DETAILED PROJECT REPORT
ON
KILN INSULATION IMPROVEMENT
(MORBI CERAMIC CLUSTER)











Bureau of Energy Efficiency

Prepared By

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KILN INSULATION IMPROVEMENT

MORBI CERAMIC CLUSTER

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We have received very encouraging feedback for the BEE SME Program in various SME Clusters. Therefore, it was decided to bring out the DPR for the benefits of SMEs. We sincerely thank the officials of BEE, Executing Agencies and ISTSL for all the support and cooperation extended for preparation of the DPR. We gracefully acknowledge the diligent efforts and commitments of all those who have contributed in preparation of the DPR.

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List of Abbreviations

BEE	Bureau of Energy Efficiency
SME	Small and Medium Enterprises
DPR	Detailed Project Report
GHG	Green House Gases
NG	Natural Gas
CDM	Clean Development Mechanism
DSCR	Debt Service Coverage Ratio
NPV	Net Present Value
IRR	Internal Rate of Return
ROI	Return on Investment
WHR	Waste Heat Recovery
SCM	Standard Cubic Meter
MT	Metric Tonne
SIDBI	Small Industries Development Bank of India

EXECUTIVE SUMMARY

SEE-Tech Solution Pvt. Ltd. is executing BEE-SME program in Morbi Ceramic Cluster, supported by Bureau of Energy Efficiency (BEE) with an overall objective of improving the energy efficiency in cluster units.

Morbi ceramic cluster is one of the largest ceramic clusters in India; accordingly this cluster was chosen for energy efficiency improvements by implementing energy efficient measures / technologies, so as to facilitate maximum replication in other ceramic clusters in India.

The main energy forms used in the cluster units are grid electricity, Natural Gas, Charcoal, Lignite and small quantity of Diesel oil. Natural Gas is used as fuel in kiln for baking of ceramic products. In ceramic plants, about 50% of total energy cost is required for kiln.

Kiln is mainly used for baking of the ceramic products where Inside temperature at firing zone of kiln is maintained at 1200^{O}C. Maximum efficiency of the Kiln are observed in the range of 30% to 40% and hence 60% to 70% of total heat supplied does not have contribution to deliver the final finish products. Out of total heat loss, about 15 to 20% heat loss occur in the form of radiation loss. This radiation loss can be reduced by replacing the damaged insulation and increasing the insulation thickness of the kiln.

Project implementation will lead to reduction in Natural Gas consumption by 56,000 SCM per year however; this intervention will not have any effect on the existing consumption pattern of electricity.

The total investment, debt equity ratio for financing the project, monetary savings, Internal rate of return (IRR), Net present value (NPV), Return on investment (ROI) etc for kiln insulation improvement project is furnished in Table below:

S.No	*Particular*	*Unit*	*Value*
1	Project cost	₹ (in Lakh)	15.345
2	Natural Gas saving	SCM/year	56000
3	Monetary benefit	₹ (in Lakh)	8.4
4	Debit equity ratio	Ratio	3:1
5	Simple payback period	years	1.8
6	NPV	₹ (in Lakh)	2
7	IRR	%age	17
8	ROI	%age	124
10	Process down time	Month	1

ABOUT BEE'S SME PROGRAM

Bureau of Energy Efficiency (BEE) is implementing a BEE-SME Programme to improve the energy performance in 25 selected SMEs clusters. Morbi Ceramic Cluster is one of them. The BEE's SME Programme intends to enhance the energy efficiency awareness by funding/subsidizing need based studies in SME clusters and giving energy conservation recommendations. For addressing the specific problems of these SMEs and enhancing energy efficiency in the clusters, BEE will be focusing on energy efficiency, energy conservation and technology up gradation through studies and pilot projects in these SMEs clusters.

***Major activities in the BEE -SME program are furnished below*:**

Energy Use and Technology Audit

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

Capacity Building of Stake Holders in Cluster on Energy Efficiency

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

Implementation of Energy Efficiency Measures

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

Facilitation of Innovative Financing Mechanisms for Implementation of Energy Efficiency Projects

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

1 INTRODUCTION

1.1 Brief Introduction about Cluster

Morbi SME Cluster is one of the largest ceramic cluster in India, which is famous for manufacturing of ceramic tiles. Over 70% of total ceramic tile products come from Morbi cluster. The nearest airport is at Rajkot, which is 67 KM from Morbi by road. Morbi could also be reached from Ahmadabad by Railway as well as by Road which is about 184 KM.

There are approximately 479 ceramic units in this cluster which are engaged in manufacturing of Wall Tiles, Vitrified Tiles, Floor Tiles, Sanitary Wares, Roofing Tiles and other ceramic products. There are around 50 more ceramic units coming up in Morbi. Many existing units are expanding production capacity.

Majority of the cluster units are of integrated type, where the raw material is processed in-house to the final product. Table 1.1 shows the total energy consumption scenario at Morbi cluster.

Table 1.1 Details of Annual Energy Consumption Scenario at Morbi Ceramic Cluster

S. No	*Type of Fuel*	*Unit*	*Value*	*% Contribution in Equivalent Energy Terms*
1	Electricity	GWh/year	1,200	8.23
2	Natural Gas	SCM/year	660,000,000	46.32
3	Charcoal	MT/year	165,000	8.55
4	Lignite	MT/year	1,320,000	36.84
5	Diesel	Litre/year	800,000	0.06

Energy Usage Pattern

Average monthly electricity consumption in ceramic plants ranges from 1 lakh to 2 lakh kWh depending on the size of the plant. In thermal energy, solid fuel such as Lignite, Charcoal, Indonesian Coal, Biomass Briquette, etc are used in spray dryer where as Natural Gas is used in kiln in all plants except few of them. Solid fuel consumption in spray dryer ranges from 80 to 160 kg/MT of dried powder production. Natural Gas consumption in kiln varies from 1.01 to 1.4 SCM/m^2 of tiles produced.

Classification of Units

The ceramic units can be categorized into following four types based on product manufacture

- Floor Tiles unit
- Wall Tiles unit
- Vitrified Tiles unit
- Sanitary Wares unit

Production wise Unit Breakup

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

Table 1.2 Production wise Unit breakups

Type of product	*No. of Units.*				*Production (m^2/day or MT*/day)*			
Scale of Unit	*Small*	*Medium*	*Large*	*Total*	*Small*	*Medium*	*Large*	*Total*
Wall Tiles	43	100	35	178	2,500	3,500	7,500	13,500
Floor Tiles	8	38	6	52	3,000	4,000	7,000	14,000
Vitrified Tiles		22	4	26		5,760	11,520	17,280
Sanitary Wares	10	24	9	43	4	8	14	26

** In case of sanitary wares, production is measured in terms of MT.*

Products Manufactured

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

Table 1.3 Product manufactured

S. No	*Type of Product*	*% share*	*Units (No.).*
1	Wall Tiles	37	178
2	Vitrified Tiles	8	36
3	Floor Tiles	11	52
4	Sanitary Wares	9	43
5	Spray Dryer Mud Manufacturing Units	8	40
6	Roofing Tiles (seasonal operation)	25	120
7	Third Firing Manufacturing (Producing pictures on tiles)	37	10
Total (No.)			479

Production Process of Manufacturing Wall/Floor/Vitrified Tiles

Only difference between manufacturing process of tiles and sanitary wares is the moulding process. In case of sanitary wares, manual moulding is carried out whereas in case of tiles hydraulic press is used to form the biscuits.

