

DETAILED PROJECT REPORT ON ENERGY EFFICIENT MOTOR FOR BALL MILLS-20HP (EAST & WEST GODAVARI REFRACTORIES CLUSTER)



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**ENERGY EFFICIENT MOTOR FOR
Ball Mill -20 HP**

BEE, 2010

Detailed Project Report on Energy Efficient Motor for Ball Mill
Refractory Cluster, East & West Godavari, Andhra Pradesh (India)
New Delhi: Bureau of Energy Efficiency;
Detail Project Report No.: E&W/Ref/EEM/03

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Acknowledgement

We are sincerely thankful to the Bureau of Energy Efficiency, Ministry of Power, for giving us the opportunity to implement the BEE SME project in “refractory Cluster, East & West Godavari District of Andhra Pradesh”. We express our sincere gratitude to all concerned officials for their support and guidance during the conduct of this exercise.

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Andhra Pradesh Industrial & Technical Consultancy Organization Ltd. (APITCO) is also thankful to “*The Ceramic Manufacturing Welfare Association, Rajamundry at East & west Godavari Districts*” for their valuable inputs, co-operation, support and identification of the units for energy use and technology audit studies and facilitating the implementation of BEE SME program.

We take this opportunity to express our appreciation for the excellent support provided by unit owners, local service providers, and equipment suppliers for their active involvement and their valuable inputs in making the program successful and in completion of the Detailed Project Report (DPR).

APITCO is also thankful to all the SME owners, plant in charges and all workers of the SME units for their support during the energy use and technology audit studies and in implementation of the project objectives.

APITCO Limited

Hyderabad

Contents

<i>List of Annexure</i>	<i>vii</i>
<i>List of Tables</i>	<i>vii</i>
<i>List of Figures</i>	<i>viii</i>
<i>List of Abbreviation</i>	<i>viii</i>
<i>Executive summary</i>	<i>ix</i>
<i>About BEE'S SME program</i>	<i>xi</i>
1 INTRODUCTION	1
1.1 Brief Introduction about cluster	1
1.1.1 Production process	1
1.2 Energy performance in existing situation	3
1.2.1 Fuel and electricity consumption of a typical unit in the cluster	3
1.2.2 Average production by a typical unit in the cluster	3
1.2.3 Specific Energy Consumption	3
1.3 Existing technology/equipment	3
1.3.1 Description of existing technology.....	3
1.3.2 Its role in the whole process	4
1.4 Establishing the baseline for the equipment.....	4
1.4.1 Design and operating parameters.....	5
1.4.2 Electricity consumption in existing system	5
1.4.2 Operating efficiency of the existing motor	5
1.5 Barriers for adoption of new and energy efficient technology / equipment.....	5
1.5.1 Technological Barriers	5
1.5.2 Financial Barrier.....	6
1.5.3 Skilled manpower	6
1.5.4 Other barrier(s)	6
2. TECHNOLOGY/EQUIPMENT FOR ENERGY EFFICIENCY IMPROVEMENTS.....	7
2.1 Detailed description of Technology/Equipment selected	7

2.1.1	Description of equipment	7
2.1.2	Technology /Equipment specifications	7
2.1.3	Justification of the technology selected & Suitability	8
2.1.4	Superiority over existing technology/equipment	8
2.1.5	Availability of the proposed technology/equipment.....	9
2.1.6	Source of technology/equipment for the project.....	9
2.1.7	Service/technology providers	9
2.1.8	Terms of sales	9
2.1.9	Process down time during implementation.....	9
2.2	Life cycle assessment and risks analysis	9
2.3	Suitable unit/plant size in terms of capacity/production	9
3.	ECONOMIC BENEFITS OF NEW ENERGY EFFICIENT TECHNOLOGY	10
3.1	Technical benefits.....	10
3.1.1	Fuel savings per year.....	10
3.1.2	Electricity savings per year	10
3.1.3	Improvement in product quality	10
3.1.4	Increase in production.....	10
3.1.5	Reduction in raw material consumption	10
3.1.6	Reduction in other losses.....	10
3.2	Monetary benefits	10
3.3	Social benefits	11
3.3.1	Improvement in working environment in the plant	11
3.3.2	Improvement in skill set of workers	11
3.4	Environmental benefits	11
3.4.1	Reduction in effluent generation	11
3.4.2	Reduction in GHG emission such as CO ₂ , NO _x , etc.....	11
3.4.3	Reduction in other emissions like SO _x	11

4.	INSTALLATION OF NEW ENERGY EFFICIENT MOTOR	12
4.1	Cost of technology/equipment implementation.....	12
4.1.1	Cost of technology/equipments.....	12
4.1.2	Other costs	12
4.2	Arrangement of funds	12
4.2.1	Entrepreneur's contribution	12
4.2.2	Loan amount.....	12
4.2.3	Terms & conditions of loan	12
4.3	Financial indicators	12
4.3.1	Cash flow analysis	12
4.3.2	Simple payback period.....	13
4.3.3	Net Present Value (NPV)	13
4.3.4	Internal rate of return (IRR)	13
4.3.5	Return on investment (ROI)	13
4.4	Sensitivity analysis in realistic, pessimistic and optimistic scenarios	13
4.5	Procurement and implementation schedule	13

LIST OF ANNEXURE

Annexure 1: Process Flow Diagram	14
Annexure 2: Detailed technology assessment report – Ball Mill Motor.....	15
Annexure 3: Detailed drawing for civil work required for EE Motor	16
Annexure 4: Detailed financial calculations & analysis	17
Annexure 5: Details of procurement and implementation plan.....	21
Annexure 6: Details of technology/equipment and service providers	22
Annexure 7: Quotation or techno-commercial bid.....	23

List of Table

Table 1.1: Energy consumption of a typical unit	3
Table 1.2: Specific energy consumption for a typical unit	3
Table 1.3 Existing Ball Mill motor specifications	4
Table 1.4 Energy consumption by Ball Mill Motor	5
Table 2.1: Technical Specifications of Energy Efficient motor.....	8
Table 3.1: Energy and monetary benefits	10
Table 4.1: Project detail cost	12
Table 4.2: Sensitivity analysis	13

List of Figure

Figure 1.1: General Process Flowchart of a Typical Ice Plant.....	2
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Lists of Abbreviations

BEE	- Bureau of Energy Efficiency
DPR	- Detailed Project Report
DSCR	- Debt Service Coverage Ratio
GHG	- Green House Gases
HP	- Horse Power
IRR	- Internal Rate of Return
MoP	- Ministry of Power
MSME	- Micro Small and Medium Enterprises
NPV	- Net Present Value
ROI	- Return on Investment
MoMSME	- Ministry of Micro Small and Medium Enterprises
SIDBI	- Small Industrial Development Bank of India

EXECUTIVE SUMMARY

APITCO Ltd is executing BEE-SME program in East and West Godavari (Refractories) Cluster, supported by Bureau of Energy Efficiency (BEE) with an overall objective of improving the energy efficiency in cluster units.

