

ANNOTATION

For the dissertation work of Mazina Ainur Kurmetovna on the topic "Organizational and economic mechanism of energy saving in agriculture of the Republic of Kazakhstan: concept of efficiency, principles and conditions of implementation", submitted for the degree of Doctor of Philosophy (PhD) in the educational program "8D04101 – Economics"

Relevance of the research topic. Agriculture plays an important role in the country's food security, supplying raw materials for various sectors of the national economy, Agriculture is one of the largest employers, especially in rural areas, where agricultural exports contribute to the growth of the country's trade balance. Thus, agriculture contributes to the economic development of the country.

Agriculture consumes a significant amount of fuel and energy resources. The share of fuel and energy resources costs in the cost of agricultural products continues to grow. The growth rate of energy prices is more than twice as high as the growth rate of prices for agricultural products.

The use of energy saving and energy efficiency methods, renewable energy sources helps agricultural producers reduce the consumption of fuel and energy resources. The use of renewable energy sources, including solar, biomass, wind and geothermal activity, is becoming increasingly common in the agricultural sector. Environmentally friendly alternatives to traditional energy sources in agriculture provide significant benefits such as reducing greenhouse gas emissions, improving energy efficiency and promoting sustainable agricultural production.

The integration of renewable energy sources into the agricultural sector contributes to improving energy efficiency, ensuring food security and creating more favorable environmental conditions, supporting the principles of ecological agriculture.

It requires a comprehensive solution that takes into account the factors affecting the rational use of energy consumption in agriculture in Kazakhstan.

The Republic of Kazakhstan has its own specifics, therefore, for the rational use of energy consumption in agriculture in Kazakhstan, a comprehensive solution will be required, taking into account the specifics of the economy and the state of the agricultural sector.

In addition to the use of energy-saving technologies, issues of reducing the load on electric networks due to their severe wear are relevant for the Republic of Kazakhstan. This is especially true in rural areas, which are characterized by significant wear and tear of power grids.

In agriculture, energy plays a crucial role in solving issues related to food production. Food production requires energy in many stages, including the use of agricultural machinery to pump water for irrigation, sowing, weeding, fertilizing, spraying and harvesting, as well as to perform various agricultural tasks such as transporting products, cooling and drying, and processing products.

In addition, the issues of organizational and economic mechanisms of energy saving in agriculture in relation to the situation in Kazakhstan have not been sufficiently studied. Taking into account the specifics and problems of the

agricultural sector of Kazakhstan, the state of its resource base and financing issues, it is necessary to develop such organizational and economic energy saving mechanisms that approach a comprehensive solution to the problem.

The degree of scientific development of the research problem. The methodological basis of the proposed dissertation research is the works of foreign and Kazakhstani scientists on organizational and economic mechanisms of energy saving in agriculture.

The following foreign scientists have worked in this area:

Xiaolin Yana, Baidia Roy, K. Sritar, V. Zdzislav, A. Demirbas, Yakub Majeda, V. Andreo, A. T. Balafutis, A. Bragalho, N. H. Lampkin, M. Muller-Lindenlauf, J. Sharifuddin, J. Paull, P. C. Struik, J. Pretty, S. Keesstra, Khokhrebov A.V., Mokhova A. A., Zekin V. N., Kuzmina E. S. and others.

The works of the following Kazakhstani scientists and economists are devoted to the problems of studying organizational and economic mechanisms of energy saving in agriculture: Temirbekova E. T., Balapanova E. S., Rakhimov Z. S., Raupova N. M., Khakimzoda B. H., Valiev M. K., Zinganshina D., Diyar S., Akparova A., Toktabaev A., Tyutunnikova A., Zhakypova A., Aigerim L., Elmira S., Dinara S., Azamat Z. Grabara J., Tleppaev A., Dabylova M., Mikhardjo L., Sembaeva G. N., Nurbekova D. M.

Despite the presence of certain scientific works by foreign and domestic authors, the issues of the development of organizational and economic mechanisms of energy saving in agriculture cannot be considered sufficiently developed, especially in relation to the Republic of Kazakhstan. The solution to the problem of the development of organizational and economic mechanisms of energy saving in agriculture of the Republic of Kazakhstan should be comprehensive, take into account the specifics of the development of agriculture and energy, which in turn predetermined the choice of the research topic, setting goals and objectives.

The purpose and objectives of scientific research. The purpose of the dissertation is to develop an organizational and economic mechanism aimed at energy conservation in agriculture of the Republic of Kazakhstan.

