Implementation of Energy Management and Energy Auditing for Educational Institution

Dr.B.Gopinath, Dr.P.Jeyaprakash, R.Hemapriya, B.Janani, R.Janani, S.Savitha
[1]*Professor and Head, Department of Electrical and Electronics Engineering, Vivekanandha College of Technology for Women, Tiruchengode, Tamil Nadu*
Assistant Professor, Department of Electrical and Electronics Engineering, Vivekanandha College of Technology for Women, Tiruchengode, Tamil Nadu
UG Student, Department of Electrical and Electronics Engineering, Vivekanandha College of Technology for Women, Tiruchengode, Tamil Nadu

Abstract: A photovoltaic system, which is incorporated into the building assessments and solutions, significantly covers the building's electricity needs. The building's Normalized Performance Indicator has showed fair performance in its brief and simplified computations, but there are still some opportunities for conservation. The energy audit is an important parameter for all the developing and developed countries and they focus on energy efficiency, energy quality, and energy intensity. In the industrial, residential, and commercial sectors the top operating expense is found to be are material, machine, manpower, and energy. Identification of the energyconsuming sector is the prior attention to look for the energy-saving potential and quality improvement.

Keywords: An energy audit, Energy efficiency, Usage of energy, Energy conservation, Sustainable power.

1.INTRODUCTION

There are numerous issues plaguing the globe now that seriously hurt everyone. Pollution and climate change are the two main issues. Humans create these issues in order to produce energy from fossil fuels. Energy conservation is crucial since energy creation is a very expensive process. A variable load is connected to the electrical system, which has a long-wired networking systemand other safety measures installed. As a result of lower transmitted power to the consumers, the grid's transmission capacities are improved, leading to (1) lower consumption costs for consumers or building owners, (2) a cleaner environment due to a decrease in emissions from conventional generation, and (3) cleaner transmission lines.

2.AIM

The purpose of an energy audit is to discover inefficient energy use on campus and to find ways to reduce it in order to save money. An examination of the merged loads displays how much energy is lost in the environment once a survey of merged and unmerged loads has been completed.

The following are the objectives of energy auditing cut electricity costs, analyse the state of loads, eliminate unnecessary loads, fix the proper loads, and make sure the right amount and quality ofloads The preparation of a load table, a switch table, and a combined load table, as well as the construction of charts, are required to satisfy the building's load requirement. If performed correctly, the Energy Audit will be advantageous to any domain from an economic point of view. The purpose-specified stages of auditing are completed, screening out any electrical load residues on campus. As a result, less energy is used than in earlier stages, and if the report's methods are used, a profit is obtained.

2.1 Energy audit types

1. Preliminary audit
2. Thorough audit

Preliminary audit:

Get the association's total energy consumption. Identify the size of the investment funds, Make note of the easiest ways to save energy. Mark the efficient energy-saving techniques to acquire a "Benchmark," andThis evaluation makes use of the most recent or readily available information to identify the areas that call for progress discussion.

Thorough Audit:

By analysing all significant processes in the sector that consume the most energy, a thorough energy audit offers the firm a complete outlook on energy usage. It uses a methodology that is incredibly precise and provides insightful insights. A proper energy balance is one of the review's most important elements. Current working conditions are expected to be used, and they are furthermore contrasted with service charge fees.

2.2 Energy audit.

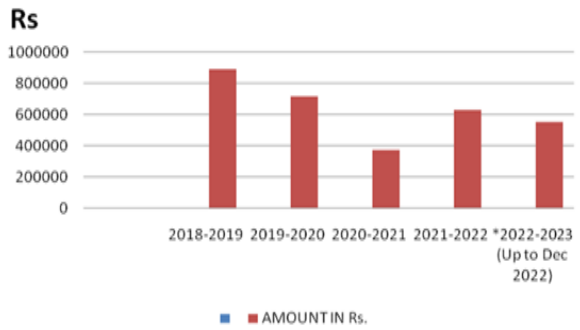
It is described as a straight forward surveying audit in which the auditor focuses solely on an organization's energy use and in which no significant actions are taken to reduce that use. It is also referred to as an initial audit of energy. It is the easiest and shortest sort of audit and the initial step in the auditing process. And it concentrates on the main area of energy usage. In less time than spam, the walk-through energy audit is accomplished. The auditor will identify the energy-consuming areas and create a comprehensive list of energy-saving strategies. The certified energy manager, certified auditor, or professional engineer completes the walkthrough audit Physical energy.

