

ENERGY IS LIFE



**BUREAU OF ENERGY EFFICIENCY**

(Ministry of Power, Government of India)

National Mission for Enhanced Energy Efficiency

# SUCCESS STORIES

*of*

## Energy Efficiency Projects Financed in INDIA



इंडिया एसएमई टेक्नोलॉजी सर्विसेस लिमिटेड  
INDIA SME TECHNOLOGY SERVICES LIMITED

**INDIA SME TECHNOLOGY SERVICES LIMITED**

(JV of SIDBI, State Bank of India, Oriental Bank of  
Commerce, Indian Bank, Indian Overseas Bank)



भारतीय लघु उद्योग विकास बैंक  
SMALL INDUSTRIES DEVELOPMENT BANK OF INDIA

**SMALL INDUSTRIES DEVELOPMENT BANK OF INDIA**



*Prepared by*



## **India SME Technology Services Limited**

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*Supported by*



## **Small Industries Development Bank of India**

Videocon Tower, Ground Floor, E-1, Rani Jhansi Road, Jhandewalan Extension, New Delhi-110055, India

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**Dr. Ajay Mathur**  
Director General, BEE

## Message

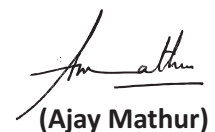
India's objective of attaining sustainable economic growth is directly related to the efficient management of its energy resources. The Government of India is implementing various programmes in order to address the growing economic challenges of the economy, where energy efficiency plays an instrumental role to bridge the gap between the demand and supply of energy.

The enactment of the Energy Conservation Act in 2001 and the announcement of National Mission for Enhanced Energy Efficiency (NMEEE) in 2008 (as part of National Action Plan on Climate Change) have led to development of energy efficiency (EE) and Demand Side Management (DSM) programmes for implementation across various sectors of the economy. Hence, in order to enhance investments, it is of paramount importance to develop fiscal schemes, policies and regulations for promoting EE financing.

Framework for Energy Efficient Economic Development (FEEED) which is one of the initiatives under NMEEE, covers funds like Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE) and Venture Capital Fund for Energy Efficiency (VCFEE). PRGFEE is a risk sharing mechanism to provide financial institutions (Banks/NBFCs) with a partial coverage of risk involved in extending loans for energy efficiency projects. VCFEE will provide risk capital support to EE projects. Energy Efficiency Financing Platform (EEFP) is also one of the initiatives under National Mission for Enhanced Energy Efficiency (NMEEE) for providing a platform to interact with financial institutions and project developers for implementation of energy efficiency projects.

Hence, as a confidence building effort towards endorsing financing of EE projects, it was envisaged to develop a booklet covering case studies on energy efficiency projects financed in India with the support of Small Industries Development Bank of India (SIDBI). I would like to compliment SIDBI for sharing project specific information and India SME Technology Services Limited (ISTSL) for developing this booklet.

I hope that the project learnings and experience shared in this booklet would benefit the relevant stakeholders and would add impetus for financing EE projects in the country.

  
(Ajay Mathur)







**Ajay Kumar Kapur**  
Country Head, Energy Efficiency Vertical, SIDBI

## Message

Micro, Small and Medium Enterprises (MSME) Sector is the backbone of Indian economy as it contributes greatly to its growth with a vast network of around 30 million units; creating employments of about 70 million resulting in equitable wealth distribution; contributing about 45 % of manufacturing output and about 40% of exports, directly and indirectly.

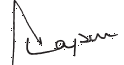
The Indian MSME sector is facing various challenges such as increased raw material cost, high energy costs and also stiff international competition in case the units are export-oriented. Majority of the MSMEs are energy-intensive employing primitive and inefficient technologies and processes that endanger their competitiveness and future growth.

Industrial sector contributes to more than 45 % of country's energy demand and offers great potential to save 49 billion kWh of energy per year. It is estimated that about 48 % of the total energy consumed in the industrial sector is from MSMEs and by adopting energy conservation measures, at least 25% of it could be potentially saved. MSMEs, especially those for whom energy costs represent a large portion of total production costs, can reap high direct economic benefits from improving efficiency of energy conversion and reduction of energy losses.

Recognizing the need for encouraging Energy Efficiency (EE) and sustainable development in the MSME sector for their survival and growth in long run, SIDBI has taken initiatives through dedicated loan products and other promotional activities. SIDBI has been operating focused concessional lending schemes for energy efficiency and cleaner production from various multilateral/ bilateral agencies viz., JICA, KfW, AfD etc.

SIDBI is also providing risk capital and equity support for innovation projects related to energy efficiency, cleaner technologies, renewable energy etc. As part of WB-GEF project, SIDBI is also implementing energy efficiency measures in five energy intensive clusters namely Foundry cluster at Kolhapur, Forging cluster at Pune, Limekiln cluster at Tirunelveli, Chemical cluster at Ankleshwar and Mixed cluster at Faridabad. This is expected to result in total investments of Rs. 120 crore with a payback period of 12-15 months, achieving 10-20 % energy savings. In terms of making sustainability of the achievements and dissemination of knowledge products developed under the WB-GEF project, SIDBI has also launched, End to End Energy Efficiency Solutions (4E solutions) Product on the World Environment day (June 05, 2014) to provide technical consulting support to its MSME clients to improve their energy savings through India SME Technology Services Limited (ISTSL).

I would like to sincerely thank the Bureau of Energy Efficiency (BEE) for providing an opportunity to showcase SIDBI's success in Energy Efficiency Financing which I believe would enhance the confidence of other financial institutions also for the promotion of EE projects. I would like to compliment the team from SIDBI and India SME Technology Services Limited for developing this case study booklet.

  
(Ajay Kumar Kapur)







## Acknowledgement

We are sincerely thankful to the Bureau of Energy Efficiency, Ministry of Power, Government of India for giving us the opportunity for the preparation of "**Success Stories for Energy Efficiency Projects Financed in India**". We express our sincere gratitude to all concerned officials for their support and guidance during the course of this assignment.

### Bureau of Energy Efficiency

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Ms. Vineeta Kanwal, Assistant Energy Economist

Ms. Sonal Passi, Project Engineer

Mr. Pranav Khanna, Project Engineer

We are also thankful to "Small Industries Development Bank of India (SIDBI)" for their valuable inputs, cooperation and support for the identification and short listing of cases under energy efficiency financing. We take this opportunity to appreciate concerned SIDBI Officers for their excellent support, active involvement and valuable inputs for the preparation of this booklet.



**Rajiv Kumar**

(Chief Executive Officer)

**India SME Technology Services Limited (ISTSL)**

**Janakpuri, New Delhi**

### About ISTSL

ISTSL was established in the year 2005 as a Joint Initiative of the Small Industries Development Bank of India (SIDBI), Indian Bank, Oriental Bank of Commerce (OBC), Indian Overseas Bank (IOB) and State Bank of India (SBI). ISTSL is engaged in providing services to MSMEs in the fields of technology upgradation, energy efficiency and renewable energy.





## List of Abbreviation

<b>AAC</b>	Autoclaved Aerated Concrete
<b>BEE</b>	Bureau of Energy Efficiency
<b>BTK</b>	Bull's Trench kiln
<b>CNG</b>	Compressed Natural Gas
<b>CFR</b>	Coke Feed Ratio
<b>DBC</b>	Divided Blast Cupola
<b>DM</b>	De-Mineralization
<b>ECBC</b>	Energy Conservation Building Code
<b>EE</b>	Energy Efficiency
<b>ETP</b>	Effluent Treatment Plant
<b>ESCO</b>	Energy Service Company
<b>GHG</b>	Green House Gas
<b>ISTSL</b>	India SME Technology Services Limited
<b>JICA</b>	Japan International Cooperation Agency
<b>LED</b>	Light Emitting Diode
<b>LDPE</b>	Low-density polyethylene
<b>LLDPE</b>	Linear low density polyethylene
<b>MSME</b>	Micro, Small & Medium Enterprise
<b>MTPA</b>	Million Tons per Annum
<b>MVD</b>	Medium Voltage Drives
<b>RO</b>	Reverse Osmosis
<b>SIDBI</b>	Small Industries Development Bank of India
<b>SEC</b>	Specific Energy Consumption
<b>TMT</b>	Thermo-Mechanical Treatment
<b>TFO</b>	Two-For-One Twisting
<b>VSBK</b>	Vertical Shaft Brick Kiln
<b>VFD</b>	Variable Frequency Drive





## Executive Summary

The Bureau of Energy Efficiency (BEE) has appointed India SME Technology Services Limited (ISTSL) for the preparation of "Success Stories for Energy Efficiency Projects financed in India by Small Industries Development Bank of India (SIDBI)". In this regard, a total of fifty case studies have been prepared based on the project specific information provided by SIDBI and these case studies are presented in this booklet.

In order to promote sustainable development, energy efficient practices and cleaner production in Micro, Small and Medium Enterprises (MSMEs), SIDBI has been operating focused lending schemes from various multilateral/ bilateral international agencies such as Japan International Cooperation Agency (JICA), Kreditanstalt fur Wiederaufbau (KfW) and Agence Francaise de Developpement (AFD). Case studies presented in this booklet have been financed through any of these three lending schemes.

Due consideration has been given to cover case studies from different sectors. As a result, the success stories have been spread across the following 20 industrial sectors:

- Auto Engineering
- Ceramic
- Electrical and Electronic
- Food Processing
- Foundry
- Packaging
- Plastic Unit
- Power Generation
- Refractory
- Textile Processing
- Building
- Engineering
- Fly Ash Brick
- Forging
- Iron & Steel
- Paper Manufacturing
- Printing
- Rice Mill
- Rubber
- Transport

The success stories which have been covered under this exercise are distributed across the country including states like Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Karnataka Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttarakhand, and Uttar Pradesh and Union Territories like Chandigarh, Dadra & Nagar Haveli and Delhi.

Financial assistance provided by SIDBI for various energy efficiency projects (presented as case studies) ranges from INR 10 Lakh to 1,500 Lakh. As a result of financial assistance, MSME industries have been able to adopt energy efficient technologies and processes. It has been observed that this has directly contributed to energy savings, monetary and environmental benefits with the help of which the MSME units have been able to sustain their businesses.





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## Case Study-1

# Auto Ancillary Unit

Computer Numerical Control (CNC) Machine, Plasma Cutting Machine

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 60 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Sheet Metal Components/ Auto Ancillaries
Project Location	Lucknow, Uttar Pradesh
Annual Turnover of the company	Rs. 2,789.3 Lakh (base year 2011)
Networth of the company	Rs. 127.41 Lakh (base year 2011)
Project DSCR	3.28
Loan Tenure	60 months after an initial moratorium of 06 months

## Project Brief

- The Company has been involved in the manufacturing of Original Equipment Manufacturer (OEM) Sheet Metal Components for 3 Wheelers, Trucks and Buses.
- Earlier, the Company employed conventional lathe machine for sheet cutting process and because of this the Company was facing problems such as higher production time, lower accuracy, higher electricity costs, high labour intensity and huge material wastage. Hence, in order to overcome these problems, the unit management decided to install Computer Numerical Control (CNC) plasma cutting machine. In this regard, the Company approached SIDBI for availing loan for the purchase of proposed machinery.



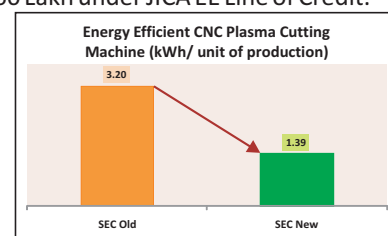
CNC plasma cutting machine has the following advantages.

- o **Faster cutting**, as no preheating is required so that the torch can begin cutting immediately.
  - o **Versatile**, as machine would be capable of piercing, intricate cutting and beveling in one operation.
  - o **Precise**, as the machine is paired with state-of-the-art software and high precision components and therefore need for costly secondary operations would be eliminated.
  - o **High Cut Quality, less dross and high quality edges**. Tight integration between the cutting torch and software would result in higher quality production.
- Other machineries purchased as part of the project were Pressmaster Centre and Coating Machine.
  - The total cost of the project was Rs. 88 Lakh and SIDBI has sanctioned a loan of Rs. 60 Lakh under JICA EE Line of Credit.



## Environmental Impact

- Estimated electricity saving from CNC plasma cutting machine: 1,69,416 kWh per year.
- Reduction in Green House Gas (GHG) emissions: 135 tons of CO<sub>2</sub> equivalents per annum.



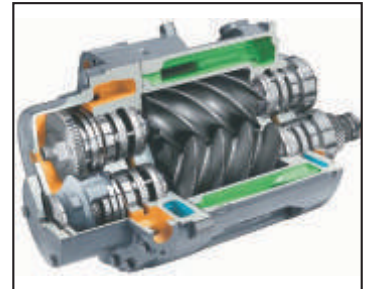
## Auto Engineering Unit

(Presses, Screw air compressor, Air dryer)

Particulars	Description
Loan Amount / Yr. of assistance	Term Loan of Rs. 89 Lakh under KfW EE Line of Credit/ 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of general engineering parts used in automobile industry, textile industry etc./ General Engineering Workshop
Project Location	Coimbatore, Tamil Nadu
Annual Turnover of the company	Rs. 384.13 Lakh (Base Year 2011)
Networth of the company	Rs. 69.75 Lakh (Base Year 2011)
Project DSCR	2.07
Loan Tenure	60 months after an initial moratorium of 06 months

### Project Brief

- This private limited company was incorporated in the year 2008. Since then, it has been engaged in the manufacturing of automobile, textile and general other engineering components.
- The company had planned for Modernisation and Technology Upgradation by acquiring latest Precision press as they were facing lot many issues like high energy losses, low product quality, less production etc. in conventional presses.
- Hence, the unit has approached SIDBI for the purchase of Cross Shaft Precision Presses, Cross shaft geared power press, Screw air compressor, Air dryer, etc.
- Total project Cost was Rs. 119 Lakh and SIDBI has sanctioned term loan of Rs. 89 Lakh under KfW EE Line of Credit.
- Normally Specific Energy Consumption of Screw Compressors is low as compared to other types of compressors like Reciprocating Compressors.
- Features of Cross shaft precision machine as given below:
  - o High torque, low noise wet clutch and brake.
  - o Rigid frame with less deflection.
  - o High accuracy transmission gears and high rigidity crank ensure press long life and accuracy.
  - o Forced Lubrication system with default monitor ensures the operation reliability.
  - o User-friendly design and all-function electric control system enable the accessories to attach easily.
  - o High accuracy level.



### Environmental Impact

- By purchasing the above machineries, unit has benefited in terms of improvement in product quality, better working environment, reduction in energy consumption, increased production etc.
- Energy saving potential was estimated in the range of 20-25 %.
- Significant reduction in GHG reduction.



## Building-Hotel

(HVAC, Lighting, Boiler, Power System, HWG etc.)

Particulars	Description
Loan Amount / Yr. of assistance	Term Loan of Rs.100 Lakh under KfW Innovation Line of Credit / 2014
Borrower / Category	MSME – ESCO-Grade 2 (Empanelled by BEE)
Product / Industry sector	Energy Audits & Implementation/ ESCO
Project Location	Lucknow, Uttar Pradesh
Annual Turnover of the company	Rs. 299.31 Lakh (base year 2013)
Networth of the company	Rs. 221.32 Lakh (base year 2013)
Project DSCR	1.95
Repayment Period	24 monthly installments after a moratorium of 06 months

### Project Brief

- The ESCO was incorporated in the year 1999 and is engaged in the implementation of various energy conservation projects on BOOT (build, own, operate & transfer) basis as well as undertaking energy audit. The company has been rated ESCO Grade 2 by BEE. Recently, the Company has been empanelled with India SME Technology Services Ltd. (ISTSL), an associate concern of SIDBI for implementation of 4E (end to end energy efficiency) solutions in MSME units. The promoters have been in the business for over two decades and so far carried out over 500 energy audits and implemented three energy conservation projects of similar nature.
- One of their ESCO projects was implemented at a hotel in Pune. Under that project, the company installed Heat pumps, LED lighting, chiller controller, roof painting etc. in order to conserve energy thereby reducing cost.
- Encouraged by the above project, ESCO has approached SIDBI for assistance to implement energy conservation measures in another hotel located in Lucknow, wherein ESCO would install and maintain all energy saving equipments towards (i) power factor improvement, (ii) performance optimization of chiller, (iii) performance improvement of cooling tower, (iv) optimization and improvement of hot water generation system, (v) optimization and improvement of steam generation system in laundry, (vi) lighting voltage optimization and (vii) optimisation of voltage levels at transformer/ main feeder.
- The funds have been proposed to be utilized for making initial investment in the project as well as acquisition of equipment for energy audit purpose. While the cost of the project was estimated (as per the contract) at Rs. 110.34 Lakh, including CAPEX of Rs.92.11 lakh which has been considered for funding by SIDBI, the cost of the equipments purchased by ESCO was estimated at about Rs.41.89 Lakh. Therefore, the total CAPEX worked out to about Rs. 134 Lakh. After providing for promoters contribution of about 25 %, it was proposed to award an assistance of Rs.100 Lakh to ESCO.
- During the contract period of 24 months, the energy savings would be shared in the ratio of 65:35 between the ESCO and the hotel located in Lucknow. During the contract period, ESCO would pay for all the operational costs. Return on investment (energy savings) was expected to begin from March 2014 onwards.
- The ESCO employed 60 professionals comprising of engineers and technicians. There are three Accredited Energy Auditors, four Certified Energy Auditors and One Certified Measurement and Verification Practitioner (CMVP) in the company. Further, all the project sites are manned by at least one person round the clock for monitoring during the contract period.



### Environmental Impact

- Estimated Electrical Savings is 31,706 kWh/ month through which the proposed reduction in energy bill would be at Rs. 101.22 Lakh/ annum with a payback period of about 13 months (i.e. about 22.90 % savings in energy cost p.a.)
- Reduction in Green House Gas (GHG) emission: 338 tonnes of CO<sub>2</sub> per annum.



(LED lighting &amp; Geothermal Cooling solution)

Particulars	Description
Loan Amount / Yr. of assistance	Venture Debt of INR 200 Lakh & Equity Investment of INR 5300/- (1 % on Paid-up Equity Capital) under KfW Innovation Line of Credit/ 2014
Borrower / Category	MSME – ESCO (Empanelled by BEE)
Product / Industry sector	(a) Geothermal Cooling Solutions for existing Air Conditioning (b) Hot Water Cogeneration and (c) Lighting solutions through LEDs / Buildings
Project Location	Mumbai, Maharashtra
Annual Turnover of the company	Rs. 163.80 Lakh (base year 2013)
Networth of the company	INR 22.52 Lakh (as on 2013)
Project DSCR	1.66
Loan Tenure	48 months after a moratorium of 36 months

### Project Brief

- The company was incubated at Wadhvani Centre for Entrepreneurial Development, Indian School of Business (ISB), Hyderabad and providing energy efficiency solutions to the buildings to achieve reduction in operating costs and carbon foot print. Mainly offering three major solutions viz. (a) Geothermal Cooling Solution for existing Air Conditioning (b) Hot Water Cogeneration and (c) Lighting solutions through LEDs. The company claims to achieve energy savings to the extent of 60 % in most cases.
- The company has won various awards and recognitions viz. Samsung Innovative Quotient award, TiE ISB award for the year 2010, Climate Solver 2012 by WWF, Parivartan Sustainability Leadership Award, Indiafrica Fellowship by Ministry of External Affairs, Government of India etc.
- The concept of Green Building is gaining momentum worldwide. The Green Building movement is also gaining acceptance in India during the past several years. However, the Green Building/ Energy Efficient building sector is largely untapped due to limited availability of the products/ services in this sector.

Company's promoter is an IGSHPA (International Ground Source Heat Pump Association) certified professional, one of only five professionals in the South East Asia. He has over 17 years of experience in the building systems space. His expertise includes global sourcing and has pioneered the entry of ultra-efficient products such as commercial geothermal and hot water cogeneration systems in India. Some of the key projects initiated recently are:

- LED lighting solution- supply and installation at Hyderabad
  - LED lighting solution- supply and installation at PAN India Locations of Dominoz Pizza
  - LED lighting solution- supply and installation for its Hyper Market Stores at Greater Noida
  - Geothermal AC System to be installed at Hyper Market store located at Musheerabad, Hyderabad
- The company has approached SIDBI to avail financial assistance to execute above projects.



## Environmental Impact

### ➤ Some of key benefits of Geothermal Systems are:

- o **Lower Operating Cost:** These ground based systems have efficiency 400 times more than that of air conditioners and 200 times more of the heating furnace. They require one kilowatt per hour power to generate 12,000 BTU while the other customary systems require 2.3 kilowatts per hour to generate the equal quantity of energy. 4 units of energy are delivered for every 1 unit of electrical energy. This does not bend the laws of physics; geothermal systems are transferring heat, not creating it by burning something. Energy savings of 25 to 50% over conventional gas, oil, or heat pump systems.
- o **Quiet Operation:** No more noisy picnics. Unlike air conditioners or heat pumps there is no outdoor unit. Geothermal units are very smooth and quiet in operation, comparable to a refrigerator. Geothermal units are also very reliable since the units are not subjected to wear and tear caused by snow, rain, ice, or vandalism.
- o **Clean and Safe:** There is no combustion in a geothermal heat pump; therefore there is no chance of carbon-monoxide poisoning. By adding high efficiency air cleaners with geothermal, a high indoor air quality level can be reached.
- o **Life Cycle Cost:** Geothermal systems are usually good for 15+ years. A typical furnace will last 7-10 years with regular maintenance. The ground loop of the geothermal system (the pipes buried in your yard) has a warranty of 50 years. The ground loop is made up of polypropylene pipe, the same pipe which is used in city gas lines.
- o **Environmentally Friendly:** Geothermal is recognized by the United States Environmental Protection Agency as the most environmentally-safe, cost effective heating and cooling system. Unlike other comfort systems, geothermal does not emit carbon dioxide, carbon monoxide, or other greenhouse gasses which contribute to air quality pollution. Additionally, low electricity demand from geothermal systems help reduce peak grid demand and the need for more electric generating plants. Installing a geothermal system is equivalent to planting 750 trees or taking 2 cars off the road.
- o **Positive Cash Flow:** Geothermal is an investment. For many retrofit applications and especially new construction the energy savings more than offset the cost of installation over a short period of time.

