

## ELECTRICAL ENERGY AUDIT OF ELECTRICAL DEPARMENT

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**Abstract:** Energy Audit is the key to a methodical approach for decision-making in the area of energy management. The energy management is necessary for procurement and utilization of energy through optimum management, throughout the area. Energy Management and Energy Audit is conducted to save money by saving the energy for different sort of industries, institution, hospitals, domestic areas, etc., under the recommendations given by the energy audit team. These management and audit teams find out the areas, where there is wastage of electricity and implements the effective and proper use of energy. Through efficient energy management and auditing methods, environment can be protected; energy and money can be saved without affecting the natural and quality ongoing work in any sectors. This paper briefly describes about importance of energy audit and energy management in and around our place of living.

**Keywords:** Energy management, energy audit, energy conservation, environment, electricity

**Introduction:** The Energy Audit was defined to meet the following objectives: Conduct a simple Walkthrough audit or observation of the energy consumption of electrical appliances within the customs department building. Review and analyze energy usage history to create a baseline for which savings can be measured in the audited building. Determine what can be done to reduce energy consumption throughout the buildings and what options are available for system improvements if funding is available. Identify and evaluate measures that could improve the environmental performance of the buildings/wards and provide recommendations. The importance of energy

auditing and process of energy auditing are presented in detail. A sincere attempt has been made to conduct the Energy Audit at SKN Sinhgad College of Engineering Korti, Pandharpur (Electrical Department) to estimate the Energy consumed. Identification of areas of energy wastage and estimation of energy saving potential in the Electrical Department has been made by walk-through energy Audit. Also, detailed analysis of data collected is done by suggesting cost-effective measures to improve the efficiency of energy use.

### Procedure of energy Audit:



## LITERATURE SURVEY:

This review is based on the work done in Energy Audit in SKN Sinhgad Collage Of Engineering, Korti, Pandharpur(Electrical Department) various sources.

A case study has been done in which says that audit was conducted 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.

It establishes engineering techniques and procedures to allow efficiency optimization in the design and operation of an electrical system considering all aspects (safety, costs, environment, those occupying the facility, management needs, etc.).

The Energy Audit would also provide a positive orientation to lower the energy cost, preventive maintenance and internal control programmers which are vital for production and utility activities. Such an audit program will help to stay specialize in variations which occur within the energy costs, availability and reliability of supply of energy, identify energy conservation technologies and retrofit for energy conservation equipment.

The fundamental goal of energy management is to produce goods and provide services with the least cost and least environmental effect. One of the strategies to reduce energy wasting and electricity cost is by periodically reviewing schedules to ensure the equipment run only when needed, and by maximizing the use of a control system to operate the equipment and systems in an energy efficient manner while maintaining a comfortable and safe building environment.

## WHY IS AN ENERGY AUDIT IMPORTANT:

Conducting a routine energy audit ensures you're reducing your carbon footprint and continuing to be energy efficient by continuously employing new energy conservation improvements. Here's a quick list of why an energy audit is important:

- An energy audit will identify energy-saving opportunities.
- It will help you understand your energy usage and ways to use energy better.
- An energy audit can identify safety concerns with electrical systems, wiring, and ventilation, thus making your home or business safer.

- It will increase a home's resale value.
- An energy audit will help you identify how to reduce carbon monoxide production in the home or business.

## NEED OF ENERGY AUDIT:

Energy Audit will help to understand more about the ways energy and fuel are used in any industry, and help in identifying the areas where waste can occur and where scope for improving efficient utilization of resources. The Energy Audit would identify quantity and cost of various energy forms, and understand which type of fuel/energy is being used in particular process and product which are vital for production and utility activities.

Energy audit gives preventive maintenance. Such an audit will help to keep focus on variations which occur in the energy costs, monitoring energy consumption at various levels, availability and reliability of supply of energy, highlighting wastage by relating energy input and production output, identify energy conservation technologies, retrofit for energy conservation equipment etc. The primary objective of Energy Audit is to recommending appropriate policies for bringing down energy consumption per unit of product output or to lower operating cost energy Audit provides a "bench-mark" (Reference point) for managing energy in the organization and also provides the basis for planning a more effective use of energy throughout the organization.

