

## CHAPTER 30. STRENGTHENING ECONOMIC SUBJECTS` INTERNAL CAPACITIES - SUSTAINABLE ENERGY MANAGEMENT<sup>1</sup>

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### **Abstract:**

*EU strategic orientation towards sustainable energy development, energy reform and redirecting of companies to new ways of operating and doing business impose need to consider the concept of application of sustainable energy management as a concept acceptable for all companies. By implementing sustainable energy management, companies reach positive results, which primarily refer to reduced consumption of energy resources and reduced negative ecological effects. Apart from that, a company which implements the concept of sustainable energy management creates positive image and improves its competitiveness. The actual application of the concept of sustainable energy management in a company can be implemented in several ways and the application of eco-management concept is considered to be the most acceptable method for realization in developing countries.*

**Key words:** *sustainability; energy; company; analysis*

### **ECO-MANAGEMENT APPROACH OF IMPLEMENTATION OF SUSTAINABLE ENERGY MANAGEMENT IN COMPANY**

The latest series of international voluntary standards known as ISO 14001 series is an effective tool for improving organizational environmental performance and implementation of sustainable approach to energy management. The purpose of standards is to establish and implement a systematic management plan which is

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designed to continually identify and reduce environmental impacts arising as a result of organizational activities, products and services.

Eco-management approach may be particularly suitable because its implementation is a possible way to replace the widely used environmental control system based on legislation and controlling of the application of environmental and energy regulations. Eco-management systems can help organizations to integrate environmental efforts into everyday efforts, decision making and business practices.

Application of eco-managements system improves compliance with environmental regulations, prevents the organizations from making progress without taking into consideration environmental regulations so that in both cases it has positive effects on reducing the negative environmental impact. Nowadays, the number of companies in the world which tend to integrate the system of eco-management in their business strategies is rapidly increasing. They accept advanced technologies and achieve some savings. Systems of eco-management encourage companies throughout the world to consider environmental consequences of their operations and based on that define strategies which would help them to reduce waste, risks and costs.

#### **BASIC STAGES OF IMPLEMENTATION**

As other management systems, eco-management is a formal approach to setting goals, decision making, information gathering, measuring progress and improving business performance. Eco-management promotes important elements of planning and improvement which are required to make an impact on all forms of environmental pollution. In addition, certain elements of eco-management provide an opportunity for implementation of assessment and continuous evaluation by the management. *Implementation of the program of sustainable management of energy by application of eco-management approach consists the following stages:*

- identification of needs,
- policy and determination,
- planning,
- implementation and
- evaluation and consideration.

Eco-management approach is based on documented policy that includes three key principles: compliance with changing environmental regulations, pollution prevention and continuous improvement of environmental performance. In some cases, corporate policy can be complex and general, and as such less clear to

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employees and the public. Therefore, eco-management policy should focus only on three basic principles stipulated above.

Eco-management system identifies and adapts environmental, legal and voluntary standards related to the work of employees and business partners. Voluntary recommendations include pollution prevention program, health and safety prevention and sustainable development. The system of eco-management for the stipulated requirements and recommendations elaborates procedures on how to achieve objectives, and also determines environmental responsibility and the ways to respond to the requests of individuals, organizations and other interested parties.

Identification of all aspects and determination of their significance is usually the biggest problem in most companies. Because of that, the system of eco-management determines procedures necessary for identification of environmental impacts of business activities, products and services. Thus, most organizations are focused almost exclusively on their negative environmental impacts. Positive environmental impacts are also important, such as recycling and hazardous waste collection sponsored by the company.

The eco-management system establishes specific goals to implement P2 initiatives, ensures the participation of employees, as well as technical and financial support. In setting goals for environmental improvement of each business function in the company, the eco-management system recognizes existing environmental laws, recommendations and requirements of all stakeholders. The eco-management system is based on documented procedures for the prevention, detection, investigation, correction and reporting (internal and external) about active or potential environmental impacts and emergency situations. If the environmental incident occurs, the system of eco-management should be reviewed immediately and adjusted so as not to allow such incident to repeat. The eco-management system also provides for adequate training of employees, suppliers and other business partners. Organization should review the competencies and capabilities of its employees to meet the requirements of implementation of the eco-management system.

A particularly important factor in the successful implementation of the system of eco-management is the determination of the top management, who should accept that the system of eco-management is more adequate than other management systems. With this regard, top management should provide maximum efforts to implement eco-management as well as to review it periodically and to improve it. During the time, the investments in implementation of eco-management system prove justified, due to the improvement in environmental performance of business which satisfies all the parties involved.

