

TOP MANAGEMENT COURSE FROM THE PERSPECTIVE OF ITS IMPACT ON THE ACTIVATION OF ENERGY-SAVING ACTIVITIES IN THE ENTERPRISE

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ABSTRACT

Energy efficiency enhancement is one of the most important courses of works realization that is aimed at the increase of enterprises competitiveness in various industries and fields of activity, which is of particular importance in a globalizing world economy. One of the deterrents, which restrains activities enhancement processes in the field of energy saving and energy efficiency increase, is a relatively low priority problems to be solved compared to the other problems of enterprise development. The paper proposes one of the possible approaches to the investigation of different scenarios of the top management course of the enterprise and determination of the influence of the degree of the top management involvement into the energy saving process on the effectiveness of energy saving activities.

Keywords: strategic development, competitive advantage, expenditure of energy, elaboration of energy saving and energy efficiency enhancement program.

INTRODUCTION

Management of energy saving and energy efficiency occupies a special place in the system of enterprise development. Under the conditions of world economy globalization the efficient use of energy resources in the enterprise becomes its most important competitive advantage. All this predetermines the necessity to activate the sphere of energy saving and energy efficiency enhancement. Referring to the most important deterrent, many researchers point to a relatively low priority problems to be solved in the field of energy saving compared to the other problems of enterprise development. Therefore, it is not possible to achieve significant results without changing the attitudes of the senior management of the enterprise to energy saving and energy efficiency problems.

Existing methods of analysis and planning of energy services activities imply realization of all the operations that are usually carried out in the direction from the production processes level to the enterprise level [1], [7], [8]. At the same time, only technical and economic indicators are mainly considered as the primary criteria for decision-making in the sphere of production processes optimization [5], [9], [10]. However, the use of this approach, when solving the strategic tasks aimed at enterprise development, faces certain difficulties because it should be based on strategic expediency of decisions and should not be guided only by the current performance efficiency of the enterprise [11], [12].

The problem of involvement and support of the decisions, which are made by the top management of the enterprise when managing energy saving and energy efficiency, is still actively elaborated in various countries. However, a comprehensive approach to the solution of this problem has not been yet proposed till the present moment. Series of the latest investigations educe that it is very difficult to realize the existing energy saving potential in the enterprise without a direct participation and active involvement of the top management in a managerial process [6]. All these predetermines the necessity to look for possible ways to solve the problem mentioned, which is aimed at the increase of enterprises competitiveness under the conditions of a globalizing world economy.

FEATURES OF THE APPROACH PROPOSED TO INVESTIGATE A POSSIBLE TOP MANAGEMENT COURSE IN THE ENTERPRISE

Development of effective management actions, which are aimed at the improvement of effectiveness of energy economy functioning of an industrial enterprise, is one of the most popular subjects under discussion regarding the optimization of production processes. When investigating the energy economy of the enterprise, different methods of analysis are used, including the widely spread MIND method based on the use of mathematical models of mixed integer linear programming [2], its different variations [3], methods of investments optimization in the framework of energy efficiency enhancement of buildings [4] and many others. All these methods are generally directed towards the identification of cost-beneficial management impacts on production processes of the enterprise. This is their major advantage. However, this also limits the scope of their use. Their appliance is facing a number of difficulties in the situations where social, political or reputational effects are crucial. Therefore, the use of such methodological approaches in an industrial enterprise is limited by mid-level management, including production and technical services as well as financial and economic subdivisions. However, mid-level management in its organizational and functional nature is oriented primarily to address operational production problems and effective realization of manufacturing processes. This explains the emergence of a certain contradiction between the operational and strategic levels of energy expenditures management, which does not allow to realize energy saving potential to its full extent.

Solutions in the field of energy conservation and energy efficiency, which are optimal not only for production, but also for business development, as a rule, can be formulated and accepted only at the level of top management. In our opinion, only the involvement of senior management of the enterprise, which have full information about enterprise possibilities and market conditions, can completely fulfil potential of energy saving and energy efficiency enhancement, formulate and implement measures aimed at competitiveness increase, image strengthening and other strategic objectives of the enterprise.

