

Innovative project management on the basis of programme-and-target approach for energy saving in the construction complex

Angela Mottaeva¹

¹Moscow State University of Civil Engineering, Yaroslavskoe shosse, 26, Moscow, 129337, Russia

E-mail: angela-1309.m@mail.ru

Abstract. Article is devoted to the consideration of the existing approaches to energy saving. According to the author's opinion, the system approach is not enough for the achievement of the goal of the increase in energy efficiency and economy of energy, which is quite relevant for the world scientific community today, when the mankind has reached the certain power and ecological threshold. The author reasons the need of programme-and-target approach to energy saving and the increase in energy efficiency of buildings. The problems of the energy saving in current conditions are revealed. The provisional algorithm of the programme-and-target approach to energy efficiency. The expected results from introduction of the programme-and-target approach are presented in the article.

1. Introduction

The efficiency of the use of energy is a type of indicator of scientific-and-technical and economic capacity of the society, allowing to evaluate the level of its development. Comparison of the indicators of energy efficiency of the Russian economy and that of the developed countries proves that the specific energy capacity of our gross domestic product (GDP) is several times higher, than in the developed countries. So, the energy consumption level counting on unit of comparable GDP of Russia is about 4 times higher, than in the USA, which is the country with high installed energy per employee of production of goods, a services sector and life. The level of consumption of the electric energy counting on unit of comparable GDP in Russia is higher, than in the USA by 2,5 time, Germany and Japan by 3,6 times. All this testifies to the considerable reserves of saving of resurs in Russia which scales can be estimated approximately at 40-50% of level consumed fuels and energies [1].

The difficult situation of economy of Russia into which there was also a domestic energy engineering can lead in the near future to the deepest energy crisis which will nullify all efforts but to reforming of economy, will stop the outlined tendencies in industry revitalizing. By estimates of the Russian experts input of 7 million kW of electric energy in a year is necessary for maintaining energy potential of Russia at least at the level of the middle of the 90th years that will demand more than 50 billion dollars of investments till 2010.

Similar unfavorable pattern developed in the heat supply industry. The torn system of the projects and programmes including connected to innovative activities in the field of energy saving makes an essential part of the created economic mechanism of control of scientific-and-technical development of the construction complex [2, 3]. However the attempts made in recent years to stir up innovative activities in the construction complex, to select processes of energy saving in an independent object



about goals management to give pulse to development of science and technology, to promote market saturation by high-quality construction production, were insufficient. In this regard further theory-applied researches of problems of control of innovative projects of energy saving in the construction complex as forms of goals management of innovative activities and as process of implementation of innovations are very important.

2. Methodology

Theoretical-and-methodological problems as well as practical problems of control of innovative projects of national economy, its separate branches and complexes are considered in the works by both Russian economists, and foreign authors, such as: Akoff R., Ansoff And., Berens V., Gamidov T.Ç., Valdaytsev C.B., Warsaw J.I.E., Vikhansky O.S., Glazyev S. Yu., Glisyn F.F., Zavlin P.N., Ilyenkova S.D., Kolosov V.G., Kruglova N.Yu., Korobeynikov O.P., Round M.I., Ma-zur I.I., Mintsberg G., Mikhaylov E.A., Monchev I., Perlaki V. D., Porshnev A.G., V.G. Cages, Tviss B., Trifilov of A.A., Folomyev A.N., Havranek P.M., Hussey D., Hartman E., Shapiro O.P., Schumpeter J. and others.

Such authors as Bondarenko V.M., Borisova I.N., Butuzov V. A., Voronin S.A., Vorotnitsky V.E., Vyatkin M.A., Galperova E.V., Danilevich Ya.B., Degtev G. V., Dyakov A.F., Elistratov V.V., M.'s Legislative Assembly, Skinners K. G., Kononov Yu.D., Kretinina Yu.S., Kurbatov B.JI., Kuznik I.V., Lyakhomsky A.B., Mazurova O.V., Malyavin B.Ya., Mastepanov A.M., Molodtsov S.D., Nekrasov A.C., Olkhovsky G. G., Pins And., Platonov V.V., Carpenters D. V., Rakhimov R.Z., Rekitar Ya.A., Samsonov B.C., Tatarinov E.P., Tiunov M.Yu., Kharitonov V. P., Khlebnikov V.V., Huzmiyev I.K., and others devoted their research to the problems of formation and implementation of innovative projects in the field of energy saving. Modern factors of development of economy of Russia require logical continuation of these researches. The development devoted to the solution of the problems connected to increase in efficiency and quality of administrative decisions in the course of formation and implementation of the innovative project of energy saving are necessary, in particular. As a result, there was the need for the development of techniques of coordination of procedures of process of formation and implementation of similar projects, gains of validity and respect for the logical sequence of administrative actions and, respectively, methodical recommendations about formation of support system the decision as a data set, systems, tools and techniques with appropriate program and the hardware by means of which participants of the innovative project of energy saving collect necessary information interpret it and put in the basis of actions for its implementation [4-6].