GHPs can reduce energy use by 23% to 44% compared to advanced air-source heat pumps, and by 63% to 72% compared to electric resistance heating and standard air-conditioning equipment

GHP systems have the lowest carbon dioxide emissions of all technologies analyzed, and the lowest overall environmental cost  
EPA, 1993

### ➤ Some of key benefits of LED Lightings are:

- o **Long Life:** Long life time stands out as the number one benefit of LED lights. LED bulbs and diodes have an outstanding operational life time expectation of up to 100,000 hours. This is 11 years of continuous operation, or 22 years of 50% operation. If you leave on the LED fixture for 8h per day it would take around 20 years before you'd have to replace the LED bulb.
- o **Energy Efficiency:** Today's most efficient way of illumination and lighting, with an estimated energy efficiency of 80%-90% when compared to traditional lighting and conventional light bulbs.
- o **Ecologically Friendly:** LED lights are free of toxic chemicals. Most conventional fluorescent lighting bulbs contain a multitude of materials like e.g. mercury that are dangerous for the environment.
- o **Zero UV Emissions:** LED illumination produces little infrared light and close to no UV emissions.



## Ceramic Unit

(Roller kiln and full drying squaring & chamfering machine)

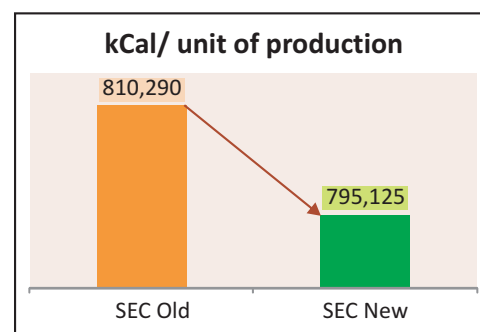
Particulars	Description
Loan Amount / Yr. of assistance	Term Loan of Rs. 100 Lakh under KfW EE Line of Credit/ 2014
Borrower / Category	MSME – Manufacturing
Product / Industry sector	Manufacturing of Ceramic Glaze Tiles / Ceramic
Project Location	Morbi, Gujarat
Annual Turnover of the company	Rs. 3,135.66 Lakh (base year 2013)
Networth of the company	Rs. 757.44 Lakh (base year 2013)
Project DSCR	1.67
Loan Tenure	60 months including the moratorium period of 06 months

### Project Brief

- The unit is a private limited company which is engaged in the manufacturing of Ceramic Glazed tiles.
- **Raw material:** The raw materials used in manufacture of tiles are wallastonite, dolomite, china clay, santalpur clay. Some natural minerals such as feldspar that are also used to lower the firing temperature and chemical additives required for the shaping process.
- The process of manufacture of ceramic tiles is well established and it consists of raw material preparation, wet grinding, granulation, pressing, drying, glazing and sizing.
- The ceramic sector in India faces numerous challenges due to use of inefficient technologies, lack of awareness regarding Energy Efficiency and productivity improvement systems. Increased fuel cost and pollution due to old inefficient hot air generators also add to the problem.
- In order to overcome the problems mentioned above, the company proposed for modernization and technology upgradation of its unit by installation of a roller kiln and full drying squaring and chamfering machine.
- The total cost of the project was Rs. 146.94 Lakh and SIDBI has sanctioned an assistance of Rs. 100 Lakh under KfW EE Line of Credit.
- It has been estimated that there would 50 % energy savings in Roller Kiln over conventional Tunnel Kiln and other advantages include productivity improvement and reduced cycle time.
- Full Dry Squaring & Chamfering Line equipped with PLC control, frequency inverter and heavy duty type grinding assembly has an energy saving potential of upto 25 %.

### Environmental Impact

- Estimated reduction in cumulative energy consumption: 15,165 kCal/ unit of production.
- Reduction in Green House Gas (GHG) emissions: 555 tons of CO<sub>2</sub> equivalents per annum.



## ESCO-Company

(Variable Frequency Drives)

Particulars	Description
Loan Amount / Yr. of assistance	Revolving Term Loan Limit of Rs. 10 crore under KFW EE Line of Credit / 2012
Borrower / Category	MSME – ESCO-Grade 3 (Empanelled by BEE)
Product / Industry sector	Manufacturing of Control Panels & dealing in Energy Saving Solutions (Assembling and processing energy saving Medium Voltage Drives (MVD) with by-pass panel and other engineering devices by studying the plant fit for energy saving solutions) / ESCO
Project Location	Pune, Maharashtra
Annual Turnover of the company	Rs. 1,136 Lakh (base year 2012)
Networth of the company	Rs. 1,346.42 Lakh (base year 2012)
Project DSCR	Not Applicable being a Cash flow financing revolving limit
Loan Tenure	30 months with moratorium period of 06 months for each project

### Project Brief

- The unit was incorporated in the year 2006 and is registered as Small Enterprises at Directorate of Industries, Government of Maharashtra. Since 2008, the Company has been engaged in providing energy efficiency solutions to energy intensive sectors such as power plants, oil and gas sectors, steel, cement etc., which have major utility loads such as pumps, fans, compressors etc. The company has been awarded “Innovation energy saving product/service award” by CII in August 2011.
- The major activity of the Company is to implement Energy Efficiency solutions (Installation of Medium Voltage Drives and allied products) in industrial units by providing end to end turnkey/ retrofit solutions, the main benefits of which are energy savings and CO<sub>2</sub> reduction. The scope of work envisages design, engineering, manufacturing, supply and commissioning of complete project on performance based contracting mode.
- The entire work towards end to end turnkey/retrofit solutions covers the following scope: a) equipment audit, b) energy saving solutions, c) site evaluation/process conditions/fault tolerance conditions required, d) installation of energy saving equipment (VFD) and AC system, e) cable laying, f) civil construction, g) tuning/ interfacing to achieve desired process conditions & achieve energy saving objectives h) post operational AMC, maintenance.
- SIDBI has sanctioned a revolving limit of Rs.10 crore to the Company for executing projects on ESCO mode.



### Environmental Impact

- A total of ten projects (aggregating Rs. 1,841 Lakh) have been implemented under the above limit which includes installation of 21 Variable Frequency Drives (VFD) in Steel & Power plants.
- Net Reduction in Power Consumption: 39,352 MWh/Yr
- Reduction in Green House Gas emission (GHG): 43,287 ton of CO<sub>2</sub> equivalents per annum.



## Electrical and Electronic Unit

(LED lightings)

Particulars	Description
Loan Amount/Yr. of assistance	Risk Capital Assistance of INR 200 Lakh under KfW Innovation Line of Credit/2012
Borrower/Category	MSME – Manufacturing sector
Product/Industry sector	Manufacture/Assembly of Light Emitting Diode(LED) street lights, LED office lights, LED drivers and controllers/Electrical and Electronics
Project Location	Bangalore, Karnataka
Annual Turnover of the company	Rs. 2,745.85 Lakh (base year 2012)
Networth of the company	Rs. 638.21 Lakh (as on 2012)
Project DSCR	3.76
Loan Tenure	84 months including moratorium of 36 months

### Project Brief

- The unit was established in 1998 as a proprietary concern and later converted into a private limited company on September 04, 2008. The company is engaged in the manufacturing/assembling of Light Emitting Diode (LED) street lights, LED office lights, LED drivers and controllers. The company has a full-fledged Research and Development (R&D) center for developing innovative LED products and customizing them based on customer specifications. The company is presently involved in developing power electronics technology products based mainly on energy efficient applications such as solar lighting and allied products, ACLED lights, solar chargers and control devices.
- The main raw material required for the products of the Company are LED chips, fixtures and electronic components. LED chips and fixtures are imported from Singapore and Hong Kong. The company is supplying around 300 products of different wattages and different dimensions. The Company is specialized in outdoor high wattage lighting systems such as LED street lights, flood lights, high mast lights and indoor office lights such as lights for commercial spaces and solar lights such as solar street lights, home lights, solar lanterns and solar charge controllers. The company has demonstrated the product quality and capabilities by
  - Supplying more than 60,000 LED street lights over the last 3 years to domestic and export markets. The company has the distinction of lighting more than 300 kilometers of highway in India purely lit with LED in one single project.
  - In the office space segment, the Company has illuminated more than 5 million square feet of space with its LED lights in private sector banks, hotels, lodges, shops, ATMs, IT centers, offices etc.
  - In Solar lighting, the Company has delivered more than 2 Lakh LED lanterns to various markets and illuminated more than 300 villages and homes with Solar LED Street Lights and home lights.
  - Also, the Company bagged the first LED tender from Central Power Research Institute (CPRI) and has the distinction of supplying Solar and office lights to CPRI.
- Considering the environmental responsibility and a need to achieve the goals envisaged to increase demand of renewable energy sources in Indian market, the unit had planned for an investment of INR 250 Lakh in its existing infrastructure viz-a-viz to set up nationwide sales and marketing team in addition to strengthening of the existing network. In view of the above, it was proposed to increase R&D personnel capacity to manage the increasing load on





new product development and to support sales activities from technical side and also proposed to set up testing and development laboratory in-house. For fulfilling these activities, the company approached SIDBI seeking Risk Capital Assistance of Rs. 200 Lakh (Sub-debt) for expenses relating to marketing/product development/ R & D etc. Total project cost was Rs. 250 Lakh.

### Environmental Impact

- o **Long Life:** LED bulbs and diodes have outstanding operational life time expectation of up to 1,00,000 hours. This is 11 years of continuous operation, or 22 years of 50 % operation.
- o **Energy Efficiency:** Today's most efficient way of illumination and lighting, with an estimated energy efficiency of 80 % - 90 % when compared to traditional lighting and conventional light bulbs.
- o **Ecology Friendly:** LED lights are free of toxic chemicals. Most conventional fluorescent lighting bulbs contain a multitude of materials like mercury that is dangerous for the environment.
- o **Zero UV Emissions:** LED illumination produces little infrared light and close to no UV emissions.



## Electrical Equipment Manufacturing

(Transformer for three phase locomotives)

Particulars	Description
Loan Amount / Yr. of assistance	Term Loan of Rs. 200 Lakh under KfW Innovation Line of Credit/2013
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing and repairing of transformers/ Electrical Equipment
Project Location	Thane, Maharashtra
Annual Turnover of the company	Rs. 2,886.66 Lakh (base year 2013)
Networth of the company	Rs. 837.09 Lakh (base year 2013)
Project DSCR	4.39
Loan Tenure	60 months after an initial moratorium of 06 months

### Project Brief

- This ISO-9001:2008 Company was incorporated in the year 1995 and has been involved in the manufacturing and repairing of transformers. The company is engaged in the manufacturing of EMU transformer, utilised by Indian Railways for DC to AC conversion. The Company is supplying 5400 kVA transformer (major supplier) and three phase locomotive transformers to Indian Railways.
- **Raw material:** Electrolytic Copper, CRGO Lamination and transformer oil which are available indigenously.
- The Company observed that there is a good potential for increasing the operation efficiency of the transformer through innovative research, manufacturing and quality control techniques. Hence, the company decided to modernise the manufacturing unit by purchasing additional machinery, testing equipment and prototype development of product to go hand in hand with evolving changes in technological requirement. In this regard, the Company approached SIDBI in order to avail loan for the purchase of following machineries:
  - Vacuum drying plant with all accessories as per technical specification having internal size of width 3000 mm, depth 3200 mm and height 3500 mm.
  - Floor Mounted & Elevated Winder Head Type Vertical Winding Machine (Fully Automated).
- With the help of these machineries, the company would manufacture transformers to be used in Indian Railways three phase locomotives (LOT-6500 & LOT-7500) (which would then be installed in electrical engines). The transformers manufactured would be able to save electricity upto 40 %. The proposed locomotives would be capable of hauling 20/22 bogies.
- In order to gradually phase out diesel locomotives, Indian Railways has proposed to introduce conventional 1-Phase electric engines and thereafter gradually increase the adoption 3-Phase Electric Engines in which the proposed transformers would be used.
  - 3-Phase locomotives (LOT-6500 & LOT-7500) would have a capacity of 6,000 HP power (capable of hauling 20/22 Bogies) whereas the conventional 1-Phase locomotives provide 4,360 HP power (capable of hauling 14/15 Bogies). Hence, by using 3-Phase locomotives, hauling capacity of the train would be improved and hence cascading of engines (in series) could be avoided.
- Other benefits of the latest technology transformers: (i) Power saving by regenerative braking, (ii) Increase in hauling capacity, (iii) Helps in replacing diesel locomotives and (iv) Import substitute electrical equipment.
- The total project Cost was around Rs. 305.92 Lakh and SIDBI has sanctioned a term loan of Rs. 200 Lakh under JICA-EE Line of Credit.
- It is worthwhile to mention that the Company has been awarded “Best SME Award” by the Bank of India.

### Environmental Impact

- Estimated electricity savings: The new transformer would be able to save upto 40 % electricity and this would result in significant reduction in Green House Gas (GHG) emissions.



## Engineering Unit

(200 kW Solid State H.F. Induction Welder)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 29 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Lancing pipes / Engineering
Project Location	Jamshedpur, Jharkhand
Annual Turnover of the company	Rs. 923 Lakh in FY 2011
Networth of the company	Rs. 244.53 Lakh in FY 2011
Project DSCR	2.22
Loan Tenure	45 months after a moratorium period of 03 months

### Project Brief

- The unit is a private limited company situated at Jamshedpur. The Company was incorporated in the year 1993. The firm is engaged mainly in manufacturing of lancing pipes and ERW black pipes. It is the only small scale industry manufacturing this kind of product in Jharkhand.
- The Company is mainly supplying its product to TATA Steel and SAIL. The manufactured pipes find its use in the LPG cylinder factory, automotive industry, truck/bus body, building industry, furniture, etc. It is also supplying its product to steel plant, ferro alloys, ferro manganese plants.
- The unit realized the deficiency in the operation due to conventional machine which was affecting the quality of the product and approached SIDBI for financing of the 200 kW solid state H.F. Induction Welder
- SIDBI has financed the project under JICA EE Line of Credit.
- The total cost of the project was Rs. 40.00 Lakh and loan has been availed for Rs. 29 Lakh.
- By installation of above, the unit has realized the following benefits:
  - Highest level of reliability & efficiency
  - Can handle wide range of voltage fluctuations and increased protection against coil arcing & short circuits
  - Reduced energy consumption and enhanced productivity
  - Easy maintenance
  - Improved Product quality (smooth & finished product that does not require further finishing)
  - High reliability
  - Better working environment



### Environmental Impact

- By implementation of the EE equipments / machinery as mentioned above, the unit is realizing the energy efficiency benefits upto 75 - 80 %.
- Significant reduction in Green House Gas emission (GHG).



## Engineering Unit

(Metal sheet (iron and steel) fabrications)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 75 Lakh under JICA EE Line of Credit / 2011
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Developing, prototyping, batch production of metal fabrications/ Engineering
Project Location	Patelnagar, Dehradun
Annual Turnover of the company	Rs. 202.14 Lakh (base year 2011)
Networth of the company	Rs. 122 Lakh (base year 2011)
Project DSCR	3.00
Loan Tenure	60 months after an initial moratorium of 06 months

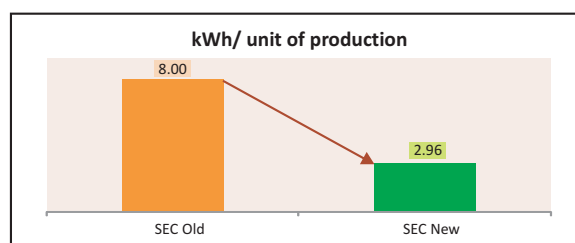
### Project Brief

- The company was established in the year 1969 and since then has been involved in developing, prototyping, batch production of metal (iron and steel) fabrications.
- Earlier, the unit outsourced intricate cutting operations and then the unit has decided to carry out the operation in-house. Hence, in order to purchase the new machinery, the unit has made enquires and visited various similar units. The owner of the unit wished to install latest energy efficient cutting machine and has finalized “5 Axis Flow CNC Abrasive Water Jet Cutting Machine”. In view of the above, the unit approached SIDBI in order to avail loan for the purchase of above said machinery.
- The “5 Axis Flow CNC Abrasive Water Jet Cutting Machine” could carry out cutting with better quality than the laser and/ or plasma cutting machines. This machine could also perform multiple operations simultaneously with reduced tool wear. The machine system configuration has incorporated a design that would combine the motion control, pump and high-pressure components of water-jet cutting tool into one compact machine. Following are some of the advantages of water jet cutting machine.
  - Energy Efficient and Cost Effective.
  - Minimal floor space and provision of excellent operator access.
  - Configured for easy material loading and unloading.
  - Can cut intricate shapes (fine detail cuts) not possible using traditional methods.
  - High Quality finish.
  - Tolerances up to  $\pm 0.1$  mm.
  - Fast set-up and programming.
  - No heat-affected zone, no part distortion and no ash or carbon deposits.
  - Capable of cutting any material.
- The total cost of the project was Rs. 136 Lakh and SIDBI has sanctioned a loan of Rs. 75 Lakh under JICA EE Line of Credit.



### Environmental Impact

- Estimated electricity savings: 1,51,200 kWh per year.
- Reduction in Green House Gas (GHG) emissions: 121 tons of CO<sub>2</sub> equivalents per annum.



(Moulded Components and Sheet Metal Components)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 68 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of rubber moulded and sheet metal components/ Engineering
Project Location	Dehradun, Uttarakhand
Annual Turnover of the company	Rs. 420.4 Lakh (base year 2012)
Networth of the company	Rs 146.95 Lakh (base year 2012)
Project DSCR	1.77
Loan Tenure	54 months after an initial moratorium of 06 months

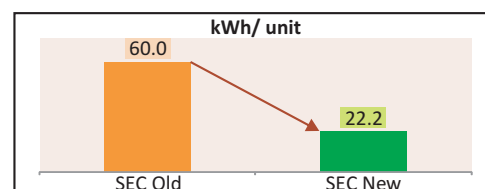
### Project Brief

- This ISO 9001-2008 Certified Company was established in the year 2004 and since then has been involved in the manufacturing, supplying and exporting of Rubber Moulded Components and Sheet Metal Components (corrosion resistant base plates, clamps, covers, washers, brackets). These products find their utilization in Automobiles, Electric Bulbs and Tubes, Defence, Home Appliances, Power Corporations & Hydro Projects, and Oil & Gas Fields.
- Earlier, the unit had to purchase moulds from outside (required for the manufacturing of rubber components). Because of this, the unit was experiencing problems such as higher costs and poor quality. Hence, the unit decided to install precision surface grinding machine (latest and energy efficient) for the in-house preparation of moulds.
- In view of the above, the unit approached SIDBI for the purchase of surface grinding machine with the following features:
  - Specification: Rated Voltage: 420 V, Rated Current: 10.5 A
  - Surface grinding accuracy: of 5 micron (conventional machine: 15 micron only) and brings good parallelism in the mould matching. Machine base, table, saddle and column are made from MEEHANITE cast iron with precision treatment for constant accuracy.
  - Automatic down feed for fully automatic 3 Axis operation
  - PLC controlled column travelling cross feed for precision grinding
  - Cross feed lead screw is hardened and precision ground to provide optimal accuracy
  - Full length splash guard
  - Separate hydraulic unit avoids the transmission of heat or vibration to the machine
- The total project cost was Rs. 91.25 Lakh and SIDBI has sanctioned a loan of Rs. 68 Lakh under JICA EE Line of Credit.



### Environmental Impact

- Estimated Electricity Savings: 34,020 kWh/ annum.
- Reduction in Green House Gas (GHG) emissions: 27.22 tons of CO<sub>2</sub> equivalents per annum.



