

# Detailed Project Report On High Alumina Grinding Media

Oswal Pottery Works  
Thangadh (Gujarat)

*Prepared for*  
Bureau of Energy Efficiency  
(13/GEF-UNIDO-BEE/LSP/14/4562)



## **©Bureau of Energy Efficiency, 2018**

This DPR has been originally prepared by TERI as a part of 'Capacity Building of LSPs' activity under the GEF-UNIDO-BEE project 'Promoting Energy Efficiency and Renewable Energy in selected MSME clusters in India'.

## **Suggested Format for Citation**

This document may be reproduced in whole or in part and in any form for educational and non-profit purposes without special permission, provided acknowledgement of the source is made. BEE and TERI would appreciate receiving a copy of any publication that uses this document as a source. A suggested format for citation may be as below:

GEF-UNIDO-BEE Project, Bureau of Energy Efficiency, 2018  
"Capacity Building of Local Service Providers"

## **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](mailto:gubpmu@beenet.in)

[pmc@teri.res.in](mailto:pmc@teri.res.in)

Website: [www.beeindia.gov.in](http://www.beeindia.gov.in)

[www.teriin.org](http://www.teriin.org)

## **Disclaimer**

This document is an output of an exercise undertaken by TERI under the GEF-UNIDO-BEE project's initiative for the benefit of MSME units and is primarily intended to assist the decision making by the management of the intended unit for the proposed technology. While every effort has been made to avoid any mistakes or omissions, GEF, UNIDO, BEE or TERI would not be in any way liable to any person or unit or other entity by reason of any mistake/omission in the document or any decision made upon relying on this document.

# Acknowledgement

---

The Energy and Resources Institute (TERI) places on record its sincere thanks to Global Environment Facility (GEF), United Nations Industrial Development Organization (UNIDO) and Bureau of Energy Efficiency (BEE) for giving opportunity to partner in this prestigious assignment on Capacity Building of Local Service Providers (LSPs) under the GEF-UNIDO-BEE project 'Promoting energy efficiency and renewable energy in selected MSME clusters in India'.

TERI is particularly grateful to Mr Milind Deore, Director, Bureau of Energy Efficiency, Mr Sanjay Shrestha, Industrial Development Officer, Industrial Energy Efficiency Unit, Energy and Climate Branch, UNIDO, Mr Suresh Kennit, National Project Coordinator, UNIDO, Mr Niranjana Rao Devela, National Technology Coordinator, UNIDO, Mr P. Vora Cluster Leader, Thangadh Foundry Cluster, UNIDO, Mr Kirit Bhai Prajapati, M/s Oswal Pottery Works and Panchal Ceramic Association Vikas Trust for their support and guidance during the project.

Last but not least, the interactions and deliberations with numerous foundry units, industry associations, technology providers and who were directly or indirectly involved throughout the study were exemplary and the whole exercise was thoroughly a rewarding experience for TERI.

The Energy and Resources Institute (TERI)  
New Delhi



# Table of contents

---

<b>ACKNOWLEDGEMENT</b> .....	<b>1</b>
List of tables .....	1
List of figures .....	1
<b>LIST OF ABBREVIATIONS</b> .....	<b>1</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>I</b>
Brief introduction of the MSME unit.....	i
Brief highlights of the past financial position of the MSME unit .....	i
Accepted/ recommended technology implementation .....	ii
Other benefits.....	ii
Cost of project & means of finance .....	ii
<b>1.0 DETAILS OF THE UNIT</b> .....	<b>1</b>
1.1 Particulars of unit.....	1
<b>2.0 ENERGY PROFILE</b> .....	<b>3</b>
2.1 Process flow diagram.....	3
2.2 Details of technology identified .....	3
2.3 Energy used and brief description of their usage pattern .....	4
2.4 Energy sources, availability & tariff details .....	4
2.5 Analysis of electricity consumption.....	4
2.6 Analysis of other energy forms/ fuels.....	5
<b>3.0 PROPOSED TECHNOLOGY FOR ENERGY EFFICIENCY</b> .....	<b>7</b>
3.1 Replacement of existing grinding media ( <i>natural pebbles</i> ) of ball mills with high alumina ball .	7
3.1.1 Background.....	7
3.1.2 Observations and analysis .....	7
3.1.3 Recommendation.....	8
3.2 Cost benefit analysis .....	8
3.3 Pre-training requirements .....	9
3.4 Process down time for implementation.....	9
3.5 Environmental benefits.....	9
3.5.1 CO <sub>2</sub> reduction.....	9
3.5.2 Reduction in other pollution parameters (gas, liquid and solid) .....	9
<b>4.0 PROJECT FINANCIALS</b> .....	<b>11</b>
4.1 Cost of project and means of finance .....	11
4.1.1 Particulars of machinery proposed for the project.....	11
4.1.2 Means of finance.....	11
4.2 Financial statement (project) .....	12
4.2.1 Assumptions.....	12

4.2.2 Payback .....	13
4.2.3 NPV and IRR .....	13
4.3 Marketing & selling arrangement.....	14
4.4 Risk analysis and mitigation .....	14
4.5 Sensitivity analysis.....	14
<b>5.0 CONCLUSIONS &amp; RECOMMENDATIONS.....</b>	<b>17</b>
5.1 List of energy conservation measures .....	17
5.2 Summary of the project .....	17
5.3 Recommendations.....	17
<b>6.0 FINANCING SCHEMES FOR EE INVESTMENTS FOR MSME SECTOR.....</b>	<b>19</b>
<b>Annexures.....</b>	<b>25</b>
<b>ANNEXURE 1: COPY OF CERTIFICATES FROM THE COMPETENT AUTHORITIES.....</b>	<b>27</b>
<b>ANNEXURE 2: BUDGETARY OFFERS/ QUOTATIONS .....</b>	<b>29</b>
Quotation - 1: Olive Merchandise .....	29
Quotation - 2: Face Impex Pvt. Ltd. ....	30
Quotation - 3: Supercon Engineers Air Systems .....	31
<b>ANNEXURE 3: INSTRUMENTS USED .....</b>	<b>33</b>

