DETAILED PROJECT REPORT
ON
ENERGY COST REDUCTION WITH POWER FACTOR IMPROVEMENT
(ALWAR OIL MILL CLUSTER)

ENERGY IS LIFE
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Bureau of Energy Efficiency (BEE)

Prepared By

CII
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ENERGY COST REDUCTION WITH POWER FACTOR IMPROVEMENT

ALWAR OIL MILL CLUSTER

BEE, 2011

Detailed Project Report on Power factor improvement for Oil Mills

Oil Mill SME Cluster, Alwar (Rajasthan) (India)

New Delhi: Bureau of Energy Efficiency

Detail Project Report No.: **ALW/PNL/PF/11**

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CII – AVANTHA Centre for Competitiveness for SMEs
Confederation of Indian Industry
Chandigarh

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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**
PF	**Power factor improvement**

EXECUTIVE SUMMARY

Confederation of Indian Industry is executing BEE-SME program in Alwar Oil Mill Cluster, supported by Bureau of Energy Efficiency (BEE) with an overall objective of improving the energy efficiency in cluster units.

Alwar Oil Mill cluster is one of the largest Oil mill 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 ceramic clusters in India.

The main energy forms used in the cluster units are grid electricity. In Oil Mill plant, electricity bill is about 100% of total plant energy bill.

Most of the Industrial installations in the country have large electrical loads which are severely inductive in nature, such as motors, large machines etc which results in a severely lagging power factor. This means loss and wastage of energy and heavy penalties by electricity boards. In case of fixed loads this can be taken care by manual switching of capacitors.

However in case of rapidly varying and scattered loads it becomes difficult to maintain a high power factor by manually switching on/off the capacitors in proportion to variation of load within an installation. This drawback can be overcome by using an APFC panel (Automatic Power Factor Correction Panel) which not only maintains a high power factor but also eliminates the need for constant manual intervention.

Improvement in power factor to unity with the installation of some additional capacitors if required and the installation of APFC panel helps in reducing the electricity bill amount by availing the benefit of incentive on improving the power factor from the Rajasthan Electricity Board.

Project implementation will lead to reduction in electricity bill by Rs.0.48 Lakh per year however; this intervention will not have any effect on the existing consumption pattern of electricity.
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 power factor improvement project is furnished in Table below.

Assumption for Power factor

Electrical load	45 kW
Existing power factor	0.9
Proposed power factor	0.99
Monthly Electricity Bill	Rs 1.0 Lakh

With increase in Power factor above 0.95 gives energy saving of 1%. As power factor varied from 0.95 to 0.99 gives energy saving of 4% in electricity bill.

Saving	4% of monthly electricity bill
Running Hours	10 hrs/day 3000 hrs/year
Monetary Saving	=0.04 x Electricity bill Rs./month X 12 months/yr
Monetary saving	= 0.04 x Rs 100000/month X 12 months /year = Rs 0.48 Lakh
Required kVAR	= 45 kW {tan (cos-1 0.9) – tan (cos-1 0.99) = 15 kVAR
Required investment	Around 1000 / kVAR = Rs. 0.15 Lakh

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 power factor improvement device is furnished in Table below;

S. No.	Particular	Unit	Value
1	Project cost	(in lakh)	0.15
2	Monetary benefit	(in lakh)	0.48
3	Debit equity ratio	Ratio	3:01
4	Simple payback period	years	0.35
5	NPV	(in lakh)	1.01
6	IRR	%age	217
7	ROI	%age	214
8	Process down time	hours	5
9	DSCR	Ratio	6.55

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 energy performance in 29 selected SMEs clusters. Alwar Oil Mill Cluster is one of them. The BEE's SME Programme intends to enhance 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 INTRODUCTION

1.1 Brief Introduction about the Cluster

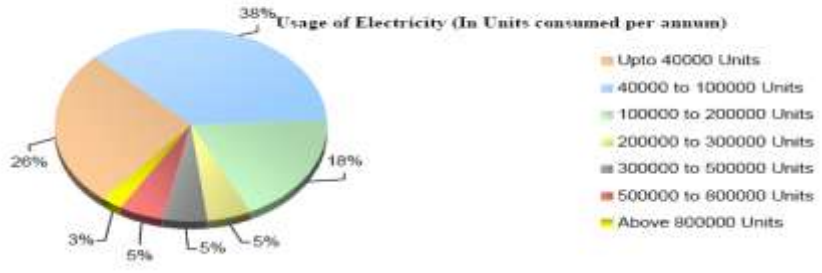
Alwar SME Cluster is one of the largest Oil Mill clusters in India, which is famous for manufacturing of Mustard Oil. The nearest airport is at Jaipur, which is 150 KM from Alwar by road.

