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A Campus Energy Auditing in Energy Utilization and Conservation using Renewable Source

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Abstract— Electricity is not freely available in nature. So it must be "produced" by power stations. An energy review is an examination overview and an investigation of energy streams for energy preservation in a structure. The energy audit is a positive involvement with significant advantages to college. The audit cycle behinds by social event information about office's activity about its past record of administration bills. This information is then investigate to understand that how much energy is utilized and squandered. Energy review is the way to orderly approach for dynamic in the region of energy the executives. It endeavors to adjust the complete energy contributions with its utilization and serves to recognize all the energy streams in an office.

Keywords— Energy audit, power consuming equipment, efficiency, solar energy.

I. INTRODUCTION

An Energy Audit is an investigation of an Electrical Network in an area to decide how and where energy is utilized and to recognize strategies for energy reserve funds. The open doors lie in the utilization of existing environmentally friendly power advancements, more prominent endeavors at energy effectiveness and the spread of these advances and choices.

On the off chance that the energy emergency isn't taken as a difficult issue and the arrangements are not outlined, at that point it may wind up in indeterminable power outages which by implication influence the financial development of the country. The fundamental explanation behind energy emergency is that there could be no legitimate usage of electrical energy and an adequate measure of force gets squandered. The primary purpose behind the wastage of electrical force is the utilization of less proficient machines which burns-through a great deal of force than the appraised force and absence of appropriate upkeep of the hardware. In this paper the therapeutic measures to make a structure an energy productive one by doing energy review and execution of the medicinal measures has been examined.

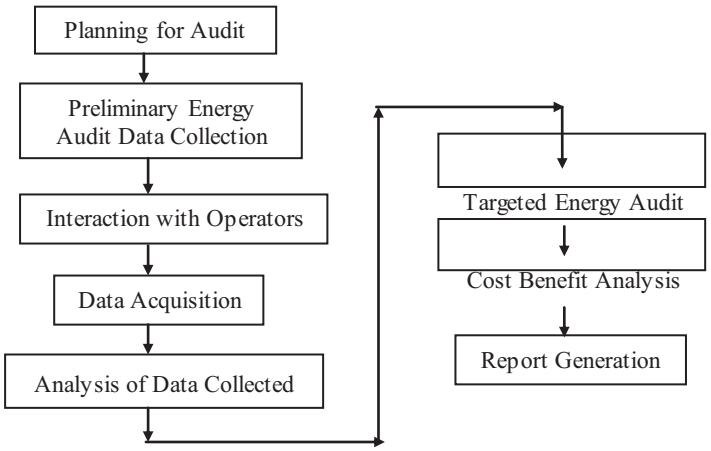
An Energy Audit is a cycle, to decide how energy is utilized and to distinguish the strategy for energy reserve funds in ventures, Institutions, power plant, etc. This paper provides an overview of a general Energy Conservation.

II. OBJECTIVE

The goal of Energy Audit is to decide the effective manner of energy utilization in the college campus and to bring out the unwanted energy consumption for the cost benefit. Surveying of merged and unmerged loads are done and an analysis for the merged loads will show the way the energy is wasted in the environment [1]

Purpose of energy auditing are Analyze the status of loads, reduce the unwanted loads ,Fix the proper loads , Reduce the electrical cost, Fix the correct quantity and quality of loads, To fulfil the load demand in the building, Preparation of load table, switch table and merged load table, Preparation of charts. The Energy Audit as seen in the view of economy will be beneficial to any domain if done in a proper manner. Auditing is done in the stages as said in the purpose thereby filtering all the electrical load residues in the campus [2]. Hence the energy is saved as compared to the previous stages and a cost benefit is attained if the methods of report are implemented.

Flow Diagram:



TYPE OF ENERGY AUDIT :

