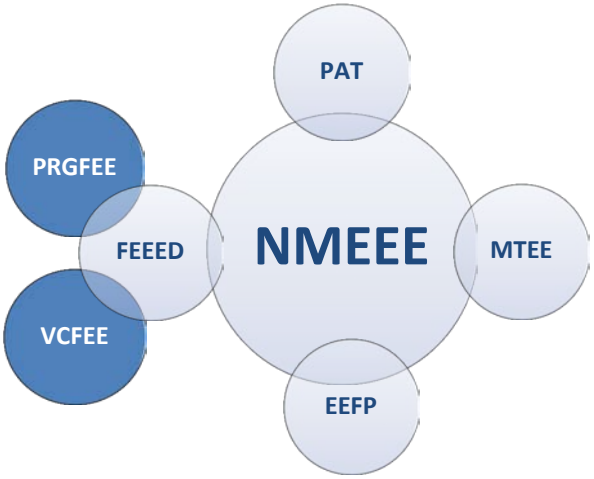
The survey estimates that there is a potential pipeline of 337 projects valued at INR 1,936 crore over the period 2014-16. The results are from the 55 responses received and the actual market pipeline would be significantly larger based on the number of ESCOs empanelled.

Considering the results of the market assessment, it is recommended that priority be given to the quick roll-out of the schemes, so that projects can capitalize on their benefits.

1. Introduction

National Mission for Enhanced Energy Efficiency (NMEEE) has been envisaged to foster innovative and sustainable business models in the EE sector. It is one of the eight national missions under the National Action Plan on Climate Change (NAPCC)[1] announced by the GOI in June 2008[2]. The implementation framework of the NMEEE, which seeks to strengthen the market for EE by establishing an enabling regulatory and policy regime, was approved in June 2010.

Figure 1: Elements of NMEEE



One of the key elements of the NMEEE is Framework for Energy Efficient Economic Development (FEEED) which focuses on developing fiscal instruments to promote EE financing.

FEEED is designed to provide comfort to lenders with the provision of a risk guarantee for performance contracts through PRGFEE and VCFEE. The initial capital is from government funds and can be supplemented with contributions from other sources.

The other elements of FEEED include guidelines for procurement of energy efficient appliances and services by public authorities, and to enhance EE measures at the utility level to enable utilities to undertake Demand Side Management (DSM).

1.1. Partial Risk Guarantee Fund for Energy Efficiency

The PRGFEE is a risk-sharing mechanism to provide commercial banks with a partial coverage of risk involved in extending loans for energy efficiency projects. The GOI has approved INR 312 crore for PRGFEE[3].

The guarantee provided by the fund will directly support financing of EE projects by:

[1] Press release on 24 June, 2010. Available at: http://pib.nic.in/newsite/erelease.aspx?relid=62791
[2] Draft mission document: NMEEE, 2008
[3] Brochure on PRGFEE, prepared by BEE with support from USAID-PACE D TA

- Addressing the risks and barriers faced and/or perceived by FIs to finance ESCOs for implementing energy savings performance contracts -based EE projects in India.
- Engaging participating financial institutions (PFIs) and building their capacity to finance EE projects on a commercially sustainable basis.
- Engaging commercial FIs and building their capacity to finance EE projects on a commercially sustainable basis.

Table 1: PRGFEE eligibility and guarantee

Eligibility
• Seek to achieve demonstrable energy savings and mitigation in emissions of greenhouse gases (GHG).
• Propose a viable method to monitor and verify energy and GHG emission savings.
• Must be a new project, not refinancing existing projects or any outstanding obligations of the eligible borrower.
• Use viable technology and be developed with competent energy audit/feasibility studies.
• Project must be implemented by BEE empanelled ESCOs on performance contracting mode.
Guarantee available
• PFI will take guarantee from the PRGFEE before disbursement of loan to the borrower.
• Guarantee will not exceed INR 300 lakhs per project or 50 percent of loan amount, whichever is less.
• Cover the first loss subject to maximum of 10 percent of the total guaranteed amount.
• Cover the remaining default (outstanding principal) amount on an equal basis up to the maximum guaranteed amount.
• Maximum tenure of the guarantee will be five years from the date of issue of the guarantee.
• Eligible projects under the PRGFEE, for which the PFI can apply for a guarantee, could be credit facilities extended by PFI to ESCO for EE projects.
• Guarantee available for government buildings, municipalities, SMEs, industries and private buildings (having commercial or multi-storey residential accommodation).

1.2. Venture Capital Fund for Energy Efficiency

VCFEE aims to provide equity capital for EE projects. A single investment by the fund shall not exceed INR 2 crore. The fund shall provide last mile equity support to specific EE projects, limited to a maximum of 15 percent of total equity required, through a special purpose vehicle (SPV) or INR 2 crore, whichever is less. The support under VCFEE is limited to Government buildings, private buildings having commercial or multi-storey residential accommodations, and municipalities. GOI has approved around INR 210 crore for VCFEE.

The fund will be registered with the Securities and Exchange Board of India under its Alternative Investment Funds Regulation, 2012. BEE will select a public FI as a 'fund manager' for management of the funds under VCFEE and the fund manager will be primarily responsible for making investment on behalf of VCFEE. The fund manager will present the quarterly progress reports to the Board of Trustees.

1.2.1 Key features of VCFEE

- The fund will invest only in the form of equity.
- A single investment by the fund shall not exceed INR 2 crore.
- The fund shall provide last mile equity support to specific EE projects, limited to a maximum of 15 percent of total equity required, through SPV or INR 2 crore, whichever is less.
- The total life of the fund will be 10 years from the date of commencement.

1.2.2 Sectors in the mandate of VCFEE

- Government buildings.
- Private buildings having commercial or multi-storey residential accommodations,
- Municipalities.

A consortium of REC Power Distribution Company Limited-REC-Energy Efficiency Services Limited (EESL) has been appointed as the Implementing Agency for PRGFEE. For VCFEE, the VCFEE Trust was registered on July 7, 2015 to monitor the activities of the fund.

1.3. Overview: ESCO market in India

The BEE defines an ESCO as an organization engaged in a performance-based contracting with a client firm to implement measures which reduce energy consumption and costs in a technically and financially viable manner[4].

In 2007, an exercise for expanding the number of existing ESCOs through an open invitation and evaluation process was taken up by BEE, whereby 37 ESCOs were rated with support from BEE. The rating exercise was done through three credit rating agencies - CARE, CRISIL and ICRA. These agencies would remain empanelled with BEE for a two-year period, at the end of which a fresh accreditation from CARE, CRISIL or ICRA would be again required[5].

The exercise of empanelment was carried out in terms of success in implementation of EE projects, ability of technical man-power, and financial strength to invest in such projects. The methodology involved an assessment of business risk (track record and market position), organizational setup and financial capability of the organization on a 5 point grading scale. In short, “an ESCO grade would reflect CARE/CRISIL/ICRA’s opinion on the ability of the graded energy service company to undertake EE projects” in India.

1.3.1 Growth of the ESCO industry

The first few ESCOs in India date back to the early 1990s, initiated in large by funding from USAID which included training workshops held by energy specialists from the U.S. along

[4] Definition adapted from the press release: an announcement made from organizations to register as an energy service company.
[5] Adapted from http://bee-dsm.in/Docs%5CAccreditedESCOs.pdf

with an ESCO feasibility study.

BEE initiated the empanelment of ESCOs in 2008 and has empanelled 129 ESCOs as of 2015. The growth is expected to continue as there remains immense untapped investment potential and several new entrants are making their way into the industry.

1.3.2 Benefits of ESCO empanelment

In order to create a sense of credibility amongst the prospective agencies that are likely to secure the services of an ESCO as well as the FIs, BEE has undertaken a process of rating the ESCOs in terms of success in implementation of EE projects based on performance contracting, availability of technical manpower, financial strength, etc. BEE empanelled ESCOs are eligible to participate in the tenders offered by state designated agencies to implement EE projects in the states. Empanelled ESCOs are likely to have higher credibility since they are eligible to avail guarantee schemes such as Partial Risk Sharing Facility (PRSF), PRGFEE, etc.

1.3.3. Unlisted ESCOs

In India, ESCOs are required to be empaneled with BEE to be a part of BEE's efforts to promote energy conservation measures as well as bid for energy savings projects in the central, state government and municipal sector.

