

## CLUSTERING FOR ENERGY EFFICIENCY PROJECTS IN THE INNOVATIVE DEVELOPMENT

Levchaev P.A.

*Ogarev Mordovia State University, Saransk, e-mail: levchaevpa@yandex.ru*

---

The article studies the cluster form of organization and financing for energy efficiency projects in the Republic of Mordovia «Energy efficient lighting engineering and intellectual lighting control system». Methodology of system approach allows revealing the purpose and objectives of the cluster, the structure and composition of its elemental base, the funding mechanism and the results. From the position of an integrated approach characterized by an innovative orientation of development of economy of region. Shown the most significant and promising projects in the field of energy efficiency – the production of modules for solar panels, energy-efficient housing construction and biogas plant.

---

**Keywords:** energy efficiency, cluster, innovation, economy, region, development, systemic approach

Energy efficiency and energy saving are topical at all levels of economic development. The purpose of such surveys is to provide necessary preconditions for the formation of the competitive characteristics of the Russian economy and its transition to a new qualitative level.

Modern economic structure is entirely dependent on the energy supply and to produce and to sell products in a modern high-tech economy requires a leading role for the production of energy and its efficient use. Energy, being one of the main types of resources, ensures continuity of production processes in industry, agriculture, construction and other sectors of the national economy. The dynamic development of these sectors often leads to the emergence of energy problems during periods of peak energy consumption. Therefore, one of the axioms of successful presence in the market is that economic system (micro, meso, macro or megawave), based on improved energy efficiency, *ceteris paribus*, more competitive in the present, but also potentially competitive in the future. One of the most important universal laws of development is that any system to strive to achieve results with minimal expenditure of energy. It is widely recognized that energy efficiency serves the least expensive and the fastest environmentally friendly way to meet energy needs, as according to experts the energy saving turns out to be 4–5 times more profitable than production of the same amount of energy.

In accordance with the energy efficiency strategy of Russia and the Federal target Programmer energy efficient economy, the policy framework of the Russian Federation in development of science and technologies priority directions of development:

- energy – saving technology;
- energy efficiency;
- electronics.

In 2009 Dmitry Medvedev first declared from the high tribune in the message to the Federal Assembly on the transfer of Russia to the energy-saving mode of development. Attempts to improve the energy efficiency of production has been made previously, for example in 1996 was adopted the law “On energy saving”. In the further provisions of energy efficiency identified in the Energy strategy of Russia for the period up to 2030, the legal support of the ongoing activities is the Federal Law “On energy saving and on increasing energy efficiency and on amendments to certain legislative acts of the Russian Federation”, governing the innovations in state and municipal, and private sectors. The Russian government is implementing a program aimed at demonstrating effective from the point of view of energy projects in the Russian regions. The experience of the advanced projects will be extended further, to other regions that will result in improved energy efficiency throughout the economy.

For example, according to the Russian news Agency “FederalPress” in many Russian cities and regions are integrated in all projects to energy efficiency “energy Efficient quarter”, “Smart metering” (stimulate energy-efficient consumption by consumers) [1]. In Moscow energy efficiency program is carried out for the period until 2020 – funding attracted more than 117 billion rubles. In St. Petersburg the financing of similar activities exceeded 100 billion rubles and pay special attention to economy in the public sector and to reduce energy consumption among the citizens. In Ekaterinburg operates Russian-German project “Ekaterinburg – energy efficient city”. In Nizhny Novgorod, a program of energy efficiency with funding of 38 billion rubles, Perm – 9,6 billion rubles, in Tyumen – 7,4 billion rubles.

The basis of territorial and sectoral structure of regions is the economic efficiency of

integration of industrial-economic relations of economic subjects for the most complete realization of joint economic potential. A modern form of optimization of production and economic interests of economic entities and other participants of economic relations is the cluster representing a relatively independent economic unit grouped of interrelated companies of the territory, characterized by specific properties. Such organization of joint activity of suppliers of products and services, institutions, infrastructure, helps to strengthen the competitive advantages of the project participants.

The complex nature of cluster organization allows the integration principles at all levels of management:

1) consistency – the correlation of elements and components with the aim of achieving a synergy effect;

2) the interrelationship and sequence of implementation of management functions – coordination, planning, analysis, control, regulate;

3) according to the structural parts of the cluster to strategic directions of development.

In the Republic of Mordovia for the construction and development segments of the regional economy, meeting the highest modern requirements, implemented a number of programs.

1) the region has a program “energy Saving and increase of energy efficiency in the Republic of Mordovia for 2014–2016”. The program is designed to encourage the overcoming of energy barriers to economic growth through the introduction of a complex of energy saving activities: 1) identifying potential energy savings; 2) ensure that the rate of reduction of energy consumption in economic sectors; 3) expanding the revenue side of the budget due to the reduction of irrational consumption of energy. Activities of this Program are balanced and cover all sectors of the economy, serve as a tool to enhance further development of the economy and technological upgrading in the region. Funding for the program is expected in the amount of 1 billion 843 million rubles from the budgets of different levels and extra-budgetary sources.