Rajahmundry is one of the oldest clusters of state of Andhra Pradesh producing Refractories and potteries. These industries were in operation since last four to five decades. Earlier, these industries were used to produce potteries for domestic market, which are commonly used for storing pickles for longer time. The products called 'Jars' are the most commonly used container in Southern India specifically in the state of Andhra Pradesh for storing various food items. During the course of time, the demand for potteries (Jars) was considerably reduced due to change in economy and food habits. These pottery making units were diversified to produce Refractories which are used in industries as insulation.

Majority of the industries are producing Refractories and very few units are producing potteries. These industries have been in operation for the last 25 to 30 years. The main raw materials are clay, refractory grog, other chemicals etc.

The major Energy used in cluster is Coal and Wood and Electricity. Coal and wood are used as fuel in down draft kilns for heat treatment of refractory bricks. Electricity is used for drive the prime movers used in Brick Press, grinding machines, clay mixers, crushers etc. The total energy cost in refractory industries varies from 40% to 50 % of production cost. The down draft kilns requires higher thermal energy, which is major share of total energy consumed.

The Ball mills are operated by inbuilt motors to rotate the drum. The ball mill are in operations in refractory Industries are daily about 14 hrs for making unshaped refractory material. The environment in ball mill area is dusty and wet which will affect the efficiency of motors and other parts of machinery. If the ball mill motor is inefficient the power consumption will be high.

During the energy use and technology audit in Refractory Manufacturing Industries all Ball Mill motors are have normal efficiency compare to energy efficient motors. To reduce the power consumption, it is essential to replace conventional motor by energy efficient motor.

The DPR highlights the details of the study conducted for assessing the potential for installation of energy efficient motor in ball mill, possible monetary benefit, availability of the technologies/design, local service providers, technical features and proposed

equipment specifications, various barriers in implementation, environmental aspects, estimated GHG reductions, capital cost, financial analysis, and schedule of Project Implementation.

This bankable DPR also found eligible for subsidy scheme of MoMSME for “Technology and Quality Upgradation Support to Micro, Small and Medium Enterprises” under “National Manufacturing and Competitiveness Programme”. The key indicators of the DPR including the Project cost, debt equity ratio, monetary benefit and other necessary parameters are given in table below

S.No	Particular	Unit	Value
1	Project cost	` (in Lakh)	0.455
2	Power saving	kWh/annum	6087
3	Monetary benefit	` (in Lakh)	0.23
4	Simple payback period	Years	1.99
5	NPV	` (in Lakh)	0.27
6	IRR	%age	30.65
7	ROI	%age	31.71
8	Average DSCR	Ratio	1.65
9	Process down time	Days	1
10	CO ₂ emission reduction	Tons/annum	5

The projected profitability and cash flow statements indicate that the project implementation i.e. installation of Energy efficient Motor for Ball Mill in refractory manufacturing cluster for reducing the power consumption will be financially viable and technically feasible.

ABOUT BEE'S SME PROGRAM

Bureau of Energy Efficiency (BEE) is implementing a BEE-SME Programme to improve the energy performance in 29 selected SMEs clusters. Bhimavaram Ice Making Units Cluster is one of them. The BEE's SME Programme intends to enhance the energy efficiency awareness by funding/subsidizing need based studies in SME clusters and giving energy conservation recommendations. For addressing the specific problems of these SMEs and enhancing energy efficiency in the clusters, BEE will be focusing on energy efficiency, energy conservation and technology up-gradation through studies and pilot projects in these SMEs clusters.

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

Activity 1: 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.

Activity 2: 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 up of energy efficiency projects in the clusters

Activity 3: Implementation of energy efficiency measures

To implement the technology up-gradation project in the 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.

Activity 4: 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 cluster

Rajahmundry is one of the oldest Industrial clusters and located in state of Andhra Pradesh and manufacturing Refractories products and potteries. These industries were in operation since last four to five decades. Earlier, these industries were used to manufacture potteries for domestic market, which are commonly used for storing pickles for longer time. The products called 'Jars' are the most commonly used container in Southern India specifically in the state of Andhra Pradesh for storing various food items. During the course of time, the demand for potteries (Jars) was considerably reduced due to change in economy and food habits. These pottery making units were diversified to refractory manufacturing due to demand.

Majority of the industries are manufacturing Refractories and very few units are potteries. There are about 83 industries in the cluster. These industries have been in operation for the last 20 to 30 years. The main raw materials are clay, refractory grog, other chemicals etc. The major Energy used in refractory cluster is Electricity and Fuels like Coal and Wood. Electricity is used for drive the prime movers of brick making units, grinding machines, mixers etc. Coal and wood are used as fuel in down draft kilns for heat treatment of the bricks.

The cost of energy is varies from 30% to 50% of production cost which is depending up on the kilns and capacities. In refractory industries, major cost is contributed by energy cost followed by raw material cost and labor cost.

1.1.1 Production process

The main process operation for manufacturing refractory bricks adopted in cluster units are as follows:

The raw material i.e. Clay 60%, refractory Greg 40% and water is feed manually and sent to clay mister for uniform mixing . The refractory bricks are either prepared by manually (Hollow bricks) or in molding machines (Solid bricks) and the bricks are dried naturally/ using fans for 2 to 3 days and naturally dried bricks are loaded to the kiln.

The heating of the bricks is done under slow firing in kiln for 72 hours for removing the moisture content. In the slow firing, for every one hour, about one shovel of coal (3.5 kgs)

in each grate is burnt. The temperature is maintained between 100 – 200°C. During this period all the doors and damper existing in the kiln are kept open.

