Detailed Project Report (DPR)
On
Energy Management System

Fresco Ceramics Private Limited

Morbi (Gujarat)

Prepared for

Bureau of Energy Efficiency

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For more information

GEF-UNIDO-BEE PMU
Bureau of Energy Efficiency
4th Floor, Sewa Bhawan, Sector-1,
R.K. Puram, New Delhi-110066

Email: gubpmu@beenet.in
pmc@teri.res.in
Website: www.beeindia.gov.in
www.teriin.org

Disclaimer

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The Energy and Resources Institute (TERI)
New Delhi

Table of contents

List of tables

List of figures

List of abbreviations

BEE	:	Bureau of Energy Efficiency
CO_2	:	Carbon Dioxide
D/E	:	Debt /Equity
DPR	:	Detailed Project Report
DSCR	:	Debt Service Coverage Ratio
EE	:	Energy Efficient
GEF	:	Global Environmental Facility
GHG	:	Green House Gas
IDC	:	Investment without interest defer credit
IGDPR	:	Investment Grade Detailed Project Report
IRR	:	Internal Rate of Return
kW	:	Kilo Watt
kWh	:	Kilo Watt Hour
LSPs	:	Local Service Providers
MGO	:	Minimum Guaranteed Offtake
MSME	:	Micro, Small and Medium Enterprises
MT	:	Metric Tonne
NG	:	Natural Gas
NPV	:	Net Present Value
O&M	:	Operation and Maintenance
PCB	:	Pollution control board
PGVCL	:	Paschim Gujarat Vij Company Limited
RE	:	Renewable Energy
ROI	:	Return on Investment
SCM	:	Standard Cubic Meter
SME	:	Small and Medium Enterprises
SPP	:	Simple Payback Period
TERI	:	The Energy and Resources Institute
Toe	:	Tonnes of oil equivalent
UNIDO	:	United Nations Industrial Development Organization
VFD	:	Variable Frequency Drive
WACC	:	Weighted Average Cost of Capital

Executive summary

The overall aim of the GEF-UNIDO-BEE project 'Promoting Energy Efficiency (EE) and Renewable Energy (RE) in selected MSME clusters in India' is to develop and promote a market environment for introducing energy efficiency and enhancing the use of renewable energy technologies in process applications in selected energy-intensive MSME clusters in India. This would help in improving the productivity and competitiveness of the MSME units, as well as in reducing the overall carbon emissions and improving the local environment.

Under the GEF-UNIDO-BEE Project, TERI has been entrusted to undertake Capacity building of Local Service Providers (LSPs) to BEE. The Scope of Work under the project,

- Organizing 4 one-day training/capacity building workshops for LSPs in each cluster.
- Development of 10 bankable DPRs for each cluster, based on mapping technology needs with capacities of local technology suppliers/service providers, and also replication potential and applications to banks in each cluster.

Brief introduction of the MSME unit

Name of the unit	M/s Fresco Ceramics Private Limited
Constitution	Private Limited
MSME Classification	Medium
No. of years in operation	11
Address: Registered Office:	Survey No- 600/4P1, near Zealtop Granito Old Ghuntu Road, Morbi - 2
Industry-sector	Ceramic
Products manufactured	Wall tiles
Name(s) of the promoters/directors	Mr. Varun Dhoriyani (Director)
Existing banking arrangements along with the details of facilities availed	NA

A detailed assessment study was undertaken in the identified area with the use of the sophisticated handheld instruments. Energy consumption pattern and production data were collected to estimate the specific energy consumption of the unit. The unit level baseline of the unit was also estimated using the historical data. The plant is consuming about 15,34,128 kWh of electricity per year. The annual consumption of NG is about 17.2 lakh SCM. The total energy consumption of the unit during last 12 months is estimated to be 1,594 toe which is equivalent to 600 lakh rupees. The total CO_2 emission during this period is estimated to be 4,269 tonnes. Electricity and NG were considered for CO_2 emission estimation.

The unit manufactures the wall tiles. The total annual production of the unit during 2017-18 is estimated to be 19,50,000 boxes. The major source of energy is electricity and NG, consume in the kiln, motor drives and lighting.

Accepted/ recommended technology implementation

The recommended technology considered after discussion with the plant personnel for implementation in the unit is given below.

Technology	Annual energy saving Electricity (kWh)	Investment[1] (Rs lakh)	Monetary savings (Rs lakh/ year)	Simple payback period (Years)	Emission reduction (tonnes of CO_2)
Installation of energy management system	1,06,767	7.84	8.24	1.0	87.5

Other benefits

- The proposed project is not expected to bring in any change in process step or operating practices therefore no change expected in the product quality.
- Implementation of the selected technology in the unit may result in reduction in CO_2 emissions.

Cost of project & means of finance

S. No.	Particulars	Unit	100% equity	D/E- 70:30	D/E- 50:50
1	Cost of Project	Rs. In Lakh	7.84	8.12	8.04
2	D/E Ratio	-	-	7:3	1:1
3	Project IRR	%	76.72	69.82	71.74
4	NPV	Rs. In Lakh	14.52	13.01	13.43
5	DSCR	-	-	4.56	6.34

[1]Investment including the energy management system– Rs. 3.13 lakh, IE3 standard motors– Rs. 3.39 lakh & taxes and miscellaneous – Rs. 1.31 lakh

1.0 Details of the unit

1.1 Particulars of unit

Table 1.1: Particulars of the unit

1	Name of the unit	M/s Fresco Ceramics Private Limited	
2	Constitution	Private Limited	
3	MSME Registration No/UAN	NA	
4	PCB consent No.	NA	
5	Date of incorporation / commencement of business	2006	
6	Name of the Contact Person	Mr. Chirag Patel	
7	Mobile / Ph. No	+91 – 9426379702	
8	Email	chirag@kenzoceramic.com	
9	Address: Registered Office	Survey No- 600/4P1, near Zealtop Granito, Old Ghuntu Road, Morbi - 2, Gujarat	Owned
10	Factory	Survey No- 600/4P1, near Zealtop Granito, Old Ghuntu Road, Morbi - 2, Gujarat	Owned
11	Industry / Sector	MSME/Manufacturing	
12	Products Manufactured	Wall tiles	
13	No of hours of operation/shift	8	
14	No of shifts/ day	03	
15	No of days/year	300	
16	Installed Capacity	9,500 boxes per day	
17	Whether the unit is exporting its products (Yes/ No)	Yes	
18	Quality Certification, if any	ISO 9001 : 2008	

2.0 Energy profile

2.1 Process flow diagram

Manufacturing of ceramic item uses wide range of raw material combination to produce different shape, size and colour. It requires both electrical and thermal energy at different stages of the process to operate the ball mill, casting/moulding, kilns, cutting & finishing machines and utilities such as motors, pumps air compressor etc. Ceramic manufacturing process primarily consists of mould preparation, body material preparation, shaping, drying and firing. Typical process flow chart is shown with figure 2.1.

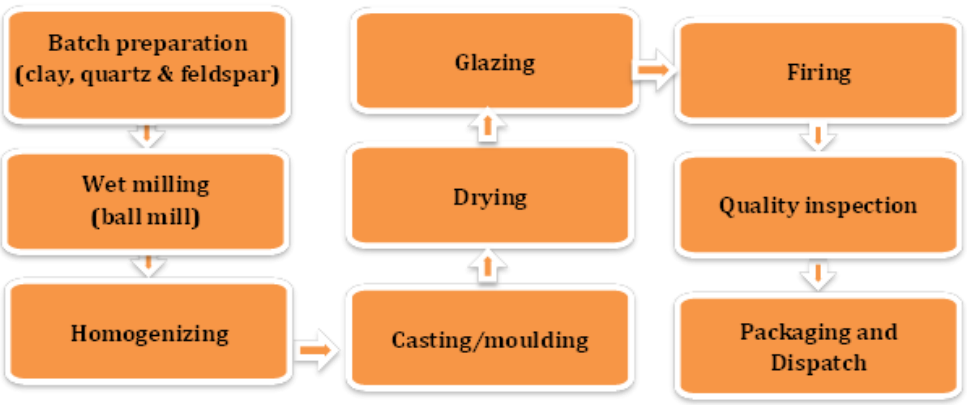


Figure 2.1: Process flow chart

2.2 Details of technology identified

The details of the machineries on which energy monitoring system will be installed in the unit are given in table 2.2.

Table 2.2: Details of energy management system

Parameters/ Equipment ID	Value
Equipment	Energy Monitoring system with 5 screens - Trends, Power Dashboard, Energy Dashboard, Alerts and Reports
Smart Energy Optimization Software (SEOS)	For up-to 30 energy meters
Energy Meters	Class 1.0 with RS485 interface of Schneider/ Enersol/Trinity Make) – Equivalent of EM6436
Monitoring locations	Ball mills – 3 no.s Air compressor – 1 no Press machine – 2 no.s Kiln fans – 2 no.s Dryer fans – 2 no.s
Mode of operation (batch/continuous)	Batch
Operating hours per day	24
Fuel Details Type	Electricity

2.3 Energy used and brief description of their usage pattern

The unit uses grid power supplied by Paschim Gujarat Vij Company Ltd. under the tariff category of HTP-1. Table 2.3 provides the details of energy uses.

