DETAILED PROJECT REPORT

ON

ENERGY COST REDUCTION WITH ENERGY EFFICIENT MOTOR (7.5 HP)

ENERGY IS LIFE
BEE
CONSERVE IT

Bureau of Energy Efficiency (BEE)

Prepared By

CII
Confederation of Indian Industry

Reviewed By

ISTSL

ENERGY COST REDUCTION WITH ENERGY EFFICIENT MOTOR

(CAPACITY-7.5HP)

JODHPUR LIMESTONE CLUSTER

BEE, 2011

Detailed Project Report on Energy Efficient Motors for Elevator motor (Capacity-7.5HP)

Limestone SME Cluster, Jodhpur (Rajasthan) (India)

New Delhi: Bureau of Energy Efficiency

Detail Project Report No.: **JDP/EEM/03**

For more information please contact

Bureau of Energy Efficiency (BEE)

(Ministry of Power, Government of India)

4th Floor, Sewa Bhawan

R. K. Puram, New Delhi – 110066

Telephone +91-11-26179699

Fax +91-11-26178352

Websites: www.bee-india.nic.in

Email:
jsood@beenet.in/pktiwari@beenet.in

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We sincerely appreciate the efforts of industry, energy auditors, equipment manufacturers, technology providers, consultants and other experts in the area of energy conservation for joining hands with Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India for preparing the Detailed Project Report (DPR) under BEE SME Program in SMEs clusters. We appreciate the support of suppliers/vendors for providing the adoptable energy efficient equipments/technical details to the SMEs.

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.

Hydrators, Classifier, Pulveriser, and Hammer Mills are the main area where motors are installed.

7.5 HP Induction motor is the prime movers for the Elevator system. At the time of audit following parameters were measured for Elevator motor.

Voltage	= 409 v
Current	= 2.0 to 3.5 A
Power	= 1.0 to 2.0 KW

It was observed that the maximum of motors are re-winded more than 5 times and were under loaded which leads to higher power consumption and lower operating efficiency. Also old in-efficient motors in the efficiency range of 70 - 85% are in use.

This DPR studies in detail the proposal for the replacement of old 7.5 HP Elevator motor with energy efficient motor.

Project implementation will lead to saving of Rs. 0.19 Lakh per year per motor, with a capital investment of Rs 0.48 Lakh /Motor. This investment will have a payback period of about 25 months.

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 installation of energy efficient motors is furnished in Table below.

Financials for BEE projects		
Name of Project	**Replacement of Old and Inefficient motors**	
	Units	**Value**
Cost of equipments	Rs (Lakhs)	0.4
Saving Potential	Rs (Lakhs) per year	0.19
IRR	%	10.9
NPV	Rs(Lakhs)	0.01
ROE	%	98
Simple payback period	Months	25

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 Program to improve the energy performance in 25 selected SMEs clusters. Jodhpur Lime Stone Cluster is one of them. The BEE's SME Program 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/Annum)
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

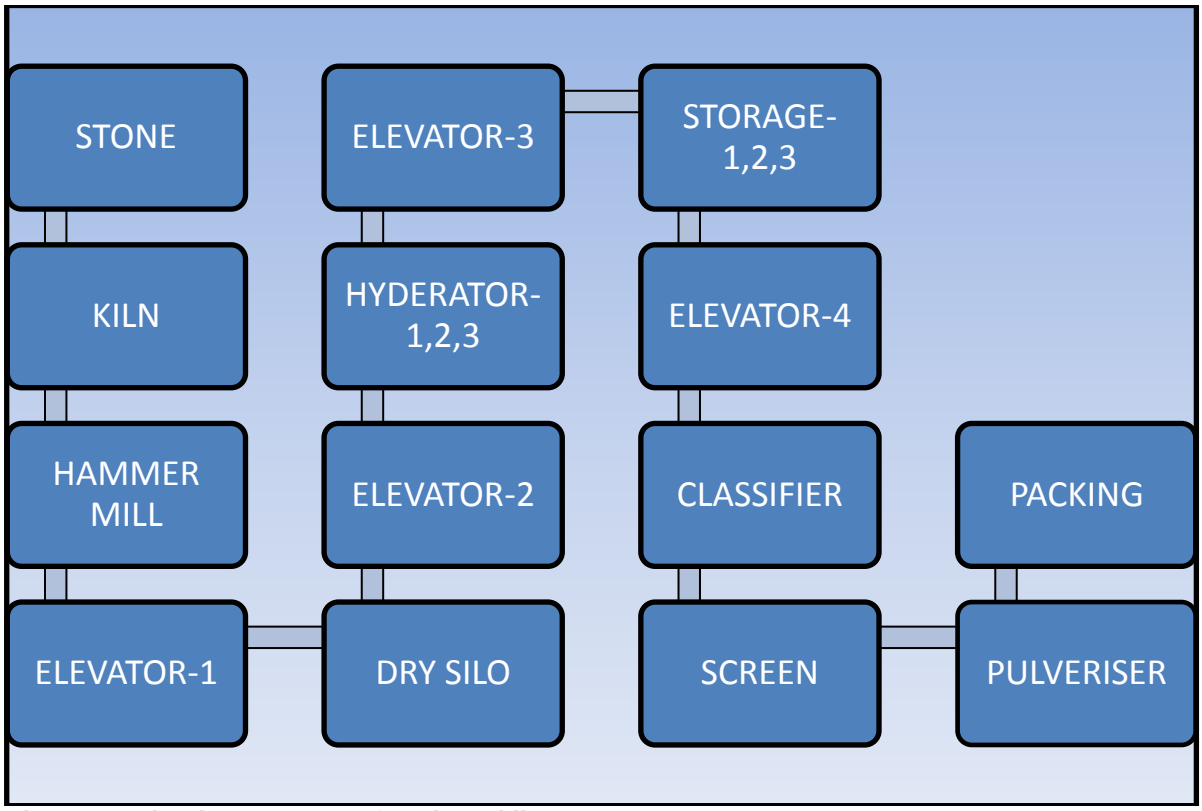

Figure *Production Process of Hydrated lime*

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 250
Medium Scale Unit	65-70	250-1500
Large Scale Unit	2-5	More than 250

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 1.6 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.

1.3 Proposed Technology/Equipment

1.3.1 Description of Existing Technology/Equipment

Hydrators, Classifier, Pulveriser, and Hammer Mills are the main area where motors are installed.
7.5 HP Induction motor is the prime movers for the Elevator systems. At the time of audit following parameters were measured for Elevator motor.

Voltage = 409 v
Current = 2.0 to 3.0 A
Power = 1.0 to 2.0 KW

It was observed that the maximum of motors are re-winded more than 5 times and were under loaded which leads to higher power consumption and lower operating efficiency. Also old in-efficient motors in the efficiency range of 70 - 85% are in use.

1.4 Benchmarking for Existing Specific Energy Consumption

Presently the Limestone cluster in Jodhpur is operating with very old and inefficient motors. Installation of Energy efficient motors in place of re-winded motors will save the power as Energy efficient motors (EEF1) have 4-5 % efficiency higher than standard motor.

Advantages:-

- Less power consumption
- High efficiency
- Less losses
- Wide range with good efficiency
- Less starting torque

1.5 Barriers in Adoption of Product Technology/Equipment

1.5.1 Technological Barrier

- In Jodhpur Lime Stone cluster, overall technical understanding on lime

stone manufacturing is good and rapidly increasing, however awareness and information about the new and emerging energy efficiency technologies available in market is less.

- In this cluster there is lack of leadership to take up the energy efficiency projects.

- The majority of the limestone plant owners are only concern about their production instead on efficiency improvement.
- Dependence on local equipment suppliers for uninterrupted after sales service

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

During the audit it was observed that the maximum of motors were re-winded more than 5 times and were operating in under loaded conditions, which leads to approx 2.5 times more power consumption and lower operating efficiency. These motors must be replaced by the Energy

Efficient Motors which leads to higher working efficiency up to 4 % for the same working condition.