It is observed that many companies, consulting organizations or equipment manufacturers provide EE solutions on a performance contract basis to a diverse set of clients. However, these companies are not listed with BEE as an ESCO and much of their work remains unnoticed.

Many new entrants are keen to participate in the BEE's empanelment process, but fall short of the eligibility requirements due to lack of experience.

1.4. Present challenges to the ESCO business in India

ESCOs provide attractive options for companies willing to undertake EE projects. However, in the Indian context, ESCOs have not been able to tap into this potential and deliver savings to the companies.

The absence of a sizable number of EPC success stories implemented through the normal project development route, long lead times for project development, lack of awareness of EPC on the part of customers and financiers, lack of objective and credible M&V tools which build confidence in client relationships, lack of mutually agreed-upon mechanisms for dispute resolution, and demonstration of solution design and project management expertise on the part of ESCOs are identified as key constraints[6]. Furthermore, the absence of strong policy support, mandatory energy reduction targets[7] and financial or tax

[6] India manual for the development of municipal energy efficiency projects (2008)
[7] Mandatory targets are set only for the designated consumers under PAT scheme

incentives, and favorable legal framework and financing terms have constituted major barriers and dampened the enthusiasm of both mature and emerging ESCO companies.

The limited revenue of the smaller and medium-sized ESCOs has pushed them to rely on FIs or investors to cover the investment costs. The financing communities still view the funding of ESCO projects as a high risk prospect. This perception arises mainly from a lack of confidence in the technical analysis and recommendations of an energy audit. This has led to a vicious cycle of non-execution of EE projects.

However, contrary to general perception, ESCOs in India have been successful in implementing a large number of meaningful projects in EE over the years. These projects have led to an estimated energy savings as high as 30 percent above original consumption levels. Most of these projects have been undertaken by the private sector in urban areas.

1.4.1 ESCO Business: technology streams and sectors

Energy services provide a wide spectrum of energy solutions and develop expertise over a set of technologies. The technologies may vary from simple lighting systems to more complex combined heat and power (CHP) systems. An illustrative list of the technologies is given in Table 2 and this information has been gathered from various sources[8].

Table 2: Common EE technology streams

Technologies	Sector
Lighting - high efficiency	Building, Industry
Lighting - control	Building, Industry
Building energy management system	Building, Industry
Management system	Industry
Boiler – controls	Industry
Power management - output voltage (VO), power factor correction (PFC)	Building, Industry
Boiler - high efficiency unit	Industry
Building fabric - glazing, insulation, materials	Building, Industry
Motors and drives	Industry
Cooling and air conditioning	Building, Industry
High speed hand dryers	Building, Industry
Heating ventilation and air conditioning (HVAC)	Building, Industry
Heat exchangers	Building, Industry
Combined heat and power	Building, Industry
Energy recovery	Building, Industry
Heat pump - air source	Building, Industry
Refrigeration - controls	Building, Industry
Refrigeration - high efficiency unit	Building, Industry
Refrigeration - optimization	Building, Industry
Heat Pumps - ground source	Building, Industry
Radiant and warm heaters	Building, Industry
Industrial process engineering	Industry
Other (mix type of loads, transformer loss reduction)	Building, Industry

[8] This list has been developed from a review of various audit reports and list of technologies. For more information, visit: http://www.sidbi.in/sites/default/files/products/Annexure%20D%281%29%20ESEL%207.5.pdf

ESCO projects are gaining popularity due to the rising cost of energy and the availability of efficiency technologies in lighting, heating, ventilation and air conditioning (HVAC), and building energy management. However, not all ESCOs have the required bandwidth and expertise to take on projects over various technologies – variable frequency drives (VFDs), chillers, lighting, pumping, energy management systems and tend to specialize in niche areas. The Indian ESCO industry can be broadly segmented into industrial, commercial, agricultural and government customers. The main growth drivers for the ESCO industry are rising energy costs, prompting the enterprises to improve their cost-effectiveness.

2. Objective and Methodology

The objective of this assignment was to identify the pipeline of projects for PRGFEE and VCFEE, based on the data supplied by ESCOs, and to identify potential issues that ESCOs see as constraining the growth of the industry. Through this assignment, Alliance for an Energy Efficient Economy (AEEE) also solicited feedback on the financing barriers faced by ESCOs in implementing EE projects.

Information was collected through a survey of all empanelled ESCOs. Taking into account the market survey response, the estimate of the potential market for the uptake of the PRGFEE and VCFEEE was undertaken. The market assessment was carried out with a broader objective of assisting BEE and other relevant Indian policymakers to make use of the study to develop existing fiscal instruments.

2.1. Methodology

The market assessment study findings were derived mainly from primary research by conducting an extensive survey of the ESCOs along with one-to-one interviews. In view of the timelines, the market assessment was also supplemented through secondary research, analysis of papers, publications and technical articles to the ESCO market dynamics.

The survey questionnaire was drafted by PACE-D TA Program with assistance from BEE and tested with few ESCOs and consultants who had affiliations with ESCOs. The design of the questionnaire was kept simple to enable the respondents to fill it with ease.

Questionnaires, developed jointly by BEE and PACE-D TA Program, were circulated to the 137 empanelled ESCOs[9] in 2014. However, as of 2015, there are 129 ESCOs empanelled with BEE. The brochures giving information about these schemes were also provided to the ESCOs for a better understanding of the schemes and potential benefits.

2.2. Who responded to the survey?

Of the 137 ESCOs canvassed, 55 ESCOs took part in the survey[10]. Thus 51 percent of the active ESCOs (excluding non- operational and closed) responded to the survey.

The findings summarize the responses gathered from 55 ESCOs and their type of operations. Further details on any projects undertaken in the preceding two years in the area of EE, and/or any efforts made to avail of financing, were also requested. As such, the survey provides a snapshot of ESCOs financing requirements for the future.

[9] List of 137 ESCOs accredited with BEE in previous cycle. List of 94 ESCOs empanelled with BEE with validity till March 2017 https://beeindia.gov.in/content/escos-0
http://www.beeindia.in/schemes/documents/ecbc/Listofesco.pdf

[10] AEEE interactions with the ESCOs indicated that 25-30 companies were new to this sector or had closed operations.

3. Market Response

This section summarizes the responses from various ESCOs. The survey was carried out at a national level across various categories of ESCOs.

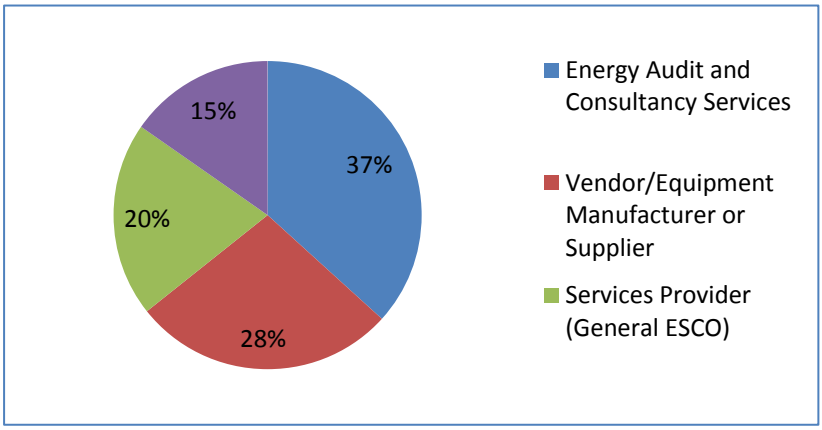
3.1. Business characteristics

ESCOs can be categorized as energy audit and consultancy service companies, vendors, equipment manufacturers or suppliers, and general ESCOs. The two commonly accepted classifications of ESCOs are vendor-driven ESCOs (these use their own technologies or products for implementation of energy improvement measures), and general ESCOs (these may be product-neutral). The majority of ESCOs surveyed offered at least two or more of the services mentioned above. A breakdown by type of operation is given in Figure 2.

3.1.1. Type of operations

It can be seen from Figure 2, that 37 percent of the companies provided energy audit and consultancy services. The equipment manufacturers and service providers (general ESCOs) comprised of 28 percent and 20 percent respectively. Other type of operations undertaken accounted for 15 percent of the total and included operations such as real time analytics for EE, and turn-key solution providers among others. ESCOs also provide a combination of the operations as package services[11].

