

DETAILED PROJECT REPORT ON ENERGY COST REDUCTION WITH ENERGY EFFICIENT EXPELLER (ALWAR OIL MILL CLUSTER)



Bureau of Energy Efficiency (BEE)

Prepared By



Confederation of Indian Industry

Reviewed By



ENERGY COST REDUCTION WITH ENERGY EFFICIENT EXPPELLER

ALWAR OIL MILL CLUSTER

BEE, 2011

Detailed Project Report on Energy Efficient Expeller in Oil Mills

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

New Delhi: Bureau of Energy Efficiency

Detail Project Report No.: **ALW/EXP/EEE/09**

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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Dr. Ajay Mathur, Director General, BEE

Smt. Abha Shukla, Secretary, BEE

Shri Jitendra Sood, Energy Economist, BEE

Shri Pawan Kumar Tiwari, Advisor (SME), BEE

Shri Rajeev Yadav, Project Economist, BEE

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CII – AVANTHA Centre for Competitiveness for SMEs
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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 bill.

Most of the Industrial installations in the country have large electrical loads which are severely inductive in nature, such as expellers, motors etc which results in a high power consumption. This means loss and wastage of energy by electricity boards as well as for Oil Mill units. This can be taken care by Energy Efficient Expellers in place of Old Expellers.

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

Project implementation will lead to reduction in electricity bill by Rs. 1.06 Lakh per year.

Old and Inefficient expeller

Rated Power = 60 hp (actual maximum loading power 40 kW)
Size = 48" x 8"

New and efficient expeller

Rated Power = 50 hp (actual proposed maximum loading power 32.5 kW)
Size = 48" x 8"
Running hrs = 10 hrs/day
Energy saving = 10 hp x 10 hrs/day
= 7.4 kW x 10 hrs/day
= 74 kWh /day / Expeller
Monetary saving = 74 kWh/day x 300 days/yr Rs. 4.8/kWh
= Rs. 1.07 Lakh
Investment required = Rs. 3.65 **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 expeller in place of old expeller is furnished in Table below;

Sr. No.	Particular	Unit	Value
1	Project cost	(` in Lakh)	3.65
2	Electricity Savings	kWh/annum	22200
3	Monetary benefit	(` in Lakh)	1.07
4	Simple payback period	Years	3.41
5	NPV	(` in Lakh)	.51
6	IRR	%age	14.09
7	ROI	%age	18.19
8	Average DSCR	Ratio	1.31
9	CO ₂ emission reduction	MT/year	20.0
10	Process down time	Days	10

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

ABOUT BEE'S SME PROGRAM

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

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

Energy Use and Technology Audit

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

Capacity Building of Stake Holders in Cluster on Energy Efficiency

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

Implementation of Energy Efficiency Measures

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

Facilitation of Innovative Financing Mechanisms for Implementation of Energy Efficiency Projects

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

1 INTRODUCTION

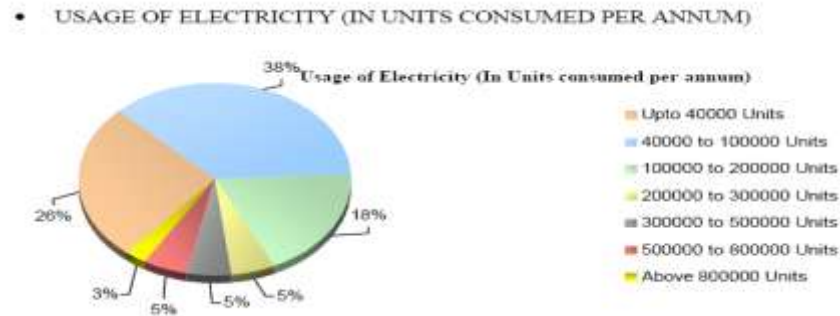
1.1 Brief Introduction about the Cluster

