ASSESSMENT OF ENERGY MANAGEMENT IN FEED PLANTS: A REVIEW OF NECESSITY AND OBJECTIVE

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ABSTRACT: Energy demand, especially in the industrial sector, is rapidly increasing in our country. Due to the inadequacy of energy production to meet demand and the limit of new energy sources, it is becoming compulsory to import energy. This demonstrates the necessity of more efficient use of energy in all sectors. The energy sector is used intensively in the industrial sector and the highest consumption values are achieved according to other sectors. For this reason, it has become a necessity to attach importance to energy management and energy efficiency in the industry. Energy use is an important issue in the feed plants. Over the past decade, the significant increase in energy costs has contributed to reducing plant profit margins. Since profit margins are generally relatively low in wheat processing plants, efficient management of energy consumption has become a necessity instead of preference. A better efficient utilization of fuel, electricity, thermal energy and labor are the major components of manufacturing cost in feed plants.

INTRODUCTION

Increasing the usage will increase the cost of product directly as well as the reduction in the total margins of the plant. Energy prices doesn't seems to be reduced in the near future. Therefore, energy management system and recovery of energy, where applicable, must be applied to decrease the energy consumption and the increase in the margins. On the other side, current/prospective environmental legislations and concerns over the environment to increase industrial energy efficiency. Manufacturers prefer to use the most cost-effective techniques to increase energy efficiency in their plants.
In feed plants, the energy consumption is very high. Each process consumes generally more energy than it needs. The optimum energy supply must be calculated. Sometimes higher energy level will be needed depending on the type of raw material and the flow rate. Commercially available energy management systems can collect energy data using one or more parameters and they can be used to identify opportunities for daily energy. They can be used with a range of sensor technologies to monitor energy carried by electricity and gas as well as other energy carriers. They can analyze these data to separate energy use resulting from production schedules from that which is driven by the weather. They can be used to target process, plant or site efficiency improvements and to display information at a range of levels from shop floor to stakeholder's level. However,

these systems suffer from lack of standardization and real-time automatic correlation of energy data across multiple production levels. Existing EMS have been shown to reduce energy use by 5% (Carbon Trust, 2008).

Another way to improve the energy and resource efficiency of manufacturing processes is the recovery of waste streams and heat losses. Energy conservation is vital for the sustainability of the feed plants. Reduced energy consumption through conservation can benefit not only energy consumers by reducing their energy costs but also the society in general by reducing the use of energy resources and the emission of many air pollutants such CO_2 (Wang, 2014).

New technologies in mixed feed production ensure safe feed production while increasing the amount of energy consumed per unit product due to high energy consumption (Figure 1). Reducing or constantly controlling the burden of energy costs within mixed feed costs is gaining importance day by day in a competitive sector.

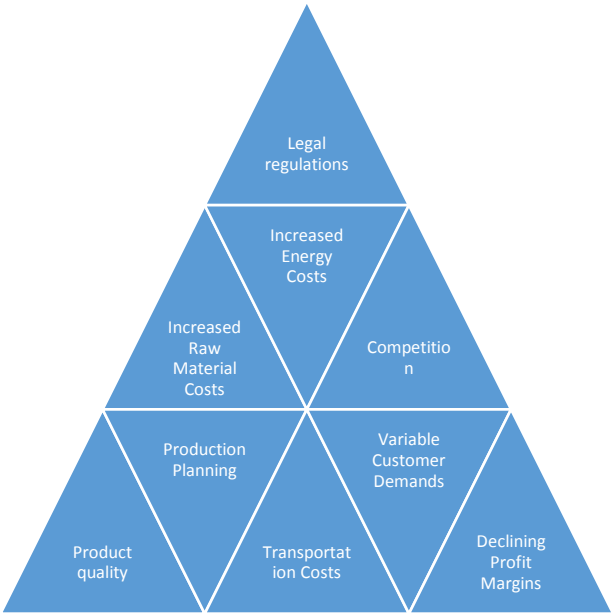

Figure 1. Main cost items in feed plants

Energy use is one of the important factors that have an impact on mixed feed production costs (Figure 2). Electricity and steam energy are heavily consumed in mixed feed production processes. Steam is mainly used in the pellet stage after powder feed production, while it is extensively used throughout the electric product processing stages. In addition, pressurized air is among the types of energy required to operate some transport and lock mechanisms. For this reason, the production methods have a separate precaution in terms of mixed feed quality. One of the ways to minimize energy consumption is to optimize the use of machinery in production without compromising feed quality. For this reason, an energy management system should be installed in each mixed feed factory and energy use should be monitored continuously.