After slow firing firstly raw material charging door in kiln is closed. Out of 24 holes provided in kiln, 4 no's of top holes are closed every 8 hrs from the time of charging door closed. After closing the all the doors, rapid firing system started by adding 1 shovel of coal per hour in every coal feeding doors.

After 72 hours, the full firing period is carried out for 48 hours and the temperature of the kiln is increased from 200 °C to 1050 °C. The damper position in kiln is kept opened for about 25%. After completion of the rapid firing for 48 hours, all the coal feed points /grates and damper are closed and firing is stopped. Then the kiln is left for maintain the temperature (soaking) for 24 hours and then the kiln is taken for natural cooling and the bricks are unloaded after 24 hours of natural cooling.

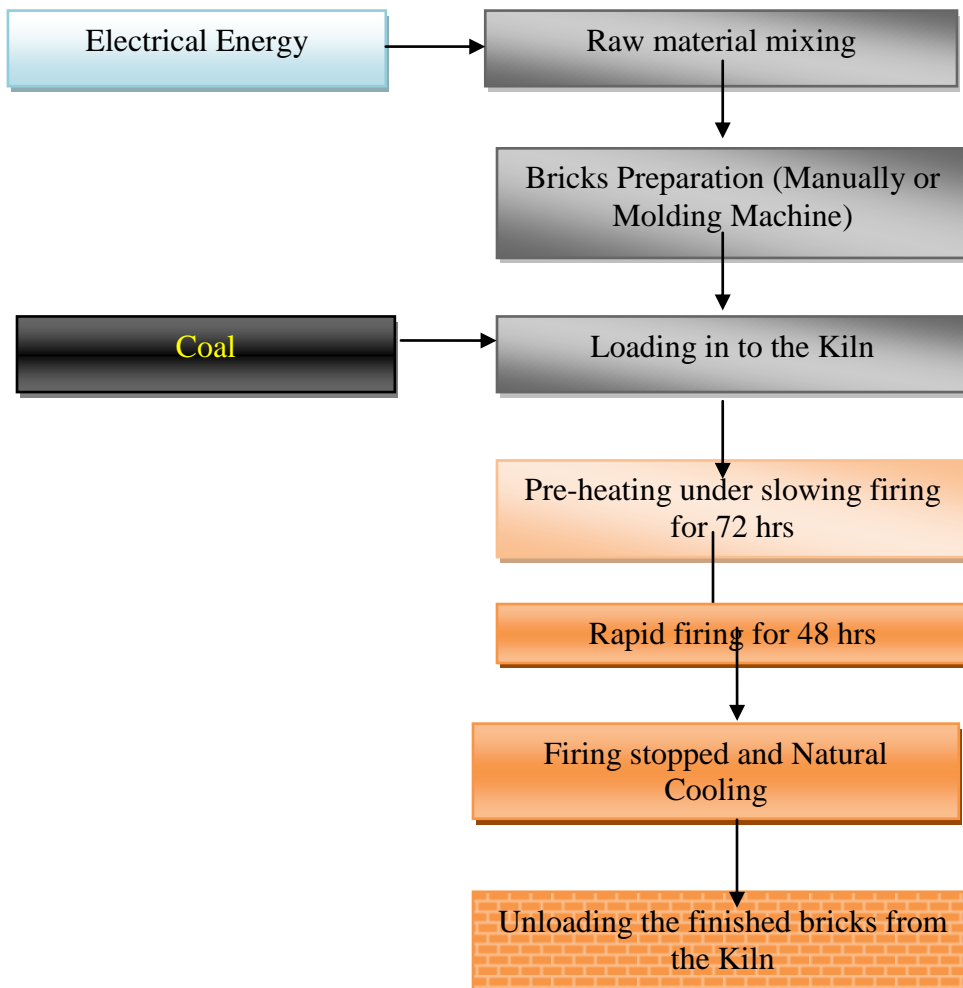


Figure 1.1: General process flowchart of a typical Refractory Unit

1.2 Energy performance in existing situation

1.2.1 Fuel and electricity consumption of a typical unit in the cluster

The main energy forms used in a typical unit in the cluster are electricity, coal, and wood. Electricity is used for drive the prime mover of brick making unit, mixers, grinding machine, etc. Coal and wood is used as fuel in the down draft kiln. The energy consumption of a typical unit in cluster is furnished in Table 1.1 below:

Table 1.1: Energy consumption of a typical unit

S.No.	Name of Unit	Yearly Consumption		
		Coal (Tons)	Electricity (kWh)	Wood (Tons)
1	M/s. Hema Engineering Refractories	1000	32114	200

1.2.2 Average production by a typical unit in the cluster

The average production in a typical refractory unit is between 1100 tons of Refractory Bricks per annum.

1.2.3 Specific Energy Consumption

The main energy forms used in the refractory production are electricity, coal, and wood. The Specific energy consumption for electrical and thermal energy per ton of Production for a typical unit is furnished in Table 1.2 below:

Table 1.2: Specific energy consumption for a typical unit

S. No.	Type of Fuel	Units	Sp. Energy Consumption
1	Coal Consumption	Tons/ ton of products	0.91
2	Grid Power consumption	kWh/ ton	29.19
3	Wood consumption	tons/ ton of Product	5.50

1.3 Existing technology/equipment

1.3.1 Description of existing technology

The refractory Manufacturing Industries use Ball mills for preparation of unshaped Refractory material. The Ball mill is also a machine where the raw material is used to crush up to 200 meshes. This machine is used in the refractory industries where the products required fine raw material up to 200 meshes. These ball mills are required in potteries, ceramics manufacturing industries which require fine powder form of material.

The ball required electrical energy to operate the motors. The capacity of Ball mill is depends up on the production capacity of the industry.

The Ball mills are operated by inbuilt motors to rotate the drum. The ball mill is in operations in refractory Industries are daily about 14 hrs for making unshaped refractory material. The environment in ball mill area is dusty and wet which will affect the efficiency of motors and other parts of machinery. If the ball mill motor is inefficient the power consumption will be high.

