DETAILED PROJECT REPORT
ON
ENERGY SAVING BY INCORPORATION OF EFFICIENT LIGHTING SYSTEMS
(MANGALORE TILE CLUSTER)




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Bureau of Energy Efficiency

Prepared By

Deloitte.

INCORPORATION OF EFFICIENT LIGHTING SYSTEMS

MANGALORE TILE CLUSTER

BEE, 2012
Detailed Project Report on Incorporation of Efficient Lighting Systems
Tile SME Cluster, Mangalore, (India)
New Delhi: Bureau of Energy Efficiency;
Detail Project Report No.: **MANG/TIL/EEL/01**

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We sincerely appreciate the efforts of industry, equipment manufacturers, technology providers, consultants and other experts in the area of energy conservation for joining hands with Bureau of Energy Efficiency (BEE), Ministry of Power, and Government of India for preparing the Detailed Project Report (DPR) under BEE SME Program in SMEs clusters. We appreciate the support of suppliers/vendors for providing the adoptable energy efficient equipments/technical details to the SMEs.

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 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 Abbreviation

BEE	Bureau of Energy Efficiency
SME	Small and Medium Enterprises
DPR	Detailed Project Report
GHG	Green House Gases
CDM	Clean Development Mechanism
DSCR	Debt Service Coverage Ratio
NPV	Net Present Value
IRR	Internal Rate of Return
ROI	Return on Investment
SIDBI	Small Industrial Development Bank of India

EXECUTIVE SUMMARY

Deloitte Touche Tohmatsu India Private Limited is executing BEE-SME program in Mangalore Tile Cluster, supported by Bureau of Energy Efficiency (BEE) with an overall objective of improving the energy efficiency in cluster units.

Mangalore Tile cluster is one of the largest SME tile 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 tile units/clusters in India. The main energy forms used in the cluster units are grid electricity and biomass. Cashew Nut Husk, Fire Wood and Saw Dust are the major fuels used in the cluster.

Energy consumption (thermal energy & electrical energy) in tile unit depends on capacity of unit and current efficiency levels in the unit. The tile units in Mangalore cluster have energy saving opportunities both in the process and utility side. During the energy audit carried out, it was observed that few tile units were performing fairly well in terms of energy efficiency. These units have tried to modify their operations and adopted the latest and energy efficient technologies available both on the process and utility side. Still there are fairly large numbers of unit that have potential to improve energy efficiency.

This DPR highlights the energy, environment, economic and social benefits of Incorporation of Efficient Lighting Systems. There are cost effective and energy efficient lighting solutions available in market. Therefore it is recommended to replace the existing lighting system with more energy efficient technologies such as Fluorescent Tube Lights (FTL's) are fitted with the conventional ballast.

Total investment required and financial indicators calculated such as debt equity ratio, monetary saving, IRR, NPV, DSCR and ROI etc for proposed technology is furnished in Table below:

Table 1: Project Overview

S.No	*Particular*	*Unit*	*Value*
1	Project cost	Rs (in Lakh)	0.28
2	Electricity Saving	kWh/year	3862
3	Monetary benefit	Rs (in Lakh)	0.23
4	Debit equity ratio	Ratio	3:01
5	Simple payback period	years	1.22

6	NPV	Rs (in Lakh)	0.46
7	IRR	%age	50.88%
8	ROI	%age	32.76%
9	DSCR	Ratio	3.63
10	Process down time	Days	Nil

The projected profitability and cash flow statements indicate that the project implementation i.e. Incorporation of Efficient Lighting Systems will be financially viable and technically feasible solution for tile cluster.

ABOUT BEE'S SME PROGRAM

Bureau of Energy Efficiency (BEE) is implementing a BEE-SME Programme to improve the energy performance in 28 selected SMEs clusters. Mangalore Tile 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 up of energy efficiency projects in the clusters

Implementation of energy efficiency measures

To implement the technology up-gradation project in the 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

Mangalore and Kundapura are situated in South Western Karnataka and are important coastal districts with mix of large and medium industries. Mangalore is known for its Fertilizer plant, Refinery, clay tile manufacturing units, educational Institutes like Manipal University and chief port. The entire tile cluster is geographically divided into three Coastal areas of Mangalore, Udipi and Kundapura. The reason for such high concentration of tile units is easy availability of raw material in the area. Tile units are normally having out-dated technologies characterized by inefficient energy and water management systems. These units are quite closely networked and successful development in one unit is very rapidly replicated in large number of similar units.

The total installed capacity of all the Tile Units in Mangalore, Udipi and Kundapura is approximately 1312 Lakhs tiles per annum. All these units are of almost same era, similar technologies and also similar style of operations.

