

DETAILED PROJECT REPORT ON ENERGY COST REDUCTION WITH ENERGY EFFICIENT SEED CRACKER MOTOR (15 HP) (ALWAR OIL MILL CLUSTER)



Bureau of Energy Efficiency (BEE)

Prepared By



Confederation of Indian Industry

Reviewed By



**ENERGY COST REDUCTION WITH ENERGY EFFICIENT
SEED CRACKER MOTOR (15 HP)**

ALWAR OIL MILL CLUSTER

BEE, 2011

Detailed Project Report on Energy Efficient Motors (15 hp) for Seed Cracker in Oil Mills

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

New Delhi: Bureau of Energy Efficiency

Detail Project Report No.: **ALW/SCKR/EEM/01**

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

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List of Abbreviations

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

EXECUTIVE SUMMARY

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

Alwar Oil Mill cluster is one of the largest Oil Mill clusters in India; accordingly this cluster was chosen for energy efficiency improvements by implementing energy efficient measures / technologies, so as to facilitate maximum replication in other Oil Mill clusters in India. The main energy forms used in the cluster units are grid electricity. In Oil Mill plant, electricity bill is almost 100% of total plant energy consumption.

Most of the Industrial installations in the country have large electrical loads which are severely inductive in nature, such as motors, large machines like Expellers & Kolhus etc which results in a high power consumption. Seed crackers driven by electrical motors are used for primary crushing of mustard seed. Generally standard motors/re-winded & old motors are in use for seed cracker. There is opportunity to use Energy Efficient Motors in place of Old / Re-winded Motors.

Implementation of Energy efficient motors will reduce cost of energy. It helps in reducing the electricity bill amount by availing the benefit of improvement in efficiency of motor and so reduction in power consumption from the Electricity Board.

Project implementation will lead to reduction in electricity bill by Rs. 0.35 Lakh per year.

| | |
|---------------------|---|
| Rated Power | = 11 kW |
| Old efficiency | = 0.80 |
| New efficiency | = 0.92.2 |
| Power saving | = 1.4 kW |
| Running hrs | = 17 hrs/day |
| Energy saving | = 1.4 kW x 17 hrs/day = 24 kWh / day / motor |
| Monetary saving | = 24 kWh/day x 300 days/yr x Rs. 4.8/kWh = Rs. 0.35 Lakh |
| Investment required | = Rs. 0.55 Lakhs |

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 energy efficient motor for seed cracker in place of re-winded motors is furnished in Table below;

| S. No. | Particular | Unit | Value |
|--------|----------------------------|------------|--------|
| 1 | Project cost | (in lakh) | 0.55 |
| 2 | Monetary benefit | (in lakh) | 0.35 |
| 3 | Debit equity ratio | Ratio | 3:01 |
| 4 | Simple payback period | years | 1.6 |
| 5 | NPV | (in lakh) | 0.3 |
| 6 | IRR | %age | 34 |
| 7 | ROI | %age | 43 |
| 8 | Process down time | hours | 2 to 3 |
| 9 | DSCR | Ratio | 1.46 |
| 10 | Co ₂ Reductions | T/yr | 6.48 |

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

ABOUT BEE'S SME PROGRAM

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

Major Activities in the BEE - SME Program are furnished below:

Energy Use and Technology Audit

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

Capacity Building of Stake Holders in Cluster on Energy Efficiency

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

Implementation of Energy Efficiency Measures

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

Facilitation of Innovative Financing Mechanisms for Implementation of Energy Efficiency Projects

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

1 INTRODUCTION

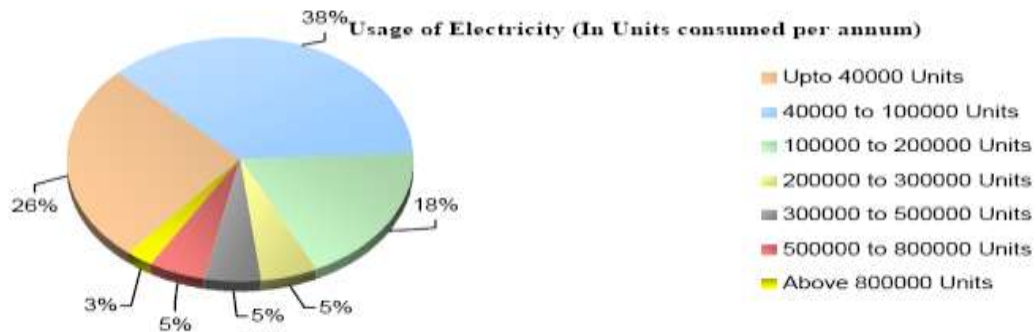
1.1 Brief Introduction about the Cluster

