DETAILED PROJECT REPORT

ON

ENERGY COST REDUCTION WITH POWER FACTOR CORRECTION

ENERGY IS LIFE
BEE
CONSERVE IT

Bureau of Energy Efficiency (BEE)

Prepared By

CII
Confederation of Indian Industry

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ISTSL

ENERGY COST REDUCTION WITH POWER FACTOR CORRECTION

JODHPUR LIMESTONE CLUSTER

BEE, 2011

Detailed Project Report on Power factor correction
Limestone SME Cluster, Jodhpur (Rajasthan) (India)

New Delhi: Bureau of Energy Efficiency

Detail Project Report No.: **JDP/PPFC/04**

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We have received very encouraging feedback for the BEE SME Program in various SME Clusters. Therefore, it was decided to bring out the DPR for the benefits of SMEs. We sincerely thank the officials of BEE, Executing Agencies and ISTSL for all the support and cooperation extended for preparation of the DPR. We gracefully acknowledge the diligent efforts and commitments of all those who have contributed in preparation of the DPR.

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List of Abbreviations

BEE **Bureau of Energy Efficiency**

SME	**Small and Medium Enterprises**
DPR	**Detailed Project Report**
GHG	**Green House Gases**
PF	**Power Factor**
EEF	**Energy Efficient Motor**
CDM	**Clean Development Mechanism**
DSCR	**Debt Service Coverage Ratio**
NPV	**Net Present Value**
IRR	**Internal Rate of Return**
ROI	**Return on Investment**
MT	**Metric Tonne**
SIDBI	**Small Industries Development Bank of India**

EXECUTIVE SUMMARY

CII – AVANTHA Centre for Competitiveness for SMEs, one of the Centre of Excellence of Confederation of Indian Industry (CII) is executing BEE - SME Program in Jodhpur Lime Stone Cluster, supported by Bureau of Energy Efficiency (BEE) with an overall objective of improving the energy efficiency in cluster units.

Jodhpur Lime Stone cluster is one of the largest Lime clusters in India; accordingly this cluster was chosen for energy efficiency improvements by implementing energy efficient measures / technologies, so as to facilitate maximum replication in other Lime Stone units in India.

The main energy forms used in the cluster units are Pet coke and grid electricity. In Lime Stone units, pet coke bill is about 80% of total plant energy bill and rest is of electricity. Pet-coke is used as fuel in kiln for getting quick lime from raw lime stone.

Existing scenario of power factor in plants of Jodhpur Limestone cluster is very poor. Even they have installed some capacitors for the improvement of power factor but maintenance and monitoring of the capacitors is not good. In this cluster unit various process working under different load condition so that it is not easier to maintain power factor with the help of those installed capacitor.

In different type of loading condition, improvement in power factor to unity can be achieved with the installation of some additional capacitor banks this will helps in reducing the electricity bill amount by availing the benefit of incentive on improving the power factor.

Power distribution companies in Rajasthan provides incentives for good power factor (PF>0.95). A consumer can avail a rebate of 1% on monthly electricity bill for every 1% improvement in power factor power factor above 0.95. Most of the plants have scope for improving power factor.

Project implementation will lead to saving of Rs. 6000.0 per year per unit with connected load of 50KW, with a capital investment of Rs 10,500.0 for 15KVAr rating of capacitor banks. This investment will have a payback period of about 21 months.

This DPR studies in detail the proposal for installation of capacitor banks for power factor improvement of the power system of a typical unit.

The total investment, debt equity ratio for financing the project, monetary savings, Internal rate of return (IRR), Net present value (NPV), Return on investment (ROI) etc for implementing capacitor banks for power factor improvement is furnished in Table below.

Financials for BEE projects	
Name of Project	**Replacement of Old and Inefficient motors**

	Units	Value
Cost of equipments	Rs	10,500.0
Saving Potential	Rs per year	6000.0
IRR		31.0%
NPV	Rs	4855.5
ROE		153%
Simple payback period	Months	21

The projected profitability and cash flow statements indicate that the project implementation will be financially viable and technically feasible.

ABOUT BEE'S SME PROGRAM

Bureau of Energy Efficiency (BEE) is implementing a BEE-SME Programme to improve the energy performance in 25 selected SMEs clusters. Jodhpur Lime Stone Cluster is one of them. The BEE's SME Programme intends to enhance the energy efficiency awareness by

funding/subsidizing need based studies in SME clusters and giving energy conservation recommendations. For addressing the specific problems of these SMEs and enhancing energy efficiency in the clusters, BEE will be focusing on energy efficiency, energy conservation and technology up gradation through studies and pilot projects in these SMEs clusters.

Major activities in the BEE -SME program are furnished below:

Energy Use and Technology Audit

The energy use technology studies would provide information on technology status, best operating practices, gaps in skills and knowledge on energy conservation opportunities, energy saving potential and new energy efficient technologies, etc for each of the sub sector in SMEs.

Capacity Building of Stake Holders in Cluster on Energy Efficiency

In most of the cases SME entrepreneurs are dependent on the locally available technologies, service providers for various reasons. To address this issue BEE has also undertaken capacity building of local service providers and entrepreneurs/ managers of SMEs on energy efficiency improvement in their units as well as clusters. The local service providers will be trained in order to be able to provide the local services in setting of energy efficiency projects in the clusters.

Implementation of Energy Efficiency Measures

To implement the technology up gradation projects in clusters, BEE has proposed to prepare the technology based detailed project reports (DPRs) for a minimum of five technologies in three capacities for each technology.

Facilitation of Innovative Financing Mechanisms for Implementation of Energy Efficiency Projects

The objective of this activity is to facilitate the uptake of energy efficiency measures through innovative financing mechanisms without creating market distortion.

1.0 INTRODUCTION

1.1 Brief Introduction about Cluster

Jodhpur SME Cluster is one of the largest Lime stone clusters in India, which is famous for manufacturing of hydrated lime. Jodhpur limestone cluster is well connected by rail, road and air ways. The nearest airport is at Jodhpur, which is 15 KM from Jodhpur by road.

There are approximately 100 lime stone units in this cluster which are engaged in manufacturing of hydrated lime.

Table 1.1 ***Details of Energy Consumption at Jodhpur Cluster:-***

S.No	Type of fuel	Unit	Value	Contribution in Equivalent Energy Term (%)
1	Pet coke	MT/year	1200	75
2	Electricity	kWh/year	120000	25

Energy Usage Pattern

Average monthly electricity consumption in lime stone units ranges from 1 lakh to 2 lakh kWh depending on the size of the plant. In thermal energy, solid fuel pet coke is used in kiln in all plants. Solid fuel consumption (Petcock) in kiln varies from 500 MT/ year to 2500 MT / year of hydrated lime production. On an average 3 MT of Pet coke is used to get 15 MT of quick lime.

