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ENERGY CONSERAVATION STEPS & SAVING PROPOSAL IN LDCITS, SORAON PRAYAGRAJ

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Abstract : **This paper provides an overview of an efficient energy conservation schemes that can be applied in the campus of LDCITS, Soraon, Prayagraj to decrease the power consumption and decrease the electricity bills. Energy Audit is one of methods to check the major energy consumption areas and energy wastage in building. Due the limitation of conventional energy sources, there is a major concern about the energy efficiency and conservation. This paper describes the process of energy audit from historical data collection, analysis of data, formulations of energy conservation schemes through the energy audit. This paper proposed the energy conservation steps and savings in the institute.**

I. INTRODUCTION

LDC Institute of Technical Studies, Soraon, Prayagraj was established in 2007 as private college in Uttar Pradesh Affiliated to Dr. A.P.J. Abdul Kalam University, Lucknow. The place has healthy climate with moderate temperature ranging from 1^0C to 38^0C with an altitude of 900 metres. As day by day our consumption of electricity is increasing tremendously but the power generation has not that much improvement as per the requirement. As the institute is associated with the technical branches, deal with the electrical energy area, it is the major sources of energy consumption. There is a need of energy management schemes to be apply which enhance the new technology in the institute and improve the status of the institute. We can improve the building requirement as per the energy conservation act and we must be able to conserve energy for further requirement. So there is a need for energy auditing of the institute, which must suggest the energy conservation schemes that should be apply to the institute to reduce the energy bills and saves the electrical energy.

II. METHODOLOGY

Energy audit is the process of systematic approach for decision making in the field of energy management. Energy auditing is the first step towards energy conservation to locate the energy usage and wastage areas. As per the Energy Conservation Act 2001, passed by the Government of India , energy audit is defined as " the verification, monitoring and analysis of the 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." Energy auditing of a building can start from walk through audit of the facility to detailed audit with recommendations of energy conservation schemes. Energy audit serves to identify energy usage through the equipment and to identify the opportunities for energy conservation but it is difficult to start an energy management program and to implement in the facility. Need for energy audit is to enhance new technology to improve the efficiency and utilized the saved energy in other proceedings and saves the money through reducing energy bills.

The ultimate goal of Energy Audit is to emphasize the concept of energy conservation in the campus of LDCITS, Soraon Prayagraj. According to Energy Conservation Act 2001,"The aim of the energy audit is to discover, quantify, justify and prioritize expenses preserving measures in reference to energy use in different locations."

The benefits of Energy Audit includes ;

- Recommending low cost measures to enhance efficient energy use.
- Identification of energy waste areas for applying energy save measures.
- Calculation of payback period

III. ANALYSIS

Energy audit is started with review of historical energy use. This is done by the collection of the utility bills of the institute of 1 years which provides the information regarding the total power consumption of the institute. These data helps in understanding the patterns of power consumption and trends of the institute. This will become a base reference for future comparison after the energy audit is implemented. The data collected can be showed in form of spreadsheet or bar graph for further analysis. From this it is easy to justify the duration of peak power consumption duration. Fig.1 shows the total power consumption of the institute during last 1 year. The figure shows the tremendous increase in power consumption in mid of summer season and mid of winter season. This is due to regular use of fans, Air Conditioners in summers. In large amount, there is continuous use of these appliances. Many time all appliances are in on position whether the person is in the faculty rooms, classroom and or not. Mainly in the classroom all electrical equipments are left in on position even the classroom is evacuated by the students.

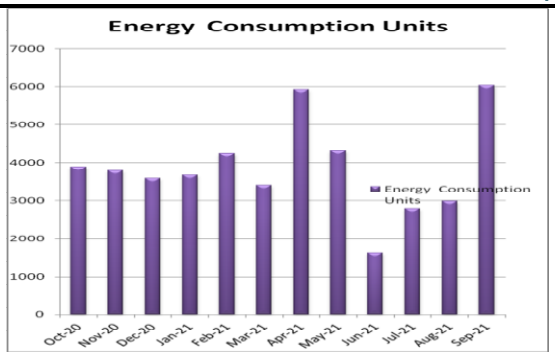

Fig.1

Fig.2. shows the total units consumed and total bill paid during last 1 year. From this we can predict that the average power consumption of the institute. Some majors must be taken to reduce the power consumption.