Alwar SME Cluster is one of the largest Oil Mill clusters in India, which is known for manufacturing of Mustard Oil. The nearest airport is at Jaipur, which is 150 KM from Alwar by road. There are approximately 60 Oil Mill units in this cluster which are engaged in manufacturing of mustard oil (Kacchi Ghani and Pakki Ghani).

Energy used for oil extraction is mainly electricity. Expellers, Kolhu & seed cracker are the main energy consuming equipment in Oil mills.

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

- USAGE OF ELECTRICITY (IN UNITS CONSUMED PER ANNUM)



Electrical energy consumption in Alwar and Sawaimadhapur units lies in range of around 186 Lakhs kWh for processing of 1240000 Quintal of Mustard Seed. Specific Energy Consumption in oil mills is in the range of 10-15 kWh/Quintal of mustard seed processed.

Energy Usage Pattern

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

Classification of Units

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

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

Production Wise Unit Breakup

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

Table 1.2 production wise unit breakups

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

Products Manufactured

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

Table 1.3 Product Manufactured

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

Production Process of Oil Mill:

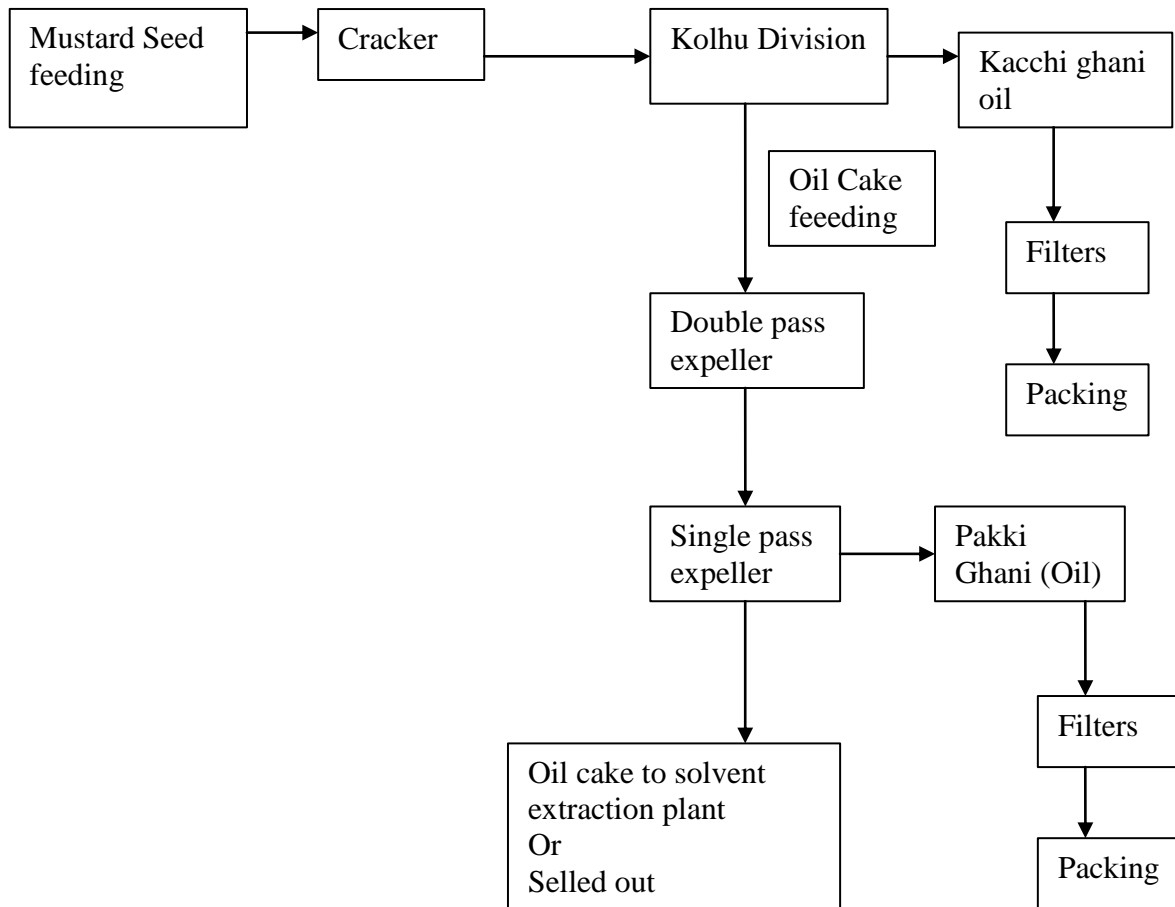


Figure 1.1 Process flow diagram of Oil Mill Units

Mustard Oil Extraction

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

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

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

1.2 Energy performance in existing situation

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

1.2.1 Average Production

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

Table 1.4 Annual Production of a Typical Unit

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

1.2.2 Energy Consumption

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

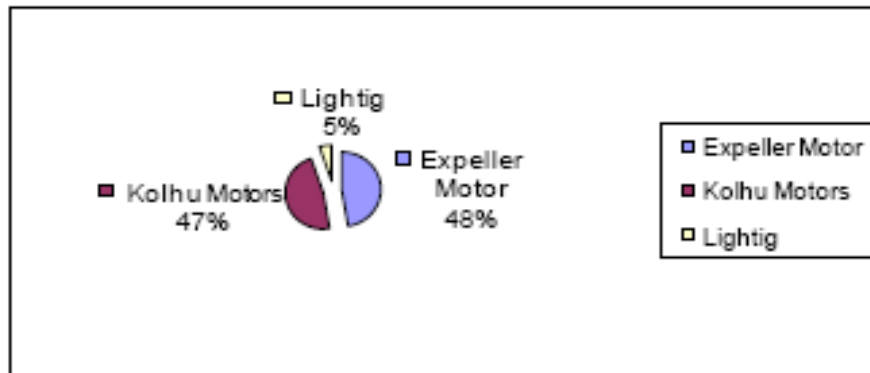


Table 1.5 Annual Energy Consumption

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

Table 1.6 Annual Energy Consumption

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