An important aspect of the unit here is that some of these units are owned by a single member of a family or jointly run by the families. As such the cluster based advantage is already being derived by most of these units. A large percentage of these mills were set up in 50's and 60's in the small and medium sector.

The capacity utilization of all these mills ranges from 60% to 90%. All the units at Mangalore and Kundapura uses biomass residues like Cashew Nut Husk, Fire Wood and Wood Chip as main fuel in the kiln operations. In few units wood chips are also used as a supplementary fuel. Details of total energy consumption at Mangalore Tile Cluster are furnished in Table 2 below:

Table 2: Details of annual energy consumption

S. No	*Type of Energy*	*Unit*	*Value*	*% contribution*
1	Electricity	TOE	35.56	0.25
2	Fuel	TOE	14188	99.75

Classification of Units

Units can be classified broadly with respect to size/capacity, raw material used and the product.

Table 3: Classification of Units

Size		
<= 30 Lakh Tiles per year	**30 to 60 Lakh Tiles per year**	**> 60 Lakh Tiles per year**

The tile units in the cluster vary widely in capacity. There are units with capacities as low as 10 Lakh Tiles per annum and as high as 90 lakhs Tiles per annum. The variation with respect to capacity is represented in the chart below.

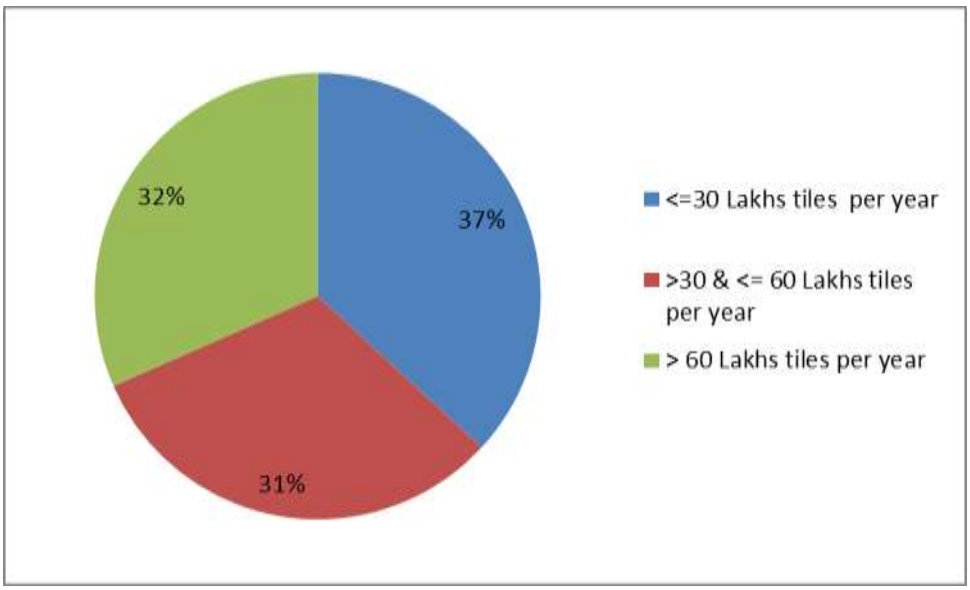

Figure 1: Classification of Units – Capacity

Most of tile unit uses fire wood as a fuel in the kiln for operation. A few of them have started using cashew nut husk and wood chips also as fuel. The classification of the units based on major fuel usage is as shown in figure below:

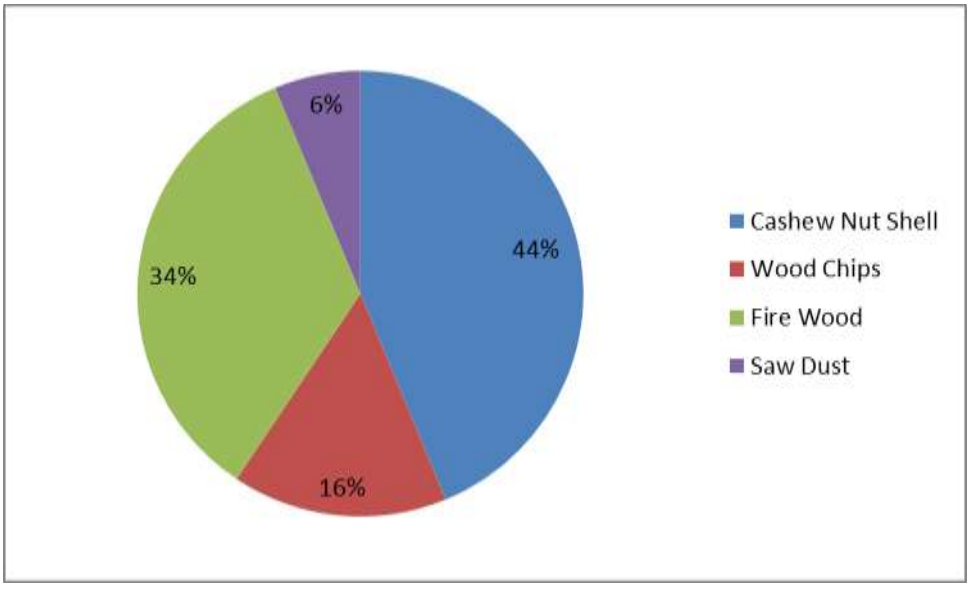

Figure 2: Classification of Units – Fuel usage

Energy usages pattern

Energy consumption (thermal energy & electrical energy) in tile unit depends on capacity of unit and kiln operating patterns. The tile units in the Mangalore cluster use various types of fuels like Fire Wood, Cashew nut Husk, Fire Wood, Wood Chips etc. Energy consumption details of Mangalore Tile cluster companies are provided in table below:

Table 4: Details of annual energy consumption

Sr. No	Fuel	Approx. Calorific Value of Fuels, kCal/kg	Price
1	Cashew Nut Shells	5056	3337
2	Fire Wood	3719	1622
3	Wood chips	3746	1185
4	Saw Dust	3691	2048
5	Rice Husk	3600	1600
6	Electricity	-	6.0 Rs/kWh

General production process for Tile cluster

Clay tiles are a product, manufactured from a special type of clay known as plastic or lean clay. Clay is the primary raw material for the tile industry. The tile industries in Mangalore and Kundapura also usage other raw materials like Kerosene and various type of fuels like saw dust, fire wood, cashew nut husk etc. The tile making process can be broadly divided into six stages:

1. Initial Preparation
2. Shaping
3. Cutting, conveying and setting of the unfired products.
4. Drying
5. Firing
6. Sorting

CLAY PREPERATION

The clay is extracted from the quarry and transported to the plant in raw form. Under its present form, clay is not stable and hence cannot take appropriate shape for tile manufacturing. The clay thus undergoes various processes of initial preparation like crushing, grinding, mixing and separating or screening to attain its shape and design characteristics. In the crushing operation clay is crushed with the help of a crusher and then undergoes various operations like mixing of water. The final mixed product is then screened to remove bigger lumps. The screened clay is now ready for further processing. The

crushing and mixing is done with the help of a roller and a mixer which are the major consumer of electrical energy in the units.

SHAPING

The ceramic clay receives its shape and design characteristics by the shaping processes like hand molding, extrusions, pressing etc. In this process, clay is fed to the molds and suitable shape is provided to the clay. The molded products are then sent to the extruders and pressed to attain desired shape.

CUTTING, CONVEYING AND SETTING OF THE UNFIRED PRODUCTS

The endless clay column emerging from the extruder dies is cut into the required lengths by the cutter. The cut products are then placed on slates or pallets for transport to driers.

DRYING

The product which comes out from extrusion is normally soft with little intrinsic strength. Water which is added for shaping purpose, has to be removed again from the product by drying. In all the units natural and sometimes convective drying is practiced

FIRING

The dried products are then fired in the kiln at a temperature of 1150 to 1200 0C in order to convert the previously water soluble clay materials to an insoluble state and also to provide strength to withstand mechanical and chemical agencies. The Kiln mainly comprises of 32 – 36 chambers and clay products coming from the drying section are kept in these chambers. In these chambers, kiln clay tiles remain stationary and firing zone keeps changing from one chamber to another. Clay tiles are taken up to 11000C where it attains the insoluble state and also gets adequate strength. The firing takes place in a chamber for the pre decided interval of time and the firing zone is then shifted to another chamber. The chamber where firing has been stopped then acts as a cooling chamber where clay tiles are allowed to cool. After attaining desired temperature of the chamber, clay tiles are then removed from the kiln manually. The fired final product from the kiln is then sent for the sorting operation for quality check.