## List of tables

Table 1.1: Particulars of the unit.....	1
Table 2.2: Details of ball mill:.....	3
Table 2.3: Energy used and description of use.....	4
Table 2.4: Energy sources, availability and tariffs.....	4
Table 2.5: Electricity consumption profile.....	4
Table 2.6: Analysis of other energy/ fuel consumption.....	5
Table 3.2: Cost benefit analysis for recommended energy savings measures.....	8
Table 4.1.1: Particulars of machinery proposed for the project.....	11
Table 4.1.2: Means of finance .....	11
Table 4.2.1: Assumptions made .....	12
Table 4.2.2: Payback.....	13
Table 4.2.3a: NPV and IRR (100% equity) .....	13
Table 4.2.3b: NPV and IRR (D/E- 70:30) .....	13
Table 4.2.3c: NPV and IRR (D/E- 50:50).....	13
Table 4.3: Marketing & selling arrangements .....	14
Table 4.4: Risk analysis and mitigation .....	14
Table 4.5: Sensitivity analysis.....	15
Table 5.1: Summary of the energy conservation measures .....	17
Table 5.2: Summary of the project.....	17
Table 6.1: Major government schemes .....	19
Table 6.2: BEE's VCFEE and PRGFEE scheme.....	20
Table 6.3: IREDA's financing guidelines .....	21
Table 6.4: Major EE financing schemes/initiatives of SIDBI.....	22
Table 6.5: JBIC-SBI Green Line.....	23
Table 6.6: Canara bank scheme of EE SME loans.....	24

## List of figures

Figure 2.1: Process flow chart .....	3
Figure 2.5: Demand pattern and energy consumption profile .....	5
Figure 2.6: Percentage share of various fuel types in the unit .....	5
Figure 3.1.2a: Natural pebbles (existing grinding media).....	7
Figure 3.1.2b: High alumina balls.....	7
Figure 3.1.2c: Power consumption trend for ball mill.....	8





## List of abbreviations

---

BEE	:	Bureau of Energy Efficiency
CO <sub>2</sub>	:	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
HSD	:	High Speed Diesel
IGDPR	:	Investment Grade Detailed Project Report
IRR	:	Internal Rate of Return
kW	:	Kilo Watt
kWh	:	Kilo Watt Hour
LSPs	:	Local Service Providers
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
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
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 Oswal Pottery Works
Constitution	Partnership
MSME Classification	Small
No. of years in operation	34
Address: Registered Office:	Village Amarapar, P.O. Thangadh, District Surendranagar, Thangadh, Gujarat, 363530, India
Industry-sector	Sanitary ware (Ceramic)
Products manufactured	Manufacturer, exporter and supplier of designer wash basin, wash basin, ceramic wash basin, Indian toilet seats, urinal, antique wash basin, sanitary ware
Name(s) of the promoters/ directors	Mr. Kirit Bhai Prajapati
Existing banking arrangements along with the details of facilities availed	State Bank of India (CC)

### Brief highlights of the past financial position of the MSME unit

		(Rs lakh)
		FY 2018
S. No	Particulars	(Audited)
1	Total income	287
2	Net profit	43.7

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 266,526 kWh of electricity per year. The annual consumption of the HSD is 1,200 litres and NG is 428,048 kg. The total energy consumption of the unit during last 12 months is estimated to

be 406 toe which is equivalent to 140 lakh rupees. The total CO<sub>2</sub> emission during this period is estimated to be 971 tonnes. Electricity, HSD and NG were considered for CO<sub>2</sub> emission estimation.

The unit manufactures the designer wash basin, wash basin, ceramic wash basin, Indian toilet seats, urinal, antique wash basin, sanitary ware. The total annual production of the unit during 2017-18 is estimated to be about 37,000 pieces. The major source of energy is NG, consume in the kiln and electricity consume in utilities 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 <sup>1</sup> (Rs lakh)	Monetary savings (Rs lakh/ year)	Simple payback period (Years)	Emission reduction (tonnes of CO <sub>2</sub> )
Replacement of existing ball mill grinding media with high alumina (68%) media	11,000	1.17	0.84	1.40	9.0

## 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<sub>2</sub> 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	1.17	1.22	1.20
2	D/E Ratio	-	-	7:3	1:1
3	Project IRR	%	46.83	40.75	42.45
4	NPV	Rs. In Lakh	1.16	0.95	1.01
5	DSCR	-	-	3.19	4.43

<sup>1</sup> Investment includes grinding media cost of Rs. 0.54 lakh and lining & miscellaneous cost of Rs. 0.63 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 Oswal Pottery works	
2	Constitution	Partnership	
3	DIC Number	GJ2380001483	
4	PCB consent No.	PCB ID: 74763	
5	Date of incorporation / commencement of business	1984	
6	Name of the Contact Person	Mr. Kirit S Prajapati	
7	Mobile / Ph. No		
8	Email	oswalpotteryworks@yahoo.in	
9	Address: Registered Office	Village Amarapar, P.O. Thangadh, District Surendranagar, Thangadh, Gujarat, 363530, India	Owned
10	Factory	Village Amarapar, P.O. Thangadh, District Surendranagar, Thangadh, Gujarat, 363530, India	Owned
11	Industry / Sector	MSME/Manufacturing	
12	Products Manufactured	Manufacturer, exporter and supplier of designer wash basin, wash basin, ceramic wash basin, Indian toilet seats, urinal, antique wash basin, sanitary	
13	No of hours of operation/shift	8	
14	No of shifts/ day	3	
15	No of days/year	350	
16	Installed Capacity	500 MT per year	
17	Whether the unit is exporting its products (Yes/ No)	Yes	
18	Quality Certification, if any	ISO 9001 : 2015	



## 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.

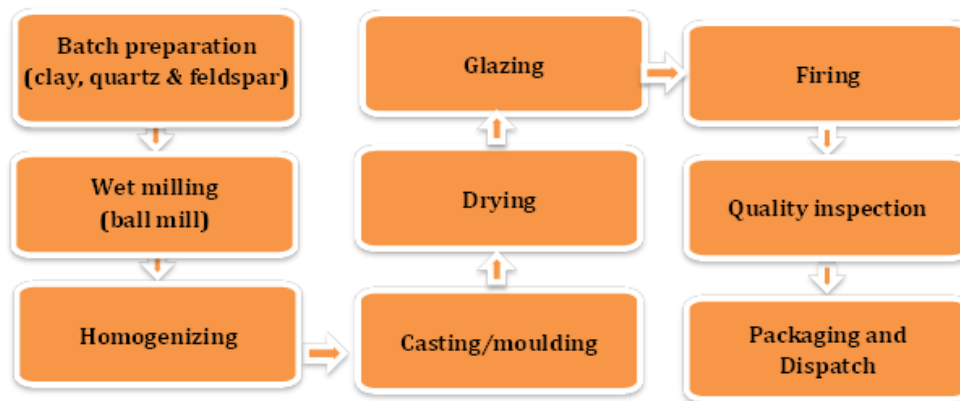


Figure 2.1: Process flow chart

### 2.2 Details of technology identified

The details of the ball mill installed in the unit are given in table 2.2.

