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Minimize use of Energy in Milk Dairy Plant by Using Different Techniques

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Abstract— In this paper we better understand the problems of high energy consumption in the milk plan. The milk dairy processes are fast growing business but high energy cost is a serious problem high consumption of energy can be reducing by using of different techniques with different approaches to Energy Management applied to a milk plant. Major emphasis of the paper is to minimize use of energy and also minimize the outgoing waste depending upon regulatory context, product type and resource cost. In the present work renewable energy is used for milk dairy plant industry. The total energy management is very complex so there are some simple strategies are given in this paper that can reduce energy consumption and saved energy in different area of plant.

Index Terms— Energy Audit, Economizer, Solar Energy, Chiller.

I. INTRODUCTION

Nowadays energy is not matter of our country it also the big matter of the world**.** Dairy industry is one of the major food industries in the world and also the Milk dairy plant is one of the most important food industries. Future demand of milk product will be increase. Planning an energy budget is difficult, but with the cost of natural gas, heating oil, renewable energy and other energy sources higher than a year ago, budgeting for the increased price of fuel and electricity is imperative[1].

There opportunities and challenges for improving the efficiency & effectiveness of the dairy operations. Improvements in processing equipment to achieve better efficiency and product quality; the term of energy management mean the effective use of energy to maximize profits .energy management is a combine technological and management function. This includes engineering economics, operational research and computer programming as well as day management of fuel and equipment [2].
The Dairy industry is going to grow in the future. It's a one of the industry which requires process heating, refrigeration cooling and electricity loads. Hence this is an industry which has a huge scope. Three utility parameters are relevant to energy-use in the operation of dairy plants, summarized as follows: Thermal energy, supplied as fuel primarily in the form of natural gas, fuel oil or propane, used for product, water and space heating. Within this guide all thermal energy values are indicated in units of mega joules (MJ). India has huge availability of renewable energy and less amount of non-renewable. We can use solar energy in dairy industry for many purposes like heating of water and milk, fore solar drying, for lighting etc. India has sufficient amount of sunshine that favours solar energy investments. Investment in solar energy technology should be encouraged as the merits include: pollution free environment, free renewable and energy source, high reliability and low maintenance costs.

II. ENERGY AUDIT APPROACH

Energy audit is essential part of every industry because that existing plant should be well instrumented and plant manufacturing be encouraged to give more accurate service consumption figure so that energy audit is essential for milk plant. The Energy Audit approach is a key approach for systematic decision making in process management. It quantifies the energy uses according to its various functions[7].

"Energy saved is Energy generated". This shows that apart from increasing the generation capacity at higher cost, one must go for the energy audit to save the energy.[9] The demand for energy is continuously growing in the different form like heating, cooling, lighting, electricity. Energy audit is an inspection, survey and analysis of energy flow [3].
It attempts to balance the total energy inputs with the output or the uses. The role of energy audit changes from preliminary audit to detailed audit. The preliminary audit can be used as control tool to take feed-back of the implemented projects and form basis of next project of improvements. The detailed audit goes beyond quantitative estimates to the energy cost and saving and includes engineering applications and recommendations. The energy conservation and maximization strategies for a process industry like dairy plant are cost effective, which conserve the environment automatically. The government should make it mandatory for every industrial house in the country for energy audit.[8]

2.1 Importance of Energy Audit Approach in Plant

a) In milk dairy plant , Large amount of heating, cooling and electrical energy require
b) In milk dairy plant consumes a large amount of water for heating and cooling process
c) Maximum use of electrical energy used in different form.
d) The major problem in milk dairy plant is high use of heating and cooling temperature in pasteurization process.

III. ENERGY LOSSES IN PLANT & ENERGY SAVING TECHNIQUES

1. ENERGY LOSSES IN PLANT

Energy consumption and losses are more in milk plant. Here we are discussing about where more energy consumed and losses. The reason for the lower efficiency is the losses of heating and cooling temperature. Energy consume in different area in milk plant for heating, cooling and different types of components like chiller, refrigeration, condenser, electrical heater.