1.2.3 Specific Energy Consumption

Specific electrical energy consumption is 10 to 15 kWh/quintal of mustard seed processing in oil mill industry.

1.3 Proposed Technology/Equipment

1.3.1 Description about the existing technology

Kolhu, seed cracker and Expellers are the main energy consumers in any oil mill. Induction motors in the range of 15 – 75 hp are the prime movers for Seed cracker, Expellers & Kolhus. Seed Cracker motors are generally of 15 hp rated capacity.

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

1.4 Establishing the Baseline for the Proposed Technology

The motors installed for the seed cracker drive system are very old standard motor and are inefficient. As per the detailed studies undertaken in various units of the cluster and based on the discussions with the supervisors and workers, the motors installed for the seed cracker are re-winded number of times due to frequent burning of the windings and is a common practice for SME owners in the cluster of rewinding of the motors. It is well known fact that the re-winded motors will have less efficiency and hence more power consumption and also increased operation and maintenance cost. The main motor of the seed cracker provides mechanical energy to the shaft of the seed cracker. The motor is operated continuously for around 8 - 15 hours in a day for 300 days in a year.

The existing motor specifications and operating parameters are furnished in Table 1.3 below:

Table 1.3 Existing motor specifications

| S.No | Parameters | Details |
|------|---------------------|-------------|
| 1 | Rated HP/kW | 15/11 |
| 2 | Year | 1986 |
| 3 | Rated Voltage | 415 |
| 4 | frequency Hz | 50 |
| 5 | Transmission system | Belt Drives |
| 6 | RPM & Efficiency | 1440 & 80% |

Installation of Energy efficient motors for seed cracker 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 proposed technology

1.5.1 Technological Barrier

- Lack of awareness and information of the loss in terms of efficiency for re-winded and energy efficient motors
- Due to lack of technical knowledge and expertise, re-winded motors are used in the Oil Mill plants.
- In this cluster, like many others, there is lack of leadership to take up the energy efficiency projects in the plant.