We propose a methodological approach that allows us to investigate the problem of top management course, based largely on a market situation in the framework of which the enterprise is functioning, leaving outside the scope of consideration subjective features of top management behavior. The proposed approach is based on the thesis which claims the necessity to take into account different scenarios of the possible top management course in relation to the processes of energy saving and energy efficiency enhancement. We have defined five possible scenarios of enterprise management

behavior according to the degree of the dependence of enterprise competitiveness on energy saving and energy efficiency, as well as according to the manifested activity or passivity of the enterprise towards energy resources management.

Results of the undertaken analysis of the main features of the possible scenarios of enterprise management behaviour according to the three key criteria are indicated in Table 1.

Table 1. Comparison of possible scenarios of management course of the enterprise in the field of energy saving and efficiency enhancement management

Scenario of behaviour	Attitude of company's management to energy saving	Dependence of competitiveness on energy saving	Energy saving potential to improve competitiveness
1	2	3	4
Ignoring	Not engaged in energy saving.	Strong	Considerable but not used.
Expectant	Not engaged in energy saving, but under certain conditions is ready to reconsider their attitude.	Strong	Considerable but not used.
Active	Actively engaged in energy saving.	Strong	Considerable and used.
Neglecting	Not engaged in energy saving.	Weak	Inconsiderable and not used.
Far-seeing	Actively engaged in energy saving.	Weak	Inconsiderable but used.

In our opinion, it is precisely these scenarios that in many respects determine the model of company's management behavior and the nature of managerial decisions in the field of energy-saving activities. In turn, the company's management behavior model can be structured and specified with the help of "positioning of energy saving" notion which was introduced by us [13]. At the same time, under the term "positioning of energy saving" we imply a fundamental decision of the top management, which concerns the problem of energy saving within the system of managerial priorities of the enterprise, adopted by taking into account objectives, requirements, and the expected result from the implementation of energy conservation and energy efficiency enhancement campaigns.

We can distinguish three suggested options aiming at the positioning of energy saving in the enterprise.

1. Energy saving and energy efficiency enhancement as a solution to specific problems of energy sector. With such positioning energy saving is aimed at solving the problems related to elimination of existing shortcomings within the energy economy of the enterprise.

2. Energy conservation and energy efficiency enhancement as one of the ways of increasing the effectiveness of enterprise activity when implementing the investment programs for its development. In this case energy saving is positioned as one of many directions aimed at the improvement of the industrial enterprise performance, alongside

with such means as introduction of innovative technologies, modernization of production equipment, the introduction of new materials, etc.

3. Energy saving and energy efficiency enhancement as means of solving the strategic issues of enterprise development.

Positioning adopted by enterprise management allows us to formulate the enterprise obligations and target priorities within energy saving and energy efficiency enhancement sector. It is positioning that determines the behavior of the top management of the enterprise, as well as all the follow-up activities when planning, accounting and controlling the efficiency of energy saving measures.

APPROBATION OF THE APPROACH PROPOSED FOR SOLVING THE TASK AIMED AT THE FORMATION OF A PROGRAM FOR ENERGY SAVING AND EFFICIENCY ENHANCEMENT IN AN INDUSTRIAL ENTERPRISE

Let us formulate a mathematical model for solving the managerial task aimed at the formation of a program for energy saving and efficiency enhancement in an industrial enterprise using positioning. In overall mathematical statement such managerial task can be formalized in the next representation basing on the main theses of set theory:

$$I \xrightarrow{\delta} \tilde{I} \mid O(\tilde{I}) \in O, \text{ where} \quad (1)$$

I – an initial set of possible energy saving and energy efficiency enhancement projects, which includes such projects, each of them can potentially be implemented in the industrial enterprise.

\tilde{I} - a set of selected projects for energy saving and efficiency enhancement, which is the subset of the set I ($\tilde{I} \subseteq I$).

$O(\tilde{I})$ - an option of internal and external restrictions, applied to the implementation of a set of selected projects \tilde{I} .

O – a set of acceptable values with all possible restrictions.

δ - rules for the projects selection, according to which the contraction of the initial set of projects I to \tilde{I} is performed. Under the notion of the rules we imply the achievement of the optimal (rational) value of the objective function, so that internal and external restrictions are performed. Rules for the projects selection and the corresponding objective function are formulated on the basis of the option of energy saving positioning selected in the enterprise.

