Priority directions of the improvement of energy management at the enterprise

Galina Dyakova¹, Svetlana Izmaylova¹, Angela Mottaeva² and Elena Karanina³

¹Russian new University ROSNOU, Radio str., 22, Moscow, 129300, Russia
²Moscow State University of Civil Engineering, Yaroslavskoe shosse, 26, Moscow, 129337, Russia
³Vyatka State University, Moskovskaya str., 36, Kirov, 610000, Russia

E-mail: doptaganka@yandex.ru

Abstract. The relevance of article is caused by the fact that at the industrial enterprises pay little attention to the matters of energy saving or to the management of energy efficiency. The authors of the article defined that the potential of the increase in energy efficiency as well as the improvement of quality of strategic management at the enterprise, is connected with investment into the human capital. For the improvement of system of energy management, the key indicators of energy efficiency at the individual level are defined, the algorithm of the development of key indicators by means of which the energy efficiency of the human capital will be measured is developed, actions for support to the developed transitional strategy of power management are offered, positive results of formation of the human capital directed to increase in energy efficiency are designated.

1. Introduction

Most research by Russian and foreign authors in the field of energy management, such as B.N. Abramovich, Brener M. With, Voronina O. In, T. Guldbransena, Dabdina O. In, Kirzhanova K. N, Yu.B. Klyueva, V.A. Koksharova, V.R. Okorokova, B.E. Ratnikova, Halldorson A., Svanberg M., Kals J., Würtenberger, etc. is devoted to the matters of studying of regional energy supply systems and problems of energy efficient functioning of the production systems from the use of energy resources.

At the same time, at any industrial enterprises from the point of view of creation of systems of management, little attention is paid to the matters of energy saving or to the management of energy efficiency. One of the perspective directions in this area (along with management of energy infrastructure) is management of innovative activity and motivation of personnel for energy saving. Meanwhile, the potential of strategic energy management can be realized through the sphere of management of the human capital of the enterprise due to attraction of intellectual and creative potential of employees for the solution of problems of energy saving. The similar directions are the additional reserve in increase in energy efficiency and at the same time they belong to the technologies of social and labour management and accumulation of the positive human capital.

2. Methodological approaches and analysis

Rational management of the human capital of the personnel is the basis of innovative development of the technological component of energy efficient production.
The most important problem of the development of the human capital of the industrial and production personnel in the field of energy management is also the formation of system of indicators of energy efficiency of the employees.

For the measurement and assessment of energy efficiency of the human capital it is necessary to create some strategic indicators of energy efficiency for the inclusion it into the general system of the balanced indicators of the enterprise’s activity.

One of the indicators of energy efficiency of the employees at the strategic level, offered by the authors, is the specific energy consumption, which can be calculated as the equivalent of full employment (EFTE):

\[ EFTE = \frac{QE}{N \times TP/TF} \] (rub, kW ort )

Where
- \( QE \) – cumulative energy consumption of division in value terms (for technical rationing natural indicators – kW • are used h or tons of conditional fuel, for the economic analysis the indicator is expressed in rubles), annually;
- \( N \) – quantity of employees (temporary and constant, regular) the surveyed division, people;
- \( TP \) – the actual quantity of hours, fulfilled by all the staff of the division, hours per month;
- \( TF \) – potentially possible quantity of hours, fulfilled at full employment (40 hours per week), hours per month.

This indicator will allow to determine the energy consumption level at the enterprise at full employment of all employees and to create areas of responsibility when developing programme of individual energy efficiency of the industrial enterprise.

Besides, the processes of involvement of the human capital assume formation of the centers of responsibility in the field of energy saving along with formation of individual responsibility and interest. That is the definition of key indicators of energy efficiency at the individual level. The technical framework defining a responsibility zone are separate administrative and production business processes in which energy resources are involved. For some categories of personnel indicators of individual energy efficiency can be established with evidence.

For the realization of a similar action it is necessary to offer any algorithm of development of key indicators by means of which the energy efficiency of the human capital will be measured. The algorithm (figure 1) offered by us includes consecutive development of key indicators of energy efficiency taking into account quality of quality of a product and optimization of all types of the used resources.