Classification of Units

The Lime stone cluster units can be categorized into following four types based on production capacity

1) Large Scale Units
2) Medium Scale Units
3) Small Scale Units

Production wise Unit Breakup

Jodhpur Lime Stone cluster can be broken into three categories viz. small, medium and large size unit. Table 1.2 shows that production wise breakup of Lime stone cluster.

Table 1.2 Production wise Unit breakups

Type of Unit	Number of units	Production range (MT)
Small Scale unit	10-15	Less than 5000
Medium Scale Unit	65-70	5000-15000
Large Scale Unit	2-5	More than 15000

Table 1.3 Products Manufactured

S.No	Type of Product	Units
1	Hydrated Lime	50-55
2	Quick Lime	10-15

Production Process of Hydrated lime

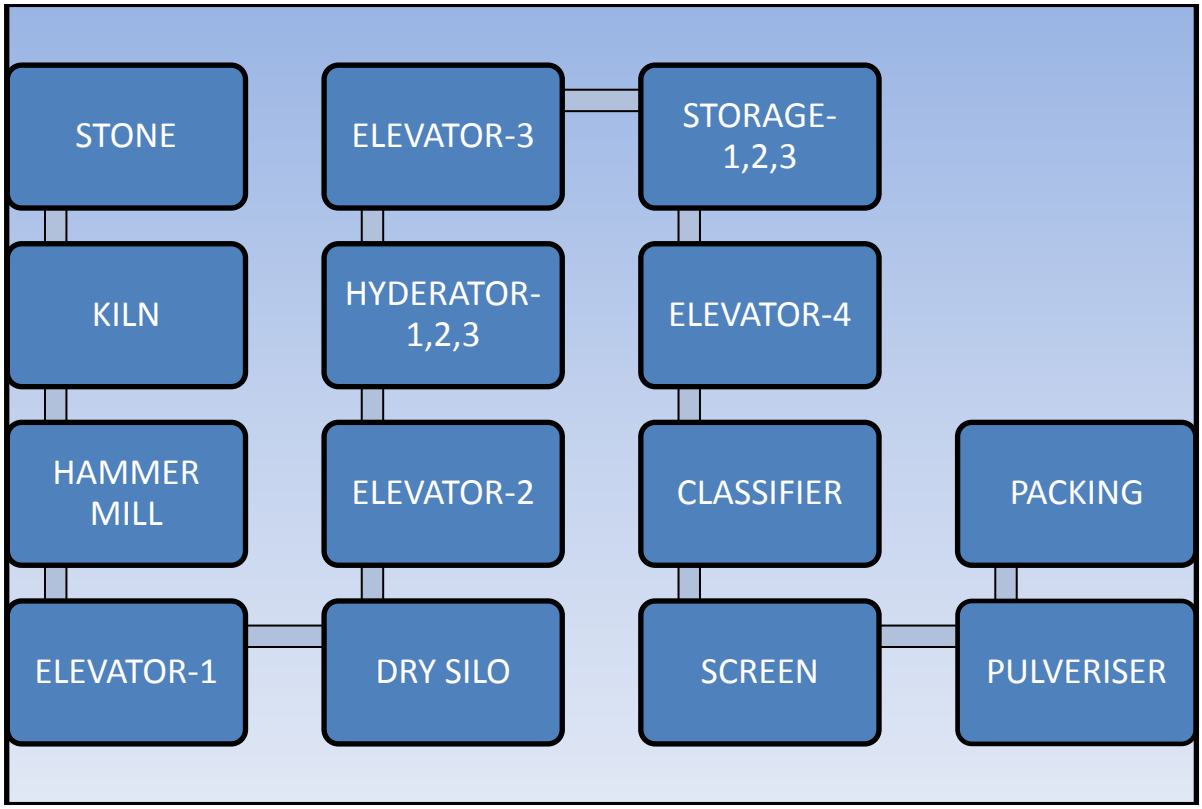


Figure *Production Process of Hydrated lime*

Figure 1.1 Process Flow Diagram of Hydrated Lime

Hydrated Lime Production

In lime stone industry kiln is major consumer of energy. Conventionally it is done in direct flame to fire the products. Kiln is batch type kiln, where raw material is fed from top side and at bottom after 12-13 hrs finished product (quick lime) is taken out.

Raw product undergoes loading section, combustion zone, cooling zone and then under loading section. Material movement is by gravity. Kiln is constructed with refractory and insulating bricks. Lime Stone cluster units in Jodhpur region producing large quantity of quick lime and hydrated lime.

Lime stone cluster in Jodhpur is spread across a large number of small companies, each company comprises of about 1 to 5 number of production units. Capacity of company varies from 15TPD to about 75TPD.

1.2 Energy Performance in Lime stone cluster

1.2.1 Average Production

Annual production in typical unit in Jodhpur Lime Stone cluster is given in Table 1.4 below:

Table 1.4 Annual productions from a typical unit

Type of Unit	Number of units	Production range (MT)
Small Scale unit	10-15	Less than 5000
Medium Scale Unit	65-70	5000-15000
Large Scale Unit	2-5	More than 15000

1.2.2 Energy Consumption

Energy Consumption (Electrical and/or Thermal) in a typical lime stone plant for Kiln is given in Table below:

Table 1.5 Energy Consumption for Kiln

Type of Kiln	Energy type Used	Running Hrs/Day	Production Capacity	Fuel Consumption/Day	Specific Energy Consumption/Ton Quicklime	Specific Energy Consumption in Rupees
Vertical Shaft	Pet Coke	Continuous	15T Quicklime Lime/ day	2.5-3.0 MT Pet coke	0.2 MT Pet coke/T Quicklime	Rs 1.44/Kg of Quick lime

For production of hydrated lime, apart from pet coke electricity energy is also used. Mainly Electricity is used for running hydrator, hammer, Classifier, elevators, blowers, rollers & conveyers of the kiln etc.

Specific energy consumption for both electrical energy and thermal energy for Crushing & Hydration motors is given in table 1.8 below.