2) a national program to support the development of the innovation cluster “energy efficient lighting engineering and intellectual lighting control system”. The cluster needs to become a leader in the domestic market. Competitive advantages: a) the leadership in the products they manufacture; b) the growing trend in the lighting industry; c) focus on implementation of a policy of the Government of the Russian Federation on stimulation of ener-

gy saving measures, qualitative change in lighting technology (the introduction of LEDs). The main objectives of the cluster: 1) the development of innovation infrastructure; promotion of innovation-based enterprises; 2) implementation of cooperation projects; 3) increasing the production and export of innovative products.

Currently the cluster consists of several components.

1) Managing company of the cluster – “Technopark-Mordovia”. “Technopark-Mordovia” and data center (one of the largest in Europe), aims to commercialize scientific and industrial developments, the growing needs of the region and the country in the processing, transmission and storage of data in the information structure of the world economy. With the activities of Technopark linked to the dynamic development of energy-saving lighting engineering, electronics and instrumentation, as well as the formation of new industries – optoelectronics, believe that radio Photonics.

“Technopark-Mordovia” has the ability to subsidize costs in areas: 1) cooperation in scientific-technical sphere; 2) marketing, information and PR-support of participants; 3) the development of cluster cooperation with government authorities, development institutions, public organizations, other clusters; 4) organization and participation in exhibition and communication activities; 5) development of production capacity and production cooperation between Cluster participants.

Strategic management and monitoring of programme activities managed by a focal point – Ministry of industry, science and new technologies of the Republic of Mordovia.

2) of the national research Mordovian state University named after N.P. Ogarev. The University implements programs of research in the field of energy saving and new materials, has a unique specialised Lighting Department for training. In the context of research to develop new environmentally friendly and energy efficient sources of optical radiation, materials and components for a new generation of devices of radio engineering, optoelectronics and power electronics.

3) Scientific research Institute of light sources named after A. N. Lodygina. The Institute has developed more than 90% of light sources in the domestic market.

4) More than 10 large and medium-sized manufacturing companies. Their activities are aimed at introduction of energy saving technologies, development of promising sectors of the economy and increasing its energy efficiency: biogas, solar panels, creating “smart” housing.

5) Association of manufacturers of lighting products “Russian light”, which brings together more than 40 lighting enterprises in Russia and abroad.

The structure of the cluster complex and diverse and involves the activation of economic relations with all levels of the budgetary system, economic actors. Financial security is implemented in the following forms:

- budget financing;
- self-financing;
- subsidies.

In 2013–2015 for the implementation of the programme of support for the development of the innovation cluster “energy efficient lighting engineering and intellectual lighting control system” is planned to attract 7 832,1 783 thousand ruble. The Composition of sources of funds were varied:

- 13,5% of Federal budget;
- 64,3% – resources of the regional budget;
- 1,8% – resources of the municipal budget;
- 20,4% of extra-budgetary sources of financing.

In the future the trend of increasing the share of the Federal budget, a slight decrease of the share of the regional budget, the reduction of income from extra-budgetary sources of funds and virtually complete absence of the municipal budget. This trend is due to the fact that the implemented program is characterized as regional in the context of strategic national development priorities of the country.

The members of the Cluster have been or are preparing to implement a complex of 26 investment projects in cooperation with domestic or foreign partners, estimated total cost 10342 million rubles, the growth Rate of performance indicators of the programme (by 2012) are:

- the volume of work and projects in the field of research of 300%;
- the volume of shipped innovative products (works and services) and growth of total revenue from sales of products in foreign markets to 250%.

The efficient functioning of the financial mechanism of the cluster depends on the optimal functioning of its structure and orientation, compliance elements and components of the tasks scheduled. The functioning components of the cluster, the development of economic and technological processes requires a systematic approach of research and consideration of the synergy of interests of economic entities.

Interesting alternative energy project is the placement in the region of production modules for the solar industry with the creation of over 200 jobs. According to experts, solar energy is

the fastest-growing segment of alternative energy. The annual rate of growth in the industry in recent times is over 50%. The creation of the enterprise due to favorable investment and production opportunities in the region and the prospects of market power for Russian villages. The benefits of such power are the minimum risk of environmental disasters, the lack of wear mechanisms, mobility design and ease of maintenance. The participants of this agreement – the government of the Republic of Mordovia, the company “Helio-Resource”, JSC “Electrovypryamitel”.

Next project is designing and building energy-efficient (“smart”) homes. Energy-efficient – house, which reduced energy consumption without loss of quality accommodation. Here, the technology used renewable energy sources that reduce consumption of energy resources. The design of these houses is: heating the geothermal waters; use of solar collectors; the use of insulated walls and glass with a thermionic coating, energy-saving ventilation system, automatic lighting control, the system of energy accounting. In Mordovia the construction of energy efficient homes is part of the implementation of the regional program on resettlement of citizens from emergency housing. It is financed with Fund of assistance to reforming of Glisno utilities [2]. Ensuring the Program is carried out from budgets of all levels, extra-budgetary sources. The financial resources of the Program is 6614,5 million. Structure of funds: 0,6% – to Federal budget; 6,4% are funds from the Republican budget; 0,2% – funds from local budgets; 92,8% of the funds from extra budgetary sources.