Figure 2: Type of operations

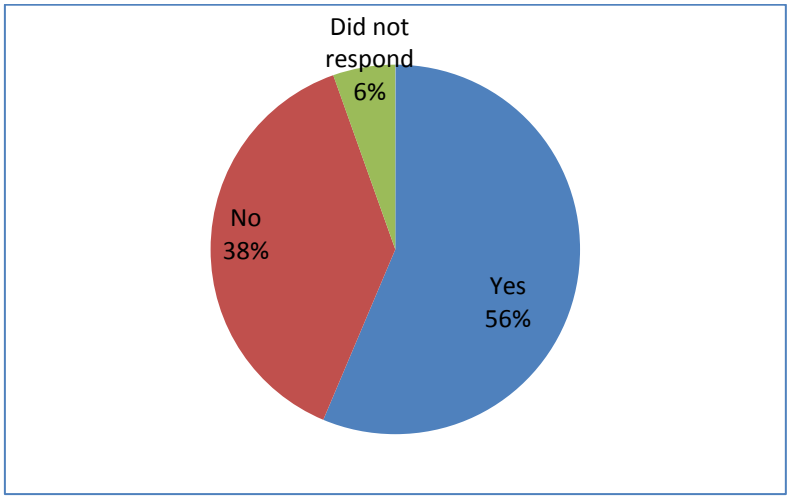


3.1.2. EPC projects

According to the information gathered from the respondents (Figure 3), more than half of all respondents (56 percent) had previous experience in EPC projects; 38 percent of the respondents did not have any previous experience in EPC projects.

[11] Survey results indicated that 17 ESCOs provide services such as energy audit and equipment supply; 3 ESCOs provide energy audit and other services; 3 ESCOs provide equipment supply and services.

Figure 3: Previous experience in EPC projects



To better understand their business and experience in EPC projects, the Program conducted interviews to analyze business plans and expectations**.** There were several reasons for ESCOs choosing not to participate in EPC projects in the last few years:

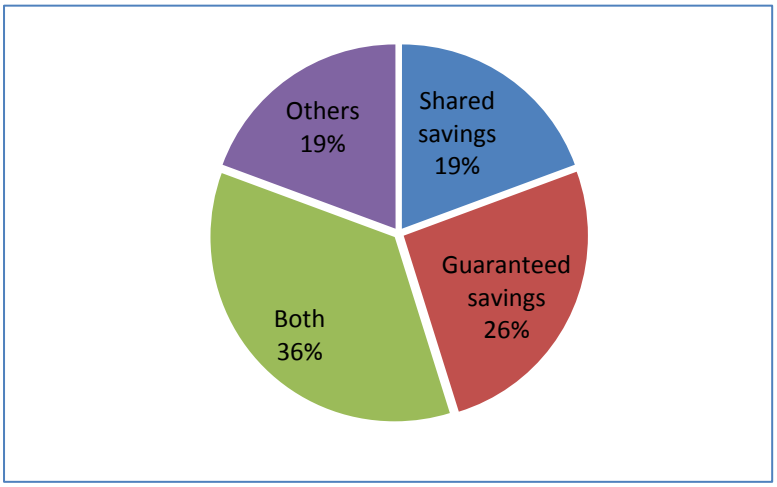
- Lack of available funding for execution or projects
- High risk perception
- Low understanding of EPC projects and the models
- Core business not being EE
- Lack of prospective clients

Predictably, a majority of the respondents claimed lack of funding as one of the major deterrents for a greater uptake of EPC business in India.

3.1.3. Business models for EPC

Amongst those with some previous experience in EPC projects, 36 percent of the ESCOs had worked on both the shared savings model and the guaranteed savings model, and 26 percent of the ESCOs had worked on the guaranteed savings model and 19 percent had worked on the shared savings model. The remaining 19 percent included models such as: subscription model; daily/monthly lease rental; design of EPC contracts; deferred payment model; and pay out of savings model. Details are given in Figure 4.

Figure 4: Business models used for EPC projects



3.1.4. Innovative models for EPC contracts

Traditionally, the widely adopted performance-based contract structures have been "guaranteed savings" and "shared savings"[12].

These models have now evolved into subscription model, daily/monthly lease rental, and design of EPC contracts, deferred payment model and pay out of savings model. The reason for this evolution may be due to the intricacies involved in the traditional approach for new entrants both on the ESCO and client side. For a more practical way of doing business with their client, such models are termed more effective[13].

The choice of business model for ESCO business may be driven by several factors such as risk perceptions for a particular technology, credibility of the client, management strategy, levels of comfort with the client, and needs of the client.

3.2. ESCO energy performance contracting: present trends in India

This section presents the market response to the technology streams, sectors, project values for energy performance contracting in India.

3.2.1 Technology stream for EPC projects

The technology streams for ESCO performance contract projects for the last two years (2012-14) were obtained from the respondents. A summary of the responses is provided in Table 3.

[12] For a better understanding of business models for EPC projects refer to the report "Developing model ESCO performance contracts for industrial projects" prepared by AEEE with support from Shakti Foundation.
[13] Interactions with one of the emerging ESCOs

Table 3: No of projects by technology streams

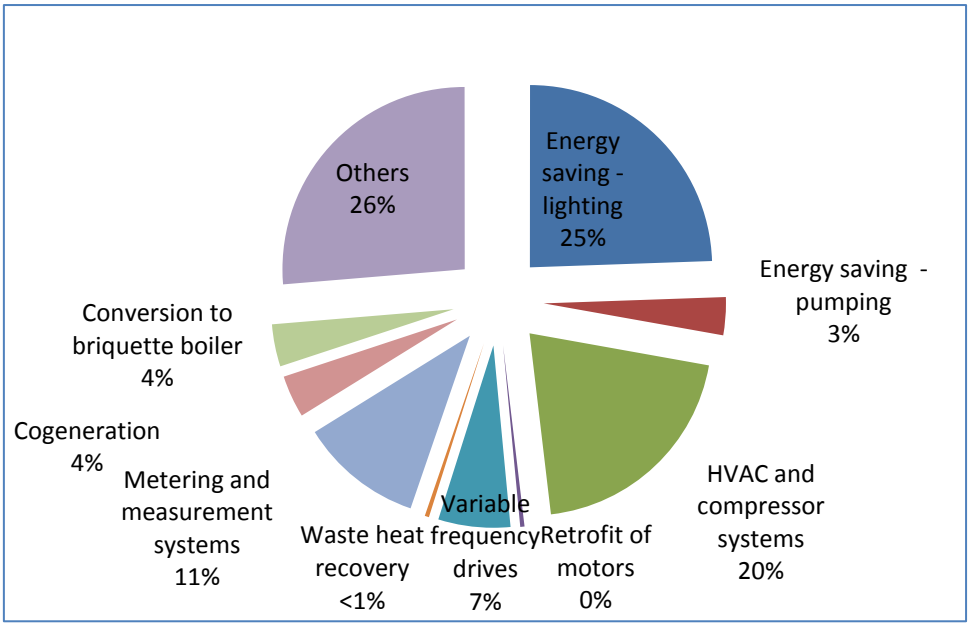
Technology	Number
Energy saving lighting	65
Energy saving pumping	9
HVAC and compressor systems	54
Retrofit of motors	1
Variable frequency drives	17
Waste heat recovery	1
Metering and measurement systems	29
Cogeneration	10
Conversion to briquette boiler	10
Others	70
Total	**266**

Information on 228[14] projects undertaken on energy performance contracting, across a variety of technology steams, was made available through the survey. The sectors in which these projects were undertaken were spread across industry facilities, municipalities, and buildings. The results were further assessed through interactions with ESCOs and secondary research.

The major share of projects (Figure 5) has been in lighting (25 percent), HVAC and compressor systems (20 percent), followed by metering and measurement systems (11 percent).

[14] Out of 70 projects in others category, there was no information on technology types for 38 projects.

Figure 5: Technologies for EPC projects



It can be seen from Figure 5 that VFD, conversion of fuel-fired to briquette-fired boilers, and cogeneration constitute 7 percent, 4 percent and 4 percent respectively. Waste heat recovery and retrofit of motors constitute less than 1 percent.

