

# Detailed Project Report On VFD on press machine

Uday Industries

Morbi (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 Niranjana Rao Devela, National Technology Coordinator, UNIDO, Mr Vijay Mishra, Cluster Leader, Morbi Ceramic Cluster, UNIDO, Mr Ganesh Bhai Patel, M/s Uday Industries and Morbi Ceramics Associations for their support and guidance during the project.

Last but not least, the interactions and deliberations with numerous ceramic 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>  |
| <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 .....          | 3         |
| 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 Retrofit the VFD on Hydraulic Press for ceramic tile pressing .....     | 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 .....   | 8         |
| 3.4 Process down time for implementation.....                               | 8         |
| 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) .....                                     | 11        |
| 4.2.1 Assumptions.....  | 11        |
| 4.2.2 Payback .....   | 12        |
| 4.2.3 NPV and IRR .....   | 12        |
| 4.3 Marketing & selling arrangement.....                                    | 13        |
| 4.4 Risk analysis and mitigation .....                                      | 14        |
| 4.5 Sensitivity analysis.....   | 14        |

|  |   |           |
|--|---|-----------|
| <b>5.0</b>   | <b>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</b>   | <b>Financing schemes for EE investments for MSME sector .....</b> | <b>19</b> |
| <b>Annexures.....</b>                                  |   | <b>25</b> |
| <b>Annexure 1: Budgetary offers / quotations .....</b> |   | <b>27</b> |
|  | Quotation - 1: A Square Solutions.....                            | 27        |
|  | Quotation - 2: Vashi Electricals Pvt. Ltd. ....                   | 28        |
| <b>Annexure 2: Instruments used .....</b>              |   | <b>31</b> |

## List of tables

|   |    |
|---|----|
| Table 1.1: Particulars of the unit.....                                     | 1  |
| Table 2.2: Details of press machine.....                                    | 3  |
| Table 2.3: Energy used and description of use.....                          | 3  |
| 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 3.1.1: Details of press machine.....                                  | 7  |
| Table 3.2a: Performance analysis of the existing compressed air system..... | 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.....  | 11 |
| Table 4.2.2: Payback.....   | 12 |
| Table 4.2.3a: NPV and IRR (100% equity).....                                | 12 |
| 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.....                            | 13 |
| Table 4.4: Risk analysis and mitigation.....                                | 14 |
| Table 4.5: Sensitivity analysis.....  | 14 |
| 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.....      | 4 |
| Figure 2.6: Percentage share of various fuel types in the unit..... | 5 |
| Figure 3.1.2: Power consumption pattern of press machine.....       | 7 |





## 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                                  |
| 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 Uday Industries  |
| Constitution   | Partnership  |
| MSME Classification  | Medium   |
| No. of years in operation  | 17   |
| Address: Registered Office:  | 8 - A, National Highway, Lalpar Power Station, P. B. No. 306 (PPW), Lalpar, Morbi - 363642, Gujarat, India |
| Industry-sector  | Ceramic  |
| Products manufactured  | Wall Tiles   |
| Name(s) of the promoters/ directors  | Mr. Ganesh Bhai Patel  |
| Existing banking arrangements along with the details of facilities availed | -  |

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 3,17,768 kWh of electricity per year. The annual consumption of the coal is 2,980 MT and NG is 1.9 million SCM. The total energy consumption of the unit during last 12 months is estimated to be 3,336 toe which is equivalent to 1,066 lakh rupees. The total CO<sub>2</sub> emission during this period is estimated to be 8,998 tonnes. Electricity, coal and natural gas were considered for CO<sub>2</sub> emission estimation.

The unit manufactures the kitchen wall tiles or rustic and matt bathroom wall tiles. The total annual production of the unit during 2017-18 is estimated to be 22.5 lakh boxes. The major source of energy is electricity, consume in the material preparation, kiln, polishing and utility.

## 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<br>Electricity (kWh) | Investment <sup>1</sup><br>(Rs lakh) | Monetary savings<br>(Rs lakh/year) | Simple payback period<br>(Years) | Emission reduction<br>(tonnes of CO <sub>2</sub> ) |
|-------------------------------------|---|--------------------------------------|------------------------------------|----------------------------------|--|
| Retrofit the VFD on Hydraulic Press | 27,770                                    | 4.5                                  | 1.97                               | 2.3                              | 22.8   |

## 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 | 4.5         | 4.5        | 4.5        |
| 2      | D/E Ratio       | -           | -           | 7:3        | 1:1        |
| 3      | Project IRR     | %           | 20.5        | 16.0       | 17.3       |
| 4      | NPV             | Rs. In Lakh | 1.2         | 0.6        | 0.8        |
| 5      | DSCR            | -           | -           | 2.1        | 0.9        |