Table 2.2: Details of ball mill:

Parameters/ Equipment ID	Value
Equipment	Ball mill
Number of ball mills	3
Rated capacity (tonnes)	2
Size of the mill	6 X 6
Type of grinding media	Natural babbles
Density of grinding media (kg/m <sup>3</sup> )	2.4
Rated capacity, kW	7.5
Water addition (kl per batch)	0.8
Purpose/ Application	Ball mill
Rated voltage, volt	440
Full load ampere, amp	12
Frequency, Hz	50
Mode of operation (batch/continuous)	Batch
Batch duration (Hours)	7
Nos of rewinding	0

## 2.3 Energy used and brief description of their usage pattern

The unit uses grid power supplied by Paschim Gujarat Vij Company Ltd under tariff category LTMD. 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	CNG	Kiln
3	HSD	For diesel generator (backup power during power cuts)

## 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

Particular	LTMD
Demand charges	<ul style="list-style-type: none"> <li>For first 40 kW of billing demand Rs. 98/kW/month</li> <li>Next 20 kW of billing demand Rs. 130/kW/month</li> <li>Above 60 kW of billing demand Rs. 195/kW/month</li> </ul>
Energy charges	Rs. 4.60/kWh
Reactive energy charges	Rs. 0.10/kVARh

## 2.5 Analysis of electricity consumption

**Table 2.5:** Electricity consumption profile

Month & Year	Total electricity consumption (kWh)	Sanctioned load/demand (kW)	Power factor	Recorded demand, kVA	Demand charges (Rs)	Energy charges (Rs)	Monthly bill (Rs)
Oct-17	24,088	90	0.83	104	15,810	110,804	186,251
Nov-17	21,447	90	0.83	92	12,430	99,728	166,814
Dec-17	18,180	90	0.84	98	14,170	114,715	143,081
Jan-18	25,127	90	0.86	77	9,515	115,584	186,338
<b>Average</b>	<b>22,211</b>	<b>90</b>	<b>0.84</b>	<b>93</b>	<b>12,981</b>	<b>110,208</b>	<b>170,621</b>
<b>Total</b>	<b>266,526</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>155,775</b>	<b>1,322,493</b>	<b>2,047,452</b>

Figure 2.5 presents contract demand, recorded maximum demand and the energy consumption of the unit.



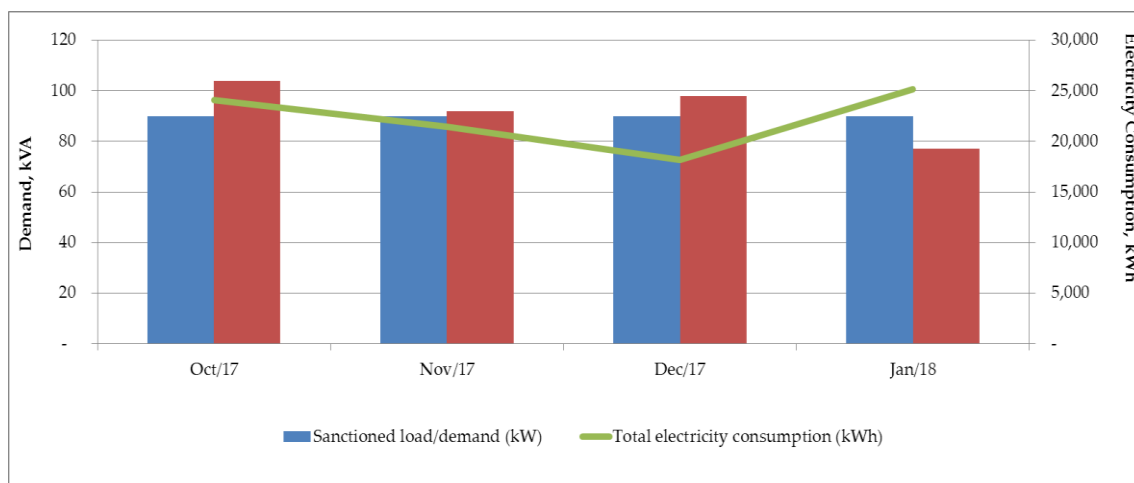


Figure 2.5: Demand pattern and energy consumption profile

## 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)	HSD (Liters)
Consumption unit/year	4,28,048	1,200
Calorific value per unit	8,935	9,202
Equivalent toe per year	382.5	1.1
Price (Rs per unit)	28.0	60.0
Total price per year	1,19,85,344	72,000

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

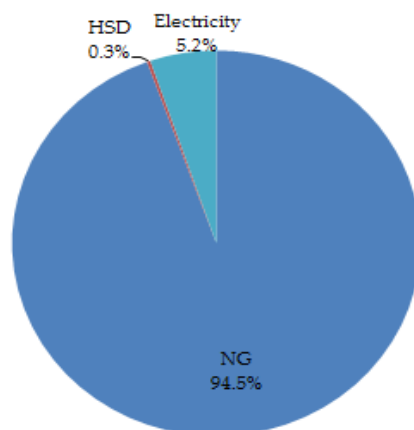


Figure 2.6: Percentage share of various fuel types in the unit

The plant is consuming about 266,526 kWh of electricity per year. The annual consumption of the HSD is 1,200 litres and NG is 428,048 kg. The total energy consumption of the unit during last 12 months is estimated to be 406 toe which is equivalent to 140 lakh rupees. The total CO<sub>2</sub> emission during this period is estimated to be 971 tonnes. Electricity, HSD and NG were considered for CO<sub>2</sub> 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 Replacement of existing grinding media (*natural pebbles*) of ball mills with high alumina ball

#### 3.1.1 Background

The Oswal Pottery Works is manufacturing sanitary ware such as designer ceramic wash basin, Indian as well as western toilet seats, urinal etc. To prepare the raw material for body casting, wet grinding technology has been used in which six ball mills of capacity of 2 tonnes each is installed in the plant. The operational parameters including the electricity consumption and material loaded were measured during the detailed assessment study.