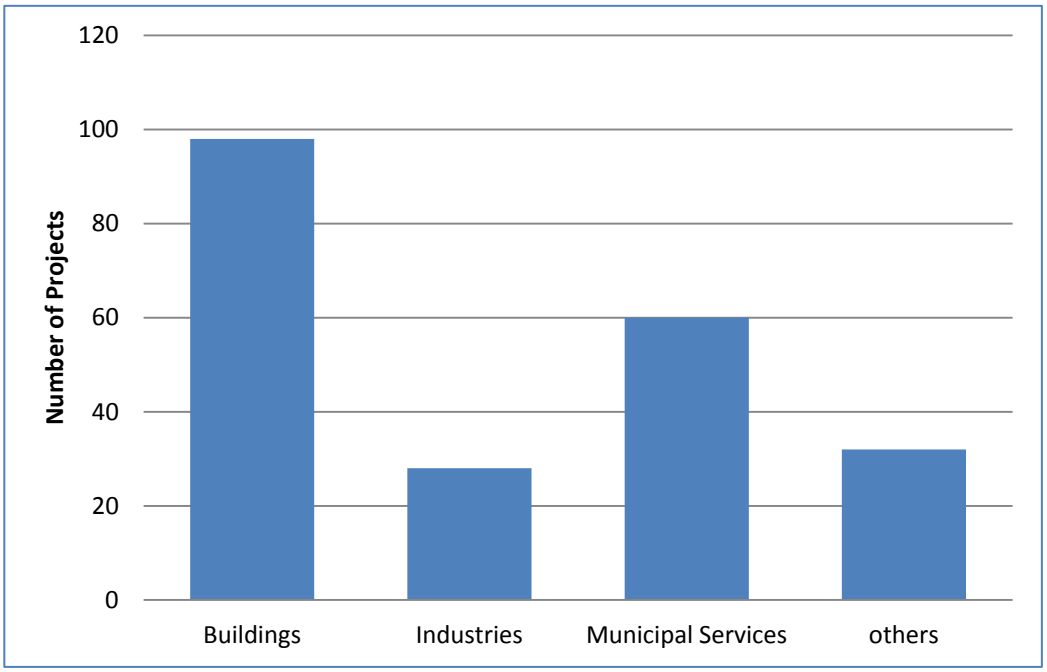
The 'others' category, at 26 percent, includes technology works on mixed type of load and lighting load energy saver, and loss reduction in transformers for utilities among others.

3.2.2 Sector-wise distribution of EPC projects

The sector-wise division of the project is provided in Figure 6. The percentage of uptake of projects in the building sector was found to be the highest relative to projects in industries and municipal services.

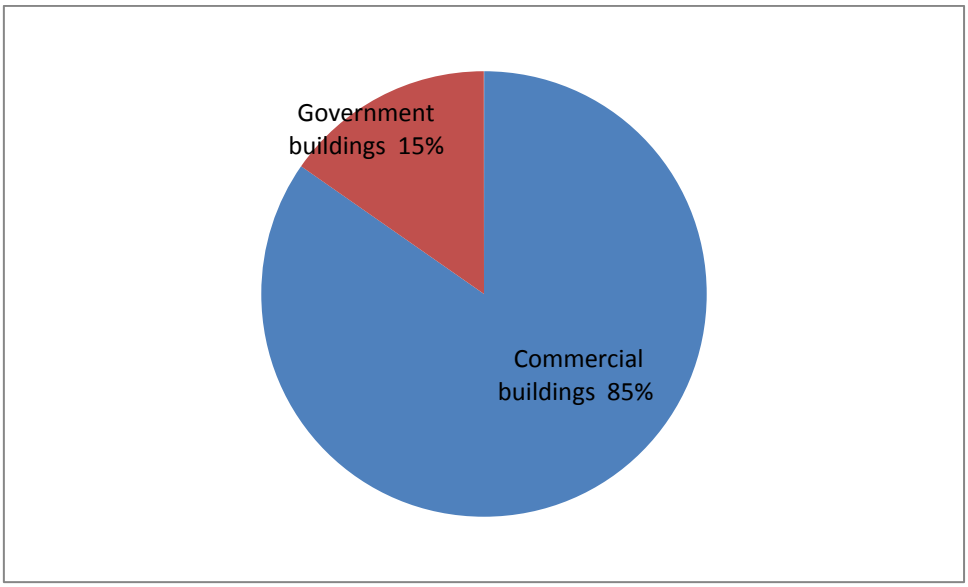
The building sector was classified into government, commercial and residential buildings. The distribution between these types of buildings is given in Figure 7.

Figure 6: Distribution by sector



As seen in Figure 7, an overwhelming 85 percent of the projects were in non-government commercial buildings and 15 percent were in government buildings.

Figure 7: Distribution by building sector



3.2.3. Distribution of EPC projects

For an understanding of the business characteristics, the distribution of projects by value of projects was obtained from the respondents. These were categorized into three

segments: projects less than INR 1 crore, between INR 1-30 crore, and more than INR 30 crore.

Figure 8: Number of projects (2012-14)

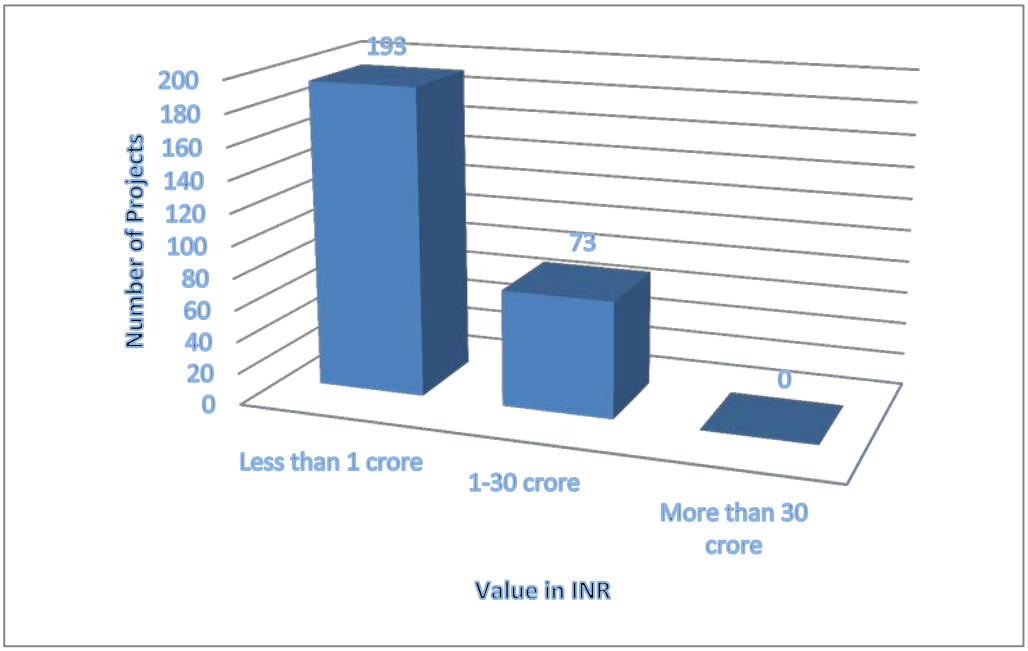


Figure 8 represents the distribution of projects by value for the period 2012-14. The majority of the projects were found to fall in the category of less than INR 1 crore followed by projects in the category INR 1-30 crore. There was no ESCO project in excess of INR 30 crore.

Interactions with the ESCOs showed that smaller and medium-sized ESCOs (grade 2-5), with comparatively low capital assets, were severely limited by their ability to take-on larger projects. Even if they did take up larger projects, they would only have the capacity to undertake a handful projects in any given year. These companies were found to be more in favor of taking projects with lower investment needs (less than INR 1 crore). ESCOS in grade 1 or grade 2 were found to be better positioned to undertake bigger projects (INR 1-30 crore).