During the energy use and technology audit in Refractory Manufacturing Industries all Ball mill motors are normal efficiency compare to energy efficient motors. To reduce the power consumption, it is essential to replace energy efficient motor.

Power costs will certainly continue to rise and further escalate motor operating expense. To reduce the power consumption by the Ball mill during the Refractory Manufacturing plant operation it is essential to implement energy efficient motor for Ball Mills. By installing Energy Efficient Motor in Ball Mills will result considerable energy savings and there by reduction in production cost. A detail of existing Ball Mill motor is given in the Table 1.3 below:

Table 1.3 Existing Ball Mill motor specifications

S.No	Details	Specifications
1	Rated HP	20
2	Voltage (V)	440
3	Rated Amps (I)	27
4	Frequency Hz	50
5	Power Consumption (kW)	14.62
6	Efficiency (%age)	84

1.3.2 Its role in the whole process

Ball mills are used to reduce the size, or change the form for further use of material in refractory manufacturing process. The material from the ball mill is used for shape the required sizes of the refractory material. The procured raw material / other material is sent to ball mill to get required granular sizes before mixing with the other materials. These ball mills are mainly used in the ceramics product manufacturing i.e. Jars, tiles etc. The capacity of the Ball mill is depends upon the production capacity of the products to be

heated. These ball mills are used to grain & size raw material up to 200 mesh depending requirement of products manufactured. The Ball mills are operated by motor and it consumed electrical energy. The capacity of motor is depends upon material to be sized.

1.4 Establishing the baseline for the equipment

1.4.1 Design and operating parameters

The present power consumption by Ball Mill motor is 14.62 kW. These motor is operated for 14 hours in a day and 350 days per year.

1.4.2 Electricity consumption in existing system

The electricity consumption by Ball Mill motor in refractory Manufacturing Units in East & west Godavari cluster is given in Table 1.4 below:

Table 1.4 Electricity consumption by Ball Mill Motor

S. No	Name of the unit	Motor Capacity (HP)	Actual Power consumption (kW)
1	M/s. Hema Engineering Refractories	20	14.62

1.4.2 Operating efficiency of the existing motor

The detailed energy audit studies had been undertaken in various units in the Refractory Manufacturing Units in the Cluster, East & West Godavari to evaluate the Ball Mill motors efficiencies. Based on age and number of times the motor under gone re winded, the efficiency of crusher motors in the name plate is found to be 86% and during the operation of the motor the efficiency is lower than the manufacturer's specification due to wind losses, core losses etc. Now a day's higher efficiency motors (eef1) are available and the efficiencies are more than the standard and existing motors.

1.5 Barriers for adoption of new and energy efficient technology / equipment

1.5.1 Technological Barriers

The major technical barriers that prevented for implementation of the energy efficient motors in the cluster are:

- Dependence on local equipment suppliers and availability of the motors at lower cost.
- Lack of awareness of the energy efficient motors.

1.5.2 Financial Barrier

The replacement of motors requires high investment and repair and rewinding of the motor will cost very less. Hence, many of the owners don't show interest due to high initial investment and lack of financial strength to invest. Further, the lack of awareness of the losses and monetary benefit of energy efficient motors also one of the major factor for implementing the energy efficient motors.

Energy Efficiency Financing Schemes such as SIDBI's, if focused on the cluster, will play a catalytic role in implementation of identified energy conservation projects & technologies.

The cluster has significant potential for implementing energy efficiency motors.

1.5.3 Skilled manpower

Not applicable

1.5.4 Other barrier(s)

Information on the energy efficient technologies not available among cluster unit owners, though the suppliers are available locally of energy efficient motors, the information was not disseminated among cluster units.

2. TECHNOLOGY/EQUIPMENT FOR ENERGY EFFICIENCY IMPROVEMENTS

2.1 Detailed description of Technology/Equipment selected

2.1.1 Description of equipment

The project activity is replacement of inefficient motors with new energy efficient motors in Refractory manufacturing units located in E&W Godavari. The new motor will have 91.8% of overall efficiency at full load conditions. The high efficiency motors having the following special features:

- These motors are available in TEFC construction for use in safe areas and also in flameproof enclosure for use in Hazardous areas.
- Low loss special grade of thinner laminations. This reduces the Iron loss even at partial loads.
- Thicker conductors and more copper contents reduce copper loss due to lower resistance.
- Longer core length, reduced and uniform air gap between stator and rotor to reduce stray losses.
- Special design of fan and fan cover to reduce windage losses

Considering the above facts and for reducing electricity consumption by the Ball Mill motor it is suggested to install energy efficient motors in Refractory units.

Advantage

- The benefits of using these motors in continuous duty applications like Blowers, Compressors, Fans, Exhausters, Crushers and Pumps etc will result the energy savings at full and part load conditions. In many applications the load factor of the motor will be range of 60-85% like ball mill in Refractory Industries.
- The efficiency curve of standard motor is dropping in nature i.e., there is a sharp fall in efficiency at partial loads. But the energy efficient motors have a flat efficiency curve and hence the fall in efficiency is marginal. Thus energy saving is significant even in part loads.

2.1.2 Technology /Equipment specifications

The detailed specification of suggested energy efficient motor for is furnished in table 2.1 below:

Table 2.1: Technical Specifications of Energy Efficient motor

S. No.	Parameter	Unit	Value
1	Rated Capacity	HP	20
2	Rated Current	Amps	26
3	Speed	RPM	1470
4	Efficiency	% age	91.8
5	Power Factor	% age	0.88

2.1.3 Justification of the technology selected & Suitability

The Ball Mills motors are major energy consuming equipment in refractory cluster where ceramic products are manufacturing due to continuous operation required for making the powder and wet material. Based on detailed energy audits conducted for various motors installed in refractory units, major motors are age-old and many times re-winded. Due to the reason the efficiency of the motor will decrease and power consumption by Ball mill will increase at same load conditions.