S. NO	YEAR	TOTAL NUMBER OF UNITS CONSUMED	AMOUNT IN Rs.
1	2018-2019	102873.2	891649
2	2019-2020	88463.6	716598
3	2020-2021	46006.4	375305
4	2021-2022	102802.4	628985
5	*2022-2023 (Up to Dec 2022)	45728.8	551655

3.1 Survey of Loads Floor wise

In floor wise the initial step of the load survey process, is taken. A plan for the survey is developed and approved prior to the work beginning. The rooms of each floor are then examined collectively for loads and switch boards. The survey makes note of the load's condition. It indicates if the load is functioning or not, and the age of the loads is provided as optional information. The loads' connection to a switch is where merged loads are discovered. The load is regarded as an unmerged load if each load has a distinct switch. When a switch manages several loads, the switches are combined into one.

3.2 ELECTRICAL LOAD DETAILS



MAIN BLOCK FOURTH FLOOR						
Sl No.	ROOM NO	FAN (60W)	LAMP		PLUG	REMARKS
			F.L (40W)	C.F.L(9W)/ C.L(36W)/ LED(9W)		
1	A501 Tutorial Room	3	2	-	-	
2	A502 Class Room	4	3	-	-	
3	A503 Class Room	5	2	-	1	
4	A504 Toilet	-	1	1	-	
5	A505 Class Room	5	3	-	-	
6	A506 Class Room	4	2	-	-	
7	A508 Class Room	4	3	-	-	
8	A509 Class Room	5	1	-	-	
9	A510 Class Room	5	2	-	-	
10	A511 Class Room	4	3	-	-	
11	A512	1	2	-	-	
12	A513	-	3	-	-	
13	A514	1	2	-	2	
14	A515 Class Room	5	2	-	-	
15	A516 Class Room	3	3	-	-	
16	A517 & A518	-	1	1	-	
17	Fourth floor veranda	-	1	7	5	
Total		49	36	9	8	

SL.NO	PARTICULARS	QUANTITY	RATING (watts)	TOTAL POWER CONSUMPTION (watts)
1	Fan	49	60	2940
2	Fluorescent Lamp	36	40	1440
3	Compact Fluorescent Lamp	9	12	108
TOTAL LOAD				4488

SLNO	BLOCK	LOAD (kW)
1	MAIN BLOCK	219.325
2	EEE BLOCK	89.453
3	CSE BLOCK	39.900
4	CIVIL BLOCK	56.713
5	KAVERI HOSTEL	93.816
T0TAL LOAD (kW)		499.207

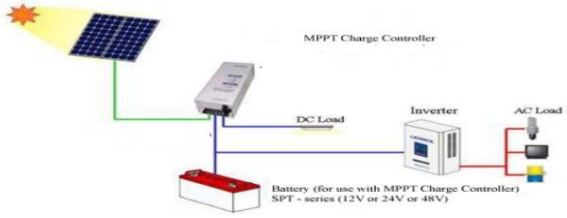
4.1 RELATED WORK:

Calculating the amount of energy conservation identifying any health or safety concerns that may

arise as a result of the planned welfare projects collecting and evaluating energy usage information from various source determining which energy-saving solutions are considerable setting standards for energy use or need by monitoring energy consumption encouraging the use of energy-saving devices or alternative energy sources determining the energy consumption of each system by inspecting or evaluating construction methods, mechanical systems, electrical wiring, or process systems preparing audit reports that include the results of the energy analysis or suggestions regarding energy cost savings examining energy bills along with utility rates or tariffs to collect past energy consumption data understanding technical.