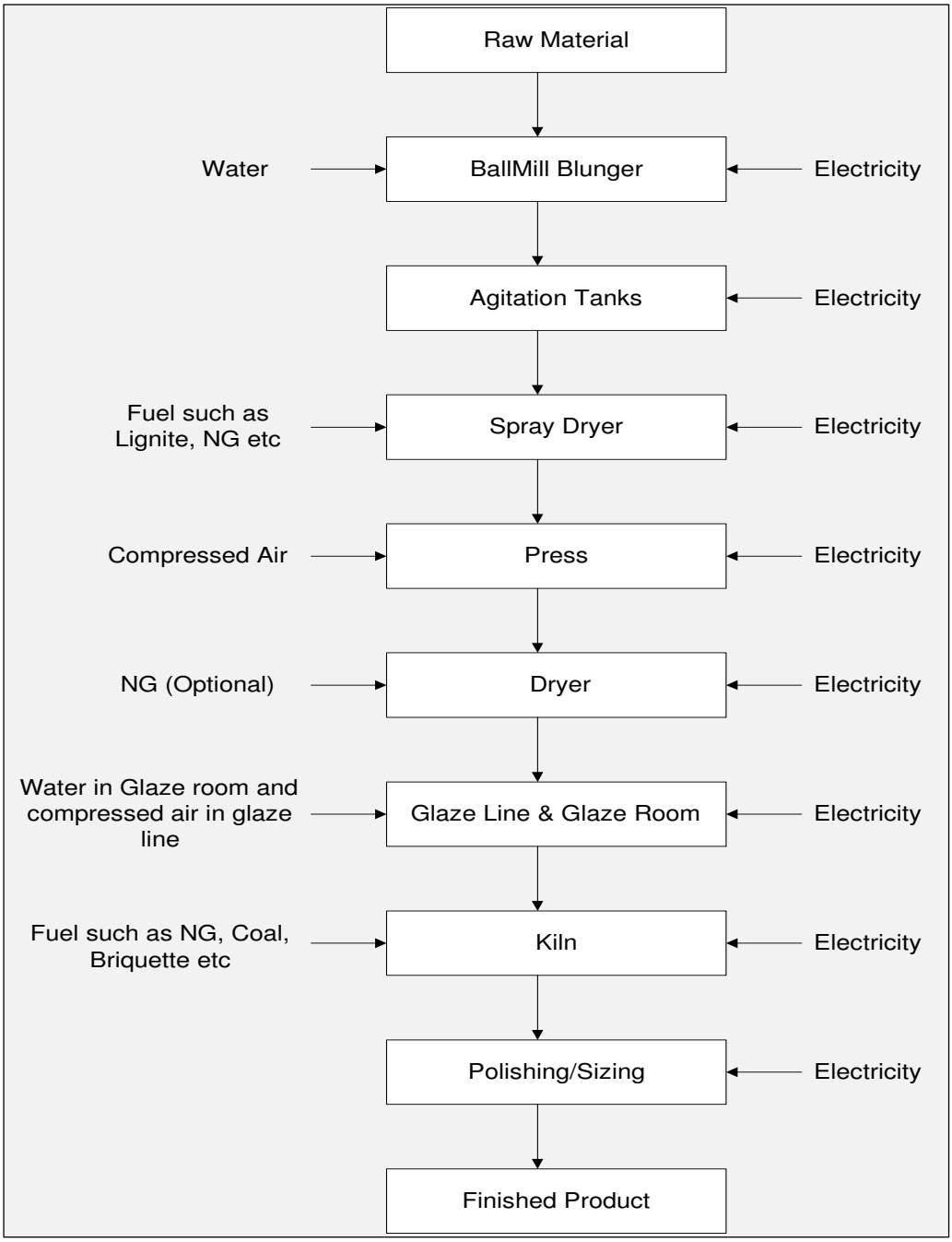


Figure 1.1 Process Flow Diagram of Wall/Floor/Vitrified Tiles

Wet Grinding

Raw materials such as clay, feldspar, quartz, calcite etc. are mixed with water in a proper proportion and are grinded in a ball mill to make a homogeneous mixture. Ball Mill is a batch type of process. After completion of one batch of ball mill, slurry is taken in to the underground tanks fitted with agitator motor in each tank to maintain the uniformity of mixture (i.e. avoiding settling of solid particles). Ball mills and blungers are used for grinding.

Continuous wet grinding process/technology also exists but it is not in use in Morbi. Dry grinding technology is also available but it is also not in use in Morbi. This is mostly due to non suitability of raw material in Morbi for dry grinding process.

Spray Drying

After preparation of the slurry of required density, it is stored in underground tanks, which are continuously agitated to maintain uniformity of the slurry. Slurry is then pumped through a hydraulic pump into the spray dryer where the slurry is sprayed through nozzles. Material is dried in spray dryer, thus the moisture which is added during the grinding process in the ball mill is removed in the spray drier. Input moisture to spray drier is 35 to 40%, which is dried to 5 to 6 %. Product from the spray dryer is then stored in silos. Hot flue gases at a temperature of about 550 to 600 ^{o}C is used as heating source; hot gases are generated by combustion of variety of fuels such as lignite, Indonesian coal, saw dust, briquette, Natural gas through direct combustion as well as through Gasifier.

As of date, Co-generation technology is not in use in Morbi Ceramic units. However with increase in exposure on gas turbine technology some of the units in Morbi are seriously considering co-generation. Specifically tile manufacturing units have good potential of co-generation, which in principle means, at the operating cost level co-generation technology can generate electricity almost at the utility (PGVCL) cost and can make spray drying energy cost almost free as the hot exhaust of the gas turbine is sufficient for spray drying. In case of Morbi Natural gas price is reducing while electricity tariff has increased in past few years.

Pressing

The product from the spray dryer is then sent to the hydraulic press where the required sizes of biscuit tiles are formed and sent to dryer through conveyer.

In press, advanced technology is available which enables 3 steps pressing to single step pressing, which improves productivity.

Drying

After press, biscuits containing about 5% to 6% moisture are sent to drier and dried to about 2% to 3% moisture level in case of vitrified tiles. In case of wall and floor tiles, biscuits are directly baked to a temperature of about 1100 to 1150 ^{o}C and after glazing, it is baked again. In some ceramic units, hot air from kiln cooling zone exhaust is used in a dryer which saves energy consumption in driers.

Glazing

After drying, biscuit tiles are sent for glazing on the glaze line. Glaze is prepared in ball mills. Glazing is required for designing on tiles.

Firing and Baking

After glazing, the biscuit tiles are sent for final firing in the kiln. The glazed tiles are fired at a temperature of 1100 to 1150 oC in the kiln. Natural gas as well as producer gas from Gasifier is used as fuel in the kiln.

Sizing

Tiles coming out of the kiln are sent for sizing and calibration in case of wall and Floor Tiles. The tiles are cut to proper sizes so that all tiles have same dimensions. After sizing finished product is sent for dispatch.

Polishing

Polishing is required for Vitrified Tiles. Polishing utilizes 40% to 45% of total electricity consumption in case vitrified units. After kiln the vitrified tiles are passed through polishing line. Polishing line consist of sizing, calibration and polishing machines.

1.2 Energy Performance in Existing Situation

1.2.1 Average Production

Annual production in typical unit in Morbi cluster is given in Table 1.4 below:

Table 1.4 Annual production from a typical unit

Type of product	*Production (m^2/year* or MT/Year*)*		
Scale of Unit	*Small*	*Medium*	*Large*
Wall Tiles	750,000	1,050,000	2,250,000
Floor Tiles	900,000	1,200,000	2,100,000

Type of product	*Production (m²/year* or MT/Year*)*		
Vitrified Tiles	NA	1,728,000	3,456,000
Sanitary Wares	1200*	2400*	4200*

**Annual production measured as m2/year in case of tiles and MT/year for Sanitary Wares*

1.2.2 Energy Consumption

Energy consumption (both electrical and thermal) in a typical ceramic plant for different types of products is given in Table 1.5.

Table 1.5 Annual Energy Consumption

Energy	*Electricity (GWh per year)*			*Natural gas (SCM per year)*			*Solid Fuel [lignite] (MT* per year)*		
Scale of Unit	*Small*	*Medium*	*Large*	*Small*	*Medium*	*Large*	*Small*	*Medium*	*Large*
Wall Tiles	0.9	1.5	2.4	750,000	1,050,000	2,250,000	2,400	2,880	3,600
Floor Tiles	0.9	1.5	2.4	900,000	1,200,000	2,100,000	3,600	4,200	4,800
Vitrified Tiles	NA	6.0	2.4	NA	2,700,000	6,000,000	NA	6,000	9,000
Sanitary Wares	0.24	0.45	0.9	120,000	240,000	420,000	NA	NA	NA

**Annual production measured as m2/year in case of tiles and MT/ year for sanitary wares*

1.2.3 Specific Energy Consumption

Specific energy consumption both electrical and thermal energy per m2 or MT of production for each type of ceramic industry is given in Table 1.6 below.

Table 1.6 Specific Energy Consumption in Different Ceramic Units

Energy	*Electricity (kWh/m²) or (kWh/MT*)*			*Natural gas (SCM/m²) or (SCM/MT*)*			*Solid Fuel [lignite] (kg/m²)*		
Scale of Unit	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
Wall Tiles	1.20	1.43	1.07	1.00	1.00	1.00	3.20	2.74	1.60

Energy	Electricity (kWh/m^2) or (kWh/MT^*)			Natural gas (SCM/m^2) or (SCM/MT^*)			Solid Fuel [lignite] (kg/m^2)		
Floor Tiles	1.00	1.25	1.14	1.00	1.00	1.00	4.00	3.50	2.29
Vitrified Tiles	NA	3.47	3.47	NA	1.56	1.74	NA	3.47	2.60
Sanitary Wares	200.00	187.50	214.29	100.00	100.00	100.00	NA	NA	NA

1.3 Proposed Technology/Equipment

1.3.1 Description of Technology/Equipment

Kiln is mainly used for baking of the ceramic products. Natural gas is used as a fuel in kiln. Inside temperature at firing zone of kiln is maintained at $1200^{O}C$. Maximum efficiency of the Kiln are observed in the range of 30% to 40%. Remaining 60% to 70% of total heat supplied does not have contribution to deliver the final finish products. Out of these total heat, percentage of radiation loss is coming out to be in the range of 15% to 20% of total energy supplied. This radiation loss can be reduced by replacing the damaged insulation and increasing the insulation thickness of the kiln. Kiln insulation improvement, will lead to saving in Natural gas consumption in kiln.

