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Heat Energy utilization opportunities at sugar based cogeneration plant

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ABSTRACT; Energy may be defined as the capacity for vigorous activity. Energy is present in nature in various forms. The various forms of energy used by mankind for different purposes consist for lighting, heating, cooking, running machinery, transportation and for other applications. It is crucial resource for all nation building activities, which keep the country's wheels of progress moving at an accelerated pace. Without energy the activities of mankind will come to a stand still and the life on the earth become impossible. Energy may be derived from coal, oil, gas, biofuels such as wood, vegetable oil, baggase etc.

Key words*:* Energy, bio fuels, machinery, coal.

I. INTRODUCTION

India stand first in cane sugar production accounting for 10% of the world production. However, till recently the ultimately of bagasse generated has been limited to power and steam generation for captive use in the sugar plants. This has resulted in the over all improvement in the equipment design and efficiency levels, resulting in lesser pollutants. With the installation of pollution control equipments in carbon dioxide and other toxic gases are eliminated. The emission of carbon dioxide and other toxic gases like sulphur oxides and nitrogen oxide are a threat to the sustainability of human beings. Carbon dioxide is a green house gas that is one of the major contributors to global warming.

A. The other benefits of co-generation

Contribution to power generation, Savings / conservation of fossil fuels and improved profitability to the sugar factory.The most promising biomass electricity generating fuel is baggase. Baggase is the solid fibrous material. Which leaves the final will after extraction of juice. The fuel i.e. baggasse is readily available at site, thus, limiting the transport cost to the extent of internal handling during crushing season for extended power generation with baggasse purchased from neighboring areas, the fuel transportation cost-would add to the inputs, but to the limited.

B. Energy conservation Necessity

Keeping above considerations in view, it is high time to focus our attention towards energy conservation. Conserving energy is a national need wherein every individual at whatever level can participate and help. By energy conservation, we can save 10 to 30% of energy through simple action. In case of industries, such as power plants the energy conservation is must. In this study our attention is focused on energy auditing. Energy audit serves to identify all the energy streams into a facility and quantify energy use according to discrete function. Energy audit is a vital link in the entire energy management chain. The energy manager is proposing course of action and evaluating their consequences, required a detailed information base from which to work. The information base is produced by energy audit a vital element in the overall energy management program.

forms of energy input and output. But the scope of the energy audit does not end here. With the help this information, potential areas of energy conservations are identified so as to review. The specific energy input both in terms of cost as well as absolute quantity.

II. METHODOLOGY

It is true that there is no clear cut methodology which can be tailor made for conducting energy audit. Historically energy audit are broadly classified two types first one is preliminary energy audit and second one is detailed enery audit.

A. Preliminary energy audit

A preliminary energy audit study typically involves two or three days. In preliminary Energy audit, the entire audit exercise can be divided into three steps:

Step-1: Identifies the quantity and cost of various energy forms used in the plant.

Step-2: Identifies energy consumption at the department/process level.

Step-3: Relates energy input to production, thereby highlighting- energy wastage in major equipment/processes. The typical output from a preliminary audit assignments are:

• Set of recommendations for immediate low-cost action, and

• Identification of major areas / projects which require a more time in depth analysis.

B. Detailed energy audit

The detailed audit goes beyond quantitative estimates of costs and savings. It includes engineering recommendations and well defined projects, and lists priorities. Approximately 95% of all energy is accounted during the detailed audit. The detailed energy audit which must always be conducted after a preliminary energy audit, is an instrumental survey followed by detailed plant energy analysis. Sophisticated instrumentation, including flow-meters, pyrometers, flue gas analyzer and infrared scanners are used to enable the energy auditor to compute energy efficiencies and balances during typical equipment operation. The actual tests performed and the instruments required depend on the type of facility under study and objectives, scope and level of funding of the energy management programme. Thus, àn energy audit can take as little as one man week or as much as several man years in a sophisticated plant.

III. PROBLEMS ENCOUNTERED IN CONDUCT OF ENERGY AUDIT STUDY

The major energy audit studies have revealed that there are several major problems which came in the way of conduct of energy audit studies in industry. It has been found that, many units do not have basic information system to give even order of magnitude figure. Mostly, figures are based on some assumed norms which have little bearing on the actual situation at the shop floor.

A. Energy Consumption Norms

In the case of industries producing only one product, energy consumption per unit of product can be worked out from the figures of total production and total energy consumption. However, this is not possible in the case of industry having a number of products since it may be difficult to separate the energy consumption of the various products being measured.

It was often observed that the energy made by the various items of requirement was difficult to quantify. While the total cost of electricity, fuel and water for example, were available, the particular efficiency of individual plant items were unknown. Since this data is very much necessary for the energy audit, a lot of time is taken for collecting and assessing this information.

B. Lack of Instrumentation

In the case of small and medium scale industries, the lack of instrumentation has been recognized as a major different. Even though instruments were installed in the large-scale industry but their proper functioning and reliability was not sure. Instruments used in majority of industrial boilers are usually the minimum required as per the statutory laws governing boiler. Industrial furnaces are generally not instrumented. As a matter of fact most of the industrial boiler and furnaces are not provided with instrument sufficiently to record the equipment performance, which can be used in the energy audit study.

IV. RESULT

The turbine under went capital overhaul and has improved in performance from 39.07% to 39.13%.Efficiency of the turbine is increased by 0.06% after overhaul, will save an annual cost of 4,59,900 lakh. In this project, an attempt is made to collect exhaustive data, calculation of boiler and turbine efficiency for cogeneration, before overhaul and after overhaul. From the observations and calculation performed in previous chapter the following conclusions are drawn.

CONCLUSION

(i) The boiler efficiency has increased from 52. 54% to 58.98% the major reasons from having lower efficiency is poor quality of bagasse and air leakages.
(ii) Efficiency of the boiler is increases by 6.44 after overhaul.
(iii) It is estimated that, increasing to boiler efficiency by 6.44% will save an annual bagasse of 21,900 tonnes.
(iv) By increasing the boiler efficiency by 6.44 will save an annual cost of 76.65 lakhs
(v) By increasing to turbine efficiency by 0.06% will save an annual cost 4,59,900 lakhs.

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