Scientific bases of energy saving in construction became relevant and have gained the development from the 1970th because of the global energy crisis. Since that moment standards on energy saving in construction according to which by 2020 all buildings under construction in the EU will have to correspond to indicators of buildings with the minimum or zero consumption of energy have been developed in the developed countries, and most of this energy would have to become covered from renewable sources.

The analysis of foreign experience of implementation of programmes of energy saving and increase in power efficiency of construction (Denmark, Sweden, Finland, Germany, EU countries, etc.) proved that this problem might be solved on the basis of system and process approaches and also the concept of the analysis of the life cycle (life cycle analysis) meaning assessment of ecological influence of materials and designs and the building in general as uniform system at each stage "lives", since production, finishing with a possibility of utilization.

The international documents considering as one of the priority directions increase in power efficiency in construction have formed the basis for the creation of standard and legal base in Russia which beginning are the "Energy strategy of Russia till 2020" accepted in 1992 and the federal law from 11/23/2009 No 261-FZ.

Thus, since the end of the 1990th years development of construction branch of the country is inseparably linked with transfer to an energy saving way of development. During this period there was an ideology of rationing of buildings, based on the concept of minimization of power expenses. Development of this ideology, emergence of new energy saving methods of the organization of

construction production, emergence in our country of innovative construction materials and technologies and also methodological experience of the developed countries in the direction of sustainable development of the environment of activity of the person, has caused further evolution of science about the organization of construction production.

Analyzing modern methodological bases, it is possible to mark out their general basis – system approach according to which the building is not just a construction object, and the system object having internal orderliness of subsystems of lower level and interacting with the external environment, having their life cycle [7-10].

Besides, it is important to investigate the industry features of the solution of problems of program goals management of energy saving. As has shown a research, in relation to a construction complex there aren't enough developments in which problems of management of innovative projects of introduction of energy saving technologies with use of technological innovations in a construction complex of the country would be considered as the incentive motives of modernization which are available or development of new types of construction materials and their involvement in economic circulation including according to the international standards and norms stated in the concept of sustainable development. Being integrally connected, with the ideas of global development of the world community, this concept has united ecological, economic, social-and-political approaches to the solution of the interconnected energy saving problems [11].

The main shortcomings of heat supply countrywide are:

- great non-productive losses (according to the Academy of Sciences this figure makes 150 million tons of fuel from 700 million tons of the fuel spent for heat supply);
- low reliability of systems of heat supply;
- work in the conditions of deficiency of heat;
- conditions of thermal comfort (in the winter cold, during a transition period retops, trailer consumers receive the heat carrier of off-design parameters, in one building the dispersion on temperature is 10-15 °C) are not maintained;

Due to the above, the works directed to decrease in energy consumption of the existing buildings and constructions and use of nonconventional energy sources are represented relevant and having the great scientific-and-technical and practical importance [12-14].

Thus, there is the need of development of the complex of the techniques allowing to exercise control of innovative projects of energy saving adapted for the enterprises of a construction complex taking into account the concept of sustainable development. The increase in the efficiency of implementation of innovative projects directly at the stage of diffusion of technological innovations which in a construction complex of the country is now the most difficult is to become result of application of these techniques.

3. Results

The author has completed a research on the buildings maintenance, which has revealed the following problems:

1. Increase in monetary expenses on heat supply, power supply, water supply and as the result insufficiently effective use of energy resources.
2. Lack of system introduction of measures for energy saving.
3. Lack of system monitoring by the state and holding actions for energy saving [15-17].