<sup>1</sup> Investment including the (i) VFD Hardware cost – Rs. 3.1 lakh and (ii) taxes and other misc. cost – Rs. 1.4 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 Uday Industries   |       |
| 2  | Constitution   | Partnership   |       |
| 3  | MSME Registration No/UAN                             | Registered  |       |
| 4  | PCB consent No. available                            | Yes   |       |
| 5  | Date of incorporation / commencement of business     | 2001  |       |
| 6  | Name of the Contact Person                           | Mr Ganesh Bhai Patel  |       |
| 7  | Mobile / Ph. No                                      | +91-9825223287  |       |
| 8  | Email  |   |       |
| 9  | Address:<br>Registered Office                        | 8 - A, National Highway,<br>Lalpar Power Station, P. B.<br>No. 306 (PPW), Lalpar, Morbi<br>- 363642, Gujarat, India | Owned |
| 10 | Factory  | 8 - A, National Highway,<br>Lalpar Power Station, P. B.<br>No. 306 (PPW), Lalpar, Morbi<br>- 363642, Gujarat, India | Owned |
| 11 | Industry / Sector                                    | MSME/Manufacturing  |       |
| 12 | Products Manufactured                                | Production of ceramic tiles   |       |
| 13 | No of hours of operation/shift                       | 12  |       |
| 14 | No of shifts/ day                                    | 02  |       |
| 15 | No of days/year                                      | 350   |       |
| 16 | Installed Capacity                                   | 10,000 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.

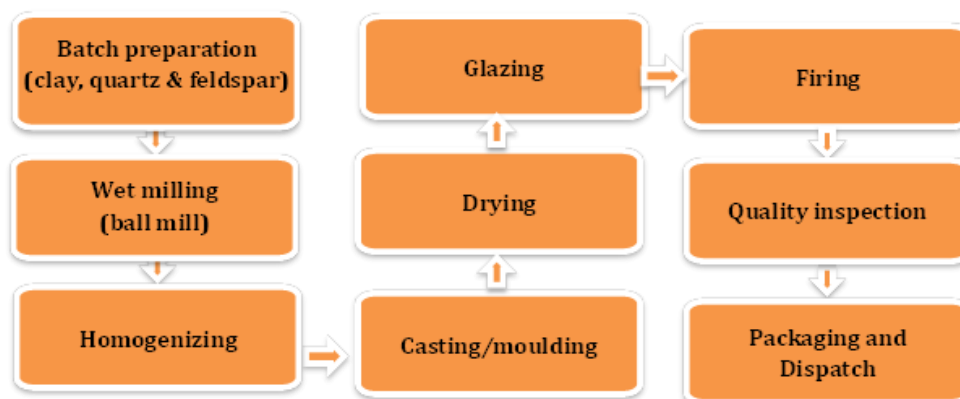


Figure 2.1: Process flow chart

### 2.2 Details of technology identified

The details of the two hydraulic press machine installed in the unit are given in table 2.2.

Table 2.2: Details of press machine

| Specification/Parameters     | Press - 1 | Press - 2 |
|------------------------------|-----------|-----------|
| Type of press                | Hydraulic | Hydraulic |
| Capacity (Max Force or Load) | 2,000     | 1,200     |
| Rated motor capacity (kW)    | 75        | 75        |
| Operation                    | Yes       | Yes       |

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

The unit uses grid power supplied by Paschim Gujarat Vij Company Limited 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    | Coal          | Kiln  |
| 3    | Natural gas   | 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

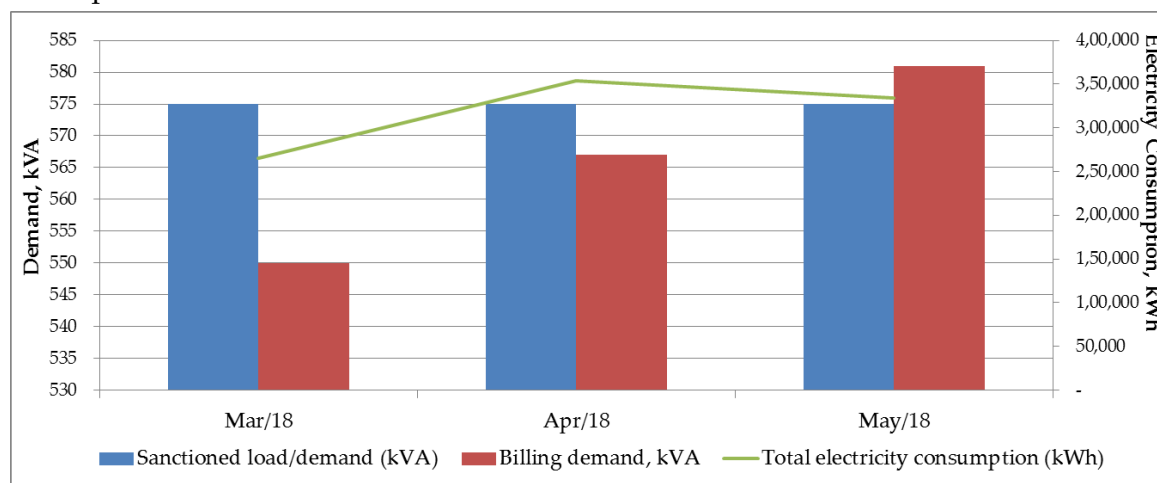
| Source              | Remarks          | Price  |
|---------------------|------------------|--|
| Electricity (PGVCL) | HTP-1            | Demand charges: <ul style="list-style-type: none"> <li>For first 500 kVA of billing demand: Rs. 150/- per kVA per month</li> <li>For next 500 kVA of billing demand: Rs. 260/- per kVA per month</li> </ul> Energy charges: @ Rs. 4.20/kWh<br>Power factor penalty: <ul style="list-style-type: none"> <li>1% of energy charges for every point drop in PF between 0.85 to 0.90</li> <li>2% of energy charges for every point drop in PF below 0.85</li> </ul> Power factor rebate: <ul style="list-style-type: none"> <li>0.5% of energy charges for every point increase in PF over 0.95.</li> </ul> |
| Natural gas         | Gujarat Gas Ltd. | <ul style="list-style-type: none"> <li>Minimum Guaranteed Offtake (MGO): Rs. 32.70/SCM</li> <li>Non - Minimum Guaranteed Offtake (Non-MGO): Rs. 35.97/SCM</li> </ul>   |

