

ANATOMY OF ENERGY MANAGEMENT

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Energy is one of the resources amongst many used by man in his social and economic activities from the earliest days. History shows that with the gradual depletion of productive resources, man succeeded in increasing their productivity or found alternatives, by his ingenuity and has now a vast amount of knowledge on the management of resources. Energy management could therefore, be based on principles that are applied to the management of other resources to achieve organisational objectives.

The primary objectives of all organisations are survival, profit and growth, while the secondary objectives can vary from organisation to organisation. To achieve these primary objectives, an organisation needs to manage its resources effectively. One of the main resources that all organisations need to control is Energy.

Energy management can be defined as a process of forecasting, planning, organising, directing, co-ordinating and controlling the use of energy in an organisation so as to achieve the organisational objectives effectively. The shortage of energy and its price escalation can be a threat to the survival, growth and profit of the organisation either in the present or in the future. Hence, the need to manage this resource effectively—individually and collectively. The management process starts with the forecasting function. The first step will obviously be to forecast the overall energy demand of the organisation and relate it to the country's supply situation. Once the likely demand and supply pattern is established, its effects on the organisation's objectives has to be determined. With this information, objectives for energy management function has to be worked out. In the present situation, generally, the objectives will be as follows :—

- (1) Minimisation of energy wastage.
- (2) Improve the efficiency with which energy is used at present.
- (3) Identify economically justifiable sources of energy compatible with the requirements of the organisation.
- (4) Search for low energy content raw materials, components and low energy consuming machinery and processes.

As a prelude for setting-up policies, objectives, procedures, rules, budgets and programmes in a specific organisation, it may be necessary to carry out further detailed investigations. An analysis of current energy usage so as to ascertain the possible areas of energy saving opportunities, may have to be carried out. It will also be necessary to set-up standards for energy

usage for specific equipment/process, etc. These could only be achieved by an energy audit.

Incidentally, it will also be observed that definition of the objectives of energy management not only high lights the activities which an organisation needs to perform in this regard, but also their relative importance *vis a vis* all other activities the organisation is to perform so as to achieve its objectives. This will also indicate the organisational level most appropriate to take decisions.

Once the objectives are selected, decisions have to be taken as to how these objectives are to be achieved. This would involve the statement of policies, framing of rules and procedures, setting-up budgets, and formulating programmes. Once a mental picture of the likely situation and those actions required to achieve the desired result are clear and agreed, we have to evolve the organisational structure required to achieve the selected objectives.

The organising process involves the breaking up of the total tasks required to achieve the desired objectives, into smaller tasks and assigning the responsibilities for carrying out these tasks to individuals. The major tasks that are to be performed in regard to energy management are :—

- (1) Prepare and maintain statistics of energy usage and cost.
- (2) Prepare short term and long term forecasting of energy demand and supply situation, and drawing up of short and long term plans to balance them.
- (3) Educating employees of the need to minimise energy wastage.
- (4) Training employees at all levels.
- (5) Setting out policies, procedures, rules and programmes to improve energy efficiency of existing process.
- (6) Research on energy efficient processes, products and use of alternative sources of energy.
- (7) Carrying out energy audits.
- (8) Implement above programmes and monitor progress.

The next phase of organising process will be to consider as to how these tasks are to be grouped. Normally business activities are grouped on the basis of region, market, product, functions, processes or equipment or on the basis of decisions that are to be taken.

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ENERGY SECTOR IMPROVES — CENTRAL BANK ANALYSIS

The Central Bank in its annual report for 1984 gives the reasons for the improved energy situation as (a) Lower international prices of oil; over 60% of which is purchased in the spot market. (b) Favourable weather conditions in the catchment area. (c) and the commissioning of additional power plant both crude oil and hydro. The report adds that on account of this, the import of oil, the largest source of commercial energy which accounted for 24% of the total imports in 1983 dropped to 23% in 1984.