Energy-efficient motors (EEM) are the ones in which, design improvements are incorporated specifically to increase operating efficiency over motors of standard design. Design improvements focus on reducing intrinsic motor losses.

Improvements include the use of lower-loss silicon steel, a longer core (to increase active material), thicker wires (to reduce resistance), thinner laminations, smaller air gap between stator and rotor, copper instead of aluminum bars in the rotor, superior bearings and a smaller fan, etc.

Energy-efficient motors now available in India operate with efficiencies that are typically 3 to 4 percentage points higher than standard motors. In keeping with the stipulations of the BIS, energy-efficient motors are designed to operate without loss in efficiency at loads between 75 % and 100 % of rated capacity. This may result in major benefits in varying load applications. The power factor is about the same or may be higher than for standard motors.

Figure 2.1: Energy Efficient Motor

Standard vs. High Efficiency Motors

Efficient motors have lower operating temperatures and noise levels, greater ability to accelerate higher-inertia loads, and are less affected by supply voltage fluctuations.

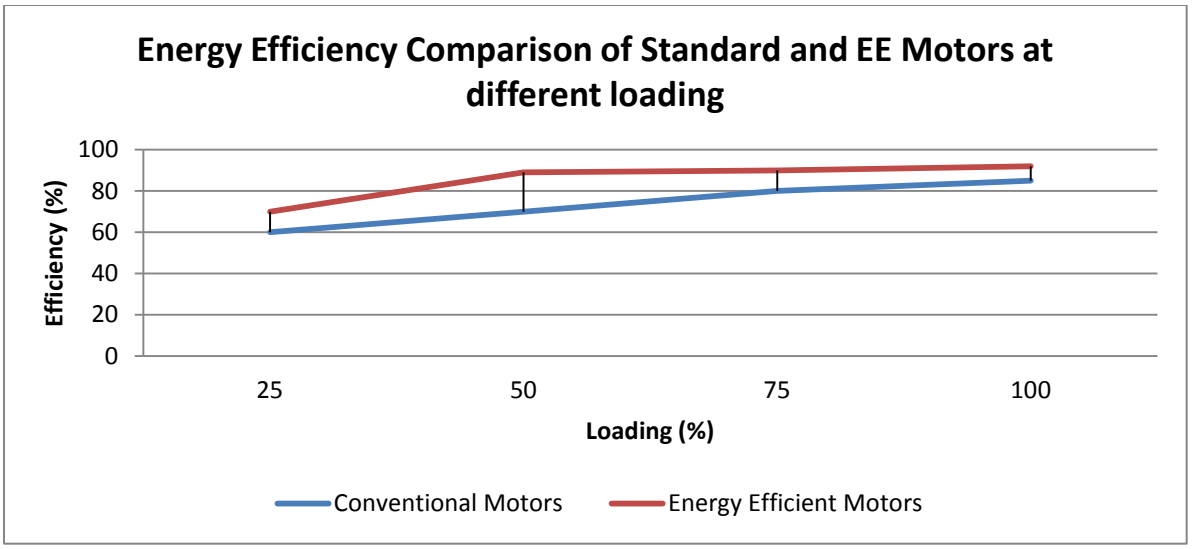

Figure 2.2: Energy Efficiency Comparison of Standard and EE Motors at different loading

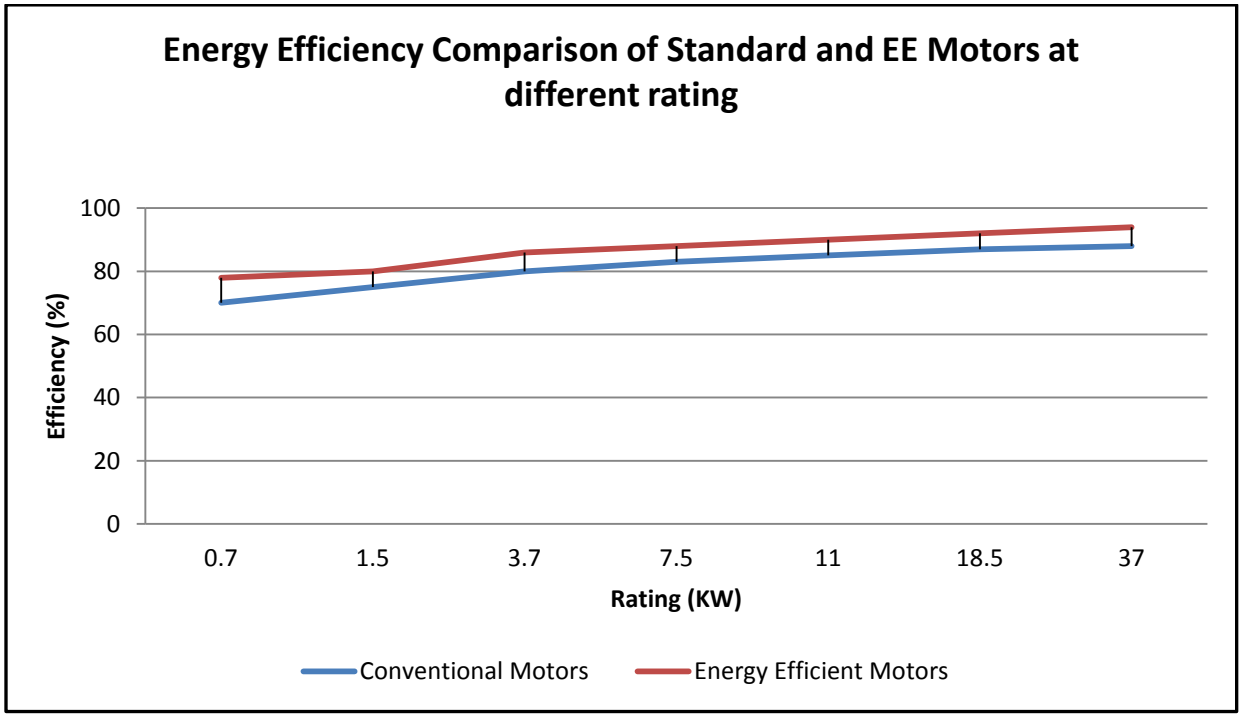

Figure 2.3: Energy Efficiency Comparison of Standard and EE Motors at different rating

2.1.2 Technology Specification

This DPR studies in detail the proposal for the replacement of old 7.5 HP Hydrator motor with energy efficient motor. Detailed specification of the motor is provided in attached annexure.

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. It does not affect the process but improves the process efficiency since these types of motors have high efficiency.

2.1.4 Availability of Technology

Service providers of this project are available at Jodhpur itself. Even many of the vendors are trying to personally visit the units to tell the unit owners about the savings achieved by replacing existing re-winded motors with high energy efficient motors.

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

Process down time requirement will be of one month for implementation of this project. Week wise break up of one month is shown in Annexure-5.

2.1.8 Life Cycle Assessment

Life of the proposed energy efficient motors will be around 10 to 15 provided periodic maintenance is carried in timely manner. Also the life cycle of the system will depend on the quality of power system.

2.1.9 Suitable Unit for Implementation of Proposed Technology

In Jodhpur, there are around 100 Lime stone units. Most of the units are using multiple time re-winded motors, thus providing a potential for energy conservation by replacing existing re-winded motors with high energy efficient motors.

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

Installation of Energy efficient motors in place of re-winded motors will save the power, as Energy efficient motors (EEF1) have 4-5 % efficiency higher than standard motor.

Thus, energy saving by replacing a standard/ Re-wound motor by a same capacity energy efficient motor will lead to substantial energy saving.

3.1.3 Improvement in Product Quality

Product quality achieved would be same as the present quality. It does not have any impact in improving the quality of the product. However it improves the overall efficiency of the system and hence reduces power consumption.

