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VALUE APPROACH TO THE FORMATION OF POWER PLANT DEVELOPMENT PROGRAMS

I. Trifonov (a)*, N. Cherepovskaya (b)
*Corresponding author

(a) Financial University under the Government of the Russian Federation, 127083, Upper Maslovka street, 15, Moscow, Russia, ITrifonov@fa.ru
(b) Financial University under the Government of the Russian Federation, 127083, Upper Maslovka street, 15, Moscow, Russia, NACherepovskaya@fa.ru

Abstract

In modern conditions, the system of strategic management of the organization provides for the formation of strategic development programs with specific measurable goals. The procedure of strategy development at energy-intensive enterprises (power plants) involves the integration process of approximation to optimality by comparative analysis of the effectiveness of different variants of design alternatives. At the same time, the criterion of optimality is the energy efficiency of new (modernized) technologies of the enterprise as a result of the formation and implementation of development programs from the point of view of energy saving, ecology, quality. The main goals of the power plant development programs are as follows: reducing energy consumption, increasing stakeholder satisfaction, and more efficient use of all enterprise resources. The authors note that the practical application of the foundations of the value-based approach to the formation and implementation of programs at power plants will make it possible to find additional factors for saving electric and thermal energy. This study formulated a hypothesis that the use of value criteria from the point of view of consumers of final products in the formation and implementation of energy conservation programs, the use of additional criteria of resource limitations on their basis, will make it possible to make effective management decisions already at the stage of ranking and selecting projects for strategic programs.

Keywords: Management strategy, programs, energy efficiency.

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1. Introduction

For industrial sectors (including power plants), the problem of efficient consumption of available resources is especially important, and the goal of the energy conservation program can be achieved by using new approaches and technologies that increase the energy efficiency of production. The process of making changes in energy efficiency is multi-stage. The energy management system should include the development and implementation of effective strategies to achieve goals and reduce risks in relation to energy efficiency (Malinauskaite et al., 2019; Soepardi & Thollander, 2018; Li, Chiu, & Lin, 2019). It is a procedure for observing, managing, and conserving energy in a building, organization, or distribution system (Trianni, Cagno, Bertolotti, Thollander, & Andersson, 2019). It integrates the process of selecting from a set of sources that are capable of generating energy that will deliver energy to a set of loads by reducing losses and costs (Schulze, Nehler, Ottosson, & Thollander, 2016). Economically, measures to improve energy efficiency in organizations are not always implemented, which contributes to the gap and creates various barriers to the implementation of efficiency measures (Brunke, Johansson, & Thollander, 2014). Timely adjustment of plans and goals is a response to changes in the internal and external environment of the organization (Trachuk & Linder, 2016). As a rule, mixed design decisions are made to attract investment in the production sphere of the organization (Shinkevich, Lubnina, Koryakov, Mikhailov, & Vodolazhskaya, 2016). To be included in the management decision-making process for the implementation of energy efficiency stages in the industry, an idea is necessary, to diagnose, make decisions and assess, then make a choice and take it for implementation. The areas will be: the specifics of the organization, taking into account its potential, measures (obstacles and drivers) and methods to improve energy efficiency (Finnerty et al., 2017).

2. Problem Statement

The strategy of the organization is implemented mainly through a specific program, which is formed in almost every enterprise, but it should be noted that in most cases, the presence of certain techniques (design practices) for its implementation is fragmentary. In assessing the effectiveness of programs, it is often necessary to perform a number of operational tasks within stationary technological processes (in particular, rationing and accounting for energy consumption at each stage of the production process).

3. Research Questions

If we consider the program as a component of strategic changes, then from the point of view of evaluating the effectiveness of this program (in this paper, it is reducing the energy consumption used by the power plant) for the chosen strategy within the framework of the value approach, in addition to generally recognized performance criteria (time, quality, finances), the following performance criteria: the value of the excess water costs per 1 monetary unit of the finished product; compliance with the technological regime of power plants; reduction of energy resources losses per 1 monetary unit of finished goods; improvement of management accounting systems. All these indicators are relevant for the energy conservation strategy at the enterprise.

