Effective Energy Management

Introduction

With rising fuel costs and the opening of electricity and gas markets to alternate suppliers and climate change, the need to monitor and reduce energy consumption is receiving greater attention than ever before.

The process of managing energy is not new. Energy should be regarded as a business cost similar to other costs like raw material and labour. The efforts required to manage energy effectively will vary between companies and depend on the company size, energy costs and energy intensity. Energy costs are expressed as a percentage of total company costs. It is not unreasonable for a company, starting out in energy management, to achieve a reduction of 20% or more in their energy bills with just a few simple measures and close monitoring. Hence, it is imperative to incorporate a structured energy management system in an organization.

A structured approach with clear sequence of events is the essence of any efforts for conservation of energy. Any organization, whether introducing energy management for the first time or upgrading its existing efforts, needs to be aware of this and adapt its activities accordingly.

Definition of Energy Management

Energy management is defined as:

"The judicious use of energy to maximize profits (minimize cost) and enhance competitive positions"

Therefore, any management activity that affects the use of energy falls under this definition. This rather broad definition covers many operations from product and equipment design through product delivery. Waste disposal also presents many opportunities foe efficient management energy.

The primary objective of energy management is to maximize profit and minimize costs. Some desirable sub-objectives of energy management programs include:

- Conserving energy, thereby reducing cost
- Cultivating good communications on energy matters
- Developing and maintaining effective monitoring, reporting, and management strategies for efficient energy usage
- Finding new and better ways to increase returns from energy investments through research and development
- Developing interest in and dedication to energy management program from all employees.

Need for Energy Management

It is estimated that industrial energy use in developing countries constitutes about 45-50 % of the total commercial energy consumption. Much of this energy is converted from imported oil, the price of which has increased tremendously. So much so that most of the developing countries spend more than 50% of their foreign exchange earnings on oil imports. Not withstanding these fiscal constraints, developing countries need to expand their industrial base so as to generate the resources to improve the quality of life of its people. The expansion of industrial base does require additional energy inputs.

India is a developing nation and has very low per capita energy consumption. To achieve economic growth, we need to increase the pace of development and increase the manufacturing of goods in quality and volume, which requires energy.

In any industry, the main operating costs are, energy (both electrical and thermal), labour, and material. If one were to assess manageability of the costs or potential cost savings in each of the above components, energy would invariably emerge as the top ranker. Thus, energy management function constitutes a strategic are for cost reduction. Energy cost savings of 5-15% are usually obtained quickly without any capital expenditure, when aggressive energy management program is launched. Thus, energy management is one of the most promising profit improvements, cost reduction programs available today.

Designing an Energy Management Program

Fundamental to the effective implementation of energy efficiency is good management. Like any resource that an organization employs, energy will only be used efficiently if it is managed properly. Good energy management, in itself saves energy.

Energy management can be broken down into a number of key areas:

- Preparation of Policy Statement
- Appointment of Energy Manager
- Planning and organizing
- Monitoring and control
- Conducting an Energy Audit
- Motivating People
- Reporting and review
- Formalized an energy Management Policy Statement

All these steps are necessary for effective energy management. However, the extent of criticality and type of approach would depend on the nature and size of the organization.

Energy management is a highly cost-effective tool requiring very little capital. None-theless effective application needs total commitment from the top management, allocation of requisite time and patience.

Policy

There should be a formal statement of the organization's objectives, demonstrating senior management commitment to continuous improvement in the efficient use of energy. It should explain the key approaches that the organization will take to achieve these objectives. An effective policy provides the foundation for setting the culture within the organization, and should be clearly communicated throughout the organization.

An effective energy policy should:

- Set out the organization's objectives for energy management.
- Demonstrate commitment to managing energy in a way that both supports good business performance and takes due regard for environmental effects.
- Commit the organization, when capital investments are planned, to giving due regard to energy efficiency in the selection and configuration of plant, and adopting the most energy efficient equipment available when the marginal cost is justifiable.
- Recognize the need for adequate resources and reporting through-out the company.
- Identify the Director or Senior Manager with overall responsibility for the energy policy and its implementation;
- Commit the company to a regular review of the policy.

Appoint Energy Manager

The energy manager, who should be a senior staff member, will be responsible for the overall coordination of the program and will report directly to the top management. Energy managers need to have a technical background, must be familiar with organization support from the top management.

Planning and Organizing

To achieve the aims and objectives of the energy policy, there should be clear and formalized responsibilities, plans and procedures in place. These should include:

• Documented roles and responsibilities.