SORTING

The fired product is then sort to examine the quality of the finished product. There may be chances that due to under firing or over firing in the kiln or due to other variation in the process parameters some of finished product may not meeting the quality standard of the tile and hence sorting plays a major role for identification and separation of quality product from the lot. The product after sorting gets ready for dispatch

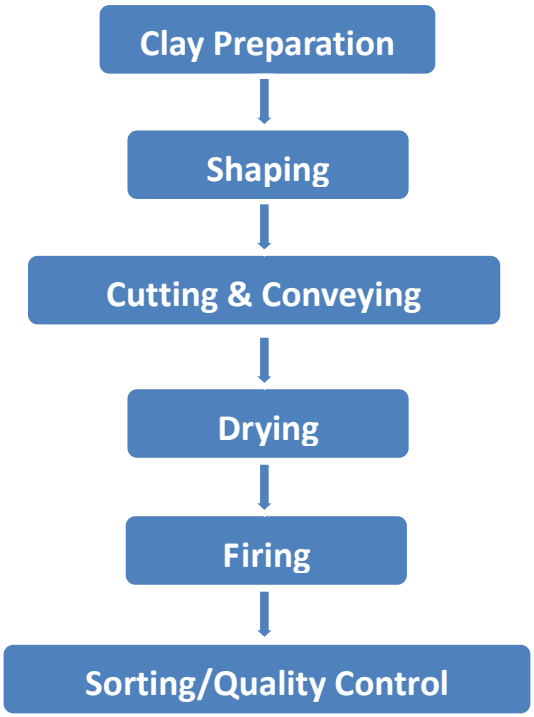

Figure 3: Process flow diagram

1.2 Energy performance in existing system

1.2.1 Fuel consumption

Average fuel and electricity consumption in a typical tile unit is given in Table 5 below:

Table 5: Annual Energy consumption in different capacities tile units

Parameter	Unit	<= 30 Lakh Tiles per year	30 to 60 Lakh Tiles per year	> 60 Lakh Tiles per year
Electricity				
Annual Consumption	kWh	51,978	166,158	241,940
Rate	Rs/kWh	6.00	6.00	6.00
Fuel				
Annual Consumption	MT	941	2,536	1,939
Gross Calorific Value	kCal/kg	3,924	3,787	4,046
Rate	Rs/MT	1,622	2,124	3,217
No. of Units	-	7	7	6
Gross Electricity Consumption	kWh	363,846	1,163,104	1,451,638
Gross Fuel Consumption	Heat, GJ	108,197	281,406	197,049
Gross Energy Consumption	MTOE	2,607	6,800	4,816
Total Energy Consumption	MTOE		14,224	

1.2.2 Specific energy consumption

The electricity demand of the tile units in Mangalore SME cluster is met through supply from electricity grid. The units mostly use biomass as fuel for kiln. The specific energy consumption of a typical unit in the cluster is represented below

Table 6: Specific energy consumption

Sr. No	Parameter	Value
1	Specific Electricity Consumption	1,620 to 5,140 kWh/Lakh Tiles
2	Specific Fuel Consumption	129 to 571 GJ/Lakh Tiles

1.3 Existing technology/equipment

1.3.1 Description of existing technology

Majority of tile units are using outdated and conventional technologies for lighting systems. The existing practice in the tile industry is usage of T -12 tube lights with magnetic ballasts. The energy charges for estimation of power savings are as given below in Table 7

Table 7: Energy Charges

S. No.	*Particular*	*Energy Charges*
1	Electricity Cost	Rs. 6 /kWh

These values have been determined on the basis of the average energy cost in the cluster.

1.3.2 Role in process

Lighting system provides adequate light and lux level in the working area.

1.4 Baseline establishment for existing technology

1.4.1 Design and operating parameters

Electricity consumption in lighting system depends on the lux needed, type of fixture installed and type of ballast installed

Since the energy conservation measure is about improving the efficiency level of lighting, the above mentioned parameters will be used to determine the efficiency levels.

1.4.2 Operating efficiency analysis

The lighting system was studied in detail and analyzed for energy efficiency improvement. At many instances it was observed that the old inefficient T -12 lights with magnetic ballasts has been installed.

T -12 tube lights with magnetic ballast consumes around 55 W of power. Detailed parameters and calculations used for evaluation of lighting saving efficiency are given in the Annexure 1.

1.5 Barriers in adoption of proposed equipment

1.5.1 Technological barrier

In Mangalore cluster, overall technical understanding on tile manufacturing is good and rapidly increasing. However, majority of the entrepreneurs in Mangalore cluster do not have any in depth technical expertise and knowledge on energy efficiency. They are dependent on local technology suppliers, service companies or limited in-house technical expertise, who normally also rely on established and commonly used technology. The lack of technical know-how has made it difficult for the tile unit owners to identify the most effective technical measures.

Technology barrier can be improved by sharing knowledge about the latest available technologies

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2. PROPOSED EQUIPMENT FOR ENERGY EFFICENCY IMPROVEMENT

2.1 Description of proposed equipment

2.1.1 Detailed of proposed equipment

Majority of tile units are using outdated and conventional technologies for lighting systems. There are cost effective and energy efficient lighting solutions are available in market. Therefore it is recommended to replace the existing lighting system with more energy efficient technologies such as Fluorescent Tube Lights (FTL's) that are fitted with the conventional ballast. Electronic ballast consumes 10 Watts lesser than the conventional choke per Fluorescent Tube Lights, which amounts to 20% reduction in energy consumption, without compromising on the illumination level

2.1.2 Equipment/technology specification

New lightings system will be installed in the tile units. Detail offer by supplier is furnished in Annexure 5.