The set goal determines the solution of the following tasks:

- study of modern directions of energy saving in agriculture;
- to consider the factors influencing the rational use of energy consumption in agriculture;
- to study the foreign experience of organizational and economic mechanisms for ensuring energy saving in agriculture;
- Analysis of the characteristic features of the current state and use of energy resources in agriculture of the Republic of Kazakhstan;
- simulation of time series of volumes of renewable energy produced in agriculture;
- Analysis of energy saving factors in agriculture of the Republic of Kazakhstan;
- Development of the concept and definition of the principles of the organizational and economic mechanism of energy saving in agriculture of the Republic of Kazakhstan;

- To propose economic methods of regulating energy saving in agriculture of the Republic of Kazakhstan.

The object of the study is agriculture of the Republic of Kazakhstan;

The subject of the study is a system of organizational and economic solutions aimed at energy saving in agriculture.

The theoretical and methodological basis of the research are methods of analysis and synthesis, a systematic approach, comparison, analogy, abstraction. In the course of the study, structural and functional methods of economic, statistical and system analysis, and mathematical modeling were used. The analysis of the work of foreign and domestic economists and practitioners in the field of organizational and economic mechanisms of energy saving in agriculture is carried out. In the course of the work, statistical data from the Bureau of National Statistics of the Agency of the Republic of Kazakhstan for Strategic Planning and Reforms, and other materials reflecting the legal, organizational and economic aspects of energy saving mechanisms were used.

An extensive list of electronic resources was also used as part of the study.

The scientific novelty of the results of the dissertation research is as follows:

- modern directions of energy saving in agriculture are systematized. The author's definition of energy saving in agriculture is given;

- based on the study of international experience, a classification of factors affecting the rational use of energy consumption in agriculture has been developed;

- international experience of organizational and economic mechanisms for ensuring energy saving in agriculture has been accumulated. The author's definition of the modern organizational and economic mechanism of energy saving in agriculture is given;

-A Box-Jenkins time series model of the volume of renewable energy produced in agriculture of the Republic of Kazakhstan has been developed, which proves the relationship between the volume of renewable energy produced in agriculture and influencing economic factors.

- the concept of an organizational and economic mechanism for energy saving in agriculture is proposed, which is based on the use of a comprehensive information resource that provides information on all aspects of energy-efficient agricultural production, representing all parties on which its implementation depends. The condition for the effectiveness of the organizational and economic mechanism is the interaction of all parties on which energy-efficient agricultural production depends, taking into account all the factors on which energy-efficient agricultural production depends. The implementation of the organizational and economic mechanism of energy saving in agriculture of the Republic of Kazakhstan will be carried out on the principle of the complexity of information, its relevance and predictability.

- a mechanism for the implementation of energy-efficient agricultural production with the participation of a foreign partner is proposed;

- a system of tariffs for electricity consumption for agricultural producers is proposed, taking into account the preferential mode of operation of equipment

according to the schedule for equalizing the time of use of the electric network and voltage.

The main conclusions to be made for the defense.

- to systematize modern directions of energy saving in agriculture, which should be targeted by organizational and economic measures.

- classification of factors affecting the rational use of energy consumption in agriculture, which should be taken into account when creating organizational and economic mechanisms for energy conservation in agriculture.

- The Box-Jenkins model, which proves the relationship between the volume of renewable energy generated in agriculture of the Republic of Kazakhstan and the economic factors affecting it.

- The concept of the organizational and economic mechanism of energy saving in agriculture is based on the use of an integrated information resource that provides information on all aspects of energy-efficient agricultural production, represents all parties on whose management its management depends.

- a mechanism for the implementation of energy-efficient agricultural production with the participation of a foreign partner.

The theoretical and practical significance of the study is based on the proposed organizational and economic mechanisms of energy saving in agriculture of the Republic of Kazakhstan, subsidized loans with the participation of an experienced foreign partner, and the introduction of an electricity tariff. Preferential tax regulation for the operation of equipment, subsidizing the introduction of an energy-efficient facility from the local budget for products sold, the creation of a comprehensive information resource "industry center for energy saving in agriculture", taking into account the "operating time of the electric network", is applied, it is used by representatives of the Ministry of Agriculture of the Republic of Kazakhstan, the Ministry of Energy of the Republic of Kazakhstan, the Ministry of Energy of the Republic of Kazakhstan can to be used in the activities of the Industrial Development Committee of the Ministry of Industry and Construction.

The main provisions of the dissertation work are widely applied in the implementation of state strategic programs in the field of energy conservation.