There are approximately 60 Oil Mill units in this cluster which are engaged in manufacturing of mustard oil (Kacchi Ghani and Pakki Ghani). There are more Oil Mill units coming up in Alwar.

Energy used for oil extraction is electricity. In Alwar and Sawaimadhopur region there is shortage of power and that leads to less production of oil. Because of the power shortage some of the very small scale units of cluster are planning to shut their plant.

Table 1.1 Details of Annual Energy Consumption Scenario at Alwar Oil Mill Cluster

- USAGE OF ELECTRICITY (IN UNITS CONSUMED PER ANNUM)



Electrical energy consumption in Alwar and Sawaimadhopur units lies in range of around 186 Lakhs kWh for processing of 1240000 Quintal of Mustard Seed. Oil units in Alwar & Sawaimadhopur regions are having Specific Energy Consumption in range of 10-15 kWh/Quintal of mustard seed processed.

Energy Usage Pattern

Average monthly electricity consumption in Oil Mill plants ranges from 0.5 lakh to 2 lakh kWh depending on the size of the plant.

Classification of Units

The Oil Mill units can be categorized into following three types based on capacity of production

- Large scale units
- Medium scale units
- Small scale units

Production Wise Unit Breakup

Alwar Oil Mill cluster can be broken into three categories viz. small, medium and large size unit. Table 1.2 shows that production wise breakup of Alwar cluster.

Table 1.2 production wise unit breakups

S. No.	Type of Unit	Production Capacity
1	Large scale unit	More than 120 MT
2	Medium scale unit	50 to 120MT
3	Small scale unit	Less than 50 MT

Products Manufactured

Different types of products manufactured in Alwar SME cluster are as shown in Table 1.3 below.

Table 1.3 Product Manufactured

S. No	Type of Product	% Share
1	Pakki Ghani	70
2	Kacchi Ghani	30

Production Process of Oil Mill:

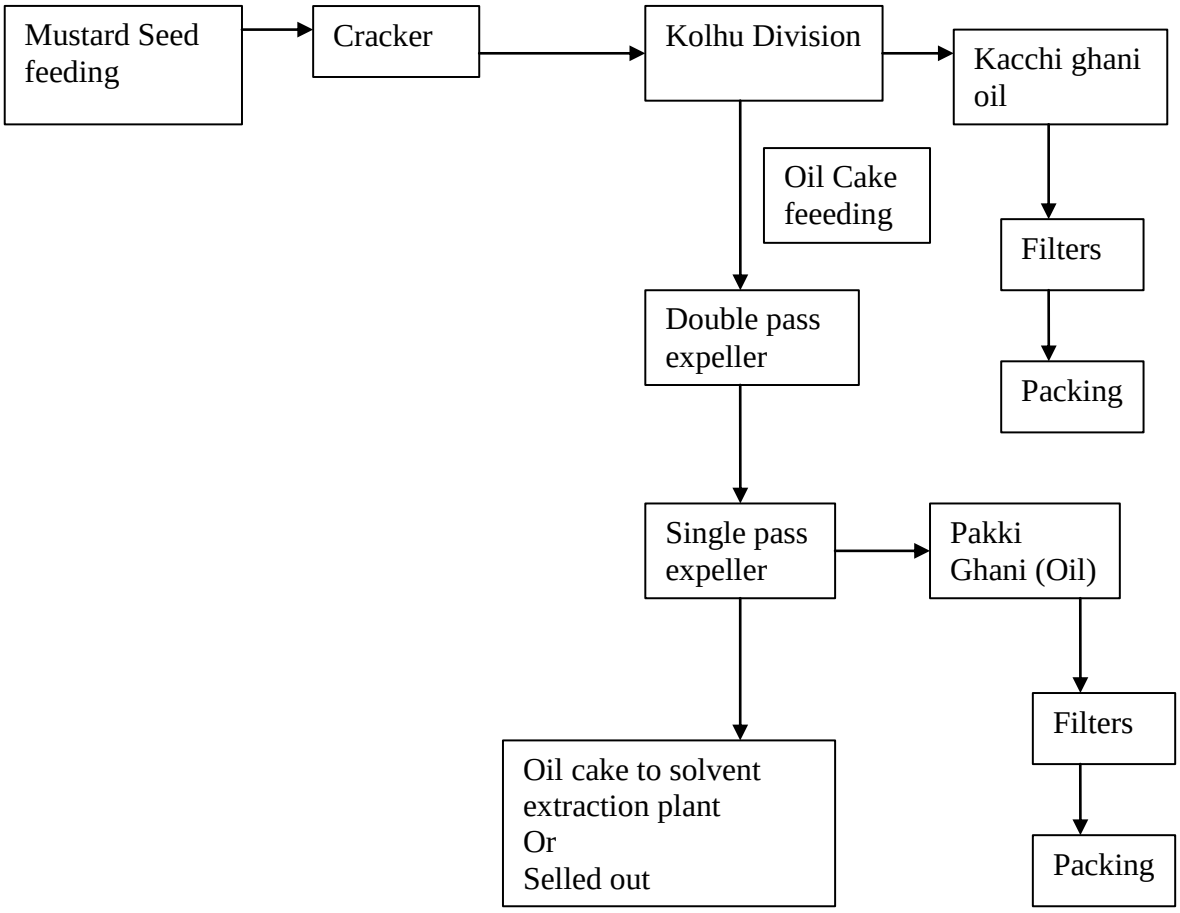


Figure 1.1 Process flow diagram of Oil Mill Units

Mustard Oil Extraction

Raw material used for oil production is mustard seeds, which is purchased from Local Mandi of Alwar and Sawaimadhopur.

Seed cracker cracks the crop of mustard in fine pieces so that it can be further processed in Kolhu and Expeller. To get oil from raw mustard seed, it is first given to Kolhu and the waste (oil cake) from the kolhu is given to Expeller which extracts more oil from the same oil cake. Remaining oil cake is given to solvent extraction plant or sold out in market. Filtered oil goes to oil filling plant where oil is filled in bottles as per requirement and finally packed in cartoon to send at required places across India.

Technology used for process involve expellers (Double pass & Single pass), Kolhus run by motors instead of any animal. Single motors run many kolhus, which are connected on same shaft by belts. After extracting oil from machines, it is sent for filtration to fine filter cloth

1.2 Energy performance in existing situation

Oil units in Alwar & Sawaimadhopur regions are having Specific Energy Consumption in range of 10-15 kWh/Quintal of mustard seed processed.

1.2.1 Average Production

Annual production in typical unit in Alwar Cluster is given in Table 1.4.

Table 1.4 Annual Production of a Typical Unit

S. No	Type of Product	Production MT/annum
1	Mustard Oil	122691

1.2.2 Energy Consumption

Energy consumption (electrical) in a typical Oil Mill plant for different types of products is given in Table 1.5 below:

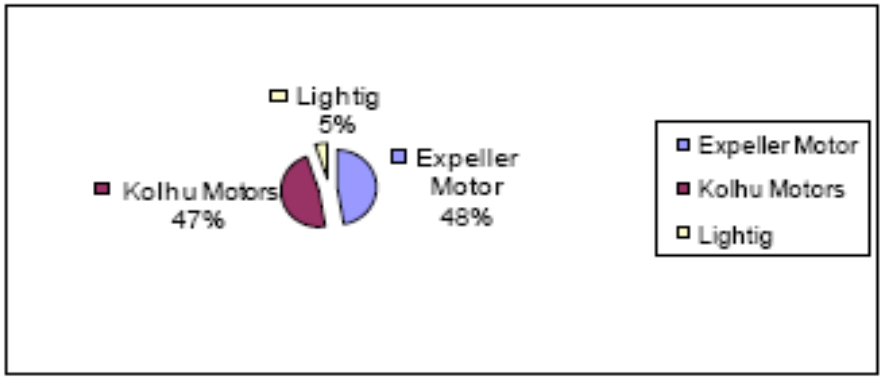


Table 1.5 Annual Energy Consumption

Annual energy consumption is around 186 Lakh Units for processing of around 1240000 quintal of mustard.