2.1.3 Integration with existing equipment

The new lightings system will replace the current installed electrical systems installed in the tile unit. The installation will lead to savings in electricity. Over all energy cost of plant will be reduced. This option would yield an energy savings of around 40% to get the equivalent light of 40 W tube lights.

2.1.4 Superiority over existing system

Use of this technology reduces the overall plant energy cost. It will also lead to efficient utilization of electricity and help in its conservation. The installation of this measure will lead to revenue generation through electricity savings.

2.1.5 Source of equipment

This technology is already implemented and in operation in many other industries. These are running successfully and customers had observed the savings in terms of rupees due to savings in electricity consumption.

2.1.6 Availability of technology/equipment

Suppliers of this technology are available at local level.

2.1.7 Service providers

Details of technology service providers are shown in Annexure 4.

2.1.8 Process down time

There is no process down time envisaged with the installation of the new system and its integration.

2.2 Life cycle assessment and risks analysis

Life of the equipment is about 15 years. There are as such no risks perceived in the installation of proposed project.

2.3 Suitable unit for Implementation of proposed technology

This EC measure can be applied to all of the units in the cluster.

3. ECONOMIC BENEFITS FROM PROPOSED TECHNOLOGY

3.1 Technical benefit

3.1.1 Fuel saving

There will not be any fuel saving due to implementation of this energy saving proposal.

3.1.2 Electricity saving

After implementation of project, the project will lead to 3862 kWh per annum of electricity saving.

3.1.3 Improvement in product quality

Product quality achieved would be same as in the present quality. It does not have any impact on the improvement in the quality of the product.

3.1.4 Increase in production

Production will be the same as in present.

3.1.5 Reduction in raw material

Raw material consumption is same even after the implementation of proposed technology.

3.1.6 Reduction in other losses

There are no other reduction losses

3.2 Monetary benefits

Details of energy and monetary benefit due to implementation of project are furnished in Table 8 below:

Table 8: Energy and monetary benefit

Particular	Unit	Value
Total Wattage before Project implementation	W	3000
Total Wattage after Project implementation	W	1560
Average. operating hours/day	hours	9
No. of days of operation / year	days	298
Average. cost of Electricity	Rs/kwh	6
Annual cost Savings	Rs. Lakhs	0.23
Annual Energy Savings	kwh	3862

Further details of total monetary benefit are given in Annexure 3.

3.3 Social benefits

3.3.1 Improvement in working environment

Use of efficient lighting system reduces the overall emission of GHG and provides better lumen enabling better working condition for the workers.

3.3.2 Improvement in workers skill

There is no improvement in technical skill of workers.

3.4 Environmental benefits

3.4.1 Reduction in effluent generation

There is no impact in effluent generation due to implementation of the project.

3.4.2 Reduction in GHG emission

Use of efficient lighting system reduces the overall emission of GHG as it consumes less electricity reducing the burden of grid electricity which is predominantly generated by fossil fuel fired power plants.

3.4.3 Reduction in other emissions like SO_X

Significant amount of SO_X will be reducing due to reduced consumption of electricity/coal.

4 INSTALLATION OF PROPOSED EQUIPMENT

4.1 Cost of project

4.1.1 Equipment cost

Cost of new electricity system is Rs 0.28 lakh

4.1.2 Erection, commissioning and other misc. cost

Other cost includes cost of P&F, CST & ED, and erection & commissioning cost, service tax, interest during implementation, civil work costs other misc. cost. Details of total project cost required for implementation of proposed technology are furnished in Table 9 below:

Table 9 Details of proposed technology project cost

S.No	*Particular*	*Unit*	*Value*
1	Cost of system	Lakh Rs	0.230
2	Packaging & Forwarding Cost	Lakh Rs	0.005
3	CST	Lakh Rs	0.005
4	Excise Duty	Lakh Rs	0.006
5	Erection & Commissioning cost	Lakh Rs	0.005
6	Service Tax	Lakh Rs	0.000
7	Interest during implementation	Lakh Rs	0.001
8	Cost of civil work	Lakh Rs	0.023
9	Other misc. cost	Lakh Rs	0.005
10	Total cost	Lakh Rs	0.279

4.2 Arrangements of funds

4.2.1 Entrepreneur's contribution

Entrepreneur will contribute 25% of the total project cost which is Rs 0.07 lakh.