1.5.2 Financial Barrier

Implementation of the proposed project activity requires an investment of Rs. 0.5 Lakhs/motor. Each unit is having around 4 - 20 motors. This is a significant investment and not commonly seen in the cluster for the implementation of energy efficiency projects.

1.5.3 Skilled Manpower

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

2 PROPOSED TECHNOLOGY

2.1 Detailed Description of Technology

2.1.1 Description of Technology

In almost most of the oil mills in Alwar region, re-winded/old in-efficient motors are being used. In these cluster units various process work under different load conditions and hence it is not easier to maintain proper condition of motors.

The project activity is replacement of inefficient and old motors with new energy efficient motors. The new energy efficient motor will have overall efficiency of more than 92.2% at full load. The high efficiency of the energy efficient motor is due to the following special features:

- 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

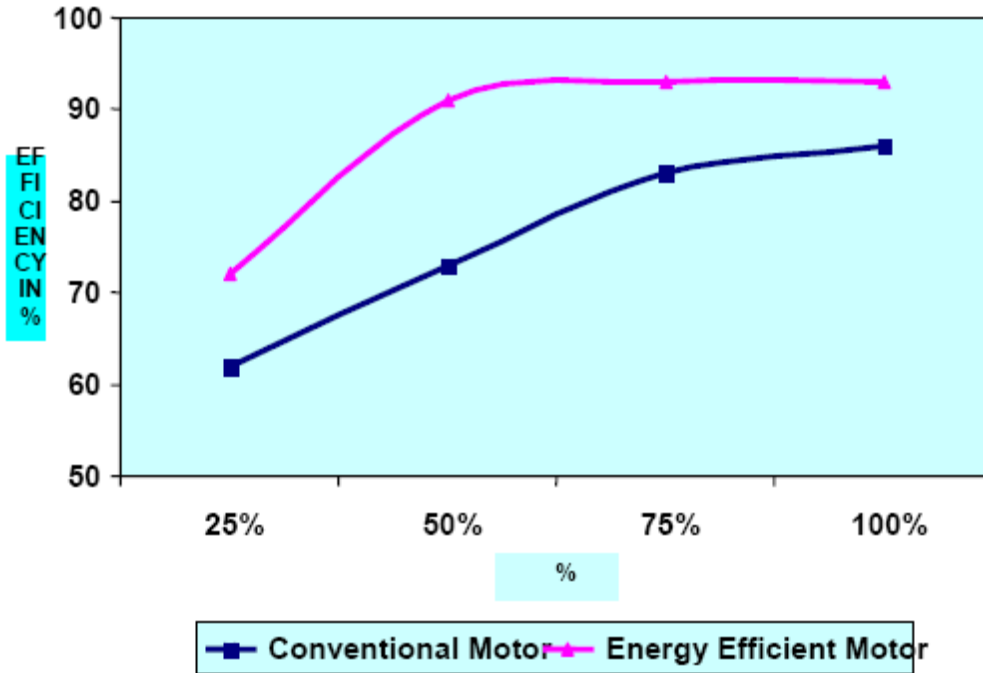
Considering the above facts and for reducing electricity consumption of the motors, it is suggested to install energy efficient motors.

These motors can be replaced with Energy Efficient Motors which leads to higher working efficiency of up to 5 - 10% 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.

Power Saving = power consumption $[(1/\text{eff})_{\text{old}} - (1/\text{eff})_{\text{new}}]$

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.



2.1.2 Technology Specification

| S. No. | Parameter | Details |
|--------|--------------|----------|
| 1 | Rated Hp | 15 |
| 2 | Speed | 1440 rpm |
| 3 | Efficiency | 92.2 % |
| 4 | Power Factor | 0.89 |

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

It is well proven technology which is adopted in many of the other similar and dissimilar units. Local vendors can arrange energy efficient motors at order. Local service providers are also available at Alwar. More details of service provider are given in annexure 5.

2.1.5 Source of Technology

The main source which has taken the initiative to create the awareness for implementation of this project by providing the benefit to the consumers in terms of rupees is the State Electricity Board. With use of energy efficient motors, State Electricity Distribution Board will be able to deliver more power to other industry.