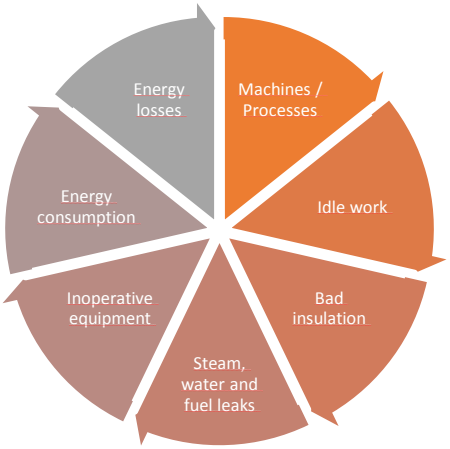

Figure 2. Aspects of energy management in feed plants

Energy management has not been considered as a vital issue so far compared with others such as production planning, marketing and the quality of product which thought a higher priority in the plant. The amount of energy used in the feed plant is an important economical consideration. Energy management is becoming a key skill in the manufacturing operations of many companies. Existing solutions for measurement, analysis and control of energy do not address all the requirements of energy management at the organization, factory or process level because they do not adequately develop in the workforce an awareness of the energy used in their business. Conventional energy management methods at the factory floor are limited because the energy performance of individual processes cannot be understood without continuous measurement of energy consumption and an infrastructure to map process energy data onto relevant business performance measures (Figure 3).

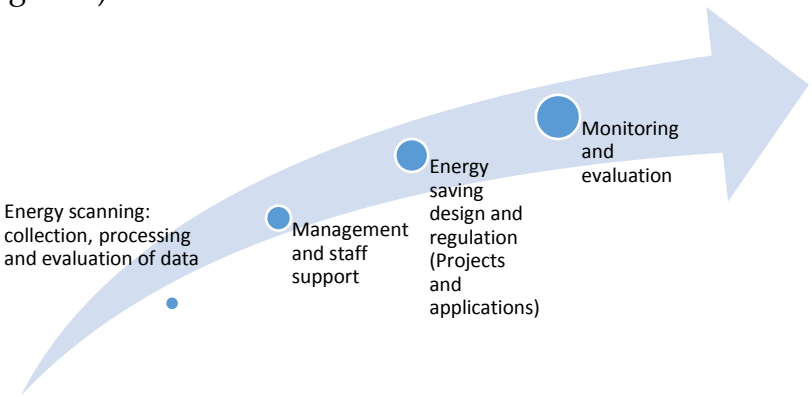

Figure 3. Energy Management Systems in Production Facilities

Each process, motor, pump, roll, machine etc. must be monitored according to their flow rate and energy consumption daily base. Also, the data should be interpreted into a meaningful directive to the operators. The fluctuations of energy usage, on the other hand, must be monitored by the data. Thus energy management for a plant must be unique for the successful implementation. Electric energy is a crucial factor in global industrial production. It can be saved

the unnecessary energy consumption by having a definite control of flour mill maintenance plan, minimizing process time and cutting down the maintenance expenses. Having a complete control of energy usage of each process is the main step of energy saving. High efficiency motors reduce energy losses through improved design, better materials and tighter tolerances and improved manufacturing techniques. Poor motor cooling can increase motor temperature and winding resistance, shortening motor life, in addition to increasing energy consumption. In addition to energy savings, this can help avoid corrosion and degradation of the system.

As a summary, effective energy management in production is a need towards increased energy efficiency in feed production plants. In order to reduce energy consumption and costs it is essential to use energy management during especially in pelleting process.

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