4.2.2 Loan amount.

The term loan is 75% of the total project cost, which is Rs 0.21 lakh.

4.2.3 Subsidy by Government

There is a subsidy of 25 % of the project cost as per the NMCP scheme of Ministry of MSME, GoI. 25 % of the project cost in this case works out to Rs 0.06 lakh. As the subsidy is

normally available after implementation of the project the same has not been taken in the project cost and means of finance. On receipt of subsidy from Ministry of MSME, GoI through the nodal agency the amount of subsidy is generally set off [reduced] from the loan outstanding by the lender bank. Availability of this subsidy will make the project economically more attractive.

4.2.4 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 6 years excluding initial moratorium period is 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 7 years. The financials have been worked out on the basis of certain reasonable assumptions.

4.3.2 Simple payback period

The total project cost of the proposed technology is Rs 0.28 lakh and monetary saving is Rs 0.23 lakh hence, the simple payback period works out to be 2 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 10% works out to be Rs 0.46 lakh.

4.3.4 Internal rate of return (IRR)

The after tax IRR of the project works out to be 50.88%.

4.3.5 Return on investment (ROI)

The average return on investment of the project activity works out at 32.76%.

Financial indicator of proposed technology is furnished in Table 10 below:

Table 10 Financial indicators of proposed technology/equipment

S.No	*Particulars*	*Unit*	*Value*
1	Simple payback period	years	2
2	NPV	Rs (in Lakh)	0.46
3	IRR	%age	50.88%
4	ROI	%age	32.76%
5	DSCR	Ratio	3.63

4.4 Sensitivity analysis

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 electricity savings or decrease in electricity savings. For the purpose of sensitive analysis, two following scenarios has been considered

- Optimistic scenario (Increase in electricity savings by 5%)
- Pessimistic scenario (Decrease in electricity 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.

Details of sensitivity analysis at different scenarios are shown in Table 11 below:

Table 11: Sensitivity analysis at different scenarios

Scenario	*DSCR*	*IRR*	*ROI*	*NPV*
Normal	3.63	50.88	32.76	0.46
5% increase in electricity saving	3.63	53.76	33.03	0.49
5% decrease in electricity saving	3.63	47.99	32.44	0.42

4.5 Procurement and implementation schedule

Procurement and implementation schedule for proposed project are shown in Table 12 below.

Table 12: Procurement and implementation schedule

S. No.	*Activities*	*Weeks*					
		1	*2*	*3*	*4*	*5*	*6*
1	Procurement						
2	Erection & commissioning						
3	Cabling & electrical panel fitting						
4	Testing and trial						
5	On site operator training						

Annexure -1: Energy audit data used for baseline establishment

S.N	Description	Unit	Value
1	Present no. of conventional Tube Lights	No's	60
2	Wattage	W	50
3	Average. operating hours/day	hours	9
4	No. of days of operation / year	days	298

Annexure -2: Detailed technology assessment report

SN	Particular	Unit	Value
1	Present no. of conventional Tube Lights	No's	60
2	Wattage	W	50
3	Total Wattage	W	3000
4	Suggested replace with T5 tubes	No's	60
5	Wattage	W	26
6	Total Wattage	W	1560
7	Average. operating hours/day	hours	9
8	No. of days of operation / year	days	298
9	Average. cost of Electricity	Rs/kwh	6
10	Annual cost Savings	Rs. Lakhs	0.23
11	Cost of T5 Tube	Rs.	500
12	Annual Energy Savings	kwh	3862

Annexure -3: Detailed financial analysis

Considerations

Name of the Technology	***Incorporation of Efficient Lighting Systems***		
Details	***Unit***	***Value***	***Basis***
Installed Wattage	W	3000	Feasibility Study
Operating Hours	hrs/Annum	2682	Feasibility Study
Proposed Investment			
Cost of sytem	Rs (in lakh)	0.230	Feasibility Study
Packaging & Forwarding Cost	Rs (in lakh)	0.005	Feasibility Study
CST	Rs (in lakh)	0.005	Feasibility Study
Excise Duty	Rs (in lakh)	0.006	Feasibility Study
Erection & Commissioning cost	Rs (in lakh)	0.005	Feasibility Study
Service Tax	Rs (in lakh)	0.000	Feasibility Study
Interest during implementation	Rs (in lakh)	0.001	Feasibility Study
Cost of civil work	Rs (in lakh)	0.023	Feasibility Study
Other misc. cost	Rs (in lakh)	0.005	Feasibility Study
Total cost	Rs (in lakh)	0.279	Feasibility Study
Financing pattern			
Own Funds (Equity)	Rs (in lakh)	0.07	Feasibility Study
Loan Funds (Term Loan)	Rs (in lakh)	0.21	Feasibility Study
Loan Tenure	years	6	Assumed
Moratorium Period	Months	6	Assumed
Repayment Period	Months	78	Assumed
Interest Rate	%	10.00	SIDBI Lending rate
Estimation of Costs			
O & M Costs	% on Plant & Equip	10.00	Feasibility Study
Annual Escalation	%	5.00	Feasibility Study
Estimation of Revenue			
Electricity saving	kWh/year	3682	
Fuel saving	Tonne/year	-	
Cost of electricity	Rs / kWh	6	
Cost of Fuel	Rs / Tonne	-	
St. line Depn.	%age	5.28	Indian Companies Act
IT Depreciation	%age	8.24	Income Tax Rules
Income Tax	%age	33.99	Income Tax