The Oswal Pottery works is manufacturing designer ceramic wash basin, Indian as well as western toilet seats, urinal etc. There are 6 number of ball mills of 2 tonnes capacity installed in the plant. Each batch in the mill is having batch duration of 7 hours and per day two number of batches in three number of ball mills are taken place. The operational parameters including the electricity consumption and material loaded were measured during the detailed assessment study.

#### 3.1.2 Observations and analysis

The grinding media used in the ball mills are natural pebble of different sizes (figure 3.1.2a). The density of the natural pebble is  $2.4 \text{ kg/m}^3$ . The drawback of natural pebble is uneven shape and size. Due to uneven shape and size, the grinding time to achieve the desired residue is estimated to be 7-8 hours per batch. The specific power consumption of the grinding is estimated to be 27.5 kWh per tonne based on the total electricity consumption measured during the assessment study.

The material addition practices also discussed and found that approximate 2.2 tonne per year grinding media addition is required in the case of natural pebble, which is increasing the operational cost also.



**Figure 3.1.2a:** Natural pebbles (existing grinding media)



**Figure 3.1.2b:** High alumina balls

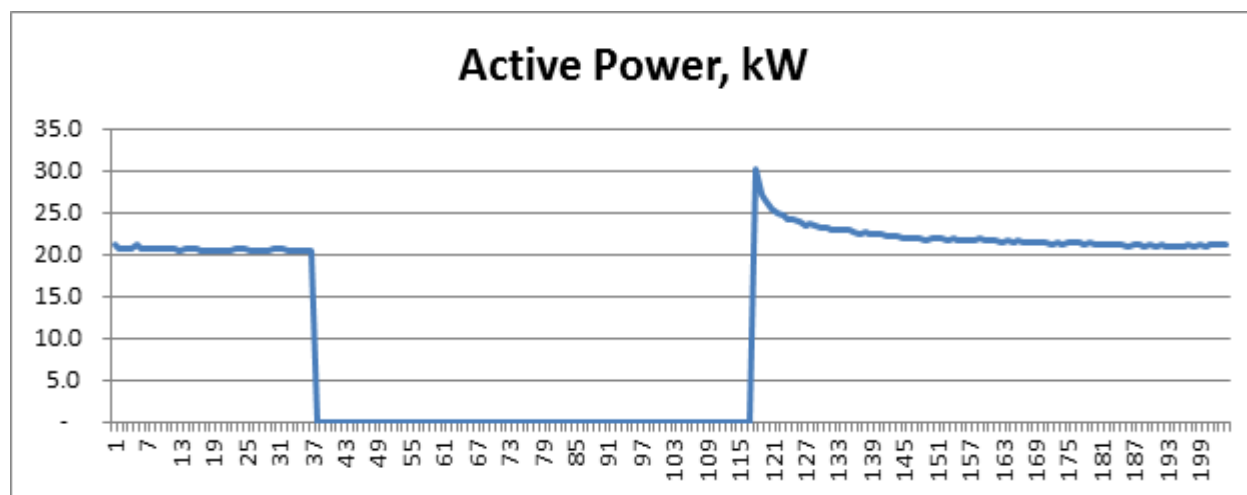


Figure 3.1.2c: Power consumption trend for ball mill

### 3.1.3 Recommendation

It is recommended to replace the existing natural grinding media with high alumina (68%) balls of desired sizes. The density of high alumina balls (68%) is about 3.2 kg/m<sup>3</sup> and shape is even in all sizes. As compared with natural pebble grinding media, the alumina grinding ball has better performance in wear resistance, uniform size, high density and high mechanical strength. The high density and ultra-hardness of the alumina grinding ball enable the increase of ball mill loading. The alumina grinding ball is compact and uniform in shape, the collide probability increased and grinding efficient increased. The alumina grinding ball can assure less contamination to the raw material and keep them chemical composition stabilized.

The specific power consumption of the ball mill with high alumina grinding media is estimated to be 19.6 kWh per tonne based on the discussion with suppliers. The grinding media consumption rate for the high alumina balls (68%) will be about 1 tonne per year per ball mill which will further reduce the operational cost.

## 3.2 Cost benefit analysis

The estimated saving in annual operation cost by replacement of existing grinding media is Rs. 0.84 lakhs for three operating ball mills. The investment requirement is Rs 1.17 lakh with a simple payback period of 1.4 years. The detailed calculations of the recommended energy conservation measures for DPR are provided in table 3.2

Table 3.2: Cost benefit analysis for recommended energy savings measures

Grinding Media	Unit	Natural (river stone)	Alumina (68%)
Weight of grinding media	tonne	2	2
Density	kg/m <sup>3</sup>	2.4	3.2
Body preparation material	tonne	2	2
Water addition	kL	0.8	0.8
Average running hours	hours/bat ch	7	5
Nos of batch per day	nos	2	2
Number of operating days	days/year	350	350
Average power input	kW	7.9	7.9

Grinding Media	Unit	Natural (river stone)	Alumina (68%)
Average unit consumption	kWh/batch	55.0	39.3
Cost of electricity	Rs./kWh	7.98	7.98
Operating cost of electricity	Rs./year	3,07,226	2,19,447
Annual addition of grinding media	tonne	2.2	0.96
Cost of grinding media	Rs./tonne	10,000	27,000
Cost of addition of grinding media		22,000	25,920
Total operating cost	Rs./Year	3,29,226	2,45,367
Life of lining	Years	2.5	2.5
Cost of lining	Rs	1,12,000	1,12,000
Total operating cost	Rs./life cycle	5,53,226	4,69,367
Saving			83,859
Investment			1,17,333
Simple payback period			1.40

### 3.3 Pre-training requirements

No training required.