## 2.5 Analysis of electricity consumption

**Table 2.5:** Electricity consumption profile

| Month & Year   | Electricity consumption (kWh) | Sanctioned load/demand (kVA) | Power factor | Billing demand, kVA | Demand charges (Rs) | Energy charges (Rs) | Monthly bill (Rs)  |
|----------------|-------------------------------|------------------------------|--------------|---------------------|---------------------|---------------------|--------------------|
| Mar-18         | 2,64,856                      | 575                          | 0.99         | 550                 | 88,000              | 16,47,347           | 18,95,199          |
| Apr-18         | 3,54,048                      | 575                          | 0.98         | 567                 | 92,420              | 21,83,871           | 25,11,452          |
| May-18         | 3,34,400                      | 575                          | 0.99         | 581                 | 97,830              | 20,67,537           | 23,77,668          |
| <b>Average</b> | <b>3,17,768</b>               | <b>575</b>                   | <b>0.99</b>  | <b>566</b>          | <b>92,750</b>       | <b>19,66,252</b>    | <b>22,61,440</b>   |
| <b>Total</b>   | <b>38,13,216</b>              | <b>-</b>                     | <b>-</b>     | <b>-</b>            | <b>11,13,000</b>    | <b>2,35,95,020</b>  | <b>2,71,37,276</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



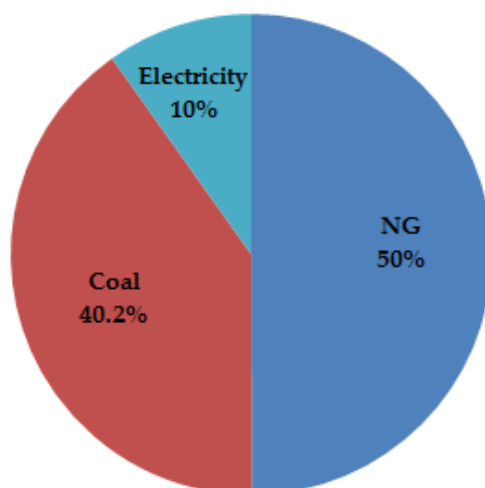
## 2.6 Analysis of other energy forms/ fuels

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)    | Coal (tonne) |
|--------------------------|-------------|--------------|
| Consumption unit/year    | 19,50,000   | 2,980        |
| Calorific value per unit | 8,550       | 4,500        |
| Equivalent toe per year  | 1,667       | 1,341.0      |
| Price (Rs per unit)      | 31.6        | 6,000        |
| Total price per year     | 6,15,77,100 | 1,78,80,000  |

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 3,17,768 kWh of electricity per year. The annual consumption of the coal is 2,980 MT and NG is 1.9 million SCM. The total energy consumption of the unit during last 12 months is estimated to be 3,336 toe which is equivalent to 1,066 lakh rupees. The total CO<sub>2</sub> emission during this period is estimated to be 8,998 tonnes. Electricity, coal and natural gas 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 Retrofit the VFD on Hydraulic Press for ceramic tile pressing

#### 3.1.1 Background

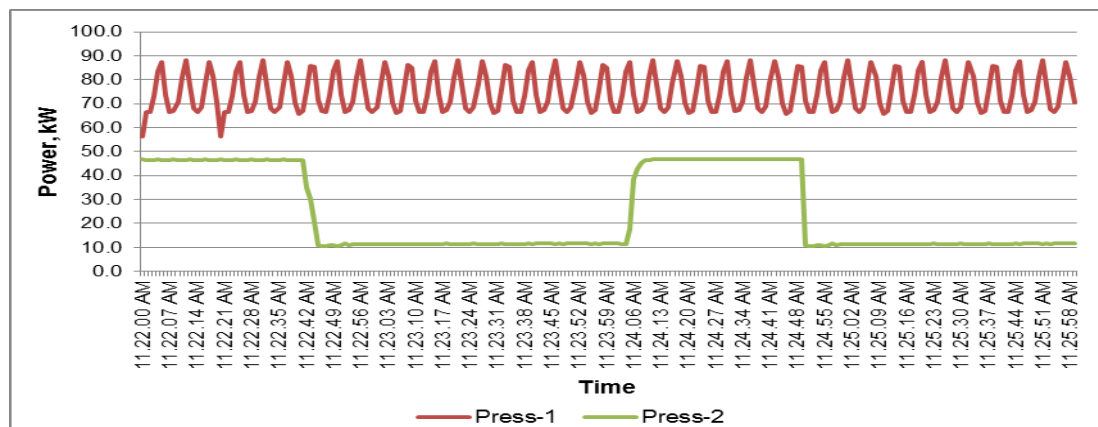
In the ceramic tile manufacturing process, dried material is fed to hydraulic press for formation of ceramic raw tiles. A hydraulic press is a machine using a hydraulic cylinder to generate a compressive force. A fluid such as oil is used to generate the required pressure for formation of tiles. Press is having about 7 to 10 strokes per minute. Hydraulic press in the ceramic industry have most fluctuating load. The details of the two hydraulic press machine installed in the unit are given in table 3.1.1.