Table 1.6 Specific Energy Consumption for Crushing & Hydration motors

Type of process	Energy type Used	Running Hrs/Day	Production Capacity	Electricity Consumption	Specific Energy Consumption/Ton Hydrated Lime	Specific Energy Consumption in Rupees
Crushing & Hydration	Electricity	8 to 10	18T Hydrated Lime/ day	250 -270 KWh	14-16 Kwh	Rs 75.0

1.2.3 Specific Energy Consumption

Pet coke consumption in Kiln is in the range of 2.5 – 3.0 Tonnes to produce around 15 Tonnes of quick lime. So, based on the lime output from Kiln, Specific energy consumption is coming around 0.2 Tonnes of Reliance pet coke (@ 7400 Kcal/kg)/T of quick lime produced.

Specific energy consumption of Lime stone units depends upon the production capacity & their corresponding power consumption. Units of Jodhpur are having Specific energy consumption in range of 14-16 kWh/MT of hydrated lime produced.

1.3 Proposed Technology/Equipment

1.3.1 Description of Existing Technology

Lime stone cluster at Jodhpur had taken the electricity connection from the state electricity board. The electricity supply coming to the industries is of High Tension (HT) category. In HT connection, electricity bill is to be paid on the basis of two part tariff. This means that the industries have to pay the charges for the maximum demand and the electricity consumption (units) for that month. Other taxes are paid as applicable. State electricity board is providing incentive on improvement of power factor.

Electricity is supplied from the generating station in the form of kVA. Power factor is the ratio of active power (kW) to apparent power (kVA). If the power factor is near the unity, this means that consumers are utilizing the power receiving from the state electricity board as the active power. Electricity Supply Company provides the incentives on the demand and energy charges to the consumers for maintaining the power factor above 0.95. The user can avail a rebate of 1% on monthly electricity bill for every 1% improvement in power factor power factor above 0.95.

Currently it was observed that most of the units in cluster are operating at a power factor of 0.9 and mostly using manually controlled capacitor banks.

1.4 Benchmarking for Existing Specific Energy Consumption

Presently most of the units in Jodhpur Limestone cluster are operating at a power factor of about 0.90. They are not getting the benefit of incentive at this power factor from the Power distribution company.

The factor related to proposed technology are

- Effect on power factor improvement
- Maximum demand charges
- Annual kWh consumption
- Annual energy charges
- Incentive on power factor improvement

1.5 Barriers in Adoption of Product Technology/Equipment

1.5.1 Technological Barrier

• Lack of awareness and information of the available benefits in terms of incentives on the total electricity bill as per the tariff provided by Power Distribution Company

• Due to lack of technical knowledge and expertise, power factor is not properly monitored in the limestone plants even after the installation of the required number of capacitors.

• In this cluster, like many others, there is lack of leadership to take up the energy efficiency projects in the plant.

1.5.2 Financial Barrier

- The majority of the unit owners are of the view that it makes business sense for them to invest in enhancing production capacity rather than making investment in energy efficiency.

- The unit owners in the cluster are wary of approaching banks for financial assistance due to their old perception that getting loan sanctioned from Banks involves lot of paper work / documentation and needs collateral security.

1.5.3 Skilled Manpower

In Jodhpur Lime Stone cluster, the availability of skilled manpower is one of the limitations, this issue gets further aggravated due to more number of lime stone units as compared to the availability of skilled manpower. One local technical person available at lime stone unit takes care of about 5 to 10 lime stone units. For major equipments of lime stone units like kiln, hammer mill, hydrator Machine etc.

2.0 PROPOSED TECHNOLOGY

2.1 Detailed Description of Technology

2.1.1 Description of Technology

Existing scenario of power factor in plants of Jodhpur Limestone cluster is very poor. Even they have installed some capacitors for the improvement of power factor but maintenance and monitoring of the capacitors is not good. In this cluster unit various process working under different load condition so that it is not easier to maintain power factor with the help of those installed capacitor.

In different type of loading condition, improvement in power factor to unity can be achieved with the installation of some additional capacitor banks this will helps in reducing the electricity bill amount by availing the benefit of incentive on improving the power factor.

In the limestone industry, presently some capacitors are already installed during the plant setup. But with the rise in load to increase the production capacity, the plant owner has not installed the additional required capacitors. It is difficult for the technicians to maintain the power factor at unity in absence of required capacity of capacitor banks.

It is very important to provide the reactive power to the unit according to the load conditions of the plant. For that the implementation of capacitors bank is very important.

Brief Description on Power Factor Controller

In a purely resistive AC circuit, voltage and current waveforms are in step (or in phase), changing polarity at the same instant in each cycle. All the power entering the loads is consumed where reactive loads are present, such as with capacitors or inductors, energy storage in the loads result in a time difference between the current and voltage waveforms.

During each cycle of the AC voltage, extra energy, in addition to any energy consumed in the load, is temporarily stored in the load in electric or magnetic fields, and then returned to the power grid a fraction of a second later in the cycle. The flow of this nonproductive power increases the current in the line. Thus, a circuit with a low power factor will use higher currents to transfer a given quantity of real power than a circuit with a high power factor.
A linear load does not change the shape of the waveform of the current, but may change the relative timing (phase) between voltage and current. Circuits containing purely resistive heating elements (filament lamps, strip heaters, cooking stoves, etc.) have a power factor of 1.0. Circuits containing inductive or capacitive elements (electric motors, solenoid valves, lamp ballasts, and others) often have a power factor below 1 Power factor is the ratio of actual power (kW) to the apparent power (kVA).

The apparent power (kVA) is defined by the following formula;

Apparent power = $\sqrt{}$ ($kW^2 + kVAR^2$)

kVAR is the reactive power; from the above formula if less power factor indicates that supply of the reactive power is high compared to active power, which contributes useful work of the system. High reactive power indicates that higher reactive current and increases the I^2R losses

of the network. Capacitor is a device that generates reactive current and consumes very less power.

Installing capacitor will improve the power factor and will also reduce the KVA demand of the system and will increase the capacity of the network that is the network cables can be loaded further. Reduction in reactive current will result in reduction of I2R losses and efficiency of the system will improve.

Required KVAR = Load (kW) x [{tan (cos-1 ɵ1)} – {tan (cos-1 ɵ2)}]

2.1.2 Technology Specification

For implementation of the proposed project, additional capacitors are to be installed in a plant. Total additional capacitors of about 15kVAr capacities for a plant of 45 KW load and operating at a power factor of 0.9 will require to be installed. However, other details are given in the quotation in annexure – 7.

2.1.3 Suitability or Integration with Existing Process and Reasons for Selection

This is the simplest and widely accepted measure for energy cost reduction in all the industries. Power distribution companies in Rajasthan provides incentives for good power factor (PF>0.95). A consumer can avail a rebate of 1% on monthly electricity bill for every 1% improvement in power factor power factor above 0.95. Most of the plants have scope for improving power factor. Power factor is improved by the installation of capacitors and replacement of the existing de-rated capacitors.