Preliminary Audit
Detailed Audit

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1. Preliminary Audit

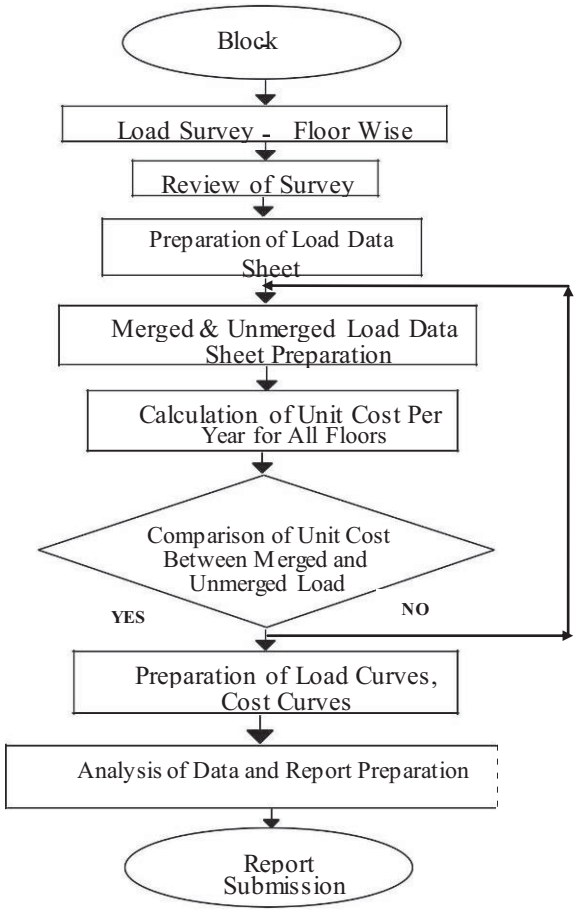
Acquire the combined energy utilization for the association, Determine the extent of investment funds, Mark the most straightforward methods of energy saving, Mark the quick methods of energy saving, Obtain a "Benchmark", Identify the areas requiring progressed considers, this review utilizes the current or presently accessible information.

2. Detailed Audit

Detailed Energy Audit provides a complete outlook on energy consumption for the organization evaluating all major energy consuming processes in the industry [4]. It is exceptionally exact in methodology and gives productive readings.

One of the vital components of this review is to give a precise energy balance. There is an expected utilization of current working conditions which is additionally contrasted with service charge charges. The itemized Energy Audit is done in three stages Step1-Pre Audit, Step2-Audit, Step3-Post Audit.

III. FLOW CHART



SOLAR ENERGY AND ITS WORK

Solar energy is the main wellspring of energy for living things. It is totally free wellspring of energy. It is a sustainable wellspring of energy dissimilar to non inexhaustible sources, for example, petroleum derivatives .Solar energy advances utilizes the sun energy to light in homes ,boiling water and so on A Solar board "works by permitting photons or particles of light to thump electrons liberated from iota's, creating a progression of power", as indicated by live science [7]. That is a specialized method of saying that the board photovoltaic cells convert the energy in daylight to power (explicitly, direct current).

IV. SOLAR IMPLEMENTATION

From this above College Campus energy auditing we implemented this as the real time implementation by solar energy [9]. Thus we will compare the result of both the college campus energy auditing and solar energy by the tabulation.

V. LOAD SURVEY – FLOOR WISE

A Floor wise Load Survey is done in the first process of work. Before the start of the work a survey plan is formulated and confirmed. Then as a team the rooms in each floor is surveyed for the loads, switch boards. The status of the load is noted in the survey. It means the load is working or not working and the age of the loads noted as an optional data. Then merged loads are found in the way how the loads are connected to a switch [15]. If each load has separate switches then the load is considered as unmerged load. If a switch controls more than one load then the loads are merged to one switch.

VI. REVIEW OF SURVEY

For the entire Floor in the block the survey is done inclusive of unnamed rooms and locked rooms. A review of the survey will be done so as to check the process of the auditing [3]. The stage of the auditing is noted and the necessary data are collected with the remarks for all the rooms of survey. The focus of review is to investigate the operating hours of the loads in all the rooms.

The operating hours are noted fixed for all the loads in all the rooms and it varies as known. A standard value of operating hours as considered is for 6 hours in college campus by neglecting the non-working hours throughout the year. And a month has the working days of 24 if a 6 day working is considered per week in a month. With all the data collected and assumptions the curves are plotted and analyzed for the energy audit.

VII.CONSERVATION ENERGY AUDIT

a). How to Conserve Energy

A professional key Safety is recommended for energy conservation demand is met by proper load usage and how the connections are loaded are provided.

b). Need of Energy Conservation

The increased cost of energy conservation in Energy Auditing Process. The Reduction in the cost of the product. It has pollution free in this process. The Reduction of use the natural energy sources. We need to save energy because the primary energy sources we depend on cannot be replaced.

