

# Electricity Conservation & Audit for Jagadambha College Of Engineering and Technology

**Pooja Rekalwar<sup>1</sup>, Snehal Lanjekar<sup>2</sup>, Priyal Mungse<sup>3</sup>**

Department of Electrical Engineering, Jagadambha college of engineering and technology, Yavatmal, India<sup>1,2,3</sup>

**Abstract:** Power the word itself says to what extent the world is dependent on it. We are totally dependent on the power which is making the usage higher and higher which left us with energy crises and increasing costs of the energy usage. It's time for Energy conservation. These days, number of people in favor of the Energy saving has been increasing not to lessen the cost of usage but to let our future generations live with light and luxury. In this project we have analyzed different methods of energy auditing and we have analysed Energy conservation measures for College building that will save the electricity to a little higher extent by using Energy Efficient Devices.

The energy audit in a Jagadambha College of Engineering and Technology is a case study. For it not only serves to identify energy use among the various services and to identify opportunities for energy conservation but it is also a crucial first step in establishing an energy management. The audit will produce the data on which electricity conservation is depend. The study should reveal to the owner, or management team of the building the options available for reducing energy waste, the costs involved, and the benefits achievable from implementing those energy-conserving opportunities. The energy management is a systematic strategy for controlling a college energy consumption pattern. It is to reduce waste of energy and money to the minimum value. Solar power plant is another strategy for controlling a college energy consumption.

**Keywords-** Audit methodology, observation, Energy Audit, Energy efficiency, Bill, Saving, Payback Period, Measure calculation, conservation.

## INTRODUCTION

Energy audit is an inspection, survey and analysis of energy flows for energy conservation in a building or system to reduce the amount of energy input to the system without negatively affecting the output[2]. As per the Energy Conservation Act, Energy Audit is defined as “the verification, monitoring and analysis of use of energy including submission of technical report containing recommendation for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption”. It is an effective and concentrate method to achieve rapid improvement in energy efficiency in building and industrial process. First step in identifying opportunities to reduce energy expenses.[1] Which is a Systematic procedure include some steps Energy auditing is also called as Energy assessment, Energy survey etc...

## LAUDIT METHODS

The energy audit can be classified in to following two types;

- Preliminary Audit :
- Detailed Audit

### *1.1 Preliminary Energy audit methodology:*

It is relatively quick exercise to Establish energy consumption in the organization[6].

- 1) Identify focused area for more detailed study/measurement.
- 2) Preliminary energy audit uses easily obtained data.

### *1.2 Detailed Energy Audit Methodology:*

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 and project cost[4].

## II. ENERGY AUDIT AND ENERGY MANAGEMENT

### A. Energy Audit Objectives:

An energy audit is an inspection, survey and analysis of energy flow for energy conservation in an industry, process to reduce the amount of energy input into the system without negatively affecting the output. Energy audit is a testing and analysis of how the organizations use energy. According to national energy conservation laws and regulations for energy consumption, investigation and energy audit management.

### B. Energy Management:

The Energy Management is the strategy of adjusting and optimizing energy using systems and procedures so as to reducing energy requirements per unit of output. [4]The main objective of energy management is:

- To maintain the load requirement.
- To reduce the cost of energy.
- To minimize environmental effects.

As per the Energy Conservation Act, passed by the government of India, energy audit is defined as “ The verification, monitoring and analysis of use of energy including submission of technical reports containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption”.

### C. Energy Conservation

Principle of Energy Conservation :-

Energy Conservation means reduction of consumption but without reduction in the quality and quantity production.

#### 4) Energy Conservation Required Due To

- To reduce energy/fuel shortage.
- To save fuel, natural resources and money.
- To minimize environmental pollution.
- Only 1 % of natural resources available in India.
- Population is 16% of the world
- Provides Energy security.

## III. ENERGY AUDIT METHODOLOGY

The methodology adopted for this audit was

- Formation of audit groups for specific areas and end use
- Visual inspection and data collection
- Observations on the general condition of the facility and equipment and quantification
- Identification of energy consumption and other parameters by measurements
- Detailed calculations, analyses and assumptions
- Validation
- Potential of energy saving opportunities
- Implementation As a first step in this regard, 1 teams of total 5 students from the department were formed and a group was assigned an area or application of energy in the campus.