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

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

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

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



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

Energy Usage Pattern

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

Classification of Units

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

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

Production Wise Unit Breakup

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

Table 1.2 production wise unit breakups

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

3	Small scale unit	Less than 50 MT
---	------------------	-----------------

Products Manufactured

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

Table 1.3 Product Manufactured

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

Production Process of Oil Mill:

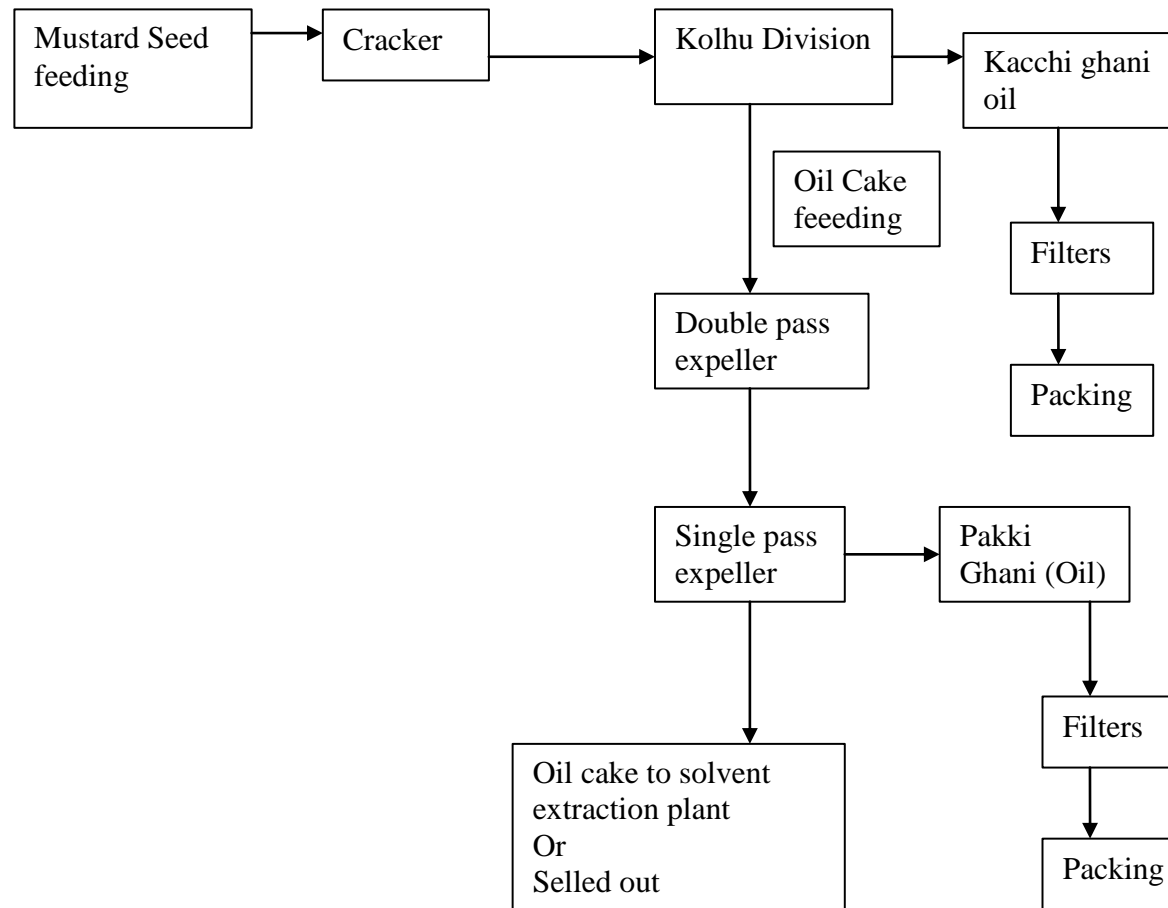


Figure 1.1 Process flow diagram of Oil Mill Units

Mustard Oil Extraction

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

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

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

1.2 Energy performance in existing situation

Oil units in Alwar & Sawaimadhapur 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
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1.2.2 Energy Consumption

