Case Study on Energy Conservation In Lighting Audit

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Abstract- *Lighting constitutes a major portion of electricity consumption in commercial and industrial sector. The minimum used of light energy has become the necessary aspect of concern today. The demand of an electrical energy is increasing to fulfill this demand, need to generate more electricity and which required the huge investment with this concern the government of India has to make mandatory the energy audit for all industrial users. Energy conservation is well accepted solution to fulfillment of demand in future. Recently the use of electronics load is increasing very fast. The most of the energy wasted by the inefficient use of the consumer electronics. Specially a light take a great part of the total energy consumption .The current various light control system are exist in the market are outdated and energy inefficient .Therefore this paper propose LED lighting system considering energy efficiency and users satisfaction. The aim of this paper is that to analyze the strategies that allow to the energy efficiency of sector.*

Keywords- Urgent Replacement (U.R); Installed Load Efficacy Ratio (ILER); Sufficient (SUF)

I. INTRODUCTION

Energy wastage is one of major problem in the world. Energy is the prime factor for development of the technology. Proper utilization of energy is one of the major view point of any developing country. Now a days use of energy has increased greatly in order to meet the demand of ever increasing consumption of it. This energy wastage problem will be solved through energy conservation and use of energy efficient equipment.This paper is an attempt to carry out energy audit of Ganesh Oil Mill, MIDC Khamgaon. It has been identified that electricity conservation has a huge potential in the industrial sector due to loss in production because of the load shedding and continuous increment of electricity price, industrial sector is in under financial pressure hence energy conservation provide benefits to the company and environment. In order to maximum the energy conservation in manufacturing industries, regular audit of plants is highly recommended.

II. LITERATURE REVIEW

Energy audit is a verification survey and analysis of energy flows. It includes process to reduce the amount of energy input into the system without negatively affecting the output. Energy audit is the first step in identifying opportunities to reduce energy expense. Energy audit is a fastest and cheapest solution to fulfill the gap between energy demand and supply. The demand of electrical energy increasing due to fast progress in industrialization. Energy audit is first step towards understanding how energy is consumed in selected premises as it indicated where the scope for energy conservation and where the waste can occurs. For energy audit starting is to find existing lighting scheme. With this input audit provides detailed information on replacing of existing luminaries, with complete cost of project, annual energy saving and payback calculation. After study and calculation it is verified that the luminance level on working area before and after changeover to make sure for sufficient level are maintained after modification of lighting.

III. ENERGY AUDIT METHODOLOGY

Effective energy audit is a process that consists of three steps
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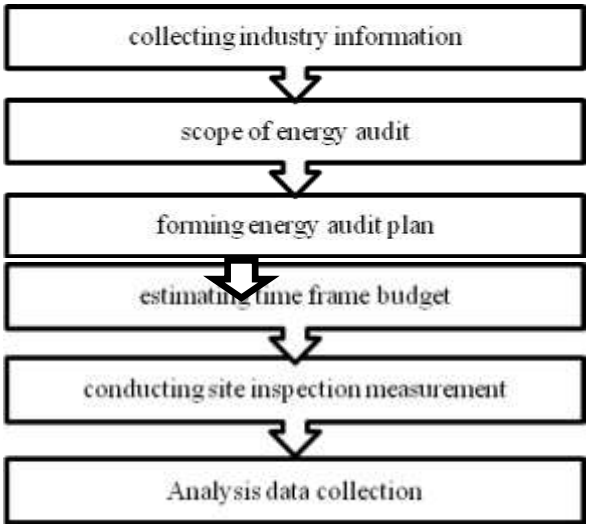
3.1. Pre-Audit Activities

In the pre-audit activities manage the informal interview with the plant manager and done the walk through audit. Identify lack of awareness on energy audit. It is not clear about existing level of operation and efficiency due to lack of instrumentation and non availability of energy consumption data. The illumination was not proper as mounting height of lamp, less number of lamp than required. Light and accessories was not clean no use of proper natural light by using translucent sheet.

3.2. Audit phase

For energy Auditing of industry. It is necessary to analysis of consumption of electrical energy of previous year and analysis of annual energy bill and energy consumption pattern and we conducted motor survey and lighting survey.



IV. STEPS TOWARDS ENERGY CONSERVATION IN LIGHTING

From ILER calculations it is observed that many sections of industry are suffering from improper illumination level. ILER(installed load efficacy ratio)is the average maintained luminance provided on a horizontal working plane per circuit watt with general lighting of an interior.

ILER= Actual Lux/W/m² / Target Lux/W/m² [4]

1. ILER calculation

- Floor Area in m^2 = 25.8920
- R. I. = L*W/H (L+W) = 0.7691

Where
L = Length of interior
W = width of interior
H = height mounting
RI = Room Index

Table 1.Sectionwise ILER Calculation[4]

SR. NO.	SECTION	TOTAL WATTAGE (WATT)		LUX (LUMEN)		ILER		ACTION
		DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	
1	MAIN OPERATION UNIT	279	399	156	33.86	0.43	0.066	UR
2	LOADING SECTION	130	210	181	20.5	1.09	0.140	UR
3	CHALNA SECTION	66	66	1401	23	2.52	0.177	UR
4	DRAYER SECTION	40	40	42	10	0.33	0.130	UR
5	OFFICE	180	180	170	90	.....	.....	SUF
6	OUTDOOR	..	142		15.5	.....	0.391	UR

- Total circuit watts of installation = 399 w
- Watt/m^2 = 399/25.892 = 15.41 watt/m^2
- Average maintained illumination by using lux meter = 33.86
- Lux/w/m^2 =33.86/15.14 = 2.1972.
- Target lux for type of application and RI from standard table = 33 Target Lux /w/ m^2
- ILER = Installed Load Efficiency Ratio.
- Calculate ILER = 2.1972/33 = 0.06658

Table 2.Indicator of Performance[4]

ILER	ASSESSMENT
0.75 or over	Satisfactory to Good
0.51 – 0.74	Review suggested
0.5 or less	Urgent action required

V. RECOMMANDATION

Energy Conservation Measures Identified

1) Replacement of T-8 Fluorescent Lamp of 51 Watt by T-5 Crompton LED Tube
2) Provide Translucent Sheets in the loading Section Area and avoid Artificial Light during day time.
3) Occupancy sensors can be used to avoid unnecessary lighting-up of office when nobody is there.
4) Provision of Solar street light in place of flood light.
5) Installation of Eco Ventilator in Place of Exhaust Fan.

6) Regular Maintenance and Cleaning of Luminaire to reduce depreciation in order to increase illumination efficiency.

VI. CONCLUSION

After making complete study of Oil mill sections in Ganesh Oil Mill energy conservation measures recommended are replacement of rewound motor by energy efficient motor and replacement of T8 51-Watt Fluorescent lamp by T5 Crompton LED tube. The project has completed with two phases of Audit. Third phase of audit is about implementation of energy saving measures recommended to the Management and monitoring as well as analyze the progress of the energy conservation measures if it is implemented by the authority of industry.

Sr. No	Energy Saving proposal	Annual Saving in Rs/Lakhs	Investment required in Rs/Lakhs	Simple Payback in Month
1.	Replace 36 W Tube Light by 18 W LED Tube Light	0.13	0.046	4.28

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