1.3.2 Role in Process

Role of Kiln is to bake the ceramic products and deliver the finished products. Final quality of product depends on the firing temperature and cycle time of kiln. In kiln, final moisture is removed and baking at higher temperature imparts strength to the ceramic products.

1.4 Benchmarking for Existing Specific Energy Consumption

Energy Consumption in kiln depends upon following parameters.

- Baking temperature which depends on the type of product to be fired
- Operational & maintenance practices
- Type of fuel and its calorific value
- Quantity of product to be beaked
- Amount of air supplied for fuel combustion
- Length of Kiln
- Insulation level & its condition

Energy use and technology audit studies were conducted in various units of Morbi ceramic cluster, the baseline energy consumption of present Kiln and the performance of the same is carried out and attached in Annexure 1.

1.4.1 Energy Audit Methodology

The following methodology was adopted to evaluate the performance of Kiln. Figure 1.2 demonstrates the methodology.

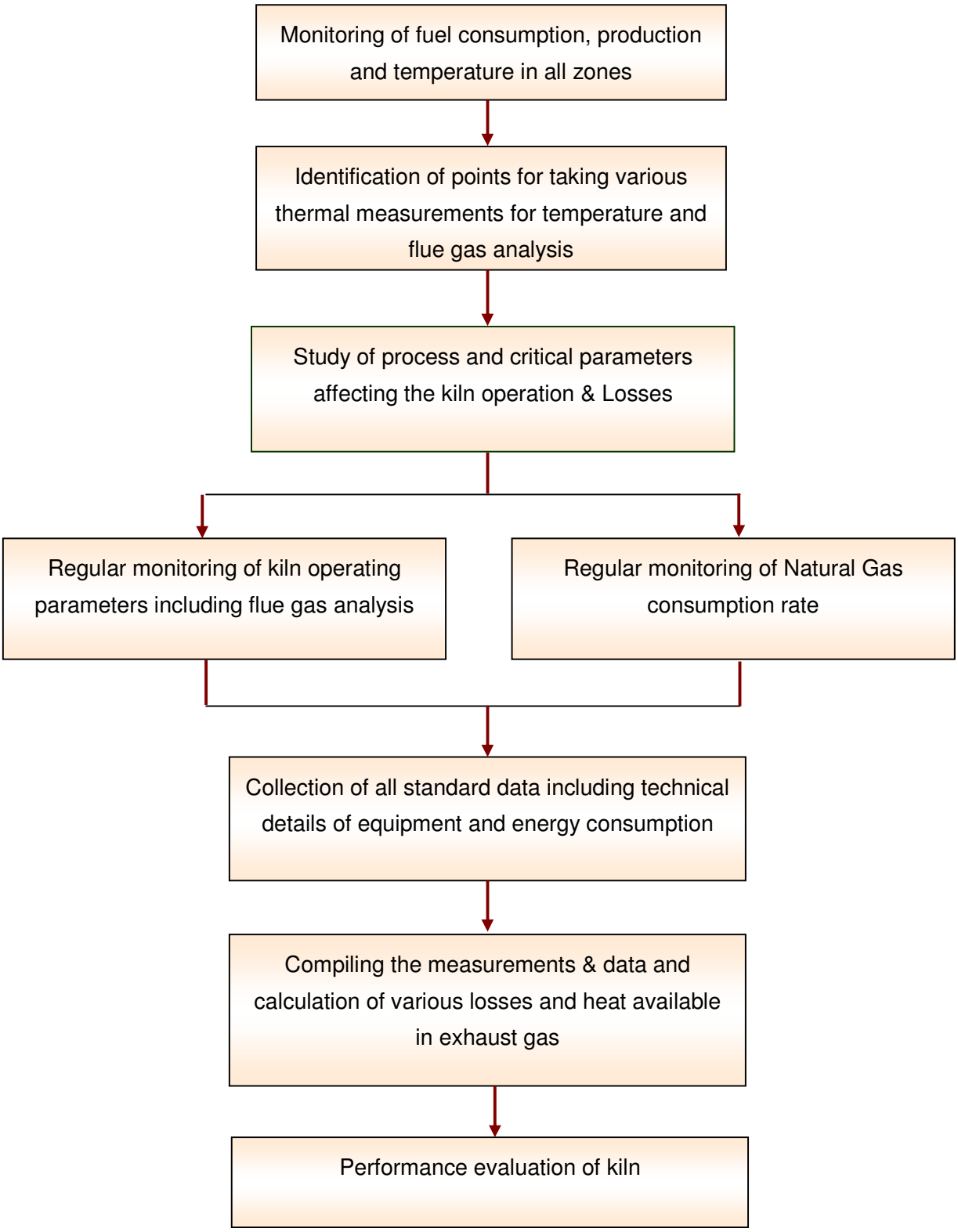


Figure 1.2 Energy Audit methodologies

1.4.2 Design and operation parameters specification

In most of the ceramic plants, Natural gas is used as a fuel. Kiln is divided into different zones depending upon zonal temperature. The zones are Pre-heating zone, Firing zone, Rapid cooling zone & cooling Zone. Major role of the kiln is to bake the product at a temperature of about 1200^{O}C. Thermal and Electrical energy consumption in kiln for different ceramic products are given in table 1.7 below:

Table 1.7 Energy Consumption in kiln for Different Ceramic Products

Particulars	*Unit*	*Plant Type*		
		Vitrified Tiles	*Wall Tiles*	*Floor Tiles*
Electricity consumption	GWh/Year	5.46	0.94	3.66
Natural gas consumption	SCM/Year	24,57,213	6,30,382	43,77,434

1.4.3 Operating Efficiency Analysis

Operating efficiency of kilns is found to be in the range of 30% to 40%. Detailed parameters and calculations used for operating efficiency evaluation of kiln and heat loss calculations are given in the Annexure 1.

1.4.4 Specific Electricity Consumption

In kiln, apart from Natural gas, electrical energy is also used. Mainly Electricity is used for running combustion blowers, rapid cooling blowers, rollers & conveyers of the kiln. Specific energy consumption for both electrical energy and thermal energy for different ceramic products of kiln is given in table 1.8 below:

Table 1.8 Specific Energy Consumption of Kiln

Particulars	*Unit*	*Plant Type*		
		Vitrified Tiles	*Wall Tiles*	*Floor Tiles*
Electricity consumption	kWh/m^2	5.01	2.47	1.92
Natural gas consumption	SCM/m^2	2.26	1.65	1.8

1.5 Barriers in Adoption of Product Technology/Equipment

1.5.1 Technological Barrier

- In Morbi cluster, overall technical understanding on ceramic manufacturing is good and rapidly increasing, however awareness and information about the new and emerging energy efficiency technologies available in market is less.
- In this cluster there is lack of leadership to take up the energy efficiency projects.

- The majority of the ceramic plant owners are only concern about their production instead on efficiency improvement.
- Dependence on local equipment suppliers for uninterrupted after sales service

1.5.2 Financial Barrier

- Implementation of the proposed project activity requires considerable investment of ₹ 14.93 lakh, which is a significant investment and not commonly seen in the cluster for energy efficiency.
- The majority of the unit owners are of the view that it makes business sense for them to invest in enhancing production capacity rather than making investment in energy efficiency.
- The unit owners in the cluster are wary of approaching banks for financial assistance due to their old perception that getting loan sanctioned from Banks involves lot of paper work / documentation and needs collateral security.

1.5.3 Skilled Manpower

In Morbi ceramic cluster, the availability of skilled manpower is one of the limitations, this issue gets further aggravated due to more number of ceramic units as compared to the availability of skilled manpower. One local technical person available at Morbi takes care of about 5 to 10 ceramic units. For major equipments of ceramic units like kiln, Polishing Machine etc. maintenance or the repair work of these equipments is taken care of by the equipment suppliers itself. Equipment suppliers like Sacmi (Italy), KEDA, Modena (China) etc. has appoint their representatives at Morbi for the maintenance work.