Table 2.3: Energy used and description of use

S. No.	Energy source	Description of use
1	Electricity	Motive power for different drives in different process sections and utilities
2	NG	Kiln

2.4 Energy sources, availability & tariff details

Different energy sources, availability of listed energy types and their respective tariffs are given in table 2.4.

Table 2.4: Energy sources, availability and tariffs

Source	Remarks	Price
Electricity (PGVCL)	HTP-1	Demand charges: • For first 500 kVA of billing demand: Rs. 150/- per kVA per month • For next 500 kVA of billing demand: Rs. 260/- per kVA per month Energy charges: @ Rs. 4.20/kWh Power factor penalty: • 1% of energy charges for every point drop in PF between 0.85 to 0.90 • 2% of energy charges for every point drop in PF below 0.85 Power factor rebate: • 0.5% of energy charges for every point increase in PF over 0.95.
Natural gas	Gujarat Gas Ltd.	• Minimum Guaranteed Offtake (MGO): Rs. 32.70/SCM • Non - Minimum Guaranteed Offtake (Non-MGO): Rs. 35.97/SCM

2.5 Analysis of electricity consumption

Table 2.5: Electricity consumption profile

Month & Year	Electricity consumption (kWh)	Contract Demand (kVA)	Maximum Demand (kVA)	Minimum Billing Demand (kVA)	Demand Charges, Rs./month	Energy Charges, Rs./month	Power factor (PF)	Total electricity bill (Rs)
Feb-18	1,10,796	700	495	595	99,700	4,51,326	0.99	8,69,447
Apr-18	1,44,892	700	515	595	99,700	5,91,231	0.98	11,03,647
Average	**1,27,844**	**700**	**505**	**595**	**99,700**	**5,21,278**	**0.98**	**9,86,547**
Total	**15,34,128**	**-**	**-**	**-**	**-**	**-**	**-**	**1,18,38,567**

2.6 Analysis of other energy forms/ fuels

The analysis of the other fuels/forms of energy used in the unit is given in table 2.6.

Table 2.6: Analysis of other energy/ fuel consumption

Parameters	NG (SCM)
Consumption unit/year	17,20,094
Calorific value per unit	8,500
Equivalent toe per year	1,462
Price (Rs per unit)	28
Total price per year	4,81,62,643

The share of various energy forms used in the unit is given in figure 2.6.

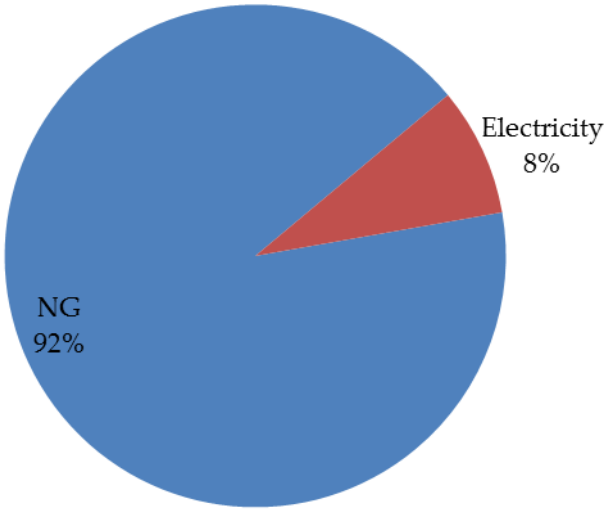


Figure 2.6: Percentage share of various fuel types in the unit

The plant is consuming about 15,34,128 kWh of electricity per year. The annual consumption of NG is about 17.2 lakh SCM. The total energy consumption of the unit during last 12 months is estimated to be 1,594 toe which is equivalent to 600 lakh rupees. The total CO_2 emission during this period is estimated to be 4,269 tonnes. Electricity and NG were considered for CO_2 emission estimation.

3.0 Proposed technology for energy efficiency

Based on the measurements, observations/ findings during detailed assessment study conducted in the unit, the following technology has been identified for energy efficiency improvement. The detail is given below.

3.1 Installation of Energy Management System for monitoring & optimisation of equipment performance

3.1.1 Background

The Fresco Ceramics Pvt. Ltd. is manufacturing wall tiles. Tile manufacturing process requires ball mills for raw material preparation, pneumatic press, kiln and associated utilities like air compressor, pumps, fans etc. The operational parameters including the electricity consumption, operating hours and capacity utilization were measured during the detailed assessment study.

Table 3.1.1a: Details of ball mills

Parameters/ Equipment ID		Value
Equipment		Ball Mill
Number of mills		3
Rated Capacity		20 tonnes
Speed		11 rpm
Type of grinding media		High alumina pebbles
Mode of operation (batch/continuous)		Batch
Batch Duration		5 hours
Batches per day		2
Motor rating		90kW / 110kW
Fuel Details	Type	Electricity

Table 3.1.1b: Details of air compressor

Particulars	Unit	Value
Make	-	ELGI
Type	-	Screw
Model	-	EG22-7.5
Year of Installation	-	2017
Purpose	-	Pneumatic utilities
Rated Capacity	M^3/Min	3.96
Rated Capacity	CFM	140
Motor rating	kW	22

3.1.2 Observations and analysis

During the detailed assessment study of the unit, electricity consumption and residue of material for two the ball mills (1 & 3) was recorded with respect to batch timing for evaluating the existing performance. Ball mills were operated using with manual control with judgement of the operating personal with his past experience. The ball mills were observed to be operated in the range of 5 to 6 hours per batch which is higher than the

recommended value for the similar ball mills. The specific quality of material in ball mills is generally achieved with batch timing of 4.5 hours. The electrical motor drives associated with ball mills were found to be operating with 47–57% loading which indicates that these motor drives are oversized.

The air compressor installed in the unit was also observed to be of over-capacity with respect to plant's existing compressed air demand. The air compressor was found to be operating on-load condition for only 33% of the total operating time. The discussion with plant management reveals that there is not monitoring system to keep a track of electricity consumption and loading of these utilities.

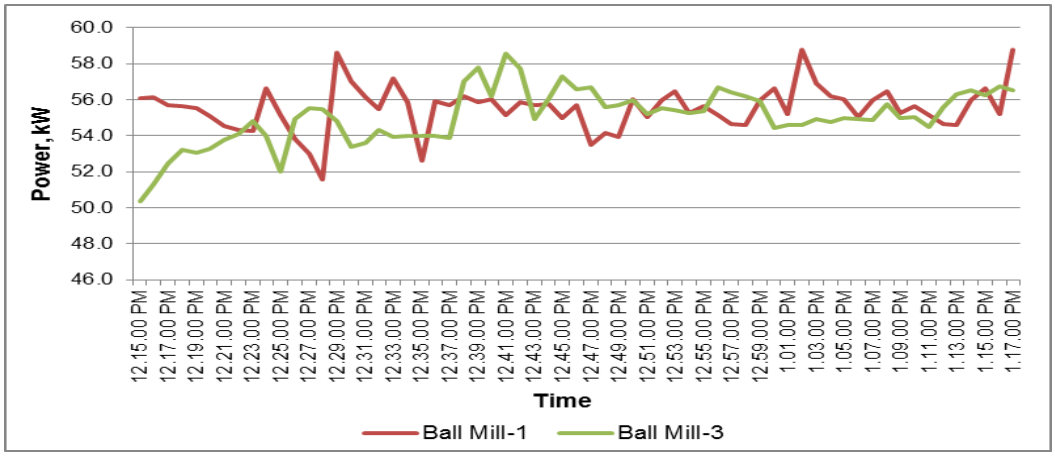


Figure: 3.1.2: Power consumption trend for Ball mills

3.1.3 Recommendation

It is recommended to install energy monitoring system which will help in reducing energy consumption of the plant by optimisation of ball mill batch timing, electrical motor size and air compressor loading. EMS will also help to identify and replace existing oversized/undersized or inefficient rewinded motor drives with energy efficient IE3 standard motors. Optimised operation will help eliminating additional electricity consumption of ball mills and air compressor during unload period whereas IE3 standard motors will improve motor operating efficiency as compared to old rewinded motors.

3.2 Cost benefit analysis

The estimated annual energy saving by installation of energy monitoring system to optimize operation of air compressor and ball mills with optimum sized IE3 standard motors is 1,06,767 kWh which is equivalent to about Rs. 8.24 lakhs. The investment requirement is Rs 7.84 lakh with a simple payback period of 1 year. The detailed calculations of the recommended energy conservation measures for DPR are provided in table 3.2.