Table 1.6 Annual Energy Consumption

S. No	Type of Fuel	Unit	Value	Contribution in equivalent energy terms (%)
1	Electricity	Mwh/year	18.6	100

1.2.3 Specific Energy Consumption

Specific electrical energy consumption is 10 to 15 kWh for quintal of mustard seed processing in Oil Mill industry

1.3 Proposed Technology/Equipment

1.3.1 Description about the existing technology

Oil Industry had taken the electricity connection from the Rajasthan State Electricity Board. The electricity supply coming to the industries is of High Tension (HT) category where Induction furnaces are installed and Low Tension (LT) where expellers and kolhus are used for oil extraction. 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. Rajasthan State Electricity Board provides the incentives on the demand and energy charges to the consumers for maintaining the power factor above 0.95. The percentage of incentive increases with every increase in power factor above 0.90. If the power factor falls less than 0.90 then consumer has to pay the penalty according to the applicable tariff.

1.4 Establishing the Baseline for the Proposed Technology

Presently almost all the Oil plants at Alwar and Sawaimadhopur are operating at a low power factor. They are not getting the full benefit of incentive at this power factor from the RSEB. If the power factor falls less than 0.90 then they have to pay the penalty according to the applicable tariff.

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 proposed technology

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 PSEB

- Due to lack of technical knowledge and expertise, power factor is not properly monitored in the Foundry 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

Implementation of the proposed project activity requires an investment of Rs. 0.15 Lakh. This is a significant investment and not commonly seen in the cluster for the implementation of energy efficiency projects.

1.5.3 Skilled Manpower

In Alwar Oil Mill cluster, the availability of skilled manpower is one of the limitations, this issue gets further aggravated due to more number of Oil Mill units as compared to the availability of skilled manpower. One local technical person available at Alwar takes care of about 2 to 3 Oil Mill units. For major equipments of Oil Mill units like Expeller or Kolhu for maintenance or the repair works of these equipments take care by the equipment suppliers itself.

2 PROPOSED TECHNOLOGY

2.1 Detailed Description of Technology

2.1.1 Description of Technology

Existing scenario of power factor in plants of Alwar Oil Mill cluster is 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 capacitors if required and the installation of APFC panel helps in reducing the electricity bill amount by availing the benefit of incentive on improving the power factor. In the ceramic 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 APFC panel. If the reactive power is provided in excess than the requirement, then the plant has to pay penalty for that to state electricity board. Therefore, 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 with APFC panel is very important. APFC panel switches ON and OFF the capacitors according to the requirement and maintain the power factor to unity. So that by installing APFC panel, plant can maintain the power factor for respective lagging load. It will not require manual operation as it automatically select capacitor bank as per requirement.

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 "ebb and 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 0.99. 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 (kW2 + kVAR2)
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 I2R 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 PFi)} – {tan (cos-1 PFf)}]

Assumption for Power factor

Parameters	Values
Electrical load	**45 kW**
Existing power factor	**0.9**
Proposed power factor	**0.99**
Monthly Electricity Bill	**Rs 1.0 Lakh**

With increase in Power factor above 0.95 gives energy saving of 1%. As power factor varied from 0.95 to 0.99 gives energy saving of 4% in electricity bill.

Parameters	Values
Saving	4% of monthly electricity bill
Running Hours	10 hrs/day 3000 hrs/year
Monetary Saving	=0.04 x Electricity bill Rs./month X 12 months/yr
Monetary saving	= 0.04 x Rs 100000/month X 12 months /year = Rs 0.48 Lakh
Required kVAR	= 45 kW {tan (cos-1 0.9) – tan (cos-1 0.99) = 15 kVAR
Required investment	Around 1000 / kVAR = Rs. 0.15 Lakh

2.1.2 Technology Specification

For implementation of the proposed project, additional capacitors only have to be put. APFC panel is already installed in the Oil Mill plant.

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.

Rajasthan State Electricity Board provides incentives for good power factor (PF>0.90) and penalty for bad PF (PF<0.90). For units with Induction Furnaces the power factor has to be maintained 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 along with APFC panel are easily available at the Rajasthan. Local service providers are also available at Rajasthan. More details of service provider are given in annexure 5.