3.3. ESCO energy performance contracting: future trends in India

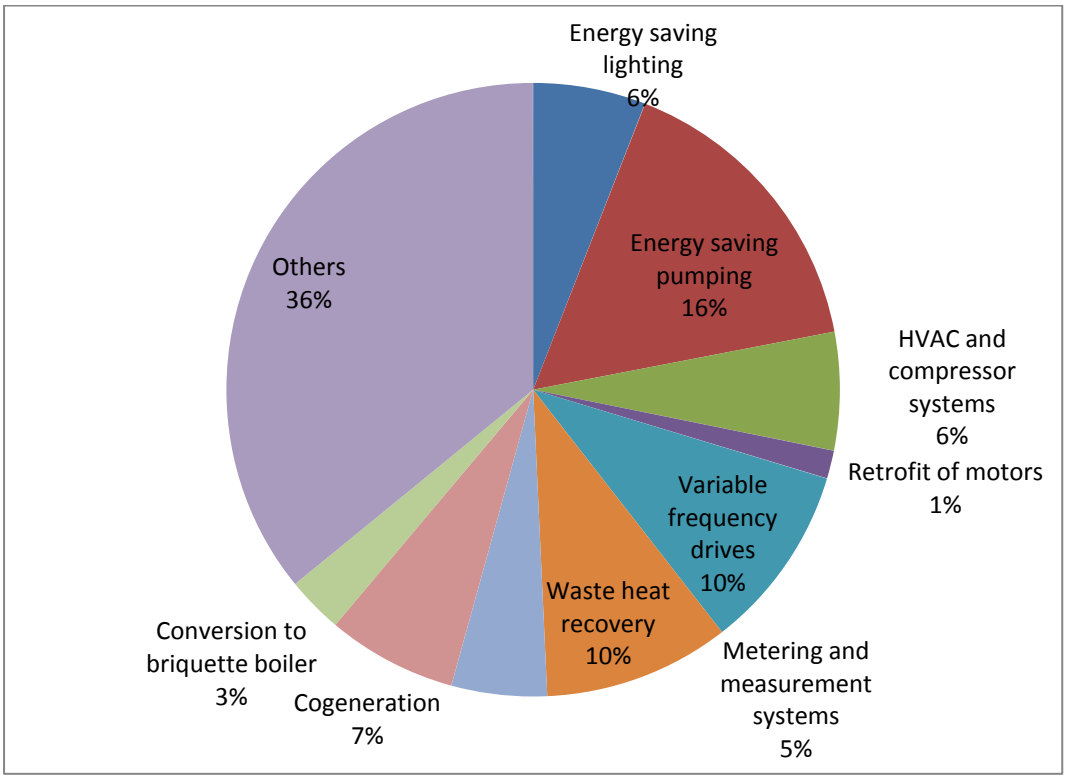
Drawing on the previous experience of the ESCOs, this section presents the market response to the future trends based on technology streams, sectors, and project values for energy performance contracting projects in India.

3.3.1 Technology streams for EPC projects, 2014-16

Of the ESCOs surveyed, 337 projects were reported to be in the pipeline for the years (2014-16). Out of 337 projects, 266[15] projects were spread across industry facilities, municipalities, buildings and other facilities[16].

For these projects, the break-up across the various technology steams is given in Figure 9.

Figure 9: Technology of EPC projects (2014-16)



An analysis of the responses obtained shows that the majority of projects are expected to be taken up in the pumping sector (16 percent), followed by waste heat recovery (10 percent) and VFD (10 percent), co-generation (7 percent), energy saving lighting (6 percent), HVAC and compressor systems (6 percent), metering and measurement system (5 percent) and conversion to briquette boiler (3 percent).

The type of technologies in the 'others' category (36 percent) constitutes mixed type of load and lighting load energy saver, and loss reduction in transformers for utilities.

[15] For 71 projects, details such as technology streams, type of sector and buildings are not provided in the survey responses.

[16] Interactions revealed that few companies were presently in talks with equipment manufacturers for deployment of projects on an annual basis. In view of this, the number of projects may increase as per market conditions.

ESCOs and Lighting

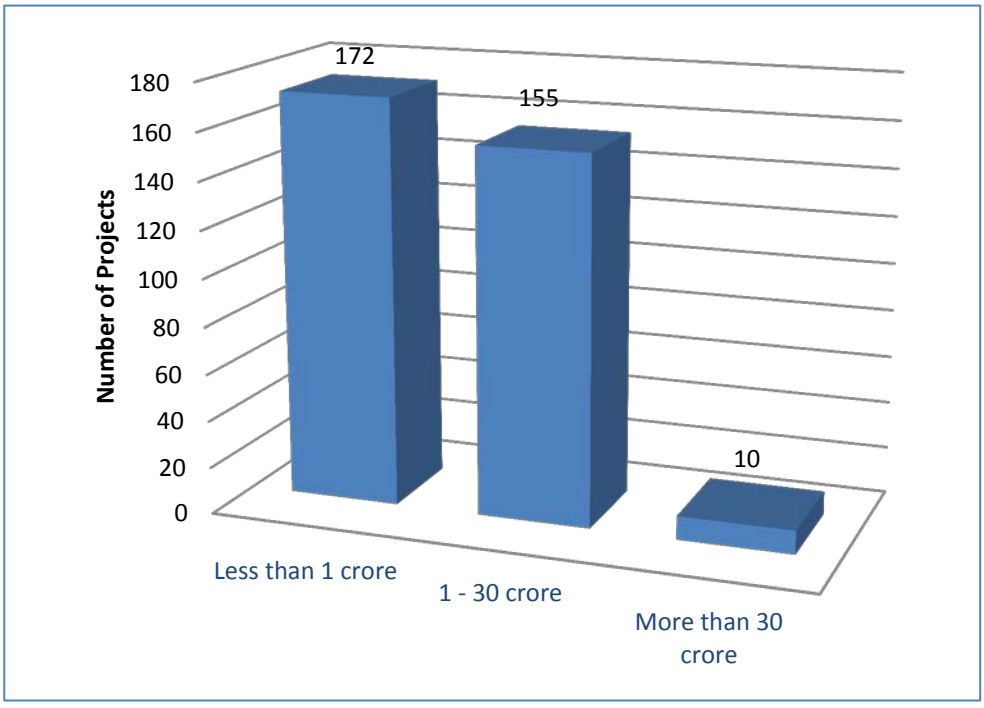
The lighting industry is going through a radical transformation driven by rapid progress in Light Emitting Diode (LED) lighting, semiconductor technology, and the need for sustainable and energy-efficient solutions. The trend is expected to continue in the future as well. These savings can eliminate or reduce the need for new generating plants. They could also provide capital for financing alternative energy solutions in remote areas.

The lighting sector appears to be a very promising prospect for ESCOs especially in commercial building and street lighting. EE technologies and designs can cut street lighting costs dramatically (often by up to 60 percent).

3.3.2 Distribution of EPC projects

As seen in Figure 10, the distribution of projects by value (in INR) shows that the majority of projects (172 projects) fall in the category of less than INR 1 crore. Most of the other projects (155) fall in the INR 1 to 30 crore range.

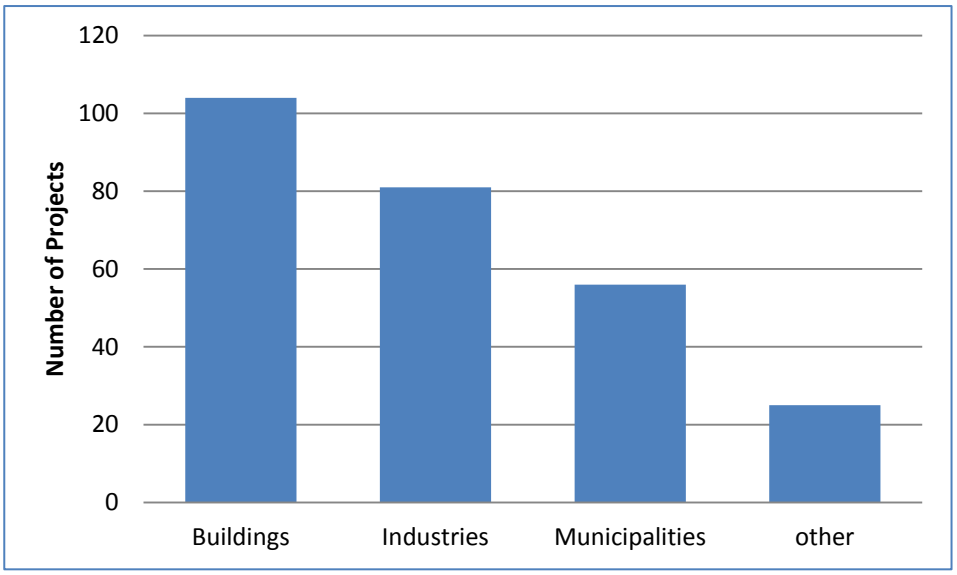
Figure 10: Number of projects (2014-16)