Table 3.2a: Energy savings estimation by optimising ball mill operation

Description	Unit	Ball Mill-1	Ball Mill-3
Existing			
Capacity	tonne/batch	20	20
Speed	rpm	11	11

Description	Unit	Ball Mill-1	Ball Mill-3
Type of grinding media	-	High alumina pebbles (68%)	High alumina pebbles (68%)
Average running hours	hours/batch	5	5
No.s of batch per day	No.s	2	2
Number of operating days	days/year	300	300
Average power input	kW	55.5	54.9
Average unit consumption	kWh/batch	277.5	274.5
Annual electricity consumption	kWh/year	1,66,516	1,64,828
Proposed			
Capacity	tonne/batch	20	20
Speed	rpm	11.0	11.0
Type of grinding media	-	220	220
Average running hours	hours/batch	4.5	4.5
No.s of batch per day	No.s	2	2
Number of operating days	days/year	300	300
Average power input	kW	54.3	53.6
Average unit consumption	kWh/batch	244	241
Annual electricity consumption	kWh/year	1,46,565	1,44,613
Electricity savings	kWh/year	19,950	20,215
Cost of electricity	Rs./kWh	7.72	7.72
Monetary Savings	Rs./year	1,53,954	1,55,993

Table 3.2b: Energy savings estimation by optimising air compressor operation

Particular	Unit	Existing	Proposed
The present annual power consumption of air compressor	kWh/year	1,19,519	-
The proposed power consumption of air compressor with VFD	kWh/year	-	52,918
Energy saving	kWh/year	-	66,601
Monetary saving	Rs lakh/year	-	5,13,951

Table 3.2c: Cost benefit analysis for recommended energy savings measures

Technology	Annual energy saving Electricity (kWh)	Investment[2] (Rs lakh)	Monetary savings (Rs lakh/ year)	Simple payback period (Years)	Emission reduction (tonnes of CO_2)
Installation of energy management system	1,06,767	7.84	8.24	1.0	87.5

3.3 Pre-training requirements

The training would be required on monitoring and analysing performance of equipments to identify irregularities. Best practices to be adopted for housekeeping near location of installation.

[2] Quotation – 1 & 4 has been considered for estimation of investments

3.4 Process down time for implementation

The estimated process down time required for implementation of recommended measure is estimated to be 1 day.

3.5 Environmental benefits

3.5.1 CO_2 reduction[3]

Implementation of the selected energy conservation measures in the unit may result in reduction in CO_2 emissions due to reduction in overall energy consumption. The estimated reduction in GHG emission by implementation of the recommended energy conservation measures is 87.5 tonnes of CO_2 per year.

3.5.2 Reduction in other pollution parameters (gas, liquid and solid)

There is not significant impact on the reduction in other pollution parameters including gas, liquid and solid.

[3] Source for emission factor: 2006 IPCC Guidelines for National Greenhouse Gas Inventories & for electricity; CO_2 Baseline Database for the Indian Power Sector, user guide version 12.0, May 2017 (CEA)

4.0 Project financials

4.1 Cost of project and means of finance

4.1.1 Particulars of machinery proposed for the project

The particulars of machinery proposed for the project is given in table 4.1.1.

Table 4.1.1: Particulars of machinery proposed for the project

S. No.	Name of machinery (Model/Specification)	Name of manufacturer, contact person	Advantage	Disadvantage
1	Energy monitoring system	Supertech Instrumentation Services (I) Pvt. Ltd.	Reputed supplier	-
2	Energy monitoring system	Systems & Controls Private Limited	Reputed supplier	-
3	Energy monitoring system	Zenatix Solutions Private Limited	Reputed supplier	-
4	IE3 standard premium efficiency motors	Shaildeep Enterprise, ABB motors	Reputed supplier	-
5	IE3 standard premium efficiency motors	Aakash Powertech Pvt. Ltd, Marathon Teramax	Reputed supplier	-
6	IE3 standard premium efficiency motors	Crompton Greaves (Online supplier- easysparepart.com)	Reputed supplier	-

4.1.2 Means of finance

The means of finance for the project is shown in table 4.1.2.

Table 4.1.2: Means of finance

S. No.	Details	100% equity	D/E- 70:30	D/E- 50:50
1	Additional (Share) Capital	7.84	2.35	3.92
2	Internal Accruals	-	-	-
3	Interest free unsecured loans	-	-	-
4	Term loan proposed (Banks/FIs)	-	5.48	3.92
5	Others	-	-	-
	Total	**7.84**	**7.84**	**7.84**

4.2 Financial statement (project)

4.2.1 Assumptions

The assumptions made are provided in table 4.2.1.

Table 4.2.1: Assumptions made

Details	Unit	100% equity	D/E - 70:30	D/E - 50:50

Details	Unit	100% equity	D/E - 70:30	D/E - 50:50
General about unit				
No of working days	Days		300	
No of shifts per day	Shifts		3	
Annual operating hours	hours/year		7,200	
Installed production capacity	boxes/year		28,50,000	
Production in last financial years	boxes/year		19,50,000	
Capacity utilization factor	%		68	
Proposed investment (Project)				
Total cost of the project	Rs. (Lakh)	7.84	7.84	7.84
Investment without interest defer credit (IDC)	Rs. (Lakh)	7.84	7.84	78.4
Implementation time	Months	6.0	6.0	6.0
Interest during the implementation phase	Rs. in lakhs	-	0.29	0.21
Total investment	Rs. in lakhs	7.84	8.12	8.04
Financing pattern				
Own funds	Rs. in lakhs	7.84	2.64	4.12
Loan funds (term loan)	Rs. in lakhs	-	5.48	3.92
Loan tenure	Years	-	5.0	5.0
Moratorium period (No EMI (interest and principal amount))	Months	-	6.0	6.0
Total repayment period	Months	-	66.0	66.0
Interest rate	%	-	10.5	10.5
Estimation of costs				
Operation & maintenance costs	%		5.0	
Annual escalation rate of O&M	%		5.0	
Estimation of revenue				
Reduction in energy cost	Rs. lakh/year		8.24	
Total saving	Rs. lakh/year		8.24	
Straight line depreciation	%		16.21	
IT depreciation	%		80.0	
Income tax	%		33.99	
Period of cash flow analysis	Years		5.0	

4.2.2 Payback

The simple payback period on the investments made are shown in table 4.2.2.

Table 4.2.2: Payback

Details	100% equity	D/E- 70:30	D/E- 50:50
Total project cost (Rs. In lakh)	7.84	8.12	8.04
Cash flow as annual saving (Rs. In lakh/year)	8.24	8.24	8.24
O&M Expenses for first year (Rs. In lakh/year)	0.39	0.41	0.40
Net Cash flow (Rs. In lakh/year)	7.85	7.83	7.84
SPP (months)	12.0	12.5	12.3

4.2.3 NPV and IRR

Table 4.2.3a: NPV and IRR (100% equity)

Particulars / years	0	1	2	3	4	5
			(Rs. in lakhs)			
Profit after tax	-	6.58	3.79	3.97	3.89	3.86
Depreciation	-	1.27	1.27	1.27	1.27	1.27
Cash outflow	7.84	-	-	-	-	-
Net cash flow	-7.84	7.85	5.06	5.24	5.16	5.13
Discount rate % @ WACC	9.30	9.30	9.30	9.30	9.30	9.30
Discount factor	1.00	0.92	0.84	0.77	0.70	0.64
Present value	-7.84	7.18	4.24	4.02	3.62	3.29
Net present value	**14.52**					
Simple IRR considering regular cash flow	**76.72%**					

Table 4.2.3b: NPV and IRR (D/E- 70:30)

Particulars / years	0	1	2	3	4	5
			(Rs. in lakhs)			
Profit after tax	-	6.24	3.60	3.66	3.65	3.70
Depreciation	-	1.32	1.32	1.32	1.32	1.32
Cash outflow	8.12	-	-	-	-	-
Net cash flow	-8.12	7.55	4.92	4.98	4.97	5.02
Discount rate % @ WACC	10.10	10.10	10.10	10.10	10.10	10.10
Discount factor	1.00	0.91	0.83	0.75	0.68	0.62
Present value	-8.12	6.86	4.06	3.73	3.38	3.10
Net present value	**13.01**					
Simple IRR considering regular cash flow	**69.82%**					

Table 4.2.3c: NPV and IRR (D/E- 50:50)

Particulars / years	0	1	2	3	4	5
			(Rs. in lakhs)			
Profit after tax	-	6.33	3.65	3.75	3.72	3.75
Depreciation	-	1.30	1.30	1.30	1.30	1.30
Cash outflow	8.04	-	-	-	-	-
Net cash flow	-8.04	7.64	4.96	5.05	5.02	5.05
Discount rate % @ WACC	9.90	9.90	9.90	9.90	9.90	9.90
Discount factor	1.00	0.91	0.83	0.75	0.69	0.63
Present value	-8.04	6.95	4.11	3.81	3.45	3.16
Net present value	**13.43**					
Simple IRR considering regular cash flow	**71.74%**					

4.3 Marketing & selling arrangement

The marketing and selling arrangements of the unit are given in table 4.3.