## Fly Ash Brick Unit

(Autoclaved Aerated Concrete (AAC) Blocks)

Particulars	Description
Loan Amount / Yr. of assistance	Term loan of Rs. 1,500 Lakh under KfW-SIDBI's Innovation Finance Program (IFP) and Sub debt of Rs. 250 Lakh under GEMS for manufacturing of AAC blocks used in Green Buildings/ 2013
Borrower / Category	MSME – Manufacturing sector
Product / Industry sector	Masonry product-Autoclaved Aerated Concrete (AAC) Blocks/ Buildings
Project Location	Nasik, Maharashtra
Annual Turnover of the company	Rs. 87.38 Lakh (base year 2013)
Networth of the company	INR 16.95 Lakh (as on 2013)
Project DSCR	1.55
Loan Tenure	Term Loan : 60 months after a moratorium period of 24 months Sub-Debt : 84 months including moratorium of 36 months

### Project Brief

- The company was incorporated in March 2013 and approached SIDBI to avail loan for setting up a facility for manufacturing of Autoclaved Aerated Concrete (AAC) blocks, with an installed capacity of 1.50 Lakh cubic meter/ annum (500 cubic meter/day for 300 days in a year). The capacity is around 21,000 bricks/day.
- The very fact that Autoclaved Aerated Concrete (AAC) block has fly ash, a by-product of the steel/ power industry, and cement as its base content makes it a green building product, as compared to the earthen soil that is used in the manufacture of traditional bricks. Traditionally, the industry has been using red-clay bricks. These stress our Nature a lot, since arable soil is used for making these bricks. At the same time, since they are cooked, they cause the release of greenhouse gases. Also, as soil becomes dearer, the cost of red-clay bricks is on the rise. Apart from this, more joints in the wall are required while using red-clay bricks. The industry is now cognizant of these challenges and is shifting to modern materials. The most tangible benefits are savings in construction water and energy costs and intangible benefits include enhanced air quality, longer life, safety for occupants and the conservation of scarce natural resources. Besides being hazardous to the environment, red brick is also inconsistent in strength or dimension. It requires a concurrently high use of plaster, steel and labour, which eventually increase the overall costs of construction.
- SIDBI has sanctioned a term loan of Rs.1,500 lakh under KfW Innovation Finance Program (IFP). Further, a sub-debt of Rs.250 Lakh has also been sanctioned by SIDBI under GEMS.



## Environmental Impact

<ul style="list-style-type: none"> <li>➤ Construction using AAC blocks helps to save up to 14 and 18% in terms of structural savings on cement and steel respectively.</li> </ul>	<ul style="list-style-type: none"> <li>➤ <b>High thermal insulation:</b> This material has a very low coefficient of heat transmission meaning air conditioners will need almost half the energy to achieve the same cooling effect. This will result into substantial Green House emissions.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Low density (about a third of that of traditional clay bricks) aids in the rapid completion of construction activities, reducing timeframes by as much as 30 %.</li> </ul>	<ul style="list-style-type: none"> <li>➤ <b>Green Technology:</b> As it is made from fly ash, it helps the environment making our construction greener.</li> </ul>
<ul style="list-style-type: none"> <li>➤ The total load on the foundation decreases by up to 27 %.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Manufacturing of AAC blocks and panels does not consume high amount of energy. Moreover since AAC blocks are light weight, it saves energy required for transportation and leads to reduced CO2 emissions by transport vehicles. Since AAC blocks are made from fly ash– an industrial waste product– generated by thermal power plants, it offers a low cost and sustainable solution for today and tomorrow. AAC blocks are a requisite for green buildings.</li> </ul>
<ul style="list-style-type: none"> <li>➤ The large face of the block helps to reduce the number of joints and mortar usage.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Considering the colossal problem of disposal of fly ash, as well as the opportunities for conserving traditional resources like clay, cement, etc., the manufacturing of fly ash bricks is very important from the nation’s environmental and economic points of view.</li> </ul>
<ul style="list-style-type: none"> <li>➤ Also, AAC blocks with good insulation properties reduce power consumption by up to 28 %.</li> </ul>	



## Forging Unit

(Induction Billet Heating System)

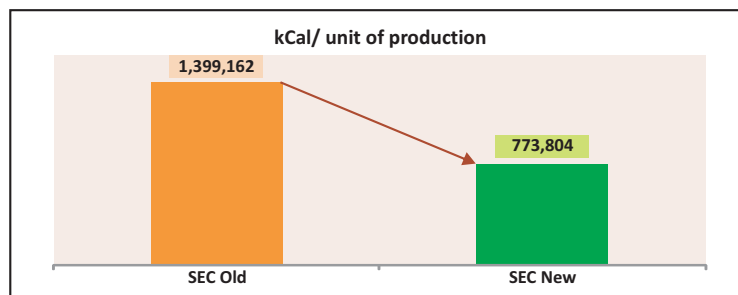
Particulars	Description
Loan Amount / Yr. of assistance	Rs. 34 Lakh under KfW EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of forged alloy components for Automobile industry / Forging
Project Location	Nasik, Maharashtra
Annual Turnover of the company	Rs. 988 Lakh (base year 2011)
Networth of the company	Rs. 88.48 Lakh (base year 2011)
Project DSCR	2.75
Loan Tenure	60 months after an initial moratorium of 06 months

### Project Brief

- The company was established in 1980 and started its business activities related to forging of various auto components.
- **Raw material:** Round bars of carbon steel, Alloy Steel available from the dealers of Rashtriya Ispat Nigam Ltd. in Visakhapatnam, Nagpur, Pune and Mumbai and ISMT, Facor Steel and Bhushan Steel.
- Forging Industry occupies a significant place among the micro, small and medium enterprises in the manufacturing sector of Indian economy. The forging sector in India faces numerous challenges due to the use of inefficient technologies, lack of awareness regarding energy efficiency and productivity improvement systems, and squeezed margins from OEMs, and pollution due to old inefficient furnaces. The unit was facing similar challenges like increasing oil prices, pollution, fuel storage, safety, product quality and raw materials etc.
- In such a situation, the unit approached SIDBI for the financing of two Induction Billet Heating System and Transformer (750 kVA) to replace the existing oil fired furnace from their unit. The total cost of the project was Rs. 45.35 Lakh.
- SIDBI has sanctioned a loan of Rs. 34 Lakh under KfW EE Line of Credit.

### Environmental Impact

- Induction billet heater is more efficient and operator-friendly solution for billet heating. Main benefits of the technology are reduced energy cost, uniform heat distribution and high surface quality for the finished product. Other benefits include reduced scale loss and better control over production rate. Besides, there is better working environment from the workers' health and safety perspective.
- Estimated Furnace Oil savings of 234 KL/annum with an annual additional electricity consumption of 5,04,552 kWh.
- Reduction in Green House Gas (GHG) emissions: 269 tons of CO<sub>2</sub> equivalents per annum.





## Case Study-14

# Forging Unit

(Medium Frequency Induction Heater)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 80 Lakh under JICA EE Line of Credit / 2009
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Gears, Axles & Shafts/ Forging
Project Location	Solan, Himachal Pradesh
Annual Turnover of the company	Rs. 3,242 Lakh (base year as on March 31, 2008)
Networth of the company	Rs. 845 Lakh (base year as on March 31, 2008)
Project DSCR	2.28
Loan Tenure	84 months including moratorium

### Project Brief

- The unit was established in the year 1984 and engaged in manufacturing of high-end automotive components for the off-highway segment of automobiles including tractors, earth movers, and heavy duty equipment.
- The company's usual process of end bar heating and upsetting was carried out in traditional forge shops with fuel oil fired reheating furnace. Such reheating furnaces have one charging end which remains open while the work piece was heated. The furnace was inefficient in design due to openings in furnace chamber. The fuel consumption in such furnaces lies between 80–120 litre of fuel oil per ton of forged material depending on the dimensions of the work piece. These figures were relatively high and this is considered to be fuel wastage.
- To overcome the above mentioned inefficient operation, the company planned to invest in the energy efficient Induction end-bar heating furnace which is essentially a medium frequency induction heater for reheating of billets prior to forging/up-setting. Accordingly, the company has approached SIDBI for financial assistance.
- Advantages over the conventional method of end-bar reheating are lower specific energy consumption, speedy production, reduced material loss and increased productivity.
- Total estimated Project cost was Rs. 128.65 Lakh and SIDBI has sanctioned an assistance of Rs. 80 Lakh under JICA EE Line of Credit.

The average fuel oil consumption of the conventional fuel fired oil reheating furnace for manufacturing rear axle shaft blank (~27 kg per piece) was 85 litre/ ton of production which would translate into specific energy consumption (SEC) of 0.75 MkCal/ ton. The quantum of reduction in SEC realized after the installation of the induction end-bar heater was 0.40 MkCal/ton (equivalents to 240 ton of fuel oil consumption per annum).

Fuel oil fired end bar reheating furnace

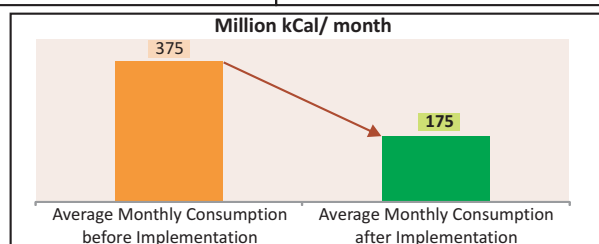


Induction end bar heater in operation



### Environmental Impact

- Thermal Energy Savings: 2,400 Million kCal/Yr
- Reduction in Green House Gas (GHG) emission of 768 tons of CO<sub>2</sub> equivalents per annum.



(Multi station Horizontal Former: Cold Forging Machine)

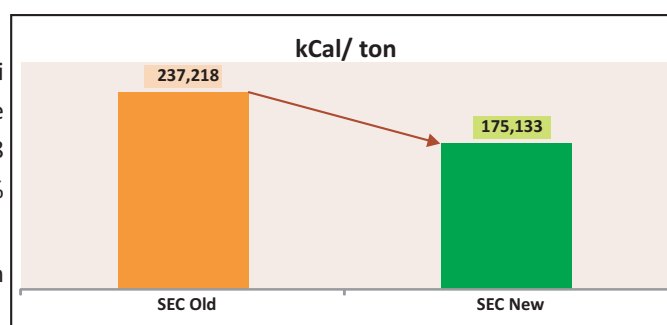
Particulars	Description
Loan Amount /Yr. of assistance	Rs. 66 Lakh under KfW EE Line of Credit / 2014
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of fasteners and sheet metal component/Auto component Manufacturing Industry
Project Location	Rohtak (Haryana) and Rudrapur (Uttarakhand)
Annual Turnover of the company	Rs. 4,245.57 Lakh in FY 2013
Networth of the company	Rs. 579.89 Lakh in FY 2013
Project DSCR	2.04
Loan Tenure	54 months after a moratorium period of 06 months

### Project Brief

- The company was incorporated in the 1995 with the objective of manufacturing of fasteners and sheet metal components.
- The company is presently supplying the fasteners and sheet metal components to many of the major auto companies/OEMs. The major clientele of the company comprises of Ashok Leyland Ltd., Neel Auto Pvt. Ltd., Metalman Micro Turners, Mahindra & Mahindra, Mahindra Vehicles Manufactures Ltd., M&M Machine Craft Pvt. Ltd., Caparo Maruti Ltd, KLT Automotive & Tabular Pvt Ltd, Badve Group etc.
- The unit realized that there has been deficiency in the operation due to conventional machines and this in turn has been affecting the quality of the product. Hence, the Company decided to install a Multi station Horizontal Former: Cold Forging Machine and approached SIDBI in order to avail loan for the same.
- The total cost of the project was Rs. 89.00 Lakh and financial assistance has been availed for Rs. 66 Lakh.
- With the installation of above, the unit has realized the following benefits:
  - Reduction in the material waste (produce no material waste)
  - Reduction in energy consumption and enhancement in productivity
  - Improved Product quality (smooth and finished product that does not require further finishing)
  - High reliability
  - Better working environment

### Environmental Impact

- By replacing the conventional machine with new "Multi Station Horizontal Former: Cold Forging Machine", the energy consumption has come down from 2,37,218 kCal / ton to 1,75,133 kCal / ton of production (26 % reduction in energy consumption).
- Reduction of Green House Gas emission (GHG): 15 ton of CO<sub>2</sub> per tonne of production.



## Forging & Foundry Unit

(High Frequency Melting Furnace)

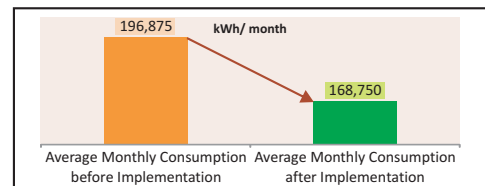
Particulars	Description
Loan Amount / Yr. of assistance	Rs. 150 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing, of ferrous and non ferrous metals/ Casting & Forging Sector
Project Location	Jaipur, Rajasthan
Annual Turnover of the company	Rs. 2,028.24 Lakh (base year as on March 31, 2012)
Networth of the company	Rs. 43.56 Lakh (base year as on March 31, 2012)
Project DSCR	2.11
Loan Tenure	60 months after moratorium of 06 months

### Project Brief

- The unit was incorporated in December, 2006 and engaged in casting and forging of grinding media balls (GMBs) which are being used as critical components in thermal power stations, chemical plants, cement plants and fertilizer units. The company is ISO 9001 & ISO 14001 certified and is the leading manufacturer cum supplier of carbon and alloyed Steel Grinding Media Balls in size ranging from 15 mm to 150 mm diameter. The Grinding Media Balls are used in Tubular Mills for grinding / crushing of coal / mineral / ores etc.
- The company was using two melting furnaces of capacity of 1.0 Ton each but only one could be used at a time. The melting time was around 1 hour 30 minutes and pre-heating time was about 10 to 15 minutes. The total cycle time was around 105 minutes. The furnace is capable of completing six such melting cycles per day.
- Considering the importance of Energy Efficiency, the company has approached SIDBI for installing modern furnaces with VIP dual-track power supply system. A VIP Dual-Track system simultaneously feeds power to two furnaces and offered great operational flexibility to the units. These systems enhanced the metal production with the same power rating compared to a single output power unit.
- The present design consists of two furnaces of 500 kg each which can be used independently as well as simultaneously. The power consumption of the system is 450 kW which is distributed among the two furnaces. At full load, the power (full) is utilized by one furnace. The average cycle time for melting is about 45 minutes and one furnace completes about 10 melting cycles per day. For the entire system, a total of 20 melting cycles per day are completed.
- The salient features of the installed machine are listed below:
  - High-strength reinforced refractory top and bottom sections supported by cast alloy structures.
  - Maximum efficiency is provided by the free magnetic path within the furnace.
  - Easy, all-around access and free-breathing coil simplifies maintenance.
  - The batch production capacity of two power units in a single system.
  - Increased metal production without increasing power demand levels or maintain current metal production at reduced power demand levels.
  - Separate sets of controls for each furnace.
  - The ability to efficiently match production to varying levels of demand for molten metal.
  - Increased alloy flexibility.
  - Reduced operation and maintenance costs.
- The project cost was envisaged at Rs. 200 Lakh and SIDBI has sanctioned a term loan of Rs 150 Lakh under JICA EE Line of Credit.

### Environmental Impact

- Electrical Energy Savings: 3,37,500 kWh/Yr
- Reduction in Green House Gas emission (GHG): 270 tons of CO<sub>2</sub>



## Foundry Unit

(Divided Blast Cupola)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 10 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Casted products / Foundry
Project Location	Samalkha, Haryana
Annual Turnover of the company	Rs. 135.21 Lakh (base year 2011)
Networth of the company	Rs. 13.66 Lakh (base year 2011)
Project DSCR	1.57
Loan Tenure	50 months after an initial moratorium of 06 months

### Project Brief

- The unit is a Cast Iron Foundry having a production capacity of around 600 TPA of casted products per annum. The average weight of the casting is around 15 T.
- Manufacturing Process: To begin the production, the coke-fired cupola is filled with layers of coke and ignited with torches. When the coke is ignited, air is introduced to the coke belt through tuyeres. When the operating temperature is reached, the raw material is charged into the furnace through the raw material intake at the top/ side. The raw material is alternated with additional layers of coke & lime etc, which acts as a flux. As the heat rises within the body, the molten metal drips down through the bed, which is subsequently poured in the moulds.
- The energy efficiency of Cupola is measured in terms of the amount of molten metal produced per unit of charged coke. This is known as Coke Feed Ratio (CFR). Lower the CFR, more efficient is the Cupola. Divided blast cupola (DBC) or twin blast cupola is a proven technology for improving the energy performance at a modest investment. DBC supplies blast air to the cupola furnace at two levels through a double row of tuyeres and it offers several advantages over the conventional cupolas. A higher metal tapping temperature and higher carbon pick-up are obtained for a given charge to coke consumption. Charge to coke consumption is reduced and the melting rate is increased, while maintaining the same metal tapping temperature.
- In view of above, Unit approached SIDBI to provide loan for modern & energy efficient machines as given below:
  - **Divided Blast Cupola (DBC):** 24" Inner Dia and allied equipments including air pollution control device, Combustion Air Blower etc. –
    - Overall Coke Feed Ratio (CFR) including the initial coke consumption for bed – 1 : 4.5
    - Coke Feed Ratio (CFR) (Excluding the initial coke consumption for bed) – 1 : 3.9
  - Sand Mixer Muller along with Pneumatically Operated Pin Lift, semi automatic Moulding machine
- The total project cost was around INR 13.44 Lakh. SIDBI has sanctioned a term loan of Rs. 10 lakh under JICA EE Line of Credit.

#### Benefits:

- Reduction in specific coke consumption is around 33% excluding coke consumed initially in the bed.
- Reduction in Lime stone consumption from 32 kgs/ton of molten metal to around 20 kgs/ton of molten metal
- Reduction in power consumption is around 62%
  - Reduction in the power consumption from 2.4 Wh/kg of sand processed to 0.87 Wh/kg of sand processed, which is reduction of around 1.5 Wh/kg of sand processed.

#### Energy Efficient DBC

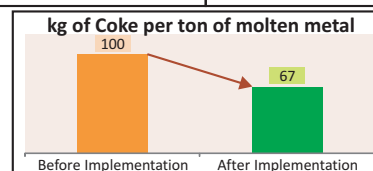


#### Sand Muller



### Environmental Impact

- Net Reduction in Coke Consumed: 33 kg/ton of Molten metal
- Net Reduction in Power Consumed: 1.5 Wh / kg of Sand processed
- Reduction in Green House Gas emission (GHG): 104 kg of CO<sub>2</sub> equivalents per tonne of molten metal.



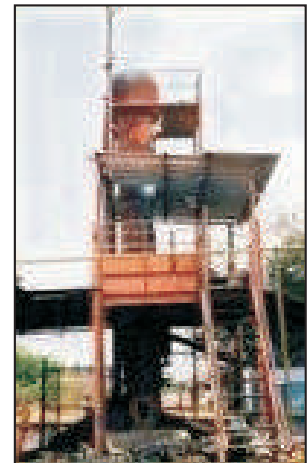
## Foundry Unit

(Divided Blast Cupola)

Particulars	Description
Loan Amount / Yr. of assistance	Term loan of Rs. 67 Lakh under JICA EE Line of Credit / 2011
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Castings / Foundry
Project Location	Coimbatore, Tamil Nadu
Annual Turnover of the company	Rs. 2,595.11 Lakh (base year 2011)
Networth of the company	Rs. 1,046.32 Lakh (base year 2011)
Project DSCR	7.06
Loan Tenure	48 months without any moratorium

### Project Brief

- The unit was incorporated in the year 1985 and since then has been involved in the manufacturing of different types of castings.
- Raw material: Pig Iron and CI Scrap which were procured locally.
- The foundry unit employed cupola for the melting of raw material (pig iron and CI Scrap). The conventional cupola consists of a vertical steel shell lined with refractory. In this cupola, the charge consisting of raw material, coke and flux would be introduced half way up the shell and air blast would be introduced through the tuyeres located near the bottom of the cupola. Heat of combustion that would be generated through the chemical reaction between the charge and air would result in the melting of the metal.
- But, there were some problems associated with the conventional cupola such as higher coke (energy) consumption, higher costs of melting and higher emission. Since the unit was also facing such problems, it decided to purchase and install Divided Blast Cupola for the melting of raw material. In view of the above, the unit approached SIDBI in order to avail financial assistance for the implementation of the project. As part of the project, the following equipments were purchased:
  - 2 nos. of Divided Blast Cupola
  - 1 no. of Sand Plant Mixer RV 15 with water panel.
- Installation and commissioning of the whole plant and machinery was completed by January, 2012.
- The machineries mentioned above were built based on proven technologies. In the case of divided blast cupola where blast air would be supplied at two levels, the unit was able to enjoy benefits such as lower coke consumption, better carbon pick-up, optimum ratio of air delivery and reduced emissions. This also resulted in other benefits such as quality, timely delivery and increased productivity.
- Sand mixer was purchased by the company for the preparation of moulding sand used in furnaces. The mixer provided excellent processing efficiency with reduced energy consumption, minimum maintenance and optimum homogenization.
- The total project cost was around Rs. 90.40 Lakh (term loan from SIDBI for Rs. 67 Lakh).



### Environmental Impact

- Energy Savings:
  - Divided blast cupola: Minimum of 25% energy savings
  - Sand mixer: Minimum of 10% energy savings
- Significant reduction in Green House Gas (GHG) emission.



