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ENERGY CONTROLLING: THE ESSENCE AND MAIN INSTRUMENTS

ЕНЕРГЕТИЧНИЙ КОНТРОЛІНГ: СУТНІСТЬ ТА ОСНОВНІ ІНСТРУМЕНТИ

ANNOTATION

The article discusses the main aspects of energy controlling at the enterprise. Author's definition of energy controlling is presented. The goals of energy controlling in enterprise energy management are given. The peculiarities of strategic and operational aspects of controlling are highlighted. The main tasks of strategic and operational energy management are determined. It is proved that instruments of energy controlling could increase the enterprise energy efficiency.

Keywords: energy controlling, controlling, energy management, energy resources, controlling instruments.

АНОТАЦІЯ

У статті розглянуто основні аспекти енергетичного контролінгу на підприємстві. Представлено авторське визначення енергетичного контролінгу. Приводяться цілі енергетичного контролінгу в управлінні енергетичним господарством підприємства. Виділені особливості стратегічного та оперативного аспектів контролінгу. Визначені основні завдання стратегічного та оперативного аспектів енергетичного менеджменту. Доведено, що інструменти енергетичного контролінгу можуть підвищити енергоефективність підприємства.

Ключові слова: енергетичний контролінг, контролінг, енергетичний менеджмент, енергетичні ресурси, інструменти контролінгу.

АННОТАЦИЯ

В статье рассматриваются основные аспекты энергетического контроллинга на предприятии. Представлено авторское определение энергетического контроллинга. Приводятся цели энергетического контроллинга в управлении энергетическим хозяйством предприятия. Выделены особенности стратегического и оперативного аспектов контроллинга. Определены основные задачи стратегического и оперативного аспектов энергетического менеджмента. Доказано, что инструменты энергетического контроллинга могут повысить энергоэффективность предприятия.

Ключевые слова: энергетический контроллинг, контроллинг, энергетический менеджмент, энергетические ресурсы, инструменты контроллинга.

Formulation of the problem in general terms.

Controlling is one of the most effective concepts of enterprise management today. Summarizing the definitions that are found in domestic and foreign economic literature, controlling can be defined as a system of relations and at the same time a set of tools that govern the activities of the enterprise and orient the employees' thinking in such a way that all the goals have been achieved [1, p. 18]. Thus, the concept of controlling offers solutions for improving the efficiency of enterprises by means of informational support for managerial decision-making.

Modern enterprises consume significant amount of different types of energy resources, including all kinds of natural and transformed

energy sources, such as fuel, electric and thermal energy. Energy resources are irreplaceable, and their shortage or absence can be a threat to the fulfillment of economic activities. Therefore, it is necessary to organize uninterrupted energy supply in every enterprise. This task should be carried out by the enterprise energy system. Its composition and structure depend on the enterprise size, its activities specifics, as well as the enterprise connection with external power systems.

In connection with the necessity to ensure the uninterrupted operation of energy supply, there is a need to create effective methods and implement effective mechanisms for enterprise energy system management. This will allow creating conditions for the rational use of energy resources for sustainable development.

Efficiency of solving problems from different spheres of the enterprise's activity allows us to distinguish different directions of controlling in separate functional divisions, in particular, energy controlling can be used to manage the enterprise energy sector.

Analysis of research and publications of recent years show great interest towards the problems of energy consumption and energy saving. The possibility of applying controlling instruments in enterprise energy management is studied in scientific works by O.A. Degtyareva, T.N. Shatalova, M.V. Chebykina, T.V. Zhirnova, E.Yu. Bobkova, etc. But in the same time the essence of the concept of energy controlling is still insufficiently covered.

Previously unsolved aspects of the problem. Nowadays the problems of using controlling tools in the enterprise management are given sufficient attention in the scientific literature. Nonetheless, it is necessary to point out the possibility of using special controlling instruments in the enterprise energy system.

Task definition. The main task of this research is to determine the concept of energy controlling. It is also necessary to define its specific instruments which can be used in strategic and operational aspects.

The main material research. The concept of «energy management» is increasingly used as a new approach to managing the energy system at a modern enterprise. In order to create energy-saving systems energy management provides an integrated approach to structural savings of various

kinds of energy. Energy management from a broad perspective can be seen as an instrument of general management with a universal set of controls energy consumption and costs to obtain it. With a narrow point of view of energy management – is planned system control and accounting of energy flows in order to minimize energy costs [2, p. 8].

Energy management in the enterprise energy system is aimed at solving common energy problems of the organization, such as minimizing costs, achieving reliable energy supply, reducing energy consumption, efficiency evaluation and applying successful experience in daily work. Using of controlling tools in enterprise energy management will allow expanding the energy manager's authority, establishing direct links between the energy manager and the enterprise management. The use of controlling in the energy system, in our opinion, contributes to its institutionalization within the enterprise, that is, to the allocation of a new direction of energy controlling. Energy controlling should become part of the overall enterprise controlling system.

Based on this, the following definition can be given: energy controlling is a system of methods and instruments for supporting energy management, which consists in planning, analysis and control, coordination and regulation, as well as providing information support for managerial decisions making to optimize processes of production, distribution, transmission and energy consumption at the enterprise [3, p. 40].