2 PROPOSED TECHNOLOGY

2.1 Detailed Description of Technology

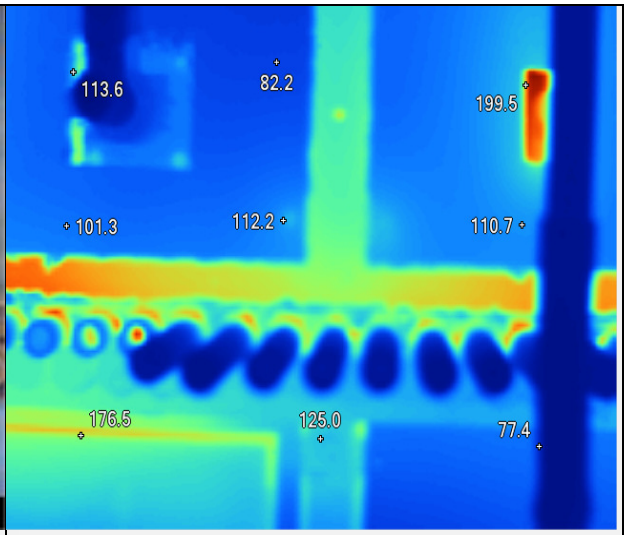
2.1.1 Description of Technology

Maximum efficiency of the Kiln is in the range of 30% to 40% and remaining 60% to 70% are losses from the kiln. Out of these losses percentage of radiation loss is coming out to be in the range of 15% to 20% of total energy supplied. This radiation loss can be reduced by replacing the damaged insulation and improving the existing insulation of the kiln. Insulation improvement, leads to saving in fuel consumption in Kiln. In this study saving potential of around 5% of total fuel consumption in kiln, is identified by reducing radiation losses.

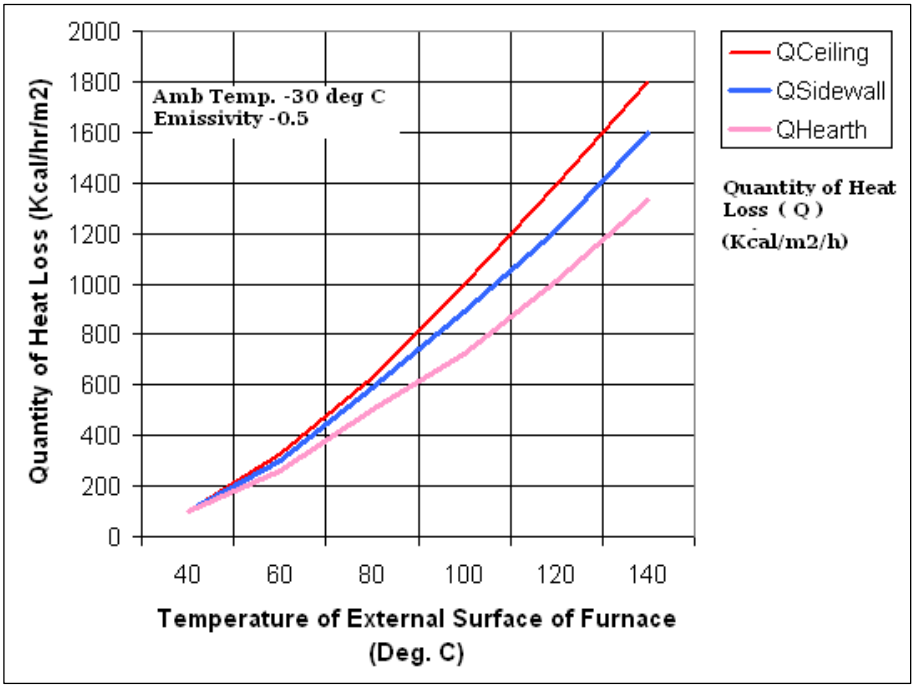
One of the important aspects in this work is to maintain the repaired insulation which can be done by checking the surface temperature timely. Units need to keep thermocouple & infra read gun type portable temperature measuring instruments to measure the surface temperature and plant persons should check it themselves status of the insulation. Both of these instruments are extremely cost effective. It is further recommended that at least once a year, the units must go for a thermograph based survey of the insulation. Left had side is photograph where as the right side picture is its thermograph which clearly identifies the hot spots in red color where insulation needs to be improved. Once the insulation work is carried out again thermograph needs to be taken to check the quality of repaired insulation. Such a holistic approach is required for insulation improvement.

Thermal Image Showing the Surface Temperature of Kiln

Actual image of Kiln surface.



Thermal Image of Kiln surface.



Graph Showing the Quantification of Heat Loss through Kiln Surface

2.1.2 Suitability of Existing Technology

In this technology radiation losses are reduced by replacing the damaged insulation or by improving the insulation of the kiln which leads to saving in fuel consumption in kiln.

To sustain the improved insulation level, insulation levels must be regularly checked. If timely corrective actions are not taken then the losses may increase. This measure can be implemented during annual shut down period to avoid loss of production. To maintain the sustainability of achieved results from the insulation improvement, awareness creation is mainly required. Loss quantification due to poor insulation needs to be explained by the LSP to the unit owners, and then this will drive the unit owners to maintain the implemented and achieved results of insulation improvement project on a regular basis.

This technology has been selected for the following reasons:

- In ceramic unit, major energy cost of unit is consumed in kiln.
- It reduces the fuel consumption in kiln.
- It increase the efficiency of kiln
- Resulting in reduction n the GHG emission
- Technology is easily available and proven

2.1.3 Superiority over Existing Technology

In this technology radiation loss from kiln will be reducing by replacing the damaged insulation of the kiln. This will results in decrease in the fuel consumption in Kiln. Thus it improves performance of existing system.

2.1.4 Availability of Technology

Service providers of this project are available at Morbi itself. Even many of the vendors are trying to personally visit the units to tell the unit owners about the savings achieved by insulation improvement in kiln.

2.1.5 Source of Technology

This Technology is already used in many of the industries and savings have been already achieved. This technology is very common and easy to implement. It reduces the fuel consumption in kiln also it increase the efficiency of Kiln and this technology is well established and easily available.

2.1.6 Terms and Conditions in Sales of Equipment

The Technology supplier shall give guarantee for proper performance after implementation of this project.

2.1.7 Process down Time during Implementation

Process down time requirement will be of one month for implementation of this project. Week wise break up of one month is shown in Annexure-6.

2.1.8 Life Cycle Assessment

Life cycle of this proposed insulation improvement project is about 4 to 5 years provided it requires periodic repair and maintenance work of damaged insulation spots over the period.

2.1.9 Suitable Unit for Implementation of Proposed Technology

In Morbi, there are around 479 ceramic units. Nearly 60% of the units have potential of insulation improvement, where this technology can be implemented.

3 ECONOMIC BENEFITS FROM PROPOSED EQUIPMENT

3.1 Technical Benefits

3.1.1 Fuel Saving

Energy & Monetary savings due to reduction in radiation loss in a typical ceramic cluster are presented in this chapter. Natural Gas consumption in a kiln is 11, 20,000 SCM per year and the proposed Natural Gas consumption in the kiln for the same production after kiln insulation improvement project implementation will be 10, 64,000 SCM per year. Therefore, implementation of this project will lead to saving in Natural gas consumption in kiln about 56,000 SCM per year.

3.1.2 Electricity Saving

No electricity savings are considered in the proposed technology because it is not reducing the electricity consumption in the kiln**.**

3.1.3 Improvement in Product Quality

Product quality achieved would be same as the present quality. It does not have any impact in improving the quality of the product. However if improves the kiln efficiency and reduce Natural Gas consumption.

3.1.4 Increase in Production

The proposed technology does not contribute to any improvement in production.

3.1.5 Reduction in Raw Material Consumption

Raw material consumption will be the same after the implementation of the proposed project.

3.1.6 Reduction in Other Losses

After implementation of this project, surface heat loss from the kiln will be reduced.

3.2 Monetary Benefits

Annual monetary savings due to insulation Improvement is ₹ 8.4 lakh per year. Energy & monetary benefit analysis of insulation improvement are shown in Table 3.1 below:

Table 3.1 Energy and Monetary Benefit due to Project Implementation

Sr. No.	*Particular*	*Unit*	*Existing Situation*	*Proposed Situation*
1	Production from kiln	m^2/day	5032	5032
2	Natural Gas Consumption	SCM/day	3200	3040

Sr. No.	Particular	Unit	Existing Situation	Proposed Situation
3	Working days in a year	Days	350	350
4	Saving in Natural gas consumption	%age	-	5
5	Saving in Natural gas consumption	SCM/day	-	160
6	Saving in Natural gas consumption	SCM/year	-	56,000
7	Cost of Natural gas	₹/SCM	-	15
8	Saving in rupees	₹ (lakh) /year	-	8.4

3.3 Social Benefits

3.3.1 Improvement in Working Environment in the Plant

Implementation of this project will result in the heat loss from the surfaces of the kiln which indirectly reduces the temperature near the kiln.

3.3.2 Improvement in Workers Skill

The technical skills of persons will definitely improve. As the training of surface temperature measuring instruments will be provided by equipment suppliers this will improve the technical skills of manpower required for operating of the equipment and also the technologies implemented will create awareness among the workforce.

3.4 Environmental Benefits

3.4.1 Reduction in Flue Gas Generation

By implementing this project there is definitely reduction in Natural gas consumption which leads to reduction in flue gas generation.