## Foundry Unit

(Induction Furnace)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 55 Lakh under JICA EE Line of Credit / 2009
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of valves, pumps and auto components/Foundry Sector
Project Location	Coimbatore, Tamil Nadu
Annual Turnover of the company	Rs. 4,700 Lakh (base year as on March 31, 2010)
Networth of the company	Rs. 596 Lakh (base year as on March 31, 2010)
Project DSCR	3.33
Loan Tenure	54 months after a moratorium period of 06 months

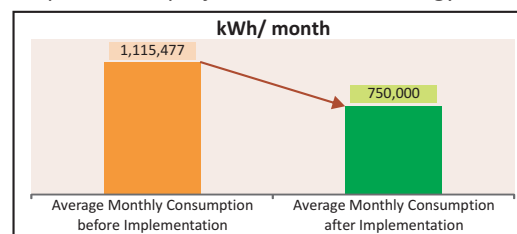
### Project Brief

- The unit was established in the year 1979 and is engaged in the manufacturing of valves, pumps and perfected grey iron casting into a fully proven process for a wide range of Precision Castings for various engineering, automobile and industrial sectors.
- Earlier, the unit installed Rotary Furnace with an installed capacity of 2 tons/hr and a production capacity of 38 tons/day. The Rotary Furnace operates by rotating the charge in the furnace which comes in direct contact with a burner flame or with a refractory wall which are directly heated by the burner. The disadvantages of such type of furnaces were low efficiency, higher maintenance requirements, and considerable salt cake formation which must be disposed off regularly as a hazardous waste.
- To avoid those disadvantages during operations and to improve the bottom-line of the company, the promoters decided replace the rotary furnace with the Induction Furnace. Accordingly, the company approached SIDBI for financial assistance which has been provided to the company by way of term loan in the year 2010.
- The company installed a 2,000 kg Induction Furnace with hydraulic tilting arrangement and water-cooled heads. The special features of the Induction Furnace are as follows:
  - Controlled melting process
  - The melting process is clean and energy efficient
  - Maximum efficiency is provided by the free magnetic path within the furnace
  - Easy, all-around access and free-breathing coil simplifies maintenance
  - Rear or side exit leads are available
  - Hydraulic tilt.
- The installed capacity of the Induction Furnace was 2 ton/hr and a production capacity of 48 ton/ day. Total connected load of the induction furnace is 1,536 kW. Average furnace oil consumption of the conventional rotary furnace was 4,180 litre/day, the thermal energy equivalent being 38.4 Million kcal/ day (~ 44,619 kWh electrical energy equivalents). Dependency in Furnace oil usage has been entirely removed with this replacement project. 33 % of the energy saving has been achieved under the project.



### Environmental Impact

- Electrical Energy Savings: 4.4 Million kWh/Yr.
- Reduction in Green House Gas emission (GHG): 3,509 tons of CO<sub>2</sub> equivalents per annum.



## Food Processing Unit

(Indirect fired biscuit baking oven)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 37 Lakh under KFW EE Line of Credit / 2013
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of biscuits / Food processing
Project Location	Nagpur, Maharashtra
Annual Turnover of the company	Rs. 235.73 Lakh (base year 2012)
Networth of the company	Rs. 161.40 Lakh (base year 2012)
Project DSCR	2.02
Loan Tenure	54 months after an initial moratorium of 06 months

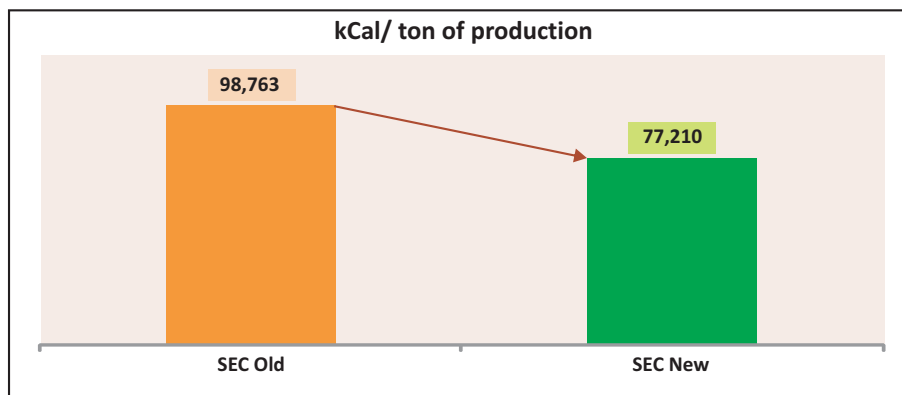
### Project Brief

- The company was incorporated in the year 1995 and is engaged in the job work of manufacturing biscuits for Parle Products Private Limited with an installed capacity of 6,000 MT of biscuits per annum.
- Raw material: Wheat/Maida flour, sugar, fats, milk powder, salt, chemicals, flavours, etc., and additives like glucose, malt, soya lecithin, vanilla, etc. all of which are supplied by Parle.
- With the existing 33 inches X 210 Feet oven, the unit was facing problems like frequent break downs, reduced quality and high energy consumption.
- The unit decided to replace its existing oven the new Indirect fired biscuit baking oven and purchase other machineries such as Fuel efficient Conveyor, Furnace (3190 sq ft) and heavy oil burner with nozzle and kit.
- In view of the above, the unit approached SIDBI for financial assistance.
- The total project cost was around Rs. 52.15 Lakh and SIDBI has sanctioned a loan of Rs.37 Lakh under KfW EE Line of Credit.



### Environmental Impact

- Estimated Electricity Savings: 1,50,000 kWh/Yr
- Reduction in Green House Gas (GHG) emissions: 124 tons of CO<sub>2</sub> equivalents per annum.



## Case Study-21

# Food Processing Unit

(Vertical Extractor & Feed Pump, Double effect Falling Film Evaporator, Double Stage Spray Drying Plant, Air Compressor, Chilling Plant, Boiler, Membrane Filter Press etc.)

Particulars	Description
Loan Amount / Yr. of assistance	Term loan of Rs. 380 Lakh and Rs. 20 Lakh under as sub-debt under JICA EE Line of Credit / 2011
Borrower / Category	MSME - Manufacturing sector
Product / Industry sector	Manufacturing of herbal food and beverage ingredients/Food processing
Project Location	Panchmahal, Gujarat
Annual Turnover of the company	Not applicable (New Unit)
Networth of the company	Not applicable (New Unit)
Project DSCR	1.88
Loan tenure	60 months including a moratorium of 12 months

## Project Brief

- The company was established in the year 2007. Inspired by the working experience of one of its associate firms (manufacturing of herbal extracts for pharmaceutical use), the Company decided to set up a new unit for the manufacturing of Herbal Food & Beverage Ingredients (Chicory powder and liquid chicory) with an installed capacity of 1,200 MTPA.
- Raw material: Chicory roots, washed, sliced and dried.
- For the manufacturing of chicory, the company decided to employ a process called agglomeration. This involves extraction of separate natural fibres from chicory root (enzyming process) and production of chicory granules with low density through special drying. The small pieces of chicory arriving at the factory would pass through the vertical extractor in running hot water and this would result in the production of extracted liquid. This is treated with specific biotechnological enzymes and the purification takes place in a 35 ft tall pre-engineered building which would host a series of Reverse Osmosis (RO) and De-Mineralization (DM) units, compressors, and as well as boiling, evaporating and chilling units. The purified product would then be evaporated to form liquid chicory, and this would further evaporated in special spray drying machines to form coffee granules and coffee powder.
- In view of the above, the Company approached SIDBI in order to avail loan for setting up the plant that would be equipped with energy efficient latest technology machineries. The total project cost was around Rs. 600 Lakh (term loan for Rs. 380 lakh and Rs. 20 lakh as sub-debt). Details of plant and machinery and expected benefits are as follows:
  - o Vertical Extractor & Feed Pump with Enzyming Process machinery (10,000 litre storage capacity) and Double effect Falling Film Evaporator with Single Stage Finisher. Double effect evaporator has been a highly efficient heat transfer equipment wherein boiling happens in successive stages of reduced pressure.
  - o Double Stage Spray Drying Plant with agglomeration system
  - o Air Compressor, Steam Filter (Sugar melt Solution flow rate of 1 ton/ hr), Chilling Plant, Boiler, Membrane Filter Press and Grinder.

## Environmental Impact

- Energy Savings:
  - o Energy Efficient Air Compressors: 30-50 % energy savings
  - o Energy Efficient Boilers: 6-10% energy savings
  - o Falling film evaporator: 5-10 % energy savings.
- Significant reduction in Green House Gas (GHG) emission.





## Food Processing Unit

(Automatic Sealing & Packing Machine)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 50 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Food Industry
Project Location	Cuttack, Orissa
Annual Turnover of the company	Rs. 1,066.84 Lakh (base year 2011)
Networth of the company	Rs. 220.65 Lakh (base year 2011)
Project DSCR	1.75
Loan Tenure	60 months

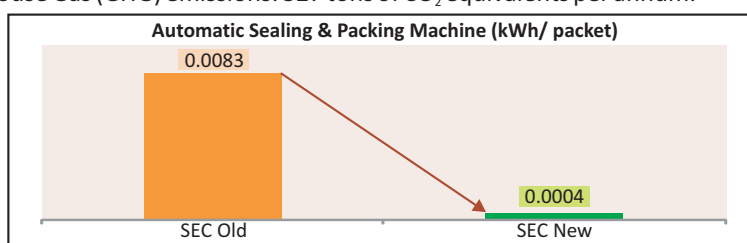
### Project Brief

- The company was established in the year 1997 and has been involved in the manufacturing of 65 varieties of biscuits (Coconut, Butter, Marigold, Salty and various cream biscuits) and cookies.
- Packing of biscuits at the unit was carried out with the help of table based heating and packing machines. The wax paper was heated on the heating table in which biscuits would then be packed and wrapped (in poly wrapper) using sealing machine. The main drawback of the machine was high energy consumption and operator safety. Also, the packing on the old machine was very slow. Hence, in order to overcome the above problems, the owner of the unit decided to install Automatic Sealing and Packing Machine. In view of the above, the owner of the unit approached SIDBI in order to avail loan for the purchase of machineries.
- The unit has installed machine to diversify the business of the unit as the installed machine can carry out automatic packing of biscuits.
- Benefits of the machinery: Less energy consumption, faster packing, fully automatic and safer for the operator.
- Other energy efficient machineries purchased through SIDBI assistance were stripper unit with VFD control, moulding rotary stacker and two tier cooling conveyor.
- The total cost of the project was Rs. 68.85 Lakh and SIDBI has sanctioned a loan of Rs. 50 Lakh under JICA EE Line of Credit.



### Environmental Impact

- Estimated electricity saving (Automatic Sealing and Packing Machine): 4,09,680 kWh per year.
- Reduction in Green House Gas (GHG) emissions: 327 tons of CO<sub>2</sub> equivalents per annum.



## Furniture Unit

(Fully Automatic Particle Board Plant)

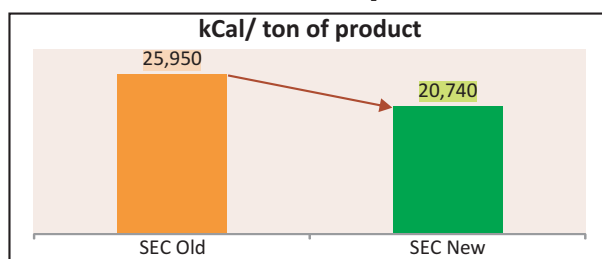
Particulars	Description
Loan Amount / Yr. of assistance	Rs. 775 Lakh under KfW EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Particle Board/ Furniture Sector
Project Location	Morbi, Gujarat
Annual Turnover of the company	Rs. 2380 Lakh (base year as on March 31, 2011)
Networth of the company	Rs. 1255 Lakh (base year as on March 31, 2011)
Project DSCR	1.77
Loan Tenure	72 months after an initial moratorium period of 12 months

### Project Brief

- The unit was established in the year 2008 and since then has been engaged in the manufacturing of decorative laminated sheets and particle board which are widely used in residential buildings, commercial complexes, hotels, offices, multiplex, shopping malls, etc. for furniture and fixture for decorative purpose.
- The company has explored in detail about the manufacturing process of the particle board plant in the nearby industrial clusters. Most of the industries in the nearby similar clusters were using a semi-automatic particle board plant which has consumed more energy in terms of both electricity and coal. The production capacity was also lesser with the semi automatic plant.
- In order to avoid risks such as higher electrical energy consumption and also to minimize the usage of coal for the production processes and increase in production capacity, the company proposed to purchase an Energy Efficient Particle Board plant. Accordingly, the promoters approached SIDBI for a financial assistance. A term loan was provided to the company for its project.
- Fully Automatic Particle Board plant having Electric Motor with A.C. Drive was installed as part of the project. The automatic plant has a specific energy consumption of 20,740 kcal/ton of product whereas the conventional semi-automatic plant has a specific energy consumption of 25,950 kcal/ton of product. The production capacity of the particle board has also increased by 1.25 times with coal usage reduced by 17% and the electricity usage reduced by 18%. The bottom line of the company has improved. With this replacement project, the company has been able to achieve an energy savings of 60%.

### Environmental Impact

- Electrical Energy Savings: 23,40,000 kWh/Yr
- Reduction in coal consumption: 2,244 tons/Yr
- Reduction in Green House Gas emission (GHG): 4,775 tons of CO<sub>2</sub> equivalents per annum.



## IT Data Centre – Building

(ECBC Compliance)

Particulars	Description
Loan Amount / Yr. of assistance	Term loan of Rs. 950 Lakh under JICA EE Line of Credit / 2009
Borrower / Category	MSME - Service Sector
Product / Industry sector	Software Development, Product Development and Internet Marketing Services/ Building
Project Location	Chandigarh
Annual Turnover of the company	Not applicable (new unit)
Networth of the company	Not applicable (new unit)
Project DSCR	2.27
Loan Tenure	66 months after 12 months of moratorium

### Project Brief

- The company was incorporated in the year 2004 and was registered with the Software Technology Park of India (STPI) as a 100% export oriented unit. The company was engaged in providing services such as software development, product development and internet marketing services.
- This project was proposed to be built in a covered area of approx. 1,50,000 sq. ft. with two basements, a ground floor and four floors above it. The building was proposed to have the latest hi-tech development centre utilities and other ancillary structure. The building was designed in such a manner that it complied with Energy Conservation Building Code (ECBC). The building was proposed to be equipped with Building Energy Management System.
- In view of the above, the company approached SIDBI in order to avail loan for the construction of the proposed project. Details of energy efficient measures that qualify the building to be energy saving are as follows:
  - o Building Envelope (Building envelope has been optimized by choice of materials with provision of insulation wherever applicable.)
  - o Lighting (Provision of ample natural lighting to optimize artificial lighting. Use of CFLs and T5 lamps for all light fixtures, Use of motion and lux level sensors for interior lighting and use of timer in external lighting, Use of Solar Photovoltaic panels for external and landscape lighting applications)
  - o Heating, Ventilation and Air conditioning (Water cooled central air conditioning plant with least power consumption, Variable Speed Chilled Water Pumping System to conserve pump operation power, Variable Frequency Drives on pumps in cooling towers), Use of High efficiency Blowers in HVAC system, Indoor Air Quality (30% extra fresh air) as per ASHRAE Standard and heat recovery for pre-cooling of fresh air, VAV Boxes for Air Distribution Systems and sound attenuators on supply air streams)
  - o Electrical Equipments (Transformers with on-load tap changers provided for superior voltage regulation, Power factor to be maintained as 0.95 and above. All capacitors would be provided with Harmonic Filters to avoid distortion in Voltage, Use of high efficiency motors for all moving equipment, Provision of dual electronic energy meter (EB & DG Power) in line with green building and LEED practices.



- o Water (Use of Solar Panels for Hot water generation, Nearly one and half day of water storage at site, Sewage Treatment Plant for recycling the sewerage and use of recycled water generated for make-up to the AC & DG cooling towers, flushing and landscaping, Ground water recharge by harnessing the rainfall on site, Water Flow meters at each point to measure actual consumption of water, Automatic upright sprinklers on each floor, Wet Riser System with Fire Hose Cabinets at each emergency fire escape staircase, External Hydrant System.
  - o Other features (Automatic Fire Detection and Alarm System and Emergency Voice Evacuation System, Superior noise and vibration control measures to prevent disturbance to tenant operations, Building Automation System for reducing dependence on manual operation staff and to ensure optimum operating conditions)
- The total project cost was around Rs. 1,457.75 Lakh (term loan from SIDBI for Rs. 950 Lakh)

### Environmental Impact

- Energy Savings:
- o Usage of VFD on above mentioned processes: 30 % energy savings
  - o Energy Efficient Blowers: 30 % energy savings
- Significant reduction in Green House Gas (GHG) emission.



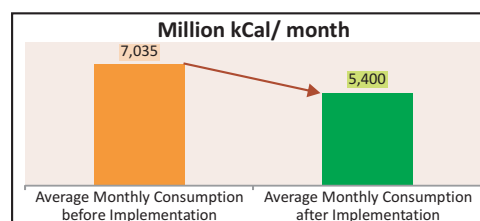
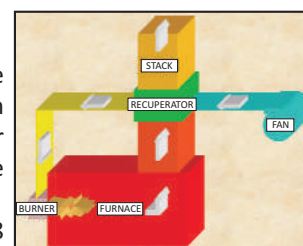
## Iron & Steel Unit

(Reheating Furnace with Recuperator)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 45 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of TMT bars/ Mini Iron & Steel Sector
Project Location	Aurangabad, Maharashtra
Annual Turnover of the company	Rs. 11,000 Lakh (base year as on March 31, 2008)
Networth of the company	Rs. 676 Lakh (base year as on March 31, 2008)
Project DSCR	12.61
Loan Tenure	36 months after moratorium period of 06 months

### Project Brief

- The unit was incorporated in the year 1996 and since then has been engaged in the manufacturing of Thermo-Mechanical Treatment (TMT) bars. The unit produces High Strength Quenched Steel TMT bars of sizes ranging from 8mm – 32mm and Wires for concrete reinforcement. The production capacity of the plant was 400 tonnes per day. The plant operated for sixteen hours per day in two shifts throughout the year.
- Earlier, the plant employed conventional technology (Furnace Oil fired furnace) in 1998 with a capacity of 18 tonnes per hour. It consists of Furnace Oil (FO) tank, electrical heater (70 kW), furnace air feeding fan (75 kW) and FO fired furnace with five burners. The total electrical power consumption of this technology was 145 kW. The furnace had no waste heat recovery system to extract heat from flue gases and the flue gas temperature of the furnace was recorded as 750 0C. Also, the old furnace used FO as fuel, which is costlier and its availability throughout the year had been a major concern.
- The company faced problems like higher energy consumption, leakages in flue gases, higher fuel cost etc. and hence decided to invest in the energy saving technology “Recuperator and Crude Station” by replacing the old furnace system to overcome those problems. Accordingly, the Company approached SIDBI at the beginning of the year 2009 and SIDBI has assisted the company by way of a term loan under JICA EE Line of Credit.
- The project included Coal based gasifier unit to supply coal gas to gas fired furnace. The Recuperator extracted heat from flue gases for pre-heating the incoming combustion air and reduces exhaust flue gas temperature from 750 0C to 450 0C.
- The energy consumption of the conventional furnace was 145 kW and 30,000 litre/day of FO for 18 ton production whereas the energy consumption of the new and energy saving furnace with recuperator and crude station is 145 kW and 760 ton of coal for 25 ton capacity.
- The following major advantages have been accrued under the project:
  - 72 % increase in production capacity.
  - Reduction in fuel cost by 60 %.
  - Reduced thermal energy consumption and reduction in flue gas heat into the atmosphere.
  - Reduction in emission of CO<sub>2</sub> into the atmosphere.
- Total estimated Project cost was Rs. 93 Lakh and SIDBI has sanctioned an assistance of Rs. 45 Lakh under JICA Energy Efficiency Scheme



### Environmental Impact

- Thermal Energy Savings: 19,620 Million kcal/Yr
- Reduction in Green House Gas (GHG) emission: 1,044 tons of CO<sub>2</sub> equivalents per annum.

## Iron & Steel Unit

(Bell type Annealing Furnace)

Particulars	Description
Loan Amount/Yr. of assistance	Rs. 80 Lakh under JICA EE Line of Credit/2010
Borrower/Category	MSME - Manufacturing Unit
Product/Industry sector	Manufacturing of electrical grade steel stampings/Mini Iron & Steel Sector
Project Location	Ahmednagar, Maharashtra
Annual Turnover of the company	Rs. 350 Lakh (base year as on March 31, 2013)
Networth of the company	Rs. 316.24 Lakh (base year as on March 31, 2013)
Project DSCR	2.38
Loan Tenure	60 months after moratorium period of 06 months

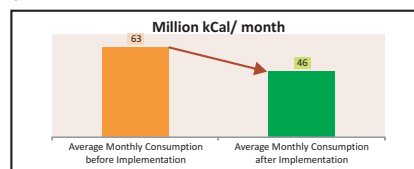
### Project Brief

- The unit was established in the year 2005 and is engaged in the manufacturing of electrical grade steel stampings which is a critical component of electrical machines used for conversion and transformation of electrical energy into mechanical energy and vice versa. Steel stampings constitute about 40 % of cost of electrical appliances and are used in manufacture of both stator and rotor part of electrical machineries like motors, transformers, chokes, DC machines, switchgears, alternators and other appliances viz., ceiling fans, table fans, automobiles etc.
- The capacity of the plant is 50 tons per day. The plant operates for 16 hours per day in two shifts throughout the year. The plant employed conventional Roller Hearth Annealing Furnace in its unit, for heating multiple semiconductor wafers in order to influence their electrical properties. The capacity of the furnace is 10 tonnes per day and its diesel consumption per day is 270 litre and the cooling tower load is 15 HP.
- The company felt that the conventional machine was consuming more energy & diesel and planned to invest in the energy saving equipment, "Bell Annealing Furnace" by replacing the old "Roller Hearth Annealing Furnace" in the year 2009. Accordingly, the company has approached SIDBI for financial assistance which has been provided to the company by way of a term loan.
- The energy consumption of the conventional roller heath annealing furnace was 100 kWh/day and 270 litre/day of diesel for 10 ton production whereas the energy consumption of new bell annealing furnace is 67 kWh/day and 200 litre/day of Diesel for the same capacity.
- The following major advantages of the Bell annealing furnace are:
  - It works in 100% hydrogen protective atmosphere designed to meet requirements for high quality final products featuring mechanical uniformity and clean surface
  - Materials are rapidly & homogeneously heated and high temperature uniformity of the charge in the furnace
  - Less energy consumption because of the shorter cycle time
  - Charge cleaned from residual lubricant used in rolling process.
- Total estimated Project cost was Rs. 130 Lakh and SIDBI has sanctioned an assistance of Rs. 80 Lakh under JICA EE Line of Credit



### Environmental Impact

- Thermal Energy Savings: 197.4 Million kcal/Yr
- Reduction in Green House Gas (GHG) emission: 183 tons of CO<sub>2</sub> equivalents per annum.