2.1.6 Terms and Conditions after Sale

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

2.1.7 Process down Time during Implementation

Technology provider will bring the complete setup for the proposed project from their site and make all the arrangements for implementation at the client's site.

2.2 Life Cycle Assessment

Life of the proposed energy efficient motors will be around 10 to 15 years which depends on the operating conditions and maintenance at client's side.

2.3 Suitable Unit for Implementation of the Identified Technology

For estimation of the saving potential on implementation of this project, here the Oil Mill plant engaged in producing mustard oil, having old and re-winded motors can be considered.

3 ECONOMIC BENEFITS FROM PROPOSED TECHNOLOGY

3.1 Technical Benefits

3.1.1 Electricity savings per year

Project of Installation of Energy Efficient Motors in place of Old and re-winded motors will result in savings of electricity consumption in Oil Mill plant.

3.1.2 Improvement in product quality

This project is not contributing to any improvement in product quality, but frequent burning of motors can be reduced.

3.1.3 Improvement in production

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

3.1.4 Reduction in raw material consumption

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

3.1.5 Reduction in other losses

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

3.2 Monetary Benefits

Annual monetary savings with installation of Energy Efficient Motors will be Rs. 0.35 Lakh per year/motor.

3.3 Social Benefits

3.3.1 Improvement in Working Environment in the Plant

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

3.3.2 Improvement in Skill Set of Workers

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

3.4 Environmental Benefits

The major GHG reduction would be in Co₂ reduction. Emission reductions are estimated at 6.4 tons of Co₂ per annum.

4 INSTALLATION OF THE PROPOSED TECHNOLOGY

4.1 Cost of Technology Implementation

Table 4.1 Details of Proposed Technology Installation Cost

| S. No. | Particular | Cost (Lakhs) |
|--------|----------------|---------------|
| 1 | Equipment cost | 0.25 |
| 2 | Other cost | 0.15 |
| 3 | Misc | 0.15 |
| 4 | Total Cost | 0.55 |

4.1.1 Technology Cost

Cost of the project is about 0.25 Lakh/motor which includes the purchase of Energy Efficient Motors.

4.1.2 Other Cost

Other costs required will be 0.15 Lakh which includes taxes, commissioning, manpower cost, transportation etc and other miscellaneous costs will be 0.15 Lakh as the contingency amount.

4.2 Arrangements of Funds

4.2.1 Entrepreneur's Contribution

Entrepreneur will contribute 25% of the total project cost which is 0.1375 Lakh.

4.2.2 Loan Amount

Remaining 75% cost of the proposed project will be borrowed from bank, which is 0.41 Lakh.

4.2.3 Terms & Conditions of Loan

The interest rate is considered at 10% which is SIDBI's rate of interest for energy efficient projects. The loan tenure is 5 years excluding initial moratorium period is 6 months from the date of first disbursement of loan.

4.3 Financial Indicators

4.3.1 Cash Flow Analysis

Profitability and cash flow statements have been worked out for a period of 5 years. The financials have been worked out on the basis of certain reasonable assumptions, which are outlined below. The cost of equipment considered is inclusive of hot water storage tanks also.

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

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

4.3.2 Simple Payback Period

The total project cost of the proposed technology is 0.55 Lakhs and monetary savings due to reduction in electricity consumption is 0.35 Lakh hence, the simple payback period works out to be 1.6 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 12% works out to be 0.3 Lakh.

4.3.4 Internal Rate of Return (IRR)

The after tax Internal Rate of Return of the project works out to be 34%. 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 43%.

Table 4.2 Financial Indicators of Proposed Technology

| S No | Particular | Unit | Value |
|------|----------------|-------------|-------|
| 1 | Simple Payback | Year | 1.6 |
| 2 | NPV | Rs. In Lakh | 0.3 |
| 3 | IRR | %age | 34 |
| 4 | ROI | %age | 43 |

4.4 Sensitivity analysis in realistic, pessimistic and optimistic scenarios

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

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

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

Table 4.3 Sensitivity Analysis in Different Scenarios

| Scenario | Monetary Benefit(Rs Lakh/year) | IRR (%) | NPV(in Lakh) | ROI (%) |
|-------------|---------------------------------|---------|--------------|---------|
| Pessimistic | 0.3325 | 31 | 0.26 | 40 |
| Base | 0.35 | 34 | 0.3 | 43 |
| Optimistic | 0.3675 | 37 | 0.353 | 46 |