3.4.2 Reduction in GHG Emission

Implementation of this technology will results in reduction in CO_2 emissions due to reduction in overall fuel consumption. Implementation of this project will result in saving of 56,000 SCM per year which leads to 114 tCO_2 emission reduction per year from one unit. Similarly, there are more than 479 Ceramic units in Morbi ceramic cluster, if all units will implement this project then total CO_2 emission reduction will be approximately 55564 tCO_2 per year. This will also help in earning the carbon credit benefit through Clean Development Mechanism (CDM) project.

3.4.3 Reduction in Other Emissions like SOx

Sulphur is practically not present in Natural Gas; hence there is no impact on SOx emissions.

4 IMPLEMENTATION OF PROPOSED EQUIPMENT

4.1 Cost of Equipment Implementation

4.1.1 Equipments Cost

Cost of project is about ₹ 11.72 Lakh, which includes the insulation material cost including transportation and tax costs.

4.1.2 Erection & Commissioning and other Miscellaneous Cost

Erection & commissioning cost is ₹ 2.34 Lakh which includes services, manpower cost work, etc Interest during Implementation is ₹ 0.35 Lakh and other misc. cost is ₹ 1.17 Lakh.

Table 4.1 Details of Proposed Equipment Installation Cost

Sr. No	*Particular*	*Unit*	*Cost*
1	Equipment Cost	₹ (in Lakh)	11.72
2	Erection & commissioning cost	₹ (in Lakh)	2.34
3	Interest During Implementation	₹ (in Lakh)	0.35
3	Misc. Cost	₹ (in Lakh)	1.17
4	Total Cost	₹ (in Lakh)	15.58

4.2 Arrangements of Funds

4.2.1 Entrepreneur's Contribution

Entrepreneur will contribute 25% of the total project cost which is ₹ 3.90 lakh.

4.2.2 Loan Amount

Remaining 75% cost of the proposed project will be funded by bank which is ₹ 11.69 lakh.

4.2.3 Terms & Conditions of Loan

The interest rate is considered at 10% which is SIDBI's rate of interest for energy efficient projects. The loan tenure is 5 years excluding the moratorium period of 6 months from the date of first disbursement of loan.

4.3 Financial Indicators

4.3.1 Cash Flow Analysis

Profitability and cash flow statements have been worked out for a period of 5 years. The financials have been worked out on the basis of certain reasonable assumptions, which are outlined below. The cost of equipment considered is inclusive of hot water storage tanks also.

The project is expected to achieve monitory savings of ₹ 8.40 lakh per annum.

- The Repair and Maintenance cost is estimated at 10% of cost of total project with 8% increase in every year as escalations.
- Interest on term loan is estimated at 10%.
- Depreciation is provided as per the rates provided in the companies act.

Based on the above assumptions, profitability and cash flow statements have been prepared and calculated in Annexure-4.

4.3.2 Simple Payback Period

The total project cost of the proposed technology is ₹ 15.58 lakh and monetary savings due to reduction in fuel consumption is ₹ 8.40 lakh hence, the simple payback period works out to be 1.85 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 10% works out to be ₹ 4.51 lakh

4.3.4 Internal Rate of Return (IRR)

The after tax Internal Rate of Return of the project works out to be 21.94%. Thus the project is financially viable.

4.3.5 Return on Investment (ROI)

The average return on investment of the project activity works out at 26.84%.

Table 4.2 Financial Indicators of Proposed Technology/Equipment

S. No.	Particular	Unit	Value
1	Simple payback period	Year	1.85
2	NPV	₹ (in Lakh)	4.51
3	IRR	%	21.94
4	ROI	%	26.84

4.4 Sensitivity Analysis in Realistic, Pessimistic and Optimistic Scenarios

A sensitivity analysis has been carried out to ascertain how the project financials would behave in different situations like when there is an increase in fuel savings or decrease in fuel savings. For the purpose of sensitive analysis, two following scenarios have been considered.

- Optimistic scenario (Increase in fuel savings by 5%)

- Pessimistic scenario (Decrease in fuel savings by 5%)

In each scenario, other inputs are assumed as a constant. The financial indicators in each of the above situation are indicated along with standard indicators

Table 4.3 Sensitivity Analysis on Fuel Saving

Scenario	*Natural Gas Savings (SCM Per year)*	*IRR (%)*	*NPV (₹ in Lakh)*	*ROI (%)*	*DSCR*
Pessimistic	53,200	18.91	3.33	26.36	2.57
Realistic	56,000	21.94	4.51	26.84	2.76
Optimistic	58,800	24.93	5.69	27.26	2.95

4.5 Procurement and Implementation Schedule

Procurement and implementation schedule required for implementation of this technology is about 7 weeks and 4-5 weeks required as a process break down. Details of procurement and implementation schedules are shown in Table 4.4 below and in Annexure 6 also.

Table 4.4 Procurement and Implementation Schedule

S. No.	*Activities*	*Weeks*						
		1	*2*	*3*	*4*	*5*	*6*	*7*
1	Identification of Damaged Insulation area in Kiln							
2	Planning & material order							
3	Procurement of Material							
4	Commissioning							

Annexure

Annexure -1: Energy audit data used for baseline establishment

Efficiency calculation and heat balance of kiln of ceramic industry are as given below.

Input Data

S. No.	Parameter	Unit	Value
1	Natural Gas Consumption	SCM/day	3200
2	% Hydrogen in fuel	%	25
3	% Carbon in fuel	%age	74
4	Weight of one tile going to kiln	kg	1.1
5	Weight of one tile coming out from kiln	kg	0.93
6	CO_2 in flue gas	%age	15
7	Production from kiln	Tiles/day	60000
8	Production from kiln	m^2/day	5032
9	Production from kiln	MT/day	56
10	kiln Cycle time	min	40
11	Highest heating temperature in firing zone	^oC	1035
12	Smoke air (flue gas) temperature	^oC	166
13	Hot air temperature from final cooling zone	^oC	135

Calculation Data

S. No.	Parameter	Unit	Value
1	Moisture removed from tiles	MT/day	10.2
2	Flue gas flow rate	kg/day	60,480
3	Hot air from final cooling zone	m^3/day	2,65,934

Surface Radiation Loss Calculation

Radiation loss measurement												
S. No	Section/ zone	Length	Height	Width	Working hrs per Day	Left Side		Right Side		Top Side		Total equivalent Heat loss, kCal/Day
						Avg Surface temp. ^oC	heat Loss, kCal/ M^2/ hr	Avg surface temp., ^oC	heat Loss, kCal/ M^2/ hr	Avg surface temp., ^oC	heat Loss, kCal/ M^2/ hr	
1	Preheating Zone	18.9	0.88	2.9	24	64	318	65.8	337	78	482	896689
2	Firing Zone	29.4	1.6	2.9	24	89	641	95.8	749	111	1023	3663807
3	Rapid cooling	6.3	0.88	2.9	24	74	433	68	361	85	584	361993
4	Final Cooling	31.5	0.88	2.9	24	45	150	51	196	58	254	788048
Total												5710539

Heat Distribution in Kiln

S. No.	Heat taken sources	Flow rate of air entering, m^3/hr or production in T/day or kg/day	Specific heat, kCal/ kg.^oC	Inlet Temp., ^oC	Outlet Temp. , ^oC	Density of air at initial temp., kg/m^3	Heat Output, KCal/day	% of total input
1	Product	56	0.19	40	182	-	1510880	5.40
2	Flue gas (Pre heating Zone Exhaust)	60480	0.23	40	166	1.129	1752710	6.27
3	Radiation loss	-	-	-	-	-	5710539	20.44
4	Hot air from final cooling zone	265934	0.24	40	135	1.129	6845460	24.50
5	Loss due to hydrogen present in fuel	-	-	-	-	-	2767824	9.90
6	Loss due to moisture present in tile	-	-	-	-	-	6422940	22.99
7	Unaccounted	-	-	-	-	-	2927601	10.47
Total							**27937954**	**100.00**