**Table 3.1.1:** Details of press machine

| Specification/Parameters     | Press - 1 | Press - 2 |
|------------------------------|-----------|-----------|
| Type of press                | Hydraulic | Hydraulic |
| Capacity (Max Force or Load) | 2,000     | 1,200     |
| Rated motor capacity (kW)    | 75        | 75        |
| Operation                    | Yes       | Yes       |

#### 3.1.2 Observations and analysis

The study of operation of hydraulic press pump revealed that during the pressing operation, hydraulic oil is supplied to piston cylinder assembly and during the idle time, hydraulic fluid is recirculated back to the oil tank with bypass valve open. Irrespective of press operation, the hydraulic pump operates at constant speed to continuously deliver hydraulic oil. The power consumption pattern of hydraulic press machine is shown in figure 3.1.2



**Figure 3.1.2:** Power consumption pattern of press machine

<sup>2</sup> Press-2 was not in continuous operation

### 3.1.3 Recommendation

It is recommended to retrofit the variable frequency drive to the both the presses. Installation of VFD on hydraulic pump will control the motor speed which in turn controls the hydraulic oil flow rate to prevent the re-circulation of oil during idle operation of machine. VFD senses the set point pressure to adjust the pump speed which regulates the oil flow instead of employing the recirculation valve.

## 3.2 Cost benefit analysis

The estimated saving in annual operation cost by Retrofit the VFD on Hydraulic Press for ceramic tile pressing is estimated to be Rs. 1.97 lakhs. The investment requirement is Rs 4.5 lakh with a simple payback period of 2.3 year. The detailed calculations of the recommended energy conservation measures for DPR are provided in table 3.2.

**Table 3.2a:** Performance analysis of the existing compressed air system

| Parameters                                      | Unit     | Existing |         | Proposed |         |
|---|----------|----------|---------|----------|---------|
|   |          | Press-1  | Press-2 | Press-1  | Press-2 |
| Rated capacity of main hydraulic motor of press | kW       | 75       | 75      | 75       | 75      |
| Average power consumption                       | kWh/hour | 74.8     | 48.6    | 70.1     | 45.6    |
| Reduction in average power input                | kWh/hour | -        | -       | 4.68     | 3.04    |
| Annual reduction in electricity consumption     | kWh/year | -        | -       | 16,830   | 10,940  |
| Total reduction in electricity consumption      | kWh/year | -        | -       | 27,770   |         |
| Annual monetary benefits                        | Rs./year | -        | -       | 1,97,971 |         |
| Total investment <sup>3</sup>                   | Rs.      | -        | -       | 4,50,000 |         |
| Simple payback period                           | Years    | -        | -       | 2.3      |         |

## 3.3 Pre-training requirements

The training would be required on operation and maintenance of VFD. Best practices to be adopted for housekeeping near the location of installation.

## 3.4 Process down time for implementation

The estimated process down time required for implementation of recommended measure is estimated to be 2 days after commissioning and testing of VFD operation in the existing press system.

<sup>3</sup>Quotation – 1 has been considered for estimation of investments

## 3.5 Environmental benefits

### 3.5.1 CO<sub>2</sub> reduction<sup>4</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 22.8 tonne 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>4</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      | Three Phase 360-480VAC +/-10% Variable Frequency Drives | A square solution<br>Devashray Industrial Estate,<br>Block No. : C, Shed No. : 5/A,<br>Beside Baroda Express<br>Highway, Phase-IV, Vatva<br>GIDC, Ahmedabad-382445. M.<br>9924233227, 9662216459/69.<br>www.asquaresolutions.co.in | -  | New supplier |
| 2      | Three Phase 360-480VAC +/-10% Variable Frequency Drives | Vashi Electricals Pvt. Limited<br>A-6, Plot No. 74, Shree Ganesh<br>Complex, Dapode Road,<br>Mankoli Naka, Gundavali<br>Village, Taluka Bhiwandi -<br>421305. Dist. Thane  | Distributor and supplier of ac drives, dc drives, electronic controller service provider of repairing service for ac drives, dc drives | -            |