2.1.5 Source of Technology

The main source which has taken the initiative to create the awareness for implementation of this project by providing the benefit to the consumers in terms of rupees is the State Electricity Distribution Board. By providing incentive on improving the power factor to the consumers the State Electricity Distribution Board is promoting the awareness on importance of power factor improvement.

2.1.6 Terms and Conditions after Sale

Warranty period of one year will be provided from the date of invoice against any manufacturing defects.

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 foundry plant, breakdown period of 2 to 3 hours will be required.

2.2 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.

2.3 Suitable Unit for Implementation of the Identified Technology

For estimation of the saving potential on implementation of this project, here the Foundry plant engaged in producing castings having present power factor of about 0.94 is considered.

3 ECONOMIC BENEFITS FROM PROPOSED TECHNOLOGY

3.1 Technical Benefits

3.1.1 Electricity savings per year

Project of improvement in power factor to unity will not result in savings in electricity consumption in foundry plant. But it helps to get the savings in the electricity bill as a rebate of about 0.75% on total electricity bill by improving power factor to 0.99.

3.1.2 Improvement in product quality

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

3.1.3 Improvement in production

This project is not contributing for increasing in production in Oil Mill plant. But it reduces the power consumption for producing same amount of oil.

3.1.4 Reduction in raw material consumption

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

3.1.5 Reduction in other losses

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

3.2 Monetary Benefits

Monetary benefit after implementation of this technology is shown in Table 3.1 below.

Parameters	Values
Electrical load	45 kW
Existing power factor	0.9
Proposed power factor	0.99
Monthly Electricity Bill	Rs 1.0 Lakh

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 Skill Set of Workers

The technical skills of workers will definitely improve. Training on the regular maintenance will help in improving the technical understanding of the workers.

3.4 Environmental Benefits

This project will not be contributing for environmental benefits.

4 INSTALLATION OF THE PROPOSED TECHNOLOGY

4.1 Cost of Technology Implementation

Table 4.1 Details of Proposed Technology Installation Cost

S. No.	Particular	Cost (Lakhs)
1	Equipment cost	0.12
2	Other cost	0.015
3	Misc	0.015
4	Total Cost	0.15

4.1.1 Technology Cost

Cost of the project is about 0.15 Lakh which includes the cost of the capacitors only.

4.1.2 Other Cost

Other costs required will be 0.015 Lakh which includes taxes, commissioning, manpower cost, transportation etc and other miscellaneous costs will be 0.015 Lakh as the contingency amount.

4.2 Arrangements of Funds

4.2.1 Entrepreneur's Contribution

Entrepreneur will contribute 25% of the total project cost which is 0.0375 Lakh.

4.2.2 Loan Amount

Remaining 75% cost of the proposed project will be borrowed from bank, which is 0.1125 Lakh.

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 5 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 0.15 Lakhs and monetary savings due to reduction in electricity consumption is 0.48 Lakh hence, the simple payback period works out to be 0.35 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 12% works out to be 1.01 Lakh.

4.3.4 Internal Rate of Return (IRR)

The after tax Internal Rate of Return of the project works out to be 217%. 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 214%.

Table 4.2 Financial Indicators of Proposed Technology

S No	Particular	Unit	Value
1	Simple Payback	Year	0.35
2	NPV	Rs. In Lakh	1.01
3	IRR	%age	217
4	ROI	%age	214

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 Lakh/year)	IRR (%)	NPV(in Lakh)	ROI (%)
Pessimistic	0.4156	207	0.95	204
Base	0.48	217	1.01	214
Optimistic	0.504	228	1.06	224

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 faulty or less capacitors							
2	Planning and material order							
3	Procurement							
4	Commissioning							

ANNEXURES

Annexure -1: Energy audit data used for baseline establishment

S. No.	Particular	Unit	Value
1	Plant load	hp	60
2	Number of passes	Nos	Single / double
3	Total length	Inches	33-66
4	Oil extraction (first pass)	%	20
5	Oil extraction (first pass)	%	2.5
6	Oil extraction (first pass)	%	1.5
7	Oil extraction (first pass)	%	1
8	Feed- mustard seed	Kg/hr	1600
9	Oil cake formation	Kg/hr	1250
10	Oil percent in cake	%	7.5

Annexure -2: Detailed Technology Assessment Report

S. No	Particular	Unit	Present situation
1	Plant present Power Factor	-	0.9
2	Plant Target Power Factor	-	0.99
3	Running hrs	Hrs/day	10
4	Power saving	kW	Nil
5	Monetary saving	Rs/yr	48000