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

After implementation of this project, core and copper losses related to motors will be reduced.

3.2 Monetary Benefits

Annual monetary savings with installation of Energy Efficient Motors will be Rs. 0.19 Lakh per year/motor.

3.3 Social Benefits

3.3.1 Improvement in Working Environment in the Plant

Implementation of this project will result in the lower DB (Sound level) in plant area.

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

3.4.1 Reduction in Flue Gas Generation

Implementation of this project will have no effect on reduction in flue gas generation.

3.4.2 Reduction in GHG Emission

Implementation of this technology will results in reduction in CO2 emissions due to reduction in energy consumption.

4.0 IMPLEMENTATION OF PROPOSED EQUIPMENT

4.1 Cost of Equipment Implementation

4.1.1 Equipments Cost

Cost of implementing this proposal varies in plant as per capacity and size of plant. For a motor size of 7.5 HP, investment would be **Rs. 0.48 Lakh**.

4.1.2 Erection & Commissioning and other Miscellaneous Cost

Erection, Commissioning and other costs required will be 0.04 Lakh which includes taxes, commissioning, manpower cost, transportation etc and other miscellaneous costs will be 0.04 Lakh as the contingency amount.

Table 4.1: Details of Proposed Equipment Installation Cost

S.No	Description	Units	Values
1	Equipment cost	(Lakhs)	0.4
2	Erection and Commissioning cost	(Lakhs)	0.04
3	Miscellaneous Cost	(Lakhs)	0.04
4	Total cost	(Lakhs)	0.48

4.2 Arrangements of Funds

4.2.1 Entrepreneur's Contribution

Entrepreneur will contribute 25% of the total project cost which is 0.12 Lakh.

4.2.2 Loan Amount

Remaining 75% cost of the proposed project will be borrowed from bank, which is 0.36 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 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 0.48 Lakhs and monetary savings due to reduction in electricity consumption is 0.19 Lakh hence, the simple payback period works out to be 2.5 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 10% works out to be 0.01 Lakh.

4.3.4 Internal Rate of Return (IRR)

The after tax Internal Rate of Return of the project works out to be 10.0%. 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 98%.

Table 4.2 Financial Indicators of Proposed Technology

S.No	Description	Units	Values
1	Simple Payback	Year	2.5
2	NPV	Rs. In Lakh	0.01
3	IRR	%	10.9
4	ROI	%	98

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)	NPV
Pessimistic	0.18	8.4	-0.03	27
Base	0.19	11	0.02	25
Optimistic	0.20	13.3	0.08	24

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	Value
1	Pet Coke consumption	MT/Day	3-4
2	Weight of Lime stone going to kiln	MT/Day	30
3	Weight of Quick Lime coming out from kiln	MT/Day	15
4	Production from Kiln	MT/Day	15
5	Kiln cycle time	Min	
6	Highest temperature in firing zone	°C	1100

S. No.	Particular	Unit	Value
1	Elevator motor capacity	hp	7.5
2	Actual power consumption	KW	2.5
3	Measured voltage at the terminal of motor	Volt	409
4	Measured current	Amps.	1.5

Annexure -2: Detailed Technology Assessment Report

S. No	Particular	Unit	Present situation	Proposed situation
1	Rated power of motor	kW	7.5	5.0
2	Efficiency	%	85	94
3	Running hrs	Hrs/day	16	16
4	Power saving	kW		1.00
5	Monetary saving	Rs/yr		19,000.0

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(Lakhs)	0.4
Saving Potential	Rs(Lakhs) per year	0.19
IRR	%	10.9
NPV	Rs(Lakhs)	0.01
ROI	%	98
Simple payback period	Months	25

Assumptions		
Commercial Inputs	**Units**	**Value**
Required Investment(cost of Equipment+ EPC cost+ Misc. cost)	Rs(Lakhs)	0.48
O&M cost (5% of equipment cost)	Rs(Lakhs)	0.020
Acceleration in O&M cost per year	%	5%
Debt/Equity ratio		3 to1
Debt component of Investment	75%	0.36
Equity component of investment	25%	0.12
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(Lakhs)	0.19	0.19	0.19	0.19	0.19
Expenditure						
O&M Expenditure	Rs(Lakhs)	0.02	0.02	0.02	0.02	0.02
Interest on term loan	Rs(Lakhs)	0.04	0.03	0.02	0.01	0.00
Book depreciation	Rs(Lakhs)	0.02	0.02	0.02	0.02	0.02
Total expenses		0.08	0.07	0.06	0.05	0.04
PBT	Rs(Lakhs)	0.11	0.12	0.13	0.14	0.15
Tax		0.00	0.05	0.05	0.05	0.06
PAT		0.11	0.08	0.08	0.09	0.09
Cash Flow Statement		1.00	2.00	3.00	4.00	5.00
PAT		0.11	0.08	0.08	0.09	0.09
Add: Depreciation		0.02	0.02	0.02	0.02	0.02
Add: Interest		0.04	0.03	0.02	0.01	0.00
Net cash In flow		0.17	0.12	0.12	0.11	0.11
Net cash out flow		-0.48				
Net cash flow		-0.31	0.12	0.12	0.11	0.11
	-0.5	0.17	0.12	0.12	0.11	0.11
IRR	11%					
NPV	0.01					
ROI	97.5%					

Cash statement						
Source		1	2	3	4	5
Equity	0.12					
Loan	0.36					
PAT		0.11	0.08	0.08	0.09	0.09
Depreciation		0.02	0.02	0.02	0.02	0.02
Total	0.48	0.13	0.10	0.10	0.11	0.11
Application						
Capital expenditure	0.5					
Loan repayment		0.04	0.03	0.02	0.01	0.00
Total	0.5	0.04	0.03	0.02	0.01	0.00
Net surplus	0.00	0.10	0.07	0.08	0.10	0.11
Add: Opening balance	0		0.10	0.17	0.25	0.35
Closing balance	0	0.10	0.17	0.25	0.35	0.46

Tax calculation						
		1	2	3	4	5
PBT	Rs(Lakhs)	0.11	0.12	0.13	0.14	0.15
ADD: Book depreciation		0.02	0.02	0.02	0.02	0.02
SUB: IT Depreciation		0.32	0.00	0.00	0.00	0.00
PBT&D		-0.19	0.14	0.15	0.16	0.16
Tax		0.00	0.05	0.05	0.05	0.06

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	0.36	0.01	0.00	0.36	0.05	0.04
	2	0.36	0.01	0.00	0.36		
	3	0.36	0.01	0.03	0.33		
	4	0.33	0.01	0.03	0.31		
2	1	0.31	0.01	0.03	0.28	0.10	0.03
	2	0.28	0.01	0.03	0.26		
	3	0.26	0.01	0.03	0.23		
	4	0.23	0.01	0.03	0.21		
3	1	0.21	0.01	0.03	0.18	0.10	0.02
	2	0.18	0.00	0.03	0.15		
	3	0.15	0.00	0.03	0.13		
	4	0.13	0.00	0.03	0.10		
4	1	0.10	0.00	0.03	0.08	0.10	0.01
	2	0.08	0.00	0.03	0.05		
	3	0.05	0.00	0.03	0.03		
	4	0.03	0.00	0.03	0.00		

Depreciation schedule						
Depreciation as per companies act		1	2	3	4	5
Value of machine at the beginning of year		0.40	0.38	0.36	0.34	0.32
Depreciation		0.02	0.02	0.02	0.02	0.02
Net value at the end of year		0.38	0.36	0.34	0.32	0.30
Depreciation as per IT act		1	2	3	4	5
Value of machine at the beginning of year		0.40	0.08	0.08	0.07	0.07
Depreciation		0.32	0.00	0.00	0.00	0.00
Net value at the end of year		0.08	0.08	0.07	0.07	0.06