The continuous operation of the refinery in 1984 enabled the CPC. to increase the output by 16% over 1983. This pushed up the import of the crude and lowered the import of refined products by 73% compared with 1983. The export of refined products amounted to Rs. 3,288 million, the report observed.

Turning to the consumption pattern, the report noted the following variations in consumption from 1983 :—

- 7% decrease in kerosene.
- 7% increase in furnace oil.
- 5% increase in auto-diesel.
- Marginal increase of petrol.

The electricity sub-sector has shown an increase in units generated viz. 7%. The notable feature being C. E. B. incurred only Rs. 443 million on fuel in 1984 compared with Rs. 2,299 million in 1983.

The report in conclusion states —

“The main policy option which provided a significant pay off in the short term was the attempt to improve the efficiency of the energy sector both in production and distribution. **These measures included reducing losses in electricity generation, transmission and distribution, improving productivity of oil refinery operations and minimising wastage in handling and transport of oil.** It is estimated that 19% (Actual 17.8%) of the electricity generated is lost in the process of transmission and distribution. It is expected that this loss would be reduced through the network rehabilitation programme which is now underway. **An area which received increased attention is the diversification of the energy sector and the development of substitute sources of energy for petroleum and electricity.** Efficient and economic use of fuel wood, use of agricultural and other agro-waste materials as substitute fuel, increased use of direct solar and wind power were other particular areas to which policy attention was given during the year. Energy audits were carried out in selected public and private sector institutions (which were identified as large consumers) with the objective of improving the efficient use of energy.

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It is usual to find a mix of these basis in any organisation. Some general principles that are to be observed in this process are :—

- (1) As far as possible the activities of all posts in an organised group should be confined to the performance of a single activity.
- (2) The tasks in an organisation should be grouped so as to achieve unity of effort towards common objective.
- (3) There should be one clear line of direct authority from top to the bottom.
- (4) Responsibility and authority must correspond.
- (5) The tasks, responsibilities and authority must be defined.
- (6) Suitable span of control to be allowed.
- (7) Structure should be so designated so as to ensure best balance.
- (8) Continuous re-organisation must accompany changing conditions.
- (9) Economics of scale — technical, managerial, financial etc.

Now then, how should the tasks involved in energy management be grouped? Is it to be grouped on regional, market, product, or function at basis? Obviously, these tasks have to be integrated, into the existing groupings. **This means that the existing organisational structure will dictate how the grouping of the tasks have to be done.**

It will be seen that introduction of energy management activities need not necessarily call for major structural alterations. In most instances, this would call for distribution of energy related tasks amongst existing groups where allied activities are carried out and assigning these tasks to various positions. Of course, the additional tasks have to be written into the list of duties and responsibilities of different positions. In other words, energy management should be an extension of the duties and responsibilities of any member of the management team who currently has responsibilities for resource management.

It is rightly said that energy management should receive the commitment of the top management. So are various other aspects. This does not therefore, mean that organisations should rush into appointing **Energy Managers reporting to the head of the organisation or expect the head of the organisation to be pre-occupied with energy management only.**

In smaller organisations, irrespective of intensity of energy usage, the responsibility of energy management could be given to the operating manager. He should of course receive appropriate training in this

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aspect. However, smaller energy intensive production units may require some outside consultant in the initial stages, to advise and guide the operating head. In instances, where it is feared that these additional tasks will overload the operating head, suitable adjustment will have to be made by taking out some less important tasks and placing them under an assistant.

A medium size production organisation will generally have a structure as shown in Fig. 1.

In an organisation so structured, the energy management tasks can be allocated as shown. In the initial stages, setting up a committee consisting of Production Manager, the Head of Planning Branch, Finance Manager, Personnel Manager and Trade Union Representative is highly desirable so as to ensure that agreement could be achieved on all aspects before implementation and to create a sense of involvement and commitment. This involves the general education of the total work force so that they become more aware of the need to minimise energy wastage.