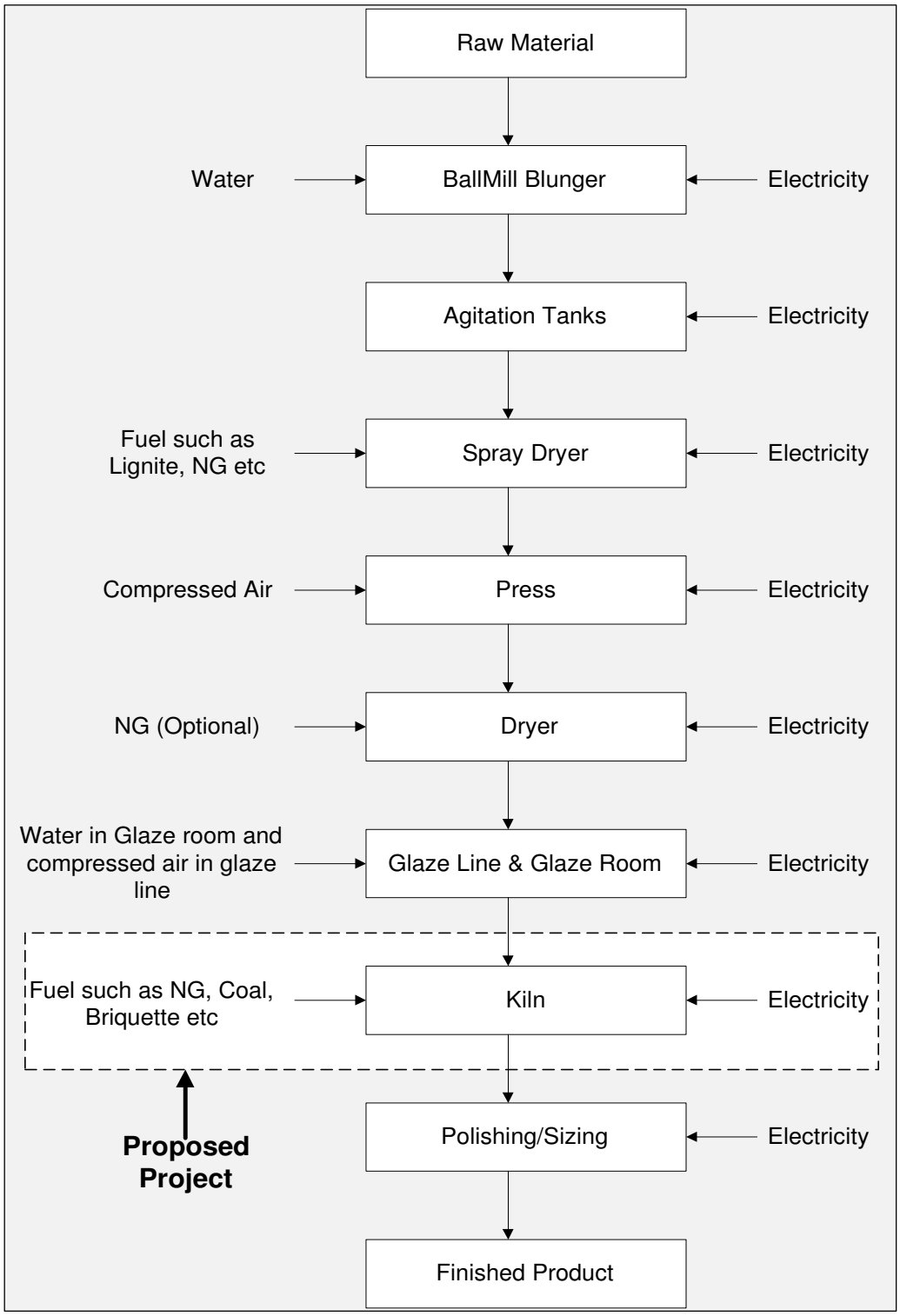
Efficiency Calculation of Kiln

Sr. No	*Parameter*	*Unit*	*Value*
1	Heat required to heat the product	kCal/day	1,05,86,800
2	Heat supplied by fuel	kCal/day	27,937,954
3	Efficiency of kiln	%	37.89

Specific Energy Consumption of kiln

Sr. No	Natural Gas Consumption, SCM/day	SCM/MT of production per day	Kcal of fuel Supplied/MT of production per day	SCM/m2 of production per day	Kcal of fuel Supplied/m2 of production per day	Rs. required/m2 of production per day
1	3200	57.35	504659	0.64	5596	10.11

Annexure -2: Process Flow Diagram



Annexure -3: Detailed Technology Assessment Report

Sr. No.	*Particular*	*Unit*	*Existing Situation*	*Proposed Situation*
1	Production from kiln	m^2/day	5032	5032
2	Firing Temperature in kiln	^{0}C	1200	1200
3	Natural Gas Consumption	SCM/day	3200	3040
4	Working days in a year	days	350	350
5	Saving in Natural gas consumption	%age		5
6	Saving in Natural gas consumption	SCM/day		160
7	Saving in Natural gas consumption	SCM/year		56,000
8	Cost of Natural gas	₹/SCM		15
9	Saving in rupees	₹ (lakh) /year		8.4

Annexure -4: Detailed Financial Calculations & Analysis

Assumption

Name of the Technology	***Kiln Insulation Improvement***		
Rated Capacity			
Details	***Unit***	***Value***	***Basis***
Installed Capacity	Kcal		Feasibility Study
No of working days	Days		Feasibility Study
No of Shifts per day	Shifts		Feasibility Study
Capacity Utilization Factor	%		Feasibility Study
Proposed Investment			
Plant & Machinery	₹ (in lakh)	11.72	Feasibility Study
Erection & Commissioning	₹ (in lakh)	2.34	Feasibility Study
Investment without IDC	₹ (in lakh)	14.06	Feasibility Study
Interest During Implementation	₹ (in lakh)	0.35	Feasibility Study
Other charges(Contingency)	₹ (in lakh)	1.17	Feasibility Study
Total Investment	₹ (in lakh)	15.58	Feasibility Study
Financing pattern			
Own Funds (Equity)	₹ (in lakh)	3.90	Feasibility Study
Loan Funds (Term Loan)	₹ (in lakh)	11.69	Feasibility Study
Loan Tenure	years	5	Assumed
Moratorium Period	Months	6	Assumed
Repayment Period	Months	66	Assumed
Interest Rate	%	10.00	SIDBI Lending rate
Estimation of Costs			
O & M Costs	% on Plant & Equip	10.00	Feasibility Study
Annual Escalation	%	8.00	Feasibility Study
Estimation of Revenue			
Natural Gas Saving	SCM/Year	56000	
Cost	₹/SCM	15	
St. line Depn.	%age	5.28	Indian Companies Act
IT Depreciation	%age	80.00	Income Tax Rules
Income Tax	%age	33.99	Income Tax

Estimation of Interest on Term Loan ***(₹ in lakh)***

Years	***Opening Balance***	***Repayment***	***Closing Balance***	***Interest***
1	11.69	0.90	10.79	1.05
2	10.79	1.92	8.87	0.99
3	8.87	2.16	6.71	0.80
4	6.71	2.40	4.31	0.57
5	4.31	2.88	1.43	0.30
6	1.43	1.43	0.00	0.04
		11.69		

WDV Depreciation

Particulars / years	1	2	3	4	5
Plant and Machinery					
Cost	14.41	2.88	0.58	0.12	0.02
Depreciation	11.53	2.31	0.46	0.09	0.02
WDV	2.88	0.58	0.12	0.02	0.00

Projected Profitability

Particulars / Years	1	2	3	4	5	6
Revenue through Savings						
Fuel savings	8.40	8.40	8.40	8.40	8.40	8.40
Total Revenue (A)	8.40	8.40	8.40	8.40	8.40	8.40
Expenses						
O & M Expenses	1.56	1.68	1.82	1.96	2.12	2.29
Total Expenses (B)	1.56	1.68	1.82	1.96	2.12	2.29
PBDIT (A)-(B)	6.84	6.72	6.58	6.44	6.28	6.11
Interest	1.05	0.99	0.80	0.57	0.30	0.04
PBDT	5.79	5.73	5.78	5.87	5.98	6.07
Depreciation	0.82	0.82	0.82	0.82	0.82	0.82
PBT	4.97	4.90	4.96	5.04	5.15	5.25
Income tax	0.00	1.16	1.81	1.96	2.02	2.06
Profit after tax (PAT)	4.97	3.74	3.15	3.08	3.13	3.18

Computation of Tax ***₹ (in lakh)***

Particulars / Years	1	2	3	4	5	6
Profit before tax	4.97	4.90	4.96	5.04	5.15	5.25
Add: Book depreciation	0.82	0.82	0.82	0.82	0.82	0.82
Less: WDV depreciation	11.53	2.31	0.46	0.09	0.02	-
Taxable profit	(5.74)	3.42	5.32	5.77	5.96	6.07
Income Tax	-	1.16	1.81	1.96	2.02	2.06

Projected Balance Sheet ***₹ (in lakh)***

Particulars / Years	1	2	3	4	5	6
Liabilities						
Share Capital (D)	3.90	3.90	3.90	3.90	3.90	3.90
Reserves & Surplus (E)	4.97	8.71	11.86	14.94	18.07	21.25
Term Loans (F)	10.79	8.87	6.71	4.31	1.43	0.00
Total Liabilities D)+(E)+(F)	19.65	21.47	22.46	23.14	23.39	25.15
Assets						
Gross Fixed Assets	15.58	15.58	15.58	15.58	15.58	15.58
Less: Accm. Depreciation	0.82	1.65	2.47	3.29	4.11	4.94
Net Fixed Assets	14.76	13.94	13.11	12.29	11.47	10.64
Cash & Bank Balance	4.89	7.53	9.35	10.85	11.92	14.50
TOTAL ASSETS	19.65	21.47	22.46	23.14	23.39	25.15
Net Worth	8.86	12.60	15.75	18.83	21.96	25.15
Dept equity ratio	1.22	0.70	0.43	0.23	0.06	0.00

