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Energy Auditing To Find Power Quality Issues Using Fluke Meter

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ABSTRACT: An energy audit is an evaluation of energy consumption in a home, business, or any other premises (including buildings). It is the process to reduce the amount of energy input into the system without negatively affecting the output. Today the demand of electrical energy in our country is more than the generation. So most of the industries and institutions choose solar power system to satisfy their demand and they use many semiconductor devices. Due to the usage of semiconductor devices, power quality problems are arising in the power system such as voltage sag ,voltage swell ,frequency fluctuation ,voltage imbalance , flicker ,transients ,dc offset ,power harmonics . In that, harmonics is considered as the major problem. This problem causes damage to sensitive equipment .To protect those equipment and to minimise the fault occurrence this paper is published. This paper deals about the harmonic analysis in solar power panel 18KW conducted at S.A Engineering College, Chennai.

KEYWORDS: Energy audit, Load analysis,Harmonics, Fluke 435, Power logger.

I. INTRODUCTION

Electrical energy is the major input for the development of any nation. Energy audit is similar to medical diagnosis. During medical diagnosis, the doctor physically examines and interviews the patient, checks the temperature and pressure of the patient and may follow up with some laboratory tests, all in an attempt to establish what is wrong with the patient and prescribe appropriate treatment. Similarly, energy audit is employed as a tool for determining what measures can and should be taken to save energy in a facility. Energy audit is the first step in understanding how a facility uses energy and how energy could be saved in the facility. The purpose of the energy audit is to identify, quantify, describe and prioritize cost saving measures relating to energy use in the facility. The energy audit is mainly preferred for effective use of electrical energy. It is generally used to determine where energy can be saved, conserved or used more efficiently.The first step of energy audit is to understand how energy is being utilized in a given organisation. The process involved in energy auditing are collection of load details, analysis and implementation of the solution. The energy auditing is to identify the energy waste and to provide the solution for eliminating that energy waste. In this paper we do analyse IT and CSC block of S.A Engineering college,Chennai-77.

II. METHODOLOGY

The electrical energy is examined periodically by using Fluke 435 series-2 to check the effective use of energy. Every half an hour the readings are taken for about six hours .The readings are taken in two aspects .One is on full load day and other is on half load condition .It is the key to a systematic approach for decision-making in the area of energy management.Energy audit is an effective tool in defining and pursuing a comprehensive energy management program within a business. As per the Energy Conservation Act, 2001 [10], 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.

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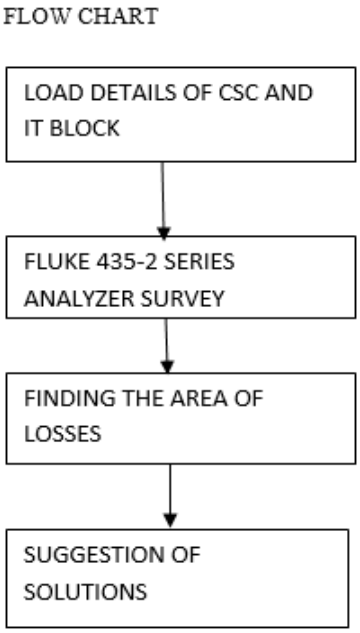
Phase 1: Electric Energy consumption survey.
Phase 2:Load detail analysis.
Phase 3: Identification of loss areas.
Phase 4: Solution to improve energy efficiency.

Energy utility survey in the institution consists of four phases:



1. ENERGY CONSUMPTION SURVEY

This energy audit is aimed at obtaining a detailed
idea about the various end use energy consumption activities and identifying, enumerating and evaluating the possible energy savings opportunities. The target is to achieve savings in
electrical energy consumption.

Electrical Energy Consumption

S.A Engineering college, Avadi being an HT consumer takes its 11kV supply from Chennerkuppam. Energy auditing has beenconducted in the College in order to estimate the Energy consumption of each day, month and year. For energy auditing, it is necessary to analyse consumption of electrical energy. The electricity utility bills for past 6 months have been collected for the purpose. The energy consumption pattern was inferred from the graph. The inferences of the graph offers the possibilities of energy conservation. These findings can be used for making recommendation to high authority. This collected data of electricity bills of institution was taken from records of the institution. A total connected load of CSC-294.5KW and IT-289.5 KW is the power utility scenario in march 2017.

2.Load detail analysis

The different loads available in the CSC and IT blocks are
1. Lighting loads

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2. UPS

3. Water cooler

4. Air conditioner

5. Water pump motors

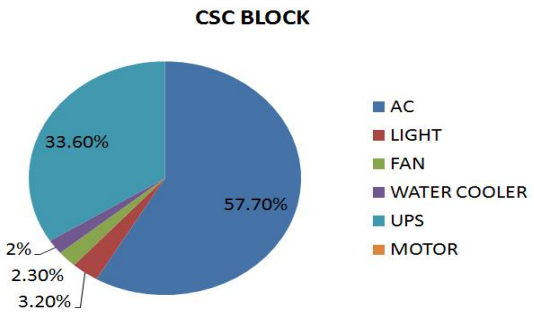
6.Computer

The energy utilization survey of CSC and IT blocks are represented using pie charts .