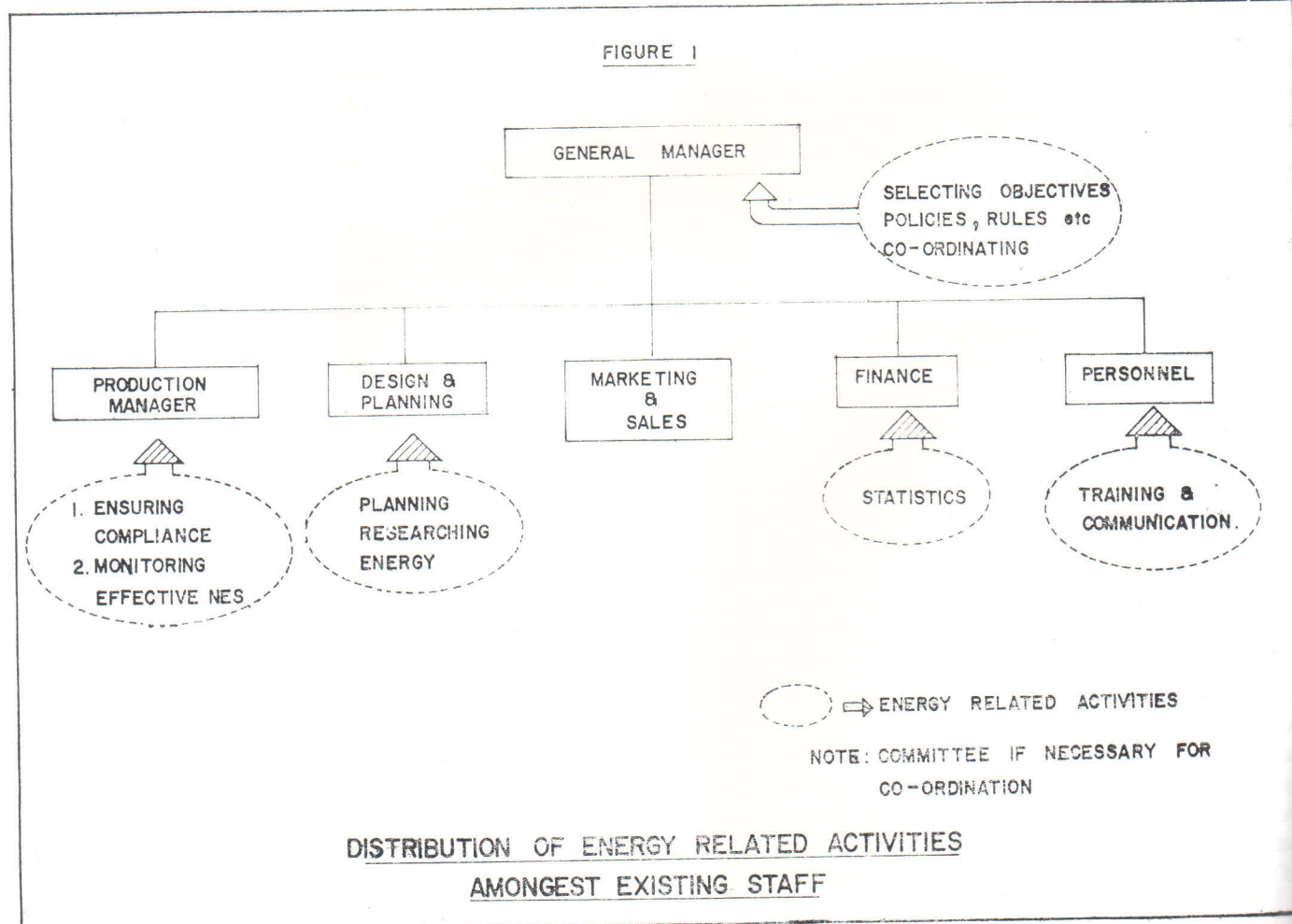
There may be a case for the employment of an Energy Manager in a large organisation whose organisational structure resembles that depicted in Fig. 2 (annexed).