### 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<sub>2</sub> reduction<sup>2</sup>

Implementation of the selected energy conservation measures in the unit may result in reduction in CO<sub>2</sub> emissions due to reduction in overall energy consumption. The estimated reduction in GHG emission by implementation of the recommended energy conservation measures is 9 tonnes of CO<sub>2</sub> 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.

<sup>2</sup> Source for emission factor: 2006 IPCC Guidelines for National Greenhouse Gas Inventories & electricity: CO<sub>2</sub> 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	Al <sub>2</sub> O <sub>3</sub> percentage 68% SiO <sub>2</sub> + Fe <sub>2</sub> O <sub>3</sub> + CaO + others = 32% Water Absorption: = 0.02% Bulk Density (g/cm <sup>3</sup> ) = 3.00 Self-Wear Rate (24h) = 0.03%	Olive Merchandise Vaibhav Plaza, GF-19 Lakhdhirpur Road Morbi - 363642 Gujarat, India Mr. Kashyap Koringa (08048582415)	-	-
2	Al <sub>2</sub> O <sub>3</sub> percentage 68% SiO <sub>2</sub> + Fe <sub>2</sub> O <sub>3</sub> + CaO + others = 32% Water Absorption: = 0.02% Bulk Density (g/cm <sup>3</sup> ) = 3.00 Self-Wear Rate (24h) = 0.03%	Face Impex Private Limited No. 58/88, Shakti Chamber, 8A, National Highway Old Morbi Morbi - 363641 Gujarat, India Mr. Nitin Bopaliya (09714009174)	-	-
3	Al <sub>2</sub> O <sub>3</sub> percentage 68% SiO <sub>2</sub> + Fe <sub>2</sub> O <sub>3</sub> + CaO + others = 32% Water Absorption: = 0.02% Bulk Density (g/cm <sup>3</sup> ) = 3.00 Self-Wear Rate (24h) = 0.03%	Supercon Engineers Air Systems No. 293/4, Govindpuri, Kalkaji Govindpuri New Delhi - 110019 Delhi, India Mr. Harish Chauhan (08048077658)	-	-

#### 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	1.17	0.35	0.59
2	Internal Accruals	-	-	-
3	Interest free unsecured loans	-	-	-
4	Term loan proposed (Banks/FIs)	-	0.82	0.59
5	Others	-	-	-
	<b>Total</b>	<b>1.17</b>	<b>1.17</b>	<b>1.17</b>

## 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
<b>General about unit</b>				
No of working days	Days		350	
No of shifts per day	Shifts		3	
Annual operating hours	Hrs/year		8,400	
Installed production capacity	tonnes/year		500	
Production in last financial years	tonnes/year		370	
Capacity utilization factor	%		74%	
<b>Proposed investment (Project)</b>				
Total cost of the project	Rs. (in Lakh)	1.17	1.17	1.17
Investment without interest defer credit (IDC)	Rs. (in Lakh)	1.17	1.17	1.17
Implementation time	Months	6.00	6.00	6.00
Interest during the implementation phase	Rs. in lakhs	-	0.04	0.03
Total investment	Rs. in lakhs	1.17	1.22	1.20
<b>Financing pattern</b>				
Own funds	Rs. in lakhs	1.17	0.40	0.62
Loan funds (term loan)	Rs. in lakhs	-	0.82	0.59
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
<b>Estimation of costs</b>				
Operation & maintenance costs	%		5.0	
Annual escalation rate of O&M	%		5.0	
<b>Estimation of revenue</b>				
Reduction in energy cost	Rs. (in lakh)/year		0.84	
Total saving	(Rs Lakh/year)		0.84	
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)	1.17	1.22	1.20
Cash flow as annual saving (Rs. In lakh/year)	0.84	0.84	0.84
O&M Expenses for first year (Rs. In lakh/year)	0.06	0.06	0.06
Net Cash flow (Rs. In lakh/year)	0.78	0.78	0.78
SPP (months)	18.05	18.77	18.56
Considered (month)	18.10	18.80	18.60

## 4.2.3 NPV and IRR

The NPV and IRR calculations are shown in table 4.2.3.

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

Particulars/ years	0	1	2	3	4	5
	(Rs. in lakhs)					
Profit after tax	-	0.59	0.44	0.33	0.32	0.32
Depreciation	-	0.19	0.19	0.19	0.19	0.19
Cash outflow	1.17	-	-	-	-	-
Net cash flow	-1.17	0.78	0.63	0.52	0.51	0.51
Discount rate % @ WACC	9.25	9.25	9.25	9.25	9.25	9.25
Discount factor	1.00	0.92	0.84	0.77	0.70	0.64
Present value	-1.17	0.71	0.53	0.40	0.36	0.33
<b>Net present value</b>	<b>1.16</b>					
<b>Simple IRR considering regular cash flow</b>	<b>46.83%</b>					

**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	-	0.54	0.41	0.29	0.29	0.29
Depreciation	-	0.20	0.20	0.20	0.20	0.20
Cash outflow	1.22	-	-	-	-	-
Net cash flow	-1.22	0.74	0.61	0.48	0.48	0.49
Discount rate % @ WACC	10.09	10.09	10.09	10.09	10.09	10.09
Discount factor	1.00	0.91	0.83	0.75	0.68	0.62
Present value	-1.22	0.67	0.50	0.36	0.33	0.30
<b>Net present value</b>	<b>0.95</b>					
<b>Simple IRR considering regular cash flow</b>	<b>40.75%</b>					

**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	-	0.55	0.42	0.30	0.30	0.30
Depreciation	-	0.20	0.20	0.20	0.20	0.20
Cash outflow	1.20	-	-	-	-	-

Particulars / years	0	1	2	3	4	5
Net cash flow	-1.20	0.75	0.62	0.50	0.49	0.50
Discount rate % @ WACC	9.86	9.86	9.86	9.86	9.86	9.86
Discount factor	1.00	0.91	0.83	0.75	0.69	0.62
Present value	-1.20	0.68	0.51	0.37	0.34	0.31
<b>Net present value</b>	<b>1.01</b>					
<b>Simple IRR considering regular cash flow</b>	<b>42.45%</b>					