## Light Engineering Unit

(High Speed Power Press, Double Action Hydraulic, Gas fired annealing cum bluing furnace, Screw Compressor with Air Dryer & other accessories)

Particulars	Description
Loan Amount / Yr. of assistance	Term loan of Rs. 250 Lakh under JICA EE Line of Credit / 2010
Borrower / Category	MSME - Manufacturing sector
Product / Industry sector	Manufacturing of laminations and die cast rotors/Light Engineering
Project Location	Faridabad, Haryana
Annual Turnover of the company	Rs. 1,460.22 Lakh (base year 2009)
Networth of the company	Rs. 268.58 Lakh (base year 2009)
Project DSCR	2.12
Loan Tenure	66 months including a moratorium of 12 months

### Project Brief

- The unit was incorporated in the year 1990 and has been engaged in the manufacturing of electrical stampings, stator stacks, die casted rotors and aluminium pressure die casted components which cater to a wide application area ranging from domestic mixers, heat convectors, room coolers, vacuum cleaners, air conditioners to washer motors, domestic pumps, microwave ovens, frost-free refrigerators, energy meters etc. The present production capacity of the unit is 2,400 tonne of stator stack and die casting components.
- The manufacturing process of laminations and die cast rotors involves cutting the metal sheet in heavy duty presses; heating of metal and casting in the die-casting machines; testing the casting and undertaking the finishing work and final testing and assembly as per requirements.
- Raw materials required: Electrical Steel, CRCA steel coils, Aluminium Ingots etc. which are available locally.
- The company was facing following problems such as (i) High energy costs associated with various presses and die-casting processes, (ii) Labour intensive manufacturing processes with minimum automation and hence more processing time, (iii) More material wastage and space constraints for the utilization of existing machinery, (iv) Less production capacity to meet the demand.
- In order to overcome the above problems, the unit approached SIDBI for purchase of following machineries: 125 Tonne high speed power press with pneumatic clutch & dynamo drive motor, Double Action Hydraulic Press Semi Automatic 4 Pillar Type, Gas fired semi continuous decarb annealing cum bluing furnace, Oil fired furnace with B-30 burner on trolley with panel stabilizer fuel filter and thermocouple, Electrode Steam Boiler, Double de-coiler complete with electric motors, gear boxes, electrical and loop control systems, 200 kVA D.G. Set, 400 kVA Electric Transformer, Electric Power Screw Compressor with Air Dryer, Exo Gas Generator, FP Electric Motor, etc.
- The total project cost was around Rs. 344.78 Lakh. SIDBI has sanctioned a term loan of Rs. 250 Lakh.
- The unit achieved the following benefits through the acquisition and installation of above machineries:
  - Earlier, the unit was using diesel based furnace for the die-casting process and this was replaced with LPG based furnace which directly reduced the carbon foot print of the unit. Also, the new furnaces purchased were state of the art with robots handling the heated material eliminating the use of manpower. This resulted in safer operation and better quality of the casted material.
  - New presses are energy efficient and reduce material wastage
  - Reduced cost of production owing to automation and energy savings.
  - Increased productivity and on-time deliveries.



### Environmental Impact

- Annealing Furnace: Minimum of 20 % energy savings.
- Press: Minimum of 20 % energy savings.
- Significant reduction in Green House Gas (GHG) emission as a result of the project.







## News Paper Printing Unit

(Computer to Plate (CTP) & Vertical Tower Machine)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 170 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Printing of News Papers / Printing
Project Location	Noida, Uttar Pradesh
Annual Turnover of the company	Rs. 419.05 Lakh (base year 2012)
Networth of the company	Rs. 243.86 Lakh (base year 2012)
Project DSCR	1.51
Loan Tenure	84 months including a moratorium period of 12 months

### Project Brief

- The unit is engaged in the printing of newspapers of different print media and is in operation since 1991. At present, the unit prints more than 50 newspapers which in itself a record gone into Limca Book of Records. The present printing capacity of the unit is 90,000 copies per hour. Processes involved in printing are receipt of final pages from Publisher, validating and printing them on Aluminium Plates. Key raw materials are paper, ink and plates.
- Earlier, the unit faced many problems like less production rate coupled with high energy consumption; huge paper wastage and more production time; trouble to print on both sides of paper, high chemical consumption, high diesel consumption, frequent break downs, manpower shortage etc. In such a situation, the unit approached SIDBI for availing loan to purchase modern & energy efficient machines as given below:
  - Add-on 4 Hi tower by replacing old horizontal printing machine
  - Web-offset Printing Machine
  - Computer To Plate (CTP) machine for replacing old computer to film (CTF) machine
- The total project cost was around INR 228 lakh. SIDBI has sanctioned a term loan of INR 170 lakh under JICA EE Line of Credit.

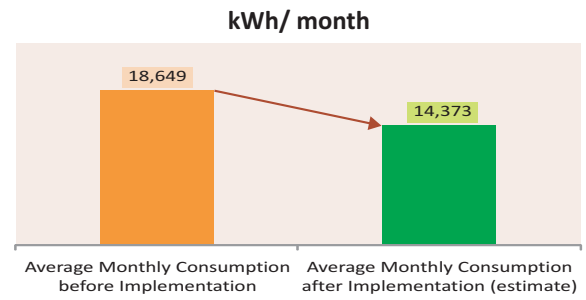
<p><b>Benefits of Energy Efficient vertical tower machine:</b></p> <ul style="list-style-type: none"> <li>○ It takes less space with respect to old horizontal machine.</li> <li>○ It has the capacity to print page on both side with unidirectional rotation whereas the old machine could print only on one side of page.</li> <li>○ Due to unidirectional page rotation property wastage of page has been reduced from 12 % to 5 %.</li> <li>○ It requires half of the manpower with respect to old horizontal machine.</li> <li>○ It is 20 -30 % efficient than old machine.</li> </ul>	<p>New Vertical Tower Machine</p> 	<p>Old Horizontal Machine</p> 
<p><b>Benefits of Energy Efficient CTP Machine:</b></p> <p>Computer to plate (CTP) is an imaging technology used in modern printing processes. In this technology, an image created in a Desktop Publishing (DTP) application is printed directly to a printing plate. CTP plate processor is the thermal variant of Glunz &amp; Jensen's basic processing platform, supporting printers. CTP is a simple processing solution with a basic range of configuration options that meets the requirements of most printers in either an offline or an online version. Power consumption, cycle time etc. would depend on the type and size of sheets being printed.</p>	<p>New CTP machines</p> 	<p>Old CTF machines</p> 





**Some of key benefits are:-**

(i) It has capacity to print five times sheets per hour with respect to old CTF. It is 20 -25% more efficient than CTF and requires only 15% of the manpower as compared to CTF. (ii) In CTP, one generation (transfer of film image to the printing plate) is removed from the printing process (eliminating the need for film and related developer chemicals), increasing sharpness and detail. (iii) CTP avoids potential losses in quality that may occur during film processing, including scratches in the film, and variations in the exposure. An image setter usually has an accuracy rate of +/-2%. Plates are produced in less time, are more consistent, and at a lower cost.



**Environmental Impact**

- Estimated Electrical Energy Savings: 51,312 kWh/Yr
- Reduction in Green House Gas emission (GHG): 46 tons of CO<sub>2</sub> equivalents per annum.



## Plastic Unit

(Fuel Switch in Thermopack)

Particulars	Description
Loan Amount / Yr. of assistance	Term Loan of Rs. 50 Lakh and Sub-ordinate debt (risk capital assistance) of Rs. 150 Lakh under KfW Innovation Line of Credit/2011
Borrower / Category	ESCO-Industry/ Power Generation Unit (Empanelled by BEE)
Product / Industry sector	Briquettes, Heat and Steam/ Power Generation
Project Location	Bharuch, Gujarat
Annual Turnover of the company	Rs. 905.93 Lakh (base year 2010)
Networth of the company	Rs. 571.07 Lakh (base year 2010)
Project DSCR	2.04
Loan Tenure	60 months after an initial moratorium of 06 months (term loan) 36 months after an initial moratorium of 36 months (sub-ordinate debt)

### Project Brief

- The Company was incorporated in the year 2003 and since then has been committed to energy generation by utilizing biomass, waste gases and effluents.
- The Company is engaged in providing heat solutions to industrial units by setting up thermopack units at their location and operating it by using biomass fuel. It is also engaged in the business of collection and processing of biomass and producing/ supplying the briquettes to various companies which use biomass fuel. Apart from briquettes and heat (thermal energy), the company is also involved in providing steam to various industries/ processes.
- The Clientele included the businesses and industries having requirement of steam, heat and biogas. The Company has identified good potential in Bharuch and Surat districts of Gujarat and Pune and Ranjangaon of Maharashtra which are rich in sugarcane and cotton crops.
- In due course, the Company has entered into an agreement with a polymer based industry (manufacturing of polyester tex, grade chips, POY, Nylon Tyre Cord Fabric etc.) for supplying 6.50 million kCal of thermal energy per hour.
- In view of the above, the Company had to set up a unit in the client industry through purchase and installation of two Thermic Fluid Heaters and five Chopper Machines (automatic cutting/ chopping in agriculture areas). Hence, the Company has approached SIDBI for the implementation of the project by availing final assistance. The main features of the project were as follows:
  - The Thermic Fluid System proposed to be installed in the Client industry would consist of heat exchanger, suitable arrangement for final temperature control, fuel feed system, ash handling system, interfacing equipments and other auxiliaries.
  - Heat energy would be provided at a rate of 6.50 MkCal per hour for a minimum of 8,300 hours in a year.
  - Client would give Rs. 180/ Lakh kCal and the contract would be valid for a period of seven years.
- The total project Cost was around Rs. 285 Lakh and SIDBI has sanctioned a term loan of Rs. 50 Lakh and Sub-ordinate debt of Rs. 150 Lakh.
- The Company has been planning to adopt various technological innovations (like introducing Bagasse Drier in Sugar mills to have optimum fuel value) in the field of biomass. The Company also had plans to register the projects under Clean Development Mechanism (CDM) so that the Company would be eligible to get carbon credit for their biomass based steam generation and Thermic fluid heating projects. This was expected to enhance the profitability of the business.

### Environmental Impact

- The thermopack that would be installed in the unit would have provisions such as better heat transfer and utilization of exhaust gases for air pre-heating.
- Estimated energy savings: Replacement of 5,990 ton of Furnace Oil per year with biomass/ briquettes.
- Reduction in Green House Gas (GHG) emissions: 18,500 tons of CO<sub>2</sub> equivalents per annum.



## Plastic Unit

(Fully Automatic Micro Processor Controlled Plastic Injection Moulding Machines)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 50 Lakh under JICA EE Line of Credit / 2013
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Plastic Components for Auto Industry / Plastic
Project Location	Gurgaon, Haryana
Annual Turnover of the company	Rs. 1,335.06 Lakh (base year 2011)
Networth of the company	Rs. 249.29 Lakh (base year 2011)
Project DSCR	1.75
Loan Tenure	50 months after an initial moratorium of 06 months

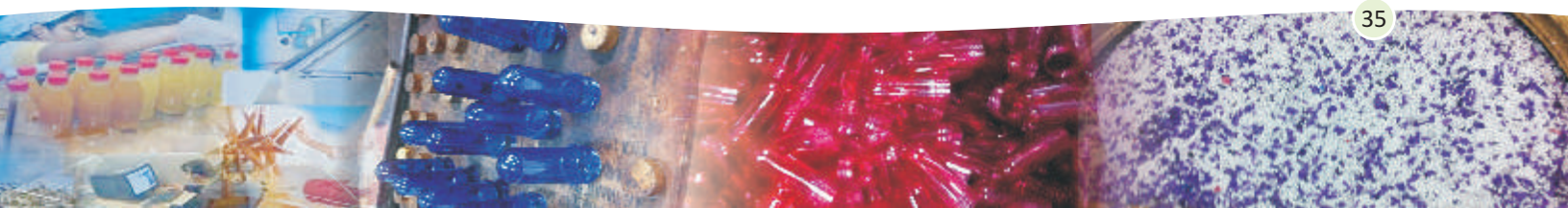
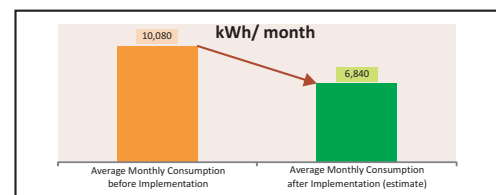
### Project Brief

- The unit was incorporated in 1999 and is engaged in the manufacturing of plastic automobile components for OEMs like shaft brackets, wiper, housings etc. The basic manufacturing process involves moulding, cooling, product finishing and assembly.
- Molding is done using injection moulding machines and cooling is done with the help of chilling units.
- Earlier, the plant was employing natural cooling which generally took more time, thus the rate of production was slow. Apart from this, unit was also facing problems like high material loss, more production time, quality issues, high energy consumption etc. in conventional machines.
- In such a situation, the unit approached SIDBI for availing loan to install Fully Automatic Micro Processor Controlled Plastic Injection Moulding Machine along with Pad Printing machine and Energy Efficient Chiller.
- The total project cost was around Rs. 75.15 Lakh and a loan of Rs. 50 Lakh was sanctioned by SIDBI under JICA EE Line of Credit.
- With the installation of the above injection moulding machines, both cycle time and power consumption has reduced. With the new chiller in place, the component cools at a faster rate. It takes around one minute for cooling as against two minutes earlier. Though the product cooling time has reduced, power consumption has increased with the installation of the chiller. Thus the net impact of the benefits/ savings has been calculated after taking into consideration the power consumption of the chiller.



### Environmental Impact

- Estimated Electrical Energy Savings: 38,880 kWh/Yr
- Reduction in Green House Gas emission (GHG): 35 tons of CO<sub>2</sub> equivalents per annum.



## Plastic Unit

(Three Layers Blown Film Plant)

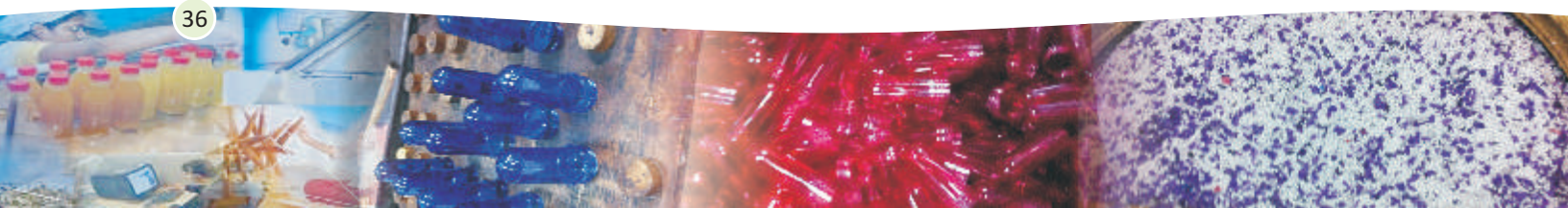
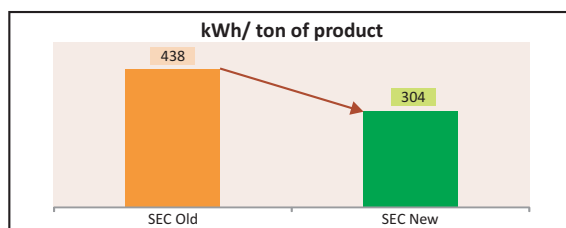
Particulars	Description
Loan Amount / Yr. of assistance	Rs. 90 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Plastic packaging products/ Plastic Sector
Project Location	Silvassa, Dadra and Nagar Haveli
Annual Turnover of the company	Rs. 572 Lakh (base year as on March 31, 2011)
Networth of the company	Rs. 113 Lakh (base year as on March 31, 2011)
Project DSCR	1.72
Loan Tenure	66 months after an initial moratorium of 06 months

### Project Brief

- The unit was established in the year 1998 and engaged in the manufacturing of printed and laminated pouches/rolls from different materials like polyester/BOPP/Aluminium foil/CPP etc. The unit is also involved in the manufacturing of printed polyethylene rolls and bags from materials like LDPE/LLDPE/PP etc.
- The company was using old technology blown film machine for producing plastic films whose specific energy consumption was high and the production rate was low. Also, the old machinery could produce only few types of plastic films and hence the company was struggling to meet the market demand for the products.
- In order to reduce the specific energy consumption, increase the production capacity and to compete with similar industries in the market, the promoters approached SIDBI with a proposal to replace the old technology blown film machine with three layers blown film plant. Accordingly, SIDBI has provided financial assistance to the company by the way of term loan in the year 2012.
- Three layer blown film plant is capable of producing variety of plastic films like liquid packaging films, ultra high barrier films, meat and cereal packaging films, oil packaging films, pharmaceutical and medical grade films, soap packaging films etc. Hence, the company was able to meet the demand of its customers.
- Old technology blown film machine has consumed 52.5 kW for manufacturing 120 kg of film per hour whereas the energy efficient three layer blown film plant has consumed 54.8 kW for manufacturing 180 kg of film per hour. Thus, the company has realized a decrease in specific energy consumption by 0.13 kWh per kg of production and the production rate also increased from 2880 kg/day to 4320 kg/day (~1.5 times increase in productivity). The bottom-line of the company has improved and with this replacement project
- The company has been able to achieve an energy saving upto 31 %.

### Environmental Impact

- Electrical Energy Savings: 1,72,440 kWh/Yr
- Reduction in Green House Gas emission (GHG): 138 tons of CO<sub>2</sub> equivalents per annum.



(Rubber Injection Moulding Machine with Electronically Controlled Hydraulic Pump)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 50 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of plastic products/ Plastic
Project Location	Bhubaneswar, Orissa
Annual Turnover of the company	Rs. 885 Lakh (base year as on March 31, 2010)
Networth of the company	Rs. 23.94 Lakh (base year as on March 31, 2010)
Project DSCR	2.44
Loan Tenure	60 months including a moratorium period of 12 months

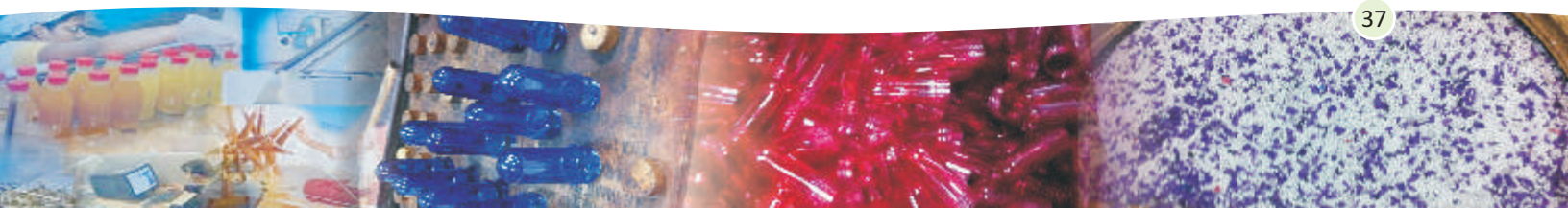
### Project Brief

- The ISO 9001-2008 certified company was established as a Small Scale Industrial (SSI) unit in 1999 with initial capital investment of Rs. 7 million and about 18 employees. The main activity of the company is manufacturing of plastic injection moulded products especially house-ware products, moulded furniture, crates and containers.
- Earlier, the company was working with conventional injection moulding machines which consumes higher power, higher manufacturing time and labour. These machines required higher lead time for maintenance and the product competitiveness was also a question.
- Hence, in order to overcome the above problems, the company approached SIDBI for financial assistance. The loan proposal of the company was to up-keep with the ever rising challenges of products quality, cost reduction and environmental compliances by replacing its conventional machines with Microprocessor and Servo controlled Injection Moulding machines.
- The new energy efficient machines installed resulted in following benefits:
  - Low specific power consumption,
  - Higher output,
  - Better workspace environment
  - Increased automation.
  - Increased productivity and reduced manufacturing cost
- As an appreciation of efforts to pioneer energy efficiency campaign in MSME sector, the unit has been conferred National Energy Conservation Award, 2011 by the Ministry of Power, Government of India.



### Environmental Impact

- Microprocessor & Servo controlled Injection Moulding machines: Upto 50 % energy savings
- Significant reduction in Green House Gas (GHG) emission.



