

ENERGY MANAGEMENT

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ABSTRACT

The rate at which the energy demand and prices are increasing; it may be impossible to pursue the present rate of development. Developing countries, like India, will be forced to retard its development/industrialization program for want of sufficient energy reserves. Besides this the environmental implications of haphazard energy utilization also need to be closely studied. Inefficient use of energy has scratched the global environments to its limits as can be seen from unpleasant responses of the nature. Greenhouse effect, acid rain, smog, deforestation, shift in climate conditions, etc., are some of indications. Setting up additional generating capacities to meet increasing energy demands is not only a very expensive alternative but also very time consuming approach .Additional power plants meaning additional pollution and further degradation of the environment. While energy conservation, besides being a quick and economical approach has the potential to provide an effective solution to emerging environmental hazards. Considering the scenario of the Indian industrial sector and its energy utilization efficiency, there is urgent need to review manufacturing technologies and the present energy management approach. Owing to odd and obsolete industrial technologies and the

present energy management wastage is very high. Energy conservation potential in the industrial sector of our nation has been projected

Between 30 to 40%.Energy conservation. Measures range from simple good house-keeping practice to plant modernization. To know extent of energy is being wasted it is very essential to know that amount of energy is being consumed. Monitoring industrial energy utilization on continuous basis and relating it to the production is the first step of any energy conservation program.

Keywords: Energy conservation, Greenhouse Effect, Energy Management, etc.

I.INTRODUCTION

The fundamental goal of energy management is to produce goods and provide services with the least cost and least environmental effect. The term energy management means many things to many people. One definition of energy management is: "The judicious and effective use of energy to maximize profits (minimize costs) and enhance competitive positions". Another comprehensive definition is "The strategy of adjusting and optimizing energy, using systems and procedures so as to reduce energy requirements per unit of output while holding

constant or reducing total costs of producing the output from these systems". The objective of Energy Management is to achieve and maintain optimum energy procurement and utilization, and: To minimize energy costs /waste without affecting production to minimize environmental effects. Always remember this theme:

“DO NOT ESTIMATE WHEN YOU CAN CALCULATE”,

“DO NOT CALCULATE WHEN YOU CAN MEASURE”.

II. ENERGY AUDIT:

Types And Methodology Energy Audit is the key to a systematic approach for decision-making in the area of energy management. It attempts to balance the total energy inputs with its use, and serves to identify all the energy streams .It quantifies energy usage according to its discrete functions. Industrial energy audit is an effective tool in defining and pursuing comprehensive energy management program. 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".

III. NEED FOR ENERGY AUDIT

In industry, the three top operating expenses are often found to be energy (both electrical and thermal), labor 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 top ranker, and energy management function constitutes a strategic area for cost reduction. Energy Audit will help to understand about the ways energy and fuel are used in industry, and help in identifying the areas where waste can occur and where scope for improvement exists. The Energy Audit would give a positive orientation to the energy cost reduction,

preventive maintenance and quality control programs which are vital for production and utility activities. Such an audit program will help to keep much focus on variations which occur in the energy costs, availability and reliability of energy supply, decide on appropriate energy mix, identify energy conservation technologies, retrofit for energy conservation eqpts.etc. Generally, 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 culture. The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating cost. Energy Audit provides a "Bench-Mark" for managing energy in the organization and also provides the basis for planning a effective use of energy throughout the organization.

IV. TYPE OF ENERGY AUDIT

The type of Energy Audit to be performed depends on:

- Function and types of industry
- Depth to which final audit is needed
- Potential and magnitude of cost reduction.

So Energy Audit can be classified in the following type:

- (i) Preliminary Audit
- (ii) Detailed Audit

IV. (a) PRELIMINARY ENERGY AUDIT METHODOLOGY

Preliminary energy audit is a relatively quick exercise to the followings:



- Establish energy consumption in the organization
- Estimate the scope for saving in all ways
- Identify the most likely
- Identify immediate improvements/ savings
- Set a 'reference point'
- Identify area for detailed study/measurement
- Preliminary energy audit uses existing, or easily obtained data.