But new energy efficient motors will have overall efficiency of 91.8 % (at full load) compare to the existing motor efficiency of 84-86%. The following benefits are possible for selection of this technology

- Reduce electricity consumption during full and part load conditions
- It reduces the GHG emissions
- Lower payback period for Continuous Operation
- High power factor
- Flat efficiency curve for at all loads
- Higher Motor life

2.1.4 Superiority over existing technology/equipment

The energy efficient motors having following superior features over existing motors

- Improved and higher efficiency is available from and at 60% to 100% load
- The efficiency curve is almost flat during part load conditions which result higher energy savings
- The special design features also result in lower operating temperatures which enhance the life of motor and reduce the maintenance costs

- These motors have inherently low noise and vibration and help in conservation of environment
- These motors are with highest power factor due the special exclusive design.
- The higher power factor reduces cable loss
- Saving is also made by reducing capacitors required to improve power factor

2.1.5 Availability of the proposed technology/equipment

The energy efficient motor suppliers are available in cluster locations.

2.1.6 Source of technology/equipment for the project

The source of the technology is indigenous and is locally available.

2.1.7 Service/technology providers

A detail of energy efficient motors suppliers has been furnished in Annexure 6.

2.1.8 Terms of sales

No specific terms and conditions

2.1.9 Process down time during implementation

The process down time for installation of energy efficient motor is considered one day which is required to dismantling/ replacing the existing motor and installation of new motor and providing electrical connections.

2.2 Life cycle assessment and risks analysis

The life of energy efficient motor is considered at 20 years. There is no risk involved as the motor are technology proven and are successfully in operation in all industries.

2.3 Suitable unit/plant size in terms of capacity/production

The motors are selected similar to the existing capacity of motor and actual power drawn at full load based on energy audits carried out plus 20% margin to overcome sudden load.

3. ECONOMIC BENEFITS OF NEW ENERGY EFFICIENT TECHNOLOGY

3.1 Technical benefits

3.1.1 Fuel savings per year

No fuel saving is possible

3.1.2 Electricity savings per year

The efficiency of the EE motor is more than the existing motor and hence it reduces electricity consumption at same loading condition. The power savings due to installation of new energy efficient motor is 6087 kWh per annum. Details of electricity saving calculation are given at Annexure 2.

3.1.3 Improvement in product quality

There is no significant impact on the product quality.

3.1.4 Increase in production

There is no significant effect on production capacity.

3.1.5 Reduction in raw material consumption

Raw material consumption will be same.

3.1.6 Reduction in other losses

Due to improved power factor of new energy efficient motor, the distribution losses may also reduce.

3.2 Monetary benefits

The monetary benefit due to installation of new energy efficient motor is ` 0.23 lakh per annum due to reduction in electricity consumption. Details of energy saving calculation are furnished in Table 3.1 below:

Table 3.1: Energy and monetary benefits

Sr. No	Parameter	Unit	Value
1	Present Power consumption	kWh/annum	71638
2	Power Consumption by new EE motor	kWh/yr	65551
3	Power saving	kWh/annum	6087
4	Monetary saving @ ` 3.75/kWh	`/annum (In lakh)	0.23

3.3 Social benefits

3.3.1 Improvement in working environment in the plant

As installation of new efficient motor may reduce the breakdowns and hence working environment may improve.

3.3.2 Improvement in skill set of workers

The technology selected for implementation is new and energy efficient motor and will create the awareness among the workforce on efficiency in motors and how it will reduce the power consumption.

3.4 Environmental benefits

3.4.1 Reduction in effluent generation

None

3.4.2 Reduction in GHG emission such as CO₂, NO_x, etc

The major GHG emission reduction source is CO₂. The technology will reduce grid electricity consumption and emission reductions are estimated at 5 tons of CO₂ per annum due to implementation of the project activity.

3.4.3 Reduction in other emissions like SO_x

No significant impact on SO_x emissions.

4. INSTALLATION OF NEW ENERGY EFFICIENT MOTOR

4.1 Cost of technology/equipment implementation

4.1.1 Cost of technology/equipments

The total cost for motor is estimated at ` 0.45 lakh, which includes motor cost and other charges and discounts as per the Quotation in Annexure 7.

4.1.2 Other costs

Other charges include cabling and panel modification. Project cost details are furnished in Table 4.1 below:

Table 4.1: Project detail cost

Sr. No.	Particular	Unit	Value
1	New Energy Efficient motor	` in lakh	0.45
2	Panel, Switch & Cabling, Elec. and Modifications etc.	` in lakh	0.005
3	Total Investment	` in lakh	0.455

4.2 Arrangement of funds

4.2.1 Entrepreneur's contribution

The entrepreneur's contribution is 25% of total project cost, which works out at 0.11 lakh.

4.2.2 Loan amount

The term loan is 75% of the total project cost, which is ` 0.34 lakh.

4.2.3 Terms & conditions of loan

The interest rate is considered at 10.0% which is prevailing interest rate of SIDBI for energy efficiency related projects. The loan tenure is 3 years and the moratorium period is 3 months.

4.3 Financial indicators

4.3.1 Cash flow analysis

Considering the above discussed assumptions, the net cash accruals starting with ` 0.15lakh in the first year operation and increases to ` 0.56 lakh at the end of 6th year.

4.3.2 Simple payback period

The total project cost of the proposed technology is ` 0.455 lakh and monetary savings due to reduction in power consumption is ` 0.23 lakh and the simple payback period works out to be 1.99 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 10.0% interest rate works out to be ` 0.27 lakh.

4.3.4 Internal rate of return (IRR)

The after tax Internal Rate of Return of the project works out to be 30.65%. 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 31.71%. The average DSCR is 1.65.

4.4 Sensitivity analysis in realistic, pessimistic and optimistic scenarios

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

- Increase in power savings by 5%
- Decrease in power savings by 5%

Table 4.2: Sensitivity analysis

Particulars	IRR %	NPV ` in lakh	ROI %	DSCR
Normal	30.65	0.27	31.71	1.65
5% increase in power savings	33.24	0.31	32.01	1.73
5% decrease in power savings	28.04	0.24	31.37	1.57

