

The volume of expenditures for carrying out works from 1 to P level where the volume of allotted budget is the boundary condition (P) is designed by the methods of discrete calculation. Thus, the system of determining repair works which may be fulfilled for the planned period is formed.

All the automated systems controlling maintenance and repairing proposed on the market and enterprise management standards on the basis of ERP-systems do not include problem solution set in this work as well as

they do not consider this problem. Standards of ERP-systems (including CSRP, MES) solve the problems where the repair is considered as indivisible unit of purposes, tasks, resources and standards help the enterprise management to answer the question «what is the sum for repairing?». Modules of controlling maintenance and repairing included into many corporation information control systems automate the processes of repairing organization and fulfillment and help not only to carry out the repair work but to organize it more efficiently.

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«ENERGY SUPPLY» AND «ENERGY EFFICIENCY»: SPECIFICATION OF CONCEPTS, THE SYSTEM OF BALANCED PARAMETERS OF «ENERGY EFFICIENCY»

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On the basis of analysis of concepts «energy supply» and «energy efficiency» the inadmissibility of their identification has been shown. Parameters for quantitative characteristic of these concepts are specified. For the first time it is offered to use the system of balanced parameters of energy efficiency for developing norms of electric energy consumption.

In the papers devoted to the problem of efficiency of using energy resources, «at all stages of their life cycles» – from generation to consumption of end products (electric and thermal energy) – two concepts denoted by the terms «energy saving» and «energy efficiency» are used [1]. However, there is a great difference of these terms among the specialists; therefore, in some articles they are used as the same and in others the term «energy saving» is rejected. The supporters of the second position suppose that energy should be consumed in volumes required for implementation of your demands, i.e. not to save but to use it efficiently and on this basis, identifying these two terms they propose to exchange the term «energy saving» by the term «energy efficiency». It is supposed that such difference occurred as a result of the fact that a serious uncertainty was admitted at interpretation of the term «energy efficiency» in the Law of the RF «On energy saving» [1]. The following explanation of these two key concepts:

- «energy saving» is the implementation of legal, scientific, engineering and economic steps directed to the efficient use of energy resources and involvement of the secondary or renewable energy resources into economic circulation.
- «energy efficiency» is the achievement of engineering capabilities and economically justified efficiency of using energy resources at the existing level of development of technology is given in the Law.

It is not difficult to see that «implementation» in the first explanation and «achievement» in the second one mean the same thing; a certain complex of actions (measures) directed to increase of quality (efficiency) of consuming energy resources. Such understanding of the first term is not objected. As for the second one, it should be taken into account that the term «efficiency» in all spheres of human activity is used for defining the achieved quality (efficiency) of realizing the aimed actions and engineering processes. In concrete cases the

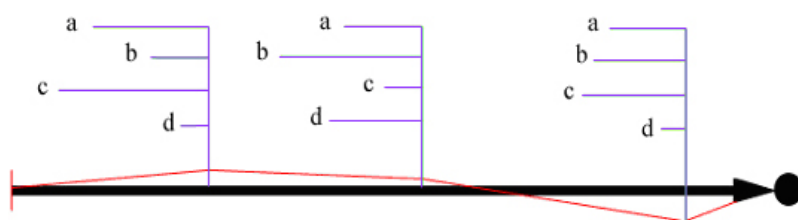


Figure. The strategy of achieving the aim and indices balance (the company strategy objective is denoted by bullet point)

«efficiency» is reflected by such quantitative indices as «utilization rate» and «displacement power factor».

«Energy efficiency» is possible and useful to be characterized as well by a quantitative parameter, for example, «energy efficiency ratio» ($\mathcal{O}$).

In general form, the energy efficiency ratio may be introduced as:

$$\mathcal{O} = \frac{W_{\Pi}}{W_{\Pi} + W_{HII}}, \quad (1)$$

where W_{Π} is the effectively used energy, W_{HII} are the nonproductive expenditures, $W_{\Pi} + W_{HII}$ is the total energy generation.

Energy efficiency ratio depends, in its turn, on a great number of indices such as: specific discharge for product manufacturing, efficiency and machine loading.

$$\mathcal{O} = f(x_1, x_2, x_3, \dots, x_n), \quad (2)$$

where, $x_1, x_2, x_3, \dots, x_n$ are the energy efficiency indices.

Identifying the expressions (1) and (2) and using the instruments of mathematical and (or) statistic analysis, the optimal indices of «energy efficiency» may be theoretically determined varying the value of nonproductive consumption of energy resources in the region of its acceptable values.

The task of determining optimal indices of «energy efficiency» is current for development of energy consumption rate reflecting sufficiently the engineering process or a chain of sequential engineering processes. The system of balanced indices of enterprise energy efficiency the prototype of which was developed in 90-s of the last century by the American scientists-economists R. Kaplan and D. Norton is suggested to be used for its solution [3]. This system was successfully applied in management of the whole enterprise and its separate process.

The fundamental idea of the system of balanced indices of energy efficiency consists in considering the enterprise activity as a whole from four different points of view-perspectives: financial (a), industrial – electric energy quality (b), processing – inner engineering processes (c), as well as staff training and development (d), in the frame of which the company aims are formed (Figure).

Singling out such perspectives has obvious and clear inner logic: the better the staff proficiency and techniques (perspectives of development) are the sim-

pler to support the efficiency of the enterprise inner processes. It serves, in its turn, to such production organization which meets the providers and suppliers interests and promotes as well the manufacturing quality product satisfying the consumer demands. All these things provide the achievement of the desired financial plans including the obtaining of gains, benefit, money flow activation.

The process of achieving the energy consumption ratio may be considered as a business process conditioned by a number of indices and the difference between the target ratio and actual energy consumption – as a benefit or loss expressed in absolute (money) or relative values. Application of these instruments allows forming the objective system of criteria and estimates and providing coordination of different levels of controlling the energy consumption process. The efficiency factor of the process, in other words, «energy efficiency coefficient» may serve as the main criterion of success in the process of increasing the energy efficiency. Using this parameter requires the formation of enterprise objective system. In respect to the balanced indices technique three objectives should be stated in terms of *business-aims*, *critical success factors*, *functional objectives* and *events (actions)*, necessary for achieving success.

Target value of activity fundamental index is the efficiency numerical value; its actual achievement means the achievement of success in proper field of activity on certain time interval.

The process of increasing the efficiency of electric energy consumption may be automated.

«Energy saving» as implementation of measures in increasing efficiency of using energy resources, electric and thermal energy is characterized by its set of indices reflecting, virtually, the economy potential determined as a result of energy inspection and energy audit.

Some of them are estimated on the basis of indices of «energy efficiency», the other have independent specific value. The most often used indices at energy inspections are:

- the value of energy saving potential by certain energy resources in denominated and relative units;
- economic effect of implementation of energy saving actions;
- payback time of energy saving actions;
- the rate of possible use of secondary energy resources;

- the value of possible economic effect owing to transformation of certain productions or engineering processes to other kinds of energy resources.

The results of energy saving actions, rate of specific energy resource consumption, multiple energy balance and balances by certain kinds of energy resources may serve as the information sources for obtaining indices of «energy saving».

Thus, in practice of energy saving potential implementation by manufacturers and consumers of energy

carriers both concepts «energy efficiency» and «energy saving» with their quantitative indices should be used. Indices referring to «energy efficiency» characterize the existing (or the achieved) level of efficiency of using energy resources and energy; the efficiency of actions for increasing «energy efficiency» refers to «energy saving». In this connection, the term «energy efficiency» should be interpreted as technologically possible and economically sound quality of using energy resources and energy at the existing level of technology development.

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