c). Need for Energy Audit

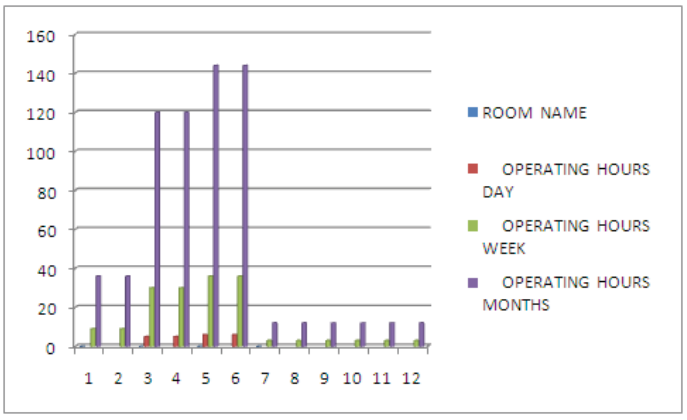
They are Minimizing our energy wastage. Find out the areas where the energy wastage occurs and optimizing energy efficiency with suitable technology [11]. We are using the most appropriate energy resources in our Energy Auditing. They are minimizing the cost of energy and operating cost.

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VIII. CALCULATION OF UNIT COST

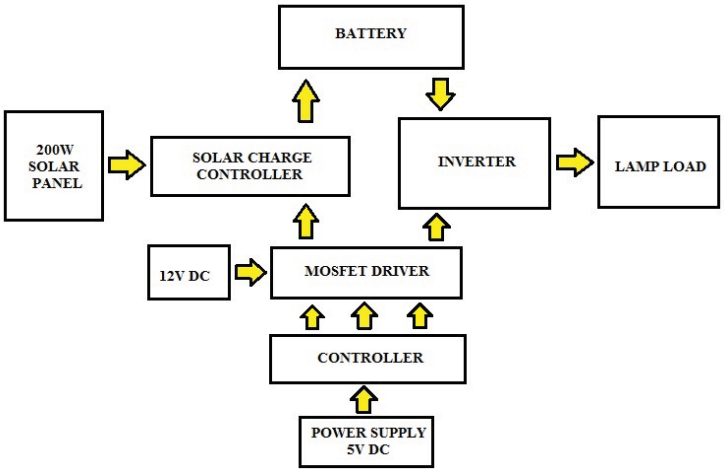
The unit cost is calculated for a year starting from the considerations of the working of loads per day. The operating hours of the loads are most perfectly assumed for the analysis for day, week and month [8]. The unit cost for operation of all the loads is found for a year and the overall energy cost is found. The cost is calculated to find the energy cost saving in a year.

S.N0	ROOM NO	ROOM NAME	LOAD	COUNT	POWER	OPERATING HRS		
						DAY	WEEK	MONTHS
1	1	CIVIL LAB	FAN	3	60		9	36
			LIGHT	2	36		9	36
2	2	TAILORING ROOM	FAN	9	60	5	30	120
			LIGHT	6	36	5	30	120
3	3	SICK ROOM	FAN	1	60	6	36	144
			LIGHT	2	36	6	36	144
4	4,5	SEMINAR HALL	TABLE FAN	9	60		3	12
			LIGHT	2	36		3	12
			AC	4	3570		3	12
			AIR FAN	1	200		3	12
			SPEAKER	5	10		3	12
			PROJECTOR	1	300		3	12
5	6	EMPTY ROOM	FAN	2	60	3	18	72
			LIGHT	2	36	3	18	72
6	7	IQAC CONFERENCE HALL	FAN	2	60		3	12
			LIGHT	2	36		3	12
			AC	1	3570		3	12
		ENTRANCE	FAN	2	60		3	12
			LIGHT	4	36		3	12
			IN.LIGHT	2	50		3	12
			PC	1	100		3	12
7	8	CANTEEN	FAN	4	60	9	54	216
			LIGHT	4	36	9	54	216
8	9	UPS ROOM	FAN	2	60	24	144	576
			LIGHT	2	36	24	144	576
9		ATM	CFL	6	20	24	144	576
			LIGHT	1	36	24	144	576
			AC	2	3750	24	144	576
			ATM	1	5000	24	144	576
10	10	LIBRARY ENTRANCE	FAN	1	60	4	24	96
			LIGHT	2	36	4	24	96
			PC	2	100	6	36	144
			MONITOR	1	80	6	36	144
		LIBRARY HALL	FAN	22	60	9	54	216
			LIGHT	23	36	9	54	216
			PC	4	100	9	54	216
			PRINTER	1	50	9	54	216
		STORE ROOM	FAN	1	60	2	12	48
			LIGHT	1	36	2	12	48
		DIGITAL LIBRARY	CFL	2	20	5	30	120
			FAN	5	60	5	30	120
			LIGHT	3	36	5	30	120
			PC	17	100	5	30	120
11	13,14	MACHINES LAB	FAN	18	60		9	36
			LIGHT	10	36		9	36