3.3.3 Sector-wise distribution of EPC Projects

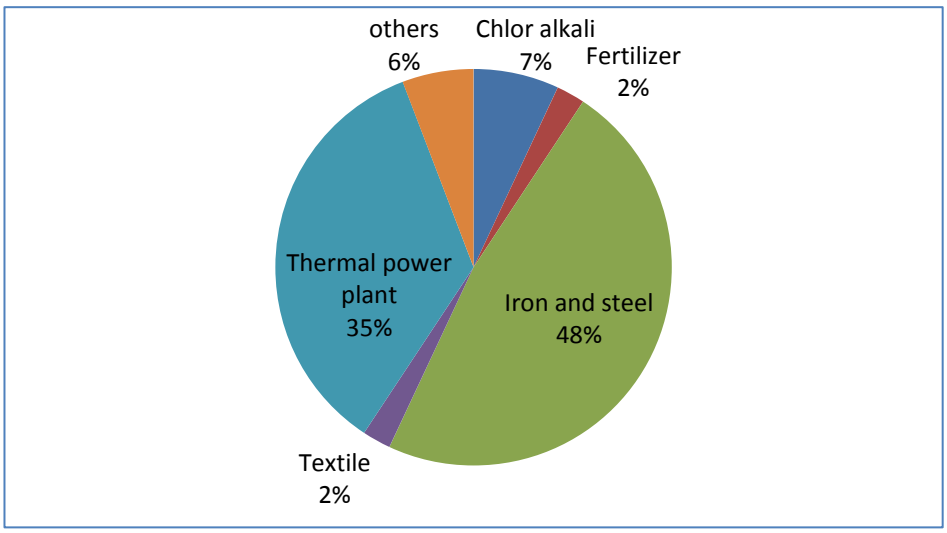
As seen from Figure 11, EPC projects in buildings are expected to make up most of the pipeline of projects for the next two years. In terms of anticipated take-up by sector, industries are next in line, followed by municipalities.

Figure 11: Distribution of projects by sector



The respondents have categorized the projects spread across different industries. A breakdown of projects within the industrial sector is given in Figure 12.

Figure 12: Distribution of projects by industry type



According to respondents, iron and steel account for 48 percent of pipeline projects and the thermal power plant accounts for 35 percent of projects. The chlor-alkali sector accounted for 7 percent of pipeline projects.

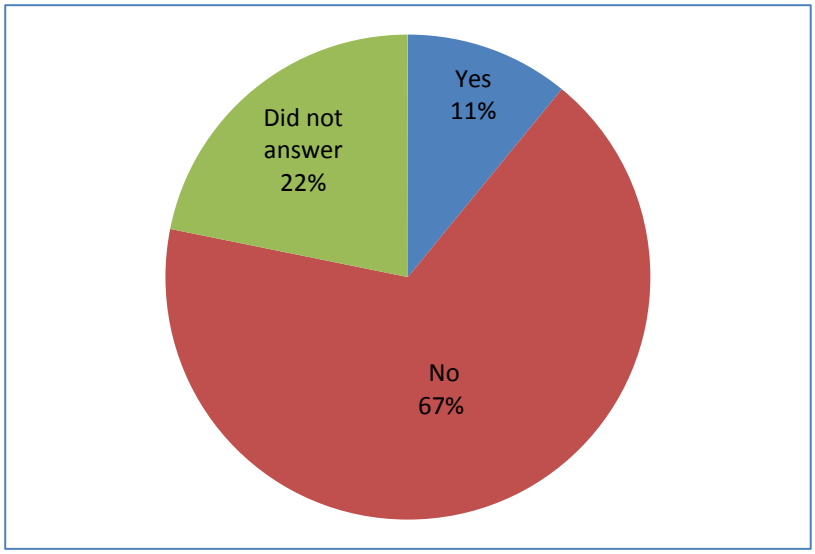
3.4. Financing energy performance contract projects

This section summarizes the results of survey on the financing aspects of EPC projects. ESCOs and FIs were asked about previous efforts in securing EE loans for EPC projects. A list of constraints faced in securing financing (both debt financing and equity) was given by the ESCOs.

3.4.1 ESCOs previous experience in EE projects financing

It can be seen from Figure 13 that 67 percent of the respondents had not applied for financing for their energy performance contracting projects. The number of companies who had previously applied for financing comprised 11 percent of respondents.

Figure 13: Previously applied for financing



The reason given was that ESCOs felt more comfortable executing projects using their own funding rather than depending on third party financing. However, the majority of respondents were in the favor of applying for financing for their projects in the future.

No analysis could be drawn on the number of successful attempts or rejections for EE financing due to a lack of information from the respondents.

3.4.2 Type of financing applied for debt or equity

From the survey, it is seen that only six ESCOs applied for financing previously out of which four applied for debt financing. Two ESCOs did not indicate the type of financing applied. No respondents had previously applied for equity funding.

3.4.3 Funding support for energy efficiency

Not all ESCOs have the capacity to offer direct financing for their projects. ESCO financing depends on its corporate financial viability, and whether it has a strategy in place to offer a combination of financial and technical services to simplify project delivery mechanisms.

A deeper understanding of the funding support for EPC projects and the constraints faced was obtained through interactions with the stakeholders (ESCOs, FIs, industrial units). Emphasis was given to ascertaining the reasons for being denied financing. As per the responses, finance was denied largely due to the following reasons:

- Lack of collateral
- Lack of credit history
- Insufficient cash flow
- Lack of clear business plan
- Low technical viability of project
- High interest rates
- Lender unfamiliar with ESCO business

It is important to establish the most common reasons ESCO businesses are denied financing. This research provides a picture of the kinds of challenges that could be addressed with appropriately designed technical assistance, alternative financial services, or both. In general, insufficient cash flow and lack of a reasonable business plan may be addressed with capacity building of ESCOs. For example, a project should be examined to determine if costs could be cut or profits increased by adjusting certain aspects of the business and thereby increasing cash flow. Lack of credit history, lenders' unfamiliarity with a specific business enterprise, or lack of collateral might be addressed by alternative financing programs such as PRGFEE and VCFEE.

4. Estimates of the Market Potential for PRGFEE and VCFEE

The estimates for the market potential for PRGFEE and VCFEE were arrived at by taking into account the responses received from the ESCOs and by examining the trends for ESCO business in the past and pipeline of projects in the future.

4.1. Requirement for debt and equity financing

From the survey responses, it was seen that six ESCOs sought debt financing of INR 282 crore for 52 projects. Sixteen ESCOs sought financing of both debt and equity for 85 projects, amounting to INR 159 crores while for 7 ESCOs indicated that they may require INR 185 crore for equity for projects for the period 2014-16. ESCOs did not indicate the number of projects for which they needed equity additions in the survey responses.

This is based on information received from a sample representation of 85 ESCOs out of 137, of which 55 responded. The actual figure is likely to be higher when taking into consideration the remaining ESCOs surveyed.

4.2. Overall estimates of the market potential for NMEEE

The overall size of EE market is estimated to be INR 74,000 crore. The distribution along with the investment potential among the Perform, Achieve and Trade (PAT) and Demand Side Management (DSM) programs is given in Table 4.

Table 4: Estimates of PAT and DSM

S.No	Initiative	Investment estimated (INR crore)	Fuel saving (Million tons of oil equivalent)	GHG emissions saving (million tons)	Avoided capacity (MW)
1	PAT	30,603	9.78	26.21	5,623
2	DSM	44,000	13.22	72.75	14,335
	Total	74,603	23.00	98.96	19,958

Source: BEE presentation on NMEEE[17]

The programmes under this mission have resulted in an avoided generation capacity addition of about 10,000 MW between 2005 and 2012 with government targeting to save 10 percent of current energy consumption by the year 2018-19. The mandated decrease in the specific energy consumption under PAT programme has led to a decline of 4 to 5 percent in their specific energy consumption in 2015 as compared to that in 2012[18].

[17] Available at: http://www.moef.nic.in/downloads/others/Mission-SAPCC-NMEEE.pdf
[18] Available at: http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf

A World Bank note indicates that the market potential for savings through EE is estimated to be 183.5 billion kWh for the period 2014-2019[19].

There is no single source of data on the potential for investment in EE technologies and projects in India. While some literature on estimates of EE potential (data from 1999 to 2004) is available, these have been arrived at using different sets of data, assumptions and indicators, which do not allow for a consistent comparison

It must be noted that despite the large market potential for ESCOs, the growth of the ESCO industry in India has been particularly slow. The recent establishment of EESL, a government super-ESCO (the first of its kind in India) set up to facilitate implementation of EE projects, may herald a welcome change.