### 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
Main Markets (locations)	Pan India
Locational advantages	-
Indicate competitors	Other units
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	16.30	1.37	53.28	-	24.91
		70:30	16.90	1.16	47.05	3.48	34.30
		50:50	16.80	1.22	48.79	4.83	30.78
2	10% reduction in estimated savings	100% equity	20.20	0.94	40.29	-	21.40
		70:30	21.00	0.74	34.34	2.90	30.84
		50:50	20.80	0.80	36.00	4.02	27.12
3	10% rise in interest rates	70:30	18.80	0.90	40.14	3.12	32.55
		50:50	18.60	0.97	42.01	4.33	28.98
4	10% reduction in interest rates	70:30	18.70	1.00	41.36	3.26	32.96
		50:50	18.50	1.05	42.90	4.53	29.25



## 5.0 Conclusions & recommendations

The IGDP prepared for the replacement of existing grinding media by high alumina grinding media based on the performance assessment study conducted at unit and the acceptance of the unit management. The brief of selected energy conservation measures 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 Electricity (kWh)	Investment (Rs lakh)	Monetary savings (Rs lakh/ year)	Simple payback period (Years)	Emission reduction (tonnes of CO <sub>2</sub> )
Replacement of existing ball mill grinding media with high alumina (68%) media	11,000	1.17	0.84	1.40	9.0

These measures have an estimated investment of 1.17 lakh rupees and can yield a savings of 0.84 lakh rupees per year. The total annual reduction in emission by implementation of recommended measures is estimated to be 9 tonnes of CO<sub>2</sub>. 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	1.17	1.22	1.20
2	D/E Ratio	-	-	7:3	1:1
3	Project IRR	%	46.83	40.75	42.45
4	NPV	Rs. In Lakh	1.16	0.95	1.01
5	DSCR	-	-	3.19	4.43

### 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	<p>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.</p>
Credit Linked Capital Subsidy Scheme (CLCSS) (2000-ongoing)	<p>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</p>
Credit Guarantee Fund Scheme for Micro and small Enterprises (in partnership with SIDBI) (2000-ongoing)	<p>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.</p>
Technology and Quality Up gradation Support to MSMEs (TEQUP) (2010-ongoing)	<p>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.</p>
Technology Upgradation Fund Scheme (TUFS) (1999-ongoing)	<p>Interest subsidy and /or capital subsidy for Textile and Jute Industry only.</p> <ol style="list-style-type: none"> <li>To facilitate Technology Up gradation of Small Scale (SSE) units in the textile and jute industries. Key features being:           <ul style="list-style-type: none"> <li>Promoter's margin -15%;</li> <li>Subsidy - 15% available on investment in TUF compatible machinery subject to ceiling of Rs 45 lakh;</li> <li>Loan amount - 70% of the cost of the machinery by way of Term Loan</li> </ul> </li> </ol>

Name of the scheme	Brief Description and key benefits
	<ul style="list-style-type: none"> <li>• Interest rate: Reimbursement of 5% on the interest charged by the lending agency on a project of technology upgradation in conformity with the Scheme</li> <li>• Cover under Credit Guarantee Fund Scheme for Micro and Small Enterprises (CGMSE) available</li> </ul> <p>2. To enable technology upgradation in micro and small power looms to improve their productivity, quality of products and/ or environmental conditions</p> <ul style="list-style-type: none"> <li>• 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.</li> </ul>
Tax incentives	<ul style="list-style-type: none"> <li>• Accelerated depreciation is provided to the customers / users of the energy saving or renewable energy devises under the direct tax laws.</li> <li>• Under indirect taxes, specific concessional rates of duty are only available to CFLs and not to all energy efficient products</li> <li>• 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.</li> </ul>

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)	<ul style="list-style-type: none"> <li>• This fund is to provide equity capital for energy efficiency projects in Government buildings and Municipalities in the first phase.</li> <li>• A single investment by the fund shall not exceed Rs 2 crore</li> <li>• 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</li> </ul>
Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE)	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Guarantees a maximum 50% of the loan (only principal). In case of default, the fund will:               <ul style="list-style-type: none"> <li>○ Cover the first loss subject to maximum of 10% of the total guaranteed amount</li> <li>○ Cover the remaining default (outstanding principal) amount on</li> </ul> </li> </ul>



Venture Capital for Energy Efficiency (VCFEE)	<ul style="list-style-type: none"> <li>This fund is to provide equity capital for energy efficiency projects in Government buildings and Municipalities in the first phase.</li> <li>A single investment by the fund shall not exceed Rs 2 crore</li> <li>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</li> </ul>
	<p>partial basis upto the maximum guaranteed amount</p> <ul style="list-style-type: none"> <li>PFI shall take guarantee from the PRGFEE before disbursement of loan to the borrower.</li> <li>The Guarantee will not exceed Rs 300 lakh per project or 50% of loan amount, whichever is less.</li> <li>Maximum tenure of the guarantee will be 5 years from the date of issue of the guarantee</li> </ul>

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	<ul style="list-style-type: none"> <li>Rs. 50 lakh</li> </ul>
Type of projects considered for term loans	<ul style="list-style-type: none"> <li>Replacement / retrofit of selected equipment with energy efficient equipment</li> <li>Modification of entire manufacturing processing</li> <li>Recovery of waste heat for power generation</li> </ul>
Incentive available	<ul style="list-style-type: none"> <li>Rebate in central excise duty</li> <li>Rebate in interest rate on term loan</li> <li>Rebate in prompt payment of loan instalment</li> </ul>
Interest rate	<ul style="list-style-type: none"> <li>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</li> <li>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.</li> <li>Rebate of 0.5% in interest rates are available for projects set up in North Eastern States, Sikkim, J&amp;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.</li> </ul>
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	<p>Support for technical /advisory services such as:</p> <ul style="list-style-type: none"> <li>• Detailed Energy Audit</li> <li>• Support for implementation</li> <li>• Measurement &amp; Verification</li> </ul> <p>Financing terms:</p> <ul style="list-style-type: none"> <li>• Terms loans upto 90%</li> <li>• Interest rate upto 3% below normal lending rate.</li> </ul>
TIFAC-SIDBI Revolving Fund for Technology Innovation (Srijan Scheme)	<p>To support SMEs for up-scaling and commercialization of innovative technology based project at flexible terms and interest rate.</p> <p>Preference accorded to sustainable technologies / products. Soft term loan with an interest of not more than 5%.</p>
Partial Risk Sharing Facility for Energy Efficiency (PRSF) Project (supported by World Bank)	<p>Sectors covered:</p> <ul style="list-style-type: none"> <li>• Large industries (excluding thermal power plants)</li> <li>• SMEs</li> <li>• Municipalities (including street lighting)</li> <li>• Buildings</li> </ul> <p>Coverage:</p> <ul style="list-style-type: none"> <li>• The minimum loan amount Rs 10 lakh and maximum loan amount of Rs 15 crore per project.</li> <li>• The extent of guarantee is 75% of the loan amount</li> </ul>
JICA-SIDBI Financing Scheme	<ul style="list-style-type: none"> <li>• 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.</li> </ul>