## METHODOLOGY ADOPTED:

### ❖ 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.

1. **Walk Through Energy Audit OR Preliminary Audit**
2. **Detailed Audit**

### ❖ Walk Through Energy Audit OR 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 (especially no-/low-cost) improvements/ savings
- Set a 'reference point'
- Preliminary energy audit uses existing, or easily obtained data

In a preliminary energy audit, readily-available data are mostly used for a simple analysis of energy use and performance of the plant. This type of audit does not require a lot of measurement and data collection. These audits take a relatively short time and the results are more general, providing common opportunities for energy efficiency. The economic analysis is typically limited to calculation of the simple payback period, or the time required paying back the initial capital investment through realized energy savings.

The Preliminary Energy Audit focuses on the major energy suppliers and demands usually accounting for approximately **70%** of total energy. It is essentially a preliminary data gathering and analysis effort. It uses only available data and is completed with limited diagnostic instruments.

Preliminary audit is carried out in the limited time say within 10 days and it highlights the energy cost and wastages in the major equipment's and processes. It also gives the major energy supplies and demanding accounting. The questionnaire containing the industrial details of energy consumption process carried out, energy need to unit product; load data etc. must be completed before the pre-audit visit.

The pre-audit visit is done, by the audit team/audit consultant, in the plant area with the attention focused on the energy inputs, spots of wastage and available energy conservation opportunities. The items for waste recycling opportunities are identified. The data regarding energy inputs and outputs are collected for use during preliminary audit.

This type of audit is simply a data-gathering exercise that offers a preliminary analysis. Often the auditor will conduct this type of audit via a walk-through investigation. A professional energy auditor will utilize readily available data and limited diagnostic instruments to complete a preliminary energy audit.

### Detailed Audit

Detailed energy audit, also known as comprehensive energy audit includes engineering recommendations and well defined projects with priorities. It account for the total energy utilised in plants. It involves detailed engineering for options to reduce energy consumption and also reduce cost. The duration of such studies is generally from 1 to 10 weeks. The action plan is divided into short term, medium term and long term actions.

The short term action plan requires no capital investment or least investment to avoid energy wastages and minimizing

non-essential energy uses and improving the system efficiency through improved maintenance programmed.

The medium term action plan requires a little investment to achieve efficiency improve-ment through modifications of existing equipment's and other operations.

The long term action plan is aimed to achieve economy through latest energy saving tech-niques and innovations. The capital investments are required to be studied thoroughly while finalizing the long term action-plan.

### DATA COLLECTION:

The Below Chart Shows the total no of equipment with specification. The total load of Department is 56.063 Kw.

Sr.no	Floor	Room no	Equipment	Equipment rating	Total no	Calculation(kw)
1	Ground	105-109	Tube	36W	28	1.008
			Fans	78W	18	1.404
			Bulbs	3watt	2	0.006
			computers	300W	22	6.6
			Printer	40W	1	0.04
			Projector	1000W	1	1
			Machine	1.Dc Shunt And Dc Series Motor with load(220V,19A,)	1	8.36
				2.Three Phase Induction Motor With Load Arrangment(Slip Ring 415V,5A)	1	1.76
				3.Three Phase Induction Motor(Squirrel 415V,3.1A)	1	1.1
			Coupling	1.DC Shunt Motor #Alternator(220V-415V,19A-4.2A)	1	6
				2.DC Shunt Motor # DC Shunt Generator(220V-220V,19A-19.6A )	1	8.5
				3.Synchronous Motor # DC Shunt Generator(415V-220V,6.2A-13.6A)	1	5.2
				4.Three Phase Induction Motor # Dc Shunt Generator(415V-220V,8.1A-1A	1	3.11
			Pannels	Simulation Pannel for differential protection of Transformer(440V,2.1A)	3	2.38
2	First	205-211	Tube	36W	23	0.828
			Fans	78W	20	1.56
			Bulb	3watt	2	0.06
			Projector	1000W	3	3
3	Second	303(A,B,C,Drawing Hall)	Tube	36W	12	0.432
			Fans	78W	10	0.78
			Bulb	40W	2	0.08
			Other Equipment	1.DC Shunt motor (220V,4A,1HP)	3	0.075
				2.DC Coupled Genrator(220V,1.5A,0.5HP)	1	0.372
				4.Single Phase Induction motor (220V,2.4A, 0.37 HP)	1	0.27
				3PH IM Controller with IGBT INVERTER(415V-5A)	1	1.784
4	Third	405-406,Seminar Hall	Tube	36W	9	0.324
			Bulb	3watt	1	0.03
						<b>56.063</b>