The allocation of energy controlling allows us to talk about the creation of an integrated energy management system using the fundamental principles of controlling. We can specify its goals as follows:

- analysis of the performance indicators of energy production, distribution, transmission and consumption, as well as control over compliance with their target values;
- planning of the results of the enterprise energy system operation, ensuring optimal use of energy resources, costs minimization;
- information support for the enterprise management for the best management decisions making;
- integration of the energy system activities into a single enterprise economic system in order to achieve its strategic goals [3, p. 40].

It should be noted that energy controlling can not exist apart from the overall system of controlling in the enterprise. That is, it is not effective by itself, but requires the interaction of all the controlling system components, since it is necessary to obtain complete and structured information for the enterprise management, providing end-to-end management of the enterprise. In order to integrate energy controlling into the overall enterprise controlling system, you can use the controlling instruments, which has a specific energy-saving character.

The main problem field of the controlling concept reveals its essence, namely it provides meth-

odological and organizational support to the enterprise management decisions, which is focused on set goals achieving. Since the enterprise activity is guided by both long-term and short-term goals, controlling as a system covers two aspects – strategic and operational. The essence of each of them was very laconically determined by A.M. Karminsky, N.I. Olenov, A.G. Primak and S.G. Falco:

– «Doing the right thing» is strategic controlling;

– «Doing the thing right» is operational controlling [4, p. 19].

Strategic controlling is necessary to ensure the effective enterprise long term existence, the formation and management of the organization's success potential. It is a kind of controlling, which interacts with the internal environment, strategic success factors, alternative strategies, strategic goals and determines the goals and objectives of operational controlling. The attention of operational control, in turn, is focused on the internal enterprise environment and its operational activities. It is defined as a kind of controlling, which coordinates the processes of achieving the organization's current goals, managing efficiency with the support of modern information system. Operational controlling provides management with methodical, informational and instrumental support and is the basis for strategic controlling success [1, p. 29].

Energy controlling, as well as other controlling areas, is also divided into strategic and operational. Strategic controlling solves the tasks of the enterprise energy strategy implementation, ensuring its long term viability based on managing its success potential. In this case, the success potential is a combination of a specific enterprise's energy-saving potential and using of alternative energy providing options.

Strategic energy controlling serves as a basis for operational energy controlling, where specific current (short-term) tasks are formed in the context of common goals. At the same time, the energy controlling service should focus on reducing costs and increasing energy efficiency.

The most significant tasks of strategic and operational energy controlling are presented in Tab. 1.

This list of strategic and operational controlling tasks is not exhaustive. It can be supplemented on the basis of the objectives of a particular enterprise energy system.

To implement the main assignments within the framework of energy controlling, the following tools can be used that will ensure efficient enterprise energy system management: ABC-analysis, budgeting, managerial accounting, energy balance development, energy use analysis (operational controlling); deviation management, portfolio analysis, scenario planning, a strategic alternative to «make-or-buy,» as well as investment calculations when introducing new technologies (strategic controlling) (Tab. 2).

Here are the main features of the considered instruments energy controlling application.

ABC analysis can be used in energy management, where the amount of energy resources used, as well as their suppliers groups and the cost of these resources and energy resulting amount, should be considered. This instrument makes it possible to investigate the costs in energy system in their places of origin. This instrument will help to identify key priorities in energy system and their compliance to the overall enterprise mission.

Energy balances can be developed both for individual processes and units, and for the enterprise as a whole. They should be developed, reflecting the overall picture of energy flows, namely, it will be possible to compare the amount of energy resources consumed with the amount of energy services received, as well as the amount of harmful side emissions.

Budgeting is the development, analysis and control of budgets. In energy controlling it is advisable to compile a number of budgets (budget of energy production by type, budget of energy

Table 1

Strategic and operational energy controlling tasks

Strategic energy controlling tasks	Operational energy controlling tasks
– Analysis of energy supply alternatives by internal and external enterprise environment assessment, identification of opportunities and risks, strengths and weaknesses	– Selecting key performance indicators of the enterprise energy system
– Development of possible strategic scenarios of enterprise energy consumption	– Calculation and comparison of performance indicators in accordance with the current objectives
– Development of «strategic map» for the energy system (identification of goals, activities and timeframe for achieving the energy strategy)	– Forming a balanced scorecard, monitoring the values of indicators and developing appropriate measures to improve them
– Evaluation of investment projects in the sphere of enterprise energy supply, investment programs justification	– Recalculation of cost and cash flow indicators for making operational decisions making
– Collection and analysis of information on energy saving of competitors and similar enterprises on the market	– Organization of information support for the energy management for operational decisions making
– Development of recommendations on the enterprise organizational structure, the responsibility centers formation, determining the location of costs	– Estimation of energy costs of enterprise units
– Evaluation of the enterprise energy management system efficiency	– Coordination of the unit's activities in the process of planning, analysis, control and regulation of costs
– Development of recommendations on model for construction processes of production, distribution, transmission and consumption of energy (for example, the choice between individual or centralized power supply)	– Identification of «bottlenecks» in the enterprise energy supply system for tactical control
– Strategic management of the energy system costs based on the value chain	Control of planned cost values achievements, deviation management
– Increasing the energy system efficiency through introducing employees motivation mechanisms, promoting energy saving, etc.	– Development of a system to stimulate compliance with targets and reduce energy consumption