Annexure -3: Detailed Financial Calculations

Financials for BEE projects		
Name of Project	Power factor improvement	
	Units	Value
Cost of equipments	Rs(Lakhs)	0.15
Saving Potential	Rs(Lakhs) per year	0.48
IRR		217
NPV		1.01
ROI		214
Simple payback period	Months	0.35

Assumptions			
Particulars	**Units**	**Value**	**Source**
Commercial Inputs			
Required Investment	Rs(Lakhs)	0.15	
O&M cost (5% of equipment cost)	Rs(Lakhs)	0.008	
Acceleration in O&M cost per year	%	5%	
Debt/Equity ratio		3 to1	
Debt component of Investment	75%	0.12	
Equity component of investment	25%	0.04	
Interest on term loan	%	10%	SIDBI Lending rates
Loan tenure	Years	5	
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(Lakhs)	0.480	0.480	0.480	0.480	0.480
Expenditure						
O&M Expenditure	Rs(Lakhs)	0.008	0.008	0.008	0.009	0.009
Interest on term loan	Rs(Lakhs)	0.01	0.01	0.01	0.00	0.00
Book depreciation	Rs(Lakhs)	0.00792	0.00750 1824	0.00710 5728	0.006 731	0.006 375
Total expenses		0.027	0.025	0.022	0.020	0.017
PBT	Rs(Lakhs)	0.453	0.455	0.458	0.460	0.463
Tax		0.11585 5446	0.15670 2525	0.15748 9354	0.158 268	0.159 038
PAT		0.337	0.298	0.300	0.302	0.304
Cash Flow Statement						
		1	2	3	4	5
PAT		0.337	0.298	0.300	0.302	0.304
Add: Depreciation		0.00792	0.00750 1824	0.00710 5728	0.006 731	0.006 375
Add: Interest		0.01	0.01	0.01	0.00	0.00
Net cash In flow		0.357	0.315	0.314	0.313	0.312
Net cash out		-0.2				

flow						
Net cash flow		0.2	0.315	0.314	0.313	0.312
	-0.2	0.357	0.315	0.314	0.313	0.312
IRR	217%					
NPV	1.011955023330580					
ROI	214%					
Cash statement						
		1	2	3	4	5
Source						
Equity	0.04					
Loan	0.12					
PAT		0.337	0.298	0.300	0.302	0.304
Depreciation		0.008	0.008	0.007	0.007	0.006
Total	0.16	0.345	0.306	0.307	0.309	0.310
Application						
Capital expenditure	0.2					
Loan repayment		0.01	0.01	0.01	0.00	0.00
Total	0.2	0.01	0.01	0.01	0.00	0.0
Net surplus	0.00	0.333	0.296	0.300	0.305	0.309
Add: Opening balance	0		0.33	0.63	0.93	1.23
Closing balance	0	0.33	0.63	0.93	1.23	1.54
Tax calculation						
		1	2	3	4	5
PBT	Rs(Lakhs)	0.453	0.455	0.458	0.460	0.463
ADD: Book depreciation		0.008	0.008	0.007	0.007	0.006

SUB: IT Depreciation		0.120	0.002	0.002	0.001	0.001
PBT&D		0.341	0.461	0.463	0.466	0.468
Tax		0.11585 5446	0.15670 2525	0.15748 9354	0.158 268	0.159 038

Loan payment schedule								
YEARS	QUARTERS	BALANCE AT THE BEGINNING OF QUARTER	QUARTER INTEREST	QUARTER'S PRINCIPLE PAYMENT	BALANCE AT THE END OF QUARTER	ANNUAL PRINCIPLE PAYMENT	ANNUAL INTEREST PAYMENT	Debt Component
1	1	0.12	0.00	0.00	0.12	0.01	0.01	0.02
	2	0.12	0.00	0.00	0.12			
	3	0.12	0.00	0.01	0.11			
	4	0.11	0.00	0.01	0.11			
2	1	0.11	0.00	0.01	0.10	0.03	0.01	0.04
	2	0.10	0.00	0.01	0.09			
	3	0.09	0.00	0.01	0.09			
	4	0.09	0.00	0.01	0.08			
3	1	0.08	0.00	0.01	0.07	0.03	0.01	0.03
	2	0.07	0.00	0.01	0.07			
	3	0.07	0.00	0.01	0.06			
	4	0.06	0.00	0.01	0.05			
4	1	0.05	0.00	0.01	0.05	0.03	0.00	0.03
	2	0.05	0.00	0.01	0.04			
	3	0.04	0.00	0.01	0.03			
	4	0.03	0.00	0.01	0.03			
5	1	0.03	0.00	0.01	0.02	0.03	0.00	0.03
	2	0.02	0.00	0.01	0.01			
	3	0.01	0.00	0.01	0.01			
	4	0.01	0.00	0.01	0.00			