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

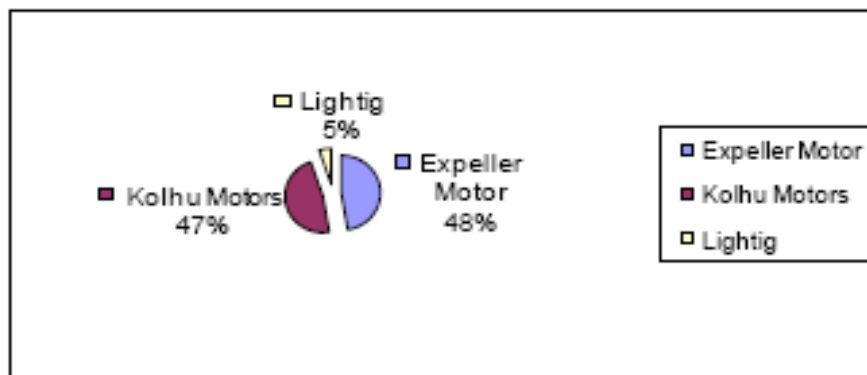


Table 1.5 Annual Energy Consumption

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

Table 1.6 Annual Energy Consumption

S. No	Type of Fuel	Unit	Value	Contribution in equivalent energy terms (%)
-------	--------------	------	-------	---

1	Electricity	Mwh/year	18.6	100
---	-------------	----------	------	-----

1.2.3 Specific Energy Consumption

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

1.3 Proposed Technology/Equipment

1.3.1 Description about the existing technology

Expellers are the main energy consumers in any oil mill.

It was observed that the maximum numbers of expellers are quite old which leads to higher power consumption and lower operating efficiency.

Now a day in Indian market, there are various new technologies available in market for expellers, whose detailed description is given as below:-

Gear Section is designed in such a way so that it will Consume 15% less power as compare to old oil expellers to operate the machine efficiently with better results as well as with superior technology to absorb jerk loads of machine. That results in fewer breaks down of machine.

1.4 Establishing the Baseline for the Proposed Technology

Presently all the Oil Mill plants at Alwar are operating with very old expellers. Installation of Energy efficient expeller in place of old expellers will save the.

Advantages:-

- Less power consumption
- Longer life
- Less losses

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 old expellers
- 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. 3.5 Lakhs/expeller. Each unit is having around 4 - 20 expeller. This is a significant investment and not commonly seen in the cluster for the implementation of energy efficiency projects.

1.5.3 Skilled Manpower

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

2 PROPOSED TECHNOLOGY

2.1 Detailed Description of Technology

2.1.1 Description of Technology

Existing scenario of old expeller in plants of Alwar cluster is poor. In almost all of the units old expellers are being used. In these cluster units various process working under different load condition so that it is not easier to maintain proper condition of expeller.

These old expeller can be replaced with Energy Efficient expeller which leads to higher working efficiency of up to 5 - 10% for the same working condition. Energy-efficient expellers are the ones in which, design improvements are incorporated specifically to increase operating efficiency and for reduction in power consumption. Design improvements focus on reducing internal losses. Improvements include the use of superior gear box, superior bearings etc.

The main energy efficient factor is double reduction of speed through gears; this ensures higher extraction ratio of oil from seeds. The other factor is use of energy efficient motor

Energy-efficient expellers now available in India operate with efficiencies that are typically 5 to 10 percentage points higher than old expellers.

2.1.2 Technology Specification

For implementation of the proposed project, old expellers must be replaced with energy efficient expeller in the Oil Mill plant.

2.1.3 Suitability or Integration with Existing Process and Reasons for Selection

This is the simplest and widely accepted measure for energy cost reduction in all the industries. It does not affect the process but improves the process efficiency since these types of expeller have high efficiency.

2.1.4 Availability of Technology

Now days when energy cost is high, it is poor practice to use old expellers. As far as technology is concerned Energy efficient expellers are available in local/ national market. It is well proven technology which is adopted in many of the other similar and dissimilar units. Local vendors can arrange energy efficient expellers 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 expeller, 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 expeller will be having longer life 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 expeller 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 Expellers in place of Old expellers 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 maintenance 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 expeller will be Rs. 1.07 Lakh per year/expeller.