### **IDENTIFICATION OF NEEDS**

The aim of the standard is to establish a common approach to eco-management which is internationally recognized. The ISO 14001 standard is a standard of the management system and not the standard for performance. Eco-management provides the system approach for the integration of environmental protection in the business functions and management strategies, primarily because it requires developing appropriate business policy by top management. Identification of needs consists the following stages:

- Identification of environmental compliance of procedures and techniques of management,
- Understanding current and future ecological orientation,
- Provision of valid information and
- Developing environmental plan for employees involved in the process.

Many organizations find it useful to make gap analysis of the existing energy system as an initial step in the development of the eco-management system. In this way the organization is able to review the current status of its own energy performance and to identify areas that require attention when applying eco-management system. Gap-analysis results provide a kind of benchmarking regarding compliance of organizational performance with ISO 14001. The gap analysis should include areas of business related to ecological systems as well as links between specific equipment.

Eco-management recommends organizations to coordinate their activities with relevant environmental legislation and regulations along with other recommendations. Eco-management system together with ISO 14001 recommendations is a good potential for achieving environmental efficiency and cost reduction. In this way, top management in the company would observe the system of eco-management as a way to achieve competitive advantage, and not as a place for incurring costs. Inclusion of top management in the procedures of policy development, considering the existing plan and ensuring the application of eco-management is a positive step.

### **ENVIRONMENTAL POLICY AND DETERMINATION**

The management is responsible to develop the vision and directions of development of energy system in accordance with the environmental assessment of performance. When defining the energy policy, the management should define the scope of observation and to ensure consistency with organizational vision, core values, goals and other efforts. The energy policy of the company should include determination to

implement pollution prevention program, harmonization of business operations with existing recommendations and continuous improvements of the system. Defining environmental policy can be summarized as follows:

- Defining vision and directions of energy policy development,
- Defining the scope and harmonization with the goals
- Determination for implementation energy policy and
- Determination to implement FMS policy.

Energy policy is used as a specific guide for developing and understanding organizational energy goals. Eco-management standard does not require defining specific energy goals. Instead, it provides general network for organization and implementation of goals which are necessary for improving energy performance.

After defining energy policy, it must be documented, updated and delivered to employees to use it. Many organizations already have developed procedures on internal and external communication with its own policy. Eco-management standard recommends announcing the energy policy of the company publicly. Many organizations already provide certain environmental and energy information in annual reports and plans for dealing with emergencies.

Eco-management system defines the procedure for responding to external demands for environmental and energy information, by which it determines who is responsible for contacts, who notes the date and the nature of the request, response, and whether and what kind of written material is sent in reply.

Eco-management also recommends that organizations develop and implement procedures for the purpose of internal communication with eco-management policy. Eco-management system and environmental aspects should be associated with all levels of organization and business functions that may have an impact on the environment. The procedure of internal communication outlines the responsibilities in the chain of communication that was developed for eco-management and environmental issues. Changes may include environmental information, such as review of the objectives, changes in procedures, environmental incidents, etc.

## **PLANNING**

Planning is necessary as the organization grows and as production lines change. Planning should go along with other business planning efforts. The stage of planning within sustainable energy management can be summarized in the following way:

- Eco-management planning,
- Identification of aspects and important influence,

- Identification of goals and targets
- Eco-management training and responsibilities and
- Developing energy program.

Insufficiently focused or badly managed efforts will inevitably lead to poor implementation of energy performance and higher costs. On the other hand, well-developed and effectively implemented programs lead to the achievement of high performance and cost reduction. Improved energy performance is an important benefit for most organizations that use the system of eco-management for development. Also, some organizations operate under the system of eco-management which systematically follows up environmentally relevant activities. The system of eco-management covers organizational structure, procedures, processes and resources needed to implement effective environmental management.

Top management appoints the company managers who will monitor the achievement of the objectives set out in the system of eco-management. Managers in charge monitor and evaluate the system and report to top management on eco-management activities. Coordinators work with lower organizational levels and try to generate new ideas that may lead to modification of the system of eco-management in terms of its improvement.

Teams are used to multiply the force of the organization. The team approach allows discussion and comparison of different viewpoints and opinions. It may be useful to form independent teams whose members will be selected from all levels of the organization. Involvement of people from different levels of business can only improve the overall efficiency of these issues. Clearly identified teams are of particular importance in the organization of activities and are opposed to individual business functions or independent work areas. These teams can be used for identification, evaluation and implementation of opportunities. Teams are empowered to take direct action, make decisions and initiate changes that will result in continuous improvement of the energy system in order to comply with policies and achieve organizational goals. Once the team has been established, it is necessary to clearly define the role of each individual in the team.