- Plans which set targets for energy savings, and supporting action plans.
- Appropriate methods for communication to ensure that policies and procedures are understood and the management commitment to them is visible.
- Training plans, both for energy managers and the workforce, as appropriate.
- Procedures for planned and emergency maintenance of equipment and the procurement of new plant taking due account of opportunities for energy efficiency.
- Procedures for assessing the cost-effectiveness of energy saving measures.

Monitoring and control

The consumption of energy cannot be effectively controlled without a clear understanding of its use. There are two complementary activities that provide, and help maintain, this understanding:

- The physical energy survey.
- Ongoing monitoring and analysis of energy consumption information.

Energy survey is an investigation of the control and flow of energy. A survey can range from a simple 'walk-through' to a comprehensive and detailed appraisal. In both cases, the aim of the survey is to gain understanding and identify cost-effective energy saving measures. Whatever their level of sophistication, surveys usually include an examination of energy conversion, distribution and end-use, together with management systems. Surveys typically result in recommendations under the categories of no-cost, low-cost, medium cost and high cost measures.

At its very basic, the second activity should consist of an examination of energy bills before they are paid and a comparison with expectations, though expectations should not be limited to 'Is the bill much the same as last month?'

Ideally, the activity often referred to as **Monitoring & Targeting (M&T)**, should be more sophisticated than this, and comprise four main elements:

- Data collection from a number of possible sources including energy bills, manual meter readings, automatic meter readings, half -hourly data from utilities; plus in-house production information and meteorological data as appropriate. Validation of utility bills as part of this activity frequently yields benefits
- Analysis and interpretation to turn the data into useful information on which to act.
- **Reporting** of appropriate information, such as unexpected excess consumption, at the right time to the individuals with the ability and responsibility to act.
- Action, without which there is little, if any benefit, as well as responding to unexpected excess consumption. This should include the setting and reviewing of standards of performance that managers are charged with achieving.

M&T may seem a little complicated at first, but really is very straightforward and is powerful in identifying waste.

Conduct Energy Audit

An energy audit establishes both – where and how energy is being used and the potential for energy savings. It includes a walk through survey, a review of energy using systems, analysis of energy use and the preparation of an energy budget, and provides a baseline from which energy consumption can be compared overtime. An energy audit can be conducted by a specialist energy auditing firm. An energy audit report also includes recommendations for actions which will result in energy and cost saving.

Motivating People

People are crucial to effective energy management. If the person tasked with energy management is working without the support of others in their organization, their endeavors are likely to be frustrated. Every employee can make a contribution to saving energy, particularly through attention to 'house-keeping' issues, if they have awareness, motivation and empowerment.

Reporting and review

Organizations should provide management reports on energy use and management (progress against plans, conclusions from regular reviews, etc) in a way appropriate to the size and complexity of the company.

Reporting should include:

- Progress reports as necessary or as required by the appropriate senior management body (e.g. Board) in order to ensure adequate control and review of objectives;
- Frequent reports for operational management control.

Reviews should include:

- Consideration of the policy (its aims and objectives, scope, adequacy).
- Comparison of quantitative performance against targets.
- Comparison with benchmark data (where available).
- A review of the barriers to the implementation of energy efficiency improvements, and proposals for addressing these as far as possible.

Energy Management Policy Statement

A written energy policy is a commitment to save energy and will guide efforts to improve energy efficiency. It will also help to ensure that the success of the program is not dependent on particular individuals in the organization. An energy management policy statement included a declaration of commitment from senior management as well as general management and aims at specific targets related to:

- Energy consumption reduction
- Energy cost reduction by lowering consumption and negotiating lower unit rates
- Timetables/schedules
- Budgetary limits
- Energy cost centers
- Organization of management resources.

Starting an Energy Management program

Several items contribute to the successful start of an energy management program. They include:

- Visibility of program start-up
- Demonstration of management's commitment to the program
- Making a beginning with simple but effective energy management program

To be successful, an energy management program must have the backing of the people involved. Obtaining this support is often not an easy task, so careful planning is necessary. The people must:

- Understand why the program exists and what is its goal;
- See how the program has full management support; and

• Know what is expected of them.

Communicating this information to the employees is a joint task of management and the energy management coordinator. The company must take the advantage of all existing communication channels.

Conclusion

Energy management is the practice of using energy more efficiently and effectively in an organization's operations. Energy is a valuable resource and a cost which can be controlled when managed efficiently and effectively. Energy management provides an opportunity to optimize energy costs by understanding energy flow as well as procurement and economics of energy, and reduce its harmful impact on our environment. It is an ongoing process and must be reviewed at regular intervals and fine tuned as required, from time to time.

Reference book:

Chemical Industry Digest, Annual – Jan 2007