	<ul style="list-style-type: none"> <li>• Project uses an Energy Saving Equipment List approach</li> <li>• Equipment/machinery with energy saving potential less than 10% is not eligible.</li> <li>• Interest rate: As per credit rating and 1% below the normal lending rate</li> <li>• 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</li> </ul>
KfW-SIDBI Financing Scheme	<p>Coverage</p> <ul style="list-style-type: none"> <li>a) SMEs for energy efficiency projects</li> <li>b) SMEs and clusters for cleaner production and emission reduction measures, waste management and Common Effluent Treatment Plant (CETP) facilities</li> </ul> <p>Interest rate</p> <p>As per credit rating and 1% below the normal lending rate</p> <p>Eligible criteria</p> <p>3 t CO<sub>2</sub> emission reduction per year per lakh invested</p> <p>List of eligible equipment/technology and potential suppliers developed for guidance</p>

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

<p><b><u>Key Features</u></b></p> <ul style="list-style-type: none"> <li>• Amount : USD 90 million</li> <li>• Repayment Schedule: First repayment on May 30, 2017 and final repayment date May 30, 2025 (equal instalment)</li> </ul> <p><b><u>Eligibility Criteria</u></b></p> <ul style="list-style-type: none"> <li>• Projects contributing to preservation of global environment, i.e. significant reduction of GHG emissions</li> <li>• 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.</li> <li>• Procurement in line with the “Guidelines for Procurement under Untied Loans by Japan Bank for International Cooperation”</li> </ul>
--

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

<b>Purpose</b>	<b>For acquiring/adopting energy conservation/savings equipment/ measures by SMEs</b>
<b>Eligibility</b>	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
<b>Maximum loan</b>	Maximum Rs 100 lakhs in the form of term loan
<b>Security</b>	Prime: Assets created out of loan Collateral: Upto Rs.5 lakhs - NIL Above Rs.5 lakhs, as determined by the bank
<b>Repayment</b>	Maximum 5-7 years including moratorium of 6 months
<b>Guarantee cover</b>	Cover available under CGMSE of CGTMSE available for eligible loans
<b>Margin</b>	10% of the project cost
<b>Rate of interest</b>	1% less than the applicable rate
<b>Upfront fee</b>	1% of the loan
<b>Insurance cover</b>	Assets acquired and charged as security to Bank to be insured
<b>Special offer, if any</b>	<b>Grants :</b> 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: Copy of certificates from the competent authorities



**GPCB**

**GUJARAT POLLUTION CONTROL BOARD**  
**PARYAVARAN BHAVAN**  
 Sector-10-A, Gandhinagar-382 010  
 Phone : (079) 23226295  
 Fax : (079) 23232156  
 Website : www.gpcb.gov.in

**BY RPAD**

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution) Act-1981 and Authorization under rule 3(c) & 5(5) of the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 framed under the E (P) Act-1986.

And whereas Board has received consolidated application Inward ID No.64358, dated 18/01/2013 for the consolidated consent and authorization (CC&A) of this Board under the provisions / rules of the aforesaid acts, Consent & Authorization is hereby granted as under.

**CONSENTS AND AUTHORISATION:**  
(Under the provisions /rules of the aforesaid environmental acts)

**TO,**  
**M/S. OSWAL POTTERY WORK,**  
**PLOT NO.SR NO-22, SARVODAY SOCIETY,**  
**AMARAPAR THAN-363530,**  
**TA- CHOTILA,**  
**DIST-SURENDRANAGAR**

- Consent Order No.: AWH -74763 date of Issue: 15/12/2015
- The consents shall be valid up to **14/12/2020** for operation of industrial plant for manufacture of the following items/products:
 

Sr. No.	Product	Total
1	Ceramic Sanitary Wares	500MT/M or 50,000 nos./M

Specific Condition: 1) You shall provide flow meters on raw water source and ETP/reuse line.  
 2) You shall maintain ZLD.
- CONDITIONS UNDER THE WATER ACT:**
  - There shall be no discharge of the industrial effluent from the manufacturing process and other ancillary industrial operations.
  - The quantity of sewage wastewater from the factory shall not exceed **550 Lit/day**
  - The quantity of the industrial effluent generated from the manufacturing process and other ancillary operation shall not exceed **300 Lit/day** and it shall be completely reuse/recycled back into the process.
  - The effluent treatment plant consisting of the following units shall be installed.
    - Collection tank
    - Primary settling tank
    - Sludge drying bed
  - Industry shall provide flow meter with fix pipeline system for reuse of treated effluent & also maintain record pertaining to use of water, reuse of treated effluent & made available for inspection.
  - Sewage wastewater shall be disposed off through septic tank / soak pit system.
- CONDITIONS UNDER THE AIR ACT:**
  - The following shall be used as fuel in tunnel kiln.
 


Sr. No.	Fuel	Quantity
1	NG	12,00 SCM/DAY
2	Diesel	30 Lit/Hrs

The applicant shall install & operate air pollution control system in order to achieve norms prescribed below.