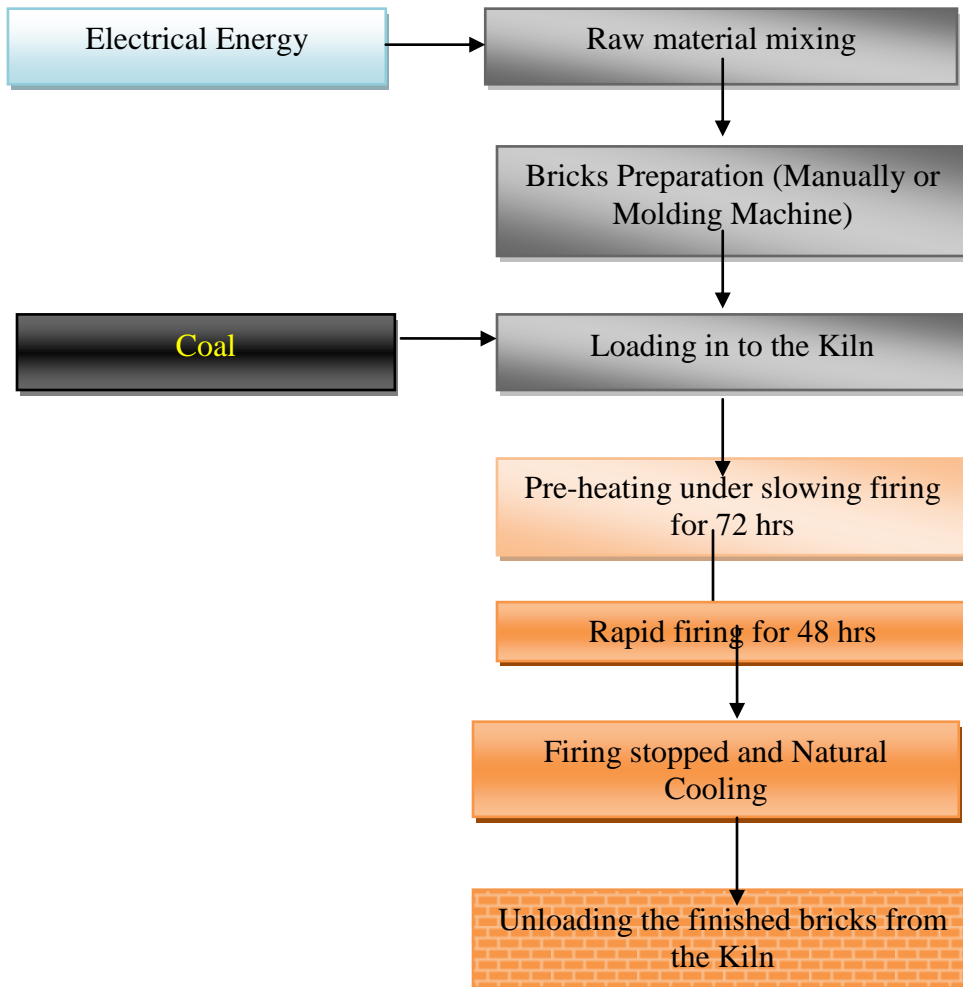
In each scenario, other inputs are assumed as constant.

4.5 Procurement and implementation schedule

The project is expected to be completed in 1 week from the date of release of purchase order. The detailed schedule of project implementation is furnished in Annexure 5.

ANNEXURE**Annexure 1: Process Flow Diagram**

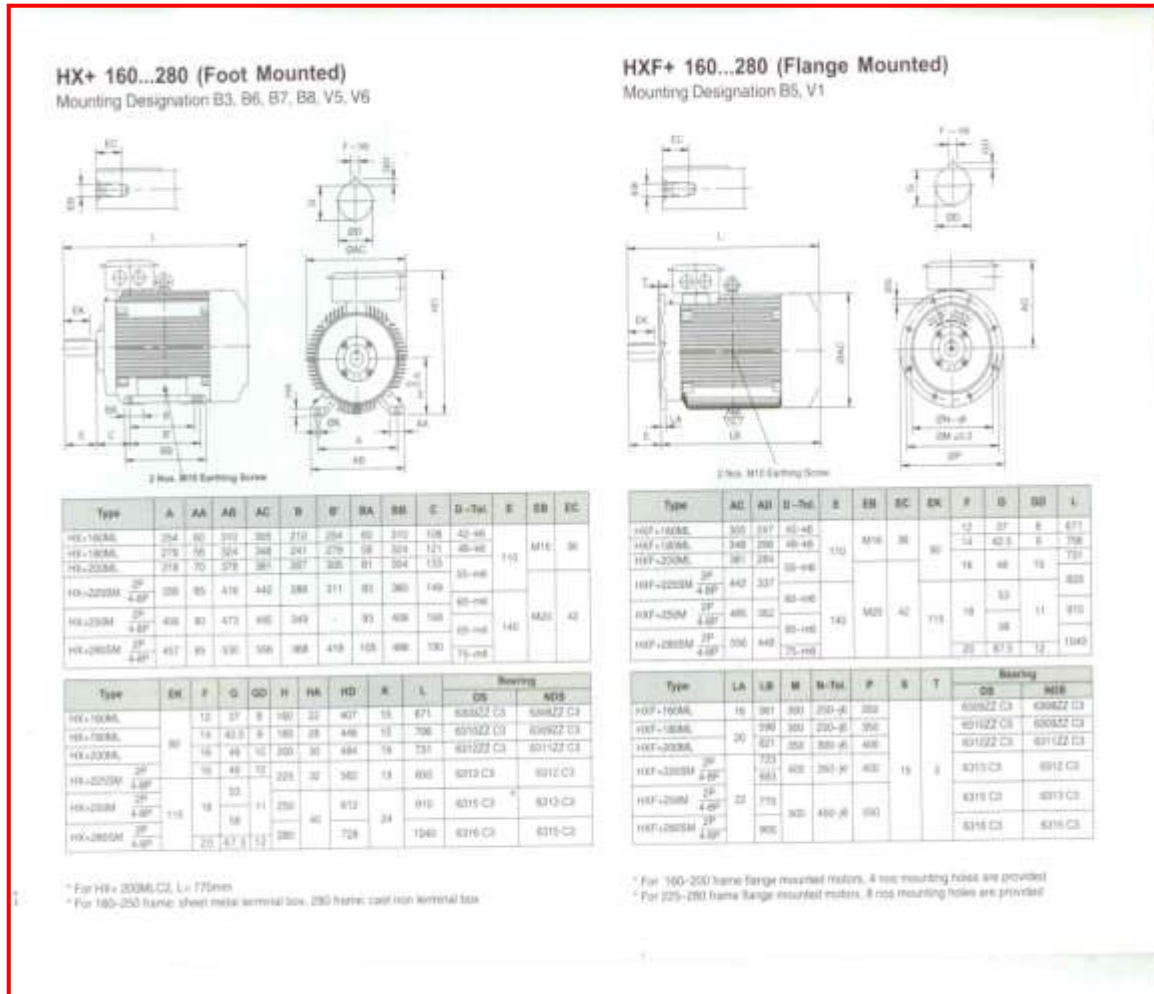
Process flow diagram will remain the same after implementation of proposed energy efficient motor.