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4. Purpose of the Study

At energy-intensive enterprises, where the research was carried out, the following approaches to combining process and project activities of the enterprise, which involve:

a) structuring the operating activities of the enterprise. The content of the stage is a formal description of the organizational and functional structure of business processes. The result of it is to determine the owner of the process. It is this person who is responsible for the outcome of the whole process, and will decide in what form to carry out the implementation of this process;

b) creation of mechanisms of implementation of processes by means of program-oriented management. The content of the stage is the adaptation of the enterprise management system to the implementation of projects and programs, the formation of regulations for the interaction of process owners with project managers.

5. Research Methods

Program management is a more complex task than managing individual projects. This is due to the fact that the program has a specific goal, and in fact it combines all the projects of the program. The goal (s) of the program are closely interlinked with the performance criteria of individual program projects. This factor allows the decomposition of the goals of the program. It is especially important to do this in programs related to the business cycle of the enterprise, and if the company uses a system of balanced indicators, then some of these indicators may be the goals of the program. It should be noted that considering the program as additional actions beyond project management, these actions should, in fact, lead to the creation of value on the basis of a unified methodology for conducting strategic changes at the enterprise.

Recently, at most enterprises that use the unified methodology for project and program management, separate units of the “Project Management Office” have been created, which are delegated the authority to manage the enterprise’s programs: energy saving, quality and environment, etc. At the second stage, a systematic view of the energy saving program was formed, the criteria of value were determined and the classification of energy saving program projects was carried out. The most important criteria for the value of the future project are organizational criteria: study of energy saving reserves, motivation of employees, organization of project and program management system; and technological criteria: repair, replacement of equipment with new ones, construction and installation of systems (heating and ventilation, water supply), installation of additional equipment, installation of alternative energy sources.

According to the method of achieving energy savings, the projects were classified in two directions: reducing energy consumption and increasing the utilization rate of fuel and energy resources. According to the type and composition of the planned economic effect the program was divided into projects:

- not affecting the production process (the effect of implementation can be achieved by reducing energy losses and costs of production, transmission and distribution of energy in heat and power plants and boilers);
- influencing the production process (the effect is achieved due to cost reduction in the production of);

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- not affecting the technological process (the effect is achieved by reducing operating costs in auxiliary production);

- process (the effect is achieved by saving energy and reducing operating costs in the main production);

- increasing the reliability of technological units (the effect is determined to prevent losses from low-quality power supply).

The analysis revealed the tasks related to the objectives of the program: testing networks, elimination of breakthroughs, bypass heating lines, inspection of heat chambers, pumping water, control of the coolant, pumping coolant into the system, water treatment, control of the level of clogging of systems in residential buildings, flushing of internal heating systems, purging of internal heating systems, control of heating devices, replacement of heating equipment, breakthroughs of mixers, audit of valves, replacement of valves; control the amount of heat, control of heat losses in the network, replacement of worn insulation, frayed insulation monitoring, the insulation of siteprovides, control the diameter of the pipe networks, partial replacement of the backbone networks to the appropriate pipe diameter, a complete replacement of the backbone networks on the pipe of appropriate diameter, control over the soaking insulation coating, the insulation coating restoration, drainage structure, availability control narrowing cracks in residential buildings, monitoring of recycling, recovery recycling, installation of a nozzle according to hydraulic calculation.

The mathematical apparatus for the third stage is presented in earlier (Trifonov, Cherepovskaya, Trifonov, Korneeva, & Ksenofontov, 2019). The obtained assessment allows to obtain two components of the assessment: the assessment of product manufacturing technology and the assessment of customer satisfaction, the assessment of stakeholder satisfaction.

6. Findings

At the first stage of the proposed methodology (project practice) formed:

1) Many projects of the energy saving program in the direction «Reduction of loss of coolant in the networks» (X): tests of networks, the elimination of breakthroughs, the bypass of heating, inspection, heat chambers, water pumping, control of coolant pump coolant in system, water treatment, monitoring of the level of clogging of the systems in residential buildings, flushing the internal systems, purge systems of internal control over heating devices, the replacement of heating devices, breakthroughs mixers, revision of valves, replacement of valves.