3. Result
The conducted research and the offered algorithm of development and introduction of key the indicators of energy efficiency have allowed to mark out the following results:

- at the level of technicians the energy efficiency indicators connected with the features of productions and necessary for the identification of potential of energy saving due to identification of important processes and sources of expenses of resources are defined. Determination of structure of the power-intensive equipment and technological installations forms a basis of identification of significant sources of energy consumption. Determination of target categories of personnel for establishment of indicators of efficiency happens on the basis of the principles of transparency and binding of potential of energy saving to a human factor. It is also revealed that negative organizational factors can influence increase in energy consumption regardless of actions of some performers.

- at the level of managerial personnel concepts of efficiency of teams of management are established. Concrete indicators of administrative energy efficiency can belong to the category of offers, the introduced improvements in administrative and organizational structure. The overall performance of the team also depends on the steady communications among certain performers.

The results of introduction of the key indicators of energy efficiency at the individual level are presented in figure 2.
Figure 1. Algorithm of the development and deployment key indicators of energy efficiency
Figure 2. Positive results of formation of the human capital, aimed on energy efficiency

It is supposed that as a result of effective processes of introduction employees will be stimulated to observance of requirements of energy policy, they will create feeling of individual responsibility that further will be an additional incentive to training in the energy efficient modes of work at production.

The complex of measures for the support to the existing strategy turns on methodical tools: development of innovative approach to power management, establishment of indicators of efficiency at all levels, training of employees for development of the energy efficient human capital (figure 3).

Figure 3. Measures for the support to the developed transitional strategy of energy management
4. Discussion
Energy management basis at the enterprise is the development of the energy strategy of the enterprise and the construction on its basis of the system of planning, the organization and control of energy efficiency. Inclusion in structure of similar strategy of approaches to management of the human capital as set of knowledge, skills in the field of energy efficient production supported with the system of material and non-material motivation becomes one of priority tasks in the field of management of the industrial enterprise.

Involvement of the human capital is directed to the maximum use saved up human капиталь by creation of the organizational structure promoting effective processes of exchange and accumulation of knowledge and creation of organizational culture in which promotion of initiatives in the field of power management is encouraged.

One of the basic principles of management of the human capital in the field of energy management is active inclusion of each employee at the enterprise in the system of energy management and saving the positive saved-up human capital promoting increase in effectiveness of system of energy management. In the field of involvement a key factor is the awareness of participants of business processes in energy management about the current policy of energy saving which in particular can be reached by through introduction of elements of energy management in all internal programmes of training. Saving the human capital is based mainly on measurement of indicators of individual energy efficiency with identification of the corresponding local reserves of growth and formation of the initiative groups dealing with problems of saving of energy resources.

5. Conclusion
Following the results of a research it is defined that:

1. The perspective direction of realization of process of strategic power management is formation of the energy efficient human capital. Measurement of efficiency of the similar human capital can be carried out by means of the offered integrated indicator of a ratio of energy consumption in value terms naEFTE.

2. The main actions for planning, development and saving the energy efficient human capital which promote increase in effectiveness of processes of training have been reflected in work and also motivate workers on use of the modes of work, effective from the point of view of energy saving.

3. Introduction of key indicators of energy efficiency of the human capital will allow to reflect effectiveness of investments of the enterprise into training of personnel and formation of professional competences in energy saving. In work the structure of key indicators, an algorithm of their development and deployment and also a range of estimated results of introduction of these indicators is offered. Feature of the formed human capital is his opportunity to act as a kernel of competences in energy saving and technologies of achievement of world indicators of energy efficiency.

4. Processes of measurement of level of energy efficiency of the human capital have to be included in structure of an organizational profile of the enterprise which reflects the level of development of system of power management in strategic level. In work the algorithm of development of key performance indicators of the human capital on the basis of stage-by-stage problem definition of energy saving, search of the centers of responsibility in energy consumption and quality control of the involved productions is offered. Realization of an algorithm promotes formation of high culture of energy saving and decrease in level of resistance to organizational changes.

Results
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