Annexure:-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							

Annexure:-5 Break-up of Process down Time

S No	Activities	Day		
		1/7	2/7	3/7
1	Dismantling of Old Motor			
2	Installing New Motor in Place of Old En-efficient Motors			
3	Testing & Trial			

Annexure -6: Details of technology service providers

Energy Conservation measure	Source of product	Details of Local vendor / service provider
1. Energy Efficient Motors	Bharat Bijlee Ltd	Mr. Rakesh Verma Sr. Manager – Marketing rakesh.verma@bharatbijlee.com 09871861872
2. Energy Efficient Motors	ABB Ltd	Mr. Neeraj Verma ABB Ltd Power Product SCO-13-14-15 Sector-34A Chandigarh Phone: 0172-4321845 Telefax: 0172-2601618 Mobile: 09878613484 email: neeraj.verma@in.abb.com
3.Energy Efficient Motors	Kirloskar Brothers Ltd	Mr. Kamlesh Gupta Station Road Alwar Tel.: +91 (144) 2700226 Mob. : +91 9414019126/ 09414019126
4.Energy Efficient Motors, Automatic Power Factor Controllers	Havells, Epcos	Mr. Sachin Hope Circus ,Alwar -301001 Tel. : +91 (144) 2337886 (o) (R) 0144-2330971
5. Energy Efficient Motors	Vijay Agencies	Mr.Jagdish Agarwal Opp Shiv Mandir ,Station Bazaria,Sawai-Madhopur Tel 07462-220678 (O) 222577 (R)

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

TEFC MOTORS (Standard Motors)

For foot mounted (B3 construction) Induction Motors suitable for 415V ±10%, 50Hz ±5%,combined variation ±10%, 3 phase supply, Insulation Class F,Degree of Protection IP55,Ambient Temperature 50°C,Conforms to IS:325.

3000 rpm 2 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.18	0.25	63	MA063213	**7860**	385
0.25	0.35	63	MA063233	**8090**	396
0.37	0.50	71	MA071213	**8600**	421
0.55	0.75	71	MA071233	**9500**	465
0.75	1.00	80	MA080213	**9830**	481
1.10	1.50	80	MA080233	**10760**	526
1.50	2.00	90S	MA09S233	**12460**	610
2.20	3.00	90L	MA09L253	**15940**	780
3.70	5.00	100L	MA10L213	**19560**	958
5.50	7.50	132S	MA13S233	**32200**	1575
7.50	10.00	132S	MA13S253	**33130**	1621
9.30	12.50	132M	MA13M293	**51590**	2524
11.00	15.00	160M	MA16M213	**57860**	2832
15.00	20.00	160M	MA16M253	**67820**	3318
18.50	25.00	160L	MA16L273	**87930**	4302
22.00	30.00	180M	MA18M213	**98020**	4796
30.00	40.00	200L	MA20L233	**145630**	7125
37.00	50.00	200L	MA20L253	**177710**	8694
45.00	60.00	225M	MA22M233	**228690**	11189
55.00	75.00	250M	MA25M213	**307850**	15062
75.00	100.00	280S	MA28S213	**400730**	19606
90.00	120.00	280M	MA28M233	**464550**	22728

1500 rpm 4 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.12	0.16	63	MA063413	**8100**	396
0.18	0.25	63	MA063433	**8620**	422
0.25	0.35	71	MA071413	**8780**	430
0.37	0.50	71	MA071433	**9090**	445
0.55	0.75	80	MA080413	**10110**	495
0.75	1.00	80	MA080433	**10200**	499
1.10	1.50	90S	MA09S433	**11640**	569
1.50	2.00	90L	MA09L453	**12720**	622
2.20	3.00	100L	MA10L433	**16810**	822
3.70	5.00	112M	MA11M433	**21520**	1053
5.50	7.50	132S	MA13S433	**29660**	1451
7.50	10.00	132M	MA13M473	**34630**	1694
9.30	12.50	160M	MA16M4A3	**54810**	2682
11.00	15.00	160M	MA16M4C3	**55450**	2713
15.00	20.00	160L	MA16L4K3	**68900**	3371
18.50	25.00	180M	MA18M433	**92880**	4544
22.00	30.00	180L	MA18L473	**103550**	5066
30.00	40.00	200L	MA20L433	**139700**	6835
37.00	50.00	225S	MA22S413	**179470**	8781
45.00	60.00	225M	MA22M433	**207960**	10174
55.00	75.00	250M	MA25M413	**285580**	13972
75.00	100.00	280S	MA28S413	**365560**	17885
90.00	120.00	280M	MA28M433	**424140**	20751

Authorised by : A M Naik

Bharat Bijlee

CE

eff2

TEFC MOTORS (Standard Motors)

For foot mounted (B3 construction) Induction Motors suitable for 415V ±10%, 50Hz ±5%,combined variation ±10%, 3 phase supply, Insulation Class F,Degree of Protection IP55,Ambient Temperature 50° C,Conforms to IS:325.

1000 rpm 6 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.25	0.35	71	MA071633	**9960**	487
0.37	0.50	80	MA080613	**10720**	524
0.55	0.75	80	MA080633	**10970**	537
0.75	1.00	90S	MA09S633	**12350**	604
1.10	1.50	90L	MA09L653	**13630**	667
1.50	2.00	100L	MA10L633	**17370**	850
2.20	3.00	112M	MA11M633	**20780**	1017
3.70	5.00	132S	MA13S633	**31760**	1554
5.50	7.50	132M	MA13M673	**35380**	1731
7.50	10.00	160M	MA16M633	**57130**	2795
9.30	12.50	160L	MA16L663	**67510**	3303
11.00	15.00	160L	MA16L673	**71090**	3478
15.00	20.00	180L	MA18L613	**97060**	4749
18.50	25.00	200L	MA20L613	**126360**	6183
22.00	30.00	200L	MA20L633	**137320**	6718
30.00	40.00	225M	MA22M623	**214070**	10473
37.00	50.00	250M	MA25M603	**288390**	14109
45.00	60.00	280S	MA28S613	**367460**	17978
55.00	75.00	280M	MA28M633	**416860**	20395

750 rpm 8 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.37	0.50	90S	MA09S813	**11840**	579
0.55	0.75	90L	MA09L853	**12980**	635
0.75	1.00	100L	MA10L813	**15940**	780
1.10	1.50	100L	MA10L833	**19430**	951
1.50	2.00	112M	MA11M813	**22520**	1102
2.20	3.00	132S	MA13S813	**29780**	1457
3.70	5.00	160M	MA16M813	**46960**	2298
5.50	7.50	160M	MA16M833	**57040**	2791
7.50	10.00	160L	MA16L873	**72430**	3544
9.30	12.50	180M	MA18M813	**94170**	4607
11.00	15.00	180L	MA18L833	**99190**	4853
15.00	20.00	200L	MA20L833	**140130**	6856
18.50	25.00	225S	MA22S813	**180800**	8846
22.00	30.00	225M	MA22M833	**218220**	10676
30.00	40.00	250M	MA25M813	**293470**	14358
37.00	50.00	280S	MA28S823	**375060**	18350
45.00	60.00	280M	MA28M853	**435140**	21289

Frame size 90S - 225M are with side terminal box with type "MA". These frames are also available in Top Terminal

EFF2 will be punched on name plate as per IS

2 Pole -0.37 kW to 90 kw

4 Pole- 0.37 kW to

6 Pole -0.37 kW to 55 kw

8 Pole- 0.37 kW to

PPL/LP-33 Effective from 21st Mar'2011

Authorised by : A.M.Naik

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TEFC Energy Efficient Motors

For foot mounted (B3 construction) Induction Motors suitable for 415V ±10%, 50Hz ±5%,combined variation ±10%, 3 phase supply, Insulation Class F,Degree of Protection IP55,Ambient Temperature 50° C,Conforms to IS:325