IX. CONVERTERS OPERATION

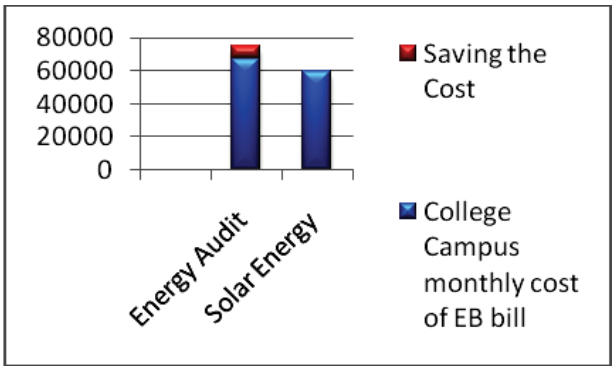
a). Block Diagram



X. COMPARISON BETWEEN ENERGY AUDITING IN COLLEGE CAMPUS

a) Table

S.No	Methods to reduce bill	College Campus monthly cost of EB bill	Saving the Cost
1.	Energy Audit	67,581	7581
2.	Solar Energy	60,000	



b). MPPT Algorithm

An initial step prior to executing a Maximum Power Point Tracking calculation is used to design the sun based board. That design representation is assists with breaking down the conduct of the framework under difference in iridescence or temperature variety [10]. Since the information electrical energy of the inverter must be very large value, a line of 0.25KW sun powered boards are arrangement associated. The future control construction plan follows up on a solitary force stage that is at the same time an inverter and a Maximum Power tracking regulator.

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An underlying advance preceding executing a Maximum Power Point Tracking figuring is to construct a design model for the sun based board. That design model helps with separating the lead of the structure under contrast in radiance or temperature assortment [10]. Since the data voltage of the inverter should be in maximum value, a line of 0.25KW sun controlled sheets are course of action related. The proposed control structure circles back to a single force stage that is at the same time an inverter and a Maximum Power Point Tracking regulator. The work of Maximum Power Point Tracking is used to arrange the impedance of sunshine based board [5]. For the current condition the MPPT regulator changes the reference voltage to get the most remarkable force from the sun arranged board.

The conclusion point in time and the trouble step range sway the capacity of the structure to gather power. Since the mistake intensifier has a small information transmission, the settling period of the data power here behind a reference trouble, goes up to a second. The conclusion period of the figuring should be privileged than the settling period of the circuit. Because of the potential swell at twofold the organization repeat, additional circuits ought to be added to channel the instances of the data voltage and data current. The disturbance step range should be adequately high for the microcontroller to recognize an assortment in the data voltage and satisfactorily low to allow the structure to get as close as possible to the MPP of the sun arranged board.

SOLAR COMPONENTS AND ITS OPERATION



Arduino

It has six basic wellsprings of data and the automated information pins, a 62.5 ns(p) resonator, power jack and a USB affiliation, an ICSP header, and a reset button. Alteration 2 of Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to pit into DFU mode. Alteration 3 of the Uno board has the going with features:

- Pinout: we can go to add SDA and SCL pins, which is near to the AREF pin and have to add new pins for very nearer to the RESET pin.
- Stronger rearrange circuit.
- AT mega 16U2 supplant the 8U2.

"Uno" connotes one in Italian and is named to check the approaching appearance of Arduino 1.0. The Uno and structure 1.0 will be the reference variations of Arduino, pushing ahead. The Uno is the latest in a movement of USB Arduino sheets.

XI. CONCLUSION

Energy audit done in the college campus gives out the loss of energy, utilization of energy, cost consumed, savings of cost , unwanted loads available, load count and finally the efficiency of the energy utility. The bill documents, replacing of loads are not much focused in the audit since the work is done in the previous audit in the campus. As a new approach the audit is done with the merged loads and the switch control. In concluding the audit the suggestion for the effective use of energy is completely done only if the merged loads are converted to unmerged loads and the reduction of load count in future if done effectively with the help of this survey.

This is an activity taken by the administration to make the establishment an energy effective grounds and from the review the complete burden that is associated with the utility has been determined. From the heap determined, the conceivable likely locales of energy protection have been advised and medicinal measures have been suggested. On the off chance that the suggested measures are being actualized, at that point there will be significant decrease in the power bill.

An enormous scope – model is proposed to test the proposed system and improve diversion times. Thusly assorted MPPT counts can be made and successfully considered. Moreover the Macro model rates up the tuning of the voltage circle and the arrangement of the data channels used for most outrageous power point following.

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