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 20.0 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	2.92
2	Other cost	0.365
3	Misc	0.365
4	Total Cost	3.65

4.1.1 Technology Cost

Cost of the project is about 3.65 Lakhs/expeller which includes the purchase of Energy Efficient expellers.

4.1.2 Other Cost

Other costs required will be 0.365 Lakh which includes taxes, commissioning, manpower cost, transportation etc and other miscellaneous costs will be 0.365 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 0.9125 Lakh.

4.2.2 Loan Amount

Remaining 75% cost of the proposed project will be borrowed from bank, which is 2.7375 Lakhs.

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 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 3.65 Lakhs and monetary savings due to reduction in electricity consumption is 1.06 Lakh hence, the simple payback period works out to be 3.41 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 12% works out to be .51 Lakh.

4.3.4 Internal Rate of Return (IRR)

The after tax Internal Rate of Return of the project works out to be 14.09 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 18.09 %.

Table 4.2 Financial Indicators of Proposed Technology

S No	Particular	Unit	Value
1	Simple Payback	Year	3.41
2	NPV	Rs. In Lakh	.51
3	IRR	%age	14.09
4	ROI	%age	18.19

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

4.5 Procurement Schedule

Procurement and schedule required for this technology is 0.5 weeks required down. Details of implementation in Table 4.4 below

Scenario	Monetary Benefit(Rs Lakh/year)	IRR (%)	NPV(in Lakh)	ROI (%)
Pessimistic	1.007	-6	-1.49	9
Base	1.06	-4	-1.35	10
Optimistic	1.113	-3	-1.2	12

and Implementation

implementation of about 8 weeks and as a process break procurement and schedules are shown

Table 4.4 Procurement and Implementation Schedule

S. No.	Activities	Weeks						
		1	2	3	4	5	6	7
1	Identification of Old expeller	■						
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	Expeller capacity	hp	50
2	Number of passes	Nos	Single / double
3	Total length	Inches	44" x 8"
4	Steam kettle , length	Inches	10
5	Steam kettle , diameter	Inches	16
6	Oil extraction (first pass)	%	20
7	Oil extraction (first pass)	%	2.5
8	Oil extraction (first pass)	%	1.5
9	Oil extraction (first pass)	%	1
10	Feed- mustard seed	Kg/hr	1600
11	Oil cake formation	Kg/hr	1250
12	Oil percent in cake	%	7.5

Annexure -2: Detailed Technology Assessment Report

S.No	Particulars	Unit	Value
1	Present rated HP	HP	50
2	Power consumption in base case scenario	kW	40
3	Proposed power consumption	kW	32.5
4	Power savings	kW	7.5
5	Total operating hours	hrs	10
6	Total operating days	days	300
7	Power savings per annum	kWh	22200
8	Monetary savings per annum (@ ` .4.80 per kWh)	` in lakh	1.07
9	Investment required for new energy efficient Expeller	` in lakh	3.65
10	Payback period	Years	3.41

Annexure -3: Detailed Financial Calculations

Assumptions

Name of the Technology	Energy Efficient Electric Motor		
Rated Capacity	50 HP		
Details	Unit	Value	Basis
Installed Capacity	HP	50	
No of working days	Days	300	
No of operating hours	Hrs	10	
Proposed Investment			
Plant & Machinery	` (in lakh)	2.92	
Other Costs	` (in lakh)	0.365	
Panel, Switch & Cabling etc.	` (in lakh)	0.365	
Total Investment	` (in lakh)	3.65	
Financing pattern			
Own Funds (Equity)	` (in lakh)	0.91	Feasibility Study
Loan Funds (Term Loan)	` (in lakh)	2.74	Feasibility Study
Loan Tenure	Years	5.00	Assumed
Moratorium Period	Months	6.00	Assumed
Repayment Period	Months	66.00	Assumed
Interest Rate	%age	10.00%	SIDBI Lending rate
Estimation of Costs			
O & M Costs	% on Plant & Equip	5.00	Feasibility Study
Annual Escalation	%age	5.00	Feasibility Study
Estimation of Revenue			
Electricity Saving	kWh/Year	22200	
Cost of electricity	` /kWh	4.8	
St. line Depn.	%age	5.28	Indian Companies Act
IT Depreciation	%age	80.00	Income Tax Rules
Income Tax	%age	33.99	Income Tax