EESL has estimated the following projects in municipality DSM programs to be in the pipeline for the next four to five years, base year taken as 2014. This is presented in Table 5.

Table 5: EESL estimates of DSM programs

S. No	Sector	Number of projects	Estimated investments (INR crore)	Estimated annual savings (mKWh)	Annual GHG emission reduction (tCO2)
1	Home efficient lighting (Domestic Efficient Lighting Programme)	6	1,800	46,845	39 million
2	Municipal DSM	15	3,200	5,520	5.9 million

Source: Adapted from the presentation "EESL business model to scale up energy efficiency implementation in India" by Mr Saurabh Kumar, Managing Director, EESL, 18th June, 2014, Mexico

4.3. Market estimates for ESCO business in year 2014-16

Table 6 summarizes the potential pipeline of projects in the ESCO industry across industry facilities, municipalities, commercial buildings and other facilities as obtained from the survey.

For the potential project pipeline and funding requirement, ESCOs responded to funding requirement under three categories: funding less than one core, funding requirement between INR 1 to 30 crore; and funding requirement above INR 30 crore.

From the survey responses, it was inferred that 172 projects were under less than one crore category, 155 projects were between INR1 to 30 crore category and 10 projects were under above INR 30 crore category. For the total funding requirement, conservative

[19] https://www-cif.climateinvestmentfunds.org/sites/default/files/WB-India%20PRSF%20Project-Independent%20Review-final%20(April%202014).pdf

estimate of the above three categories were considered. This amounts to 137 projects requiring a total debt funding of about INR 441.95 crore. The survey also indicated a potential of INR 184.5 crore as equity funding for municipalities and government buildings.

Table 6: Debt-Equity requirement for 2014-2016[20]

Parameter	Requirement in INR crore	Number of ESCOs	Remarks
Debt	441.95	19	137 projects
Equity	184.5	6*	Under 3 sectors - energy saving pumping, municipalities and government buildings

* Six ESCOs expressed their requirement for both debt and equity

4.3.1. Market potential for ESCOs (2012-2016)

The information from the respondents relates to two distinct periods: 2012-14 and 2014-16. This is set out in Table 7.

From the survey responses it was inferred that total 266 projects were taken up by ESCOs during the period 2012-2014, of which193 projects fall under the category of expected funding less than INR one crore and 73 projects fall under the category of expected funding between INR 10 to 30 crore[21].

For the period 2014-16, ESCOs indicated that there is a pipeline of 337 projects with an estimated value of INR 1,936 crores (which may include those projects for which no external funding is required as some of the questionnaires have partial information).

Table 7: ESCO potential estimates for period (2012-2016)

Period	Projects (No.)	Value (INR crore)
2012-2014	266	826.6
2014-2016	337*	1,936[22]

*Estimated pipeline for 2014-2016: detailed breakdown available in previous sections

[20] As obtained from ESCOs
[21] Since exact project values are not available, calculations were carried out by taking average value of projects (in crore) x number of projects for the time period. 193x 0.5+73x10 = INR 826.5 crore
[22] Since exact project values are not available, calculations were carried out by taking average value of projects (in crore x number of projects for the time period. (172 x 0.5)+(155x10)+(10x30) = INR 1936 crore

5. Feedback on PRGFEE and VCFEE

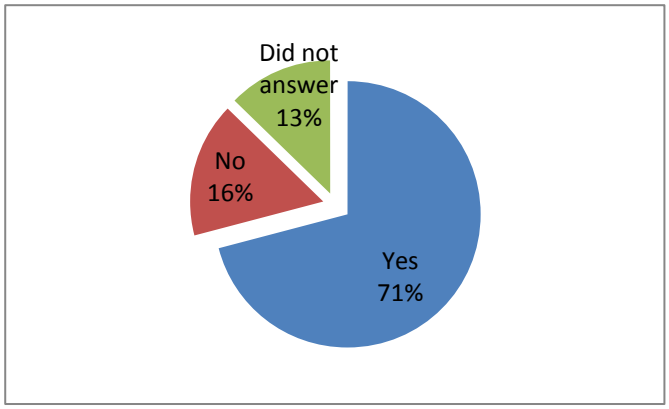
This section describes the responses of the ESCOs on the present structure of the PRGFEE and VCFEE and reflects their expectations from these schemes to help improve their businesses.

5.1. PRGFEE

In reference to Figure 14, it can be seen that a majority of the respondents (71 percent) agreed that PRGFEE would overcome some of the typical challenges in debt financing for ESCO projects.

A small number of ESCOs responded that they would be in a position to comment only when the scheme is launched.

Figure 14: Responses to PRGFEE assistance

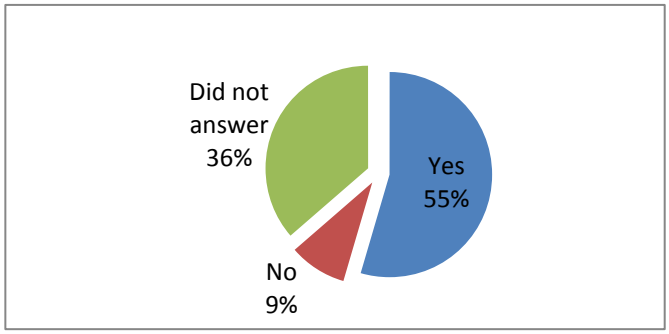


Some of the ESCOs observed that the shared savings model could be a high risk model and would require stricter policy compliance regulations to energy savings.

5.2. VCFEE

A majority of the respondents (54 percent) agreed that VCFEE would overcome some of the typical challenges in equity financing for ESCO projects. This is presented in Figure 15.

Figure 15: Responses to VCFEE assistance



6. Market Assessment: Learnings and Recommendations

This section summarizes the insights from the market assessment and recommendations for the strategies to be adopted for the PRGFEE and VCFEE.

The key observations include:

a) Bridging the gap between demand and supply

The major beneficiaries of the PRGFEE and VCFEE are expected to be grade 3, 4, 5 ESCOs due to their small size, lack of collaterals, or provisions to provide bank guarantees and lack of experience in availing EE financing in the past.

The ESCOs in the grade 1 and few in grade 2 comprised multi-national companies and public sector companies. These seldom require debt financing and confine themselves to the technical risks associated with a project. The major reason for not taking this route[23] was cited by senior management as a high financial risk perception on their part.

The PRGFEE and VCFEE need to be formulated and administered in a way that allows ESCOs with limited financial resources to have the opportunity to secure bank loans. It must be ensured that the benefits of the guarantee support provided by GOI to the participating institutions percolate down to the end-users and ESCOs.

b) Need for favorable financing conditions for securing EE loans

The survey concluded that only a smaller percentage of ESCOs had previously applied for EE financing and of those, only a few had secured financing. The majority of ESCOs reported that they preferred using their own funding rather than securing loans from a FI.

Most of the small and medium-sized firms are not able to fulfill requirements in terms of collaterals, and at times are not in agreement with the terms and conditions set by the lending institute (interest rates offered, term of the loan). Also, the time gap between a loan application and approval/rejection is generally long by which time the ESCO may have already started to explore other sources of funding.

Financing conditions must be made favorable to ESCOs to secure such EE loans, given that EE is a priority area for investment.

c) Rationalization of interest rates

The majority of the ESCOs expressed the need for project financing at lower interest levels than the present market rates[24]. The interest rate charged by the lending institute can have a major bearing on the commercial feasibility of the project.

For instance, if a firm can borrow money at 6 percent to invest in an EE project that will yield a 10 percent rate of return, then it would be prudent for the business to borrow the

[23] From interactions with select Grade 1 and 2 ESCOs
[24] Typically expected lending rate was 10-12 percent

money. But in case the interest rate on loanable funds is 12 percent (a difference of 2 percent), then it makes little sense to borrow the money, especially since there is also a high risk involved.

It is also found that most of the FIs do not differentiate between a normal project application and an EE project application. Commercial banks were found to be in need of techno-commercial expertise to develop appraisal procedures.

Thus, EE investments can scale up if commercial banks get assistance in developing appraisal procedures for EE applications and are encouraged to provide low-interest rate loans for EE projects[25].

d) Capacity Building of ESCOs and Financial Institutions

Technical assistance to the ESCOs may be enough to manage issues such as insufficient cash flow and lack of a realistic business plan. Similarly, FI's need for understanding the risks associated with EE financing can be addressed with a technical assistance component. Appraisal criteria can be set in consultation with the FIs.