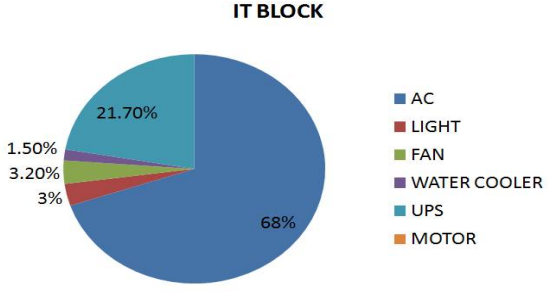
The load details of CSC and IT blocks are also given below the pie chart .The load detail contains information such as

- Apparatus
- Number of element
- Watts/Element

A.CSE ENERGY UTILIZATION SURVEY



B.IT ENERGY UTILIZATION SURVEY



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LOAD DETAILS OF CSC BLOCK

CSC BLOCK				
S.NO	Apparatus	No.of element	Watts/Element	Total power in watts
1	Tube light	238	36	8568
2	CFL	76	14	1064
3	Fans	97	70	6790
4	Water cooler	4	1500	6000
5	AC	63 ton	2700	170100
6	UPS	10 KVA-9	9000	81000
		20 KVA-1	18000	18000
7	Motors	1phase-1HP	746	746
		3phase-3HP	746	2238
	Total power consume	in KW		294.5

LOAD DETAILS OF IT BLOCK

IT BLOCK				
S.NO	Apparatus	No.of element	Watts/Element	Total power in watts
1	Tube light	65	36	2340
2	Water cooler	3	1500	4500
3	AC	73 ton	2700	197100
4	Focus light	4	125	500
5	Lift motor	3phase	4000	4000
6	CFL	354	14	4956
		8	18	144
7	Fans	132	70	9320
		1	80	80
8	UPS	10 KVA-1	9000	9000
		20 KVA-3	18000	54000
9	RO water motors	1phase-1HP	746	746
		3phase-3HP	746	2238
10	LED	9	30	270
		11	60	660
	total power consume in KW			289.54

III. HARDWARE DESCRIPTION

FLUKE 435-II SERIES

Power quality issues can affect the operation of critical loads and have a negative impact on your bottom line .Think of the FLUKE 435-II power quality and energy analyser as your insurance policies.

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The FLUKE 435-II is a power quality and energy analyser is a world's power quality analyser that can monetize the cost of the energy waste due to the poor power quality.

The wide range of measurement functions and measurement method in the FLUKE 435-II make it the ideal tool for both power quality troubleshooting and discovery energy savings whether you are checking the performance of motors and generators ,trying to discover the source of an intermittent power problem or performing an energy study the FLUKE 435-II will give you the data you need to quickly get to the heart of the problems .

ADVANTAGES

- It will record output in analog as well as digital format .
- It will measures all electrical parameters at a time .
- It will record at every .25 seconds .

FLUKE 435-II SERIES

The FLUKE meter provides following measures

- Vrms
- Arms
- Wfund
- Afund
- VAfund
- Vpeak
- Apeak
- THDvolt
- THDamp
- Hertz
- KW

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- KVA
- Kvar
- Power factor
- KWh

FEATURES

- Have a battery backup.
- It has memory capacity of 16GB.
- Measurements are recorded automatically.
- Long term analysis is possible .
- Data can be viewed in graphs.

POWER LOGGER

FLUKE 435 three phase power data logger is fluke's most versatile multi purpose power quality and energy analyser on the market for the price and is the ideal power meter for conducting energy studies and basic power quality logging . Set the power logger up in seconds with the included flexible current probes and colour display . By using this software we can analyse rms values for both voltage and current ,frequency harmonics ,power ,energy.

OUTPUT

HARMONICS IN CSC BLOCK

HARMONICS IN IT BLOCK

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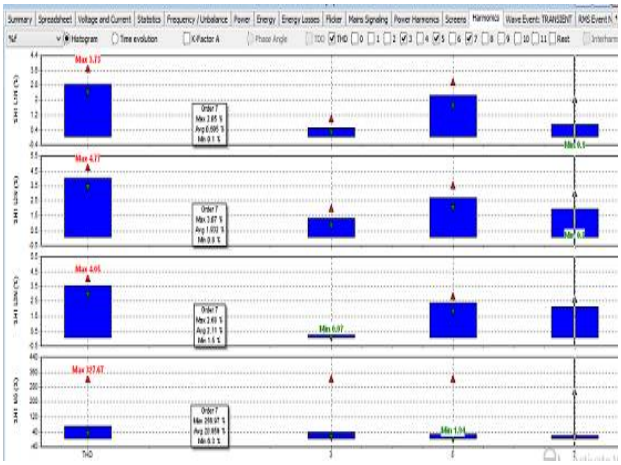

IV. CONCLUSION

The FLUKE 435-II power quality analyser is used to analyse the behaviour of PV connected grid system in SAEC .The major problems noticed are harmonics ,neutral current , voltage unbalance .The reason for the issues are UPS , SMPS ,power electronic components .Filters are recommended for harmonic problems .

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