The irrational use of energy causes in turn:

- the growth of expenses of the owner of the building or the budgetary financing of service of buildings;
- the growth of financial load of the budget of municipal unit or the region [18].

The programme-and-target approach to energy saving and the increase in energy efficiency of the building will allow to provide the decrease in consumption of energy resources by the building, transition to their more economic and rational expenditure at full satisfaction of needs for their quantity and quality, to turn energy saving into a decisive factor of technical functioning of the building.

Within the programme-and-target approach the algorithm "Goals-Tasks-Measures", which example is presented in the Figure 1, is to be observed.

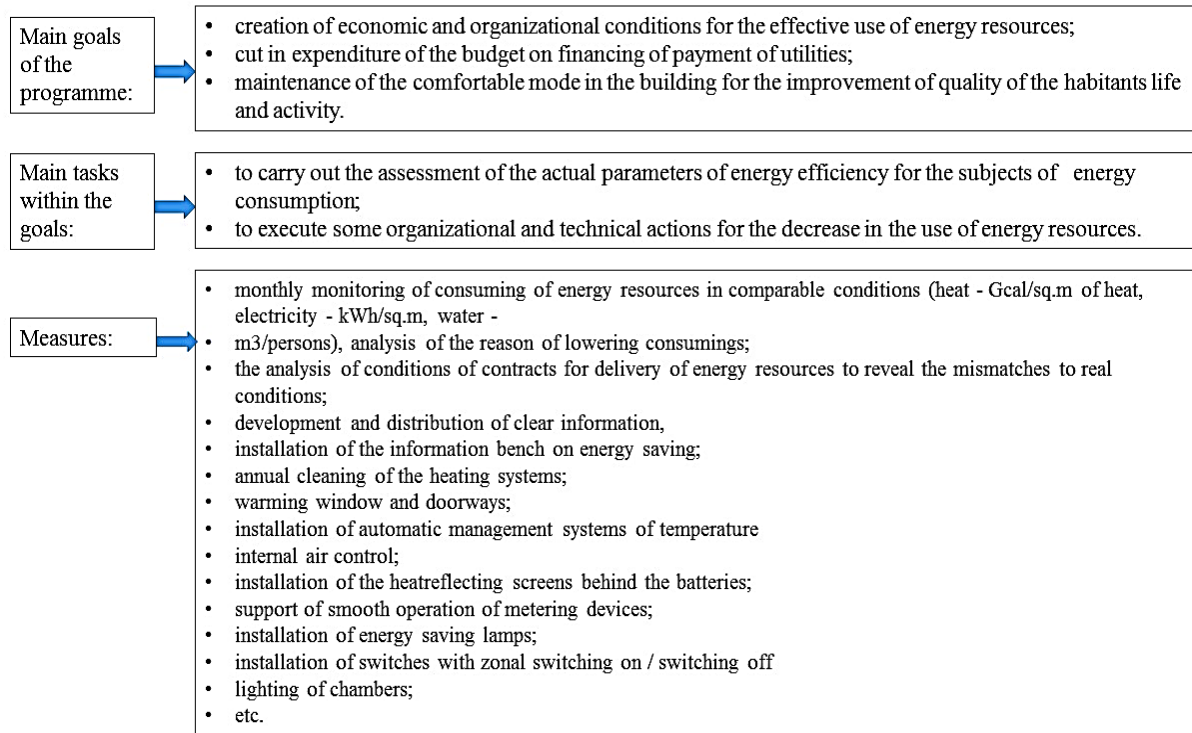


Figure 1. Algorithm of the programme-and-target approach to energy efficiency

The author considers reasonable to carry out two stages of the programme (Figure 2).