Annexure 2: Detailed technology assessment report – Ball Mill Motor

S.No	Particulars	Unit	Value
1	Present rated	HP	20
2	Present rated	kW	14.92
3	Efficiency of existing motor	% age	84
4	Input Power	kW	17.76
5	Actual power consumption	kW	14.62
6	% Loading	%	82.31
7	New Energy Efficient Motor	kW	14.92
8	Efficiency of energy efficient motor	% age	91.8
9	Input Power to New Motor at full load	kW	16.25
10	Power Consumption at same loading	kW	13.38
11	Power savings	kW	1.24
12	Total operating hours	Hrs	4900
13	Power savings per annum	kWh	6087
14	Monetary savings per annum (@ ` 3.75 per kWh)	` in lakh	0.23
15	Investment required for new energy efficient motor	` in lakh	0.455
16	Payback period	years	1.99

Annexure 3: Detailed drawing for civil work required for EE Motor



Annexure 4: Detailed financial calculations & analysis**Assumptions**

Name of the Technology	New Energy Efficient Motor		
Rated Capacity	20 HP		
Details	Unit	Values	Basis
Installed capacity	HP	20	
No of working days	Days	350	
No of Operating Hours	Hrs.	14	
Proposed Investment			
New Energy Efficient Motor	` in lakh	0.45	
Cabling, Civil and Modifications	` in lakh	0.005	
Total Investment	` in lakh	0.455	
Financing pattern			
Own Funds (Internal Accruals)	` in lakh	0.11	Feasibility Study
Loan Funds (Term Loan)	` in lakh	0.34	Feasibility Study
Loan Tenure	Years	3	Assumed
Moratorium Period	Months	3	Assumed
Repayment Period	Months	39	Assumed
Interest Rate	%	10	SIDBI Lending Rate
Estimation of Costs			
O & M Costs	% on Plant & Equip	2	Feasibility Study
Annual Escalation	%	5	Feasibility Study
Estimation of Revenue			
power savings	kWh/annum	6087	Detailed calculations enclosed
power cost	`/kWh	3.75	
St. line Depn.	%	5.28	Indian Companies Act
IT Depreciation	%	80.00	Income Tax Rules
Income Tax	%	33.99	Income Tax

Estimation of Interest on Term Loan

` (in lakh)

Years	Opening Balance	Repayment	Closing Balance	Interest
1	0.34	0.03	0.31	0.04
2	0.31	0.10	0.22	0.03
3	0.22	0.15	0.07	0.02
4	0.07	0.06	0.01	0.00
		0.34		

WDV Depreciation

₹ (in lakh)

Particulars / years	1	2
Plant and Machinery		
Cost	0.46	0.09
Depreciation	0.36	0.07
WDV	0.09	0.02

Projected Profitability

₹ (in lakh)

Particulars / Years	1	2	3	4	5	6
Fuel savings	0.23	0.23	0.23	0.23	0.23	0.23
Total Revenue (A)	0.23	0.23	0.23	0.23	0.23	0.23
Expenses						
O & M Expenses	0.01	0.01	0.01	0.01	0.01	0.01
Total Expenses (B)	0.01	0.01	0.01	0.01	0.01	0.01
PBDIT (A)-(B)	0.22	0.22	0.22	0.22	0.22	0.22
Interest	0.04	0.03	0.02	0.00	0.00	0.00
PBDT	0.18	0.19	0.20	0.22	0.22	0.22
Depreciation	0.02	0.02	0.02	0.02	0.02	0.02
PBT	0.16	0.17	0.18	0.19	0.19	0.19
Income tax	0.00	0.04	0.07	0.07	0.07	0.07
Profit after tax (PAT)	0.16	0.13	0.11	0.12	0.12	0.12

Computation of Tax

₹ (in lakh)

Particulars / Years	1	2	3	4	5	6
Profit before tax	0.16	0.17	0.18	0.19	0.19	0.19
Add: Book depreciation	0.02	0.02	0.02	0.02	0.02	0.02
Less: WDV depreciation	0.36	0.07	-	-	-	-
Taxable profit	(0.18)	0.12	0.20	0.22	0.22	0.22
Income Tax	-	0.04	0.07	0.07	0.07	0.07

Projected Balance Sheet

₹ (in lakh)

Particulars / Years	1	2	3	4	5	6
Share Capital (D)	0.11	0.11	0.11	0.11	0.11	0.11
Reserves & Surplus (E)	0.16	0.28	0.39	0.51	0.63	0.75
Term Loans (F)	0.31	0.22	0.07	0.01	0.01	0.01
Total Liabilities (D)+(E)+(F)	0.58	0.61	0.57	0.63	0.75	0.87
Assets	1	2	3	4	5	6
Gross Fixed Assets	0.46	0.46	0.46	0.46	0.46	0.46
Less Accm. Depreciation	0.02	0.05	0.07	0.10	0.12	0.14
Net Fixed Assets	0.43	0.41	0.38	0.36	0.33	0.31
Cash & Bank Balance	0.15	0.21	0.19	0.27	0.42	0.56
TOTAL ASSETS	0.58	0.61	0.57	0.63	0.75	0.87
Net Worth	0.27	0.40	0.51	0.63	0.74	0.86
Debt Equity Ratio	2.74	1.89	0.57	0.05	0.05	0.05

Projected Cash Flow

₹ (in lakh)

