

MIEEIP

Malaysian Industrial Energy Efficiency Improvement Project

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News



IMPLEMENTATION OF AN ENERGY MANAGEMENT SYSTEM -

Energy Management for improved energy efficiency and better profits

What is Energy Management?

Energy Management (EM) is an activity organised to optimise the use of energy by avoiding waste or recovering unused energy in processes or facilities. EM primarily seeks to utilise energy (electricity and fuel) more efficiently without reducing production levels or lowering product quality, safety and environmental standards.

When an organisation practices good EM, top management and employees become more aware of how energy is used, the actual cost of energy and the methods and equipment that can be used to control and reduce energy waste.

The principle underlying EM must be cost effectiveness: energy efficiency (EE) should only be practiced if its end result proves profitable to the company, i.e., the benefits from reducing energy waste and losses exceed the investment cost. Therefore, EM requires both technical and financial evaluation in order to achieve a successful overall plant energy conservation programme.

What are the benefits of Energy Management?

Many companies have not taken the trouble to identify and implement simple EE measures with short payback periods. Amongst the reasons stated for their in-action are lack of technical expertise, low management interest and financial constraints. However, anecdotal evidence shows that those who have adopted the concepts of EM have derived significant savings in their energy use, especially in the commercial sector, where the relevant EM practices are more or less 'standard' and easily replicable.

Similar successes have been recorded from several manufacturing companies audited by Pusat Tenaga Malaysia (PTM) under the Malaysian Industrial Energy



The energy management team at Jayakuik Sdn Bhd

Efficiency Improvement Project (MIEEIP), a project co-funded by the Government of Malaysia (GoM), United Nations Development Programme (UNDP), Global Environment Facility (GEF) and the local private sector.

For these companies, savings have been achieved in both electricity and thermal energy use. The audited factories have combined no-cost and low-cost initiatives with investment in EE options to derive the maximum, cost-effective benefits. How successful have such initiatives been? Some case studies identified by the MIEEIP audit team during their audit exercises in local factories are tabled in the following page.

These results clearly show the economic benefits of implementing EM in the industrial sector in Malaysia, even under the current low electricity tariffs. Although increased profits due to the direct consequence of energy cost reduction will be the motivating factor for companies to pursue EM activities, the following are other implied benefits and positive aspects of EM that industrial

Energy management involves the following basic approaches:

- Reducing avoidable energy losses at every stage of energy transport, distribution and use (process/facilities)
- Reusing and recycling energy within a factory
- Making use of waste generated within the plant as sources of energy and reducing the component of purchased fuels

Company	Measures	Total Investment Cost (RM)	Annual Energy Cost Savings (RM)	Average SPP*
Pan-Century Edible Oils Sdn Bhd	Total Low Cost	400,000	680,964	6 months
JG Containers (M) Sdn Bhd	Total Low Cost	50,000	57,000	8 months
	Total High Cost	7,000,000	1,681,000	4 years
Jayakuik Sdn Bhd	Good house keeping / No cost	nil	363,707	n/a
Malayawata Bhd	Total Low Cost	496,000	322,000	1.5 years
Cargill Palm Products Sdn Bhd	Good house keeping / No cost	nil	53,000	n/a
	Total Low Cost	132,000	308,000	5 months
	Total High Cost	1,231,000	1,550,000	1.3 years

* SPP – Simple Payback Period

Table showing energy saving results achieved by MIEEIP audit clients.

consumers should be aware of:

- Saving energy always leads to lower emissions (eg less smoke and less emission of green house gases) from the manufacturing sector.
- Firms achieving savings in energy cost can improve their resilience and competitive position against other competitors amongst domestic firms and in export markets
- Effective EM improves ability to better withstand future energy cost increases or energy curtailments
- EM programmes can help identify productivity improvement and costs reduction opportunities that may relate to areas other than energy. Since EM incorporates many disciplines (eg engineering, management, human relations) it often results in improved utilisation of other resources such as raw materials and manpower.

For companies intending to embark on EM, it is worthwhile to note that savings for a plant which is starting an EM programme are often more than 15% of their initial energy consumption.

The Energy Management Approach

The support of top management is crucial to the development and implementation of an effective EM Programme. In fact, it is ‘top management’ who must recognise the importance of controlling energy consumption and costs within a facility and push forward EM activities at their sites.

This support by management must not only be implied, but should be spelled out in the form of an energy policy to guide all decisions and also define company activities in relation to energy consumption. The policy should also include the provision of necessary resources to generate the confidence among factory staff that their management is fully committed to the EM programme being implemented.