IV. (b) DETAILED ENERGY AUDIT METHODOLOGY

A comprehensive audit provides a detailed energy project implementation plan for a facility, since it always evaluates all major energy using systems. This type of audit offers the most accurate estimate of energy savings and cost. It considers the interactive effects of all projects, accounts for the energy use of all major eqpts. and includes detailed energy cost saving calculations and project total cost .In comprehensive audit, one of the key elements is the energy balance. This is based on an inventory of energy using systems, assumptions of current operating conditions and calculations of present energy use. This estimated use is then compared to utility bill charges. Detailed energy auditing is carried out in three phases: Phase I, II and III.

- Phase I - Pre Audit Phase
- Phase II - Audit Phase
- Phase III - Post Audit Phase

V. TEN STEPS METHODOLOGY FOR DETAILED ENERGY AUDIT

Phase I —Pre Audit Phase

Step 1 *Plan and organize

- *walk through Audit
- *Informal interview with Energy Manager

Step 2 *Conduct of brief meeting / awareness program for all divisional heads

Phase II —Audit Phase

Step 3 *Primary data gathering, Process Flow Diagram& Energy Utility Diagram

Step 4 * Conduct monitoring.

Step 5 *Conduct of detailed trials

Step 6 *Analysis of energy use

Step 7 *Identification and development of Energy Conservation opportunities

Step 8 *Cost benefit analysis

Step 9 *Reporting & Presentation the Top Management

Phase III- Post Audit phase

Step 10 * Implementation and Follow up

VI. (a) Phase I -Pre Audit Phase Activities

A structured methodology to carry out an Energy audit is necessary for efficient working. An initial study of the site should be carried out, as the planning of the procedures necessary for an audit is important.

Initial Site Visit and Preparation Required for Detailed Auditing:

An initial site visit may take one day and gives the Energy Auditor, an opportunity to meet the personnel concerned, to familiarize him with the site and to assess the procedures necessary to carry out the energy audit. During the initial site visit the Energy Auditor should carry out the following actions: -

→Discuss with the site's senior management the aims of the energy audit.

→Discuss economic guidelines associated with the recommendations of the audit.

→Analyze the major energy consumption data with the relevant personnel.

→Obtain site drawings where available building layout, steam distribution, compressed air distribution, electricity distribution etc.

→Tour the site accompanied by engineering/production.

The main aims of this visit are: -

→To finalist Energy Audit team

→To identify the energy consuming areas to be surveyed during the audit.

→To identify any existing instrumentation metering required. To decide whether any meters will have to be installed prior to the audit.

→To identify the instrumentation required for carrying out the audit.

→To plan with time frame management.

→To collect micro/macro data on plant energy resources, major energy consuming centers.

→To create awareness through meetings.

VI. (b) Phase II- Detailed Energy Audit Activities

Depending on the nature and complexity of the site, a comprehensive audit can take from several weeks to several months to complete. And detailed studies to establish, and investigate, energy and material balances for specific plant departments or items of process equipment are carried out. Whenever possible, checks of plant operations are carried out over extended periods of time, at nights and at all weekends as well as during normal day time working hours, to ensure that nothing is overlooked/escaped. The audit report will include a description of energy inputs and

product outputs by major department or by major processing function, and will evaluate the efficiency of each step of the manufacturing process . Means of improving these efficiencies will be listed, and at least a preliminary assessment of the cost of the improvements will be made to indicate the expected pay-back on any capital investment needed. The audit report should conclude with specific recommendations for complete engineering studies and feasibility analyses, which must then be per-formed to justify the implementation of those conservation measures that require investments.

VII.THE INFORMATION TO BE COLLECTED DURING THE DETAILED AUDIT INCLUDES

1. Energy consumption by type of energy, by department, by major items of process equipment, by end-use.
- 2.Material balance data (raw materials, intermediate and final products etc.)
- 3.Energy cost and Electric tariff data.
- 4.Process and material flow diagrams.
- 5.Generation and distribution of site services.
- 6.Sources of energy supply .
- 7.Potential for fuel substitution, process modifications, and the use of co-generation systems.
- 8.Energy Management procedures and energy awareness training programs within the establishment.

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