  - The flue gas emission through stack attached to shuttle kiln & D. G. Set shall conform to the following standards:

1 of 3

**Clean Gujarat Green Gujarat**  
 ISO - 9001 - 2008 & ISO - 14001 - 2004 Certified Organisation

**GUJARAT POLLUTION CONTROL BOARD**  
PARYAVARAN BHAVAN  
Sector-10-A, Gandhinagar-382 010  
Phone : (079) 23226295  
Fax : (079) 23232156  
Website : www.gpcb.gov.in

**B**

e) It is the duty of the authorised person to take prior permission of the Gujarat Pollution Control Board to close down the facility.

f) An application for the renewal of an authorisation shall be made as laid down in rule 5 (6) (ii).

g) Industry shall submit annual report within 15 days and subsequently by 30<sup>th</sup> June of every year.

**6. GENERAL CONDITIONS:-**

6.1 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.

6.2 Applicant shall also comply with the general conditions given in annexure I.

6.3 The waste generator shall be totally responsible for (I.E. Collection, storage, transportation and ultimate disposal) of the wastes generated.

6.4 Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form – 4 by 30<sup>th</sup> June of every year.

6.5 In case of any accident, details of the same shall be submitted in Form – 5 to Gujarat Pollution Control Board.

6.6 As per "Public liability Insurance Act – 91" company shall get Insurance policy, if applicable.

6.7 Empty drums and containers of toxic and hazards material shall be treated as per guideline published for "management & handling of discarded containers". Records of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.

6.8 In no case any kind of hazardous waste shall be imported without prior approval of appropriate authority.

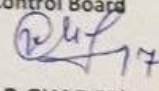
6.9 In case of transport of hazardous waste to a facility for (I.E. Treatment, Storage and disposal) existing in a state other than the state where hazardous waste are generated, the occupier shall obtain "No Objection certificate" from the state pollution Control Board, the Committee of the concerned state or Union territory Administration where the facility exists.

6.10 Unit shall take all concrete measures to show tangible results in waste generation reduction, avoidance, reuse and recycle. Action taken in this regards shall be submitted within three months and also along with Form – 4.

6.11 Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon Supreme Court's order in W.P. No.657 of 1995 dated 14th October 2003.

6.12 Industry shall have to display on-line data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including wastewater and air emissions and solid hazardous waste generated within the factory premises.

6.13 The applicant shall provide proper collection system for storage of solid waste generated from plant and Effluent treatment plant & disposed of the same in environmentally mentally sound manner.

For and on behalf of  
Gujarat Pollution Control Board  
  
(V. R. GHADGE)  
Senior Environmental Engineer

NO: GPCB/ CCA/SN-168/ ID 25888/ 345691 / 18.02.2016  
ISSUED TO:  
M/S. OSWAL POTTERY WORK,  
PLOT NO.SR NO-22, SARVODAY SOCIETY,  
AMARAPAR THAN-363530,  
TA- CHOTILA,  
DIST-SURENDRANAGAR

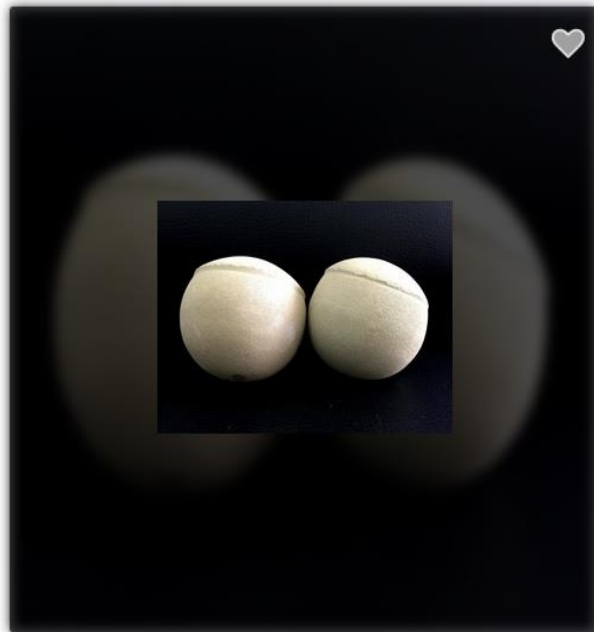
Copy to:-  
1. The Regional Officer, G.P.C.Board, Surendranagar -With a request to carry out and inspection under the provisions of e Water Act 1974, Air Act, 1981& EP Act 1986.  
1. MPR copy

Page 3 of 3



# Annexure 2: Budgetary offers / quotations

## Quotation - 1: Olive Merchandise



### Medium Alumina Grinding Ball

Color: White  
Rs 25/Kilogram



**Olive Merchandise**   
Lakhdirpur Road, Morbi, Gujarat  
Send to my mobile

 **Call this Supplier**  
**08048582415**

Nature of Business: Importer  
Delivery Location: Deals In India As Well As Global

**Contact Supplier**  
Have a question?


**Get Latest Price**  
Request a quote

#### Product details:

Color White

Minimum Order Quantity 5000 Kilogram

## Quotation – 2: Face Impex Pvt. Ltd.



Alumina Ceramic Balls

Physical State: solid  
Grade Standard: Reagent Grade, Technical Grade  
**Rs 25/Kilogram**

**Face Impex Private Limited**  
Old Morbi, Morbi, Gujarat  
Send to my mobile  
**Call this Supplier**  
**09714009174**

Response Rate: 71%  
Nature of Business: Importer  
Delivery Location: Deals In India As Well As Global

**Contact Supplier**  
Have a question?

**Get Latest Price**  
Request a quote

## Quotation – 3: Supercon Engineers Air Systems



### Alumina Ceramic Balls

Material: Alumina Ceramic  
Moh's Hardness: More than 9  
**Rs 55/kilogram**



#### Supercon Engineers Air Systems

Govindpuri, New Delhi, Delhi  
Send to my mobile

[Call this Supplier](#)  
**08048077658**

Response Rate: 97%  
Nature of Business: Manufacturer  
Delivery Location: All Over India

[Contact Supplier](#)

Have a question?

[Get Latest Price](#)

Request a quote

#### Product details:

Material	Alumina Ceramic
Moh's Hardness	More than 9



## Annexure 3: Instruments used

---

Instruments	Model/ Make	Application	Accuracy
Power analysers	Fluke: 435, Fluke: 43B,	Electrical Parameters Harmonics analysis, power logging	$\pm 0.5\%$
Thermal imager	875-2/Testo	Surface Temperature & Image	$\pm 2\%$
Infrared thermometer	Testo: 845,	Surface Temperature	$\pm 0.75\%$ of mv