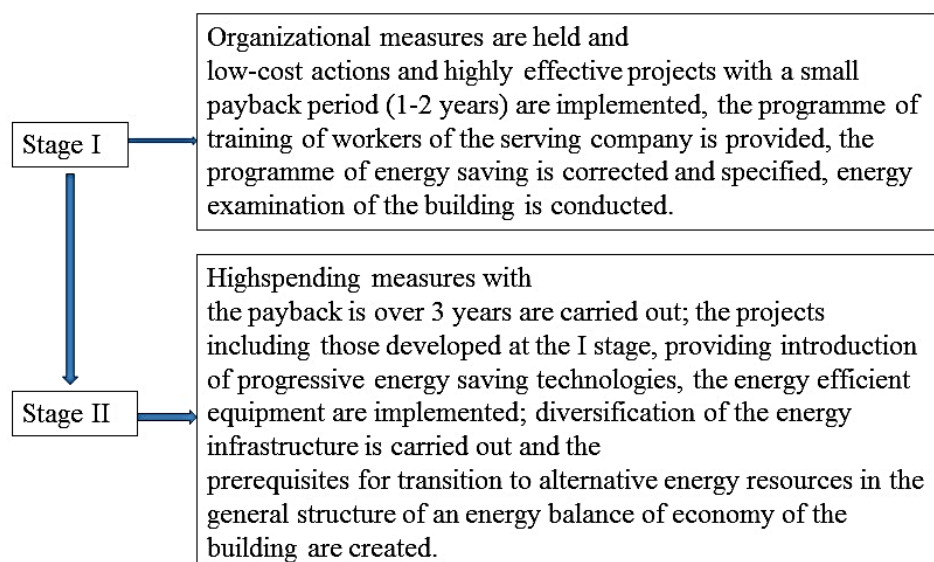


Figure 2. Stages of the programme-and-target approach to energy efficiency

Realization of the programme-and-target approach might also provide the release of additional financial means for realization of actions for energy saving and increase in power efficiency at the expense of the received economy as a result of cutting of costs for payment of energy resources.

4 Discussion

The innovation as the philosophy of business acquires the role of "core" of the energy saving strategy, gradually merging with it in broad understanding of the essence of these terms. As the result, the entity of interpretations of the concepts "energy saving" and "energy efficiency" changes.

Energy saving is understood in the modern science as the innovative activities for implementation of the economic, social, ecological and political approaches, directed to the effective use of energy resources and drawing into economic circulation of renewables. The energetic efficiency is the cost cutting of energy on a unit of production due to use of the modern energy- and resource-saving technologies, allowing to increase productivity in case of the existing consuming of energy or with the existing productivity to reduce energy consuming, that is actually it is about technical and technological efficiency [19, 20].

The success of the solution of problems of energy saving is inseparably linked with the extending opportunities of the use of advanced methods and methods of control among which, first of all it is necessary to point out the programme-and-goals management.

The programme-and-target approach is the modern modification of traditional forms and methods of management providing framing of long-term strategy for survival in the market. On its basis in case of adequate application it is possible to turn the concept of sustainable development into the specific production and economic plan which is subject to implementation in practice. The end result of the programme goals management in this context is strategy which is understood as the purpose, logic, the system of the rules ordering certain actions in each of the situations making innovative activities [17].

Due to that, it is important to research the following aspects of programme goals management.

First, the theoretical analysis of forms of manifestation of the basic concepts and content of economic strategy, in relation to the innovative project of energy saving of the organization of a construction complex is necessary.

Secondly, the development of scientifically based recommendations about formation of the project of energy saving according to special federal and regional programs of development of scientific and technical and innovative activities is required.

Thirdly, the development of strategic programmes of production and involvement in economic circulation of energy efficient construction materials and constructions is necessary.

Fourthly, it is necessary to develop techniques of assessment of efficiency of strategic administrative decisions in energy saving, considering the increasing role of the innovative oriented approach to formation and projects implementation of energy saving.

5 Conclusions

The lack of the main energy resources, the increasing cost of their production and also the global environmental problems have made the energy saving of one of priority problems of state policy of Russia at the present stage.

The carried-out analysis confirmed the effectiveness of the use of programme-and-target approach to the solution of the problem of the energy saving and the increase in power efficiency. The main advantage of the programme-and-target approach in modern conditions is concentration of resources on realization of the interconnected actions, a possibility of control of their expenditure, adjustment and stimulation of their effective use.

Application of the programme-and-target approach to the energy saving and the increase in energy efficiency is caused by the complex character of the problem and the need of coordination of measures of all the services for its solution, on the development of the general technical policy and the increase in the efficiency of expenditure of budgetary funds. From the positions of the concept of sustainable development any project of energy saving has the economical and ecological nature, and the system of programme-and-goals management of energy saving provides tracking dynamics of the needs for economy of resources and a condition of the environment.

The process of programme-and-goal management of innovative projects of energy saving in a construction complex with the use of basic provisions of the concept of sustainable development

assumes stage-by-stage determination of structure of the research tasks connected from formation and realization of strategy of energy saving.