Estimation of Interest On Term Loan

(Rs.in lakhs)

Years	Opening Balance	Repayment	Closing Balance	Interest
1	2.74	0.12	2.62	0.32
2	2.62	0.36	2.26	0.25
3	2.26	0.48	1.78	0.20
4	1.78	0.60	1.18	0.15
5	1.18	0.76	0.42	0.08
6	0.42	0.42	0.00	0.01
		2.74		

WDV Depreciation

(Rs.in lakhs)

Particulars / years	1	2			
Plant and Machinery					
- Cost	3.65	0.73			
- Depreciation	2.92	0.58			
- WDV	0.73	0.15			

Projected Profitability

Particulars / Years	1	2	3	4	5	6	7	8
Revenue through Savings								
Fuel savings	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Total Revenue	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
EXPENSES								
O & M Expenses	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.24
Total Expenses	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.24
PBDIT	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.83
Interest	0.32	0.25	0.20	0.15	0.08	0.01	0.00	0.00
PBDT	0.57	0.63	0.66	0.70	0.76	0.82	0.82	0.83
Depreciation	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
PBT	0.37	0.44	0.47	0.51	0.57	0.63	0.63	0.64
Income tax	0.00	0.00	0.00	0.00	0.00	0.22	0.28	0.27
Profit after tax (PAT)	0.37	0.44	0.47	0.51	0.57	0.41	0.35	0.37

Computation of Tax

(Rs.in lakhs)

Particulars / Years	1	2	3	4	5	6	7	8
Profit before tax	0.37	0.44	0.47	0.51	0.57	0.63	0.63	0.62
Add: Book depreciation	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Less: WDV depreciation	2.92	0.58	-	-	-	-	-	-
Taxable profit	(2.35)	0.04	0.66	0.70	0.76	0.82	0.82	0.81
Loss Carried Forward	(2.35)	(2.31)	(1.65)	(0.95)	(0.19)	0.63	0.82	0.81
Income Tax	-	-	-	-	-	0.22	0.28	0.27

Projected Balance Sheet

Particulars / Years	1	2	3	4	5	6	7	8
LIABILITIES								
Share Capital	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Reserves & Surplus	0.37	0.81	1.28	1.79	2.35	2.77	3.12	3.46
Term Loans	2.62	2.26	1.78	1.18	0.42	0.00	0.00	0.00
TOTAL LIABILITIES	3.90	3.98	3.97	3.88	3.68	3.68	4.03	4.37
ASSETS								
Gross Fixed Assets	3.65	3.65	3.65	3.65	3.65	3.65	3.65	3.65
Less : Accm.depreciation	0.19	0.39	0.58	0.77	0.96	1.16	1.35	1.54
Net Fixed Assets	3.46	3.26	3.07	2.88	2.69	2.49	2.30	2.11
Cash & Bank Balance	0.45	0.71	0.89	1.00	1.00	1.18	1.72	2.26
TOTAL ASSETS	3.90	3.98	3.97	3.88	3.68	3.68	4.03	4.37
Net Worth	1.29	1.72	2.19	2.70	3.27	3.68	4.03	4.37
Debt Equity Ratio	2.87	2.47	1.95	1.29	0.46	0.00	0.00	0.00

Projected Cash Flow:

Particulars / Years	0	1	2	3	4	5	6	7	8
Sources									
Share Capital	0.91	-	-	-	-	-	-	-	-
Term Loan	2.74								
Profit After tax		0.37	0.44	0.47	0.51	0.57	0.41	0.35	0.34
Depreciation		0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Total Sources	3.65	0.57	0.63	0.66	0.70	0.76	0.60	0.54	0.53
Application									
Capital Expenditure	3.65								

Repayment Of Loan	-	0.12	0.36	0.48	0.60	0.76	0.42	0.00	0.00
Total Application	3.65	0.12	0.36	0.48	0.60	0.76	0.42	0.00	0.00
Net Surplus	-	0.45	0.27	0.18	0.10	0.00	0.18	0.54	0.53
Add: Opening Balance	-	-	0.45	0.71	0.89	1.00	1.00	1.18	1.72
Closing Balance	-	0.45	0.71	0.89	1.00	1.00	1.18	1.72	2.26

Calculation of Internal Rate of Return

Particulars / months	(Rs.in lakhs)								
	0	1	2	3	4	5	6	7	8
Profit after Tax		0.37	0.44	0.47	0.51	0.57	0.41	0.35	0.3
Depreciation		0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.1
Interest on Term Loan		0.32	0.25	0.20	0.15	0.08	0.01	-	-
Cash outflow	(3.65)	-	-	-	-	-	-	-	-
Net Cash flow	(3.65)	0.88	0.87	0.86	0.85	0.84	0.62	0.54	0.5
IRR	14.09%								

NPV 0.51

Break Even Point

Particulars / Years	1	2	3	4	5	6	7	8
A. Variable Expenses								
Oper. & Maintenance Exp (75%)	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.19
Sub Total	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.19
B.Fixed Expenses								
Oper.& Maintenance Exp (25%)	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06
Interest on Term Loan	0.32	0.25	0.20	0.15	0.08	0.01	0.00	0.00
Depreciation	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Sub Total	0.56	0.49	0.45	0.40	0.33	0.26	0.25	0.26
C.Sales	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
D.Contribution	0.93	0.92	0.91	0.91	0.90	0.89	0.88	0.87
E.Break Even Point (B/D)	59.88%	52.72%	48.86%	43.65%	37.01%	29.54%	28.78%	29.43%
F.Cash Break Even	39.13%	31.81%	27.79%	22.40%	15.58%	7.91%	6.93%	7.35%
G.BREAK EVEN SALES	0.64	0.56	0.52	0.47	0.39	0.31	0.31	0.31

Return on Investment

Particulars / Years	1	2	3	4	5	6	7	8	T
A.Net Profit Before Taxes	0.37	0.44	0.47	0.51	0.57	0.63	0.63	0.62	4
B.Net Worth	1.29	1.72	2.19	2.70	3.27	3.68	4.03	4.37	2

18.5

Debt Service Coverage Ratio

Particulars / Years	1	2	3	4	5	6	7	8	T
CASH INFLOW									
Profit after Tax	0.37	0.44	0.47	0.51	0.57	0.41	0.35	0.34	2
Depreciation	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	1
Interest on Term Loan	0.32	0.25	0.20	0.15	0.08	0.01	0.00	0.00	1
TOTAL	0.88	0.87	0.86	0.85	0.84	0.62	0.54	0.53	4



DEBT

Interest on Term Loan	0.32	0.25	0.20	0.15	0.08	0.01	0.00	0.00
Repayment of Term Loan	0.12	0.36	0.48	0.60	0.76	0.42	0.00	0.00
TOTAL	0.44	0.61	0.68	0.75	0.84	0.43	0.00	0.00
	2.02	1.44	1.26	1.14	1.00	1.43	#DIV/0!	#DIV/0!
Average DSCR	1.31							

Financials for BEE projects		
Name of Project	Replacement of Old and Inefficient expellers	
	Units	Value
Cost of equipments	Rs(Lakhs)	3.65
Saving Potential	Rs(Lakhs) per year	1.07
IRR		14.09 %
NPV		.51
ROI		18.19
Simple payback period	Months	40