The developed mechanisms for managing the development of energy saving in agriculture through the resource "industry center for energy saving in agriculture" allow us to develop agriculture in priority areas of energy efficiency for the state.

Scientifically based theoretical conclusions in the field of energy saving in agriculture can be used by educational institutions and scientific organizations.

Publication of the research results. 10 (ten) scientific papers have been published on the topic of the dissertation, 3 of them in journals recommended by the Committee for Control in the field of education and Science of the Ministry of Education and Science of the Republic of Kazakhstan, 6 in materials of international conferences, including 4 in materials of foreign conferences and 1 in international scientific publications included in the company's database Scopus.

The main results of the research were presented in the form of scientific reports at the scientific and practical conference "Digital Economy: new business architecture and transformation of competencies" (Karaganda, 2021), the

International Scientific and Practical Conference "Actual problems of economic development of the Russian Federation" (Moscow, 2022), the international scientific and practical conference "Digital Economy: a new architecture" (Karaganda, 2023), in the materials of the foreign conference "Efficiency in business " (Gojow-Velkopolsky, 2021).

The structure and scope of the dissertation. The dissertation work consists of an introduction, three sections, a conclusion, a list of sources used and appendices. The main text of the dissertation is presented on 182 pages.

In the first chapter, the author studies the theoretical issues of the organizational and economic mechanism of energy saving in agriculture, considers modern directions of energy saving in agriculture. From the positions of different authors, he examines the term "Energy Saving", indicates the peculiarities of the definition of each author.

The author systematizes the modern world technical and technological directions of energy saving in agriculture, the implementation of which will be aimed at organizational and economic measures.

The author comes to the conclusion that there is significant international experience and methods developed in world practice to ensure energy efficiency in agriculture. Therefore, in the Republic of Kazakhstan, which is at the beginning of the path of ensuring agricultural energy efficiency, it is necessary to create organizational and economic energy saving mechanisms that take into account world experience and systematized in the first paragraph technical and technological directions of energy saving in agriculture.

In order to create effective organizational and economic mechanisms for energy saving in agriculture, it is necessary to analyze the factors affecting the rational use of energy consumption in agriculture. Therefore, the author considers the factors influencing the rational use of energy consumption in agriculture as the next step.

Rational use of energy consumption in agriculture requires a comprehensive solution that takes into account the identified factors affecting the rational use of energy consumption: economic factor, legal factor, organizational factor, natural factor, scientific factor, technical and technological factor and social factor. The Republic of Kazakhstan has its own specifics, therefore, for the rational use of energy consumption in agriculture in Kazakhstan, a comprehensive solution will be required that takes into account the specifics of the economy, the state of the agricultural industry, the organization system, the state and level of technology and technology, the regulatory framework, the culture of energy consumption and the level of mastery of energy technologies by the workforce.

Next, the author examines the organizational and economic mechanisms for ensuring energy saving in agriculture in foreign countries. The article reviews the specifics of definitions from the general concept of "Organizational and economic mechanism" to "Organizational and economic mechanism in agriculture" and "Organizational and economic mechanism of energy saving in agriculture".

The organizational and economic mechanisms of energy saving of the leading countries in this field are considered: China, the USA, Germany, Japan, Russia, etc.

The author points out that modern organizational mechanisms of energy saving are based on the use of information technology

The second chapter analyzes the use of energy resources in agriculture of the Republic of Kazakhstan. The analysis of the characteristic features of the current state and use of energy resources in agriculture of the Republic of Kazakhstan is considered.

The author points out that from 2018 to 2022, the gross output of agricultural, forestry and fisheries products (services) increased by 2.05 times. Gross crop production increased 2.31 times, gross livestock production increased 1.77 times, and agricultural services increased 1.18 times. Such a trend in the growth of agricultural products (services) of the Republic of Kazakhstan requires appropriate energy and fuel supply.

The author compares the dynamics of renewable energy generation in general in all sectors of Kazakhstan and in agriculture

In general, there is a clear trend in the increase in electricity production by wind farms, solar power plants and small hydroelectric power plants in all sectors of Kazakhstan.

In agriculture, there is no dynamics of increasing electricity production according to renewable energy sources.

Thus, it can be concluded that the existing organizational and economic mechanisms of energy conservation in agriculture are ineffective

The factors of creation and operation of energy-efficient agricultural production in the Republic of Kazakhstan are also considered. An important issue is the application of energy-efficient technologies acceptable to the climate of Kazakhstan. Creating energy-efficient agriculture for Kazakhstani farmers is much more difficult and has fewer incentives. One of the main factors of creation is the Factor of having an energy efficiency coordinator, the Information factor, as well as the Psychological factor due to the familiarity of traditional farming methods. There are no problems with these factors in foreign countries.