For the increase in effectiveness of the control system of innovative projects of energy saving of the organizations of the construction complex realizing the concept of sustainable development in the activity the methodical providing allowing to estimate the level of achievement of strategic objectives of production and involvement in economic circulation of energy efficient materials and designs is developed and approved.

References

- [1] Arseniev D G, Rechinskiy A V, Shvetsov K V, Vatin N I and Gamayunova O S 2014 *Applied Mechanics and Materials* **635-637** pp 2076-80 DOI: 10.4028/www.scientific.net/AMM.635-637.2076
- [2] Jevric M and Romanovich M 2016 *Procedia Engineering*, **165**, 1478 – 1482, doi: 10.1016/j.proeng.2016.11.882
- [3] Chechevichkin V N and Vatin N I 2014 *Magazine of Civil Engineering* **50(6)** 67-74 DOI: 10.5862/MCE.50.7
- [4] Dudin M O, Vatin N I and Barabanshchikov Y G 2015 *Magazine of Civil Engineering* **54(2)** 33-45 DOI: 10.5862/MCE.54.4
- [5] Gorshkov A S, Rymkevich P P and Vatin N I 2014 *Magazine of Civil Engineering* **52(8)** 38-48 and 65-6 DOI: 10.5862/MCE.52.5
- [6] Gorshkov A S and Vatin N I 2013 *Magazine of Civil Engineering* **40(5)** 5-19 DOI: 10.5862/MCE.40.1
- [7] Grinfeldi G I, Gorshkov A S and Vatin N I 2014 *Advanced Materials Research* **941-944** pp 786-99 DOI: 10.4028/www.scientific.net/AMR.941-944.786
- [8] Hirkovskis A, Serdjuks D, Goremikins V, Pakrastins L and Vatin N I 2015 *Magazine of Civil Engineering* **57(5)** 86-96 and 116-7 DOI: 10.5862/MCE.57.8
- [9] Isaev S A, Baranov P A, Vatin N I, Zhukova Y V and Sudakov A G 2014 *Technical Physics Letters* **40(8)** 653-6 DOI: 10.1134/S1063785014080057
- [10] Isaev S A, Vatin N I, Baranov P A, Sudakov A G, Usachov A Y and Yegorov V V 2013 *Magazine of Civil Engineering* **36(1)** 103-9 DOI: 10.5862/MCE.36.13
- [11] Isaev S A, Vatin N I, Lebiga V A, Zinoviev V N, Chang K C and Miao J J 2013 *Magazine of Civil Engineering* **37 (2)** 54-61+118-20 DOI: 10.5862/MCE.37.8
- [12] Nazmeeva T V and Vatin N I 2016 *Magazine of Civil Engineering* **62(2)** 92-101 DOI: 10.5862/MCE.62.9
- [13] Priadko I N, Mushchanov V P, Bartolo H, Vatin N I and Rudnieva I N 2016 *Magazine of Civil Engineering* **65(5)** 27-41 DOI: 10.5862/MCE.65.3
- [14] Lukichev S and Romanovich M 2016 *Procedia Engineering*, **165**, 1717-1721, doi: 10.1016/j.proeng.2016.11.914
- [15] Romanovich M and Simankina T 2016 *Procedia Engineering*, **165**, 1587 – 1594, doi: 10.1016/j.proeng.2016.11.897
- [16] Saknite T, Serdjuks D, Goremikins V, Pakrastins L and Vatin N I 2016 *Magazine of Civil Engineering* **64(4)** 26-39 DOI: 10.5862/MCE.64.3
- [17] Strelets K and Vatin N 2015 *Rocznik Ochrona Srodowiska* **17 (1)** 104-12
- [18] Usanova K, Rechinsky A and Vatin N 2014 *Applied Mechanics and Materials* **635-637** pp 2090-4 DOI: 10.4028/www.scientific.net/AMM.635-637.2090
- [19] Pimenova A, Kuzmina S, Morozova N and Mottaeva A 2016 *MATEC Web of Conferences*, **73**, 07018 DOI: <https://doi.org/10.1051/mateconf/20167307018>
- [20] Chibisova E 2015 *Journal of International Scientific Publications: Economy & Business* **52** p 600.