Assumptions			
Particulars	Units	Value	Source

Commercial Inputs			
Required Investment	Rs(Lakhs)	3.65	
O&M cost (5% of equipment cost)	Rs(Lakhs)	0.183	
Acceleration in O&M cost per year	%	5%	
Debt/Equity ratio		3 to1	
Debt component of Investment	75%	2.74	
Equity component of investment	25%	0.91	
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)	1.07	1.070	1.070	1.070	1.070
Expenditure						
O&M Expenditure	Rs(Lakhs)	0.18	0.19	0.20	0.21	0.22
Interest on term loan	Rs(Lakhs)	0.32	0.25	0.20	0.15	0.08
Book depreciation	Rs(Lakhs)	0.19	0.19	0.19	0.19	0.19
Total expenses		0.659	0.606	0.542	0.479	0.417

PBT	Rs(Lakhs)	0.401	0.454	0.518	0.581	0.643
Tax		0	0.203356774	0.222502958	0.24145	0.260191
PAT		0.401	0.251	0.296	0.340	0.383

Cash Flow Statement						
		1	2	3	4	5
PAT		0.401	0.251	0.296	0.340	0.383
Add: Depreciation		0.19272	0.182544384	0.172906041	0.163777	0.155129
Add: Interest		0.28	0.23	0.17	0.10	0.04
Net cash In flow		0.878	0.665	0.636	0.607	0.578
Net cash out flow		-3.8				
Net cash flow		-3.0	0.665	0.636	0.607	0.578
	-3.8	0.878	0.665	0.636	0.607	0.578
IRR	-4%					
NPV	-1.35					
ROI	10%					

Cash statement						
		1	2	3	4	5

Equity	0.96					
Loan	2.87					
PAT		0.401	0.251	0.296	0.340	0.383
Depreciation		0.193	0.183	0.173	0.164	0.155
Total	3.83	0.594	0.433	0.469	0.503	0.538
Application						
Capital expenditure	3.8					
Loan repayment		0.28	0.23	0.17	0.10	0.04
Total	3.8	0.28	0.23	0.17	0.10	0.0
Net surplus	0.00	0.311	0.202	0.301	0.400	0.498
Add: Opening balance	0		0.31	0.51	0.81	1.21
Closing balance	0	0.31	0.51	0.81	1.21	1.71
Tax calculation		1	2	3	4	5
PBT	Rs(Lakhs)	0.401	0.454	0.518	0.581	0.643
ADD: Book depreciation		0.193	0.183	0.173	0.164	0.155
SUB: IT Depreciation		2.920	0.039	0.037	0.035	0.033
PBT&D		-2.326	0.598	0.655	0.710	0.765
Tax		0	0.203	0.22	0.24	0.26

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	2.87	0.07	0.00	2.87	0.32	0.28	0.60
	2	2.87	0.07	0.00	2.87			
	3	2.87	0.07	0.16	2.71			
	4	2.71	0.07	0.16	2.56			
2	1	2.56	0.06	0.16	2.40	0.64	0.23	0.87
	2	2.40	0.06	0.16	2.24			
	3	2.24	0.06	0.16	2.08			
	4	2.08	0.05	0.16	1.92			

3	1	1.92	0.05	0.16	1.76	0.64	0.17	0.81	
	2	1.76	0.04	0.16	1.60				
	3	1.60	0.04	0.16	1.44				
	4	1.44	0.04	0.16	1.28				
4	1	1.28	0.03	0.16	1.12	0.64	0.10	0.74	
	2	1.12	0.03	0.16	0.96				
	3	0.96	0.02	0.16	0.80				
	4	0.80	0.02	0.16	0.64				
5	1	0.64	0.02	0.16	0.48	0.64	0.04	0.68	
	2	0.48	0.01	0.16	0.32				
	3	0.32	0.01	0.16	0.16				
	4	0.16	0.00	0.16	0.00				