This technology is

- Simple in monitoring
- Requires less maintenance
- Requires no additional manpower
- Easy to installed

2.1.4 Availability of Technology

Suppliers of the capacitors bank panel are easily available at the Rajasthan. Local service providers are also available at Jodhpur. More details of service provider are given in annexure 6.

2.1.5 Source of Technology

This Technology is already used in many of the industries and savings have been already achieved. This technology is very common and easy to implement. It reduces the net KVA

demand from the grid also it increases the overall efficiency of the system.

This technology is well established and easily available.

2.1.6 Terms and Conditions in Sales of Equipment

The Technology supplier shall give guarantee for proper performance after implementation of this project.

2.1.7 Process down Time during Implementation

Technology provider will bring the complete setup for the proposed project from their site and make all the arrangements for implementation at the client's site. During the final connection with the main supply of the plant, breakdown period of 2 to 3 hours will be required.

2.1.8 Life Cycle Assessment

Life of the proposed capacitors will be around 1,00,000 hours which depends on the operating conditions and maintenance at client's side.

2.1.9 Suitable Unit for Implementation of Proposed Technology

For estimation of the saving potential on implementation of this project, here the Limestone units having present power factor of about 0.9 are considered.

3.0 ECONOMIC BENEFITS FROM PROPOSED EQUIPMENT

3.1 Technical Benefits

3.1.1 Fuel Saving

No fuel savings are considered in the proposed technology because it is not reducing the fuel consumption in the kiln.

3.1.2 Electricity Saving

Project of improvement in power factor to unity will not result in savings in electricity consumption in Limestone units. But it helps to get the savings in the electricity bill as a rebate of about 2.5% on total demand and energy charges by improving power factor to unity.

3.1.3 Improvement in Product Quality

This project is not contributing to any improvement in product quality.

3.1.4 Increase in Production

The proposed technology does not contribute to any improvement in production.

3.1.5 Reduction in Raw Material Consumption

Raw material consumption will be the same after the implementation of the proposed project.

3.1.6 Reduction in Other Losses

This project does not contribute to any reduction in any loss.

3.2 Monetary Benefits

Annual monetary savings due to implementation of capacitor bank panel will be Rs.6000 per year for a unit with connected load of 50 KW, with an investment of Rs.7500.

3.3 Social Benefits

3.3.1 Improvement in Working Environment in the Plant

There is no significant impact of this project in the working environment in the plant.

3.3.2 Improvement in Workers Skill

The technical skills of persons will definitely improve. As the training on better operation and maintenance practices will be provided by equipment suppliers this will improve the technical skills of manpower required for operating of the equipment and also the technologies implemented will create awareness among the workforce.

3.4 Environmental Benefits

This project will not be contributing for environmental benefits.

4.0 IMPLEMENTATION OF PROPOSED EQUIPMENT

4.1 Cost of Equipment Implementation

4.1.1 Equipments Cost

Cost of the project is about Rs.10500.0 for a 15KVAR capacitor bank, which includes the cost of the EPC of the capacitors panel.

4.1.2 Erection & Commissioning and other Miscellaneous Cost

Erection, Commissioning and other costs required will be Rs. 1,500 which includes taxes, commissioning, manpower cost, transportation etc and other miscellaneous costs will be Rs. 1,500 as the contingency amount.

Table 4.1: Details of Proposed Equipment Installation Cost

S.No	Description	Units	Values
1	Equipment cost	INR	7500.0
2	Erection and Commissioning cost	INR	1500.0
3	Miscellaneous Cost	INR	1500.0
4	Total cost	INR	10500.0

4.2 Arrangements of Funds

4.2.1 Entrepreneur's Contribution

Entrepreneur will contribute 25% of the total project cost which is Rs.2625 only.

4.2.2 Loan Amount

Remaining 75% cost of the proposed project will be borrowed from bank, which is Rs.7875 only.

4.2.3 Terms & Conditions of Loan

The interest rate is considered at 10% which is SIDBI's rate of interest for energy efficient projects. The loan tenure is 4 years excluding initial moratorium period is 6 months from the date of first disbursement of loan.

4.3 Financial Indicators

4.3.1 Cash Flow Analysis

Profitability and cash flow statements have been worked out for a period of 5 years. The financials have been worked out on the basis of certain reasonable assumptions, which are

outlined below. The cost of equipment considered is inclusive of hot water storage tanks also.

- The Operation and Maintenance cost is estimated at 10 % of cost of total project with 5 % increase in every year as escalations.
- Interest on term loan is estimated at 10 %.
- Depreciation is provided as per the rates provided in the companies Act.

Based on the above assumptions, profitability and cash flow statements have been prepared and calculated in Annexure-3.

4.3.2 Simple Payback Period

The total project cost of the proposed technology is Rs. 10500.0 and monetary savings due to reduction in electricity consumption is Rs. 6000.0 per year hence, the simple payback period works out to be 1.75 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 10% works out to be Rs.4855.0 only.

4.3.4 Internal Rate of Return (IRR)

The after tax Internal Rate of Return of the project works out to be 31%. Thus the project is financially viable.

4.3.5 Return on Investment (ROI)

The average return on investment of the project activity works out at 153%.

Table 4.2 Financial Indicators of Proposed Technology

S.No	Description	Units	Values
1	Simple Payback	Months	21
2	NPV	Rs.	4855
3	IRR	%	31
4	ROI	%	153

4.4 Sensitivity analysis in realistic, pessimistic and optimistic scenarios

A sensitivity analysis has been carried out to ascertain how the project financials would behave in different situations like when there is an increase in rupees savings or decrease in rupees savings. For the purpose of sensitive analysis, two following scenarios have been considered.

- **Optimistic scenario (Increase in monetary savings by 5%)**
- **Pessimistic scenario (Decrease in monetary savings by 5%)**

In each scenario, other inputs are assumed as a constant. The financial indicators in each of the above situation are indicated along with standard indicators.