Depreciation schedule :						
Depreciation as per companies act		1	2	3	4	5
Value of machine at the beginning of year		0.2	0.1	0.1	0.1	0.1
Depreciation		0.00792	0.007501824	0.007105728	0.00673	0.00638
Net value at the end of year		0.1	0.1	0.1	0.1	0.1
Depreciation as per IT act		1	2	3	4	5
Value of machine at the beginning of year		0.15	0.0	0.0	0.0	0.0
Depreciation		0.12	0.001584	0.001500365	0.00142	0.00135
Net value at the end of year		0.0	0.0	0.0	0.0	0.0

Annexure:-4 Procurement and implementation schedule

S. No.	Activities	Weeks						
		1	2	3	4	5	6	7
1	Identification of faulty or less capacitors							
2	Planning and material order							
3	Procurement							
4	Commissioning							

Annexure:-5 Break-up of Process down Time

S No	Activities	Week		
		1/7	2/7	3/7
1	Dismantling of Faulty Capacitors if any			
2	Installing New Capacitors			
3	Testing & Trial			

Annexure -6: Details of technology service providers

Energy Conservation measure	Source of product	Details of Local vendor / service provider
1. Capacitor Banks	M/s Dhruv Electrical	Mr. Sachin Mob: 9414892818 Mr. Mahesh Khandelwal Mob 9414017886
2. Capacitor Banks	Epcos India Pvt. Ltd.	Jayant Sharma Mobile: +91 98290 65472
3. Capacitor Banks	ABB Ltd	Mr. Neeraj Verma Contact No: 09878613484
4. Capacitor Banks	Naac Energy Control (p) Ltd	Mr. Chander M. Kapoor Contact No:09811199085

Annexure–7: Quotations or Techno-commercial bids for new technology/equipment

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

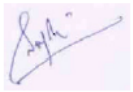
FOR APFC (AUTOMATIC POWER FACTOR CONTROL) PANELS

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.**
Capacitor Bank	Attached Doc.	1 Month	0.15	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	Actuals for previous years	Y1	Y2	Y3	Y4	Y5	Total
1	Total income		0.48	0.48	0.48	0.48	0.48	2.4
2	Raw material							
	Power and fuel							
	Wages and salaries							
	Selling expenses							
	Other expenses		0.008	0.008	0.008	0.009	0.009	0.041
	Total cost		0.008	0.008	0.008	0.009	0.009	0.041
3	Profit before depreciation, interest and taxes (PBDIT)		0.472	0.472	0.472	0.471	0.471	2.358
4	Interest on term loan		0.01	0.01	0.01	0.00	0.00	0.034
5	Interest on working capital		-	-	-	-	-	-
6	Interest on unsecured land		-	-	-	-	-	-
7	Depreciation		0.00792	0.0075	0.0071	0.0067	0.0063	0.036
8	PBT		0.453	0.455	0.458	0.460	0.463	2.289
9	Tax		0.1158	0.1567	0.1574	0.158	0.159	0.747
10	PAT		0.337	0.298	0.300	0.302	0.304	1.542
11	Dividends/ withdrawal							
12	Cash accruals		0.344	0.305	0.307	0.0308	0.3103	1.297
13	Debt service coverage ratio		14.40	8.82	9.48	0.03	0.03	
	Av. DSCR	**6.55**						

Annexure V

CHECK LIST of documents to be Submitted along with the application

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
Websites: www.bee-india.nic.in, www.energymanagertraining.com

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
Fax: 0172-2606259 / 2614974
E-mail: harinder.singh@cii.in
Website: www.ciicfc.org

India SME Technology Services Ltd
DFC Building, Plot No.37-38,
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