

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 1, January 2019

Electrical Energy Audit in SRICT Campus

Modi dax¹, Prajapati keyur², Jadav harshrajsinh³

U.G. Student, Department of Electrical Engineering, SRICT, Vataria, Gujarat, India

ABSTRACT:- Energy audit is a process of checking the way energy is used and identify areas where wastage can be minimizing if not totally eradicate. Energy audit consists of several tasks which can be carried out depending on the type of audit. It started with review the historical data of energy consumption which can be compiled from the electricity bill. This paper focuses on the utility bill analysis of SRICT Institute, Vataria. In the course of the process the electricity bill of the institution was analysed in detail. It was found from the bill that the maximum demand which occurs at some point of the month was contributing a considerable amount to the monthly electricity bill. This was taken as an area of improvement and research was done on it. The reduction of maximum demand is discussed in detail in this paper

KEYWORDS: Utility bill; Energy Audit; maximum demand; Bill Analysis; Energy Conservation.

I. INTRODUCTION

Energy generation cannot be increased quickly but the available energy can be judiciously used. One such method is described in this paper. Utility bill analysis is a quick, comprehensive method that aims to identify errors in energy bill. This will determine if you are overpaying for your energy in addition to better understanding how energy efficient your building is. Unlike other energy audits in which the reduction in consumption and improvement of power factor will be the main focus areas, this paper deals with the idea of reducing, the overall electricity bill by reducing the maximum power demand. This paper consists of the complete methodology to reduce the maximum power demand.

Energy audit

Energy audit is an inspection, survey and analysis of energy flow for energy conservation in an industry, Energy audit 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 enterprises another organization use energy. According to national energy conservation laws and regulation for energy, consumption investigation and energy audit management [1]

The energy auditing is one of the first task to be promoted in the accomplishment of an effective energy cost control program. An energy audit consist of a detailed examination of how facility uses energy, what the facility pay for that energy, and a finally, a recommended program for change in operating practices or energy consuming.

Equipment that will cost effectively saves bucks on energy bills. With new technology and alternative energy resources now available, this country could possibly reduce its energy consumption by 50%.

Energy auditing is an official method of finding out of the ECO's. It is the official survey/study of the energy consumption processing/supply aspects related with of industry or organization. Purpose of energy auditing is to recommend steps to be taken by management for improving the energy efficiency, reduce energy cost and saving the money on the energy bills.

As per energy conservation Act, 2001, energy Audit is defined as "the verification, monitoring and analysis of energy including submission of technical report containing recommendation for improving energy efficiency with cost benefit analysis and inaction plan to reduce energy consumption".

Type of energy audit

- A] Preliminary energy audit
- B] Detailed energy audit
- C] General energy audit

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 1, January 2019

1. Preliminary energy audit

The preliminary audit alternatively called a simple audit, screening audit or walk-through audit, is the simplest and quickest type of audit. It involves minimal interviews with site operating personal brief review of facility utility bills and other operating data, and a walk-through of the facility to become familiar with the building operation and identify areas of energy waste or in efficiency. Typically, only major problem areas will be uncovered during this type of audit.

2. Detailed energy audit

Detailed energy is also called comprehensive audit or investment grader audit. It expands on the general energy audit. It covers estimation of energy input for the different processes, collection of past data on production levels and specific energy consumption. It is a comprehensive energy audit acting plan to be followed effectively by the industry. In detail audit we define energy use and losses through a more detailed review and analysis of equipment, systems, operational characteristics, and on-site measurements and testing.

3. General energy audit

The general audit alternatively called mini-audit; site energy audit or complete site energy audit expands on the preliminary audit described above by collecting more detailed information about facility operation and performing a more detailed evaluation of energy conservation measures identified.

II. ELECTRIC BILLING

The electricity billing by utilities for medium and large enterprises, in High Tension [HT] category, is often done on two-part tariff structure, i.e. one part of capacity [or demand] drawn and the second part for actual energy drawn during the billing cycle. Capacity or demand is in KVA [apparent power] or KW terms. The reactive energy [i.e.] KVA drawn by the service is also recorded and billed for in some utilities, because this would affect the load on the utility. Accordingly, utility charges for maximum demand, active energy. And variable expenses are also levied. [5] Reactive power drawn (as reflected by the power factor) in its billing structure. In addition, other fixed and the tariff structure generally includes the following components:

a. Maximum demand Charges

These charges relate to maximum demand registered during month/billing period and corresponding rate of utility.

b. Energy Charges

These charges relate to energy (kilowatt hours) consumed during month/ billing period and corresponding rates. Often levied in slabs of use rates. Some utilities now charge on the basis of apparent energy (KVAH), which is vector sum of KWH.

c. Power factor penalty or bonus rates, as levied by most utilities, are to contain reactive power drawn from grid.

e. Electricity duty charges levied with respect to unit consumed.

f. Meter rentals

g. Lighting and fan power consumption is often at higher rates, levied sometimes on slab basis or on actual metering basis.

h. Time of Day (TOD) rates like peak and non-peak hours are also prevalent in tariff structure provisions of some utilities.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 1, January 2019

I. Penalty for exceeding contract demand.

j. Surcharge if metering is at LT side in some of the utilities.

