

# ENERGY MANAGEMENT AIMS AND OBJECTIVES

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## 1. Introduction

Electricity is extremely flexible in the ways it can be used. It can provide amongst other things; lighting and refrigeration in the domestic sector; air conditioning and lifts in the commercial sector and motive power for many industrial processes in the industrial sector.

The proper utilization of electricity supply has to be set against an economic background. This policy paper gives basic guidelines on energy management in the industrial sector with the establishment of an energy management group. Efficient operation and maintenance of plants and correct loading are essential for economic use of electricity.

## 2. Aim of Energy Management

The aim of energy management is to achieve organizational objectives at minimum energy consumption and cost. Energy management is a vital element in the total quality system of any organization. It is therefore no coincidence that the best run companies are the most energy efficient. The three key principles of energy Management are:

- Purchase energy supplies at lowest possible cost
- Manage at peak : Having purchased energy at lowest possible price, it is then important to use it as efficiently as possible and to avoid wastage.
- Harness the most appropriate technology : Energy saving can be achieved by three levels of practical measures : no cost (good house keeping); low cost; and high cost.

Good management is as central to achieving energy efficiency as it is to managing the whole organization effectively and profitably. Good results can often be achieved by adopting a commonsense approach and at relatively low cost.

## 3. Barriers and how to overcome them

There are many perceived barriers to managing energy including :

- ignorance;
- fear;
- mundaneness of the subject;
- latent desire to preserve the status quo;
- long time-scales to achieve results;
- a hundred and one other excuses.

In practice all of these barriers can be dismantled.

### Knowledge of energy cost and consumption

Establishing the energy costs is one of the first and essential (sometimes embarrassing) actions.

### Relevance

The bill may be high, but it may still be only a small percentage of the total cost of production. This fact frequently misguides people; unlike many other items, energy is a controllable commodity.

### Management matters

Energy is frequently not considered a management issue. It deserves the same level of attention that is paid to material yield, labour costs, productivity or other production costs.

### Comparisons

Comparison of performance is crucially important in today's increasingly competitive world. This is required to help maintain existing performance, improve upon it and make sure that competitors are not creeping ahead in their drive to eliminate unnecessary cost.

### Lack of funds

Lack of funds is another frequent argument for ignoring energy-related programs. Capital up-front, although desirable, is not essential in all cases. Some of the best energy programs have begun by focusing on opportunities that require no or little investments first; in this way the benefits of no-cost and low-cost programs can be used to finance high-cost investments later.

### Awareness of opportunities

Another barrier to energy management arises from one's ignorance of many possibilities that may exist. This may be true in the short term, but there is much that can be done to find out the real opportunities. One way is to hire an expert to identify and quantify the opportunities; this will obviously require some capital expenditure.

### Technical jargon

Energy is a straightforward, commonsense subject and should be treated as such. An energy manager should learn to use simple, everyday terms.

### Time scales to see results

It is true that it generally takes a long time before major investments in new plant and equipment designed to save energy start showing results. To get demonstrable results early, start by ruling out any major investment and give your full attention to the no and low capital cost items that usually yield quick pay-backs.

## 4. Key aspect of energy management by motivation

### The people aspect

Motivation (and willingness to co-operate with management) tends to increase as people are involved in

decision making, informed about realities, problems and reasons for decision, given authority to decide on the most effective way to do their own work, recognized for their personal contributions, and made to understand rewards of success and consequences of failure.

**The management aspect**

A response oriented management style cannot be undertaken casually. A number of important considerations such as the interaction with other people have to thought through first to encourage as many ideas and suggestions, as possible (i.e. mention individuals by name when announcing decisions). Freedom to choose how different ideas are put it into effect is also important.

**The energy management aspect**

The principles of motivation are of particular importance to energy management and to the never-ending struggle with energy wastage problems.

**De-motivating and motivating aspect**

Resources, including energy, may be costs that concern the managers, but not a major concern for many other employees. Three main reasons for this are :

- employees tend to concentrate on the job in hand rather than on the means or facilities used.
- employees may think about energy only occasionally
- employees do not view energy costs in the same way in the work place as they do in their own homes, because the costs are not directly paid by them.

**Communication aspect**

Communication is a very important aspect. Results

cannot be achieved by announcing and imposing energy consumption targets or by laying down routine duties. One can successfully evolve and establish energy consumption targets and working procedures by asking all those involved to help in formulating, agreeing and implementing tasks.

**5. Energy Manager**

The energy manager of an organization has an overall responsibility for securing energy savings centrally and departmentally, either through technical change or good house keeping. As with management generally, the energy manager needs to know what is going on-it is no different to managing one's bank account where one needs to check bank statements regularly to ensure that finances will not go out of control.