*The identification of aspects and significant impacts.* The system of eco-management is essentially derived from environmental problems and encourages organizations to systematically monitor the environmental impacts that result from carrying out their activities, products and services. This approach can be very effective and can encourage organizations to take a proactive and sustainable approach to managing their environmental impacts and programs. Aspects of impact are in fact elements of organizational activities, products or services which may affect the environment. The

organizational aspects may include generation of waste and pollution, use of resources, use and losses of energy and other environmental impacts. The standard proposes some basic planning activities that are used in most organizations in order to implement sustainable energy management, as follows:

- Identification of activities, operations, processes, products and services which have environmental impact
- Identification of legal recommendations in the field of energy which influence organizational activities, products and services
- Evaluation of ecological impacts of energy consumption according to the degree of importance
- Setting goals whose achievement reduces negative environmental impacts generated by the use of energy
- Selection and implementation of activities during the eco-management program which are necessary for achieving the desired goals.

During the procedures of identification and ranking of environmental impacts, planning can serve as a key element of the eco-management plan. Planned assessment is a systematic, periodic research of organizational operations designed to identify potential areas for change of energy performance. Properly designed system of eco-management can have a far greater range than the traditional approach to energy management. In order to understand all environmental impacts, the organization should consider the use of energy and water, conservation of landscape, the problem of noise and other impacts. In addition, organization may request information from its information suppliers about the content of certain materials, the method and type of packaging and methods of delivery. The procedure to identify aspects briefly includes the following:

- Process mapping
- Interviews
- Questionnaires
- Check-lists
- Benchmarking
- Cost-benefit analysis
- Life-cycle analysis
- Analysis of input-output balance

A particularly important aspect of environmental impact includes consideration of the state of the control systems in energy management. The organization should develop appropriate criteria for determining the degree of significance of these effects. Criteria may include regulatory activities, management costs and risks associated with the use of energy resources. The most important feature of these

criteria lies in the fact that they reflect organizational values stipulated in the business policy.

Identification of operations, as well as monitoring and measuring of activities which are associated with significant environmental impacts lead to the creation of procedures to minimize risks from environmental influences. A systematic approach encourages the organization to find new solutions and to identify different opportunities, and to surpass the traditional way of considering energy issues, according to which only people in charge of health and safety of employees deal with environmental problems.

Typically, organizations separate their own environmental impacts to the impacts on soil, air and water, and compare them with current regulations. This approach leads to individual problems and application of the so-called *end-of-pipe* strategies which consider only the consequences and essentially lack efficiency and are linked with higher costs. Corrections in terms of that increase efficiency and reduce costs.

The organization can have benefits if it includes its suppliers and co-operants into procedures of eco-management when it comes to important environmental impacts which they can make on the environment. It can turn necessary and useful to organize training for external colleagues if they directly influence environmental impacts. In this way, a forum of the two organizations is created which are trying to reconsider their own goods and services so as to improve them.

The organization may choose to modify the existing assessment tools or to develop its own procedures to identify all organizational environmental impacts and the level of their significance. Using teamwork during the planning process, as well as sticking to the list of activities and time frame is of particular importance. Possible improvements should be made first for the problems of the utmost importance. Finally, the importance of consideration of these issues beyond the organization and the existing regulations should be emphasized once again.

*Identification of objectives and targets.* The eco-management goals represent the most important place in the process of achieving the planned efforts to implement sustainable energy management (objectives and goals). *Objectives* are general environmental efforts that the organization wants to accomplish, while *goals* are detailed performances which are recommended in order to achieve the previously defined environmental efforts. Regardless of specific nature of some goals, they have to be consistent with the existing organizational environmental policy.

Program techniques are the most successful if achievable and measurable goals are set. In the stage of determining the goals, the organization should consider the



significant environmental impacts, such as energy consumption, legal and other regulations, public attitudes, technical abilities and flexibility of equipment. In this stage, the possibility to return on investment should be considered and business opportunities to correct its position in the market and gain profit. Eco-management approach encourages innovative solutions to the problems of using energy and materials at all levels of the organization. The objectives must be documented for all levels and business functions of the company which may affect the environment. The goals may be different at different levels such as the level of management, engineers, supervisors and operatives. In short, the eco-management standard recommends organizations to set their own goals to reduce harmful environmental impact, choose the activities necessary to achieve their goals and then to carry out continuous monitoring in order to correct and improve the system.