Analysis of utility bill and monitoring its trends helps energy manager to identify ways for electricity bill reduction through available provisions in tariff framework, apart from energy budgeting.

III. BACKGROUND OF SRICT

The literature proposes energy audit of utility bill analysis of Shroff S.R. Rotary Institute of Chemical Technology [SRICT]. SRICT located at Vataria, Ankleshwar. SRICT power station consisted 3 buses power line with 11 KV from D.G.V.C.L. SRICT contract maximum demand (or set demand) is 130KVA. The audit of maximum demand thereby reducing electricity bill was suggested in this Paper

IV. BILL ANALYSIS OF SRICT INSTITUTE

In a corporate electricity bill three factors contribute significantly to the total amount. They are active energy consumption: The total active or useful energy consumed by all loads connected to the feeders. Power factor consumption: The total reactive power energy consumed by inductive or capacitive loads. Maximum power demand: The peak power or the cumulative power rating of all connected loads at a Particular point of time.

DATA RECEIVED FROM ELECTRICITY BILL OF LAST ONE YEAR AND TABULATED IN TABLE MONTHLY TOTAL BILL:

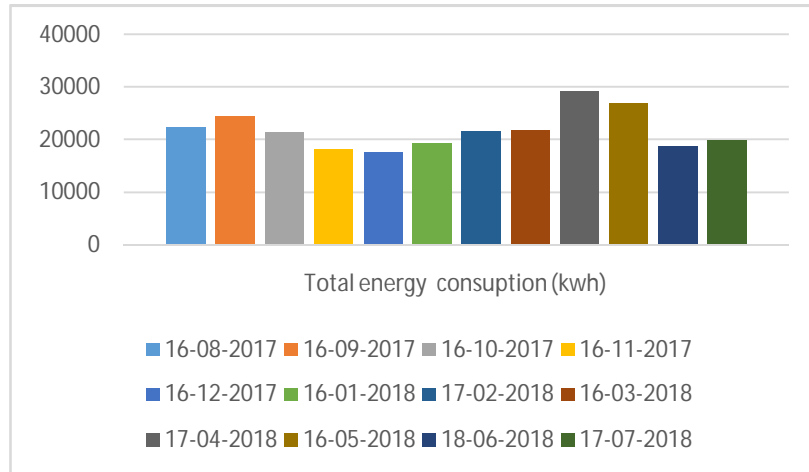
Month & year	Total energy consumption (kwh)	Energy consumption during peak hour	Energy charge (RS/KWH)	Avg power factor	Power factor penalty rebate (RS)	Total bill (RS)	Avg cost (RS/kwh)
16-08-2017	2269	6255	4	1	-2160.99	141823.35	6.39
16-09-2017	24432	7335	4	1	-2371.86	154232.01	5.45
16-10-2017	21417	5964	4	0.999	-2086.89	137345.58	6.7
16-11-2017	18213	5901	4	1	-1725.02	119133.46	6.77
16-12-2017	17556	6081	4	1	-1696.53	115571	6.57
16-01-2018	19446	6594	4	1	-1881.66	126254.7	6.06
17-02-2018	21708	7365	4	1	-2104.14	137409.75	5.43
16-03-2018	21810	6732	4	1	-2119.05	137872.65	5.94
17-04-2018	29169	9107	4	1	-2841.75	179421.87	4.39
16-05-2018	26952	8127	4	1	-2622.51	168166.8	4.92
18-06-2018	18783	5942	4	1	-1819.3	120862.89	6.73
17-07-2018	19835	6696	4	1	-1868.78	127295.69	5.97

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 1, January 2019



Monthly analysis maximum demand and its cost:

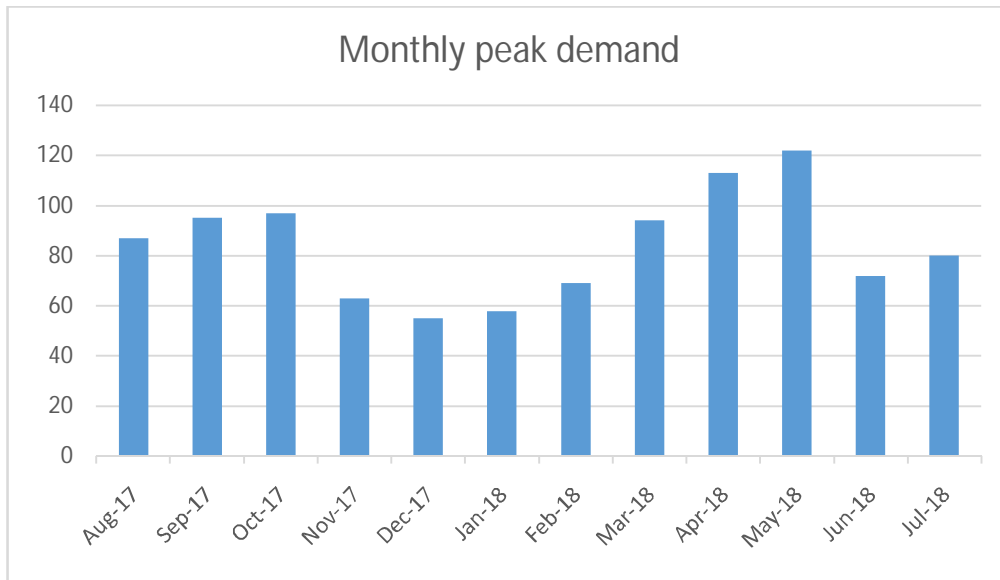
Sr no	Month & year	Max demand (kva)	Demand charge (kva)	Demand charge RS	Permitted MD (kva)	Penalty due to MD
1	Aug-17	87	150	13050	130	0
2	Sep-17	95	150	14250	130	0
3	Oct-17	97	150	14550	130	0
4	Nov-17	63	150	9450	130	0
5	Dec-17	55	150	8250	130	0
6	Jan-18	58	150	8700	130	0
7	Feb-18	69	150	10350	130	0
8	Mar-18	94	150	14100	130	0
9	Apr-18	113	150	16950	130	0
10	May-18	122	150	18300	130	0
11	Jun-18	72	150	10800	130	0
12	Jul-18	80	150	12000	130	0
13	AVG	83.75	150	12562.5	130	0

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 1, January 2019



Suggestion 1: Feasibility of Maximum demand and control meter

Maximum demand control meter is preventive control method of maximum demand where the loads get automatically disconnected when the demand exceeds a present limit various maximum demand control meter are available in the market.

Saving Anticipated

The maximum demand meter considered here is "SMART DEMAND CONTROLLER –EM3460".

Recent MD meter set value= 130KVA

Average maximum demand= 83.75

If we take maximum demand = 122 KVA

Therefore, saving in maximum demand per month= $(130-122) \text{ KVA} * 150$
= $8 * 150 = 1200 \text{ Rs/Month}$

Total annual saving will be:

= $1200 * 12 = 14400 \text{ Rs/Year}$

Energy audit at SRICT electrical zone's Class Rooms:

Background of electrical zone's Class Rooms:

Electrical zone at SRICT Institute Campus has 11 class rooms and each class room has containing 60 student's capacity.

Quantification by end used:

The loads were segregated based on the end use as lighting and fans, Projectors etc. Quantification, types and necessary measurements were carried out. The details are given below.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 1, January 2019

ELECTRICAL CLASSROOM'S CONNECTING LOAD CALCULATION

CLASS ROOM	13	14 A		15	16	17 A	17 B	21	22	23	24	TOTLE	TOTLE CON-SUMPPTION (WATT)
FAN	7	3	3	6	9	3	3	9	9	10	10	70	4200
TUBE LIGHT	9	5	5	9	9	5	5	10	8	10	10	85	2380
PC	1	1	1	1	1	1	1	1	1	1	1	11	2530
PROJECTOR	1	1	1	1	1	1	1	1	1	1	1	11	3300
5 AMP SOCKET	2	2	2	2	2	2	2	2	2	2	2	22	5060

TOTAL CONNECTING LOAD = 17.47 KW

V. CONCLUSION

Bill analysis is Fast universal method that aims at identifying errors in energy bills and u can better understand the energy how energy is efficient, and reduce SRICT monthly electricity cost by reducing demand by installing the maximum demand control meter and the annual savings are almost without any investment.

REFERENCES

1. Report of " IIT Kanpur Halls of residence energy audit". The group for Environment and Energy Engineering. IIT Kanpur halls of residence energy audit.
2. International journal of emerging trends in Engineering and Development issue 4,vol 1(Jan 2014) Silpi Sahu, M. Tech Student [Takshshila Institute of Engineering & Technology, Jabalpur] Assistant professor Amir ansari [Takshshila Institute of Engineering & Technology, Jabalpur] Energy Saving opportunity of lighting system by energy audit[7]
3. Energy Audit Report of Lal Bahadur Shashtra College of Arts, Science and Commerce, Samara. Dr. Gaurav mahadev lohar [Head of department of physics] Energy audit of lal bahadur shastri college campus.