#### 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     | 4.5         | 1.4        | 2.3        |
| 2      | Internal Accruals              | -           | -          | -          |
| 3      | Interest free unsecured loans  | -           | -          | -          |
| 4      | Term loan proposed (Banks/FIs) | -           | 3.2        | 2.3        |
| 5      | Others                         | -           | -          | -          |
|        | <b>Total</b>                   | <b>4.5</b>  | <b>4.5</b> | <b>4.5</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        | 2         |      |      |
| Annual operating hours                                     | Hrs/year      | 8400      |      |      |
| Installed production capacity                              | Box/year      | 35,00,000 |      |      |
| Production in last financial years                         | Box/year      | 22,50,000 |      |      |
| Capacity utilization factor                                | %             | 64        |      |      |
| <b>Proposed investment (Project)</b>                       |               |           |      |      |
| Total cost of the project                                  | Rs. in Lakh   | 4.5       | 4.5  | 4.5  |
| Investment without interest defer credit (IDC)             | Rs. in Lakh   | 4.5       | 4.5  | 4.5  |
| Implementation time  | Months        | 3         | 3    | 3    |
| Interest during the implementation phase                   | Rs. in lakhs  | -         | 0.02 | 0.01 |
| Total investment   | Rs. in lakhs  | 4.5       | 4.5  | 4.5  |
| <b>Financing pattern</b>                                   |               |           |      |      |
| Own funds  | Rs. in lakhs  | 4.5       | 1.4  | 2.3  |
| Loan funds (term loan)                                     | Rs. in lakhs  | -         | 3.2  | 2.3  |
| Loan tenure  | Years         | -         | 5.0  | 5.0  |
| Moratorium period (No EMI (interest and principal amount)) | Months        | -         | 3.0  | 3.0  |
| Total repayment period                                     | Months        | -         | 60.0 | 60.0 |
| Interest rate  | %             | -         | 10.5 | 10.5 |
| <b>Estimation of costs</b>                                 |               |           |      |      |
| Operation & maintenance costs                              | %             | 5         |      |      |
| Annual escalation rate of O&M                              | %             | 5         |      |      |
| <b>Estimation of revenue</b>                               |               |           |      |      |
| Reduction in energy cost                                   | Rs. lakh/year | 2.0       |      |      |
| Total saving   | Rs lakh/year  | 2.0       |      |      |
| Straight line depreciation                                 | %             | 16.2      |      |      |
| IT depreciation  | %             | 80.0      |      |      |
| Income tax   | %             | 34.0      |      |      |
| Period of cash flow analysis                               | Years         | 5         |      |      |

## 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)               | 4.5         | 4.5        | 4.5        |
| Cash flow as annual saving (Rs. In lakh/year)  | 2.0         | 2.0        | 2.0        |
| O&M Expenses for first year (Rs. In lakh/year) | 0.2         | 0.2        | 0.2        |
| Net Cash flow (Rs. In lakh/year)               | 1.7         | 1.7        | 1.7        |
| SPP (months)                                   | 30.9        | 31.1       | 31.1       |
| Considered (month)                             | 30.9        | 31.1       | 31.1       |

## 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                                | -             | 1.02  | 1.29 | 0.46 | 0.41 | 0.39 |
| Depreciation                                    | -             | 0.73  | 0.73 | 0.73 | 0.73 | 0.73 |
| Cash outflow                                    | 4.50          | -     | -    | -    | -    | -    |
| Net cash flow                                   | -4.50         | 1.75  | 2.02 | 1.19 | 1.14 | 1.12 |
| Discount rate % @ WACC                          | 9.30          | 9.30  | 9.30 | 9.30 | 9.30 | 9.30 |
| Discount factor                                 | 1.00          | 0.922 | 0.84 | 0.77 | 0.70 | 0.64 |
| Present value                                   | -4.50         | 1.60  | 1.69 | 0.91 | 0.80 | 0.72 |
| <b>Net present value</b>                        | <b>1.22</b>   |       |      |      |      |      |
| <b>Simple IRR considering regular cash flow</b> | <b>20.48%</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                                | -             | 0.85  | 1.16  | 0.31  | 0.30  | 0.33  |
| Depreciation                                    | -             | 0.73  | 0.73  | 0.73  | 0.73  | 0.73  |
| Cash outflow                                    | 4.52          | -     | -     | -     | -     | -     |
| Net cash flow                                   | -4.52         | 1.58  | 1.90  | 1.04  | 1.03  | 1.07  |
| 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                                   | -4.52         | 1.44  | 1.56  | 0.78  | 0.70  | 0.66  |
| <b>Net present value</b>                        | <b>0.62</b>   |       |       |       |       |       |
| <b>Simple IRR considering regular cash flow</b> | <b>16.00%</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                                | -             | 0.90 | 1.20 | 0.35 | 0.33 | 0.35 |
| Depreciation                                    | -             | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 |
| Cash outflow                                    | 4.51          | -    | -    | -    | -    | -    |
| Net cash flow                                   | -4.51         | 1.63 | 1.93 | 1.08 | 1.06 | 1.08 |
| 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                                   | -4.51         | 1.48 | 1.60 | 0.82 | 0.73 | 0.68 |
| <b>Net present value</b>                        | <b>0.79</b>   |      |      |      |      |      |
| <b>Simple IRR considering regular cash flow</b> | <b>17.28%</b> |      |      |      |      |      |