Table 4.3: Marketing & selling arrangements

Items	Remarks

Items	Remarks
Main Markets (locations)	Pan India
Locational advantages	-
Any USP or specific market strength	-
Whether product has multiple applications	NA
Distribution channels (e.g. direct sales, retail network, distribution network)	Direct sales
Marketing team details, if any.	NA

4.4 Risk analysis and mitigation

The risk analysis and mitigation for the proposed options are given in table 4.4.

Table 4.4: Risk analysis and mitigation

Type of risk	Description	Mitigation
Technology	The equipment/technology provided by the supplier may not be of high quality, which may result in underperformance.	The equipment/technology should be procured from standard/reputed vendors only.
Market /Product	Demand of the product manufactured by the unit may change resulting in lower capacity utilization.	Regular vigilance/tab on the market scenario by the SME will help in better understanding of new substitute product. The unit may modify the product line based on the emerging market trend.
Policy/Regulatory	Changes in government regulation/policy related to pollution and taxes & duties can affect the viability of the unit.	Local industrial association may play a role in discussing these issues with the relevant governmental bodies on a regular basis, so that any concerns of the unit are brought to their notice.

4.5 Sensitivity analysis

A sensitivity analysis for various scenarios which may affect the return on investment is given in table 4.5.

Table 4.5: Sensitivity analysis

S. No.	Scenario	D/E ratio	Payback period (months)	NPV (Rs lakh)	IRR (%)	DSCR	ROI (%)
1	10% increase in estimated savings	100% equity	10.80	16.64	85.92	-	30.88
		70:30	11.30	15.09	78.72	4.98	39.14
		50:50	11.10	15.53	80.73	6.94	36.26
2	10% reduction in estimated savings	100% equity	13.40	12.39	67.49	-	27.92
		70:30	13.90	10.93	60.87	4.13	36.89
		50:50	13.80	11.34	62.72	5.74	33.64
3	10% rise in interest rates	70:30	12.50	12.55	69.14	4.46	38.01
		50:50	12.30	13.10	71.25	6.20	34.99
4	10% reduction in interest rates	70:30	12.40	13.48	70.50	4.66	38.25
		50:50	12.30	13.78	72.24	6.49	35.16

5.0 Conclusions & recommendations

The DPR prepared for the installation of energy monitoring system which will help in reducing energy consumption of the plant by optimisation of ball mill batch timing, electrical motor size and air compressor loading based on the performance assessment study conducted at unit and the acceptance of the unit management. The brief of selected energy conservation measure is given below;

5.1 List of energy conservation measures

The brief summary of the energy conservation measures are given in table 5.1.

Table 5.1: Summary of the energy conservation measures

Technology	Annual energy saving	Investment	Monetary savings	Simple payback period	Emission reduction
	Electricity (kWh)	(Rs lakh)	(Rs lakh/ year)	(Years)	(tonnes of CO_2)
Installation of energy management system	1,06,767	7,83,500	8,23,898	1.0	87.5

The measure has an estimated investment of 7.83 lakh rupees and can yield a savings of 8.23 lakh rupees per year. The total annual reduction in emission by implementation of recommended measure is estimated to be 87.5 tonnes of CO_2. The financial indicators provided above in the table shows the project is financially viable and technically feasible.

5.2 Summary of the project

The summary of the project is given in table 5.2.

Table 5.2: Summary of the project

S. No.	Particulars	Unit	100% equity	D/E- 70:30	D/E- 50:50
1	Cost of Project	Rs. In Lakh	7.84	8.12	8.04
2	D/E Ratio	-	-	7:3	1:1
3	Project IRR	%	76.72	69.82	71.74
4	NPV	Rs. In Lakh	14.52	13.01	13.43
5	DSCR	-	-	4.56	6.34

5.3 Recommendations

The financial indicators provided above show the project is financially viable and technically feasible. It is recommended that the implementation of the identified the energy conservation measures may be undertaken by the unit.

6.0 Financing schemes for EE investments for MSME sector

Government of India has many schemes to provide concessional finance for EE technologies among MSMEs. Some major government schemes are summarised in table 6.1.

Table 6.1: Major government schemes

Name of the scheme	Brief Description and key benefits
ZED assessment and certification	Assessment process, fee and subsidy are as follows: Online (e-Platform) self-assessment: Nil fee Desk Top assessment : Rs 10,000 per SME Complete assessment : Rs 80,000 ZED rating per SME; Rs 40,000 for additional ZED defence rating; Rs 40,000 for re-rating The rating costs will include cost of Rs 10,000/- as certification cost by QCI. Subsidy for Micro, Small and Medium Enterprises are 80%, 60% and 50% respectively.
Credit Linked Capital Subsidy Scheme (CLCSS) (2000-ongoing)	15% capital subsidy of cost of eligible plant and machinery / equipment for adoption of proven technologies for approved products / sub-sectors for MSE units subject to ceiling of INR 15 lakhs
Credit Guarantee Fund Scheme for Micro and small Enterprises (in partnership with SIDBI) (2000-ongoing)	This scheme was launched by MoMSME and SIDBI to alleviate the problem of collateral security and enable micro and small scale units to easily adopt new technologies. Under the scheme, collateral free loans up to Rs 1 crore can be provided to micro and small scale units. Additionally, in the event of a failure of the SME unit which availed collateral free credit facilities to discharge its liabilities to the lender, the Guarantee Trust would guarantee the loss incurred by the lender up to 75 / 80/ 85 per cent of the credit facility.
Technology and Quality Up gradation Support to MSMEs (TEQUP) (2010-ongoing)	The benefits available to SMEs under TEQUP include—technical assistance for energy audits, preparation of DPRs and significant capital subsidy on technologies yielding an energy savings of over 15%. The scheme offers a subsidy of 25% of the project cost, subject to a maximum of Rs. 10 lakhs. TEQUP, a scheme under NMCP, focuses on the two important issues in enhancing competitiveness of the SME sector, through EE and Product Quality Certification.
Technology Upgradation Fund Scheme (TUFS) (1999-ongoing)	Interest subsidy and /or capital subsidy for Textile and Jute Industry only. 1. To facilitate Technology Up gradation of Small Scale (SSE) units in the textile and jute industries. Key features being: • Promoter's margin -15%; • Subsidy – 15% available on investment in TUF compatible machinery subject to ceiling of Rs 45 lakh; • Loan amount – 70% of the cost of the machinery by way of Term Loan

Name of the scheme	Brief Description and key benefits
	• Interest rate: Reimbursement of 5% on the interest charged by the lending agency on a project of technology upgradation in conformity with the Scheme • Cover under Credit Guarantee Fund Scheme for Micro and Small Enterprises (CGMSE) available 2. To enable technology upgradation in micro and small power looms to improve their productivity, quality of products and/ or environmental conditions • 20% margin subsidy on investment in TUF compatible specified machinery subject to a ceiling of Rs 60 lakhs or Rs 1crore (whichever is applicable) on subsidy amount to each unit – released directly to the machinery manufacturer.
Tax incentives	• Accelerated depreciation is provided to the customers / users of the energy saving or renewable energy devises under the direct tax laws. • Under indirect taxes, specific concessional rates of duty are only available to CFLs and not to all energy efficient products • A further waiver of import tariffs and taxes for EE technology imports are dealt on a case to case basis, meaning higher costs for those imported technologies that are not available in the domestic markets at present.

Two financing schemes have been created by Bureau of Energy Efficiency (BEE) under The National Mission for Enhanced Energy Efficiency (NMEEE) for financing of energy efficiency projects - Venture Capital for Energy Efficiency (VCFEE) and Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE). These funds seek to provide appropriate fiscal instruments to supplement the efforts of the government for creation of energy efficiency market. Highlights of these two schemes are provided in the table 6.2.