For an in-house energy management programme to be successful, a systematic approach should be developed and

practiced within a company as follows:

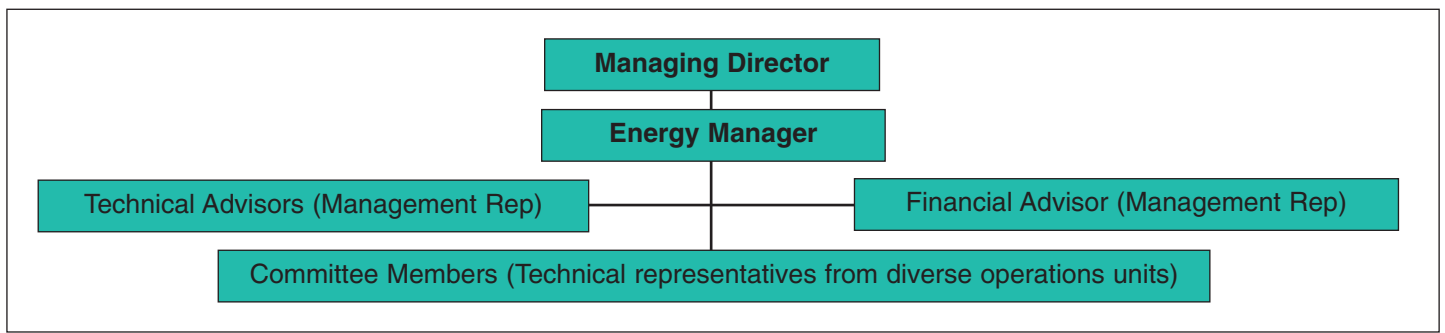
• The formation of an Energy Management Team (EMT)

As a first step, top management must form an EMT. An effective EMT must involve a number of people from relevant departments which consume the bulk of the company’s energy in its production processes. EMT members should also be selected from those employees who show commitment to adopt and champion the company’s energy programme. It will also be ideal for a representative from top management to act as Patron or Coordinator of the EMT to facilitate direct communication between the team and management. This will also ensure that management gets first hand information on the efforts and successes of the EMT and commits the necessary resources to the team as and when needed.



The Energy Management Team at Cargill Palm Products Sdn Bhd led by the Plant Superintendent

Forming an EMT will increase the number of people who will be involved in the sharing of ideas on EE among various departments throughout the company. This will create a larger pool of expertise and networking for communication, monitoring and enhancing the energy programme’s success. This team will be able to agree on energy conservation initiatives across departmental boundaries and approach the management as a whole instead of as various individuals.



A typical structure of an Energy Management Team

The EMT should establish its own scope of responsibility and the extent of executive cover of the facility's operations for EM activities. The key roles and tasks should include at least the following:

- Mapping of energy use by function (air-conditioning, lighting, power, etc.);
- Introducing “good-housekeeping” practices;
- Seeking and eliminating sources of energy waste, such as leaking windows and doors to air-conditioned space, turning off idling equipment, reducing unnecessary energy use, inappropriate lighting (‘on’ when not required), etc.;
- Ensuring adequate equipment maintenance and scheduling equipment operation to optimise energy use;
- Assessing energy saving options for specific EE initiatives, and getting management support to implement cost-effective initiatives, (say with simple payback periods of up to 3 years); and
- Reporting to management the results of their EM programme efforts and proposing new initiatives for incremental, reiterative improvement.

Before embarking on any activity, the EMT must have information relating to the following:

- The cost of energy consumed;
- Energy cost as a percentage of total production cost;
- Who in the company currently looks at or records or evaluates energy consumption and cost?;
- The size of the company (number of employees, department, site area etc.);
- How many different products are made?;
- How diversified is the energy consuming equipment? ;
- With the existing company organisation, how best can energy consumption be monitored in different areas;
- Cost of additional meters;
- What are the potential savings? and
- How do potential savings compare with current profits?

• The Appointment of an Energy Manager

Forming an EMT is not enough. Someone is needed to lead the EMT, and interact with top management to translate and implement the decisions made by the team and gather the relevant data needed by the EMT to make decisions. The role of the Energy Manager will vary from company to company but he will normally be concerned with the

following tasks:

- Collecting and analysing energy related data regularly ;
- Monitoring energy use and cost ;
- Identifying energy saving opportunities ;
- Developing projects to save energy, including undertaking the necessary technical and economic evaluations ;
- Getting management approval for the required resources; and
- Implementing projects

In general, the Energy Manager should be involved with all matters concerning energy purchases, distribution and utilization within the plant or company.