### 4.3 Marketing & selling arrangement

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

Table 4.3: Marketing &amp; selling arrangements

| 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 | 30.9                    | 1.2           | 2.0     | -    | 14.0    |
|        |                                    | 70:30:00    | 31.0                    | 1.1           | 2.0     | 0.1  | 15.0    |
|        |                                    | 50:50:00    | 31.0                    | 1.1           | 2.0     | 0.1  | 14.7    |
| 2      | 10% reduction in estimated savings | 100% equity | 30.9                    | 1.2           | 2.0     | -    | 14.0    |
|        |                                    | 70:30:00    | 31.0                    | 1.1           | 2.0     | 0.1  | 15.0    |
|        |                                    | 50:50:00    | 31.0                    | 1.1           | 2.0     | 0.2  | 21.6    |
| 3      | 10% rise in interest rates         | 70:30:00    | 31.0                    | 1.1           | 2.0     | 0.1  | 15.0    |
|        |                                    | 50:50:00    | 31.0                    | 1.1           | 2.0     | 0.1  | 14.7    |
| 4      | 10% reduction in interest rates    | 70:30:00    | 31.0                    | 1.1           | 2.0     | 0.1  | 15.0    |
|        |                                    | 50:50:00    | 31.0                    | 1.2           | 2.0     | 0.1  | 14.7    |





## 5.0 Conclusions & recommendations

The DPR prepared for the retrofitting VFD on the existing under screw compressed air system 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<br>Electricity<br>(kWh) | Investment<br>(Rs lakh) | Monetary savings<br>(Rs lakh/<br>year) | Simple payback<br>period<br>(Years) | Emission reduction<br>(tonnes<br>of CO <sub>2</sub> ) |
|-------------------------------------|--|-------------------------|--|-------------------------------------|---|
| Retrofit the VFD on Hydraulic Press | 27,770                                       | 4.5                     | 1.97                                   | 2.3                                 | 22.8  |

The measure has an estimated investment of 4.5 lakh rupees and can yield a savings of 1.97 lakh rupees per year. The total annual reduction in emission by implementation of recommended measure is estimated to be 22.8 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 | 4.5         | 4.5        | 4.5        |
| 2      | D/E Ratio       | -           | -           | 70:30      | 50:50      |
| 3      | Project IRR     | %           | 20.5        | 16.0       | 17.3       |
| 4      | NPV             | Rs. In Lakh | 1.2         | 0.6        | 0.8        |
| 5      | DSCR            | -           | -           | 2.1        | 0.9        |

### 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:<br/>           Online (e-Platform) self-assessment: Nil fee<br/>           Desk Top assessment : Rs 10,000 per SME<br/>           Complete assessment : Rs 80,000 ZED rating per SME; Rs 40,000 for additional ZED defence rating; Rs 40,000 for re-rating<br/>           The rating costs will include cost of Rs 10,000/- as certification cost by QCI.<br/>           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 style="text-align: center;">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.<br/>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> <li>• Project uses an Energy Saving Equipment List approach</li> </ul>   |

|                            |  |
|----------------------------|--|
|                            | <ul style="list-style-type: none"> <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

| Purpose               | For acquiring/adopting energy conservation/savings equipment/measures by SMEs   |
|-----------------------|---|
| Eligibility           | Units under Small and Medium Enterprises<br>Cost of energy for the unit should constitute not less than 20% of the total cost of production<br>Unit should possess energy audit report issued by an approved energy Consultant/Auditor.<br>Borrowal a/cs-ASCC code S1 or S2 during previous review.<br>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<br>Collateral: Upto Rs.5 lakhs – NIL<br>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 | <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: Budgetary offers / quotations