*Training and accountability.* After defining the goals it is necessary to conduct appropriate training. The employees must be familiar with their own environmental responsibility and therefore trained to behave in an environmentally responsible manner. Depending on the situation it is necessary to develop appropriate training that is required in order to achieve the desired objectives and integrate it into the existing environmental, health and safety programs. Training should provide opportunity to include all employees in the implementation of sustainable energy management. Experience has shown that quality training of the participants is one of the most important factors for successful implementation of the program.

Employees should be trained on the relevant procedures, their individual tasks and responsibilities, as well as be familiar with results which should be achieved in that way. Conducting training for all employees, the company will soon receive numerous proposals from the employees about how to improve certain activities. Depending on the nature of the program, each company will predict the level of knowledge and training that is required for each individual to be able to achieve environmental and energy requirements of their jobs.

*Developing energy program.* The last element of the planning within eco-management system is the formation of eco-management program. The program should contain an action plan, specified responsibilities at all organizational levels, the execution plan, timeline and resources required to meet objectives. Upon formation of the program, each individual who has been assigned certain responsibilities develops his/her own plan. Although the stage of achieving goals is separated from the stage of planning, they are closely related. It is necessary to have an idea in advance as to how the objectives can be achieved before the program is integrated into the company eco-management system.

The organization may have a different number of eco-management programs. Sometimes the company develops eco-management programs for all determined objectives. In other cases, the company establishes specific eco-management programs for regulatory aspects, solid waste, energy use, etc. Finally, each company should follow the implementation of eco-management programs and make adjustments as needed.

### **IMPLEMENTATION**

There is a clear need to conduct a careful evaluation of the ways in which the implementation of eco-management system would affect organizational energy performance. At this point it is necessary to decide how to incorporate the eco-management approach into the existing environmental regulations. The stage of implementation of eco-management system can be represented as follows:

- Implementation of eco-management,
- Operational control and
- Checking and corrective activities.

The first sub stage of implementation involves the development and control of documents. Today, most organizations have already developed procedures for monitoring energy processes, which include work instructions, training plan, the results of testing and monitoring and calibration instructions. It is important that organizations make their own documentation whenever it is appropriate. The documentation provides an answer to the question of how to perform certain actions and provides step-by-step instructions for task execution. System requirements have to be documented necessary for the operation. The documentation should be as clear and simple as possible.

If the instructions and the documentation do not add some value to operational control, are they necessary at all? It is realistic that detailed documentation is not required for all departments in the company. The main factor affecting the need for documentation and its scope is the risk and complexity of activities as well as the frequency of control which is necessary in order to perform a particular activity. Organization team needs to identify differences in relation to existing documentation and, if necessary, initiate the creation of new procedures.

Operational control develops procedures for performing certain activities, defines the operational criteria as well as preventive and corrective measures. Implementation of operational control is in the true sense the working part of eco-management system. Procedures are instructions which organization uses so as to implement environmental activities. Procedures determine who, what, when, where

and why does some of the planned activities. At this point, most organizations face a great number of problems. Since the developed procedures are extremely important, the organization will benefit if it properly determines what procedures will be documented and if it documents them in the form of guidelines for training and implementation. Written procedures are an essential element of operational control and if they are lacking, it often leads to large deviations and discrepancies.

An important step in the phase of operational control is the identification of individual business activities and functions that may have active or potential impact on the environment. Operational control that is specified for the most important environmental impacts helps the company define roles, responsibilities and authority necessary in order to achieve the desired performance. Quality operational control can be briefly defined as a procedure or a process within an organization which reduces the generation of waste and preserves natural resources.

If, for example, there is a change in the working process in which the waste is generated - air pollution due to using fossil fuels, it is necessary to adequately modify operational control. For example, by appropriate marking of materials and waste it is possible to reduce the risk of incorrect disposal of substances. If it properly separates and disposes the particular elements of waste, the organization can access the recycling or reuse of materials. Operational control should also ensure the proper use of equipment. In order to avoid possible failures and inefficiencies, preventive measures have been developed and implemented.

After the sub-stage of operational control, there is the sub-stage of checking and implementation of corrective actions. It is necessary to control each active system in order to see whether the system is working well, to identify current or potential problems and determine ways in which identified problems can be solved. Certain measures of environmental performance have been specified and according to the results, corrective actions are taken if needed.