Table 4.3 Sensitivity Analysis in Different Scenarios

Scenario	Monetary Benefit(Rs/year)	IRR (%)	NPV(Rs)
Pessimistic	5700.0	28	4050
Base	6000.0	31	4855
Optimistic	6300.0	34	5660

4.5 Procurement and Implementation Schedule

Procurement and implementation schedule required for implementation of this technology is about 8 weeks and 0.5 weeks required as a process break down. Details of procurement and implementation schedules are shown in Table 4.4 below

Table 4.4 Procurement and Implementation Schedule

S. No.	Activities	Weeks						
		1	2	3	4	5	6	7
1	Identification of Old and inefficient motors							
2	Planning and material order							
3	Procurement							
4	Commissioning							

ANNEXURES

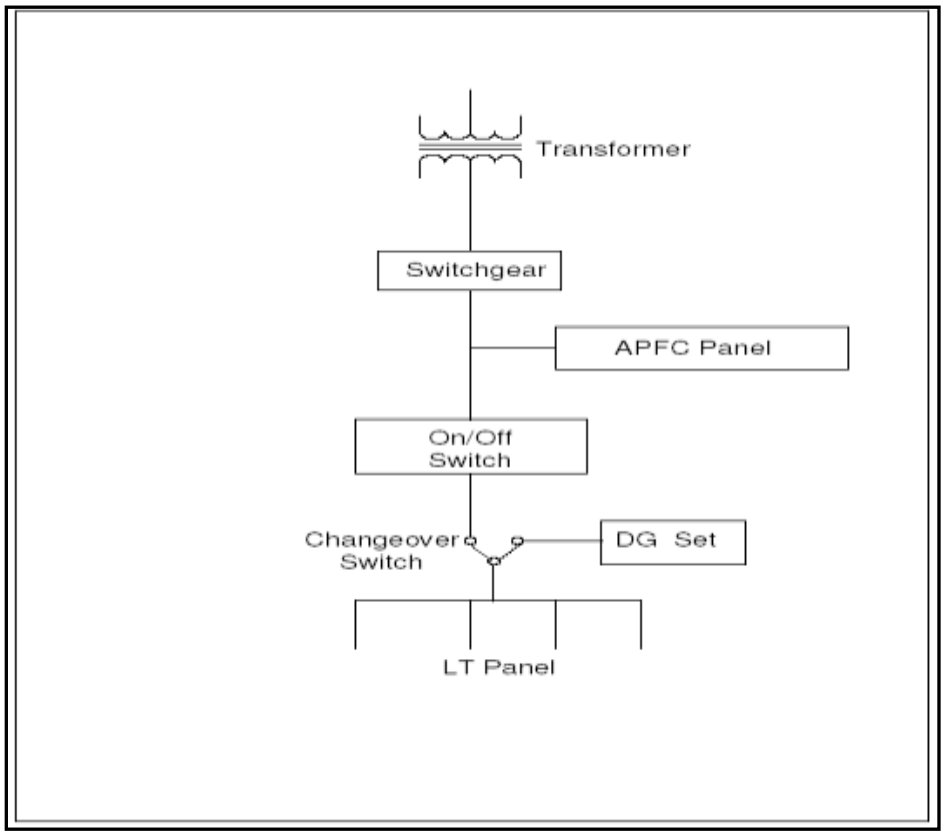
Annexure -1: Energy audit data used for baseline establishment

S.No.	Parameter	Unit	Present situation	Proposed situation
1	Power factor		0.9	0.99
2	Connected load for the sample unit	KW	50	50
3	KVA requirement of unit	KVA	55.5	50.5
4	Additional KVAr required	KVAr	15	
5	Proposed saving	Rs/Year	6000.0	

Annexure -2: Detailed Technology Assessment Report

S.No.	Parameter	Unit	Present situation	Proposed situation
1	Power factor		0.9	0.99
2	Connected load for the sample unit	KW	50	50
3	Additional KVAr required	KVAr	15	
4	Proposed saving	Rs/Year	6000.0	

Schematic arrangement for APFC installation



Annexure -3: Detailed Financial Calculations

Template: Financials for BEE projects		
Name of Project	**Replacement of Old and Inefficient motors**	
	Units	**Value**
Cost of equipments	Rs	10500.0
Saving Potential	Rs per year	6000.0
IRR		31%
NPV	Rs	4850.0
ROE		153%
Simple payback period	Months	21

Assumptions	Units	Value
Commercial Inputs		
Required Investment(Cost of equipment+ EPC cost+ Misc. cost)	Rs	10500.0
O&M cost (5% of equipment cost)	Rs	375.000
Acceleration in O&M cost per year	%	5%
Debt/Equity ratio		3 to1
Debt component of Investment	75%	7875.00
Equity component of investment	25%	2625.00
Interest on term loan	%	10%
Loan tenure	Years	4
Moratorium period	Months	6
Depreciation rate (Companies act)	%	5.28%
Depreciation rate (IT act)	%	80%
Income tax rate	%	33.99%

PROFITABILITY & IRR Calculations						
Particulars/ Years		1	2	3	4	5
Revenue						
Total saving	Rs	6000.00	6000.00	6000.00	6000.00	6000.00
Expenditure						
O&M Expenditure	Rs	375.00	393.75	413.43	434.10	455.81
Interest on term loan	Rs	773.44	590.63	365.6	140.63	0.00
Book depreciation	Rs	396	375.091	355.28	336.52	318.75
Total expenses		1544.43	1359.46	1134.34	911.26	774.57
PBT	Rs	4455.56	4640.53	4865.65	5088.73	5225.42
Tax		0	1677.890	1749.09	1819.89	1861.59
PAT		4455.56	2962.643	3116.55	3268.84	3363.83

Cash Flow Statement						
		1	2	3	4	5
PAT		4455.56	2962.64	3116.55	3268.84	3363.83
Add: Depreciation		396	375.091	355.28	336.52	318.75
Add: Interest		773.44	590.63	365.63	140.63	0.00
Net cash In flow		5625.00	3928.35	3837.46	3745.99	3682.59
Net cash out flow		-10500.0				
Net cash flow		-4875.0	3928.35	3837.46	3745.99	3682.59
	-10500.0	5625.0	3928.4	3837.5	3746.0	3682.6
IRR	31%					
NPV (INR)	4855.67					

Cash statement						
		1	2	3	4	5
Source						
Equity	2625.0					
Loan	7875.0					
PAT		4455.56	2962.64	3116.55	3268.84	3363.83
Depreciation		396.00	375.09	355.28	336.52	318.75
Total	10500.0	4851.5	3337.7	3471.8	3605.37	3682.59
Application						
Capital expenditure	10500.0					
Loan repayment		773.4	590.6	365.63	140.63	0.00
Total	10500.0	773.4	590.6	365.6	140.6	0.0
Net surplus	0.00	4078.3	2747.1	3106.21	3464.75	3682.59
Add: Opening balance	0		4078.13	6825.23	9931.45	13396.19
Closing balance	0	4078.1	6825.2	9931.45	13396.1	17078.79