	3000 rpm 2 Pole					
	Kw	Hp	Frame	Type	LP33	Excise
	0.37	0.50	71	MH0712A3	**9890**	484
	0.55	0.75	71	MH071233	**10930**	535
	0.75	1.00	80	MH080213	**11320**	554
	1.10	1.50	80	MH080233	**12370**	605
	1.50	2.00	90S	MH09S243	**14330**	701
	2.20	3.00	90L	MH09L273	**18340**	897
	3.70	5.00	100L	MH10L233	**22520**	1102
	5.50	7.50	132S	MH13S253	**36940**	1807
	7.50	10.00	132S	MH13S293	**38110**	1865
	9.30	12.50	160M	MH16M233	**65490**	3204
	11.00	15.00	160M	MH16M253	**66570**	3257
	15.00	20.00	160M	MH16M263	**77980**	3815
	18.50	25.00	160L	MH16L293	**101130**	4948
	22.00	30.00	180M	MH18M233	**107830**	5276
	30.00	40.00	200L	MH20L2A3	**160200**	7838
	37.00	50.00	200L	MH20L253	**195490**	9564
	45.00	60.00	225M	MH22M253	**251560**	12308
	55.00	75.00	250M	MH25M233	**340770**	16672
	75.00	100.00	280S	MH28S233	**420770**	20586
	90.00	120.00	280M	MH28M253	**487780**	23865
	110.00	150.00	315S	MH31S233	**614830**	30081
	125.00	170.00	315M	MH31M2A3	**721700**	35309
	132.00	180.00	315M	MH31M233	**756280**	37001
	150.00	200.00	315L	MH31L2A3	**799550**	39118
	160.00	215.00	315L	MH31L253	**828460**	40532
	180.00	240.00	315L	MH31L2B3	**871770**	42651
*	200.00	270.00	315L	MH31L273	**971450**	47528
*	250.00	335.00	355L	MH35L213	**1077730**	52728
*	315.00	425.00	355L	MH35L233	**1174110**	57443

	1500 rpm 4 Pole					
	Kw	Hp	Frame	Type	LP33	Excise
	0.37	0.50	71	MH071433	**10450**	511
	0.55	0.75	80	MH080433	**11640**	569
	0.75	1.00	80	MH080453	**11730**	574
	1.10	1.50	90S	MH09S423	**13390**	655
	1.50	2.00	90L	MH09L473	**14630**	716
	2.20	3.00	100L	MH10L473	**19360**	947
	3.70	5.00	112M	MH11M473	**24760**	1211
	5.50	7.50	132S	MH13S473	**34130**	1670
	7.50	10.00	132M	MH13M443	**39840**	1949
	9.30	12.50	160M	MH16M4C3	**62130**	3040
	11.00	15.00	160M	MH16M4K3	**63750**	3119
	15.00	20.00	160L	MH16L4T3	**79250**	3877
	18.50	25.00	180M	MH18M473	**102170**	4999
	22.00	30.00	180L	MH18L483	**113900**	5573
	30.00	40.00	200L	MH20L453	**153670**	7518
	37.00	50.00	225S	MH22S433	**197410**	9658
	45.00	60.00	225M	MH22M453	**228770**	11193
	55.00	75.00	250M	MH25M433	**316400**	15480
	75.00	100.00	280S	MH28S413	**383840**	18779
	90.00	120.00	280M	MH28M433	**445340**	21788
	110.00	150.00	315S	MH31S413	**539180**	26379
	125.00	170.00	315M	MH31M4A3	**616820**	30178
	132.00	180.00	315M	MH31M433	**632520**	30946
	150.00	200.00	315L	MH31L4A3	**683620**	33446
	160.00	215.00	315L	MH31L453	**742690**	36336
	180.00	240.00	315L	MH31L463	**791660**	38732
	200.00	270.00	315L	MH31L473	**903630**	44210
	250.00	335.00	355L	MH35L413	**995980**	48728
	315.00	422.00	355L	MH35L433	**1140030**	55776
	355.00	480.00	355L	MH35L453	**1467630**	71804
	400.00	540.00	400M	MH40M413	**2013580**	98514
	450.00	600.00	400M	MH40M433	**2078320**	101682
	500.00	670.00	400M	MH40M453	**2158470**	105603
	560.00	750.00	400L	MH40L473	**2273260**	111219
	630.00	850.00	400L	MH40L493	**2340780**	114523

* These ratings are sutiable for Ambient Temperature 45 C

rating upto 1000kW/4p,800 kW/6P & 630kW/8P can be offered in Frame 450. For price refer to marketing office.

eff1 increased Safety EX'e', Non Sparking Ex 'nA' can be offered upto Frame 355. For price & frame size refer to marketing office.

eff1 will be punched on name plate as per IS 12615:2004 for

2 Pole-0.37kW to 160kW 4 Pole-0.37kW to 160kW

Authorised by : A M Naik

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eff

TEFC Energy Efficient Motors

For foot mounted (B3 construction) Induction Motors suitable for 415V ±10%, 50Hz ±5%,combined variation ±10%, 3 phase supply, Insulation Class F,Degree of Protection IP55,Ambient Temperature 50° C,Conforms to IS:325

	1000 rpm 6 Pole					
	Kw	Hp	Frame	Type	LP33	Excise
	0.37	0.50	80	MH080613	12330	603
	0.55	0.75	80	MH080633	12640	618
	0.75	1.00	90S	MH09S633	14220	696
	1.10	1.50	90L	MH09L653	15660	766
	1.50	2.00	100L	MH10L633	19970	977
	2.20	3.00	112M	MH11M653	23890	1169
	3.70	5.00	132S	MH13S633	36530	1787
	5.50	7.50	132M	MH13M693	40690	1991
	7.50	10.00	160M	MH16M633	65710	3215
	9.30	12.50	160L	MH16L663	77630	3798
	11.00	15.00	160L	MH16L673	81760	4000
	15.00	20.00	180L	MH18L613	106770	5224
	18.50	25.00	200L	MH20L613	139020	6802
	22.00	30.00	200L	MH20L633	151060	7391
	30.00	40.00	225M	MH22M643	235470	11520
	37.00	50.00	250M	MH25M633	316440	15482
	45.00	60.00	280S	MH28S613	385840	18877
	55.00	75.00	280M	MH28M633	437680	21413
	75.00	100.00	315S	MH31S613	516960	25292
	90.00	120.00	315M	MH31M633	650340	31818
	110.00	150.00	315M	MH31M653	724460	35444
	125.00	170.00	315L	MH31L6A3	789510	38627
	132.00	180.00	315L	MH31L673	841670	41179
	150.00	200.00	315L	MH31L6B3	869170	42524
	160.00	215.00	315L	MH31L693	876130	42865
	180.00	240.00	355L	MH35L6A3	966350	47279
	200.00	270.00	355L	MH35L613	1003510	49097
	250.00	335.00	355L	MH35L633	1081560	52915
*	315.00	425.00	400M	MH40M613	1939100	94870
*	355.00	480.00	400M	MH40M633	1997520	97729
*	400.00	540.00	400L	MH40L653	2078510	101691
*	450.00	600.00	400L	MH40L673	2161560	105754

