

## An Industrial Energy Auditing: Basic Approach

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### ABSTRACT:

Growing concerns arise about energy consumption and its adverse environmental impact in recent years in India, which cause manufactures to establish energy management groups. The energy auditing is the key to successful running of an industry with saving energy & contributing toward preserving national recourses of energy. "Managing energy is not a just technical Challenge but one of how to best implement those technical Challenges within economic limits, and with a minimum of disruptions. In this paper importance of energy auditing and process of energy audit is discussed.

*Keywords:* Energy Audit, Energy Audit Report, ECOs, Energy Saving.

### I. INTRODUCTION

This Saving Money on energy bills is attractive to Business, industries and individuals alike customers whose energy bill use up a large part of their income and especially those customers whose energy bills represent substantial fraction of their companies operating cost, have strong motivation to initiate and continue on an ongoing to energy cost control program. No cost or very low cost operational changes can often save a customer or an industry 10-20% on utility bills Capital Cost Programs with pay back times of two years or less can often save an additional 20-30%[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 a how facility uses energy ,what the facility pays for that energy ,and a finally, a recommended program for changes 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%. If there were

no barriers to implementation [2] but off course there are barriers mostly economical.

Energy auditing is an official method of finding out 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.

### II. METHODS OF ENERGY AUDITING:

Energy audits can be carried outs in different ways. Depending on time span invested auditing can be classified in as:

- i) *Walk Through Audit*
- ii) *Intermediate Audit*
- iii) *Detailed / Comprehensive Audi*

#### i) *Walk Through Audit*

This is simple kind of energy, it carries rapid survey of plant. During rapid walk survey main focus is on the energy input, spots of energy wastages and ECO's. Data about plant is collected in such a way that, data should be utilized for next detailed audits. Usually audit is carried out at two periods viz. During off period & during working shifts

Generally this kind of audit is carried out for three days to one week. As the time span required is short cost involve in auditing is also less.

#### ii) *Intermediate Audit*

This kind of audit is conducted for detailed survey and measurement of systems compare with walk through audit. Major focus is made on energy loses measure and quantification to analyze energy efficiency of system. Generally low tech recommendations are preferred with first preference is given for

-Switching off lights and fans when not required.

-Placing of automatic thermostat to control temperature of water heaters etc

-Spotting out golden ECO's which involves higher energy wastage cost.

This type of audit is carried out for one week to one week; time span required is more so the cost associated with audit is also more compare with walk through audit.

*iii) Detailed / Comprehensive Audit*

This is exhaustive audit than the previous types of audit. Detailed survey of systems as well as subsystems of an industry is done. Energy consumption of all subsystems and systems is compared with targeted energy consumption. This kind of audit also identifies the consumption of secondary energy like electricity, steam, gases etc. Modernization and changes in major retrofitting as suggested if required.

### III. BASIC COMPONENTS OF EVERY AUDITING

The Energy Audit Process starts by collecting information about facilities Operation and its past record of utility bills. This data is then analysed to get Picture of how the Facility uses and possibly wastes energy, as well as to help the auditor learn that areas to examine to reduce energy cost. Specific changes called Energy Conversion Opportunities (ECO) are identified and evaluated to determine their benefits and their cost effectiveness. These ECOs are assessed in terms of their costs & benefits and economic comparison is made to rank various ECOs. Finally an action plan is created whether certain ECOs are selected for implementation and the actual process of energy saving & saving money begins [4],[5].

*i) Auditor's tool box:* To obtain the best information from a successful energy cost control program the auditor must make some measurement during audit visit.

*ii) Preparation for audit visit:* Some preliminary work must be done before the auditor makes actual energy audit. To a facility some parameters that should be needed are: energy use data, energy rate schedule, physical & operational data for facility that will consist of geographical location, whether data, facility layout, operation house, equipment list. One more important part of energy audit is safety of energy auditor & audit team. The audit person & audit team must be thoroughly briefed on safety equipments & processes.

*iii) Conducting the audit:* Once the information on energy bills, faculty equipments and facility operations has been obtained, the audit equipment can be gathered up and actual visit is to be started. Following are some important steps in audit:

*iv) Introductory meeting* audit team should meet facility manager & maintenance manager to brief about purpose of audit

*v) Audit interview* getting correct information on facility equipment and operation is important, if the audit is going to most successful in identifying ways

to save money on energy bills. Auditor must interview with floor supervisor and equipment operator to understand building and process problems.

*vi) Walk through audit* a walk through tour of facility or plant should be arranged by facility/ plant manager and should be arranged to the auditor or audit team can see major operational and equipment features of facility. During walk through audit data regarding ECOs should be gathered by looking at : lighting, HVAC system, electrical motors, water heaters, waste heat sources, peak equipment loads and other energy consuming equipments.

*vii) Post audit analysis* after visit data collected should be examined , organized and reviewed for completeness ant thing missing data items should be obtained form facility of re-visit.

*viii) The energy audit report:* Next step in energy auditing process is to prepare a report which details the final result and recommendation. An industrial audit report is more likely to have a detailed explanation of ECOs and benefit cost analysis. The report should begin with an executive summary that provide owners/ manager of facility with brief synopsis of total saving available and the highlights of each ECOs

*ix) Energy action Plan:* The last step in audit process is to recommend an action plan for facility. The energy action plan list the ECOs which should implement first and suggest an over all implementation schedule , often one or more of the recommended ECOs should provide an immediate or very short period pay back, so saving from that Eco or those ECOs can be used to generate capital to pay for implementing other ECO

### IV. CONCLUSIONS

Energy audit is an effective tool in identifying and perusing a comprehensive energy management program. A care full audit of any type will give the industry a plan with which it can effectively manage the industrial energy system at minimum energy cost. This approach could be useful for an industry in combating essential energy cost and also raps several other benefits like improved production, better quality, higher profit and most important satisfaction of heading towards contributing in world energy saving.

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