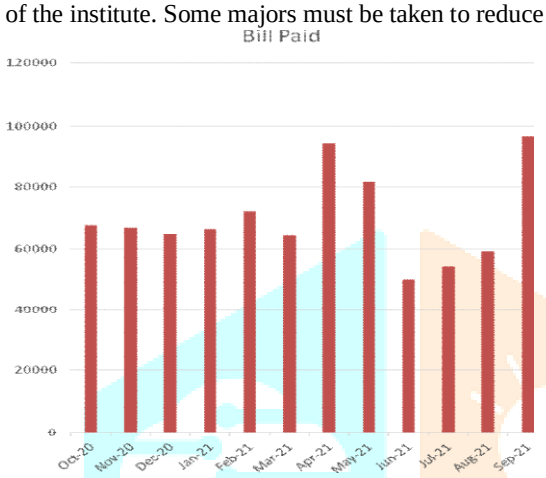

Fig.2

YEAR	*TOTAL UNITS CONSUMED(kWh)*	*TOTAL BIL PAID(Rs)*	*AVERAGE UNITS CONSUMED PER DAY(kWh)*	*AVERAGE BILL PAID PER DAY(Rs)*
2020-21	*46421*	*868509*	*127*	*2379*

Fig.2.

Power consumption areas

Major power consumption devices are ACs, fans, tube lights and Lab Equipments in office ,classrooms and laboratories.

IV. DISCUSSION

On the basis, details of power consumption certain steps are suggested for efficient use of energy of the institute. Economic analysis of implementation with recommended measures is calculated. Depicted below are some vital recommendations for efficient energy implementation.

A. Replacing tubelights with T5 lights

In the institute, there are conventional tubelight are used. There are 200 conventional tubelights(power rating - 40W) . replacing them with T5 lights of power rating 12 W.

Economis analysis

Total number of tubelights are in tha campus = 200

Average power spare of T5 lights = 12 W

Total power spared = 200*12 =2400 W

Total utilisation a year = 260 * 4 h = 1040 h

Total energy spared in a year = 1040 * 2400= 2496kWh

Bill for the year = 2496*8 = Rs 19968

Expense for replacement of lights = 200 *500 = Rs 100000

Payback period = 100000/19968 = 5 yrs

Total energy spared in a year by tubelights 1040*200*40 = 82320 kWh

Bill for the year = Rs 66560
Money saved in a year by the replacement = Rs 46592

B. Replacement of Fans by 4 star rating fans (46W) (cost-Rs 1150)
For 150 fans
Total energy spared in a year = 9384kWh
Total bill =Rs 75072
Total expense in replacement = Rs 172500
Total payback period =2.29 yrs

C. Switch to green energy

Installation of solar roof top to bear the load and reduce the electricity bills. There are numerous types of solar cells availability. The battery backup solar installation charges are near about for 100kW load Rs.4500000. Installation of solar panels for 100 kW load, cost = Rs 45,00,000
average energy consumed = 3853 kWh
Total bill paid in a year = 3853*12*8 = Rs 369888
Payback period = 12 yrs

SOME SUGGESTION

During the survey, problem concern with energy conservation has been recognized. These can be solved by proposal of replacement of tubelights by T5 lights and energy efficient fans and solar panel schemes, identification of cost savings and new wiring diagram.

- Energy and cost is saved by reinstallation of equipment's with energy efficient equipment's.
- The payback is very less in case of fans and T5 lights.
- With the installation of solar panel , the green energy is used and decrease the load of generator.
- In classrooms, faculty rooms the occupancy sensors can reduce the cost and energy wastage.
- Energy efficient AC's can also reduce the cost of energy consumption.

Study has conducted for 24 hrs and hence energy saving is calculated. More than 15 % energy is saved.
Actions to reduce utility costs

- Replacing existing lights with more efficient types.
- Replacing electric equipment with more efficient models.
- Adding insulation to walls and ceilings.
- Replacing motors with high efficiency models and using variable speed drives.
- Installation of solar panels on roof top can reduce the generator consumption. • LED street lights can be used

New wiring

New wiring of the department with the efficient electric wiring reduces the wastage of electricity. The lamps are connected to suitable switch which makes person comfortable to switch on and off the equipments.
Special occupancy sensors and dimmers can be incorporated in the classrooms, faculty rooms and corridors of the department. Through AUTOCAD software, layout of proposed distribution system can be designed which provides proper location of switches, lamps and distribution board. ***Maintenance and replacement***
Maintenance means proper take and care of the equipment which can increase the saving of energy. It includes cleaning, replacing defected items by efficient energy equipment. Maintain proper time table for scheduling of cleaning of equipments. Identify dirt condition and selection of maintenance schedule of desired facility. Proper maintenance scheduling for cleaning of fans and Air Conditioners to reduce power consumption of equipment and increase its life span. Introduction of new technology and be aware of new trends.
Replacing old fans with energy efficient fans or energy star rated fans. Replacing energy star AC to reduce energy bills.

V. CONCLUSION

In this paper, some energy conservation aspects are described by energy auditing to reduce energy wastage, utility bills. Replacement of lighting lamps, fans and ACs by energy efficient equipment. This would be the first step towards energy conservation and environment friendly. we can reduce the burden of electricity bills to the department and utilize the saved energy in better prospects. Energy conservation by energy auditing provide substantial savings. Proper use of appropriate wiring design, maintenance schedule and properly incorporated place of switches, boards and lamps comfort to users and saves time, money.

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