	750 rpm 8 Pole					
	Kw	Hp	Frame	Type	LP33	Excise
	0.37	0.50	90S	MH09S813	13620	666
	0.55	0.75	90L	MH09L853	14950	731
	0.75	1.00	100L	MH10L813	18330	897
	1.10	1.50	100L	MH10L833	22330	1092
	1.50	2.00	112M	MH11M813	25890	1267
	2.20	3.00	132S	MH13S813	34240	1675
	3.70	5.00	160M	MH16M813	62150	3041
	5.50	7.50	160M	MH16M833	65600	3209
	7.50	10.00	160L	MH16L873	83280	4074
	9.30	12.50	180M	MH18M813	103580	5068
	11.00	15.00	180L	MH18L833	109100	5338
	15.00	20.00	200L	MH20L833	154150	7542
	18.50	25.00	225S	MH22S823	198880	9730
	22.00	30.00	225M	MH22M833	240050	11744
	30.00	40.00	250M	MH25M813	323500	15827
	37.00	50.00	280S	MH28S823	393830	19268
	45.00	60.00	280M	MH28M853	456900	22354
	55.00	75.00	315S	MH31S813	525950	25732
	75.00	100.00	315M	MH31M833	661590	32368
	90.00	120.00	315M	MH31M853	743310	36366
	110.00	150.00	315L	MH31L873	784880	38400
	125.00	170.00	315L	MH31L8A3	871800	42653
	132.00	180.00	315L	MH31L893	919240	44974
	150.00	200.00	355L	MH35L8A3	965250	47225
	160.00	215.00	355L	MH35L813	1061560	51937
	180.00	240.00	355L	MH35L8B3	1063050	52010
	200.00	270.00	355L	MH35L833	1162910	56895
	250.00	335.00	400M	MH40M813	2486650	121659
	315.00	425.00	400L	MH40L853	3037900	148629
	355.00	480.00	400L	MH40L873	3189840	156063

Eff1 will be punched on name plate as per IS 12615: 2004 for

6 Pole - 0.37kW to 132kW 8 Pole - 0.37kW to 110kW

eff1 increased Safety EX'e', Non Sparking Ex 'nA' can be offered upto Frame 355. For price & frame size refer to marketing office.

* These ratings are sutiable for Ambient Temperature 45 C

Increased Safety Ex 'e', Non Sparking Ex 'n' can be offered

BBL/LP-33 Effective from 21st Mar'2011

Authorised by : A M Naik

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CE eff2

FLAME PROOF MOTORS (Standard Motors)

For foot mounted (B3 construction), 415V ±10%, 50Hz ±5%,combined variation ±10%, 3 phase supply, Insulation Class F,Degree of Protection IP55,Ambient Temperature 45° C,Conforms to IS:325, IS:2148, Gas Group IIA,IIB.

3000 rpm 2 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.37	0.50	80	MD0802A3	18940	927
0.55	0.75	80	MD0802B3	21190	1037
0.75	1.00	80	MD080213	21840	1069
1.10	1.50	80	MD080233	24080	1178
1.50	2.00	90 L	MD09L233	27320	1337
2.20	3.00	90 L	MD09L253	34100	1668
3.70	5.00	100 L	MD10L213	43290	2118
5.50	7.50	132 M	MD13M233	61140	2991
7.50	10.00	132 M	MD13M253	67610	3308
9.30	12.50	132 M	MD13M293	96080	4701
11.00	15.00	160 M	MD16M213	118440	5795
15.00	20.00	160 M	MD16M253	143520	7022
18.50	25.00	160 L	MD16L273	162900	7970
22.00	30.00	180 L	MD18L213	192760	9431
30.00	40.00	200 L	MD20L233	259780	12710
37.00	50.00	200 L	MD20L253	336520	16464
45.00	60.00	225 M	MD22M233	425080	20797
55.00	75.00	250 M	MD25M213	521320	25506
75.00	100.00	280 S	MD28S213	697800	34140
90.00	120.00	280 M	MD28M233	722870	35366

1500 rpm 4 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.37	0.50	80	MD0804A3	18600	910
0.55	0.75	80	MD080413	20530	1004
0.75	1.00	80	MD080433	21370	1046
1.10	1.50	90 L	MD09L433	24380	1193
1.50	2.00	90 L	MD09L453	26520	1297
2.20	3.00	100 L	MD10L433	33690	1648
3.70	5.00	112 M	MD11M433	42260	2068
5.50	7.50	132 M	MD13M433	58300	2852
7.50	10.00	132 M	MD13M473	66320	3245
9.30	12.50	160 M	MD16M4A3	101540	4968
11.00	15.00	160 M	MD16M4C3	107510	5260
15.00	20.00	160 L	MD16L4K3	130700	6394
18.50	25.00	180 L	MD18L433	147700	7226
22.00	30.00	180 L	MD18L473	175450	8584
30.00	40.00	200 L	MD20L433	236410	11566
37.00	50.00	225 S	MD22S413	307170	15028
45.00	60.00	225 M	MD22M433	386450	18907
55.00	75.00	250 M	MD25M413	474150	23198
75.00	100.00	280 S	MD28S413	609470	29818
90.00	120.00	280 M	MD28M433	621210	30393

Authorised by : A M Naik

Bharat Bijlee

CE eff2

FLAME PROOF MOTORS (Standard Motors)

For foot mounted (B3 construction), 415V ±10%, 50Hz ±5%,combined variation ±10%, 3 phase supply, Insulation Class F,Degree of Protection IP55,Ambient Temperature 45° C,Conforms to IS:325, IS:2148, Gas Group IIA,IIB.

1000 rpm 6 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.37	0.50	80	MD080613	21900	1071
0.55	0.75	80	MD080633	22260	1089
0.75	1.00	90 L	MD09L633	25890	1267
1.10	1.50	90 L	MD09L653	26620	1302
1.50	2.00	100 L	MD10L633	38120	1865
2.20	3.00	112 M	MD11M633	44410	2173
3.70	5.00	132 M	MD13M633	58810	2877
5.50	7.50	132 M	MD13M673	72710	3557
7.50	10.00	160 M	MD16M633	110520	5407
9.30	12.50	160 L	MD16L663	127480	6237
11.00	15.00	160 L	MD16L673	134900	6600
15.00	20.00	180 L	MD18L613	180680	8840
18.50	25.00	200 L	MD20L613	223830	10951
22.00	30.00	200 L	MD20L633	242700	11874
30.00	40.00	225 M	MD22M623	397740	19459
37.00	50.00	250 M	MD25M603	489560	23952
45.00	60.00	280 S	MD28S613	593540	29039
55.00	75.00	280 M	MD28M633	639770	31301

750 rpm 8 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.37	0.50	90L	MD09L833	25470	1246
0.55	0.75	90L	MD09L853	27540	1347
0.75	1.00	100 L	MD10L813	33230	1626
1.10	1.50	100 L	MD10L833	38670	1892
1.50	2.00	112 M	MD11M813	46220	2261
2.20	3.00	132M	MD13M813	60910	2980
3.70	5.00	160M	MD16M813	98340	4811
5.50	7.50	160M	MD16M833	113070	5532
7.50	10.00	160L	MD16L873	137700	6737
9.30	12.50	180L	MD18L813	174720	8548
11.00	15.00	180L	MD18L833	184140	9009
15.00	20.00	200L	MD20L833	248550	12160
18.50	25.00	225S	MD225813	308520	15094
22.00	30.00	225M	MD22M833	405540	19841
30.00	40.00	250M	MD25M813	498070	24368
37.00	50.00	280S	MD28S823	639100	31268
45.00	60.00	280M	MD28M853	652640	31930

BBL/LP-33 Effective from 21st Mar'2011

Authorised by : A M Naik

Bharat Bijlee CE eff1

FLAME PROOF MOTORS (Standard Motors)

For foot mounted (B3 construction), 415V ±10%, 50Hz ±5%,combined variation ±10%, 3 phase supply, Insulation Class F,Degree of Protection IP55,Ambient Temperature 45°C,Conforms to IS:325, IS:2148, Gas Group IIA,IIB.