2. ENERGY SAVING TECHNIQUES

Now a days for growth of our country energy saving is most important criteria to develop for country. Energy saving proposal for the critical area is pasteurization process in milk dairy plant. In Milk dairy plant Pasteurization is less efficient. The reason for the lower efficiency is the losses of heating and cooling temperature. These problems in the present study using solar energy for saving energy in milk dairy plant. Solar water heating industry constitutes the majority of solar thermal applications in both domestic and industrial sectors. We can use solar water heater in pasteurization process for reheat the milk and, the basic element of a solar water heater are flat plat collector and insulated storage tank. By attaching this system to storage tank and heater, reheat the water and save energy

2.1 Solar Energy To Lightning Dairy Offices And Premises

SPV lighting systems are becoming popular in both the rural and urban areas of the country. In rural areas, SPV lighting systems are being used in the form of portable lanterns, home-lighting systems with one or more fixed lamps, and street-lighting systems. A solar street-lighting system (SLS) is an outdoor lighting unit used to illuminate a street or an open area usually in dairy, garden, road approach to dairy and chilling center. A CFL (compact fluorescent lamp) is fixed inside a luminary who is mounted on a pole. The PV module is placed at the top of the pole, and a battery is placed in a box at the base of the pole. The module is mounted facing south, so that it receives solar radiation throughout the system

2.2.Economizer

By using economizer to heat feed water for boilers, so use waste heat, an economizer is normally employed to perform heat recovery from hot exhaust gases to cold fluid. In this work, economizer is devised to achieve high heat recovery in a pasteurized milk plant.

2.3 Chiller System

By proper integration of chilling system to the main process by load balancing. A chiller is machining that remove heat from a liquid. The chiller is basically cooling system that remove heat from one element and deposits into another

2.4 Waste Heat

To use waste heat of air compression outlet to heat boiler inlet water

2.5 Power Load

By proper loading of electrical motors and lightening system save more energy. Motor sizing motor usage and motor maintenance is one of the most important ways of ensuring that your motors continue to work efficiently

2.6 Equipment's

By regular and proper maintenance of equipment's in milk dairy plant can increase their efficiency and saving more energy. Effective maintenance can reduce energy cost, depending on the system or equipment involved

2.7 Plat Type Heat Exchanger

Plate heat exchangers (PHEs) are widely used in dairy, by using flat plate heat exchanger to preheat milk of chilling process raw milk. Flat plate type heat exchanger reduces the heating load in milk dairy plant [5].

IV. FUTURE SCOPE OF ENERGY

Energy is an important input in all sectors of any country. Future economic growth crucially depends on the long-term availability of energy from sources. Study of 'Energy strategies for Future' evolved two things - efficient use of energy, energy conservation and use of Renewable Energy. Energy conservation techniques use in different area and save more energy. The challenge is particularly difficult in the area of energy management, Dairies consume electricity for various day to day operations like functioning of compressors, agitators, pumps and heaters besides lighting etc.. Cost involved in electricity consumption for chilling of milk is 17 percent. More number of industries can be surveyed beyond the milk dairy plant "It takes … one hour to promote energy conservation, but only one sec. to save energy"[10].

The scope of energy management should not limited in India, India is developing country and it present primary product related to food industry ,Dairy industry is one of the major food industries in India, Currently India produces around 123.7 million tons of milk every year and the same is processed in milk processing plants[3]. The scope of improvements in energy utilization discussed the characteristics and the technology which are described and Suggestions for the development of traditional milk products

IV. CONCLUSION

An energy loss is considered to be a big problem in today's milk dairy plant scenario due to the presence of various criteria. In this paper we have presented some techniques to reduce the energy use & cost. The overall objective of the study was to minimize losses of energy & maximize use of renewable energy in milk dairy plant and save energy. The dairy sector is dynamic global industries and the dairy is one of the most important industries of the world food system. The energy audit is essential method for any process industry like milk dairy plant by help of this technique the energy loss and wastages are easily identified and improved system or model can be developed. The major reason why Indian dairy sector not catching up with the rest of the world is the fact that India being a developing country has all its potential resources scattered all over and we never figured out how to make the optimum use of these resources by bringing them under one roof. In this paper, what is achieved from this paper i.e. minimize the waste of energy, implementing simple energy efficient, technologically feasible methods to reduce the milk processing energy cost to minimum.

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