Energy Audit Of Vidyavardhini's College Of Engineering And Technology

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Abstract- *Energy is very important constraints in all sectors for any country's economy. The economic development of any country is closely linked with consumption of energy. Educational institutions are often overlooked as a contributor to energy intensive operations in India within the commercial buildings sector. An energy cost is one of the manageable costs within an institute's budget and can be managed effectively. It attempts to balance the total energy inputs with its use, and serves to identify all the energy streams in a facility. It quantifies energy usage according to its discrete functions. Industrial energy audit is an effective tool in defining and pursuing comprehensive energy management programs.*

Estimation of monthly energy consumption is studied through analysis of electric bills. Energy conservation areas are identified. It will help to implement the energy efficient measures for improving energy efficiency in institute. This study aims to highlight several opportunities to create and implement an energy management plan within VCET institute. The audit was conducted in various field i.e. Illumination, power consumption and Air conditioning that includes Lighting, Fans, Air Conditioners, Computers and suitable strategies of adjusting and optimizing energy were suggested so as to reduce energy requirements and hence, the total cost spent towards energy consumption along with a graphical representation of the same.

Keywords- Energy Audit, Energy Consumption by light, Management plan.

I. INTRODUCTION

Energy Audit is the key to a systematic approach for decision-making in the area of energy management. As per the Energy Conservation Act, 2001, Energy Audit is defined as "the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption. The Energy Audit would give a positive orientation to the energy cost reduction, preventive maintenance and quality control programmers which are vital for production and utility activities. Such an audit programmer will help to keep focus on variations which occur in the energy costs, availability and reliability of supply of energy, decide on appropriate energy mix, identify energy conservation technologies, retrofit for energy conservation equipment etc.

In general, Energy Audit is the translation of conservation ideas into realities, by lending technically feasible solutions with economic and other organizational considerations within a specified time frame. The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs.

II. METHODOLOGY

2.1 Type of Energy Audit

The type of Energy Audit to be performed depends on :
- Function and type of industry
- Depth to which final audit is needed, and
- Potential and magnitude of cost reduction desired

Thus Energy Audit can be classified into the following two types.
i) Preliminary Audit
ii) Detailed Audit

2.2 Preliminary Energy Audit Methodology

- Preliminary energy audit is a relatively quick exercise to:
- Establish energy consumption in the organization
- Estimate the scope for saving
- Identify the most likely (and the easiest areas for attention
- Identify immediate improvements/savings Set a 'reference point'
- Identify areas for more detailed study/measurement
- Preliminary energy audit uses existing, or easily obtained data

2.3 Detailed Energy Audit Methodology

A comprehensive audit provides a detailed energy project implementation plan for a facility, since it evaluates all major energy using systems.

This type of audit offers the most accurate estimate of energy savings and cost. It considers the interactive effects of all projects, accounts for the energy use of all major equipment, and includes detailed energy cost saving calculations and project cost. In a comprehensive audit, one of the key elements is the energy balance. This is based on an inventory of energy using systems, assumptions of current operating conditions and calculations of energy use.
This estimated use is then compared to utility bill charges. Detailed energy auditing is carried out in three phases: Phase I, II and III..

- Phase I - Pre Audit Phase
- Phase II - Audit Phase
- Phase III - Post Audit Phase

A Guide for Conducting Energy Audit at a Glance Industry-to-industry, the methodology of Energy Audits needs to be flexible. A comprehensive ten-step methodology for conduct of Energy Audit at field level is presented below. Energy Manager and Energy Auditor may follow these steps to start with and add/change as per their needs and industry types.

III. THEORETICAL EVALUATION

3.1 Illumination

Procedure :-

1. Measure the floor area of the interior.
2. Calculate the Room Index (RI)
3. Determine Lux measurement points based on RI.

RI	Below 1	1 and below 2	2 and below 3	3 and above
Points	9	16	25	36

4. Determine the total circuit watts of the installation.
5. Calculate Watts per square metre. (Value of step 4÷ value of step 1)
6. Ascertain the average maintained illumination by using Lux meter.
7. Divide 6 by 4 to calculate Lux per watt per square Metre.
8. Obtain target Lux/W/m² Lux for type of the type of interior/application and RI (2).
9. Calculate Installed Load Efficacy Ratio (6 ÷ 8).

On the sampling basis, following readings are obtained

Table 3.1

SR NO	Location	Room No	Length	Width	Height	Type Of Light	Rating (WATT)	Fixture Height	No Of Lights	
									Fitted Total	Working
1	Ground Floor	13	26.66	7.2	2.5	CFL	40	1.95	17	8
2	Second Floor	220	9.75	7.47	2.5	CFL	11*40 5*30	2	16	16
3	Fourth Floor	416	9	7	2.5	CFL	9*40	2	9	9
4	Fifth Floor	512	9	7	2.5	CFL	9*40	2	9	9

Sample Reading 1

W = width of interior;
Hm = the mounting height, which is the height of the lighting fittings above the horizontal working plane.

Room Index (R.I.)= 2.95

As value 2.95<3, from above table taking 25 reading at different points using Lux meter.

Table 3.2 Lux table

SR No	Location	Room No	No Of Readings	AVG LUX
1	Ground Floor	13	25	309.08
2	Second Floor	220	25	245.4
3	Fourth Floor	416	16	247.37
4	Fifth Floor	512	16	570.87

Annual energy wastage (in kWh) =
(1.0 - ILER) x Total load (kW) x annual operating hours (h)

Assuming 8 hours of work and 300 working days
Annual energy wastage (in kWh) = (1.0 – 1.03) x 0.64 x 8 x 300

= -46.37 kWh/annum

IV. RESULTS

From our readings and analysis of illumination of light we obtained results of wastage of light in VCET. Also we can give suggestions to college to reduce current energy consumption like replacing high watt tube light with LED low voltage tube lights, by converting some section of college on solar energy like canteen etc. Again we got annual energy wastage of a room is 259.18 kWh/annum.

Table 4.1 Result table

SRNO	Location	R.I.	Total Circuit in(Watt)	Intensity W/M2	Lux level	Actual Lux/W /M2	Targeted Lux/W /M2	ILER	Annual wastage
1	Ground Floor	2.95	640	3.33	309.08	92.81	90.09	1.03	-46.37
2	Second Floor	2.11	590	8.10	245.4	30.29	37.03	0.817	259.18
3	Fourth Floor	1.96	360	10	247.37	24.73	30	0.824	152.06
4	Fifth Floor	1.96	360	10	570.87	57.08	30	1.903	-780.19

V. CONCLUSION

Here we come to conclude that, firstly institute must have to coloured so that intensity of light will be more in required area. Again choke tube must have to be replaced by ballast tube light. If we obtain these suggestion or implement in VCET then the energy waste will be reduced.

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