Projected Cash Flow: ***₹ (in lakh)***

Particulars / Years	0	1	2	3	4	5	6
Sources							
Share Capital	3.90	-	-	-	-	-	-
Term Loan	11.69	-	-	-	-	-	-
Profit After tax		4.97	3.74	3.15	3.08	3.13	3.18
Depreciation		0.82	0.82	0.82	0.82	0.82	0.82
Total Sources	15.58	5.79	4.56	3.98	3.90	3.95	4.01
Application							
Capital Expenditure	15.58						
Repayment of Loan	-	0.90	1.92	2.16	2.40	2.88	1.43
Total Application	15.58	0.90	1.92	2.16	2.40	2.88	1.43
Net Surplus	-	4.89	2.64	1.82	1.50	1.07	2.58
Add: Opening Balance	-	-	4.89	7.53	9.35	10.85	11.92
Closing Balance	-	4.89	7.53	9.35	10.85	11.92	14.50

Calculation of Internal Rate of Return ***₹ (in lakh)***

Particulars / months	0	1	2	3	4	5	6
Profit after Tax		4.97	3.74	3.15	3.08	3.13	3.18
Depreciation		0.82	0.82	0.82	0.82	0.82	0.82
Interest on Term Loan		1.05	0.99	0.80	0.57	0.30	0.04
Salvage/Realizable value							
Cash outflow	(15.58)	-	-	-	-	-	-
Net Cash flow	(15.58)	6.84	5.55	4.77	4.47	4.26	4.05
IRR	21.94%						

NPV	4.51

Break Even Point ***₹ (in lakh)***

Particulars / Years	1	2	3	4	5	6
Variable Expenses						
Oper. & Maintenance Exp (75%)	1.17	1.26	1.36	1.47	1.59	1.72
Sub Total (G)	1.17	1.26	1.36	1.47	1.59	1.72
Fixed Expenses						
Oper. & Maintenance Exp (25%)	0.39	0.42	0.45	0.49	0.53	0.57
Interest on Term Loan	1.05	0.99	0.80	0.57	0.30	0.04
Depreciation *(H)*	0.82	0.82	0.82	0.82	0.82	0.82
Sub Total (I)	2.27	2.23	2.08	1.88	1.66	1.44
Sales (J)	8.40	8.40	8.40	8.40	8.40	8.40
Contribution (K)	7.23	7.14	7.04	6.93	6.81	6.68
Break Even Point (L= G/I)	31.34%	31.30%	29.49%	27.20%	24.33%	21.52%
Cash Break Even {(I)-(H)}	19.96%	19.78%	17.80%	15.33%	12.25%	9.21%
BREAK EVEN SALES (J)*(L)	2.63	2.63	2.48	2.29	2.04	1.81

Return on Investment ***₹ (in lakh)***

Particulars / Years	***1***	***2***	***3***	***4***	***5***	***6***	***Total***
Net Profit Before Taxes	4.97	4.90	4.96	5.04	5.15	5.25	25.31
Net Worth	8.86	12.60	15.75	18.83	21.96	25.15	94.30
							26.84%

Debt Service Coverage Ratio ***₹ (in lakh)***

Particulars / Years	***1***	***2***	***3***	***4***	***5***	***6***	***Total***
Cash Inflow							
Profit after Tax	4.97	3.74	3.15	3.08	3.13	3.18	16.28
Depreciation	0.82	0.82	0.82	0.82	0.82	0.82	4.11
Interest on Term Loan	1.05	0.99	0.80	0.57	0.30	0.04	4.11
TOTAL (M)	6.84	5.55	4.77	4.47	4.26	4.05	24.51

Debt

Interest on Term Loan	1.05	0.99	0.80	0.57	0.30	0.04	2.71
Repayment of Term Loan	0.90	1.92	2.16	2.40	2.88	1.43	10.79
TOTAL (N)	1.95	2.91	2.96	2.97	3.18	1.47	13.49
Average DSCR (M/N)	2.76						

Annexure -5: Details of Procurement and Implementation

SR. NO.	ACTIVITIES	WEEKS						
		1	2	3	4	5	6	7
1	Identification of Damaged Insulation area in Kiln							
2	Planning & material order							
3	Procurement of Material							
4	Commissioning							

Annexure -6: Break-up of Process down Time

S. NO.	ACTIVITIES	WEEKS			
		1	2	3	4
1	Time required for cooling down of Kiln				
2	Dismantling of damaged insulation portion				
3	Putting new refractory lining in place of damaged insulation portion				
4	Testing & Trial (Start the Kiln)				

Annexure -7: Details of Technology Service Providers

Technology	*Name of Service Provider*	*Address*	*Contact Person and No.*	*Email ID*
Kiln Insulation	Shri Sadguru Dev Engg. Services	A/4, New Veena Vihar, Datta Mandir Road, Dahanukar Wadi, Kandivali (W), Mumbai-67	Mr. Ravi Patel 09969378982	sadgurudev_engg@yahoo.co.in
Kiln insulation improvement	Poonam Refractories	Bazar Road, Post Box No. 2, Wankaner-363621 (Dist. Rajkot)	Mr. Ketan Mehta - 09825224640	dhimantmehta@yahoo.co.in
Kiln Insulation	Steamco Services	05,Jai shri Siddhivinayak Co. Op. Hsg-so., Gr. Floor, Shivaji Nagar, B-Cabin, Thane (W)-400602	Mr. Rajesh Bamane 09820998390	steamco.services@vsnl.net

Annexure -8: Quotations for Proposed Technology

SHRI SADGURU DEV ENGG. SERVICES

Energy Conservation & Magnetic Water Treatment Experts

A/4, New Veena Vihar, Datta Mandir Road, Dahanukar Wadi, Kandivali (W), Mumbai - 67. Tel : 2806 3086

To,
M/s SEE-Tech Solutions Pvt Ltd.
11/5, MIDC Info Tech Park,
Near VRCE Telephone Exchange,
South Ambazari Road,
Nagpur-440022

Date: 26/01/2010

Kind Attn: Milind Chittawar
Sub: Regarding Estimation of cost for insulation repair of Kiln and professional charges.

Dear Sir,

As per our discussion, we are submitting the estimated cost of project & professional charges. The copy is enclosed with this cover letter.

We assure you sir that we will provide our best services.

Thanking you,

Yours Faithfully

Ravi 26.01.10.

For, SHRI SADGURU DEV ENGG SERVICES

Ravi Patel

SHRI SADGURU DEV ENGG. SERVICES

Energy Conservation & Magnetic Water Treatment Experts

A/4, New Veena Vihar, Datta Mandir Road, Dahanukar Wadi, Kandivali (W), Mumbai - 67. Tel : 2806 3086

A. Project Estimated cost and Professional Charges

Sr. No.	ITEM	Size L x H x W	Value in Rs.
1	Pre-Hating Zone	20 x 0.88 x 3	1,00,000
2	Firing Zone	30 x 1.6 x 3	8,30,000
3	Rapid cooling Zone	6.5 x 0.88 x 3	50,000
4	Final Cooling zone	30 x 0.88 x 3	85,000
	Sub Total		**10,65,000**
5	Professional Charges for Refractory lining works		1,50,000
	Grand Total		**12,15,000**

The total project cost approximately will be Rs 12, 15,000 (Rs. Twelve Lac Fifteen Thousand Only)

B. List of Refractory Material along with per meter cost of Insulation

Sr. No.	Item	Size	Rate/m2
1	IS – 6 – Fire Bricks	3" Thick	1125
2	IS – 8 – Fire Bricks	3" Thick	1430
3	IS – 8 – Fire Bricks	9" Thick	4585
4	50 % Alumina Fire Bricks	9" Thick	6575
5	Cold face insulation bricks	3" Thick	1150
6	Cold face insulation bricks	4 ½ " Thick	1725
7	Hot face insulation bricks	9" Thick	3300
8	Hot face insulation bricks	4 ½ " Thick	1700
9	Cera wool Blanket	128 Kg/m^3, 6" Thick Density with SS – 310 stud, 6" long	2650
10	Glass Wool	6" Thick, 60 Kg/m^3 Density	450

B. Payment Terms & Conditions for Professional Charges

Sr. No.	Description	%
1	Kick of Payment	20 %
2	Progress and procurement of man power	30%
3	After completed job with refractory lining	50%

C. Taxes Extra as per applicable rates.

Standard application form for financial assistance to existing units
(upto and including Rs. 50 lakh)

I Applicant details

1	Name of Unit	
2	Address for correspondence	
3	Constitution	
4	SSI Registration. No.	
5	Date of Incorporation	
6	Date of Commencement of Operations	
7	Activity / Industry	

	Registered Office	Factory / Service Establishment (existing)	Factory / Service Establishment (proposed)
Full Address			
Contact Person(s)			
Tel No.			
Fax No.			
E mail address			

II Promoters/Directors

Bio-data of all the promoters/directors of the unit (Preferably make separate sheet for each promoter/director)

Promoter/Director	
Name	
Full Address(incl Tel no./ mobile no)	
Age	
Passport No.	
Father's / husband's name	
Qualification	
Experience	
Functional responsibility in the unit	
Relationship with Chief Promoter	
Shareholding in the unit	
Net worth	

Pl. furnish details of any other shareholder having more than 5% in the unit.

