

ENERGY AUDIT: LITRATURE SURVEY

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Abstract: - In any industry, the three top operating expenses are often found to be on energy, labour and materials. If one were to find out the potential cost savings in each of the components, energy would invariably emerge at the top, and thus energy management function constitutes a strategic area for cost reduction. This paper discusses the shortcomings in the analysis of the energy auditing process which can lead to effective energy auditing.

Keywords: -Energy audit, energy conservation, data based management, payback period.

I. INTRODUCTION

Availability of power has a crucial rule in economic development of the country. In today's world energy is very precious India ranks fifth in the world in total energy. All India installed capacity of electric power generating stations under various electrical utilities was 185.5 GW as on November 2011 [1]. The detail break up share of different type of generating stations is follow:

Hydro power plants - 37367.4 GW
Thermal power plants - 115649.48 GW
Nuclear power plants - 4.8 GW
Renewable Energy Source - 22.4 GW[1].

Energy Audit is the key to a systematic approach for decision-making in the area of

energy management [2]. It attempts to balance the total energy inputs with its use, and serves to identify all the energy streams in a facility. Industrial energy audit is an effective tool in defining and pursuing comprehensive energy management programme. As per the Energy Conservation Act, 2001, Energy Audit is defined as "the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption"[2].

II. NEED FOR ENERGY AUDIT

In any industry, the three top operating expenses are often found to be energy (both electrical and thermal), labour and materials. If one were to relate to the manageability of the cost or potential cost savings in each of the above components, energy would invariably emerge as a top ranker, and thus energy management function constitutes a strategic area for cost reduction. Energy Audit will help to understand more about the ways energy and fuel are used in any industry, and help in identifying the areas where waste can occur and where scope for improvement exists.

In general, Energy Audit is the translation of conservation ideas into realities, by lending technically feasible solutions with economic and other organizational

considerations within a specified time frame. The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs. Energy Audit provides a "bench-mark" for managing energy in the organization and also provides the basis for planning a more effective use of energy throughout the organization.

a) TYPES OF ENERGY AUDITS:

The energy audit orientation would provide positive results in reduction energy billing for which suitable preventive and cost effective maintenance and quality control programmes are essential leading to enhanced production and economic utility activities. The type of energy audit to be performed depends upon the function or type of industry. There can be three types of energy audit.

- Preliminary energy audit
- General energy audit
- Detailed energy audit
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(i) Preliminary Energy Audit:

The preliminary energy audit alternatively called a simple audit screening audit or walk through audit, is the simplest and quickest type of audit. It is carried out in a limited span of times and it focuses on major energy supplies and demands. It aims at taking steps which are necessary for implementation of energy conservation program in an establishment. It involves activities related to collection, classification, presentation and analysis of available data in arising at the most appropriate steps to be taken in establishing energy conservation. It involves collection of necessary data, minimal interviews with site operating personnel, a brief review of

facility utility bills and other operating data and identifies glaring areas of energy waste or inefficiency.

Typically, only major problems area will be uncovered during this type of audit, corrective measures are briefly described and quick estimates of implementation cost, potential operating cost savings and simple payback periods are provided. This level of detail, while not sufficient for searching a final decision on implementing proposed measures, is adequate to prioritize energy efficiency projects and determine the need for more detailed audit.

(ii) General Energy Audit:

The general energy audit is also called a mini audit or site energy audit or complete site energy audit. It expands on the preliminary audit by collecting more detailed information about facility operation and performing a more detailed evaluation of energy conservation measures identified. Utility bills are collected for a 12 to 36 months period to allow the auditor to evaluate the facility energy/demand rate structure and energy usage profiles. Additional metering of specific energy consuming systems is often performed to supplement utility data. In depth interviews with facility operating personnel are conducted to provide a better understanding of major energy consuming systems as well as insight into variations in daily and annual energy consumption and demand. This type of audit will be able to identify all energy conservation measures appropriate for the facility given its operating parameters. A detailed financial analysis is performed for each measures based on detailed implementation cost estimates, site specific operating cost savings and the customer's investment criteria. Sufficient detail is provided to justify project implementation.

(iii) Detailed Energy Audit:

Detailed energy audit is also called comprehensive audit or investment grader audit. It expands on the general energy audit. It covers estimation of energy input for different processes, collection of past data on production levels and specific energy consumption. It is a comprehensive energy audit action plan to be followed effectively by the industry.

It provides a dynamic model of energy use characteristics of both the existing facility and all energy conservation measures identified. The building model is calibrated against actual utility data to provide a realistic baseline against which to compute operating savings for proposed measures.

Extensive attention is given to understanding not only the operating characteristics of all energy consuming systems, but also situations that cause load profile variations on both an annual and daily basis. Existing utility data is supplemented with sub metering of major energy consuming systems and monitoring of system operating characteristics.

Thus, the scope of this audit is to formulate a detailed plan on the basis of quantitative and control evaluation, to evolve detailed engineering for options to reduce total energy costs, consumption for the product manufactured. It should be at 8 to 10 percent savings, detailed audit study shall be completed in a period of three weeks from the date of commencement. After which, preparation of energy audit reports shall be completed in a period of three weeks. The major system that are encountered in industries with regard to which energy audit is to be carried out are: Boilers, furnaces, air conditioning systems, refrigeration or cold room etc., power generation and distribution systems,

compressed air generation systems, pumping systems and electric motor driven systems.

b) ENERGY SAVED IS ENERGY GAINED:

During case study of following papers:

1. Energy audit: a case study to reduce lighting cost [6].
2. Energy Audit in Industry -A case study of Centrifugal Pumps [4].
3. Energy Audit of an Industrial Unit- A Case Study [3].
4. Advanced energy auditing and conservation in industrial facilities [5].

We came to find that there is lot to be improved in previous audit methods to increase its performance.

There have been a savings of 15-35% of energy saving through traditional methods. Small changes on energy auditing process can produce large change in the energy savings.

Energy auditing processes in the above cases have the following shortcomings:

- Data collection for Energy auditing is often taken for short duration of time.
- Audits are focused on concern areas only. End use consumption doesn't necessarily correlate with saving potentials.
- Short Payback periods were given more preferences in auditing process.

III. CONCLUSIONS

Apart from increasing the generation capacity at higher cost, one must go for the energy audit to save the electricity at much lower cost. Because the demand for electricity is continuously growing and it is putting stress on the power utilities to increase the capacity to meet the load demand. We can save electric energy by incorporating some effective changes in the energy auditing process and making it more energy efficient. The government should make it mandatory for every industrial house in the country for energy audit so as to bridge the growing gap between energy demand and supply.

RECOMMENDATIONS:

- Energy manager should have data collection system on yearly basis such that it should help the energy auditing companies in detailed energy auditing.
- Increasing payback periods offers a lot more savings hence preference should not be given to very short payback period.
- Audit should decide life of equipments. Change of old set ups after particular time period.
- Data based managements by energy auditing companies can help other small scale industries.
- Compulsory energy auditing should be employed.

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