The energy manager and the department managers should develop energy budgets covering all energy cost headings such as electricity, gas, oil, steam, compressed air, and hydraulics. To achieve success regular monitoring will be required at all interfaces: supplier/company (central) and central/departmental. This will give all managers a good idea of what energy they are using and why, and will also show the results of their energy saving measures.

For every significant energy consuming centre, there should be a simple index of performance that fully reflects consumption on a comparable basis. For example, energy consumed per square foot in a factory building, warehouse or office, is an effective index for both the initial assessment and subsequent regular monitoring.

Measure	Example	Emphasis
No cost (Good housekeeping)	Resetting controls Switch off when not required Repair leaks Reschedule loads/usage	Behavior of people using existing installed technology
Low cost	Maintenance Meters M & T monitoring Simple controls Insulation Training end users	A combination of investment in low-cost technology and people's involvement
High cost	Heat recovery systems Combined heat and power Fuel conversion Energy management systems	Investment in high cost technology with some people's involvement

**6. Energy management group**

An Energy Management Group (EMG) will be established to promote energy efficiency among bulk electricity customers through sharing good practices and to achieve the targets on energy management programs. This is a forum for energy managers to share their

experience, discuss their common problems and collectively seek solutions. EMG also encourages practical evaluation and application of new energy efficient techniques, whether in a technical or public relations area.

Energy management groups have been in existence in

many countries over a decade or so. They constitute a valuable informal body of knowledge covering industrial, commercial and public sectors. These informal groups can be also utilized to implement and monitor progress of proposed programs.

### 7. Potential for energy saving

In many organizations, there is enormous potential to save energy by good house keeping (no cost measures) and by raising the awareness and motivation levels of staff who are end-users of energy. End users should be encouraged to avoid waste and to take personal initiatives to save energy. However, changing attitudes, behavior and habits can be difficult.

### 8. Summary of the energy management role

At all levels, and in all situations, the energy management role is essentially catalytic.

It includes :

- involving people;
- making it happen;
- selling/persuading;
- using the 'power' in energy management control information;
- developing and presenting the case to invest capital in energy conservation;
- maintaining improvements;
- ensuring that energy management continues as a way of life, rather than a one-off exercise that is designed to meet short term crises and then forgotten.

In addition to meeting these motivational needs, those in energy management roles will have to complete five stages of action.

- **Audit :** An energy audit is necessary to identify the main areas of usage and the approximate quantities involved. The end result should be a list of key areas of usage pointing to where the most potential for saving exists.
- **Critical Examination :** Having got your list of key areas of usage, each area must now come under critical examination in order to identify what is done, what could be done and so on. Determine how, why, where, what, when and who for each

area. Eliminate areas which cannot be changed, combine areas which are linked, and simplify wherever possible. Explore technical opportunities just because an expert designed and laid down the process originally, that is no reason why you should not question it.

- **Action programs :** Now that you have a good idea of what is going on, you need to come up with actions to improve the current situation. Draw up three lists of possible actions, categorized as no-cost, low-cost and high-cost opportunities.
- **Targets :** Targets are crucial to success. When setting targets remember to make them realistic, if possible calculate, consult and agree with those involved before publishing. If nobody seems interested, set one yourself and publish it. Relate them to output or other factors which represent usage. Keep the units simple and easy to understand. Regular control information is essential to keep interest up and make the targets real.
- **Control information :** Control information is the final stage of energy management, and can only be properly understood if the previous stages have all been completed.

### 9. Formulating your plan

Here are the important principles for success set out in the form of a checklist:

- ⇒ Establish energy as a management issue.
- ⇒ Give each line department their own energy budgets.
- ⇒ Calculate a simple index of performance for each building, process plant, group of buildings, or sites.
- ⇒ Establish an overall energy policy at an early stage.
- ⇒ Categorize savings opportunities into no, low and high cost. Energy management is concerned with achieving the no-cost and low-cost opportunities first.

SLEMA NEWS.....

### Masters Programme in Energy Technology

First ever Masters Programme in Energy Technology in Sri Lanka was started in the Department of Mechanical Engineering, University of Moratuwa late 1999. The programme offers a wide variety of courses involving different areas of energy technology ranging from dominant renewable energy technologies and energy conservation to energy economics and environment covering both theoretical and practical aspects.

The next batch of students will be enrolled by October 2000 and the programme is open for graduates in Mechanical, Electrical or Chemical Engineering or for those with equivalent qualifications.