Table 6.2: BEE's VCFEE and PRGFEE scheme

Venture Capital for Energy Efficiency (VCFEE)	• This fund is to provide equity capital for energy efficiency projects in Government buildings and Municipalities in the first phase. • A single investment by the fund shall not exceed Rs 2 crore • Fund shall provide last mile equity support to specific energy efficiency projects, limited to a maximum of 15% of total equity required, through Special Purpose Vehicle (SPV) or Rs 2 crore, whichever is less
Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE)	• A PRGF is a risk sharing mechanism lowering the risk to the lender by substituting part of the risk of the borrower by granting guarantees ensuring repayment of part of the loan upon a default event. • Guarantees a maximum 50% of the loan (only principal). In case of default, the fund will: o Cover the first loss subject to maximum of 10% of the total guaranteed amount o Cover the remaining default (outstanding principal) amount on

Venture Capital for Energy Efficiency (VCFEE)	• This fund is to provide equity capital for energy efficiency projects in Government buildings and Municipalities in the first phase. • A single investment by the fund shall not exceed Rs 2 crore • Fund shall provide last mile equity support to specific energy efficiency projects, limited to a maximum of 15% of total equity required, through Special Purpose Vehicle (SPV) or Rs 2 crore, whichever is less
	partial basis upto the maximum guaranteed amount • PFI shall take guarantee from the PRGFEE before disbursement of loan to the borrower. • The Guarantee will not exceed Rs 300 lakh per project or 50% of loan amount, whichever is less. • Maximum tenure of the guarantee will be 5 years from the date of issue of the guarantee

Indian Renewable Energy Development Agency (IREDA), a non-banking financial institution established by the government also extends financial assistance for setting up projects relating to new and renewable sources of energy and energy efficiency/conservation. The detailed financing guidelines for energy efficiency projects are provided in table 6.3.

Table 6.3: IREDA's financing guidelines

Eligible companies who can apply	Private Sector Companies/ firms, Central Public Sector Undertaking (CPSU), State Utilities/ Discoms/ Transcos/ Gencos/ Corporations, Joint Sector Companies which are not loss making.
Minimum loan amount	• Rs. 50 lakh
Type of projects considered for term loans	• Replacement / retrofit of selected equipment with energy efficient equipment • Modification of entire manufacturing processing • Recovery of waste heat for power generation
Incentive available	• Rebate in central excise duty • Rebate in interest rate on term loan • Rebate in prompt payment of loan instalment
Interest rate	• 10.60% to 11.90% depending upon the grading of the applicant with prompt payment rebate of 15 bps if payment is made on / before due dates • Interest rates are floating and would be reset on commissioning of the project or two years from the date of first disbursement. Thereafter, the rates will be reset after every two years. • Rebate of 0.5% in interest rates are available for projects set up in North Eastern States, Sikkim, J&K, Islands, Estuaries. Rebates of 0.5% in interest rates are also available for projects being set up by SC/ST, Women, Ex Servicemen and Handicapped categories involving project cost of upto Rs. 75.00 lakh.
Loan	Upto 70% of the total project cost. Promoter's contribution should be Minimum 30% of the total project cost
Maximum debt	3:1

equity ratio	The project cash flow should have a minimum average Debt Service Coverage Ratio of 1.3
Maximum repayment period	12 years with moratorium of maximum 12 months
Procurement procedures	The borrower is required to follow the established market practices for procurement and shall demonstrate that the quality goods and services are being purchased at reasonable and competitive prices. Wherever the loan is sanctioned against international lines of credit such as the World Bank, Asian Development Bank, KfW, etc., the relevant procedures will have to be followed and requisite documents will have to be submitted by the borrower

Small Industries Development Bank of India (SIDBI) has several schemes and focused lines of credit for providing financial assistance for energy efficiency and cleaner production projects for SMEs. Highlights of some of the major financial assistance schemes/projects managed by SIDBI are given in table 6.4.

Table 6.4: Major EE financing schemes/initiatives of SIDBI

End to End Energy Efficiency (4E) Program	Support for technical /advisory services such as: • Detailed Energy Audit • Support for implementation • Measurement & Verification Financing terms: • Terms loans upto 90% • Interest rate upto 3% below normal lending rate.
TIFAC-SIDBI Revolving Fund for Technology Innovation (Srijan Scheme)	To support SMEs for up-scaling and commercialization of innovative technology based project at flexible terms and interest rate. Preference accorded to sustainable technologies / products. Soft term loan with an interest of not more than 5%.
Partial Risk Sharing Facility for Energy Efficiency (PRSF) Project (supported by World Bank)	Sectors covered: • Large industries (excluding thermal power plants) • SMEs • Municipalities (including street lighting) • Buildings Coverage: • The minimum loan amount Rs 10 lakh and maximum loan amount of Rs 15 crore per project. • The extent of guarantee is 75% of the loan amount
JICA-SIDBI Financing Scheme	• The loan is used to provide SMEs with funds necessary to invest in energy-saving equipment (and some medical equipment) in the form of two-step loans through SIDBI or three-step loans through intermediary financial institutions.

	• Project uses an Energy Saving Equipment List approach • Equipment/machinery with energy saving potential less than 10% is not eligible. • Interest rate: As per credit rating and 1% below the normal lending rate • Separate technical assistance component which is used for wetting of loan applications, holding seminars to raise awareness of energy saving among SMEs and to improve the ability of financial institutions to screen loan applications for energy-saving efforts
KfW-SIDBI Financing Scheme	Coverage a) SMEs for energy efficiency projects b) SMEs and clusters for cleaner production and emission reduction measures, waste management and Common Effluent Treatment Plant (CETP) facilities Interest rate As per credit rating and 1% below the normal lending rate Eligible criteria 3 t CO_2 emission reduction per year per lakh invested List of eligible equipment/technology and potential suppliers developed for guidance

State Bank of India (SBI) has been provided a green line of credit by Japan Bank for International Cooperation (JBIC) for financing of energy efficiency investments. Highlights of the line of credit are given in table 6.5.

Table 6.5: JBIC-SBI Green Line

Key Features

- Amount : USD 90 million
- Repayment Schedule: First repayment on May 30, 2017 and final repayment date May 30, 2025 (equal instalment)

Eligibility Criteria

- Projects contributing to preservation of global environment, i.e. significant reduction of GHG emissions
- Acceptance of JBIC-MRV ('J-MRV") by the project proponent in terms of the numerical effect of the environment preservation. To ensure effective GHG reduction emissions in Green financed projects, JBIC reviews such effects through simple and practical Measurement Reporting Verification (MRV) process both in (a) prior estimation and (b) ex-post monitoring.
- Procurement in line with the "Guidelines for Procurement under Untied Loans by Japan Bank for International Cooperation"

Canara bank has a dedicated scheme for financing EE investment among SME sector as mentioned in table 6.6.

Table 6.6: Canara bank scheme of EE SME loans

Purpose	**For acquiring/adopting energy conservation/savings equipment/ measures by SMEs**
Eligibility	Units under Small and Medium Enterprises Cost of energy for the unit should constitute not less than 20% of the total cost of production Unit should possess energy audit report issued by an approved energy Consultant/Auditor. Borrowal a/cs-ASCC code S1 or S2 during previous review. Current account holders having dealings exclusively with us satisfactorily for a period of last one year
Maximum loan	Maximum Rs 100 lakhs in the form of term loan
Security	Prime: Assets created out of loan Collateral: Upto Rs.5 lakhs – NIL Above Rs.5 lakhs, as determined by the bank
Repayment	Maximum 5-7 years including moratorium of 6 months
Guarantee cover	Cover available under CGMSE of CGTMSE available for eligible loans
Margin	10% of the project cost
Rate of interest	1% less than the applicable rate
Upfront fee	1% of the loan
Insurance cover	Assets acquired and charged as security to Bank to be insured
Special offer, if any	**Grants :** Bank provides 25% of the cost of Energy Audit / Consultancy charges with a maximum of Rs 25000/- to the first 100 units on a first come first served basis which is in addition to the grant of Rs 25000/- being provided by IREDA(First 100 units)

Among the private sector banks in India, Yes Bank is also active in financing of renewable energy and energy efficiency projects. The bank has an MOU with SIDBI for providing funding for EE through PRSF.

Most commercial banks charge interest rate between from 11% to 13% from MSMEs depending upon general criteria such as credit ratings, references, past lending record, balance sheet for last 3 years and so on. Interest rebate is offered for a few customers whose collateral value is around 125% of the loan amount. Further 0.5% concession in interest rate was offered to women entrepreneurs

Annexures

Annexure 1: Budgetary offers / quotations

Quotation 1: Supertech Instrumentation Services (I) Pvt. Ltd.

Our Ref.: SIS/CSL/QUT/Q-4618/Rev2/2018 Date: 25/06/2018

M/s. TERI.
New Delhi

Kind Attn: - Mr. Vivek Sharma
Subject: - Offer for Energy Monitoring System for monitoring consumption of energy in factory.

Dear Sir,
With reference to discussion had with you, we are pleased to submit our revised offer for Energy Monitoring System for monitoring consumption of energy in factory.