## Case Study-33

# Plastic Unit

(Vertical Injection Moulding Machine, Robot arm, Dehumidification Dryer, Air handling unit, and Screw Barrels)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 75 Lakh under JICA EE Line of Credit / 2013
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Plastic moulded components for Auto and Luggage Industries
Project Location	Ambad, Maharashtra
Annual Turnover of the company	Rs. 1,914 Lakh (base year 2013)
Networth of the company	Rs. 292.59 Lakh in (base year 2013)
Project DSCR	2.42
Loan tenure	36 months

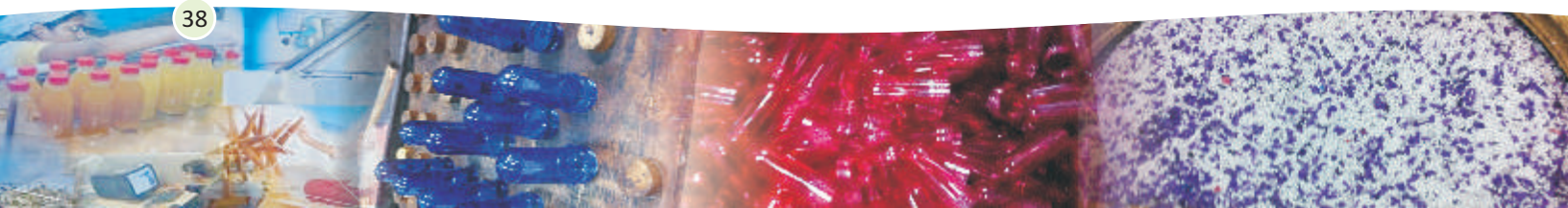
### Project Brief

- The company is engaged in the manufacturing of Plastic moulded components for Auto and Luggage Industries.
- The unit realized the deficiency in the plant operation due to conventional machines and approached SIDBI for financing of the following machines: (i) Vertical Injection Moulding Machine, (ii) Robot arm, (iii) Dehumidification Dryer, (iv) Air handling unit, and (v) Six Screw Barrels.
- SIDBI has financed the project under JICA Line of Credit.
- By installation of above, the unit has realized the following benefits:
  - o Reduced energy consumption and enhanced productivity.
  - o Improved Product quality (smooth & finished product that does not require further finishing).
  - o Better tolerance and accuracy.
  - o Improved repeatability.
  - o Better working environment.
  - o High efficient, automated operation through robot arm.
  - o Adsorbent is non toxic / non-flammable and fully water washable, minimum heat carry over in Dehumidification Dryer.
  - o Compact, smooth & quiet operation, good indoor air quality, load reduction 20-30% of air conditioning load by EE Air handling unit.



### Environmental Impact

- Through the implementation of the project, the unit is realizing energy savings upto 30%.
- Significant reduction in Green House Gas emission (GHG).



## Case Study-34

# Packaging Unit

(Heavy Duty Combined Corrugation Plant with Boiler using Agri Residues (Biomass briquettes) & Accessories, Double Colour Flexo Board Printer Slotter & Semi Auto Stitching Machine)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 500 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Corrugated Boxes/ Packaging Sector
Project Location	Aurangabad, Maharashtra
Annual Turnover of the company	Rs. 3,328.26 Lakh (base year as on March 31, 2012)
Networth of the company	Rs. 385.97 Lakh (base year as on March 31, 2012)
Project DSCR	1.63
Loan Tenure	84 months including moratorium

## Project Brief

➤ The unit was incorporated in August, 2003 and engaged in manufacturing of various kinds of ayurvedic and herbal products. The company has won second prize for best industrial unit in the district for the year 2009. During 2011, the company ventured into packaging activities (duplex and corrugated packaging) and diversified its business operations.

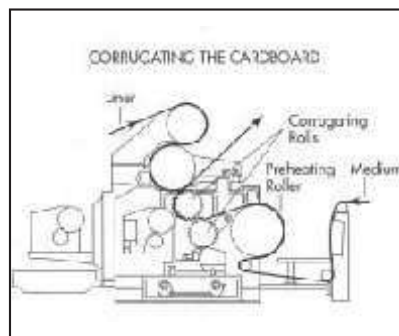
➤ To have flexibility in fuel usage and to supplement the heat source in the process of manufacturing corrugated boxes, the unit planned to install steam boiler which uses biomass briquettes. Outstanding features of the machine are reverse flame technology, consistent thermal efficiency, fully automatic and longer coil life. Considering the proposal of the unit, SIDBI has provided a term loan to install the following major machineries under its JICA scheme for Energy Efficiency:-

- o 5 Ply Heavy Duty Combined Corrugation Plant
- o Steam Boiler using Agri Residues (Biomass briquettes) & Accessories.
- o Double Colour Flexo Board Printer Slotter
- o Semi Auto Stitching Machine

➤ The boiler runs for 8 hours a day consuming 10 tons of biomass briquettes and generates 4.5 tons of steam per hour at a pressure of 10.5 kg/cm<sup>2</sup>. This has resulted in the diesel saving of 440 litre/day and direct cost saving of Rs. 22,000/day.

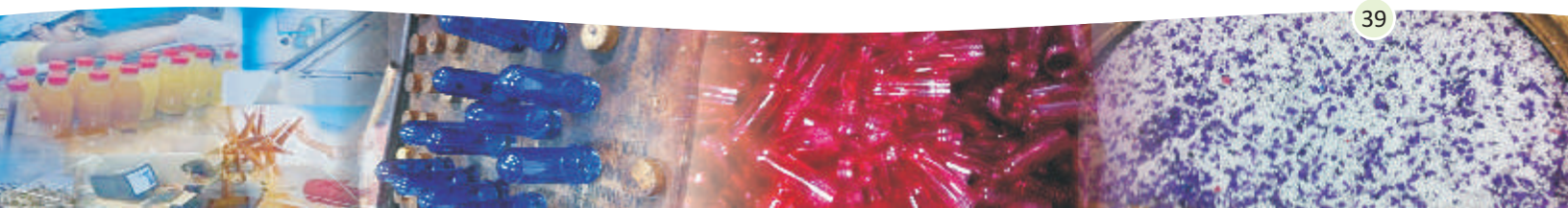
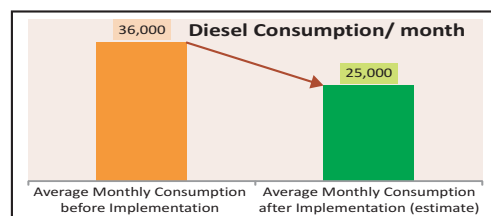
➤ Other benefits of the unit under the project are its increased production capacity, flexibility in fuel usage, faster drying, and large size printing and achieved better quality in the end-products.

➤ Total estimated Project cost was Rs. 828 Lakh and SIDBI has sanctioned an assistance of Rs. 500 Lakh (under JICA EE Line of Credit - Rs. 351 Lakh & Normal DCS - Rs. 149 Lakh)



## Environmental Impact

- Diesel Savings: 1,32,000 litre/Yr
- Reduction in Green House Gas emission (GHG): 356 tons of CO<sub>2</sub> equivalents per annum.



## Packaging Unit

(New Technology Die Punching Machine, Rotary Creaser Slotter Machine, Folder Gluer Machine)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 50 Lakh under JICA EE Line of Credit / 2013
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Corrugated sheets and boxes / Packaging
Project Location	Noida, Uttar Pradesh
Annual Turnover of the company	Rs. 400.94 Lakh (base year 2012)
Networth of the company	Rs. 28.57 Lakh (base year 2012)
Project DSCR	3.02
Loan Tenure	72 months including a moratorium of 12 months

### Project Brief

- The Company was established in the year 2001. The company has been involved in the manufacturing of corrugated sheets and boxes for various Indian as well as foreign brands. The processes involved in the manufacturing of corrugated boxes are cutting, gluing, folding and punching of corrugated sheets. The Company has employed the following machineries for these processes:
  - **Conventional cutter** was used to trim the edges and sizing of the corrugated sheets. The edging process was slow on this machine and the operator had to turnaround the pieces four times to complete the job. Also, only small size sheets could be processed.
  - **Gluing** was done **manually** and folding operation was done using **conventional folding machine**. This had resulted in poor quality gluing and slower production (1,000 boxes/ day).
  - **Conventional punching machine** was employed to print golden and silver marks on the corrugated sheets and/or boxes. This had resulted in lesser production levels and poor quality impression.
- Hence, in order to overcome the above problems and also to reduce energy consumption, the unit decided to purchase the following machineries and approached SIDBI for availing financial assistance for the purchase of the same:
  - **Combined Rotary Creaser Slotter Machine** Increased production, lesser energy consumption and processing of the large dimension sheets.
  - **Folder Gluer Machine** Increased production (15,000 boxes per day), lesser energy consumption and both gluing and folding operations in one go.
  - **New Technology Die Punching Machine** High quality impressions on the corrugated boxes and sheets, higher production rate (800 sheets/hr) with reduced energy consumption.
- Apart from the machineries mentioned above, the company purchased Corrugation Machine Flute, Flute Laminator and a DG Set.
- The total project cost was Rs. 68 Lakh and SIDBI has sanctioned a loan of Rs. 50 Lakh under JICA EE Line of Credit.

Combined Rotary Creaser Slotter Machine



Folder Gluer Machine

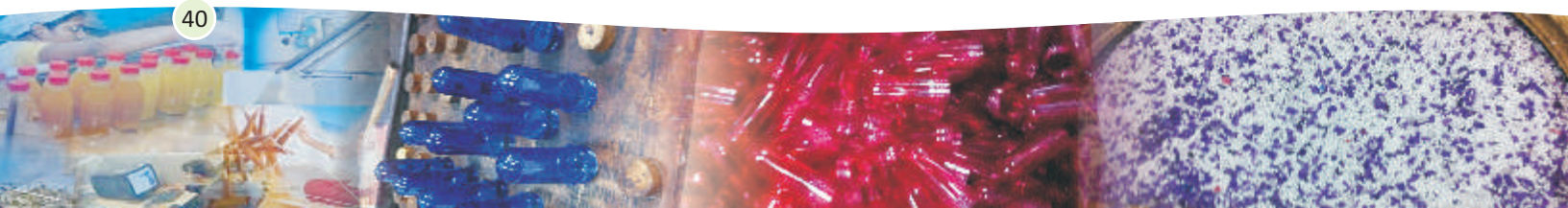
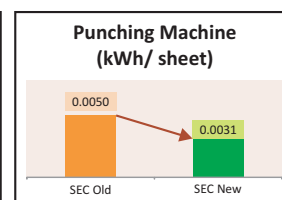
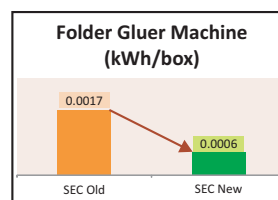
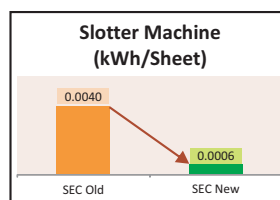


Die Punching Machine



### Environmental Impact

- Estimated Electricity Savings: 17,022 kWh/ annum.
- Reduction in Green House Gas (GHG) emissions: 13.54 tons of CO<sub>2</sub> equivalents per annum.





## Packaging Unit

(Energy Efficient Circular looms with other accessories)

Particulars	Description
Loan Amount /Yr. of assistance	Term Loan of Rs. 479.53 Lakh under JICA EE Line of Credit/2012-13
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Packaging Industry
Project Location	Alwar, Rajasthan
Annual Turnover of the company	Rs. 476.19 Lakh (base year 2013)
Networth of the company	Rs. 46.22 Lakh (base year 2013)
Project DSCR	2.22
Loan Tenure	72 months after an initial moratorium of 12 months

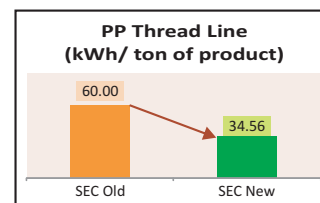
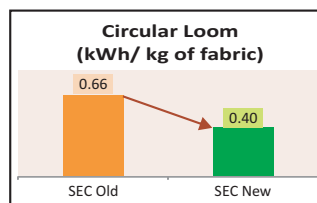
### Project Brief

- The company was established in the year 2012 and involved in the manufacturing of woven PP/HDPE bags, BOPP bags and PP ropes for various types of packaging industries.
- The Company wished to setup a unit for the manufacturing of woven PP/HDPE bags. The unit would also consist of a production line for the manufacturing of PP threads. In due course, the company understood that similar units were facing problems such as lesser production rate, lesser quality and higher energy consumption and hence the unit decided to install energy efficient machineries in the new unit.
- In view of the above the unit decided to purchase following machineries and approached SIDBI in order to avail loan for the same.
  - o 16 no. of energy efficient Circular Looms for manufacturing woven PP/HDPE bags, BOPP bags, etc.
  - o Fully automatic energy efficient production line for the manufacturing of PP threads.
- The specific energy consumption of newly installed energy efficient circular looms has been found to be very much lower than conventional looms. These machines have also resulted in higher production rate, better product quality and faster operation.
- The energy efficient PP production has online monitoring and control system to manufacture PP threads. This consists of various sub-components like melting unit, extruder line, holding unit, stretching unit, annealing unit and top roller.
- These machineries machine have also resulted in higher working speed, lower maintenance cost and better space utilization.
- Other energy efficient machineries included three colour flexographic Printing Machine, Oil Transformer, and Air Compressor etc.
- The total cost of the project was Rs. 479.53 Lakh and SIDBI has provided a term loan of Rs. 305 Lakh as term loan under JICA EE Line of Credit.



### Environmental Impact

- Estimated electricity saving from newly installed machineries: 9,65,520 kWh per year.
- Reduction in Green House Gas (GHG) emissions: 772 tons of CO<sub>2</sub> equivalents per annum.



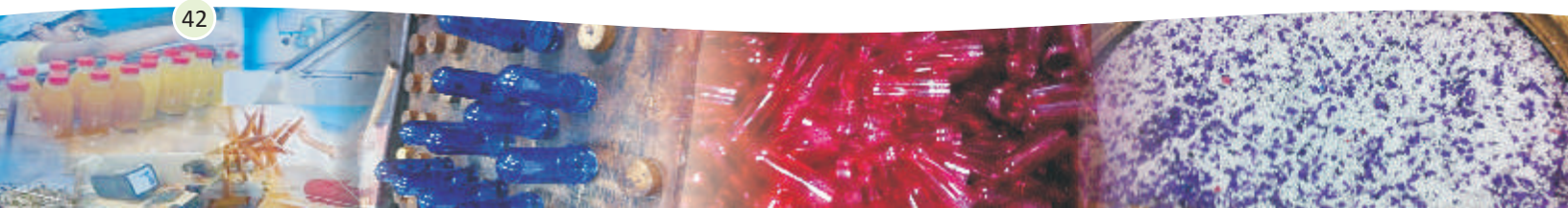
## Paper Manufacturing Unit

(Energy Efficient Motors, VFDs & ETP)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 97.5 Lakh under AfD EE Line of Credit / 2011
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Producing specialty machine glazed (MG) plain and ribbed Kraft paper of different grades and shades / Paper
Project Location	Rajahmundry, Andhra Pradesh
Annual Turnover of the company	Rs. 1,456.12 Lakh (base year 2010)
Networth of the company	Rs. 264.51 Lakh (base year 2010)
Project DSCR	2.87
Loan Tenure	60 months including a moratorium period of 06 months

### Project Brief

- The unit is involved in producing specialty machine glazed (MG) plain and ribbed kraft paper of different grades and shades. The unit has employed two MG machines producing both lower and higher GSM (Grams per square meter) grade paper (32-180 GSM) and the overall annual capacity is 9,000 tons with both the machines put together.
- The company was taken over by the present management in the year 2009. The present management identified many areas where energy can be conserved directly. A few more areas have also been identified where energy consumption can be reduced by bottle necking some of the critical areas, to achieve higher rate of production. Originally the paper mill was equipped with constant energy consuming equipment irrespective of grade and rate of production. In such a situation, the unit approached SIDBI to avail loans for its modernization and technology upgradation project.
- The total project cost was around Rs. 130 Lakh. SIDBI sanctioned a term loan of Rs. 97.5 Lakh
- Brief details of the project are given below:
  - Replacing two no. of 100 HP old inefficient motors associated with 1 no.
  - Replacing Horizontal pulper (capacity 900 kg/hr) and vertical pulper (capacity 1,200 kg/hr) by 1 no. New vertical pulper (capacity 2,300 kg/hr), 150 HP Energy Efficient motor with VFD.
  - Installing VFD for the Fan Pump 100 HP (The only changes are in electrical control system that is introduction of VFD for precise control.
  - Replacing 155 HP motor with 120 HP Energy Efficient motor with control VFD
  - By replacing 10 kW motor with 0.75 kW motor with VFD control and also by placing multiple nozzles in the line
  - Replacing the 25 HP motor with 15 H.P motor with VFD control in Pressure Screen System and increase the Hole Size from 1.6 mm to 1.8 mm
  - Installing new Energy Efficient HD cleaner system and replacing of inefficient 10 HP motor with 2HP Efficient motor
  - Replacing smaller diameter Rolls with Larger Diameter rolls for the Press Rolls @10% Savings on 100 HP



- o Replacing two old in efficient motors with two 120 HP Energy Efficient motors with VFD control
- o Installing new ETP system for water recovery



Energy Efficient Vertical Pulper Motor 150 HP



VFD Control Panel on 150 HP Vertical Pulper Motor



VFD Control Panel on Fan Pump 100 HP



VFD Control Panel on 120 HP Energy Efficient motor



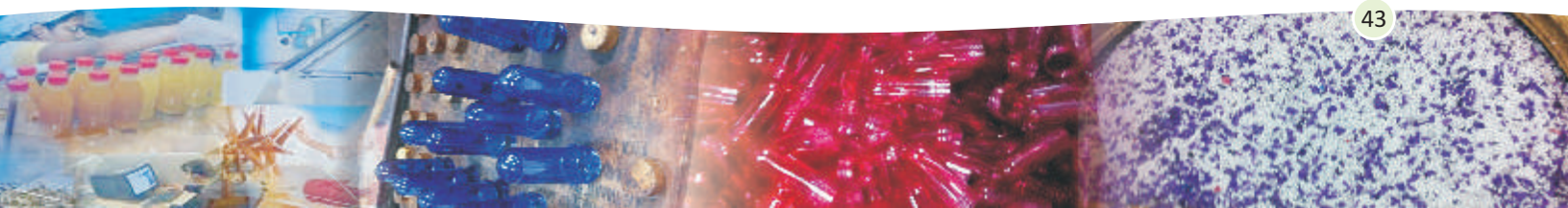
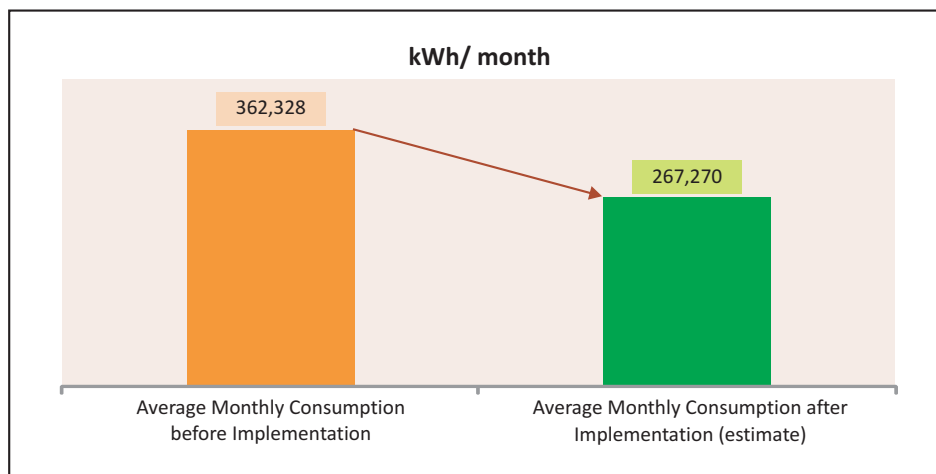
HD cleaner with EE Pump



ETP system for water recovery

### Environmental Impact

- Electrical Energy Savings: 11,40,690 kWh/Yr
- Reduction in Green House Gas emission (GHG) 1015 tons of CO<sub>2</sub> equivalents per annum.