## Quotation - 1: A Square Solutions

|  <b>A SQUARE SOLUTIONS</b><br><small>Solutions for all kinds of Industrial Electronics</small>  |   |   |                        |             |
|--|---|--|------------------------|-------------|
| <b>Offer Price / Quotation</b>   |   |  |                        |             |
| Devashray Industrial Estate, Block No. : C, Shed No. : 5/A, Beside Baroda Express Highway,<br>Phase-IV, Vatva GIDC, Ahmedabad-382445. M. 9924233227,9662216459/69. www.asquaresolutions.co.in<br>Email:- info@asquaresolutions.co.in |   |  |                        |             |
| The Energy & Resources Institute   |   | QU. NO   | :                      |             |
|  |   | DATE   | :                      |             |
|  |   | INQ REF  | E-Mail                 |             |
|  |   | DATE   | :                      |             |
|  |   | ADD REF  | DD045                  |             |
| Kind attn:- Mr. Nilesh   |   | E-mail : Nilesh.Shedge@terl.res.in   |                        |             |
| Cell:- +91-9579418527  |   |  |                        |             |
| Sl. No.  | Description   | Qty  | Rate                   | Total       |
|  | Hitachi Make AC Drive                                   |  |                        |             |
| 1  | Model : SJ700I - 750 HFEF2<br>Rating : 75 KW / 100 HP   | 1  | 1,56,156               | 1,56,156    |
| 2  | Model : SJ700I - 1100 HFEF2<br>Rating : 110 KW / 150 HP | 1  | 2,37,952               | 2,37,952    |
| 3  | Model : SJ700D - 220 HFEF3<br>Rating : 22 KW / 30 HP    | 1  | 67,504                 | 67,504      |
| 4  | Model : SJ700I - 370 HFEF2<br>Rating : 37 KW / 50 HP    | 2  | 1,02,102               | 2,04,204    |
| 5  | Model : SJ700I - 300 HFEF2<br>Rating : 30 KW / 40 HP    | 2  | 83,283                 | 1,66,566    |
| 6  | Model : SJ700D - 185 HFEF3<br>Rating : 18.5 KW / 25 HP  | 1  | 63,017                 | 63,017      |
| 7  | Model : WJ200 - 055 HFC<br>Rating : 5.5 KW / 7.5 HP     | 2  | 29,040                 | 58,080      |
|  | <b>Total</b>  | 10   |                        | 9,53,479.00 |
| <b>Terms &amp; Conditions :</b>  |   |  |                        |             |
|  |   | <i>Our Bank Details</i>  |                        |             |
| Excise :   | Extra As Applicable                                     | Bank :   | Kotak Mahindra Bank    |             |
| PSF:   | Extra @ 2%  | Branch :   | Navrangpura, Ahmedabad |             |
| VAT/CST:   | Extra @ 2% against C form                               | A/c. No.:  | 3711175883             |             |
| Payment :  | 100% Advance Against PI                                 | A/c. Type :  | Current Account        |             |
| Freight :  | Extra As Applicable                                     | MICR :   | 380485003              |             |
|  |   | IFSC :   | KKBK0000812            |             |
| <b>Above Rate is Net Of Discount.</b>  |   |  |                        |             |
| FOR A SQUARE SOLUTIONS   |   |  |                        |             |
| AUTHORISED SIGNATORY   |   |  |                        |             |

## Quotation – 2: Vashi Electricals Pvt. Ltd.



**Vashi Electricals Pvt. Ltd.**

An ISO 9001 : 2008 Company



A-6, Plot No. 74, Street Ganesh Complex, Behind Gajda Compound, Dapodi Road, Marol Naka, Gumbrolli Village, Taluka Bhiwandi - 421305, Dist. Thane  
Tel: 02522-661600, Fax: 02522-661669 Email: sales@vashielectricals.com, Website: www.vashielectricals.com



### INDEX

- 1) SYN' & S2U Series Single Phase 200-240VAC +/-10% Variable Frequency Drives ....
- 2) AGIIE' Series Three Phase 380-480VAC +/-10% Variable Frequency Drives
- 3) Active' Series Three Phase 380-480VAC +/-10% Variable Frequency Drives

### Business Terms & Conditions :

1. Discount \_\_\_\_\_@ on above pricelist.
2. Excise duty exclusive. First dealer invoice to enable you to claim Cenvat credit will be issued on receipt of special request.
3. Taxes as applicable.
4. Goods are supplied subject to Mumbai Jurisdiction only.
5. This price list supersedes all our previous prices and is subject to alteration without any notice.
6. Municipal Levis Octroi extra if applicable.

### PAYMENT TRANSFER FACILITY

|   |   |
|---|---|
| ICICI Bank Roaming A/c No.: 015105001078    | State Bank of India A/c. No.: 33644082057   |
| ICICI IFSC Code for RTGS/NEFT : ICIC0000151 | State Bank of India IFSC Code : SBIN0014177 |
| Branch : Vashi – Navi Mumbai.               | Branch : Thane (W)                          |





**Vashi Electricals Pvt. Ltd.**



**SYN' Series Single Phase 200-240VAC +/-10% Variable Frequency Drives**

|                  | KW   | HP   | Rated<br>Current <sub>FL (Amps)</sub> | List Price |
|------------------|------|------|---------------------------------------|------------|
| SYN 108 220 01AF | 0.2  | 0.25 | 1.4                                   | 15800      |
| SYN 108 220 03AF | 0.4  | 0.5  | 2.3                                   | 15800      |
| SYN 108 220 05AF | 0.75 | 1    | 4.2                                   | 15800      |

**S2U' Series Single Phase 200-240VAC +/-10% Variable Frequency Drives**

|              | KW   | HP   | Rated<br>Current <sub>FL (Amps)</sub> | List Price |
|--------------|------|------|---------------------------------------|------------|
| S2U-230-S02F | 0.2  | 0.25 | 1.8                                   | 14118      |
| S2U-230-S03F | 0.4  | 0.5  | 2.6                                   | 14118      |
| S2U-230-S07F | 0.75 | 1    | 4.3                                   | 14889      |
| S2U-230-S11F | 1.5  | 2    | 7.5                                   | 23445      |
| S2U-230-S13F | 2.2  | 3    | 10.5                                  | 26954      |