It is advised that PRGFEE and VCFEE should have a stand-alone component to help FIs understand the technical intricacies of the project and ESCOs to develop financial cash-flow models to secure loans and ensure timely paybacks. A similar exercise is already being conducted the through the Energy Efficiency Financing Platform (EEFP) for the capacity building of ESCOs as well as FIs.

e) Require documenting M&V plans and systems

Standard M&V protocols provide open, transparent, and replicable methods of calculating energy savings for any type of energy conservation measure. The preparation of an M&V Plan is the single most important M&V activity in an energy savings project. It is central to proper savings determination, and is the basis of verification.

It is recommended that the implementing agency must ensure that the applications received for guarantees from the participating financial institutions must comprise of a robust and yet simple M&V plan developed in consultation with the client.

6.1. Conclusion

ESCOs who responded to the survey have indicated that there is a potential pipeline of 337 projects valued at INR 1936 crore over the next 2 year period, 2014-16.

The ESCO industry has shown it has tremendous potential and is aggressively moving ahead to capture a significant share of the EE project market. ESCOs are looking forward to an early launch of the PRGFEE and VCFEE to boost to the efforts of the ESCO industry.

[25] More information of developing appraisal procedures available at: http://www.iipnetwork.org/IIP-FinanceFactsheet-3-EERF.pdf

Annexure A: Survey Form- ESCOs

Market Assessment for the Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE)&Venture Capital Fund for Energy Efficiency (VCFEE)

General Information				
Name of the ESCO/Firm:				
ESCO Grade: (1-5)		Duration of Empanellment	From Year	To Year
Details of Personnel filling the survey:	Name:			
	Designation:			
	Phone Number:			
	Email:			

I. ESCO's Past Experience: *A brief description of the project experience of your firm in the provision of energy efficiency services in India*

1. Please select one or more options given below that best describes your operation:
   - ☐ Energy Audit and Consultancy Services
   - ☐ Vendor/Equipment Manufacturer or Supplier
   - ☐ Services Provider (General ESCO)
   - ☐ Any other Services - please specify here: _____

2. Does your organization have any previous experience working on performance contracting projects?
   - ☐ Yes
   - ☐ No
   - **A. If Yes,** please select the type of performance contracting model used:
     ☐ Shared Savings ☐ Guaranteed Savings ☐ Other: _____

3. **If yes,** please provide the following information on the projects undertaken by your organization in the **last 2 years?**

Type of Project	Sector	Location (City/Town/State)	No of Projects		
			Less than 1Cr(INR)	1-30 Cr (INR)	More than 30 Cr(INR)
Choose an item.	Choose an item.		Select	Select	Select
Choose an item.	Choose an item.		Select	Select	Select
Choose an item.	Choose an item.		Select	Select	Select
Choose an item.	Choose an item.		Select	Select	Select

II. ESCO's Future Requirements: *Information on pipeline of projects for the next 2 years and anticipated financing (loan/equity) for this period*

1. Please provide the following information on your ESCO projects pipeline and plans for implementation in the **next 2 years?**

Project Type	Sector	Location (City/Town/State)	No of Projects		
			Less than 1Cr(INR)	1-30 Cr (INR)	More than 30 Cr(INR)
Choose an item.	Choose an item.		Select	Select	Select
Choose an item.	Choose an item.		Select	Select	Select
Choose an item.	Choose an item.		Select	Select	Select
Choose an item.	Choose an item.		Select	Select	Select
Choose an item.	Choose an item.		Select	Select	Select

2. Are you in requirement of any loans/additional equity for your projects in the **next 2 years?**(Choose from below)
   ☐ Debt ☐ Both
   ☐ Equity ☐ None

3. Have you previously applied for financing for any of your projects in the **last 2 years?**
   ☐ Yes
   ☐ No
   A. If yes, please provide the following details on project financing?

Project Type	Sector	Name of lending Bank	Loan Amount (INR)	Approved (Yes/No)
Choose an item.	Choose an item.			☐ Yes ☐ No
Reasons for rejections:				
Choose an item.	Choose an item.			☐ Yes ☐ No
Reasons for rejections:				

4. Please give a brief description of anticipated debt funding assuming the PRGFEE is in place to give risk-sharing agreements for the loans in the **next two years?**
   A. Debt Funding

Type of Project	Sectors	Number of projects	Amount of loan required (INR)
1. Choose an item.	Choose an item.	Select	
2. Choose an item.	Choose an item.	Select	

B. In your opinion, if the PRGFEE is available would it help overcome some of the challenges to debt financing of your ESCO projects?

☐ Yes

☐ No

(i) If No, What are your concerns regarding PRGFEE? *For more details on the scheme refer to brochures*

Mention Here:

5. Please give an approximate value of the additional equity for your projects in government buildings and municipalities which you plan to seek in the **next two years?**

A. Additional Equity

Type of Project	Location (City/Town/State)	Sectors	Amount of additional Equity (INR)
1. Choose an item.		Choose an item.	
2. Choose an item.		Choose an item.	

B. Have you previously applied for any additional equity?

☐ Yes

☐ No

(i) If Yes, please provide the following details:

Type of Project	Amount of Equity (in lakhs)	Source	Approved(Yes/No)	Reasons for rejections:
Choose an item.			☐ Yes ☐ No	

C. In your opinion, if the VCFEE is available would it help overcome some of the challenges to equity financing of your ESCO projects?

☐ Yes

☐ No

(i) If No, What are your concerns regarding VCFEE? *For more details on the scheme refer to brochures*

Mention Here:

Annexure A.1 ESCO project types and sectors

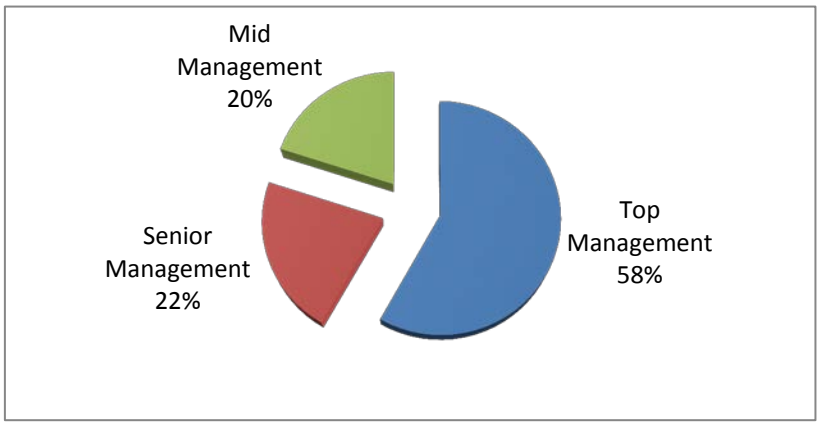
Project Type	Sectors
Energy saving – Lighting	Government Building
Energy saving – Pumping	Commercial Building
HVAC and Compressor systems	Residential Building
Retrofit of Motors	Industry - Aluminium
Variable frequency drives	Industry - Cement
Waste heat recovery	Industry - Chlor Alkali
Metering and Measurement systems	Industry - Fertilizer
Cogeneration	Industry - Paper and Pulp
Others	Industry - Iron and Steel
	Industry - Textile
	Industry - Thermal Power Plants
	Municipal Services (Street lighting, Ag Pump)
	others

Annexure B: Profile of the respondents

Respondents' profile

The participants in the survey were from different sectors and had varying professional backgrounds. Of the participants, 58 percent of the participants in the survey were from top management (CEOs, Directors). 22 percent of the participants had were part of the senior management in their respective companies. 20 percent of the participants were from the mid management. Figure 16 gives a breakdown of number of participants by area of responsibility.

Figure16: Participants profile



Distribution by grade

A sample representation from each grade was obtained from the various respondents. The distribution of ESCOs by grade is outlined in Table 8.

Table 8—Participation profile by grade of ESCOs

Grade	Respondents (in %)
1	16
2	36
3	33
4	13
5	2

BUREAU OF ENERGY EFFICIENCY
(Ministry of Power, Government of India)
4th Floor, Sewa Bhawan, Sector 1, R. K. Puram, New Delhi - 110066
Phone: +91 11 26179699, Fax : +91 11 26178328
Email: eefp@beenet.in, Web: www.beeindia.gov.in