## Printing Unit

(Offset Printing Machine)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 50 Lakh under JICA EE Line of Credit / 2011
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Commercial printing job work / Printing
Project Location	Bhubaneswar, Odisha
Annual Turnover of the company	Rs. 173 Lakh (base year 2011)
Networth of the company	Rs. 27.97 Lakh (base year 2011)
Project DSCR	1.83
Loan Tenure	54 months after an initial moratorium of 06 months

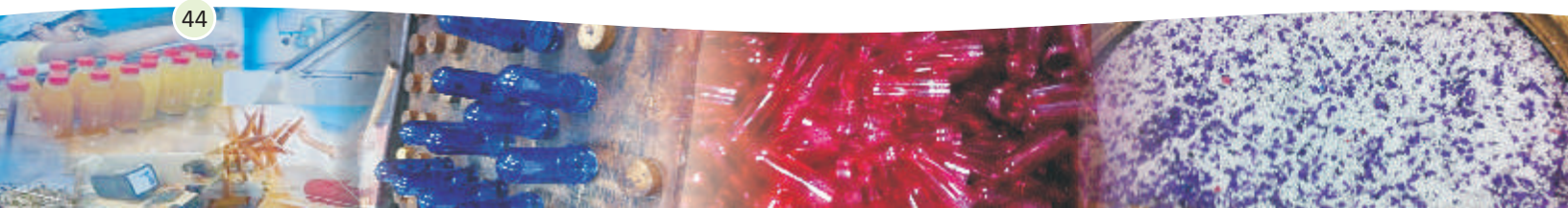
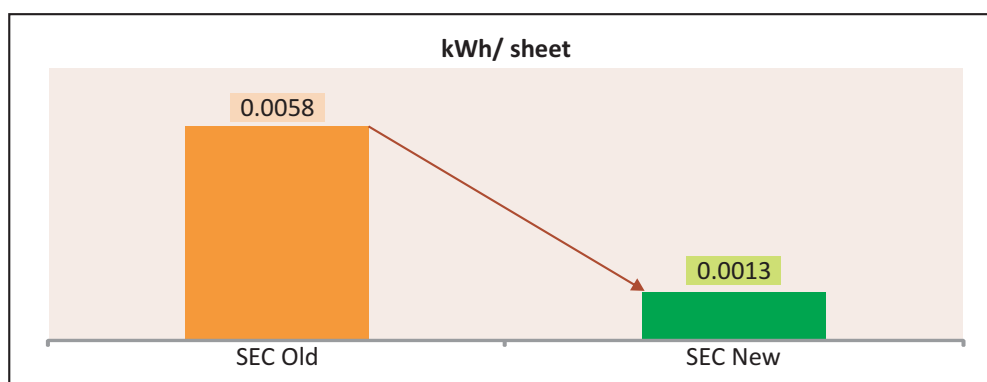
### Project Brief

- The Company was established in the year 2001 and has been involved in commercial printing job work for Government and private clients.
- In order to carry out printing job work, the company was using conventional printing machine on which the printing quality was poor and the rate of production was slower. Also, the energy consumption of the machine was higher. Hence, in order to overcome these problems, the company decided to install energy efficient Offset Printing Machine and approached SIDBI in order to avail loan for the purchase of new machinery. Features of the new Offset Printing Machine are as follows:
  - Production: 13,000 sheets/ day.
- The printing rate on the new efficient machine is more than double and the power consumption has been reduced by more than 70 % when compared with the old technology printing machine. The machine has also provided higher flexibility in operation.
- The total project cost was Rs. 70 Lakh and SIDBI has sanctioned a loan of Rs. 50 Lakh under JICA EE Line of Credit.



### Environmental Impact

- Estimated Electricity Savings: 2,11,800 kWh/ annum.
- Reduction in Green House Gas (GHG) emissions: 169 tons of CO<sub>2</sub> equivalents per annum.



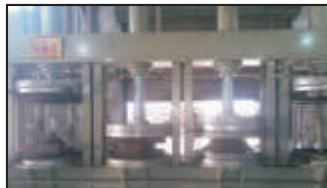
## Rubber Unit

(Energy Efficient Roto-cure machine)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 150 Lakh under JICA EE Line of Credit / 2011
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of tyres and tubes/ Rubber Sector
Project Location	Paschim Vihar, New Delhi
Annual Turnover of the company	Rs. 316 Lakh (Base Year 2011)
Networth of the company	Rs. 124 Lakh (Base Year 2011)
Project DSCR	1.52
Loan Tenure	60 months excluding a moratorium period of 09 months.

### Project Brief

- The unit was established in the year 1972 and engaged in the manufacturing tyres and tubes. The unit caters to both national and international tyre markets. The main products of the company are tyres for various types and sizes for automobiles.
- The company was using the conventional pressing machine machines to manufacture tyres, in which, rubber is injected in to the mould (of the tyre to be made) and then high temperature steam is passed through it, in order to heat the rubber and make it take its final shape. The process of tyre manufacturing through conventional pressing machine was energy and time consuming. The process of rubber heating was taking long time due to which the production of the plant was low (400 tyres/ day).
- To overcome this difficulty, the unit has installed energy efficient Roto-cure machine with financial assistance from SIDBI and the installed machinery requires less time to heat the rubber thereby increasing the production rate (500 tyres/ day) of the unit. The total project cost was around Rs. 201 Lakh. SIDBI has sanctioned a term loan of Rs. 150 Lakh under JICA EE Line of Credit.



New Roto-Cure Machine

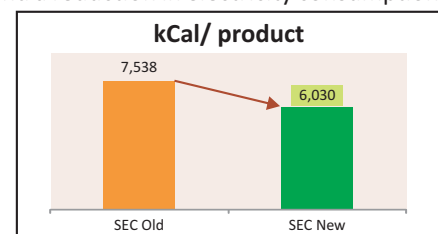


Old machine (Pressing Machine)

- The production of the company has increased with less energy and maintenance cost which automatically improved the profit and bottom-line of the company. Further, the company got benefitted by reduction in steam energy usage for heating processes and improved quality in the tyre by way of EE investment made in the project.
- The average monthly diesel and electricity consumption of the conventional pressing machine are 300 litres and 1,300 kWh respectively whereas the diesel savings of 0.15 per tyre manufacturing and a reduction in electricity consumption of 440 kWh have been achieved by the way of new Roto-cure machine.

### Environmental Impact

- Electrical Energy Savings: 10440 kWh/Yr
- Diesel Savings: 22500 litres/Yr
- Reduction in Green House Gas emission (GHG) 70 tons of CO<sub>2</sub> equivalents per annum.



(Rubber Injection Moulding Machine with Electronically Controlled Hydraulic Pump)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 25 Lakh under JICA EE Line of Credit / 2011
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of forged alloy components for Automobile industry/ Forging
Project Location	Mumbai, Maharashtra
Annual Turnover of the company	Rs. 104.23 Lakh (base year 2011)
Networth of the company	Rs. 23.94 Lakh (base year 2011)
Project DSCR	2.44
Loan Tenure	36 months excluding a moratorium period of 3 months

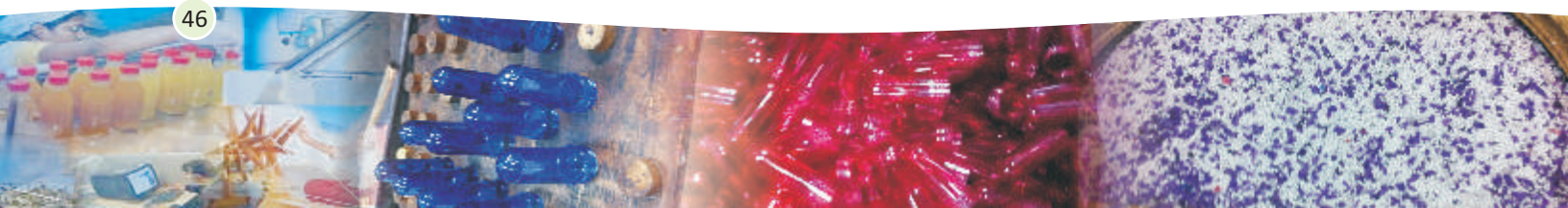
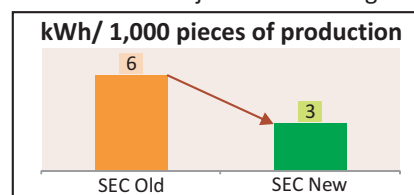
### Project Brief

- The company was established in 1986 and is engaged in the manufacturing of products like moulded and extruded rubber products viz O-rings, oil seals, rubber sheets, heat exchanger gasket etc. for the beverage, breweries, pharmaceuticals, chemicals and fertilizers industries etc. The unit is ISO 9001 certified. Besides supplying its products to various reputed brands in India, the unit also exports its products to various countries.
- The unit uses natural rubber to manufacture rubber components. Previously, the unit was using conventional moulding machine to produce rubber components, which resulted in high energy consumption. Also, the machine cannot be utilized when the component has to be produced in bulk because the process was very slow. In order to increase the production and reduce the energy consumption, the unit has installed an energy efficient Rubber injection moulding machine by taking loan from SIDBI. The rated power of the energy efficient Rubber Injection Moulding Machine is 20 kW.
- The total project cost was around Rs. 35.30 lakh. SIDBI has sanctioned a term loan of Rs. 25 lakh under JICA EE Line of Credit. The company has procured Rubber Injection Moulding Machine with Electronically Controlled Hydraulic Pump which had the following salient features:
  - State-of-the-art microprocessor controls equipped to handle basic machine operations. Upgradation for further automation is possible as an option.
  - Improved efficiency and reduced specific energy consumption.
  - Increased production due to faster operation.
  - User friendly operation and less human dependency.
  - Sliding safety gates provide adequate safety for the operators.
- The actual power consumption of Rubber Injection Moulding machine was 14 kW for the production of 38,000 pieces/day whereas the conventional moulding machine consumes 8.61 kW for 12,000 pieces/day. Thus resulted in a reduction of Specific Energy consumption by around 49 % by the installation of the Rubber Injection Moulding machine.



### Environmental Impact

- Electrical Energy Savings: 2,54,688 kWh/Yr
- Reduction in Green House Gas emission (GHG): 227 tons of CO<sub>2</sub> equivalents per annum.



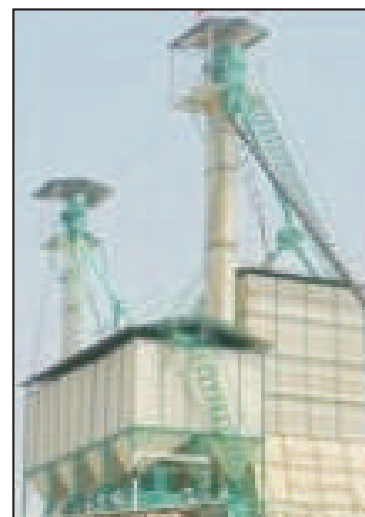
## Rice Mill Unit

(Paddy based Dryer Plant)

Particulars	Description
Loan Amount / Yr. of assistance	Term loan of Rs. 20 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Milled Rice / Rice Mill
Project Location	Raipur, Chhattisgarh
Annual Turnover of the company	Rs. 421.12 Lakh (base year 2011)
Networth of the company	Rs. 85.59 Lakh (base year 2011)
Project DSCR	5.23
Loan Tenure	40 months without any moratorium

### Project Brief

- The unit was incorporated in the year 1965 and since then it has been dealing with rice milling.
- Rice milling involves various processes including cleaning, soaking, parboiling, drying, dehusking, polishing, destining, grading, weighing, packaging and the milled rice is then sent to the market.
- The borrower rice milling unit in Raipur was facing a lot of problems such as higher energy consumption, higher processing time, higher air pollution and release of affluent from parboiling process, non-availability of raw material during monsoon seasons etc. Hence, the unit developed plans to make the process energy efficient.
- In view of the above, the unit decided to replace the existing old paddy dryer plant and approached SIDBI for availing loan to implement the proposed project.
- The total project cost was around Rs. 30 Lakh and SIDBI has sanctioned a term loan of Rs. 20 Lakh under JICA EE Line of Credit.
- The new paddy dryer plant included different layers for circulation, drying and storage of paddy for further processes. The parts and components used in the plant conformed to latest industry standards. The quality of the rice produced would be directly affected by the temperature maintained in the dryer plant and hence a provision for controlling the temperature was also in-built in the new dryer plant.
- Implementation of the project resulted in an energy savings of 20% as compared to the earlier conventional paddy drying plant. The unit is enjoying other benefits such as lesser pollution, high precision and environment friendly drying.



### Environmental Impact

- Energy Savings: 20% energy savings as compared to the conventional drying plant.
- Significant reduction in Green House Gas (GHG) emissions.

## Refractory Unit

(Gas Fired Tunnel Kiln with Agro Waste Based Producer Gas Plant)

Particulars	Description
Loan Amount / Yr. of assistance	Term loan of Rs. 285 Lakh under JICA EE Line of Credit / 2011
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Refractory bricks and Refractory Mortar/Refractory
Project Location	Coimbatore, Tamil Nadu
Annual Turnover of the company	Rs. 795.03 Lakh (base year 2011)
Networth of the company	Rs. 176.76 Lakh (base year 2011)
Project DSCR	1.64
Loan tenure	72 months after 12 months of moratorium

### Project Brief

- The company commenced its business in the year 1971 and since then it has been involved in the manufacture of refractory bricks and refractory mortar and also consumables for foundry industry like Runner Sleeves, Bottom pouring ladle Nozzles, Stopper Rod Sleeves, Ladle Ramming Masses, Strainer Cores and Ceramic filters, Ceramic Breaker Cores etc.
- For the purpose of manufacturing of refractories, the firm employed FO fired continuous tunnel kiln with an installed capacity of 4,000 MT per annum. The unit was facing problems related to higher fuel consumption as well as pollution issues, and hence decided to replace the existing kiln with producer gas fired tunnel kiln with a capacity of 6,000 MT per annum. In view of the above, the company approached SIDBI in order to avail loan for the implementation of the project. Details of machineries installed as part of the project are as follows:
  - 1 no. gas fired tunnel kiln
  - 1 no. producer gas plant (domestic waste and agro waste)
- The producer gas plant is more efficient and reduces pollution. The plant helps in conservation of fossil fuels. The gas fired tunnel kiln is having following advantages:
  - The heat is retained inside the tunnel and the heat loss to atmosphere is minimized.
  - The heat of the tunnel from the cooling chamber (end of the tunnel) is recycled to the pre-heater section (beginning of the tunnel).
- The total project cost was Rs. 390 Lakh. (term loan from SIDBI for Rs. 285 Lakh)
- Advantages of the project:
  - Reduction of heat loss in the kiln.
  - Heat from cooling chamber is recycled to the pre-heater section and
  - Proposed kiln environment friendly since using producer gas being generated through domestic and agro waste.



### Environmental Impact

- Energy Savings: 20% energy savings compared to FO fired kiln.
- Significant reduction in Green House Gas (GHG) emission.





## Sustainable Transport Unit

(CNG Buses)

Particulars	Description
Loan Amount / Yr. of assistance	Term loan of INR 3,100 Lakh [Part term loan of INR 2,500 Lakh covered under KfW Innovation Line of Credit and balance term loan of INR 600 Lakh covered under JICA EE Line of Credit]/ 2014
Borrower / Category	MSME – Services Sector
Product / Industry sector	CNG-operated Buses/ Transport
Project Location	Pune, Maharashtra
Annual Turnover of the company	Rs. 1086.53 Lakh (base year 2012)
Networth of the company	Rs. 215.37 Lakh (base year 2012)
Project DSCR	1.91
Loan Tenure	48 months after initial moratorium period of 12 months

### Project Brief

- The company was incorporated in the year 1997 as an Authorised dealer of Maruti Suzuki and Hero MotoCorp. The Company is engaged in the selling, repairing and servicing of motor vehicles.
- The proposed project envisaged purchase of 110 Tata make CNG-operated buses for supply to Pune Mahanagar Parivahan Mahamandal Ltd. (PMPMPL) and operating for a period of 7 years to cater to PMPMPL's day to day passenger transport requirement in and around Pune Municipal Corporation (PMC) and Pimpri Chinchwad Municipal Corporation (PCMC) Municipal limits.
- PMPML has short-listed five bidders to operate minimum 100 buses each, for a 7 year period. The revenue generated from advertisements and other income generating activities would go to operators' account (Borrower). The annual income has been estimated at INR 3,204 Lakh. The company was one of the successful bidders and hence approached SIDBI for financial support for the proposed project.
- The project is helping in mitigation of environmental pollution, promotes the go-green initiatives apart from improving the fleet strength, operational efficiency and cash flows of PMPML.
- The buses are CNG driven and comply with Euro-IV norms.



### Environmental Impact

- Bus transport operation results in emissions, however, since the bus operates on CNG and would be Euro-IV compliant, pollution would be mitigated to a greater extent. Further, bus operation (transport) is governed by emission control norms of Regional Transport Authorities and hence no problem is foreseen from the pollution angle.
- CNG buses emit virtually no visible Particulate Matter or black soot at the tailpipe. In chassis dynamometer testing conducted by West Virginia University, CNG buses consistently emit dramatically less PM than diesel buses. For example, testing of commercial buses in Boulder, Colorado, on the central business district (CBD) driving cycle demonstrated a 97 % PM reduction and a 58 % reduction in oxides of nitrogen (NOx) with buses running on CNG rather than diesel.

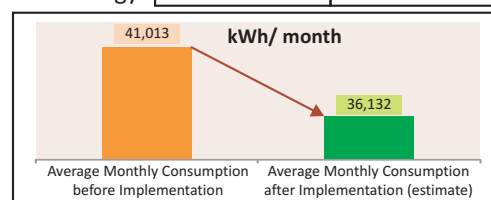
## Textile Unit

(Servo Winder & TFO)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 30 Lakh under JICA EE Line of Credit / 2011
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Stitching yarn and Embroidery Yarn / Textile
Project Location	Master Mohalla Libaspur, Delhi
Annual Turnover of the company	Rs. 210.65 Lakh (base year 2011)
Networth of the company	Rs. 26.32 Lakh (base year 2011)
Project DSCR	1.57
Loan Tenure	60 months excluding moratorium period of 03 months.

### Project Brief

- The company is a proprietorship firm incorporated in the year 2005. The unit is engaged in the manufacturing of Stitching yarn and Embroidery Yarn. The stitching yarn normally manufactured by the plant has 10 twists per inch (tpi) and the polyester yarn manufactured has 18 to 24 tpi depending on the market requirements.
- The basic raw material is Bright Polyester Yarn, which is subsequently wound, twisted and doubled to manufacture stitching and embroidery yarn. It may be noted that the load on the motors is process dependent and changes with the doff condition.
- Earlier, the unit was facing quality issues like knot problems in yarn manufacturing and individual sub-processes like Winding, Twisting, Doubling and Reeling makes production process more complex and difficult. Other problems include high energy consumption, heavy wastages, more time consuming process, reduced quality etc.
- In view of the above, SIDBI was approached in order to avail loan for the purchase of modern & energy efficient machines. Details of machineries are as follows:
  - 146/96 & 200/120 Spindle (each 2 no) for on-Twister Machine (Model: Threadstar), 32 Spindle and 60 spindle Servo Winder Machine (Model: Windstar W 28 s), all complete with servo drive and electrical accessories and single flange cops, double flange bobbin.
- Total project cost was Rs. 41.28 Lakh (Term loan from SIDBI is Rs. 30 Lakh).
  - With the installation of the new machines, some of the sub processes have been clubbed and they are now performed by a single machine. As a result, the labour requirements have reduced from 12-15 persons to around 8-9 persons.
  - **Improvement in the quality:** TFO produces knot less yarn.
  - Increase in the productivity levels from 600 kg per shift (12 hours) to 800 kg per shift (12 hours). Production has increased by around 33 %.
  - Installation of TFO machines is a value addition to the product in terms of improvements in quality. There would be an increase in the power consumption, but a holistic view of the old vis-à-vis the new process (starting from the raw material to the finished product) indicated an increase in the production level and a subsequent reduction in the specific energy consumption by around 30 %.



### Environmental Impact

- Net Reduction Power Consumed: 98.07 Wh/kg
- Reduction in Green House Gas emission (GHG): 52 ton of CO<sub>2</sub> equivalents per annum.



(Circular weaving machines with machine controller)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 27.50 Lakh under JICA EE Line of Credit / 2011
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of Woven Sack Bags and Fabrics / Textile
Project Location	Morbi, Gujarat
Annual Turnover of the company	Rs. 188.60 Lakh (base year 2011)
Networth of the company	Rs. 167.73 Lakh (base year 2011)
Project DSCR	1.70
Loan Tenure	60 months excluding moratorium period of 12 months

### Project Brief

- The Unit is a Partnership firm having its manufacturing unit at Morbi, Gujarat. The unit is engaged in manufacturing of Woven Sack Bags and Fabrics.
- The manufacturing process is described as follows. The raw material which is in the form of small bins is converted into film by heating in the extruder machine. The film is further heated in the oven after cutting into tape. The film whose width is reduced in the oven is wended into bobbin. The bobbins are then arranged on the spinners. After that, weft preparation, weaving/looming are done. The final output is then measured and inspected before sending to the packaging department.
- The warp tapes are taken from two creels via rollers to the Weaving Machine, which ensures uniform warp tension, excellent cloth quality and trouble-free handling. During production, warp bobbins can be changed easily and quickly without shutdown of the circular Weaving Machine. Tape ends are simply tied in. Six shuttles running in a reed ring constructed for this purpose insert the weft bobbins.
- The cloth width can be modified by simply changing the weaving ring and adjusting the round holder and spreading system. The tubular cloth is taken past a Round Holder and Spreading system to two continuously driven Haul-off rollers and subsequently wound onto a cloth Beam.
- Company has been using heavy duty circular weaving machine (CWM) in the past and have now installed the machine with certain improvements. The heavy duty circular weaving machine is specially designed to weave endless tubular or flat cloth out of PP, HDPE, LLDPE tapes or other blends of polyolefines.
- In view of above, SIDBI had been approached to provide loan for modern and energy efficient machine as given below:
  - Installation of Circular weaving machines with machine controller
- Total project cost was Rs. 36.80 Lakh (Term loan from SIDBI is Rs. 27.50 Lakh).
- The project has resulted in reduced power consumption, reduced machine breakdown resulting in higher productivity. The specific Energy Consumption (SEC) (KWh/kg) for Machine with CWM was about 0.35 and that of machines without CWM was 0.6.

Old Equipment without Machine Controller

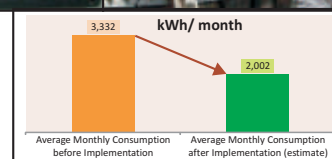


New Equipment with Machine Controller



### Environmental Impact

- Net Reduction in Power Consumption: 15,964 kWh/Yr.
- Reduction in Green House Gas emission (GHG): 14 ton of CO<sub>2</sub> equivalents per annum.