Depreciation schedule :						
Depreciation as per companies act		1	2	3	4	5

Value of machine at the beginning of year		3.7	3.5	3.3	3.1	2.9
Depreciation		0.192	0.182	0.172	0.163	0.155
Net value at the end of year		3.5	3.3	3.1	2.9	2.8
Depreciation as per IT act		1	2	3	4	5
Value of machine at the beginning of year		3.65	0.7	0.7	0.7	0.6
Depreciation		2.92	0.038	0.036	0.0345	0.0327
Net value at the end of year		0.7	0.7	0.7	0.6	0.6

Annexure:-4 Procurement and implementation schedule

S. No.	Activities	Weeks						
		1	2	3	4	5	6	7
1	Identification of Old expeller							

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 expeller			
2	Installing New expeller in Place of Old in-efficient expeller			
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 Expellers	Rajdhani Expeller Industries	<p>Mr. Sunil Tondon Managing Director Rajdhani Expeller Industries 19/312, Daya Basti, Old Rohtak Road, Delhi Mob-09810286526, 09313880981 Ph- 01123658224, 23659198</p>

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

TECHNO-COMMERCIAL OFFER

For

MUSTARD SEED OIL EXTRACTION PLANT**PRICE LIST:-**

<u>PLANT SECTION</u>	<u>QTY.</u>	<u>PRICE</u>
1) <u>Oil Expeller</u>		
a) 44 x 8"	1	365000/-Each
Complete with Newly Designed Double Reduction Gear Box, Steam Kettle & V – Belt Pulley.Motor Required – 50 H.P Each.		
b) 44 x 7" (Oil Expeller)	1	355000/-Each
Complete with Newly Designed Double Reduction Gear Box, Steam Kettle & V – Belt Pulley.Motor Required – 40 H.P Each.		
c) 44 x 6 ½" (Oil Expeller)	1	350000/-Each
Complete with Newly Designed Double Reduction Gear Box, Steam Kettle & V – Belt Pulley.Motor Required – 40 H.P Each.		

ELECTRICALS:-

On Buyer`s Scope.

Terms and Conditions:-

- Prices are ex – works.
- Delivery within 60 Days after confirmation of Order.
- Payment 30% Advance, and Balance against Delivery.

d) Loading & Forwarding extra.

Hope for best business relations in future.

Best regards,

For RAJDHANI EXPELLER INDUSTRIES.

Sunil Tandon
(Managing Director)
981028652

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.
Energy Efficient Expeller	Attached Doc.	1 Month	3.65	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		1.06	1.06	1.06	1.06	1.06	3.48
2	Raw material							
	Power and fuel							
	Wages and salaries							
	Selling expenses							
	Other expenses		0.183	0.192	0.201	0.211	0.222	1.008
	Total cost		0.183	0.192	0.201	0.211	0.222	1.008
3	Profit before depreciation, interest and taxes (PBDIT)		0.877	0.868	0.859	0.849	0.838	4.291
4	Interest on term loan		0.28	0.23	0.17	0.10	0.04	0.826
5	Interest on working capital		-	-	-	-	-	-
6	Interest on unsecured land		-	-	-	-	-	-
7	Depreciation		0.19272	0.182544384	0.172906041	0.163777	0.155129	0.867
8	PBT		0.401	0.454	0.518	0.581	0.643	2.598
9	Tax		0	0.203356774	0.222502958	0.24145	0.260191	0.928
10	PAT		0.401	0.251	0.296	0.340	0.383	1.671
11	Dividends/ withdrawal							
12	Cash accruals		0.593	0.433	0.468	0.503	0.538	2.535
13	Debt service coverage ratio		1.46	0.76	0.79	0.74	0.68	
	Av. DSCR	0.89						

Annexure V
CHECK LIST of documents to be
Submitted along with the application

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



Bureau of Energy Efficiency (BEE)

(Ministry of Power, Government of India)

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

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

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



Confederation of Indian Industry

CII – AVANTHA Centre for Competitiveness

Block No.3, Dakshin Marg

Sector 31-A, Chandigarh - 160030

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

Fax: 0172-2606259 / 2614974

E-mail: harinder.singh@cii.in

Website: www.cii.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