Source: [5, p. 225-226]

Table 2

Assignments and instruments of energy controlling

No	Assignments	Instruments	Scope of application
1	Establishment of correspondence between the energy management goals and the general enterprise goals	ABC-analysis	Allocation of priorities in the energy management and determination of their compliance with the enterprise's mission
2	Increasing of economic efficiency of the energy resources use	Energy balance, budgeting, managerial accounting	Cost management of energy production and using
3	Reduction of dangerous emissions level associated with traditional energy resources use.	Energy use analysis (operational controlling), portfolio analysis (strategic controlling)	Calculation of energy consumption per unit, the emissions level from energy use. Achieving the sustainable development goals
4	Improvement of internal business processes on the energy use	Benchmarking	Study of the successful experience of similar enterprises in the field of energy use
5	Initiation, development and control investment projects for traditional energy sources replacement with alternative	SWOT-analysis, scenario planning, «make-or-buy» decision, investment calculations	Substantiation of transition to alternative energy sources efficiency, planning, analysis and control, as well as coordination of this activity

Source: [6, p. 88]

reserves, etc.) that will ensure transparency of cash and material flows associated with energy production and consumption.

Managerial accounting is a system of accounting, planning, control, analysis of data on costs and results, prompt decision-making in order to optimize the enterprise financial performance. If we consider energy system of non-productive enterprises, it applies to the center of arbitrary costs at the enterprise. In this case, managerial accounting is primarily directed at cost management. The most significant indicators that characterize the performance of enterprise energy system will be the share of costs for energy system activities in enterprise total costs, as well as net cost of the energy system, which is accounted for the cost of services provided.

The analysis of energy resources use is carried out to identify alternative energy resources that can be used for energy production, and also to search for energy efficiency reserves at the enterprise. Based on the results of the work done, it is possible to improve on a number of performance indicators for the energy system.

The portfolio analysis use allows increasing the level of enterprise strategic planning. Applying in energy controlling, on the one hand, it will allow using the enterprise potential most effectively, and on the other, minimizing risks. With the help of portfolio analysis, enterprises are divided into strategic business units and analyzed them separately from each other. Strategic business units are positioned in strategic segments, which allows to develop an independent development strategy for them, which will best allow the energy resources use, taking into account the identified chances and risks.

Benchmarking (benchmark assessment). Analyzing the activities of competitors in the energy sector, comparing the indicators that characterize the energy efficiency level, the enterprise should find options to improve its energy system performance, using the experience of other enterprises that is suitable for it. This tool will allow you to monitor the main trends in energy sector, quickly adapting to changes.

SWOT-analysis allows to identify the strengths and weaknesses of the enterprise, its opportunities and threats, as well as to establish links between them. This tool is appropriate to use in the analysis of the energy system work, identifying the main development areas and the main problems and showing how critical they are to the enterprise.

The strategic alternative «make-or-buy» in energy controlling acquires a new meaning. The choice between own production and the purchase of services from the outside is transformed into a choice between joining a centralized energy supply system or autonomous energy supply. Given the enterprise scale, the amount of energy consumed, the energy services cost, the available space and the amount of financial resources, the

enterprise management should decide what kind of energy services should be supplied from outside and choose suppliers.

Investment calculations should be used in energy controlling, when investment projects are initiated that ensure the enterprise long term success. The necessity of using this tool is provided by the task of reducing the risks associated with the enterprise adaptation to changes. Investment calculations allow to evaluate the implemented investment projects, relying on the expected result from their implementation [7, p. 111-112].

Operational controlling tools do not guarantee consistency in the enterprise long-term operation, because they are used mainly to adapt to changes in the external environment. Therefore, the focus for the future of strategic controlling helps the enterprise to use its existing strengths and advantages, as well as to apply timely measures to strengthen the weaknesses and prevent risks to create new potentials for successful operations.

At the present stage, it is the controlling can be applied to more effective management of the enterprise energy system for transition to sustainable development. The use of basic controlling principles in this sphere will be able to guarantee the production management and energy consumption in accordance with the enterprise objectives, will increase the efficiency of energy resources use, thereby increasing the efficiency of the enterprise as a whole.

Conclusions. Currently, controlling is becoming one of the leading management approaches that can make a significant contribution to improvement economic efficiency of both the enterprise and its energy system, in particular. The use of controlling instruments in business practices moves management to a qualitatively new level.

The enterprise controlling is an integral system, and the energy controlling subsystem can reproduce its structure in a functional section, taking into account the features of energy system operation. The energy system activities will be coordinated in connection with other enterprise units, that is, controlling will ensure the enterprise system components integration into a single whole. Thus, energy controlling can become a new perspective direction in the enterprise energy management, which corresponds to the growing need to increase the efficiency of the energy resources using.

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