Supply				
SN	**Description**	**Qty.**	**Unit Price**	**Total (Rs)**
1	Power Monitoring Expert V8.1 with 5 meters license	1	26,000	26,000
2	Link 150 Modbus to Ethernet protocol converter	1	27,500	27,500
3	PME Server machine (Dell Optiplex with Windows 10 OS and other softwares. **See Note 7**	1	75,000	75,000
4	Modbus RS-485 cable for looping of meters (100 mtr. Roll)	1	18,000	18,000
5	Ethernet Cable (As Req.)	1	8,000	8,000
6	8 port Ethernet switch (Industrial Type Phoenix or eq. make)	1	9,000	9,000
7	EM6400NG Meter (KWH & Demand)	4	12,000	48,000
8	PM 5310 Meter	1	22,500	22,500
9	24V DC Power Supply 72W, 3A - 1No. & required MCB's	1	14,000	14,000
10	Enclosures for Meters & CTs.	3	3,500	10,500
			Total (Rs)	**258,500**
Services				
1	Meters Installation & Wiring	5	5,000	25,000
2	Application software development for 5 meters and reports.	LS	20,000	20,000

Supertech Instrumentation Services (I) Pvt. Ltd.
13, Vardhman Industrial Complex,
Old Mumbai Agra Road, Near Hotel Royal Inn,
Thane - 400601 (Maharashtra), INDIA
Tel : +91 22 4155 0100 Fax : +91 22 4155 0179
Email: automation@supertech.co.in
www.supertech.co.in

Our Ref.: SIS/CSL/QUT/Q-4618/Rev2/2018 Date: 25/06/2018

3	Commissioning for one day	1	10,000	10,000
			Total Rs.	**55,000**
			Total Supply + Services (Rs)	**313,500**

Notes:

1. We have considered Enclosures for only 3 locations where meters & CTs will be installed in it. For other 2 locations where analog meters are already installed in the panels, it will be replaced with the new suppled meters, hence same cut out will be used.
2. Installation of CTs. Will be in your scope in the 2 panels where analog meters are already installed.
3. Wiring from CTs upto meters for all the panels will be in our scope.
4. Supply of CTs will be free issue to us.
5. Laying & Termination of all the communication cables (Modbus & Ethernet) will be in your scope (As per provided system Architecture).
6. To carry out all the above installation activities shut down should be provided whenever required.
7. We have offered Dell make Workstation for PME. The configuration of the machines will be as follows:

   Dell Optiplex:
   Intel Core i5-4570 Processor (Quad Core, 6MB Cache, 3.2GHz, w/HD Graphics 4600)
   8GB (1x8GB) 1600MHz DDR3 Memory
   500GB 3.5inch Serial ATA (7,200 Rpm) Hard
   Drive 22" Wide Screen Monitor
   16X Half Height DVD+/-RW Drive
   USB Optical Mouse and USB Keyboard
   Windows 8.1 Pro 64bit License and
   Media 3 Years Warranty

We hope that you will find our offer in line with your requirement and expect your favourable reply.

Thanking You,
Yours Sincerely,
For Supertech Instrumentation Services (I) Pvt. Ltd.,

.....
C.S. LIMAYE
DIRECTOR

Supertech Instrumentation Services (I) Pvt. Ltd.
13, Vardhman Industrial Complex,
Old Mumbai Agra Road, Near Hotel Royal Inn,
Thane - 400601 (Maharashtra), INDIA
Tel : +91 22 4155 0100 Fax : +91 22 4155 0179
Email: automation@supertech.co.in
www.supertech.co.in

Our Ref.: SIS/CSL/QUT/Q-4618/Rev2/2018 Date: 25/06/2018

General Terms and Conditions:

Please issue two separate orders, one for supply and other for services.

For Supply:

1.	Packing forwarding	: Extra at Actual.
2.	Excise Duty/ CVD	: Extra as applicable.
3.	Tax	: GST as applicable.
4.	Freight	: Extra at Actual.
5.	Insurance	: In your scope.
6.	Delivery	: 4-6 Weeks.
7.	Payment Terms	: 20% advance, balance 80% against proforma invoice prior to dispatch for supply and 100% against completion of work for services.
8.	Warranty	: 18 months from the date of supply or 12 months from date of Commissioning, whichever is earlier.
9.	Validity of Offer	: 30 days.
10.	Ordering Instructions	: Please place the supply Order on the following address: **M/s. Supertech Instrumentation Services (I) Pvt. Ltd.** 3 – Pratik Corner Bldg, Giriraj CHS Ltd, Plot No. 49.,Sector A, Airoli, Navi Mumbai-400 708.

For Services:

We have considered one man day for commissioning in our offer. Beyond one day, our charges for the same will be Rs. 10,000/- per day per engineer.

1.	Tax	: GST extra.
2.	Payment terms	: 100% against completion of work.
3.	Ordering Instructions	: Please place the supply Order on the following address: **M/s. Supertech Instrumentation Services (I) Pvt. Ltd.** 3 – Pratik Corner Bldg, Giriraj CHS Ltd, Plot No. 49.,Sector A, Airoli, Navi Mumbai-400 708.

Supertech Instrumentation Services (I) Pvt. Ltd.
13, Vardhman Industrial Complex,
Old Mumbai Agra Road, Near Hotel Royal Inn,
Thane - 400601 (Maharashtra), INDIA
Tel : +91 22 4155 0100 Fax : +91 22 4155 0179
Email: automation@supertech.co.in
www.supertech.co.in

Quotation 2: Systems & Controls Pvt. Ltd.

SYCON

An ISO 9001:2008 Company

- Automatic Power Factor Controllers
- Thyristor Capacitor Switching Modules • Series Reactors
- Maximum Demand Controllers
- Earth leakage Relays
- Motor Protection Relays
- Digital Panel Meters
- Current Transformers

Ref: SYCON/MKT/2018-19/BSP/021 **Date: - 13.06.18**

To,
TERI
New Delhi

Kind Attn: - Mr. Vivek Sharma,

With reference to your Enquiry about **SYCON Intelligent Load Manager With EMS System,** We are quoting as follows,

Sr. No.	Specifications	Quantity	List Price	Total Amount
01	**Intelligent Load Manger (KVA/KW) SYCON-4600 Block Window** 1alarm 3trip Model, low power factor alarm (optional), Display of average KVA Demand, Voltage & current, PF, KW, KVA, KVAR, Frequency, selectable display of present & previous demand, Adjustable integration time 15 min or 30 min, available in three phase 3 wire, Rs,485 port with MODBUS protocol	01	23650.00	21285.00
02	**SYCON Digital Multifunction Meter SYCON 9900- P** Large 16*2 LCD, Display of voltage, current, PF, KW(RYB), KVA (RYB), KVAR(RYB), Kwh & frequency.	05	4620.00	20790.00
03	**Hooter (Electronic Hooter 230 volt)**	01	1500.00	1500.00
04	**Energy Monitoring System (EMS)**	01	35000.00	35000.00
05	**Installation Commissioning for 3 days (Per next day 2000.00)**		12000.00	12000.00

CIN No. : U333130MH1988PTC049403

Systems and Controls (Sangli) Pvt.Ltd.
C-24, MIDC- Miraj-416410. Sangli, Maharashtra, India. +91 233 2644320
info@sycon.co.in www.sycon.co.in

SYCON

An ISO 9001:2008 Company

- Automatic Power Factor Controllers
- Thyristor Capacitor Switching Modules
- Series Reactors
- Maximum Demand Controllers
- Earth leakage Relays
- Motor Protection Relays
- Digital Panel Meters
- Current Transformers

Commercial Terms & Conditions	
Taxes	GST as applicable
Price Basis	Ex our works at Miraj, Sangli.
Mode of dispatch	By Road.
Delivery	7-8 Days from the date of Techno Commercial Confirmation.
Payment Terms	100% Against Proforma Invoice.
Packing & Forwarding.	At Actual at a time of delivery.
Insurance	To your account.
Freight	Extra at actual at the time of delivery.
Warranty	12 Months from the date of supply.
Validity	15 Days
Installation & Commissioning	In customer scope (Extra – if required)

We hope our offer is in line with your requirements and we expect your valuable order for the same.

Thanking You.

Yours truly,

For

Authorized Signatory

Mrs. Bhagyashree Patil

+91 9822878912

CIN No. : U333130MH1988PTC049403

Systems and Controls (Sangli) Pvt.Ltd.

C-24, MIDC- Miraj-416410. Sangli, Maharashtra, India. +91 233 2644320

info@sycon.co.in www.sycon.co.in

Quotation 3: Zenatix Solutions Pvt. Ltd.

zenatix

WE HELP YOU SAVE ENERGY

5th Floor, Investopad
Plot 18, Sector 32
Gurgaon - 122001 (Haryana)

To whosoever it may concern

Sub: Scope & Commercial Offer for EMS with 10-30 Energy Meters

Please see below the revised scope of work and corresponding commercial offer for our Smart Energy Optimization System (SEOS) solution.

Technical Specifications

Given below are the technical specifications of our energy monitoring and analytics solution.