An energy audit is an inspection survey and an analysis of [energy](#) flows for [energy conservation](#) in a building. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output. In commercial and industrial real estate, an energy audit is the first step in identifying opportunities to reduce energy expense.

#### Energy Consumed per Month with Cost:

The Total Energy Consumed in one Month (20 Days)(December) = 645.8Kw/h

So the total monthly Cost of Energy =  $645.8 \times 16 = 10,332.8$

Rs The Total Energy Consumed in one Month (20 Days) (January) = 600.45kw/h

So the total monthly Cost of Energy =  $600.45 \times 16 = 9,607.2$

Rs The Total Energy Consumed in one Month (20 Days) (February) = 615.8Kw/h

So the total monthly Cost of Energy =  $615.8 \times 16 = 9,852.8$  Rs.

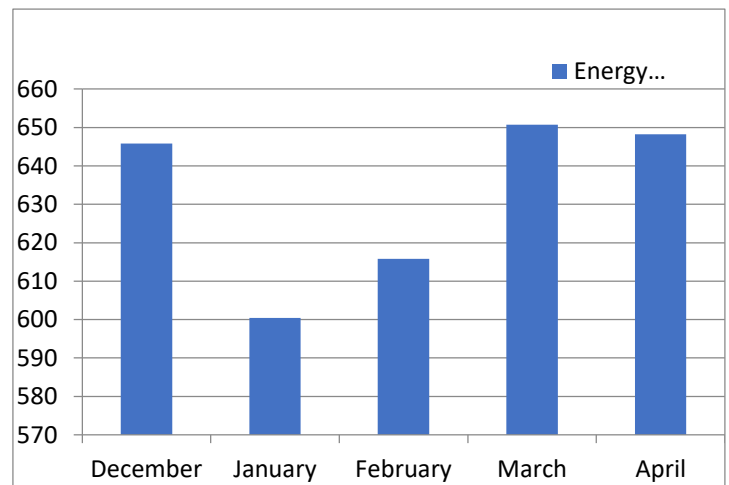
The Total Energy Consumed in one Month (20 Days) (March) = 650.74Kw/h

So the total monthly Cost of Energy =  $650.74 \times 16 = 10,411.84$  Rs.

The Total Energy Consumed in one Month (20 Days) (April) = 648.25Kw/h

So the total monthly Cost of Energy =  $648.18 \times 16 = 10,372$  Rs.

**The Below Chart Shows Variation of Energy Consumed/Month:**



#### ENERGY CONSERVATION MEASURES(ECM'S) RECOMMENDATIONS

Replace the existing Office ordinary FTL-Copper Choke (1x40W+16W choke), with 20W LED Tube light.

Replace existing ceiling fan (80 W) by energy efficient fan (28 W).

Other recommendations are:

Switch off the computers during idle time. Instructions to be given to faculty members and all students.

Switch off the lights/fans when it is not in use.

Use BEE Certified by Green Pro / Energy 3 star rated appliances (e.g. Refrigerators, Photocopiers, Printers, Water coolers, UPS)

Use of natural light as maximum as possible in the campus.

#### CONCLUSION

These audits are very important for the society. The buildings, offices, rooms etc. are designed without taking into consideration of the use of energy efficient lighting system. These buildings consume more energy as the energy required by energy efficient structure design for In this we have considered the academic sector for evaluation of energy audit and energy conservation of SKN Sinhgad College Of Engineering Korti, Pandharpur(Electrical Department) Key issues pertaining to the implementation of Energy Conservation proposal and methodology have been discussed in detail. Based on the exhaustive literature survey were presented for energy conservation and energy audit in keeping mind the present Energy scenario and future condition.

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