**AGLE' Series Three Phase 380-480VAC +/-10% Variable Frequency Drives**

|                | KW   | HP   | Rated<br>Current <sub>FL (Amps)</sub> | List Price |
|----------------|------|------|---------------------------------------|------------|
| AGL402 02 1 FA | 0.25 | 0.33 | 0.8                                   | 23531      |
| AGL402 03 1 FA | 0.37 | 0.5  | 1.2                                   | 23531      |
| AGL402 05 1 FA | 0.55 | 0.75 | 1.5                                   | 25242      |
| AGL402 07 1 FA | 0.7  | 1    | 2.1                                   | 25242      |
| AGL402 09 1 FA | 1.1  | 1.5  | 3                                     | 27810      |
| AGL402 11 1 FA | 1.5  | 2    | 4                                     | 29949      |
| AGL402 13 1 FA | 2.2  | 3    | 5.5                                   | 34227      |
| AGL402 15 2 FA | 3    | 4    | 7.5                                   | 43640      |
| AGL402 18 2 FA | 4    | 5.4  | 9.5                                   | 43640      |
| AGL402 19 3 FA | 5.5  | 7.5  | 13                                    | 62465      |
| AGL402 21 3 FA | 7.5  | 10   | 17                                    | 66742      |
| AGL402 22 3 FA | 9.2  | 12.5 | 20                                    | 77010      |
| AGL402 23 3 FA | 11   | 15   | 30                                    | 77010      |

**Active' Series Three Phase 380-480VAC +/-10% Variable Frequency Drives**

| Model        | KW   | HP   | Rated<br>Current <sub>FL (Amps)</sub> with keypad (P500) | List Price |
|--------------|------|------|--|------------|
| ACT 401 05FA | 0.55 | 0.75 | 1.8  | 37546      |
| ACT 401 07FA | 0.75 | 1    | 2.4  | 40586      |
| ACT 401 09FA | 1.1  | 1.5  | 3.2  | 40586      |
| ACT 401 11FA | 1.5  | 2    | 3.8  | 40586      |
| ACT 401 13FA | 1.85 | 2.5  | 4.2  | 47172      |
| ACT 401 13FA | 2.2  | 3    | 5.8  | 47172      |
| ACT 401 15FA | 3    | 4    | 7.8  | 56567      |
| ACT 401 18FA | 4    | 5    | 9  | 56567      |
| ACT 401 19A  | 5.5  | 7.5  | 14   | 67103      |
| ACT 401 21A  | 7.5  | 10   | 18   | 71915      |
| ACT 401 22A  | 9.2  | 12.5 | 22   | 81812      |
| ACT 401 23A  | 11   | 15   | 25   | 98157      |
| ACT 401 25A  | 15   | 20   | 32   | 111958     |
| ACT 401 27A  | 18.5 | 25   | 40   | 154408     |
| ACT 401 29A  | 22   | 30   | 45   | 188778     |
| ACT 401 31A  | 30   | 40   | 60   | 216290     |
| ACT 401 33A  | 37   | 50   | 75   | 273222     |
| ACT 401 35A  | 45   | 60   | 90   | 304094     |
| ACT 401 37A  | 55   | 75   | 110  | 313538     |
| ACT 401 39A  | 65   | 90   | 125  | 329158     |
| ACT 401 43A  | 75   | 100  | 150  | 408457     |
| ACT 401 45A  | 90   | 120  | 180  | 507466     |
| ACT 401 47A  | 110  | 150  | 210  | 560155     |
| ACT 401 49A  | 132  | 175  | 250  | 632796     |



## Vashi Electricals Pvt. Ltd.

An ISO 9001 : 2008 Company



A-8, Plot No. 74, Shree Ganesh Complex, Behind Gupta Compound, Dapode Road, Mankoli Naka, Gundevali Village, Taluka Bhiwandi - 421305, Dist. Thane  
 Tel.: 02522-861600, Fax : 02522-861689 Email : sales@vashieletricals.com, Website : www.vashieletricals.com

### SALES TEAM

| PRODUCT MANAGER | Areas            | Contact No. | BUSINESS MANAGER   | Areas      | Contact No. |
|-----------------|------------------|-------------|--------------------|------------|-------------|
| YATIN CHAVAN    | MUMBAI - WESTERN | 9225832811  | UMESH AGGRAWAL     | CHANDIGARH | 9582632785  |
| MANISH SHAH     | MUMBAI - CENTRAL | 7508440735  | RITESH DHOLAKIA    | NASIK      | 9225832804  |
| ANKIT AGARWAL   | KOLKATA          | 8298084888  | HARESH PATIL       | BARODA     | 7567288999  |
| SUDARSHAN       | BANGLORE         | 9880823125  | AMAR PATIL         | PUNE       | 9225832801  |
| MANISH K.       | MADHYA PRADESH   | 9300020088  | GIRISH DANDEKAR    | NAGPUR     | 9225832870  |
| MANISH B.       | GURGAON          | 9582632801  | ANURAG SINGH (ASM) | HYDERABAD  | 8888050001  |
|                 |                  |             | SAMEER PATEL       | AHMEDABAD  | 9825033188  |

## Annexure 2: Instruments used

---

| Instruments     | Model/ Make                   | Application   | Accuracy    |
|-----------------|-------------------------------|---|-------------|
| Power analysers | Fluke: 435,<br>Krykard ALM 10 | Electrical Parameters<br>Harmonics analysis, power<br>logging | $\pm 0.5\%$ |