1. The web dashboard provided by Zenatix (SEOS) will contain 5 screens - Trends, Power Dashboard, Energy Dashboard, Alerts and Reports
2. Ability to configure the alerts on any parameters from any meter e.g., get an email when the power consumption of a load goes to more than 5 KW
3. One click comparison of a day's consumption with up to 7 previous days or the up to 4 same days in previous weeks (e.g., comparison of Tuesday consumption' with previous 4 Tuesdays' consumption)
4. Simple comparison of load wise energy consumption for today with yesterday and this month with last month
5. Configurable reports as per the desired format
6. Automated calculation of peak demand, TOD slab wise and shift based energy consumption comparison
7. Data logger has the following features:
    a. Take input from up to 25 meters
    b. Send the collected data to Zenatix cloud platform using either Ethernet/GSM
    c. Ability to locally store data for more than 3 months to ensure there is no data loss even when the internet connectivity is down
8. Collect and store meter parameters every 30 seconds

Scope of Work

- Database set up and configuration of Zenatix software for real time monitoring of energy related data on the cloud server
- Set up of user accounts for personnel at RBEI
- Installation will be in the scope of the client

Requirements from Client

1. Internet access through Ethernet for transmitting data from our controllers to the our cloud server
2. UPS Power supply for Zenatix controllers.
3. Provision of remote access to the Zenatix team for software installation and troubleshooting (as and when required)

Registered Office: 356, Dr. Mukherjee Nagar, Delhi - 110009. M: +91 9958964442 Email:info@zenatix.com

Commercial Terms

Upfront Cost

S. No.	Item	Quantity	Pricing (Rs)	Remarks
1.	Smart Energy Optimization Software (SEOS)n	Up to 30 energy meters	75,000	This will only be configured on the cloud. Cloud charges are included.
2.	Ethernet/GSM DCU	1	20,000	Network connection in the scope of the client. For GSM based communication, additional Rs 5000 will be charged.
3.	Data Cable (Lapp Make) + Conduit	Per meter	170	This will be charged on actuals as used on site
4.	Energy Meters (Class 1.0 with RS485 interface of Schneider/Enersol/Trinity Make) - Equivalent of EM6436	1	4500	-
5.	Current Transformers (CTs) for different ratings	100/5, 200/5; 1000/5	Variable	100/5, 200/5 is priced @ Rs 400 per CT (as quoted) 1000/5 is priced at Rs 850 per CT
7	Panel boxes for installing meters at site	1	2000	Each panel will house one meter and will be required for installing meter at the load level (not in the panel)

Recurring Cost

Further, Zenatix will bill 20% of the upfront cost of software towards annual operating and maintenance cost. This annual fee will start from Year 2 i.e., 12 months after the installation of our solution and will be charged in advance in full for the entire year.

Terms and conditions

1. Taxes, as applicable, will be charged extra
2. The warranty of the installed hardware is for a period of 1 year from the date of installation.
3. Payment terms: 50% advance, 30% in delivery of material, Remaining within 7 days of installation
4. Zenatix will decide on the meter make (choose between Schneider, Enersol and Trinity) in mutual agreement with the client

Best regards,
Amarjeet Singh
Director
(For Zenatix Solutions Private Ltd.)

Registered Office: 356, Dr. Mukherjee Nagar, Delhi - 110009. M: +91 9958964442 Email:info@zenatix.com

Quotation 4: Shaildeep Enterprise

Shaildeep Enterprise

Plot No.1, Survey No.235, Nr.Galaxy Agrico, B/H, Hotel Pitrukrupa, Veraval (Shapar) Dist.Rajkot-360024,
Ph.:02827-252479, Cell: - 07201977277, 7201877277 E-mail: shaildeepent@gmail.com

To, M/S. VIVEK SHARMA Kind Attention :Mr. Vivek Sharma Contact: 09850366248 Email ID: vivek_honest@yahoo.co.in	Our Reference: SD/QTN/015/18-19 Date: 20-06-2018 Rev.: Enquiry Reference: E-mail Enquiry date:19-09-2018

Dear Sir,

This is with reference to your enquiry of electric motors; we are pleased to submit our offer as below

A. GENERAL TECHNICAL SPECIFICATIONS

☐ ABB make totally Enclosed Fan Cooled (TEFC) Squirrel Cage, Induction Motors, Continuously rated (S1) suitable for operation on 415 Volt ± 10% 3 phase, 50 Hz ± 5%, A.C. supply with Class F insulation for 50° C ambient temperature, IP55 and as per IS_325 and IS 12615:2011.

☐ IE2 motors. Standard test certificate is available with every motor. Motor Datasheet and GA Drawing attached.

☐ Offered Motors are suitable for Direct On Line starting. In case application calls for VFD. It is recommended to use VFD Duty Motors. Extra charges @5% on quoted prices for VFD Duty Motors.

☐ Offered Motors are suitable for Direct Coupling. In case your application calls for V belt and Pulley, It is recommended to use Roller bearing at NDE side. Roller bearing Charges Extra for160 TO 200 Frame INR 1500 225 to 250 Frames is INR 3000 per Motor.

B. PRICE SCHEDULE

ABB MAKE IE3 TEFC MOTOR SUITABLE DIRECT COUPLING									
Sr. No.	Qty	KW/HP	RPM	Mount	Type Of Starting	Frame Size	Unit Price	Total Amount	Delivery
1	1	75/100	1500	B3-FOOT	DOL	280SX	169492	169492/-	6-8 WEEK

Shaildeep Enterprise
Plot No.1, Survey No.235, Nr.Galaxy Agrico, B/H, Hotel Pitrukrupa, Veraval (Shapar) Dist.Rajkot-360024,
Ph.:02827-252479, Cell: - 07201977277, 7201877277 E-mail: shaildeepent@gmail.com

C. Terms and Conditions:

Testing Charge	:	Motors will be supplied with Routine Test Certificate. However any witness testing required. Same will be charged extra as per Manufacturers price list
Taxes / Surcharge	:	GST extra as applicable. Present Rate of GST will be 18%
Validity	:	15 Days from the date of our offer
Payment	:	100% Invoice prior to dispatch within 2 day
P&F / Insurance	:	NIL
Price	:	Ex Rajkot. Freight To pay
Warranty	:	Limited to a period of 12 months from the date of installation or 18 months from the date of dispatch, ex-works whichever is earlier.
Delivery		As mentioned in above price schedule

D. Our GST Details are as below

Company Name	:	Shaildeep Enterprise
GSTIN	:	24ACTFS1580L1ZJ

E. Bank Detail :

Bank Name	:	Central Bank Of India
Branch	:	Main Branch Rajkot
A/C No.	:	3468387369
A/C Type	:	CC
NEFT CODE	:	CBIN0280571

We hope it will be in line with your requirement, incase if you have any query please feel free to contact us.

Thanking you once again and assuring you of our best services at all times.

Truly Yours,

For, Shaildeep Enterprise

Dipen Devani

7600053277

Quotation 5: Aakash Powertech Pvt. Ltd.

aakash powertech pvt. ltd.
power channelling solutions

AAKASH POWERTECH PVT.LTD

hindustan ELECTRIC MOTORS

Express Zone, A- Wing, Unit No. 501-505, W E Highway, Malad (E), Mumbai -400097 Tel No:- 61441600 , Fax No:- 61441650
Email:- info@aakashpower.com

HINDUSTAN IE3 induction motors suitable for 415V±10%, 50Hz±5%, combined ±10%, 3 phase supply, foot mounted (B3 construction), ambient temperature 50°C, TEFC, Class 'F' insulation, IP55 protection, continuous rated (S1 duty) with bare shaft & key as per IS: 325 / IEC: 60034-1.

KW	HP	Frame	Type Designation	Price	KW	HP	Frame	Type Designation	Price
2 Pole, 3000 RPM					4 Pole, 1500 RPM				
0.37	0.5	71	IE3	5150	0.37	0.5	71	IE3	5440
0.55	0.75	71	IE3	6710	0.55	0.75	80	IE3	7120
0.75	1	80	IE3	6930	0.75	1	80	IE3	7230
1.1	1.5	80	IE3	7570	1.1	1.5	90S	IE3	8920
1.5	2	90S	IE3	8670	1.5	2	90L	IE3	10840
2.2	3	90L	IE3	11140	2.2	3	100L	IE3	12910
3.7	5	100L	IE3	14290	3.7	5	112M	IE3	16360
5.5	7.5	132S	IE3	22580	5.5	7.5	132S	IE3	22720
7.5	10	132S	IE3	23370	7.5	10	132M	IE3	26860
9.3	12.5	160M	IE3	37820	9.3	12.5	160M	IE3	43340
11	15	160M	IE3	40840	11	15	160M	IE3	43340
15	20	160M	IE3	47840	15	20	160L	IE3	52850
18.5	25	160L	IE3	61490	18.5	25	180M	IE3	67640
22	30	180M	IE3	68210	22	30	180L	IE3	74080
30	40	200L	IE3	101450	30	40	200L	IE3	102200
37	50	200L	IE3	123180	37	50	225SX	IE3	119520
45	60	225M	IE3	158520	45	60	225MX	IE3	144870
55	75	250M	IE3	213420	55	75	250MX	IE3	199100
75	100	280S	IE3	266540	75	100	280SX	IE3	242300
90	120	280M	IE3	307470	90	120	280MX	IE3	282250
110	150	315S	IE3	388360	110	150	315SX	IE3	341860
125	170	315M	IE3	443700	125	170	315MX	IE3	379190
132	180	315M	IE3	477310	132	180	315MX	IE3	400580
160	215	315L	IE3	522850	160	215	315LX	IE3	506660
180	240	315L	IE3	550430	180	240	315LX	IE3	547660
200	270	315L	IE3	610440	200	270	315LX	IE3	570530
225	300	355S	IE3	645970	225	300	355SX	IE3	704340
250	335	355M	IE3	683760	250	335	355MX	IE3	703880
275	370	355L	IE3	723880	275	370	355LX	IE3	761080
315	425	355L	IE3	741290	315	425	355LX	IE3	816900