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

Years	*Opening Balance*	*Repayment*	*Closing Balance*	*Interest*
1	0.21	0.02	0.19	0.02
2	0.19	0.03	0.16	0.02
3	0.16	0.03	0.12	0.01
4	0.12	0.03	0.09	0.01
5	0.09	0.03	0.05	0.01
6	0.05	0.03	0.02	0.00
7	0.02	0.02	0.00	0.00

WDV Depreciation ***(Rs in lakh)***

Particulars / years	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Plant and Machinery							
Cost	0.28	0.26	0.23	0.22	0.20	0.18	0.17
Depreciation	0.02	0.02	0.02	0.02	0.02	0.01	0.01
WDV	0.26	0.23	0.22	0.20	0.18	0.17	0.15

Projected Profitability ***(Rs in lakh)***

Particulars / Years	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Revenue through Savings							
Electricity savings	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Total Revenue (A)	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Expenses							
O & M Expenses	0.03	0.03	0.03	0.03	0.03	0.04	0.04
Total Expenses (B)	.03	0.03	0.03	0.03	0.03	0.04	0.04
PBDIT (A)-(B)	0.20	0.20	0.20	0.20	0.20	0.20	0.19
Interest	0.02	0.02	0.01	0.01	0.01	0.00	0.00
PBDT	0.18	0.18	0.19	0.19	0.19	0.19	0.19

Depreciation	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PBT	0.17	0.17	0.17	0.17	0.18	0.18	0.18
Income tax	0.05	0.06	0.06	0.06	0.06	0.06	0.06
Profit after tax (PAT)	0.11	0.11	0.12	0.12	0.12	0.12	0.12

Computation of Tax ***Rs (in lakh)***

Particulars /	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Profit before tax	0.17	0.17	0.17	0.17	0.18	0.18	0.18
Add: Book depreciation	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Less: WDV depreciation	0.02	0.02	0.02	0.02	0.02	0.01	0.01
Taxable profit	0.16	0.16	0.17	0.17	0.17	0.18	0.18
Income Tax	0.05	0.06	0.06	0.06	0.06	0.06	0.06

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

Particulars / Years	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Liabilities							
Share Capital (D)	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Reserves & Surplus (E)	0.11	0.23	0.34	0.46	0.58	0.69	0.81
Term Loans (F)	0.21	0.19	0.16	0.12	0.09	0.05	0.02
Total Liabilities D)+(E)+(F)	0.39	0.49	0.57	0.65	0.73	0.82	0.90
Assets							
Gross Fixed Assets	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Less: Accm. Depreciation	0.01	0.03	0.04	0.06	0.07	0.09	0.10
Net Fixed Assets	0.26	0.25	0.23	0.22	0.21	0.19	0.18
Cash & Bank Balance	0.13	0.24	0.34	0.43	0.53	0.63	0.72
TOTAL ASSETS	0.39	0.49	0.57	0.65	0.73	0.82	0.90

Net Worth	0.18	0.30	0.41	0.53	0.65	0.76	0.88
Dept equity ratio	1.14	0.64	0.38	0.23	0.13	0.07	0.02

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

Particulars / Years	***0***	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Sources								
Share Capital	0.07							
Term Loan	0.21							
Profit After tax		0.11	0.11	0.12	0.12	0.12	0.12	0.12
Depreciation		0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Sources	0.28	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Application								
Capital Expenditure	0.28							
Repayment of Loan		0.02	0.03	0.03	0.03	0.03	0.03	0.02
Total Application	0.28	0.02	0.03	0.03	0.03	0.03	0.03	0.02
Net Surplus		0.11	0.09	0.10	0.10	0.10	0.10	0.11
Add: Opening Balance		-	0.11	0.21	0.30	0.40	0.49	0.59
Closing Balance		0.11	0.21	0.30	0.40	0.49	0.59	0.71