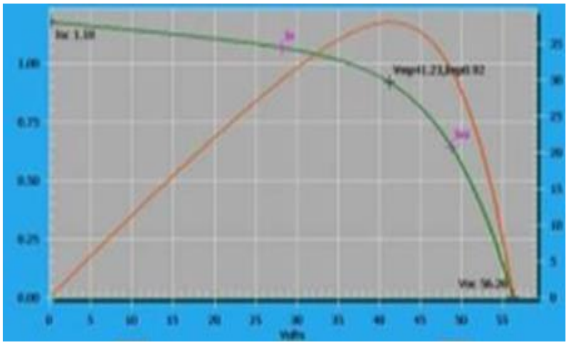
5.1 SOLAR POWER PLANT

A solar power plant is a facility that converts solar radiation, made up of light, heat, and ultraviolet radiation, into electricity suitable to be supplied to homes and industries. A PV system with a 40 kW output is suggested as a means of producing electricity. The amount of renewable energy produced with a 40 kW per day PV system is greater than 9% of the total energyusage. In this system, direct current (DC) from solar PV panels is fed into a solar inverter, which transforms it into usable 230V-50 Hz AC. The solar inverter doesn't require grid electricity when the panels produce enough power.



5.2 MPPT solar charge controller:

A MPPT solar charge controller is the charge controller embedded with MPPT algorithm to maximize the amount of current going into the battery from PV module.MPPT is DC to DC converter which operates by taking DC input from PV module, changing it to AC and converting it back to a different DC voltage and current to exactly match the PV module to the battery.The major principle of MPPT is to extract the maximum available power from PV module by making them operate at the most efficient voltage (maximum power point).MPPT checks output of PVmodule,compares it to battery voltage then fixes what is the best power that PV module can produce to charge the battery and converts it to the best voltage to get maximum current into battery. It can also supply power to a DC load, which is connected directly to the battery.



5.3 SOLAR BATTERIES:

Batteries can be described as devices that are used to store electrochemical energy, which can be converted into electrical energy upon use.Batteries usually consist of an anode, cathode and electrolyte in it.Ions move from cathode to anode in the vicinity of electrolyte in order to produce electric current .A solar battery is a device that you can add to your solar power system to store the excess electricity generated by your solar panels.You can then use that stored energy to power your home at times when your solar panels don't generate enough electricity, including nights, cloudy days, and during power outages.The point of a solar battery is to help you use more of the solar energy you're creating. If you don't have battery storage, any excess electricity from solar power goes to the grid, which means you're generating power and providing it to other people without taking full advantage of the electricity your panels create first.

6. RESULT

This initiative has shown that there is significant room for energy and cost savings in the educational sector.

The energy consumption was reduced by almost 16% by just replacing inefficient appliances with more efficient ones and installing a PV system, producing over 9% more renewable energy. It was accomplished for a cost surplus of roughly 1.76 percent of the project's total budgeted cost.The initiatives are projected to save about considerable amount of cost over the course of the next ten years. The entire amount saved in 20 years will be greater than what was spent on the building's construction. The results show that air conditioning is the single biggest consumer of electricity in the educationalinstitution.

7.CONCLUSION

Every effort to increase energy efficiency begins with a tool called an energy audit.Several activities fall under the umbrella of the notion of an energy audit, ranging from straightforward studies of energy usage that are carried out within professional groups in businesses to thorough energy audits that allow the development of an excellent mid-term energy strategy.This article also analyses various measuring and diagnostic software and techniques used in energy audits. Priority is given to identifying energy-consuming industries in order to seek for opportunities for energy savings and quality enhancement. implementation of an energy audit that can increase power quality and efficiency while lowering bill prices and energy wastage.

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