Tax calculation						
		1	2	3	4	5
PBT	Rs	4455.56	4640.53	4865.65	5088.73	5225.42
ADD: Book depreciation		396.00	375.09	355.28	336.52	318.75
SUB: IT Depreciation		6000.0	79.20	75.018	71.057	67.305
PBT&D		-1148.4	4936.42	5145.919	5354.20	5476.88
Tax		0	1677.8	1749.097	1819.89	1861.59

Loan payment schedule							
YEARS	QUARTERS	BALANCE AT THE BEGNING OF QUARTER	QUARTER INTEREST	QUARTER'S PRINCIPEL PAYMENT	BALANCE AT THE END OF QUARTER	ANNUAL PRINCIPEL PAYMENT	ANNUAL INTEREST PAYMENT
1	1	7875.00	196.88	0.00	7875.00	1125.00	773.44
	2	7875.00	196.88	0.00	7875.00		
	3	7875.00	196.88	562.50	7312.50		
	4	7312.50	182.81	562.50	6750.00		
2	1	6750.00	168.75	562.50	6187.50	2250.00	590.63
	2	6187.50	154.69	562.50	5625.00		
	3	5625.00	140.63	562.50	5062.50		
	4	5062.50	126.56	562.50	4500.00		
3	1	4500.00	112.50	562.50	3937.50	2250.00	365.63
	2	3937.50	98.44	562.50	3375.00		
	3	3375.00	84.38	562.50	2812.50		
	4	2812.50	70.31	562.50	2250.00		
4	1	2250.00	56.25	562.50	1687.50	2250.00	140.63
	2	1687.50	42.19	562.50	1125.00		
	3	1125.00	28.13	562.50	562.50		
	4	562.50	14.06	562.50	0.00		

Depreciation schedule						
Depreciation as per companies act		1	2	3	4	5
Value of machine at the begning of year		7500.0	7104.0	6728.9	6373.6	6037.1
Depreciation		396	375.091	355.28	336.52	318.75
Net value at the end of year		7104.0	6728.9	6373.6	6037.1	5718.3
Depreciation as per IT act		1	2	3	4	5
Value of machine at the beginning of year		7500.00	1500.0	1420.8	1345.8	1274.7
Depreciation		6000	79.2	75.01	71.05	67.30
Net value at the end of year		1500.0	1420.8	1345.8	1274.7	1207.4

Annexure:-4 Procurement and implementation schedule

S.NO.	Activities	Weeks					
		1	2	3	4	5	6
1	Study of units power system for APFC capacity assessment						
2	Issue of purchase order						
3	Receipt of the equipment						
	Civil work at site for foundation and mounting panels						
4	Commissioning and testing						

Annexure:-5 Break-up of Process down Time

During commissioning, shut down period of about 3 to 4 hours will be required.

Annexure -6: Details of technology service providers

S.No	Name of Company	Contact person	Contact Details	Address
1	BHEL	Mr. N Ramakrishna Contact No. - 9945530146	Tel : +91-26001010 Fax : +91 11 26493021 +91 11 26492534	BHEL BHEL House, Siri Fort, New Delhi- 110049,
2	Danfoss Industry Pvt Ltd	Mr. Mahendra Chalke Contact No.- 09967971799	Tel : +911244036677 Fax : +911244039321	Danfoss Industry Pvt Ltd VI floor, JMD Pacific Square,Sector – 15,N.H.-8, Gurgaon -122001
3	Siemens Ltd.	Mr. Rajesh Jain Contact No. 9987089336	Tel : (022)27623502 Fax :(022)27623727	Siemens Ltd. Thane Belapur Road Thane – 400601,
4	CONZERV SYSTEMS PVT LTD		Tel:- 0124 4268899 Fax:- 0124 4268957 Email: del.sales@conzerv.com	CONZERV SYSTEMS PVT LTD 87, 1st Floor Industrial Development Colony (IDC) Mehrauli Road Gurgaon - 122 001,
5	NAAC Energy Controls (P) Ltd	Mr. Chander M. Kapoor Cell: 09811199085	Tel.: 0120-4221631, 32, 33, 34 Fax: (91)-(120)-4221635	NAAC Energy Controls (P) Ltd C-135 Hosiery Complex, Phase II (Extn.), Noida – 201305
6	NEPTUNE INDIA LTD.	Mr.Robin Bhatia	91-98294-28666 jaipur@neptuneindia.com	

7	Crystal Controls	Mr.Dhanji Ghinaiya dghinaiya@gmail.com	9714714192	309, Abhishree complex,Opposite star bazar, Near Jodpur char rasta, satellite, Ahmedabad
8	Meher Capacitors	Mr.Ketan Budhelia indcares_ad1@sancharnet.in	9825216761	Industrial cares 302 royal complex, Bhutkhana Ch0wk, Rajkot-360002
9	Siemens Ltd.	olm.india@siemens.com	022-27568000	Industrial sollutions and services, sector-2,plot-2,Kharghar Node,Navi mumbai-410210
10	Tech-Mark Automation & controls	rahul@tech-mark.net, aparna@tech-mark.net	020-25423284	Plot no.-5,Shriman Society,Opposite Pune Peoples cooperative bank,Kerve Nagar,Pune-411052
11	Shiv Engineering	Mr.Rakesh Mayavanshi	0265-6451780, 09898688978	Plot no.-976/8/4,GIDC Estate,Makarapura, Vadodra,Gujarat-390010
12	Standard Capacitors	Mr.Subhash Gupta standardcap@gmail.com	011-27181490/27101958	No. B-70/43, DSIDC Complex,Lawrence Road,Industrial Area,New Delhi-110035

Annexure -7: Details of quotation for Power factor controller

STANDARD CAPACITORS

B-70/43, DSIDC complex, Lawrence Road Industrial area, Delhi-110 035
Ph.: 27181490, 27101958, 27151027 Fax: 011-25257151 E mail: standcap @ gmail.com

Shunt Capacitors, APFC Panels, LT/HT Control/Distribution Panels,
Consultancy, Turnkey Projects & AMC for Power Factor Improvement

SG/S/200/5645
July 28, 2011

SUB : YOUR ENQUIRY DATED 28.07.2011 FOR POWER CAPACITORS AND APFC PANELS

Dear Sir.