Wherever possible, the Energy Manager or EMT should be independent of the main operating department; it is usually not desirable to report directly to the Production Manager, or to the Maintenance Supervisor. Reporting to the highest level, such as the Plant Manager or Managing Director would often give the needed independence and authority.



An Energy Manager should institute energy measurement

Most Energy Managers are appointed from within the organisation. This is primarily done because the position requires good practical knowledge of all aspects of the company's operations, both technical and administrative. Above all, the Energy Manager needs an open mind to view problems from different perspectives and the skills to convince others that savings are both possible and worthwhile if the right measures are taken. These initiatives become more effective if the Energy Manager also enjoys top management confidence in his competence and loyalty to the organisation.

The Energy Management Operation

Initial operation of the EMT would best suit the organisation's objectives if the top management (e.g., the CEO or MD) personally launches the EM initiative for the organisation and commits management support for the team's operation and authority. Ideally, this could be at an inaugural meeting of the EMT, coupled with its formal launch.

• EMT Meetings

After the inaugural meeting as mentioned above, the EMT should hold a kick-off meeting to discuss the team's activities, programmes and mode of operation. This meeting ideally should consider the company's energy consumption issues such as the total energy consumption segregated by functional use and costs for the installation, and also, the company's energy reduction goals.

The first EMT meeting should also assign specific responsibilities and action items to team members and develop target dates for completion of the tasks.

How often should the Energy Manager call for an EMT meeting? This will depend on the magnitude of energy costs as a proportion of the overall production costs of the company and the number of EM initiatives in progress at any time.

Normally, a monthly meeting is usual, so that monthly production and energy consumption may be reviewed regularly by the EMT. This review would include a comparison of actual performance against previously set targets and budgeted figures.

The EMT meetings should also review the performance of the EM investments in progress or planned.

• Review of current energy use and practices

Once the EMT has been formed and an Energy Manager appointed, the team should concentrate on reviewing past energy use records and good house-keeping practices, which can be implemented with relative ease and practically no cost in a short time. The next logical step is to review current practices of energy use, based on energy audits. This requires data on total energy consumption (electrical and thermal) as well as total production output.

The energy consumption data collected from energy audits will enable the EMT to establish the baseline for measuring future results, set energy reduction goals, create action plans, implement the action plans, evaluate the progress of each

energy saving initiative and recognise achievements. More information is given under 'Energy Audits'.

One important objective of the EMT is to establish the specific energy consumption (SEC), which is the company's energy consumption per unit of production or output. The SEC should preferably be calculated at the sub-process levels, rather than the overall company level so as to identify potential energy saving opportunities at these processes.

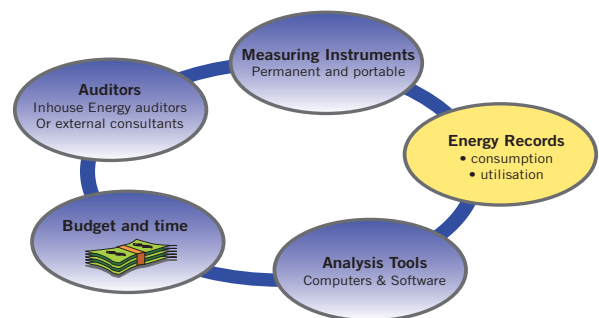
PTM's MIEEIP has established an on-line e-benchmarking system to enable companies to establish and compare their SEC against peers in their industry. To log on to the system companies are invited to contact the project team at 03-8943 4300 Ext 511 to gain access to the benchmarking facility.

• Energy Audits

Energy audits can be done in phases. A preliminary audit involves checking the condition of equipment based on which adjustments can be made, mainly involving tuning-up operations.

A detailed audit requires the development of energy and mass balances, which entails checking of flows, temperatures, etc. This is more time consuming and complex. Based on energy audits and analysis of the plant, a number of potential energy saving projects may be identified. These may be classified under three categories:

- Good house keeping/ no cost measures
- Low Cost measures
- High Cost measures



Resources required for an Energy Audit

Normally, the low cost-high return projects receive priority. Other projects have to be analysed, engineered and budgeted for implementation in phases. Projects relating to energy cascading and process changes almost always involve high costs coupled with high return, and require careful scrutiny before funds are committed. Thus they need long lead times before they can be implemented.

There are many ways to approach energy management but two points are extremely important:

- Top management must be fully committed to controlling energy costs
- The energy management team must be set up to implement, and be accountable for the energy management programme

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