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. | Particular | Unit | Value |
|--------|-------------------------------|--------|-----------------|
| 1 | Seed cracker motor capacity | hp | 15 |
| 2 | Actual power consumption | kW | 11 |
| 3 | Number of passes | Nos | Single / double |
| 4 | Total length | Inches | 33-66 |
| 5 | Oil extraction (first pass) | % | 20 |
| 6 | Oil extraction (first pass) | % | 2.5 |
| 7 | Oil extraction (first pass) | % | 1.5 |
| 8 | Oil extraction (first pass) | % | 1 |
| 9 | Feed- mustard seed | Kg/hr | 1600 |
| 10 | Oil cake formation | Kg/hr | 1250 |
| 11 | Oil percent in cake | % | 7.5 |

Annexure -2: Detailed Technology Assessment Report

| S. No | Particular | Unit | Present situation | Proposed situation |
|-------|-------------------|---------|-------------------|--------------------|
| 1 | Power consumption | kW | 11 | 9.6 |
| 2 | Efficiency | % | 85 | 94 |
| 3 | Running hrs | Hrs/day | 16 | 17 |
| 4 | Power saving | kW | | 1.4 |
| 5 | Monetary saving | Rs/yr | | 35000 |

Annexure -3: Detailed Financial Calculations

| Financials for BEE projects | | |
|-----------------------------|---|-------|
| Name of Project | Replacement of Old and Inefficient motors | |
| | Units | Value |
| Cost of equipments | Rs(Lakhs) | 0.55 |
| Saving Potential | Rs(Lakhs) per year | 0.35 |
| IRR | | 34 |
| NPV | | 0.3 |
| ROI | | 43 |
| Simple payback period | Months | 19 |

| Assumptions | | | |
|-----------------------------------|--------------|--------------|---------------------|
| Particulars | Units | Value | Source |
| Commercial Inputs | | | |
| Required Investment | Rs(Lakhs) | 0.55 | |
| O&M cost (5% of equipment cost) | Rs(Lakhs) | 0.028 | |
| Acceleration in O&M cost per year | % | 5% | |
| Debt/Equity ratio | | 3 to1 | |
| Debt component of Investment | 75% | 0.43 | |
| Equity component of investment | 25% | 0.14 | |
| Interest on term loan | % | 10% | SIDBI Lending rates |
| Loan tenure | Years | 5 | |
| Moratorium period | Months | 6 | |
| Depreciation rate (Companies act) | % | 5.28% | |
| Depreciation rate (IT act) | % | 80% | |
| Income tax rate | % | 33.99% | |

| PROFITABILITY & IRR Calculations | | | | | | |
|----------------------------------|-----------|-------|-------|-------|--------|-------|
| Particulars/ Years | | 1 | 2 | 3 | 4 | 5 |
| Revenue | | | | | | |
| Total saving | Rs(Lakhs) | 0.350 | 0.350 | 0.350 | 0.350 | 0.350 |
| Expenditure | | | | | | |
| O&M Expenditure | Rs(Lakhs) | 0.028 | 0.029 | 0.030 | 0.032 | 0.033 |
| Interest on term loan | Rs(Lakhs) | 0.04 | 0.03 | 0.03 | 0.02 | 0.01 |
| Book depreciation | Rs(Lakhs) | 0.029 | 0.027 | 0.026 | 0.024 | 0.023 |
| Total expenses | | 0.099 | 0.091 | 0.082 | 0.072 | 0.063 |
| PBT | Rs(Lakhs) | 0.251 | 0.259 | 0.268 | 0.278 | 0.287 |
| Tax | | 0 | 0.095 | 0.098 | 0.1017 | 0.103 |
| PAT | | 0.251 | 0.163 | 0.170 | 0.177 | 0.183 |