In this case, the Energy Manager becomes a functional head and will serve as an adviser to the General Manager, and will have functional authority over the Plant Managers. The responsibility for operating the plant at economical cost will still rest on the individual Plant Managers. The Energy Manager will also advise other functional heads on energy related matters. However, top management should be careful to prevent 'EMPIRE BUILDING' by the Energy Manager. It will also be desirable to set-up a committee at headquarters and at plant level to co-ordinate the energy management activities, as well as to create a greater sense of involvement. The alternative is to employ a consultant.

The next managerial function involves the manning of the organisation structure through proper and effective selection and development of personnel to fill the roles designed into the structure. As far as energy management is concerned, the additional staff requirements will be minimal but training requirement will be higher, involving the top management, executives and shop floor workers.

Motivation of employees centres around creating and maintaining the need to conserve energy and create a climate where every energy user's behaviour is

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influenced towards conservation. Creating awareness depends on the methods adopted to convey the information and commitment of all employees of the organisation.

Further, there is the danger of employees interpreting energy conservation measures as a means to reduce hard won amenities and working conditions. It is necessary that the management should clearly explain the objectives of energy management to the employees, the benefits accruing to the employer, employee and to the nation. The management should be 'visibly' committed to energy management, and provide appropriate leadership, if energy management is to be adopted as a way of living in the organisation.

Another difficulty that is likely to be encountered is the people's resistance to change. People invariably, cannot be expected to change their attitudes and habits over night or in a short period. This requires consistent and conscientious effort by all levels of management to change the attitude of employees towards 'Energy'.

In order to motivate people to conserve energy at their work places, some form of incentives, particularly for those at operator level appears to be a 'must'. As energy is used by everyone in the organisation, group incentives are bound to be more effective. However, at the higher hierarchical level, the motivators could

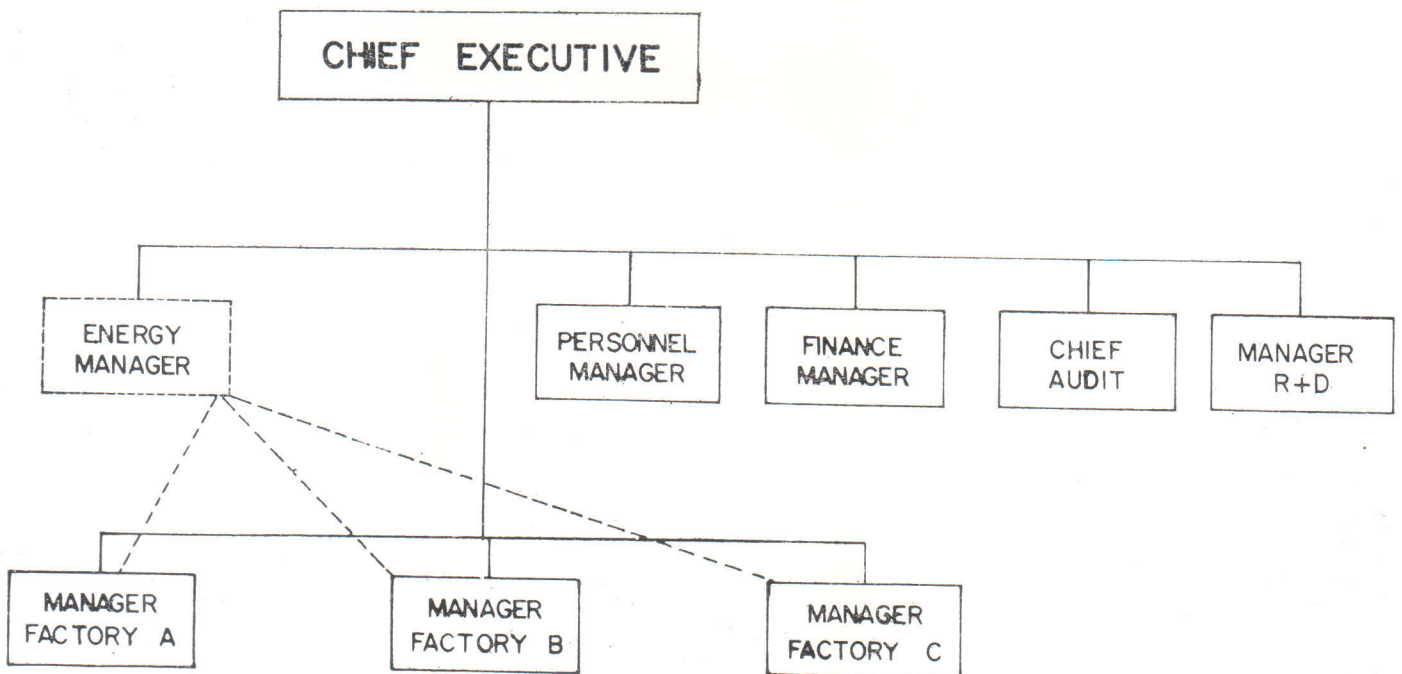
be challenging situation, prestige and recognition. Introduction of energy management efforts into an organisation can also be made use of effectively to enlarge or enrich the existing jobs, and thereby create a climate for higher overall productivity. This aspect should not be overlooked.