Modern large-scale development project is the construction of Russia’s largest biogas plant with a capacity of over 4 MW. This object appears near the capital of the Republic Saransk. In many developed countries there are special storage of solid waste of cities with the purpose of extraction of biogas for production of electric and thermal energy.

Bioenergy [3] is a promising sector of the economy. It allows you to solve the problems of obtaining fuel from biomass and the environment. Large-scale production of energy resources from plant materials non-food uses, processing of agricultural waste and timber industry, woodworking plants, and organic and domestic waste can improve the environmental situation in the country. Biogas is a high quality carrier of energy and can be used in the household, average and small business, for the production of electricity, heating of residential and industrial premises. Economic

and industrial effect bioenergetics is associated with the following factors:

- decrease of consumption of hydrocarbonaceous fossil;
- recycling of production wastes;
- reduction of harmful emissions and greenhouse gases into the environment;
- increasing the energy security of the region, country;
- highly effective fertilizer as an additional product of bioenergy production;
- decentralization of electricity supply.

This technology allows you to create waste-free environmentally friendly production. Raw material for the production of electricity being built in Mordovia biogas plant will be the waste products of cattle and beet pulp. In the enterprise will be interested in the agricultural region. A large part (about 4 MW) electricity will be supplied to network tariffs approved by Regional energy Commission, and the rest will be used for powering farms. Generated heat and byproduct biogas plant – organic fertilizer, will be used in greenhouse farms. This creates a sustainable closed cycle: plants – food products (food) – waste plants. This system provides the region's agriculture fertilizer and feed, and production – energy and raw materials. This reduces the use of mineral energy sources and the release of gases that cause the greenhouse effect, pollution of the environment.

In Mordovia adopted the legal acts aimed at regulation and support of innovative economy and energy-saving technologies: the Law of the Republic of Mordovia “On the Strategy for socio-economic development of the Republic of Mordovia till 2025”, the government of the Republic of Mordovia “On approval of the Program of increasing the investment attractiveness of the Republic of Mordovia for 2011–2015 years”, decree of the Government of the Republic of Mordovia “On the Republican target program energy Saving and increase of energy efficiency in Mordovia Republic for 2011–2020”, the decree of the Government of the Republic of Mordovia “On granting financial support to scientific and technical activity and development of innovative projects in the Republic of Mordovia”, the Government decree of the Republic of Mordovia “On approving the Concept of the Republican target program of scientific and innovative development of the Republic of Mordovia for 2010–2015 years”. The purpose of regulatory and

legal support is the development of scientific and technical potential of the Russian Federation, implement measures aimed at reducing energy consumption while maintaining the corresponding useful effect from their use in the field of lighting engineering and intellectual lighting management systems.

With a view to better realize the potential of the cluster of energy efficient projects in the region, subsequent to the effective decision of tasks it is advisable the use of adequate scientific tools. This is achievable through the implementation of scientific research approaches: the system, process, evolutionary, targeted. Modern approved method of comprehensive solution of financial and economic problems is the program-target method of planning. This method is in the target orientation of activity of economic subjects and planned resource provision – “goal – the way (objectives) – methods (activities) – resources”. The priority is not the current organizational structure and management system elements, software, benchmarks, actions.

In the Republic of Mordovia successfully implementing a complex of programs on formation of the innovative environment and support for priority directions of science, technologies and technics of Russia energy saving and efficiency. The peculiarity of the financial mechanism of the innovation cluster “energy efficient lighting engineering and intellectual lighting control system” is a flexible combination of budget financing, self-financing subsidies. An integrated scientific approach, the cluster method of program planning help you to achieve your objectives in accordance with resources development. This approach allows us to create high-tech background for development of the region for the formation of innovative structure of its economy.

#### References

1. Energoefektivnost rossiiskih gorodov [Energy efficiency of russian towns], FederalPress, Access mode: [http://old.fedpress.ru/federal/polit/analit/id\\_267327.html](http://old.fedpress.ru/federal/polit/analit/id_267327.html).
2. Federalnii portal Protown [Federal portal Protown], Access mode: [http://www.protown.ru/russia/obl/articles/article\\_325.html](http://www.protown.ru/russia/obl/articles/article_325.html).
3. Levchaev P.A. *Ekonomika novogo tehnologicheskogo uklada* [The Economics of a new technological order. Financial aspects of the innovation vector of economic development of the region], Germany, “Palmarium Academic Publishing”, 2015.
4. Levchaev P.A. The concept of innovation value in economy of the global financial crisis. // “International journal of applied and fundamental research”, 2015. – № 3. – P. 14–15. Access mode: <http://www.science-sd.com/pdf/2015/3/24949.pdf>.