## Textile Unit

(High Speed Rapier Looms)

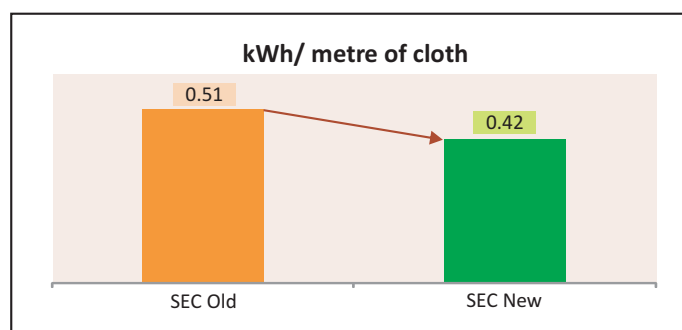
Particulars	Description
Loan Amount / Yr. of assistance	Rs. 200 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of fabrics, clothes & garments/ Textile Sector
Project Location	Karimnagar, Telangana
Annual Turnover of the company	Not applicable (New unit)
Networth of the company	Not applicable (New unit)
Project DSCR	1.68
Loan Tenure	72 months after moratorium period of 12 months

### Project Brief

- The unit was incorporated in the year 2011 and is engaged in manufacturing of fabrics, clothes and garments. The promoter of the firm is a women entrepreneur and she has a core business experience of more than 20 years. She hails from a family which is traditionally engaged in weaving activities and textile cloth business.
- Since it is a new unit, at the inception of the project, the management had the option to go for less capital intensive conventional looms over energy efficient rapier looms. But the management did not do so because, the management was aware of the advantages associated with the rapier looms such as high speed, high production, low maintenance costs, low energy consumption, and high throughput and quality.
- Accordingly, the company approached SIDBI for the purpose of setting up a manufacturing facility by procuring high speed rapier looms for weaving of grey cloth. SIDBI has assisted the company by providing a term loan. The raw material, polyester grey yarn, was proposed to be procured from large companies like Reliance and the finished product would be marketed through local traders/ buyers. The plant would operate for two shifts in a day and 300 days in a year.
- A total of 36 rapier looms (the major components are warp beam, heddles, harnesses, shuttle, reed & take up roll) with an aggregate installed production capacity of 27 lakh meters per annum has been assisted under the project. The manufacturing process involves major operations like shedding, picking, battening, and taking up. The total load of rapier looms is 126 HP. The rapier looms are designed for processing all kinds of manmade yarn.
- The specific energy consumption (SEC) of high speed rapier looms and conventional looms were found to be 0.21 kWh/ meter and 0.3 kWh/ meter respectively (SEC of Conventional looms were assessed in the associate concern of the unit). The production capacity of the rapier looms and conventional looms were 250 meter/day and 150 meter/day respectively. Thus, a reduction in SEC of 0.09 kWh/metre has been realized by the company which resulted in an electrical energy savings of 21,195 kWh/month for 36 rapier looms.
- The project cost was envisaged at Rs. 384 Lakh and SIDBI has sanctioned a term loan of Rs 200 Lakh under JICA EE Line of Credit.

### Environmental Impact

- Electrical Energy Savings: 2,54,340 kWh/Yr
- Reduction in Green House Gas emission (GHG): 203 tons of CO<sub>2</sub> equivalents per annum.



## Case Study-47

# Textile Processing Unit

(Multi Chamber Stenter Machine, High Speed Rapier Loom, bleaching and washing machine, rotary printing machine (automatic), straighteners, with ETP, boilers etc)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 1,500 Lakh (Rs. 1,224 Lakh under JICA EE Line of Credit and Rs. 276 Lakh under SIDBI Direct Credit Scheme) / 2011
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Processing and printing of cloth/ Textile Processing
Project Location	Tirupur, Tamil Nadu
Annual Turnover of the company	Not applicable (New Unit)
Networth of the company	Not applicable (New Unit)
Project DSCR	1.85
Loan Tenure	84 months after an initial moratorium of 15 months

## Project Brief

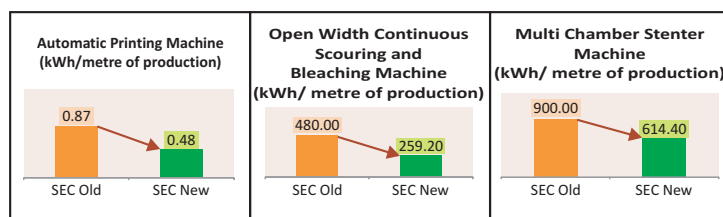
- The Company was incorporated in 2010 and has been engaged the processing and printing of cloth.
- Encouraged by the working experience and success of the associate firms, the Company decided to establish a new unit (green field project for backward integration by enhancing the capacity of processing/ printing activity) to cater to the increased demand. For this new unit, the borrower proposed to acquire sophisticated state-of-the-art processing and printing machineries that are also energy efficient. This would help in improving on quality and the products would also be delivered on time.
- Machineries proposed to be purchased are continuous open width bleaching and washing machine, high performance rotary printing machine (automatic), slitting and weft straighteners, Multi Chamber Stenter Machine, besides other miscellaneous equipments such as effluent treatment plant, boilers, etc. In view of the above, the unit approached SIDBI in order to avail loans for the purchase these latest machineries.
- The automatic printing machines are based on Injet Printing Technology and the fabric to be printed would be inserted from one end and the printed fabric would be collected from the other end. The Open width continuous scouring and bleaching machine would clean and bleach the fabric. The process consists of several washing stages which removes stains and yellow colour of the fabric.
- The objective of Multi Chamber Stenter machine is to dry the wet fabric coming from the bleaching machine. The wet fabric would be inserted into the machine, which would then passed through the different stages of heated roller to remove water/ moisture content of the fabric and also to maintain the thickness of the fabric. After drying, the fabric would be trimmed at both the edges and would then be set for the design printing.
- These machines have computerized operation, easy to print multi colour designs and operated with less energy consumption.

The total project cost was around Rs. 2,800 Lakh and SIDBI has sanctioned a term loan of Rs. 1,500 Lakh (Rs. 1,224 Lakh under JICA EE Line of Credit and Rs. 276 Lakh under SIDBI Direct Credit Scheme).



## Environmental Impact

- Estimated electricity savings from major machineries mentioned above: 1,885 MWh per year.
- Reduction in Green House Gas (GHG) emissions: 1,508 tons of CO<sub>2</sub> equivalents per annum.



## Textile Unit

(New Raising Machine)

Particulars	Description
Loan Amount / Yr. of assistance	Rs. 10 Lakh under JICA EE Line of Credit / 2010
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of different types of fabrics/ Textile
Project Location	New Delhi
Annual Turnover of the company	Rs. 300 Lakh (base year 2010)
Networth of the company	Rs. 17.58 Lakh (base year 2010)
Project DSCR	2.59
Loan tenure	40 months after an initial moratorium of 06 months.

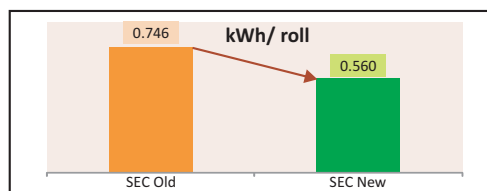
### Project Brief

- The company, a proprietorship concern, is engaged in the processing of different types of fabric like cotton, polyester, hosiery, denim etc.
- The unit has been manufacturing cotton cloth rolls by using conventional machine. Hence, the unit was facing problems related to the transmission loss from motor to roller of the machine and this was affecting the production capacity of the plant as well as consuming more energy to produce the same.
- The unit realized the deficiency in the plant operation due to conventional machine. Hence, the unit decided to replace the existing conventional machine with New Raising Machine and approached SIDBI for availing financial assistance. SIDBI has financed the project under Sustainable Finance Scheme of SIDBI.
- The total cost of the project was Rs. 14 Lakh and SIDBI has provided a loan for Rs. 10 Lakh.
- Features:
  - High Efficiency for Raising
  - Combined Integer System
  - Special Driving System
  - Low Noise
  - Easy Operation
  - Easy Maintenance
  - Stable Frame of Machine
  - Mass Production



### Environmental Impact

- By replacing the conventional machine with new raising machine, the energy consumption for processing of cotton cloth has come down from 0.746 kWh to 0.56 kWh per roll i.e. a saving of 0.19 kWh of energy per roll. In percentage terms, this comes to around 25 % energy savings in energy consumption.
- Reduction in Green House Gas (GHG) emissions: 8 tons of CO<sub>2</sub> equivalents per annum.



## Textile Unit

(Energy Efficient Automatic Spreading cum Cutting Machine)

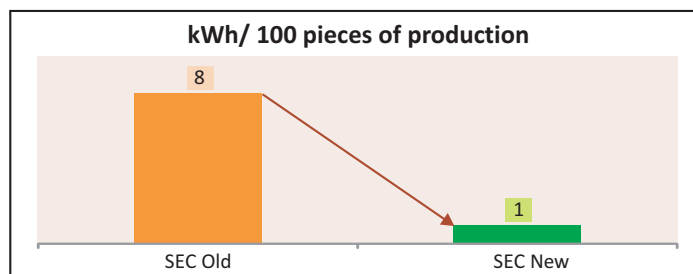
Particulars	Description
Loan Amount / Yr. of assistance	Rs. 100 Lakh under KfW EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit
Product / Industry sector	Manufacturing of knitted garments/ Textile Sector
Project Location	Tirupur, Tamil Nadu
Annual Turnover of the company	Rs. 5,192 Lakh (base year as on March 31, 2012)
Networth of the company	Rs. 233 Lakh (base year as on March 31, 2012)
Project DSCR	6.55
Loan tenure	60 months

### Project Brief

- The unit was established in the year 2005 and engaged in the manufacturing of ready-made knitted garments and export.
- The company was using eight no. of conventional cutting machines whose specific energy consumption was high and the production was low. The conventional machines also resulted in more wastage of clothes and the machines were semi-automatic.
- Hence, in order to reduce the energy consumption and wastage during operations, and to sustain in the textile business market, to increase the production capacity and to also export quality products, the company decided to replace its old conventional machines with multipurpose energy efficient machinery. Accordingly, the promoters decided to buy one no. of "Automatic spreading cum cutting machine" and approached SIDBI for financial assistance. SIDBI provided a term loan to the company for its replacement proposal.
- Eight no. of conventional cutting machines together have consumed 32 kWh per hour with a production rate of 420 pieces per hour whereas the energy efficient automatic spreading cum cutting machine consumes only 19 kWh per hour with a production rate of 3,000 pieces per hour.
- Thus, the company has realized a decrease in specific energy consumption by 7 kWh per 100 pieces of production. The production rate has also increased from 5,040 pieces/ day to 36,000 pieces/ day (~7 times increase in productivity). The bottom line of the company has improved and with this replacement project the company has been able to achieve an energy savings of upto 60%.

### Environmental Impact

- Electrical Energy Savings: 8,40,000 kWh/Yr
- Reduction in Green House Gas emission (GHG): 756 tons of CO<sub>2</sub> equivalents per annum.



## Case Study-50

# Transport Equipment Unit

(Injection Moulding Machine with servo drive, Hydraulic Core Pull, Air Ejection, AC Variable Drive, Barrier Screw etc.)

Particulars	Description
Loan Amount / Yr. of assistance	Term loan of Rs. 115 Lakh under JICA EE Line of Credit / 2012
Borrower / Category	MSME - Manufacturing Unit (Small Enterprise)
Product / Industry sector	Manufacturing of plastic moulded battery containers and lids / Transport Equipment
Project Location	Howrah, West Bengal
Annual Turnover of the company	Rs. 1,812.59 Lakh (base year 2011)
Networth of the company	Rs. 349.63 Lakh (base year 2011)
Project DSCR	2.26
Loan tenure	66 months after a moratorium of 6 months

## Project Brief

- The Company was incorporated in the year 2003. Earlier, the Company was engaged in the trading business of P.U. Resins. In the year 2010, the company embarked upon manufacturing of injection moulded plastic components such as containers and lids for battery cases. The Company became a dedicated vendor for Exide Industries after this new line of business had been started. Later, the company also set up a battery charging and packaging unit.
- The production capacity of the Company was 25.68 Lakh containers per annum. Also, the company was able to cater to 2.40 lakh batteries per annum in its Battery charging facility.
- The main raw material has been PP Granules (procured locally and as well as imported)
- In due course, the Company wanted to increase the production levels, improve the quality of the products, and make the processes energy efficient and also to ensure continuous power for increased production. In this regard, the unit decided to implement certain projects and approached SIDBI for availing loan. Details of the new machineries proposed to be installed are as follows:
  - 1 no. of Single Colour Injection Moulding Machine with servo drive.
  - 1 no. of Injection Moulding Machine. 60 HP Power Pack with Water Battery (16 Stack), Hydraulic Core Pull, Air Ejection, AC Variable Drive, Barrier Screw in lieu of Std. & Robot Interface SPI.
  - 500 kVA Silent DG Set.
- The technologies employed in the machineries are proven and would directly contribute to quality.
- Both the injection moulding machines are equipped with Servo drive/ Variable drive. These drives would directly result in reduced power consumption through (i) drawl of power in proportion to load and (ii) no power drawl during idle time in the injection moulding process cycle.
- Also, the Company was also able to increase the production through the acquisition of new machineries and would be able to cater to the requirements of other industries in automobile, railways and defence sectors.
- The total project cost was around Rs. 155 Lakh and SIDBI has provided a term loan of Rs. 115 Lakh.



## Environmental Impact

- Energy Savings: The energy saving potential of the machines proposed in the project ranges from 30 to 70%.
- Significant reduction in Green House Gas (GHG) emission.





## References

### Heating Values

Fuel	Unit	CV
Electricity	kCal/kWh	860
Coke	kCal/kg	6000
Natural Gas	kCal/scm	8500
Liquefied Petroleum Gas	kCal/kg	12500
Furnace Oil	kCal/Liter	9870
High Speed Diesel	kCal/kg	10500
Lignite (Indian Coal)	kCal/kg	4000

### Carbon Emission Factor

Fossil Fuel		CO <sub>2</sub> emission factor
Gaseous fossil	Natural Gas	2.693 t/t
	Liquefied Petroleum Gas	2.985 t/t
Liquid Fossil	FO	3.101 t/t
	HSD	3.070 t/t
	Kerosene	3.149 t/t
	LDO	3.186 t/t
	Bio diesel	70.8 tonne per TJ
Solid Fossil	Anthracite	2.625 t/t
	Sub-Bituminous Coal	1.816 t/t
	Lignite	1.202 t/t
	Coke	107 tonne per TJ
Others	Electricity	0.89 kg per kWh

Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Intergovernmental Panel on Climate Change 2006

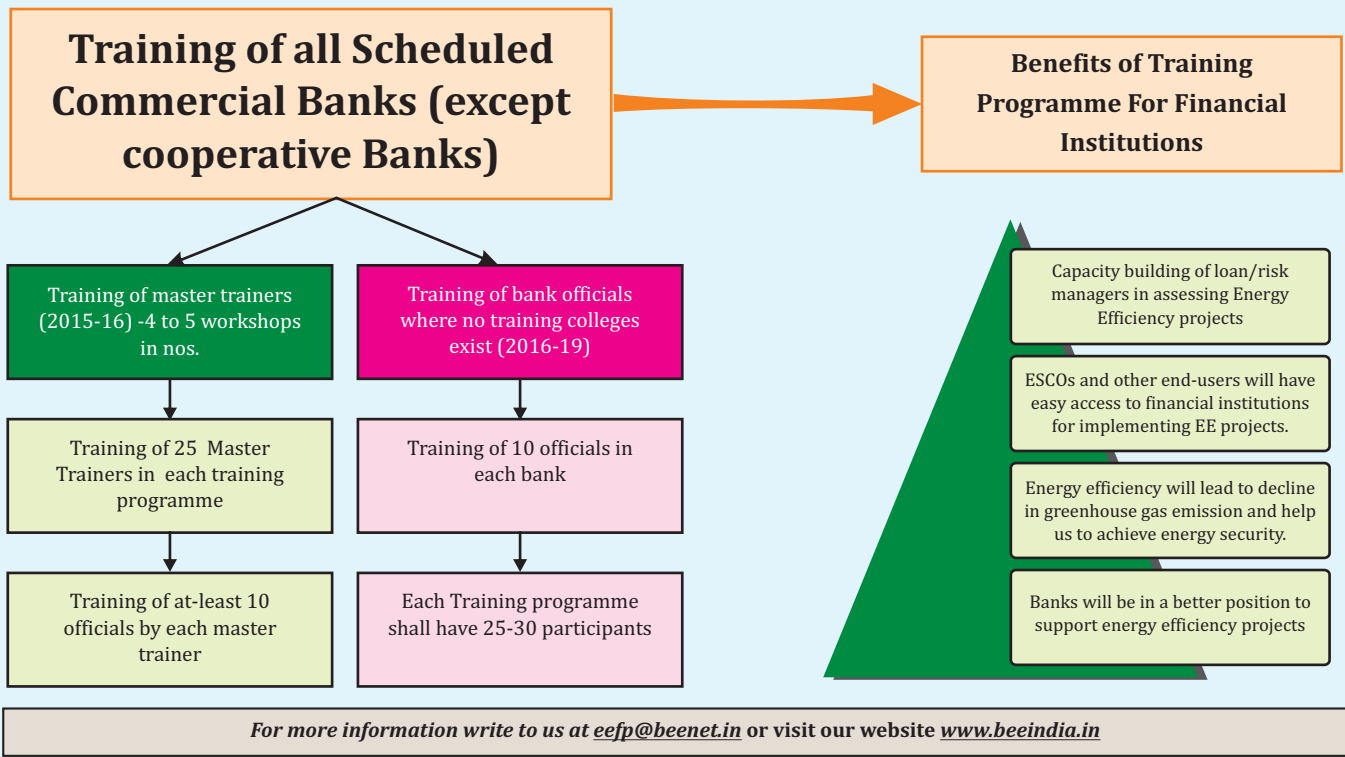
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TJ – Tera joule

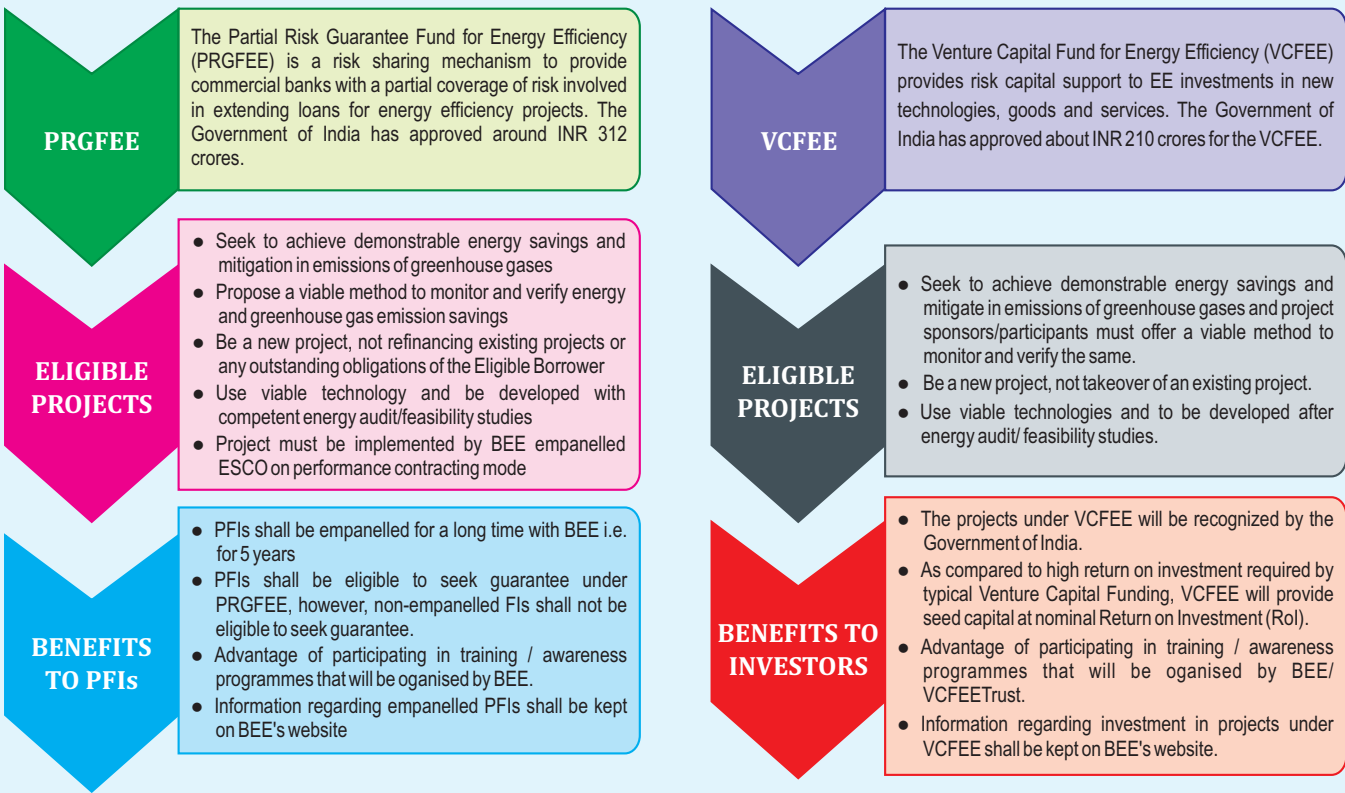




# ENERGY EFFICIENCY FINANCING PLATFORM (EEFP)



# FRAMEWORK FOR ENERGY EFFICIENT ECONOMIC DEVELOPMENT



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