This has reference to your above enquiry. We take this opportunity to introduce ourselves as one of the leading manufacturers of STANDARD make capacitors & Automatic **power factor control (APFC) panels.** We undertake turnkey jobs for supply and installation of APFC panels. We are an ISO certified company. Our panels are approved by Ordnance factories, Delhi Jal Board, MES and tested by CPRI

Detailed description of our products is available at our website www.standardcapacitors.com

We have over 34 years' experience in the field. Our clients include ORDNANCE FACTORY BHUSAWAL/ MURADNAGAR/ AMBAJHARI, OPTO ELECTRONIC FACTORY DEHRADUN, RAILWAY, CPWD, PWD, DELHI JAL BOARD, , NBCC LTD. INDIAN OIL CORPORATION,ONGC, GAIL (INDIA) LIMITED, NIFT, INDIAN AIRLINES, AIR INDIA, AIRPORTS AUTHORITY OF INDIA, AIIMS, ITDC, CDRI LUCKNOW, REGIONAL RESEARCH LABORATORY BHUBANESHWAR (CSIR), STANDING CONFERENCE OF PUBLIC ENTERPRISES (SCOPE), PUNJAB GENCO LIMITED, DELHI UNIVERSITY,JNU, DEPARTMENT OF TELECOMMUNICATIONS, , BEL, BHEL DELHI/NOIDA/,TIRUCHIRAPALLI/HYDERABAD, IRCON INTERNATIONAL LTD. Srinagar, THDC India Limited, etc. etc.

Our commercial offer is attached herewith.

Thanking you.

Yours truly
For STANDARD CAPACITORS

Subhash C.Gupta
CAPACITOR SALES
BE (E), MIE, FIV, C, Engg. (I)
Cell Ph. 98100-49253

COMMERCIAL OFFER

PRICE:

FOR CAPACITOR UNITS

1.	Cylindrical MPP type capacitors from 1 KVAr to 4 KVAr	: Rs. 125/- per KVAr
2.	Cylindrical MPP type capacitors from 5 KVAr to 50 KVAr	: Rs. 110/- per KVAr
3.	Square MPP type capacitors from 1 KVAr to 4 KVAr	: Rs. 145/- per KVAr
4.	Square MPP type capacitors from 5 KVAr to 50 KVAr	: Rs. 125/- per KVAr
5.	Heavy duty MPP double layer capacitors	: Rs. 175/- per KVAr
6.	Super heavy duty MPP type capacitors	: Rs. 275/- per KVAr

BANKING CHARGES for parallel connected capacitors for higher ratings: Rs. 50/- per KVAr extra

FOR APFC (AUTOMATIC POWER FACTOR CONTROL) PANELS

Up to 50 KVAr	: Rs. 1750/- per KVAr
Above 50 KVAr & up to 100 KVAr	: Rs. 1600/- per KVAr
Above 100 KVAr	: Rs. 1500/- per KVAr

TERMS & CONDITIONS :

01. Sales Tax @ 12.5% will be charged extra
02. Prices are Ex our works and are exclusive of packing, forwarding, freight and insurance.
03. Delivery will be made within 3 months of receipt of your firm order
04. Payment terms are 35% advance, 65% against Performa invoice
05. Equipments are guaranteed for one year against all manufacturing defects
06. Our offer is valid for 60 days

For STANDARD CAPACITORS

Subhash C.Gupta
CAPACITOR SALES
BE (E), MIE, FIV, C, Engg. (I)
Cell Ph. 98100-49253

Annexure 8

To be submitted by Indian company/firm
Seeking financial assistance under
TIFAC-SIDBI Revolving Fund for Technology Innovation

सृजन (SRIJAN)
Application Format

PART A: Brief about the Unit

1.1 Particulars of company / firm

1	Name	
2	Constitution	
3	Year of incorporation / commencement of operations	
4	Address of registered office and site of operations	
5	Main Promoter(s) / contact details	

1.2 Particulars of Promoters

Name (age)	Educational/ Professional qualification	No of years of professional experience	No of years of entrepre-neurial experience	Stake in the firm / company (%)

1.3 Present line of business and Technology / product successfully developed by the entity in the past:

1.4 Technology know-how Partner (**name, designation with educational and professional background, affiliation address, telephone, fax, e-mail etc.)**:

PART B: Technical Information

2 Project title:

2.1 Background:

2.2 Project objectives :

2.3 Major Targets :

2.4 Process / Products proposed to be developed under the project along with specifications etc.:

2.5 Technology development/demonstration in Product/Process

Technology development:

(i) Process:

(ii) Product:

2.5.1 Detailed technology description:

2.6 What is the specialty / novelty / uniqueness / innovation about the technology:

2.7 Work already carried out for proof of concept / technology validation:

2.8 Whether the technology has been already patented. If yes, provide the details:

2.9 Process flow-charts / schematic diagram etc.:

2.10 Raw materials and their availability:

2.11 Comparative advantages / disadvantages over the conventional/ emerging technologies and brief comments on competitions / challenges:

2.12 Techno-economics, cost benefit analysis and demand statistics in next 2/3 years:

2.13 Environmental Impact, if any:

2.14 Work Plan:

2.14.1 Project Duration (in months):

2.14.2 Time schedule indicating important activities/milestones & duration (*bar-chart)*:

2.15 Deliverables of the project:

2.16 List of existing facilities already available for the proposed project (land, building, machinery, software, manpower, utilities etc.)

PART C: Financial information

3.1 Total Project Cost:

Project head	Area / Qty./ Specifications/ Capacity	Company/Firm Contribution (`Lakh)	Contribution from Fund (`Lakh)	Total Cost (`Lakh)
Cost of construction / augmentation of factory shed for the project				
Technology Know-how fee / patent / licensing				
Equipment / Machinery / Utilities				
Consumables / Raw Materials				
Equipment for Testing & Evaluation / Quality Control				
Manpower Salaries				
Marketing related expenses				
Working Capital Margin				
Others (pl specify)				
Contingency				

Total				

3.2 Means of Finance:

Means of finance	**Amount (`lakh)**
Additional Share capital	
Unsecured loans from …..	
SIDBI Assistance	
Assistance sought from the Fund	
Others (pl specify)	
Total	

3.3 Detailed Break-up of following Heads of Project Cost with equipment details (in tabular form):

3.3.1 Capital Equipment / plants & machinery
3.3.2 Testing & Laboratory Equipment
3.3.3 Manpower Salaries
3.3.4 Consumables/Raw Materials

3.4 What makes the technology different from existing ones and advantage in terms of business opportunities?

3.5 Whether this proposal has been submitted to any other agency for funding support (if yes, give details)

3.6 Financial performance: In case of existing entity, brief business highlights given below (*Pl. enclose last FY audited accounts with auditors report)*.