| Cash Flow Statement | | | | | | |
|--------------------------|-------|-------|-------|-------|-------|-------|
| | | 1 | 2 | 3 | 4 | 5 |
| PAT | | 0.251 | 0.163 | 0.170 | 0.177 | 0.183 |
| Add: Depreciation | | 0.029 | 0.027 | 0.026 | 0.024 | 0.023 |
| Add: Interest | | 0.04 | 0.03 | 0.03 | 0.02 | 0.01 |
| Net cash In flow | | 0.323 | 0.226 | 0.221 | 0.217 | 0.213 |
| | | | | | | |
| Net cash out flow | | -0.6 | | | | |
| | | | | | | |
| Net cash flow | | -0.3 | 0.226 | 0.221 | 0.217 | 0.213 |
| | -0.6 | 0.323 | 0.226 | 0.221 | 0.217 | 0.213 |
| IRR | 34% | | | | | |
| NPV | 0.306 | | | | | |
| ROI | 43% | | | | | |

| Cash statement | | | | | | |
|-------------------------------|------------|------------|-----------------|-----------------|--------------|--------------|
| | | 1 | 2 | 3 | 4 | 5 |
| Source | | | | | | |
| Equity | 0.14 | | | | | |
| Loan | 0.43 | | | | | |
| PAT | | 0.251 | 0.163 | 0.170 | 0.177 | 0.183 |
| Depreciation | | 0.029 | 0.028 | 0.026 | 0.025 | 0.023 |
| Total | 0.58 | 0.280 | 0.191 | 0.196 | 0.201 | 0.207 |
| Application | | | | | | |
| Capital expenditure | 0.6 | | | | | |
| Loan repayment | | 0.04 | 0.03 | 0.03 | 0.02 | 0.01 |
| Total | 0.6 | 0.04 | 0.03 | 0.03 | 0.02 | 0.0 |
| Net surplus | 0.00 | 0.237 | 0.156 | 0.171 | 0.186 | 0.201 |
| Add: Opening balance | 0 | | 0.24 | 0.39 | 0.56 | 0.75 |
| Closing balance | 0 | 0.24 | 0.39 | 0.56 | 0.75 | 0.95 |
| Tax calculation | | | | | | |
| | | 1 | 2 | 3 | 4 | 5 |
| PBT | Rs(Lakhs) | 0.251 | 0.259 | 0.268 | 0.278 | 0.287 |
| ADD: Book depreciation | | 0.029 | 0.028 | 0.026 | 0.025 | 0.023 |
| SUB: IT Depreciation | | 0.440 | 0.006 | 0.006 | 0.005 | 0.005 |
| PBT&D | | - 0.160 | 0.280 | 0.289 | 0.297 | 0.306 |
| Tax | | 0 | 0.09531692 5 | 0.09820196 6 | 0.10105 7 | 0.10388 1 |

| Loan payment schedule | | | | | | | | |
|-----------------------|----------|-------------------------------------|------------------|-----------------------------|-------------------------------|--------------------------|-------------------------|----------------|
| YEARS | QUARTERS | BALANCE AT THE BEGINNING OF QUARTER | QUARTER INTEREST | QUARTER'S PRINCIPLE PAYMENT | BALANCE AT THE END OF QUARTER | ANNUAL PRINCIPLE PAYMENT | ANNUAL INTEREST PAYMENT | Debt Component |
| 1 | 1 | 0.43 | 0.01 | 0.00 | 0.43 | 0.05 | 0.04 | 0.09 |
| | 2 | 0.43 | 0.01 | 0.00 | 0.43 | | | |
| | 3 | 0.43 | 0.01 | 0.02 | 0.41 | | | |
| | 4 | 0.41 | 0.01 | 0.02 | 0.39 | | | |
| 2 | 1 | 0.39 | 0.01 | 0.02 | 0.36 | 0.10 | 0.03 | 0.13 |
| | 2 | 0.36 | 0.01 | 0.02 | 0.34 | | | |
| | 3 | 0.34 | 0.01 | 0.02 | 0.31 | | | |
| | 4 | 0.31 | 0.01 | 0.02 | 0.29 | | | |
| 3 | 1 | 0.29 | 0.01 | 0.02 | 0.26 | 0.10 | 0.03 | 0.12 |
| | 2 | 0.26 | 0.01 | 0.02 | 0.24 | | | |
| | 3 | 0.24 | 0.01 | 0.02 | 0.22 | | | |
| | 4 | 0.22 | 0.01 | 0.02 | 0.19 | | | |
| 4 | 1 | 0.19 | 0.00 | 0.02 | 0.17 | 0.10 | 0.02 | 0.11 |
| | 2 | 0.17 | 0.00 | 0.02 | 0.14 | | | |
| | 3 | 0.14 | 0.00 | 0.02 | 0.12 | | | |
| | 4 | 0.12 | 0.00 | 0.02 | 0.10 | | | |
| 5 | 1 | 0.10 | 0.00 | 0.02 | 0.07 | 0.10 | 0.01 | 0.10 |
| | 2 | 0.07 | 0.00 | 0.02 | 0.05 | | | |
| | 3 | 0.05 | 0.00 | 0.02 | 0.02 | | | |
| | 4 | 0.02 | 0.00 | 0.02 | 0.00 | | | |