aakash powertech pvt. ltd.
power channelling solutions

AAKASH POWERTECH PVT.LTD

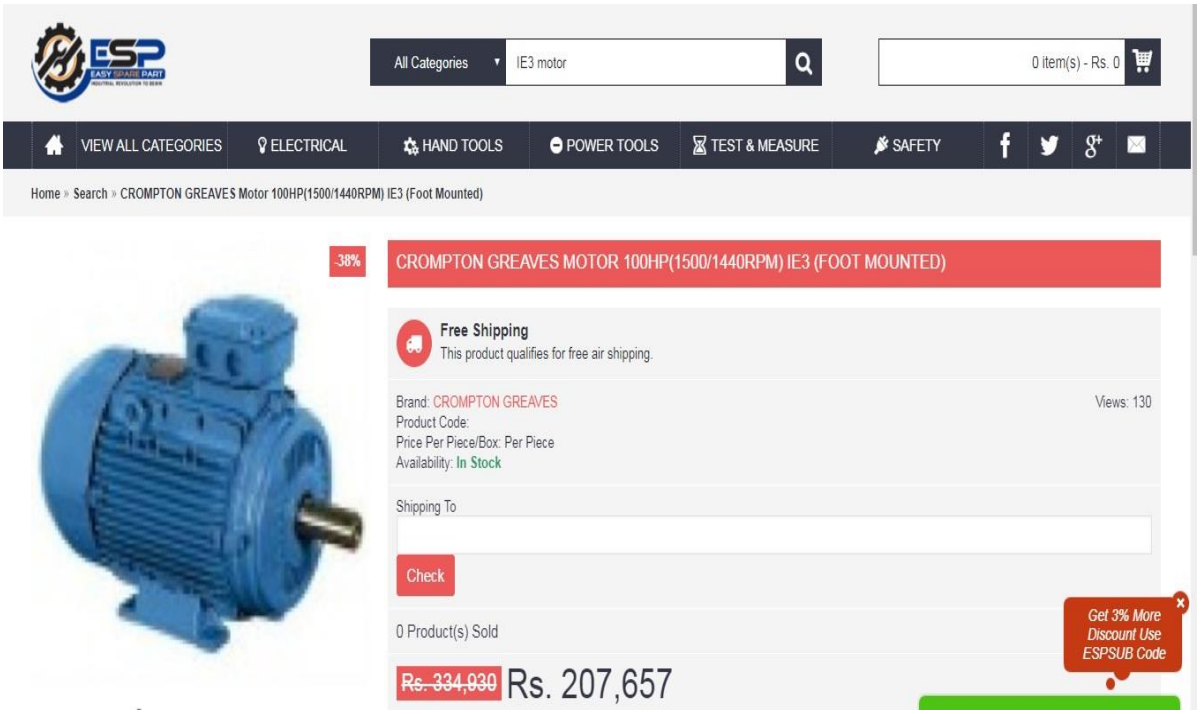
hindustan ELECTRIC MOTORS

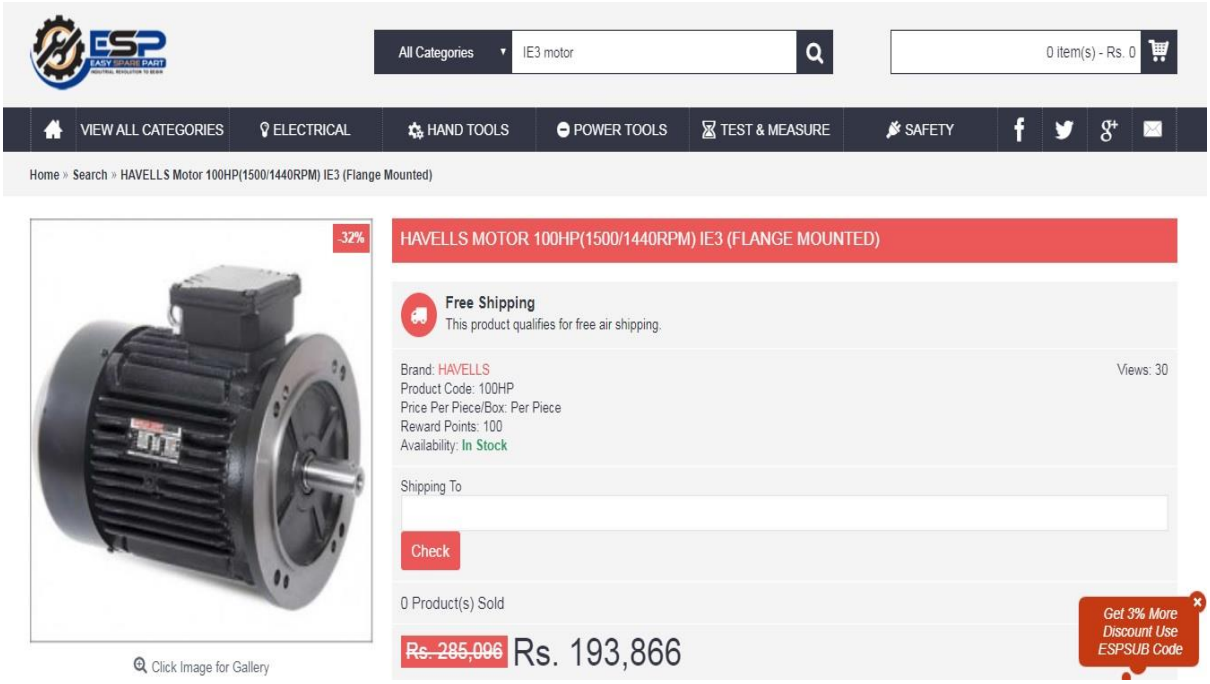
Express Zone, A- Wing, Unit No. 501-505, W E Highway, Malad (E), Mumbai -400097 Tel No:- 61441600 , Fax No:- 61441650
Email:- info@aakashpower.com

HINDUSTAN IE3 induction motors suitable for 415V±10%, 50Hz±5%, combined ±10%, 3 phase supply, foot mounted (B3 construction), ambient temperature 50°C, TEFC, Class 'F' insulation, IP55 protection, continuous rated (S1 duty) with bare shaft & key as per IS: 325 / IEC: 60034-1.

KW	HP	Frame	Type Designation	Price
6 Pole, 1000 RPM				
0.37	0.5	80	IE3	7560
0.55	0.75	80	IE3	7750
0.75	1	90S	IE3	8960
1.1	1.5	90L	IE3	9580
1.5	2	100L	IE3	14720
2.2	3	112M	IE3	15550
3.7	5	132S	IE3	22910
5.5	7.5	132M	IE3	28180
7.5	10	160M	IE3	42010
9.3	12.5	160L	IE3	46980
11	15	160L	IE3	51710
15	20	180L	IE3	67550
18.5	25	200L	IE3	96470
22	30	200L	IE3	96470
30	40	225MX	IE3	148440
37	50	250MX	IE3	199630
45	60	280SX	IE3	239120
55	75	280MX	IE3	274590
75	100	315SX	IE3	327750
90	120	315MX	IE3	410120
110	150	315MX	IE3	457320
125	170	315LX	IE3	506820
132	180	315LX	IE3	533860
160	215	315LX	IE3	555880
180	240	355MX	IE3	679090
200	270	355MX	IE3	679090
225	300	355LX	IE3	743430
250	335	355LX	IE3	743430

Quotation 6: easysparepart.com





Annexure 2: Instruments used

Instruments	Model/ Make	Application	Accuracy
Power analysers	Fluke: 435, Krykard ALM 10,	Electrical Parameters, Harmonics analysis	± 0.5%
Thermal imager	Testo: 875-2	Surface Temperature & Image	± 2%
Digital Temperature indicator	Comark: N1001, Testo: 925	Temperature	± 1%
Infrared thermometer	Testo: 845, Comark: KM848	Surface Temperature	±0.75% of mv
Anemometer	Testo: 425, Airflow: TA45	Air Velocity	±(0.03 m/s +5% of mv)