## IV. POWER CONSUMPTION (CAMPUS)

Power consumption of buildings in campus before replacement of appliances.

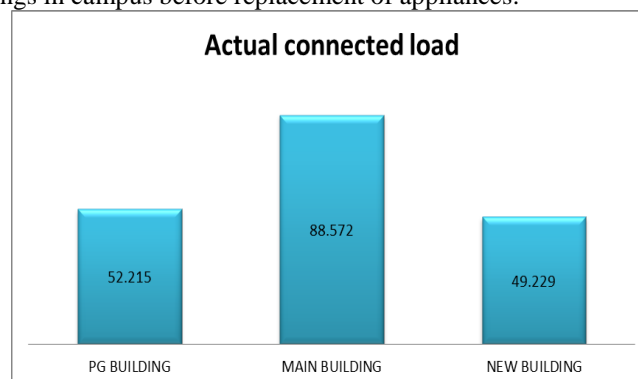


Fig. 1 Power consumption of three building.

V. QUANTIFICATION BY END USE

The loads were segregated based on the end use as lighting and fans, air-conditioning, Computer/ printers , water pumping, canteen , lab, and water-cooler Quantification, types and necessary measurements were carried out. The details are given here for working hour 8 hr[5].  
Pie chart before replacement of appliances:

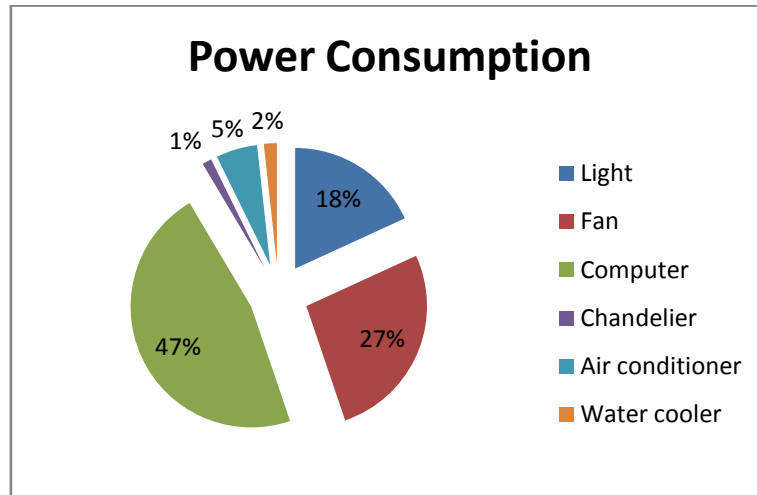


Fig. 2 Energy Consumption by different appliances in Campus.

The Institute has about 773( CFL, tube lights , Bulb , LED ) in different departments and labs. All of this consumes 209.632kw for 8 hr per day. The Institute is having 480 fans in different departments and labs. All this consume 307.2kw for 8 hr per day. The institute is having 306 Computer in different departments and labs. All of this consumes 538.56 kw for 8 hr per day. The institute is having 05 Chandeliers in Seminar halls which consume 14.56kw. The institute is having 05 Air-conditioner in different areas which consume 64kw for 8hr per day. The institute is having 05 Water-cooler in campus which consume 20kw for 8hr per day.