III. Products Manufactured

Sl. No.	Product	Installed capacity p.a.	Present capacity utilisation	End use of product	Export orientation
					Yes/ No

IV. Existing Facilities with Banks /FIs incl. SIDBI

a	Name of the Bank(s) / FI, Branch,	
b	Dealing person and contact tel. no.(s)..	
c	Dealing since (each Bank / FI)	

Facilities enjoyed :

Nature of facility (bankwise)	Amount (Rs. lakh)		Rate of interest	Nature of Security and value
	Sanctioned	Outstanding as on ___ ___		
Fund based Basedkfjdffkldkfjdfkjdfkjdfkdjfkdjf				
-Term Loan				
-Working capital				
Non Fund Based				

Are there any defaults ? Yes/No

V. Financial Position of applicant unit/ associate concern

(Rs. lakh)

	Net-worth			Sales			Net profit		
	Y1	Y2	Y3	Y1	Y2	Y3	Y1	Y2	Y3
Applicant unit									
Associate concern I									
Associate concern II									

Details of Associate concerns to be given as per **Annexure I**.

VI. Project Details

6.1. Purpose for which assistance now required :

	Purpose	
1	Indicate whether Expansion /diversification / modernisation and details	Technology Upgradation for Energy Efficiency
2	If new products envisaged give details	N/A
3	Details of expected incremental qualitative / quantitative benefits	Saving in the fuel bill to the extent of 20-25% leading to commensurate improvement in the bottom line of the applicant unit.
4	Expected month/year of implementation	7 weeks
5	No. of employees existing and additional	

Cost of Project (Rs. Lakh)

S. No	Details	Total Amount
1	Civil Works	-
2	Plant & Machinery (incl. installation) * -Indigenous -Imported	11.72
3	Professional charges	-
4	Erection & commisioning charge	2.34
5	Preliminary & pre-operative expenses [Loan syndication fee etc.] &	0.35

6	Taxes(CST)	
7	Contigency	1.17
	TOTAL	15.58
** Details of Plant and machinery/ Misc. fixed assets at* ***Annexure II and III***		

Indicate details of expenditure already incurred, if any and how the expenditure was financed ?

6.3. **Means of Finance**

(Rs. Lakh)

S. No. No.	Details	Total
1	Additional share capital / Internal accruals	3.90
2	Interest free Unsecured Loans	-
3	Term Loan proposed from SIDBI / Banks inclusive of subsidy ####	11.68
	Total	15.58
# ### In terms of existing guidelines of Ministry of MSME , GoI the subsidy amount is received on implementation of the project Say within 3 months therefore the amount of subsidy is included in the term laon amount as bridge loan and funded by the bank On receipt of the subsidy from the GoI it is adjusted towards the loan amount.		

#

6.4 Whether additional Working Capital required for the unit. If yes, amount and arrangements proposed may be indicated:

6.5 **Technology**

S. No.	Item	
1	Any Technical collaboration? If yes, details	
2	Details of main technical professionals employed	
3	Any quality certification obtained ? If yes enclose certificate.	

6.6 **Raw material / Labour/ Utilities**

1	Raw material (Details, arrangement, sources and distance)	
2	Power	Connected Load Utilised load Requirement of power for Additional machines Back-up arrangement (DG)
3	Other critical inputs if any	

6.7 **Marketing & Selling Arrangements**

Items	Applicants remarks
Main Markets (Locations)	
Main buyers, Indicate clearly if the unit is relying on a single buyer	
Indicate competitors	
Whether product has multiple applications	

Distribution channels (e.g. direct sales, retail network, distribution network)	
Marketing team details, if any.	
Orders on hand (enclose copies)	

6.8 **Projected profitability** : Statement to be enclosed as per **Annexure IV**.

6.9 **Others**

Items	
Please indicate the various licenses / consents for the project / unit already obtained from the respective authorities	
Please indicate licenses / consents for the project / unit that are yet to be obtained.	
Category as per pollution control dept. If polluting, pollution control measures taken	
Whether the project is entitled for any govt. subsidy, tax exemptions. Details thereof	
Repayment period (in months) sought including repayment holiday requested, if any,	
Details of Collateral security offered and value (basis).	
List of guarantors for the proposed loan	

Enclose documents as indicated in the check list at Annexure V.

6.10 **Strengths / Weaknesses of the borrower** (such as market standing, product/ service differentiation, technical expertise, infrastructure facilities etc.)

Strengths	

Weaknesses	

DECLARATION

I/We certify that all information furnished by me/ us above and in the appendix/ annexures/ statements and other papers enclosed is true; I/we have no borrowing arrangements for the unit with any bank / FI except as indicated in the application; that there are no overdues / statutory dues/government enquiry/proceedings/prosecution against the unit/associate concerns/ promoters/directors except as indicated in the application; that no legal action has been/ is being taken against the unit/associate concerns/promoters/directors; that I/ we shall furnish all other information that may be required by SIDBI in connection with my/our application and I/ We have no objection to your furnishing the information submitted by me/ us to any agency as you may deem fit in connection with consideration of the assistance. We have no objection to SIDBI/ its representatives making suitable enquiries while considering the application.

Place : **Signature**

Date **Name & Designation**

Annexure I

Details of Associate Concerns

Name , Address & products manufactured	Existing since	Name & Address of existing Banker (s)	Facilities Enjoyed	Share holding of the main promoter(s) of applicant unit

Annexure II

Particulars of machinery proposed for the project

Name of machinery, (model / specification)	Name of manufacturer, contact person, e-mail address telephone no.	Lead time for delivery of machinery	Invoice price (for indigenous machinery) / CIF price (for imported) (Rs. lakh)	Purpose /use of machine	Basis of selection of supplier	Remarks reg. after sale service etc.
Kiln Insulation Improvement	Shri Sadguru Dev Engg. Services A/4, New Veena Vihar, Datta Mandir Road, Dahanukar Wadi, Kandivali (W), Mumbai-67 Mr. Ravi Patel 09969378982 sadgurudev_engg@yahoo.co.in	4 Weeks	15.58	To prevent heat loss	Crediability of the Technolgy Provider	

- Furnish competitive quotations, catalogues / invoice for each machinery proposed to be acquired
- In case of second hand /fabricated machinery, indicate the need / reasons for acquiring such machinery. Also enclose Chartered Engineer's certificate regarding residual value and life in respect of second hand machinery.

Annexure III

Details of Misc. Assets / equipment Proposed

S.No.	Name of item	Supplier	Cost (Rs. lakh)	Purpose/ use of MFA	Remarks

Annexure IV

Profitability projections for the Unit/ Company as a whole*

S.No.	Item	Actuals for previous year	Y1	Y2	Y3	Y4	Y5	Y6	TOTAL
1	Total Income		8.40	8.40	8.40	8.40	8.40	8.40	50.4
2	Raw materials								
	Power and fuel								
	Wages and salaries								
	Selling expenses								
	Other expenses		1.56	1.68	1.82	1.96	2.12	2.29	11.43
	Total Cost		1.56	1.68	1.82	1.96	2.12	2.29	11.43
3	Profit before depreciation, Interest and taxes (PBDIT) (2 - 1)		6.84	6.72	6.58	6.44	6.28	6.11	38.97
4	Interest on Term Loan		1.05	0.99	0.80	0.57	0.30	0.04	**3.75**
5	Interest on Working Capital								
6	Interest on unsecured loans								
7	Depreciation		0.82	0.82	0.82	0.82	0.82	0.82	**4.92**
8	Profit before Tax (3 - 4 - 5 - 6 - 7)		4.97	4.90	4.96	5.04	5.15	5.25	30.27
9	Tax		0.00	1.16	1.81	1.96	2.02	2.06	9.01
10	Profit after Tax (8 - 9)		4.97	3.74	3.15	3.08	3.13	3.18	**21.25**
11	Dividends/ Withdrawals								
12	Cash Accruals (10 - 11 + 7)		5.79	4.56	3.97	3.9	3.95	4	26.17
13	Repayments of all term liabilities (Principal)		0.90	1.92	2.16	2.40	2.88	1.43	11.69
14	Debt Service Coverage Ratio ((10+7+4)/(13+4))		3.51	1.91	1.61	1.51	1.34	2.75	1.94
15	Average DSCR (Total of 10+7+4 for projected period/(Total of 13+4 for projected period)		1.94						

* Please give projections for the entire tenure of SIDBI / Bank loan.

Annexure V

CHECK LIST of documents to be submitted along with the application

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

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