2) Many projects of the energy saving program in the direction «Reduction of heat losses in networks» (Y): controls the amount of heat, heat losses, replacement of worn insulation, control of worn-out insulation, insulation of siteprovides, control the diameter of the pipe networks, partial replacement of the backbone networks to the appropriate pipe diameter, a complete replacement of the backbone networks on the pipe of appropriate diameter, the control of soaking the insulation material, the insulation coating restoration, drainage structure, control over the presence of narrow cracks in residential buildings, installation of nozzles according to hydraulic calculation, recirculation recovery.

3) Many projects of the energy saving program in the direction «Control of the effects of loss of coolant and heat networks» (Z): crawl heating inspection heating chambers, control of coolant, control

over the level of clogging of the systems in residential buildings, the control of heating devices revision of the existing rebar constipation, control the amount of heat control for worn insulation, control the diameter of the pipe networks, the control of soaking the insulation material, availability control and narrowing of cracks in houses, control of availability of recycling.

The set of characteristics of the product of DTEK (heat supply service) on the following properties is defined: temperature at the consumer, gas consumption for heating of the heat carrier, water consumption, energy costs for delivery to the consumer.

7. Conclusion

According to the results of the study, it was concluded that the most significant problem in implementing the energy saving strategy at enterprises (power plants) is a low rating of customer satisfaction (this rating ranges from 57.81 to 66.41).

The proposed and tested method for assessing the effectiveness of the energy conservation program at enterprises (power plants) allows us to determine the value of the program based on an alternative comparison of individual projects already at the stage of its formation. This method will allow the program manager to make informed decisions when selecting projects for the program based on the proposed performance criteria.

References

Brunke, J. -C., Johansson, M., & Thollander, P. (2014). Empirical investigation of barriers and drivers to the adoption of energy conservation measures, energy management practices and energy services in the Swedish iron and steel industry. *Journal of Cleaner Production*, *84*, 509-525. https://doi.org/10.1016/j.jclepro.2014.04.078

Finnerty, N., Sterling, R., Coakley, D., Contreras, S., Coffey, R., & Keane, M. (2017). Development of a global energy management system for non-energy intensive multi-site industrial organisations: A methodology. *Energy, 136,* 16-31. https://doi.org/10.1016/j.energy.2016.10.049

Li, Y., Chiu, Y. -H., & Lin, T. -Y. (2019). Energy and environmental efficiency in different Chinese regions. *Sustainability*, *11*(4), 1216. https://doi.org/10.3390/su11041216

Malinauskaite, J., Jouhara, H., Ahmad, L., Milani, M., Montorsi, L., & Venturelli, M. (2019). Energy efficiency in industry: EU and national policies in Italy and the UK. *Energy, 172*, 255-269. https://doi.org/10.1016/j.energy.2019.01.130

Schulze, M., Nehler, H., Ottosson, M., & Thollander, P. (2016). Energy management in industry – A systematic review of previous findings and an integrative conceptual framework. *Journal of Cleaner Production*, *112*(5), 3692-3708. https://doi.org/10.1016/j.jclepro.2015.06.060

Shinkevich, A. I., Lubnina, A. A., Koryakov, A. G., Mikhailov, V. G., & Vodolazhskaya, E. L. (2016). Economic aspects of risk management of stakeholders activities. *International Review of Management and Marketing. 6*(2), 328-332.

Soepardi, A., & Thollander, P. (2018). Analysis of relationships among organizational barriers to energy efficiency improvement: A case study in Indonesia's steel industry. *Sustainability*, *10*(1), 1-13.

Trachuk, A. V., & Linder, N. V. (2016). Liquidity limitation influence on industrial companies' investments in investigations and development and effectiveness of innovative activity. *Strategic Decisions and Risk Management, 1*, 80-89. https://doi.org/10.17747/2078-8886-2016-1-80-89

Trianni, A., Cagno, E., Bertolotti, M., Thollander, P., & Andersson, E. (2019). Energy management: A practice-based assessment model. *Applied Energy, 235*(C), 1614-1636. https://doi.org/10.1016/j.apenergy.2018.11.032

Trifonov, I., Cherepovskaya, N., Trifonov, P., Korneeva, I., & Ksenofontov, A. (2019). Making management decisions based on value criteria when developing programs for energy-intensive enterprises. *International Journal of Recent Technology and Engineering (IJRTE)*, *8*(1), 2154-2160.