3000 rpm 2 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.37	0.50	80	MJ0802A3	20380	997
0.55	0.75	80	MJ080283	22690	1110
0.75	1.00	80	MJ080213	23310	1140
1.10	1.50	80	MJ080233	26050	1274
1.50	2.00	90 L	MJ09L243	29120	1425
2.20	3.00	100L	MJ10L213	45000	2202
3.70	5.00	112M	MJ11M233	52820	2584
5.50	7.50	132 M	MJ13M253	65440	3202
7.50	10.00	132 M	MJ13M293	72360	3540
9.30	12.50	160M	MJ16M233	130300	6375
11.00	15.00	160 M	MJ16M253	134210	6566
15.00	20.00	160 M	MJ16M263	153250	7498
18.50	25.00	160 L	MJ16L293	176070	8614
22.00	30.00	180 L	MJ18L233	207460	10150
30.00	40.00	200 L	MJ20L2A3	280670	13732
37.00	50.00	200 L	MJ20L253	363170	17768
45.00	60.00	225 M	MJ22M253	459380	22475
55.00	75.00	280S	MJ28S213	717820	35119
75.00	100.00	280M	MJ28M233	750010	36694
90.00	120.00	280 M	MJ28M253	831280	40670
110.00	150.00	315S	MJ31S233	868100	42472
125.00	170.00	315M	MJ31M2A3	1018790	49844
132.00	180.00	315M	MJ31M233	1029370	50362
150.00	200.00	315L	MJ31L2A3	1131040	55336
160.00	215.00	315L	MJ31L253	1166970	57094
180.00	240.00	315L	MJ31L283	1399060	68449
* 200.00	270.00	315L	MJ31L273	1747190	85481

1500 rpm 4 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.37	0.50	80	MJ080413	20230	990
0.55	0.75	80	MJ080433	22050	1079
0.75	1.00	80	MJ080453	22900	1120
1.10	1.50	90 L	MJ09L423	26040	1274
1.50	2.00	100L	MJ10L453	33960	1661
2.20	3.00	112M	MJ11M433	38570	1887
3.70	5.00	132M	MJ13M433	54520	2667
5.50	7.50	132 M	MJ13M473	62550	3060
7.50	10.00	160M	MJ16M4A3	99480	4867
9.30	12.50	160 M	MJ16M4C3	109290	5347
11.00	15.00	160 M	MJ16M4K3	115460	5649
15.00	20.00	180L	MJ18L433	152340	7453
18.50	25.00	180 L	MJ18L473	161640	7908
22.00	30.00	200L	MJ20L433	224550	10986
30.00	40.00	200 L	MJ20L453	256450	12547
37.00	50.00	225M	MJ22M433	332890	16287
45.00	60.00	250M	MJ25M4A3	465310	22765
55.00	75.00	250 M	MJ25M413	517000	25294
75.00	100.00	280 S	MJ28S413	664300	32501
90.00	120.00	280 M	MJ28M433	684810	33504
110.00	150.00	315S	MJ31S413	769320	37639
125.00	170.00	315M	MJ31M4A3	885360	43316
132.00	180.00	315M	MJ31M433	922210	45119
150.00	200.00	315L	MJ31L4A3	958800	46909
160.00	215.00	315L	MJ31L453	968600	47389
180.00	240.00	315L	MJ31L463	1159390	56723
* 200.00	270.00	315L	MJ31L473	1395660	68283

*Rating suitable for 40c

Eff1 will be punched on name plate as per IS 12615: 2004 for

2 Pole- 0.37kW to 160Kw 4 Pole- 0.37kW to 160Kw

Authorised by : A M Naik

Bharat Bijlee CE eff1

FLAME PROOF MOTORS (Standard Motors)

For foot mounted (B3 construction), 415V ±10%, 50Hz ±5%,combined variation ±10%, 3 phase supply, Insulation Class F,Degree of Protection IP55,Ambient Temperature 45°C,Conforms to IS:325, IS:2148, Gas Group IIA,IIB.

1000 rpm 6 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.37	0.50	80	MJ080613	23510	1150
0.55	0.75	80	MJ080633	23910	1170
0.75	1.00	90 L	MJ09L633	27670	1354
1.10	1.50	90 L	MJ09L653	28590	1399
1.50	2.00	100 L	MJ10L633	40730	1993
2.20	3.00	112 M	MJ11M653	47520	2325
3.70	5.00	132 M	MJ13M633	63350	3099
5.50	7.50	132 M	MJ13M693	77780	3805
7.50	10.00	160 M	MJ16M633	118700	5807
9.30	12.50	160 L	MJ16L663	137170	6711
11.00	15.00	160 L	MJ16L673	145090	7099
15.00	20.00	180 L	MJ18L613	195230	9552
18.50	25.00	200 L	MJ20L613	242790	11879
22.00	30.00	200 L	MJ20L633	263290	12881
30.00	40.00	225 M	MJ22M643	429840	21030
37.00	50.00	250 M	MJ25M633	532820	26068
45.00	60.00	280 S	MJ28S613	648660	31736
55.00	75.00	280 M	MJ28M633	702300	34360
75.00	100.00	315S	MJ31S613	777550	38042
90.00	120.00	315M	MJ31M633	911760	44608
110.00	150.00	315M	MJ31M653	999570	48904
125.00	170.00	315L	MJ31L6A3	1182910	57874
132.00	180.00	315L	MJ31L673	1211660	59280
150.00	200.00	315L	MJ31L683	1417750	69363
160.00	215.00	315L	MJ31L693	1460290	71445

750 rpm 8 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.37	0.50	90L	MJ09L833	27250	1333
0.55	0.75	90L	MJ09L853	29480	1442
0.75	1.00	100 L	MJ10L813	35630	1743
1.10	1.50	100 L	MJ10L833	41580	2034
1.50	2.00	112 M	MJ11M813	49620	2428
2.20	3.00	132M	MJ13M813	65370	3198
3.70	5.00	160M	MJ16M813	105380	5156
5.50	7.50	160M	MJ16M833	121250	5932
7.50	10.00	160L	MJ16L873	148090	7245
9.30	12.50	180L	MJ18L813	188850	9240
11.00	15.00	180L	MJ18L833	199020	9737
15.00	20.00	200L	MJ20L833	269580	13189
18.50	25.00	225S	MJ22S823	335630	16421
22.00	30.00	225M	MJ22M833	438270	21442
30.00	40.00	250M	MJ25M813	542100	26522
37.00	50.00	280S	MJ28S823	695350	34020
45.00	60.00	280M	MJ28M853	717920	35124
55.00	75.00	315S	MJ31S813	793620	38828
75.00	100.00	315M	MJ31M833	929520	45477
90.00	120.00	315M	MJ31M853	1017350	49774
110.00	150.00	315L	MJ31L873	1272560	62260
125.00	170.00	315L	MJ31L8A3	1501510	73461
132.00	180.00	315L	MJ31L893	1546910	75683

Eff1 will be punched on name plate as per IS 12615: 2004 for
6 Pole- 0.37kW to 132Kw 8 Pole- 0.37kW to 110Kw

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Bharat Bijlee

TEFC SLIPRING CRANE DUTY MOTORS

B3 const., 415V ±10%, 50Hz ±5% Combn var. ±10%,3 Phase supply, Insl Stator/Rotor Class F, Degree of Protection IP55, Ambient Temperature 45° C Duty S4, CDF 40%, 60 Starts/ Stops per hour Conforms to IS : 325

1000 rpm 6 Pole					
Kw	Hp	Frame	Type	LP33	Excise
1.10	1.50	100L	MP10L613	50790	2485
1.50	2.00	100L	MP10L623	53670	2626
2.40	3.20	112M	MP11M623	57740	2825
3.30	4.40	112M	MP11M643	70450	3447
4.00	5.30	132M	MP13M613	76080	3722
5.50	7.50	132M	MP13M663	82900	4056
7.00	9.40	160L	MP16L613	99580	4872
10.00	13.40	160L	MP16L653	126630	6195

TEXTILE MOTORS - RING FRAME

B3 const.,415V ±10%, 50Hz ±5% Combn var. ±10%, 3 Phase supply, Insulation Class F, Degree of Protection IP55, Ambient Temperature 45° C, Conforms to IS : 325

1500 rpm 4 Pole					
Kw	Hp	Frame	Type	LP33	Excise
2.20	3.00	100L	MR10L453	17680	865
3.70	5.00	112M	MR11M453	22610	1106
5.50	7.50	132S	MR13S453	31170	1525
7.50	10.00	132M	MR13M483	36370	1779
9.30	12.50	160M	MR16M413	56750	2776
11.00	15.00	160M	MR16M433	58210	2848
13.00	17.50	160L	MR16L453	66830	3270
15.00	20.00	160L	MR16L473	72330	3539

BBL/LP-33 Effective from 21st Mar'2011

Authorised by : A M Naik

Bharat Bijlee

CRANE & HOIST DUTY SQUIRREL CAGE MOTORS

B 3 Construction, 415V ±10%, 50Hz ±5% Combined variation ±10%, Insulation Class F, Degree of Protection IP55, Ambient Temperature 45° C, Duty S4, CDF 40%, Starts/Stops 150 per hour, Conforms to IS : 325.