(` Lakhs)

Particular	FY ….	FY …..	Particular	FY …..	FY ….
Revenue			Share Capital (promoters)		
EBDITA			Share capital (others)*		
Profit After Tax (PAT)			Net worth/ Accumulated losses		
Initial/ product dev expenses not written off			Bank term loans		
Net Profit Margin (%)			Unsec loans – promoters		
Debt Equity Ratio (DER)			Unsec loans – others		
			Bank borrowings –WC		

**please provide details*

3.7 Credit/ Banking facilities from SIDBI / other banks/ FIs/ PE or VC or Angel investors in respect of customer (` Lakh)

PE/ VC/ Angel inv/ Bank, branch	Facility	Sanc amt	Outstanding

3.7.1 **Whether any over dues in any banking credit facilities by the applicant enterprise/ associate concerns in past 2 years.**

3.7.2 **Whether any of the accounts of the enterprise/ associate concern classified as NPA/ any restructuring done during past 3 years or any OTS done ever.**

3.7.3 **Whether any default in promoters' personal/ consumer loans/credit card payments, etc.**

3.8 Tentative Business projections (in Lakh)

Particular	First Year		Second Year		Third year		Fourth year	
	H1	H2	H1	H2	H1	H2	H1	H2
Sales								
PAT								

4. Key strengths and risk factors

5. Any other relevant information

DECLARATION

I/We certify that all information furnished by me/ us above and in the appendix/annexures/ statements and other papers enclosed is true; I/we have no borrowing arrangements for the unit with any bank / FI except as indicated in the application; that there are no overdues / statutory dues/government enquiry/proceedings/prosecution against the unit/associate concerns/ promoters/directors except as indicated in the preliminary information; that no legal action has been/ is being taken against the unit/associate concerns/promoters/directors; that I/ we shall furnish all other information that may be required by SIDBI in connection with my/our application and I/ We have no objection to your furnishing the information submitted by me/ us to any agency as you may deem fit in connection with consideration of the assistance. We have no objection to SIDBI/ its representatives making suitable enquiries while considering the application.

Place: **Signature**

Date: **Name & Designation with Seal**

Annexure I

Details of Associate Concerns

Name , Address & products manufactured	**Existing since**	**Name & Address of existing Banker (s)**	**Facilities Enjoyed**	**Share holding of the main promoter(s) of applicant unit**

Annexure II

Particulars of machinery proposed for the project

Name of machinery, (model / specification)	**Name of manufacturer, contact person, e-mail address telephone no**	**Lead time for delivery Of machinery**	**Invoice price (for Indigenous machinery) / CIF price (for imported) (Rs. lakh)**	**Purpose /use of machine.**	**Basis of selection of supplier**	**Remark s reg. After Sale Service etc.**
APFC	Attached Doc.	1 Month	As per quotation	To Improve energy Efficiency	Techno-commercial competitiveness.	

Annexure III

Details of Misc. Assets / equipment Proposed

S.No.	Name of item	Supplier	Cost (Rs. lakh)	Purpose/ use of MFA	Remarks

Annexure IV

Profitability projections for the unit/company as whole:

S. No.	Items	Actual for previous years	Y1	Y2	Y3	Y4	Y5	Total
1	Total income		6000	6000	6000	6000	6000	30000
2	Raw material							
	Power and fuel							
	Wages and salaries							
	Selling expenses							
	Other expenses		375.0	393.8	413.4	434.1	455.8	2072.1
	Total cost		375	393.75	413.43	434.1	455.81	2072.09
3	Profit before depreciation, interest and taxes (PBDIT)		5625	5606.25	5586.57	5565.9	5544.19	27927.9
4	Interest on term loan		773.44	590.63	365.6	140.63	0	1870.3
5	Interest on working capital							
6	Interest on unsecured land							
7	Depreciation		396	375.09	355.28	336.52	318.75	1781.64
8	PBT		4455.56	4640.529	4865.69	5088.75	5225.44	24276
9	Tax		0	1677.9	1749.1	1819.9	1861.6	7108.5
10	PAT		4455.56	2962.639	3116.6	3268.86	3363.85	17167.5
11	Dividends/ withdrawal							
12	Cash accruals							
13	Debt service coverage ratio		3.0	1.4	1.5	1.6	-	-
	Av. DSCR	1.8						

Annexure V

S. No	Documents	Y/N	Reasons for Non-Submission
1	SSI Regn. / CA certificate certifying SSI status.		
2	Certified copies of Memorandum & Articles of association / Partnership Deed.		
3	Audited financial results for the last three years of Applicant unit.		
4	Copies of lease deed / sale deed on which the unit is situated.		
5	Copies of sanction letters from commercial banks/ FIs which have sanctioned assistance to the unit.		
6	NOC from pollution control board/consent letter, if applicable.		
7	IT Returns/Assessment orders/Sales tax returns of the Applicant Unit/ promoters/directors for 2years.		
8	List of existing plant and machinery.		
9	Competitive quotations for machines and Misc.fixed assets proposed to be acquired under the scheme.		
10	Duly signed latest net worth statements of promoters/directors & guarantors in SIDBI format;In case of guarantors please furnish, Name, Age,Father's/Husband's name, residential address.Details of similar guarantee, if any, given to other institutions.		
11	2 sets of photographs along with signatures of all promoters/directors/guarantors duly certified by a Bank or Gazetted Officer.		
12	Audited financial results for last three years for each associate concerns. If applicable.		
13	Copy of title deed of collateral security and valuation report.		

Bureau of Energy Efficiency (BEE)

(Ministry of Power, Government of India)

4th Floor, Sewa Bhawan, R. K. Puram, New Delhi – 110066

Ph.: +91 – 11 – 26179699 (5 Lines), Fax: +91 – 11 – 26178352

Confederation of Indian Industry

CII – AVANTHA Centre for Competitiveness

Block No.3, Dakshin Marg

Sector 31-A, Chandigarh - 160030

Tel: 0172-5080784 (D) / 2666517-19

India SME Technology Services Ltd

DFC Building, Plot No.37-38,

D-Block, Pankha Road,

Institutional Area, Janakpuri, New Delhi-

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(Ministry of Power, Government of India)
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Websites: www.bee-india.nic.in, www.energymanagertraining.com

SEE-Tech Solutions Pvt. Ltd

11/5, MIDC, InfoTech Park,

Near VRCE Telephone Exchange,

South Ambazari Road,

Nagpur – 440022

Website: www.letsconserve.org

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