VI.COMPARISON BETWEEN POWER CONSUMPTION BY NORMAL DEVICES AND ENERGY EFFICIENT DEVICES

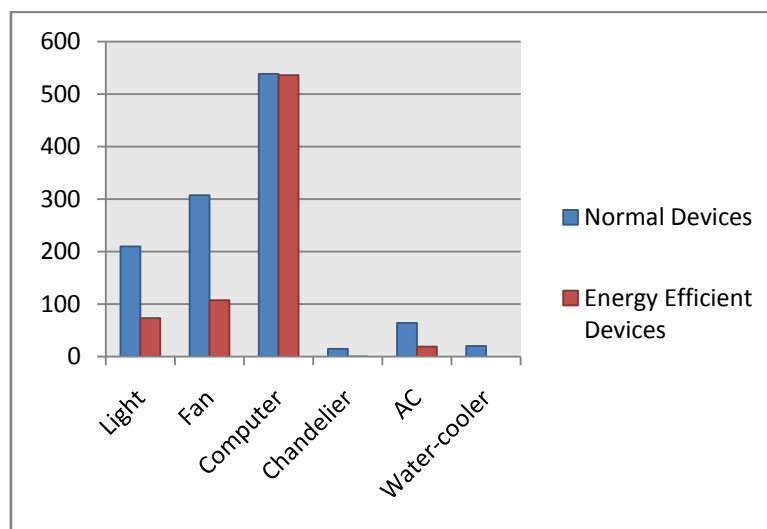


Fig.3 Energy Consumption By normal and Energy Efficient Equipment

1. By using Energy Efficient Equipment .In Lighting, if we replace regular lighting with LED tube light(18w) and LED bulb (20w) then,  $9.208\text{kw} \times 8\text{hrs} = 73.664\text{kw}$ , net savings =  $209.632 - 73.664 = 135.968\text{kw}$ .
2. In Ceiling Fans if we replace with Energy Efficient BLDC Fans (Atomberg gorilla E1-1200) then  $28\text{w} \times 480\text{no} \times 8\text{hrs} = 107.456\text{kw}$  Net savings= $307.2 - 107.456 = 199.744\text{kw}$

3. In Computer if we use hibernation setting Energy Efficient then  $219\text{w} \times 306\text{no} \times 8\text{hr} = 536.112\text{kw}$ , Net savings = 2.44 kwatt.

4. AC require 1600w but Noria air-conditioner require only 480w.  $480\text{w} \times 5\text{no} \times 8\text{hrs} = 19.2\text{kw}$ , Net savings =  $64 - 19.2 = 44.8\text{kw}$ .

5. In Chandelier if we use energy efficient MASKROS Pendant IKEA chandelier lamp in seminar halls then ratings is  $6\text{w} \times 5\text{no} \times 8\text{hrs} = 0.24\text{kw}$  per day, Net savings =  $14.56 - 0.24 = 14.32\text{kw}$ .

6. If we replace Water-cooler with Solar water-cooler then it consume zero wattage  $0\text{w} \times 05\text{no} \times 8\text{hours} = 0\text{w}$  Net Savings = 20kw.

7. If we use controllers and sensors in water pump there will be 500 watts savings, Net Savings =  $2500 - 2000 = 500\text{w}$ .

Total kwatt conserved by replacing Energy efficient Equipment are: 727.024kw i.e., 426.982 units saved per day if we replace with Energy Efficient Equipment. With normal appliances the units consumed is: 1153.952 units per day But replacing normal appliances with Energy Efficient Appliances the units consumed is 727.024 units only. There is nearly 426.982 units savings per day i.e.  $426.982\text{units} \times 30\text{days} = 12807.84\text{units}$  saved per month =  $12807.84 \times 12\text{months} = 153694.08$  units saved per year.

## VII. CONCLUSION

Energy Audit deals with identification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving Energy Efficient with cost benefit analysis and an action plan to reduce energy consumption. Energy Saving is a Responsibility for every individual. In this paper we have analysed the amount of wattage consumed by different devices before replacement is 190kw approximately and after suggested necessary replacements its consumption is 134kw and showed the net savings is upto 30%. By this analysis, if we implement Energy Efficient Equipment we can conserve a lot of power being wastage with current devices without disturbing the output and we can use it for some other devices. By using Energy Efficient Devices we can save and reduce shortage of Power.

## REFERENCES

1. Guide to Electric Load Management by Anthony J. Pansini, Kenneth D. Smalling, Pennwell publications (1988).
2. Energy Management hand book by Turner, Wayne C, Lilburn, The Fairmont press (2001).
3. Handbook of Energy Audits by Albert Thumann, Fairmount Press, 5th edition (1998).
4. IIT Bombay Energy audit report, Department of Energy Science and Engineering.
5. Energy Audit Report On a Technical Institute I. Dr. K. Umesha, M.E, Phd, 2Miste. Mieee (Madras Section) Jawaharlal College of Engineering and Technology, Lakkidi, Palakkad district, Kerala, India IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE) ISSN: 2278-1676 Volume 4, Issue 1 (Jan. - Feb. 2013), PP 23-37
6. Energy Audit report of IIT Kanpur Utilization of Electric power by N.V. Surya Narayana. New age international publishers.