## **EVALUATION AND OBSERVATION**

Eco-management system requires certain procedures in terms of monitoring and measuring energy performance, collecting information needed to monitor and assess the potential for achieving the goals and the assessment of compliance with environmental regulations. A particularly critical moment is the determination as to what should be monitored and measured and which information needs to be collected. As previously set goals are measurable, the whole process leading to their implementation must be monitored. The evaluation phase and observation of the functioning of eco-management system consists the following stages:

- Monitoring and measuring with corrective and preventive actions,
- Periodic observation of the implementation and efficiency by management and
- Improved readiness to react in hazardous situations and prevention.

Eco-management measurements are used as indicators of energy performance, and certainly must be in accordance with legal and other regulations. The number of indicators that will be established and monitored must be carefully determined. A large number of indicators may produce a huge number of information that surpass the abilities of the information processing system, while an insufficient number of indicators does not provide enough information needed for effective decision making. In order to conduct measuring in a high-quality way, it is necessary to determine who is responsible for monitoring, analysing, collecting and processing data, the frequency of measurement required to obtain quality information, the way the data will be analysed and the way in which the data would be presented.

The company may do monitoring every day or every hour, depending on the needs. Monitoring will be used to determine the existence and character of the trend so that deviation can be quickly and easily identified. Monitoring of the eco-management performance is specific in that it requires monitoring at different levels of work and business functions, i.e., it is focused on employees and their effects.

The review and improvement by the management is conducted in order to provide continuous improvement, which is one of the basic characteristics of the systems approach. Top management should periodically examine the implementation of eco-management system and its efficiency. Experience has shown that the efficiency of management directly affects the chances of successful implementation of eco-management system. Eco-management system is a business system that directs the organization to manage its environmental issues in a way that is based on continuous improvement. Eco-management system is focused primarily on the support to top management and involvement of all employees.

If discrepancies are identified during observation, the person responsible should determine the way in which adjustments will be implemented and how the system of prevention would be developed so as not allow the similar situations to repeat in the future. Readiness to respond in emergency situations is a necessary step because these situations can happen in the best-prepared organizations. In order to reduce the probability of such events to a minimum, the system of eco-management develops a system of procedures for the implementation of preventive measures.

Studies on the application of preventive and corrective measures and the ways of reacting in emergency situations must be integrated into the operational control procedures. Procedures may include various changes which are necessary to make,

from changes in the way of thinking of managers, to changes in the direct production. Preventive procedures should be perceived and updated when needed after an environmental accident or emergency situation.

## **CONCLUSION**

Energy management is in most cases planned in theory and implemented in practice in a traditional way by implementing the already established principles of management which can be applied to almost any other human activity. Classical management science has developed valuable and effective mechanisms for management in all sectors of human labour, in which, depending on the needs and specific nature of work certain adjustments can be made, but they are pre-determined and largely known in advance. Thus developed management, based on the learning of Stoner, Adzes, Dracker and other founders of modern management science, has greatly improved the business in the second half of the 20<sup>th</sup> century and increased efficiency and effectiveness of human labour in all areas where it has been applied.

Traditional management has been adapted to the modern business operations under the conditions of globalization and of controlled flows of people, goods and capital and it greatly enables the persistence of a certain system and socio-economic relations in the world community. With changes in social consciousness and the first criticism of the existing relations in the global economic and political scene, there emerges the need for certain changes in many spheres of interest for modern mankind. That imposes the need to make changes and adjustments in the field of management, which would empower this science to respond to challenges of doing business in the future.

Energy management is a particularly demanding challenge in all areas, especially in terms of the need to manage energy in a manner required by the modern world community, which is not a simple application of the process of management in the field of energy. With the increasing intensity of energy use in the world, from the second half of the 20th century, there has been a need to develop adequate energy management at all levels, where it is necessary to develop mechanisms that will react and adapt the whole process of management depending on the character and intensity of changes taking place in the environment.

The process of energy management can be seen in an extremely simplified way as a process that takes place from the moment of extraction of energy raw material to its final consumption and disposal of the waste energy. This process takes place in an extremely complex environment, it is subject to the impact of numerous different

factors and represents certain challenge in countries and regions where very stable conditions prevail and parameter changes are reduced to minimum. A particular problem is power management in the areas where frequent changes occur regarding the type and intensity. Moreover, particularly challenging is the attempt to develop a unique model for energy management globally.

With the introduction of the principle of sustainability, as the only principle of the development of mankind in the future, the issues of energy management are given a new dimension, which greatly differs from the traditional management and imposes the need for the adoption of new solutions. In the most widely accepted context, energy management involves the use of a sustainable model of strategic management in the field of monitoring of energy flows in terms of production, transport, transformation and consumption.

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