By giving the example of the enterprise dealing with the production of machine-tools and equipment, we have shown the possible ways to investigate the positioning impact on the top management decision-making in the field of energy saving and efficiency enhancement program setup. At the same time the setup of the projects in their final program is formed from a variety of projects, which can be divided into five groups shown in Table 2. Only three groups of projects out of five can be selected into the final program as the enterprise owners place budget limitations on their realization.

Table 2. Example of the initial set of projects aiming at the generating of the energy saving program in the enterprise dealing with the production of machine-tools and equipment

Group of projects number	Relative reduction in the specific energy consumption of the production process compared with the current value (in %)	Internal rate of projects profitability IRR (in%)	Impact on the sustainable position in overseas markets
1	2	3	4
1st group	2,5	10	Average
2nd group	3,5	16,2	Average
3rd group	4	15,4	Weak
4th group	0	12,4	Absent
5th group	0	8	Strong

Let us consider a mechanism used for the top management involvement into the process of energy-saving management in the framework of the transition from the "expectant" behavior scenario to the "active" one, i.e. the change in managerial behavior from the general support of activities to active participation in them. In order to strengthen the involvement of the top management in energy-saving activities it is necessary for the management to recognize the importance of these events and the subsequent positioning of energy saving in the system of managerial priorities. Let us consider each of the three proposed options of positioning us, as well as its impact on the managerial priorities in the formation of the energy saving and efficiency enhancement program shown in Table 3.

Table 3. Final setup of energy saving programs with different options of positioning

Group of projects number	Program setup with the 1st option of positioning	Program setup with the 2nd option of positioning	Program setup with the 3rd option of positioning
1	2	3	4
1st group	+	-	+
2nd group	+	+	+
3rd group	+	+	-
4th group	-	+	-
5th group	-	-	+

Each option of positioning has its own corresponding behavior model of the top management of the enterprise, which can be characterized by decisions made according to the setup of the activities, included into the program of energy saving and efficiency enhancement. Being used for each of the options of positioning, the behavioral scheme, which is formalized as the objective function δ , allows us to formulate a unique setup of program activities for each of these options; under conditions of existing financial and managerial constraints, this setup allows us to achieve maximal effectiveness from energy-saving activities.

In the example under consideration the personal involvement of top management of the enterprise dealing with machine-tools and equipment production in the processes of energy saving can be represented as a means of achieving managerial objectives and key performance indicators. This predetermines the necessity to consider the involvement of the top management in the light of the goals that are specific for an individual enterprise. Therefore, it is necessary to introduce the top management to various options of energy saving positioning, including the assessment of receiving effects at different levels of enterprise management and the required level of personal involvement. The use of positioning allows to structure targets and describe possible behavior models of the top management in terms of achieving the final result from the realization of energy saving programs. Having analyzed each of the three program options aimed at energy saving and energy efficiency enhancement, we came to the conclusion that, depending on the positioning of energy saving in the industrial enterprise, the top management can select a corresponding behavioral scheme that determines the setup of energy conservation and energy efficiency enhancement program. The generated program has an individual setup for each option of positioning as far as it is aimed at achieving various objectives of the top management of the enterprise. Moreover, the effectiveness of each program option is determined by various parameters with different means of their measurement and control. Thus, the efficiency of the energy saving program, which can be already determined at the stage of its formation, depends on the degree of involvement of the company's management in this process.

CONCLUSION

The proposed approach is based on the thesis which claims the necessity to take into account different scenarios of the possible top management course in relation to the processes of energy saving. We have proposed five possible scenarios of the enterprise management behavior according to the degree of their perception of the importance of the work in this area. On the basis of the proposed scenario approach the pattern of the enterprise management behavior was defined, structured and described using the notion of the "positioning of energy saving".

The article represents the results of the carried out approbation of the methodological approach proposed by us as applied to the solution of the formation problem of energy conservation and energy efficiency enhancement program. At the same time there were analyzed different positioning options for energy saving in the enterprise and relevant behavior patterns of top management, which were characterized by differences in the managerial decisions according to the set-up of the activities included into the energy efficiency programs. According to the approbation, there was confirmed the high dependence of energy-saving activities effectiveness in the enterprise on the degree of involvement of its top management in the process.

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