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

Particulars / months	***0***	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Profit after Tax		0.11	0.11	0.12	0.12	0.12	0.12	0.12

Depreciation		0.01	0.01	0.01	0.01	0.01	0.01	0.01
Interest on Term Loan		0.02	0.02	0.01	0.01	0.01	0.00	0.00
Salvage/Realizable value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18
Cash outflow	(0.28)	-	-	-	-	-	-	-
Net Cash flow	(0.28)	0.15	0.15	0.14	0.14	0.14	0.14	0.31
IRR	50.88							
NPV	**0.46**							

Break Even Point ***Rs (in lakh)***

Particulars / Years	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Variable Expenses							
O.& M Exp (75%)	0.02	0.02	0.02	0.02	0.03	0.03	0.03
Sub Total (G)	0.02	0.02	0.02	0.02	0.03	0.03	0.03
Fixed Expenses							
O & M Exp (25%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Interest on Term	0.02	0.02	0.01	0.01	0.01	0.00	0.00
Depreciation *(H)*	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Sub Total (I)	0.04	0.04	0.04	0.03	0.03	0.03	0.02
Sales (J)	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Contribution (K)	0.21	0.21	0.21	0.21	0.21	0.21	0.20
Break Even Point (L= G/I)	50.1 %	55.63%	63.43%	72.81%	84.26%	98.47%	112.39 %
Cash Break Even {(I)-(H)}	12.83 %	11.81%	10.37%	8.94%	7.49%	6.04%	5.02%
Break Even Sales (J)*(L)	0.12	0.13	0.15	0.17	0.20	0.23	0.26

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

Particulars / Years	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***Total***
Net Profit Before Taxes	0.17	0.17	0.17	0.17	0.18	0.18	0.18	1.22
Net Worth	0.18	0.30	0.41	0.53	0.65	0.76	0.88	3.72
								32.76%

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

Particulars / Years	***1***	***2***	***3***	***4***	***5***	***6***	***7***
Cash Inflow							

Profit after Tax	0.11	0.11	0.12	0.12	0.12	0.12	0.12
Depreciation	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Interest on Term Loan	0.02	0.02	0.01	0.01	0.01	0.00	0.00
Total (M)	0.15	0.15	0.14	0.14	0.14	0.14	0.13

Debt

Interest on Term Loan	0.02	0.02	0.01	0.01	0.01	0.00	0.00
Repayment of Term Loan	0.02	0.03	0.03	0.03	0.03	0.03	0.02
Total (N)	0.04	0.05	0.05	0.05	0.04	0.04	0.02
Average DSCR	3.85						

Annexure -4: Details of technology service providers

S.No.	*Name of Service Provider*	*Address*	*Contact Person and No.*
1	Asian Electronics	G 2, Shailja Estate, Gaddiannarm, Dilsukhnagar, Hyderabad - 500060 Phone No. : 040 - 24151700 Fax : 040 - 24151700	Mr. Satish Kumar (Area Manager)
2	Flair Engineers	Plot No 58 A, MLA Colony, Road No 12, Banjara Hills, Hyderabad, AP, India	Mr. Abdul Aleem Mulla 099585026992

Annexure–5: Quotations or Techno-commercial bids for new technology/equipment

FLAIR ENGINEERS

To,
Mr. Puneet Sethi
Deloitte Touche Tohmatsu India Pvt Ltd.
Gurgaon

9th January, 2012.

Sub : Your requirement for T5 FTL Tube With Diffuser,1*28W Street Light

With reference to the subject, we are pleased to submit our competitive offer as follows:

S No	Description Of Energy Efficient Lighting Equipment	Quantity (No.s)	Price	Amount
1	T5 FTL Tube With Diffuser	1	345	345
2	1*28W Street Light	1	910	910

Terms & Conditions:

Sales Tax : Extra @ 14.5% VAT
Delivery : Within 4 weeks after receipt of Order.
F.O.R. : Destination.
Payment : 50% advance payment along with P.O. and balance 50% Against delivery of materials.
Validity : 30 days

Transportation Extra as applicable.

We hope you will find our offer competitive and favor us with your valued order.

Thanking you and assuring you of our best attention at all times,

Yours faithfully,
Flair Engineers,

Abdul Aleem Mulla
Managing Partner

FLAIR ENGINEERS HYDERABAD

Office : Plot No. 58A, MLA Colony, Road No. 12, Banjara Hills, Hyderabad, A.P., India - 500 035.
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Email : aleem@flairengineers.com, www.flairengineers.com
Registered Office : 6-3-1177/7/3, Husain Nagar, Kundan Bagh, Begumpet, Hyderabad - 500 016.

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(Ministry of Power, Government of India)
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