Particulars / Years	0	1	2	3	4	5	6
Sources							
Share Capital	0.11	-	-	-	-	-	-
Term Loan	0.34						
Profit After tax		0.16	0.13	0.11	0.12	0.12	0.12
Depreciation		0.02	0.02	0.02	0.02	0.02	0.02
Total Sources	0.46	0.18	0.15	0.13	0.14	0.14	0.14
Application							
Capital Expenditure	0.46						
Repayment Of Loan	-	0.03	0.10	0.15	0.06	0.00	0.00
Total Application	0.46	0.03	0.10	0.15	0.06	0.00	0.00
Net Surplus	-	0.15	0.06	-0.02	0.08	0.14	0.14
Add: Opening Balance	-	-	0.15	0.21	0.19	0.27	0.42
Closing Balance	-	0.15	0.21	0.19	0.27	0.42	0.56

IRR

₹ (in lakh)

Particulars / months	0	1	2	3	4	5	6
Profit after Tax		0.16	0.13	0.11	0.12	0.12	0.12
Depreciation		0.02	0.02	0.02	0.02	0.02	0.02
Interest on Term Loan		0.04	0.03	0.02	0.00	-	-
Cash outflow	(0.46)	-	-	-	-	-	-
Net Cash flow	(0.46)	0.22	0.18	0.15	0.14	0.14	0.14
IRR	30.65%						
NPV	0.27						

Break Even Point

₹ (in lakh)

Particulars / Years	1	2	3	4	5	6
Variable Expenses						
Oper. & Maintenance Exp (75%)	0.007	0.007	0.008	0.008	0.008	0.009
Sub Total (G)	0.007	0.007	0.008	0.008	0.008	0.009
Fixed Expenses						
Oper. & Maintenance Exp (25%)	0.002	0.002	0.003	0.003	0.003	0.003
Interest on Term Loan	0.039	0.027	0.016	0.001	0.000	0.000
Depreciation (H)	0.024	0.024	0.024	0.024	0.024	0.024
Sub Total (I)	0.066	0.053	0.042	0.028	0.027	0.027
Sales (J)	0.228	0.228	0.228	0.228	0.228	0.228
Contribution (K)	0.221	0.221	0.221	0.220	0.220	0.220
Break Even Point (L= G/I)	29.63%	24.05%	19.19%	12.62%	12.18%	12.27%
Cash Break Even {(I)-(H)}	18.78%	13.18%	8.30%	1.71%	1.26%	1.32%
Break Even Sales (J)*(L)	0.068	0.055	0.044	0.029	0.028	0.028

Return on Investment

₹ (in lakh)

Particulars / Years	1	2	3	4	5	6	Total
Net Profit Before Taxes	0.16	0.17	0.18	0.19	0.19	0.19	1.08
Net Worth	0.27	0.40	0.51	0.63	0.74	0.86	3.41
							31.71%

Debt Service Coverage Ratio

` (in lakh)

Particulars / Years	1	2	3	4	5	6	Total
Cash Inflow							
Profit after Tax	0.16	0.13	0.11	0.12	0.12	0.12	0.51
Depreciation	0.02	0.02	0.02	0.02	0.02	0.02	0.10
Interest on Term Loan	0.04	0.03	0.02	0.00	0.00	0.00	0.08
Total (M)	0.22	0.18	0.15	0.14	0.14	0.14	0.69

DEBT

Interest on Term Loan	0.04	0.03	0.02	0.00	0.00	0.00	0.08
Repayment of Term Loan	0.03	0.10	0.15	0.06	0.00	0.00	0.34
Total (N)	0.07	0.12	0.17	0.06	0.00	0.00	0.42
DSCR	3.16	1.45	0.90	2.36	0.00	0.00	1.65
Average DSCR (M/N)	1.65						

Annexure 5: Details of procurement and implementation plan**Project Implementation schedule**

S. No	Activity	Days			
		2	4	6	7
1	Placement of Orders for Equipment				
2	Supply of energy efficient motor				
3	Erection and Commissioning				
4	Trial runs				

The process down time is considered for only one day.

Annexure 6: Details of technology/equipment and service providers

Equipment details	Source of technology	Service/technology providers
Energy Efficient Motors	SIEMENS	SLR Enterprises D.No:3464, (4-3-1 to 6) 3rd Floor, "Dundoo Vihar" R.P.Road Secunderabad-500 003 Ph No:040-66588120 Fax:040-66338262 Mobile:9849006201

Annexure 7: Quotation or techno-commercial bid

QUOTATION

Ph : (O) 66568120
Telefax : 66338262
Mobile : 9849006201

SLR ENTERPRISES

AUTHORISED DEALER FOR :
FINOLEX CABLES LTD, ROTOMOTIVE - MOTORS & WORM GEAR BOXES
D. No. 3464, (4-3-1 to 6) 3rd Floor, "Dundoo Vihar", R.P. Road, Secunderabad - 500 003.

M/s. APSCO LTD,
Rachakapally,
Hill Road.

Qtn. No. : **358** Date **24/12/10.**

Ref. No. :

S.No.	DESCRIPTION	Qty.	Unit Price	Amount Rs.	Ps.
4)	SIEMENS Make 1500 RPM FOOT MOUNTING MOTOR EFF1				
1)	5 HP 1SED 113-4Y80		19935/-		
2)	7.5 HP 1SED 130-4Y80		27470/-		
3)	10 HP 1SED 133-4Y80		31995/-		
4)	12.5 HP 1SED 163-4Y80		51480/-		
5)	15 HP 1SED 163-4Y80		52900/-		
6)	20 HP 1SED 166-4Y80		65750/-		
7)	25 HP 1SED 183-4Y80		86830/-		
8)	30 HP 1SED 186-4Y80		91650/-		
9)	40 HP 1SED 207-4Y80		123750/-		
10)	50 HP 1SED 221 4Y80		160500/-		

Discount : 45% extra @ 10.3%

APGST No. SEC/10/1/2734/96-97 CST No. : SEC/10/1/2352/2000-2001
Valid from : 1-4-1996 w.e.f. : 1-8-2000

Terms & Conditions :
1) Prices : Val @ 4% extra for SC no 1703 & 14.5% extra for client
2) Delivery : 60 days
3) F.O.R. : Sec. Rd.
4) Payment : 25% advance balance against delivery
5) Validity : One week

for SLR ENTERPRISES



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



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Phones: +91- 040-23237333, 23237981,

Fax: +91-40-23298945

E-mail: hyd1_apitco@bsnl.in

Website: www.apitco.org



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