| Depreciation schedule | | | | | | |
|--|--|---------|-------------|-------------|---------|---------|
| | | | | | | |
| Depreciation as per companies act | | 1 | 2 | 3 | 4 | 5 |
| Value of machine at the beginning of year | | 0.6 | 0.5 | 0.5 | 0.5 | 0.4 |
| Depreciation | | 0.02904 | 0.027506688 | 0.026054335 | 0.02468 | 0.02338 |
| Net value at the end of year | | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 |
| Depreciation as per IT act | | 1 | 2 | 3 | 4 | 5 |
| Value of machine at the beginning of year | | 0.55 | 0.1 | 0.1 | 0.1 | 0.1 |
| Depreciation | | 0.44 | 0.005808 | 0.005501338 | 0.00521 | 0.00494 |
| Net value at the end of year | | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

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 | Week | | |
|------|--|------|-----|-----|
| | | 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-Madhapur 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 | 19580 | 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 | 57880 | 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

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:
Seal

Name & Designation with

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 | Remarks reg. After Sale Service etc. |
|--|---|-------------------------------------|--|------------------------------|------------------------------------|--------------------------------------|
| 415V,15HP, 4 Pole, 1500 RPM, 3-φ Induction Motor | Attached Doc. | 1 Month | 0.25 | To Improve energy Efficiency | Techno-commercial competitiveness. | |
| | | | | | | |

Annexure III

Details of Misc. Assets / equipment Proposed

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

Annexure IV

Profitability projections for the unit/company as whole:

| S. No. | Items | Actuals for previous years | Y1 | Y2 | Y3 | Y4 | Y5 | Total |
|--------|--|----------------------------|-------|-------|-------|-------|-------|-------|
| 1 | Total income | | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 1.75 |
| 2 | Raw material | | | | | | | |
| | Power and fuel | | | | | | | |
| | Wages and salaries | | | | | | | |
| | Selling expenses | | | | | | | |
| | Other expenses | | 0.028 | 0.029 | 0.030 | 0.032 | 0.033 | 0.152 |
| | Total cost | | 0.028 | 0.029 | 0.030 | 0.032 | 0.033 | 0.152 |
| 3 | Profit before depreciation, interest and taxes (PBDIT) | | 0.322 | 0.321 | 0.32 | 0.318 | 0.317 | 1.6 |
| 4 | Interest on term loan | | 0.04 | 0.03 | 0.03 | 0.02 | 0.01 | 0.125 |
| 5 | Interest on working capital | | - | - | - | - | - | - |
| 6 | Interest on unsecured land | | - | - | - | - | - | - |
| 7 | Depreciation | | 0.029 | 0.027 | 0.026 | 0.024 | 0.023 | 0.13 |
| 8 | PBT | | 0.251 | 0.259 | 0.268 | 0.278 | 0.287 | 1.343 |
| 9 | Tax | | 0 | 0.095 | 0.098 | 0.101 | 0.103 | 0.398 |
| 10 | PAT | | 0.251 | 0.163 | 0.170 | 0.177 | 0.183 | 0.944 |
| 11 | Dividends/ withdrawal | | | | | | | |
| 12 | Cash accruals | | 0.28 | 0.19 | 0.196 | 0.201 | 0.206 | 1.073 |
| 13 | Debt service coverage ratio | | 3.55 | 1.72 | 1.82 | 0.11 | 0.10 | |
| | Av. DSCR | 1.46 | | | | | | |

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. | | |



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(Ministry of Power, Government of India)

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