1500 rpm 4 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.55	0.75	71	MC071433	10000	489
0.75	1.00	80	MC080413	11120	544
1.10	1.50	80	MC080433	11730	574
1.50	2.00	90S	MC09S433	12830	628
2.20	3.00	90L	MC09L453	14000	685
3.70	5.00	100L	MC10L453	18530	907
5.50	7.50	112M	MC11M453	24830	1215
7.50	10.00	132S	MC13S453	32660	1598
9.30	12.50	132M	MC13M483	39970	1956
11.00	15.00	160M	MC16M4A3	59440	2908
15.00	20.00	160M	MC16M4F3	60970	2983
18.50	25.00	160L	MC16L4P3	75840	3710
22.00	30.00	180L	MC18L473	113900	5573
30.00	40.00	200L	MC20L433	153670	7518
37.00	50.00	225S	MC22S413	197420	9659
45.00	60.00	225M	MC22M433	228830	11196
55.00	75.00	250M	MC25M413	314150	15370
75.00	100.00	280S	MC28S413	402120	19674
90.00	120.00	280M	MC28M433	466550	22826
110.00	150.00	315S	MC31S413	587490	28743
132.00	160.00	315M	MC31M433	689230	33721
160.00	215.00	315L	MC31L453	809260	39593
180.00	250.00	315L	MC31L463	879030	43007
200.00	270.00	315L	MC31L473	984630	48173

1000 rpm 6 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.37	0.50	71	MC071633	10950	536
0.55	0.75	80	MC080613	11780	576
0.75	1.00	80	MC080633	12660	619
1.10	1.50	90L	MC09L6A3	13630	667
1.50	2.00	90L	MC09L653	14280	699
2.20	3.00	100L	MC10L653	19110	935
3.70	5.00	112M	MC11M653	23940	1171
5.50	7.50	132S	MC13S653	34940	1709
7.50	10.00	132M	MC13M693	40780	1995
9.30	12.50	160M	MC16M633	62840	3074
11.00	15.00	160L	MC16L663	74240	3632
13.00	17.50	160L	MC16L673	78300	3831
17.00	23.00	180L	MC18L633	106770	5224
22.00	30.00	200L	MC20L633	151060	7391
30.00	40.00	225M	MC22M623	235470	11520
37.00	50.00	250M	MC25M603	317230	15520
45.00	60.00	280S	MC28S613	404200	19775
52.00	70.00	280M	MC28M633	458550	22435
70.00	95.00	315S	MC31S613	563270	27558
85.00	115.00	315M	MC31M633	708630	34670
102.00	135.00	315M	MC31M653	789390	38621
125.00	167.00	315L	MC31L673	917100	44869
150.00	200.00	315L	MC31L693	954630	46705

ENERGY IS LIFE BEE CONSERVE IT

Bharat Bijlee

CRANE & HOIST DUTY SQUIRREL CAGE MOTORS

B 3 Construction, 415V ±10%, 50Hz ±5% Combined variation ±10%, Insulation Class F, Degree of Protection IP55, Ambient Temperature 45° C, Duty S4, CDF 40%, Starts/Stops 150 per hour, Conforms to IS · 325.

750 rpm 8 Pole					
Kw	Hp	Frame	Type	LP33	Excise
0.55	0.75	90S	MC09S813	13050	638
0.75	1.00	90L	MC09L853	14270	698
1.10	1.50	100L	MC10L813	17540	858
1.50	2.00	100L	MC10L833	21370	1046
2.20	3.00	112M	MC11M833	24780	1212
3.70	5.00	132S	MC13S853	36020	1762
5.50	7.50	160M	MC16M833	54050	2644
7.50	10.00	160L	MC16L873	79680	3898
9.30	12.50	180M	MC18M813	103580	5068
11.00	15.00	180L	MC18L833	109100	5338
15.00	20.00	200L	MC20L833	154150	7542
18.50	25.00	225S	MC22S813	198880	9730
22.00	30.00	225M	MC22M833	240060	11745
30.00	40.00	250M	MC25M813	322800	15793
37.00	50.00	280S	MC28S823	412570	20185
45.00	60.00	280M	MC28M853	478660	23418
55.00	75.00	315S	MC31S813	572970	28033
75.00	100.00	315M	MC31M833	720870	35269
90.00	120.00	315M	MC31M853	809920	39625
110.00	150.00	315L	MC31L873	855220	41842
132.00	180.00	315L	MC31L893	1001610	49004

Note:

1. Prices mentioned are maximum recommended selling prices and c subjecte to change without notice.
2. Prices are Ex-Works / EX-Godown exclusive of Excise duty, tax and other Central / Local levies which will be charged extra
3. kW & HP are indicated, howver kW is binding and HP is approxi

Extra Price Calculations.

a) Wherver percentage is mentioned, add to LP and then offer c
b) Where absolute values are mentioned, same to be directl to the nett price(No discount applicable ob absolute values).

Authorised by : A M Naik

BBL/LP-33 Effective from 21st Mar'2011

On the list price offer discount of 55 % + ED + Vat for retail customer. For enquiries of motors more than 5 prices are negotiable.

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.**
415V,50HP, 3-φ Induction Motor	Attached Doc.	1 Month	1.3	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		0.19	0.19	0.19	0.19	0.19	0.76
2	Raw material							
	Power and fuel							
	Wages and salaries							
	Selling expenses							
	Other expenses		0.02	0.02	0.02	0.02	0.02	0.08
	Total cost		0.02	0.02	0.02	0.02	0.02	0.08
3	Profit before depreciation, interest and taxes (PBDIT)		0.17	0.17	0.17	0.17	0.17	0.68
4	Interest on term loan		0.04	0.03	0.02	0.01	0	0.06
5	Interest on working capital							
6	Interest on unsecured land							
7	Depreciation		0.02	0.02	0.02	0.02	0.02	0.08
8	PBT		0.11	0.12	0.13	0.14	0.15	0.54
9	Tax		0	0.05	0.05	0.05	0.06	0.21
10	PAT		0.11	0.07	0.08	0.09	0.09	0.33
11	Dividends/ withdrawal							
12	Cash accruals							
13	Debt service coverage ratio		1.9	0.9	1.0	1.0		
	Av. DSCR	1.2						

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

Confederation of Indian Industry

CII – AVANTHA Centre for Competitiveness

Block No.3, Dakshin Marg

Sector 31-A, Chandigarh - 160030

India SME Technology Services Ltd

DFC Building, Plot No.37-38,

D-Block, Pankha Road,

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

SEE-Tech Solutions Pvt. Ltd
11/5, MIDC, Infotech Park,
Near VRCE Telephone Exchange,
South Ambazari Road,
Nagpur – 440022
Website: www.letsconserve.org

India SME Technology Services Ltd
DFC Building, Plot No.37-38,
D-Block, Pankha Road,
Institutional Area, Janakpuri, New Delhi-110058
Tel: +91-11-28525534, Fax: +91-11-28525535
Website: www.techsmall.com