The need for co-ordinating all activities in the organisation need not be emphasised. This aspect should be kept in mind while planning and organising, and should be provided for in the design of organisational structure, systems and procedures, etc. The need for resorting to committees and co-ordinators to achieve co-ordination may exist in some organisations.

The last management function, will be 'controlling' wherein actuals are compared with the goals and corrective action taken when shortfalls are noticed. The control system adopted should fit into the systems already adopted, and should not cause much disturbance to it. The essential feature of the control system should be —

- (1) A predetermined standard,
- (2) A means of measuring activity,
- (3) A means of comparing activity with the standard, and
- (4) A means to correct current activity so as to meet the desired standards.

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CO-ORDINATION BY COMMITTEES.

POSITION OF ENERGY MANAGER IN A LARGE INDUSTRIAL COMPLEX

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There are some basic principles which have to be observed in designing the control system, viz.

- (1) The control must assure the desired standard by detecting deviations early to permit correction.
- (2) The control must be efficient and cost effective.
- (3) Controls should be exercised by managers responsible for execution.
- (4) Adequate control requires realistic standards.
- (5) Controls should be exercised at strategic points.
- (6) Adequate controls require attention to exceptions rather than the normal.
- (7) Controls should be flexible to remain effective despite failure of plans.
- (8) Control system should be reviewed periodically.
- (9) Controls are justified only if deviations could be corrected.

It will be realised that however much a firm or an organisation may be enthusiastic and committed to

energy management, its success depends on the management skills that goes into planning, organising, directing, co-ordinating and controlling the activities connected with energy management, and harmonising them with the activities required for achieving the primary objectives of the organisation.

WASTE HEAT RECOVERY (Contd from Page 13)

pitch and water. Two commercial applications are available for the distillate. It can be used as a wood preservative or can be mixed with furnace oil in the ratio of 40:60 (distillate 40 and furnace oil 60) and used as boiler fuel.

The WHRU technology is an inovative approach; and no doubt has the capability of offering wide range of applicability in agro-based industries in countries like ours.

REFERENCES

1. Breag, G. R. Harker, A. P. Paddon, A. R. and Robinson A. P. (1984). The Design, Construction and Operation of a unit for the carbonisation of coconut shell with recovery of waste heat. Report of the Tropical Development and Research Institute, G 182, iv + 18pp.
2. Prof. Ayal Jayatilaka, Timber Technology, University of Moratuwa. (1985).

TRAVAILS OF AN ENERGY MANAGER