In the third chapter, the author concluded that in the Republic of Kazakhstan it is necessary to have information on all aspects of energy-efficient agricultural production: technical, technological, economic, organizational and legal, state regulation, personnel, scientific, material.

However, there is no such information resource in the Republic of Kazakhstan. The lack of information on all aspects of energy-efficient agricultural production, its potential and advantages is one of the main constraints on the introduction of energy-efficient technologies in agriculture.

A comprehensive information resource is needed that provides information on all aspects of energy-efficient agricultural production, allowing to raise awareness among all parties involved and thereby accelerate the transition to advanced energy-efficient agricultural technologies in the Republic of Kazakhstan.

Information on the factors influencing the creation of energy-efficient agricultural production is scattered across various information resources of the Republic of Kazakhstan, where insufficient attention is paid to agriculture.

It is difficult for an entrepreneur working in the field of agriculture, a foreign investor in the field of energy-saving agriculture to navigate the information field and find all the necessary components of factors.

The organizational and economic mechanism of energy saving in agriculture will be effective when it solves the problem comprehensively, taking into account all the parties on which the conduct of energy-efficient agricultural production depends. A comprehensive solution to the issue of energy saving in agriculture is possible only with the help of a comprehensive information resource that provides information on all aspects of energy-efficient agricultural production.

The "Sectoral Center for Energy Saving in Agriculture" will be created by the state. It will be an independent organization.

Thus, the concept of an organizational and economic mechanism for energy saving in agriculture will be based on the use of a comprehensive information resource that provides information on all aspects of energy-efficient agricultural production, representing all parties on which its management depends.

Proposed measures: specialists in equipment and advanced agricultural energy-saving technologies provided by the foreign investor and partner will transfer their experience to local specialists.

The Industry Center for Energy Saving in Agriculture should ensure on its website the exchange of experience in energy saving in agriculture, including with foreign countries. The exchange of experience can be carried out both on the introduction of new technologies and on the modernization and reconstruction of existing production facilities.

The author suggests the following mechanism for financing energy-efficient production in agriculture, which avoids the above-mentioned constraints.

Due to the fact that the equipment and new technologies for energy-efficient production of agricultural products are mainly of foreign production, we propose to add a foreign investor to the existing lending mechanism.

Requirements for a foreign investor: production of energy-efficient equipment for agriculture, work experience in the field of energy-efficient agricultural production, the availability of implemented projects in the field of energy-efficient agricultural production. The foreign investor will be selected by the "Industry Center for Energy Saving in Agriculture".

The participation of a foreign investor consists in providing a specialist in the maintenance of equipment and technological process for one year, provided that local specialists are trained. The payment of foreign specialists during the year should be on a grant basis. Also, a foreign investor must provide equipment maintenance service.

The author gives suggestions on the tariff - a discount for the operation of equipment according to the proposed voltage equalization schedules. Due to the strong load imbalances of agricultural producers during the day and year, a special technical service can provide recommended schedules for connecting agricultural producers to the renewable energy network. For those agricultural producers who will turn on their equipment according to the proposed voltage equalization

schedules (i.e. during hours of low demand for electricity), a discount on the tariff will be provided.

The concept of efficiency of the organizational and economic mechanism of energy saving in agriculture will be a system of interrelated organizational and economic measures and tools aimed at optimizing the use of energy resources at minimal cost while maintaining or increasing the volume of agricultural production.

Due to the use of the energy saving information center in agriculture, the concept of the effectiveness of the organizational and economic mechanism of energy saving in agriculture will be based on the principles indicated by the author:

1. Information support.
2. Training.
3. Consulting..
4. Introduction of energy-efficient agricultural technologies.
5. Sustainable development.

The activities of the information center should contribute to the sustainable development of agriculture.

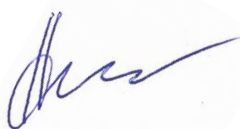
6. Financial support..
7. Analytical activities.
8. Integration of data obtained from various agricultural facilities into a single system, which allows centralized control and analysis of energy consumption.
9. Prompt response to changes in energy consumption and adaptation of energy management in accordance with current needs and conditions.

The conditions for the implementation of the proposed organizational and economic mechanism of energy saving in agriculture of the Republic of Kazakhstan as a whole are given.

1. The regulatory framework.
2. Financial support.
3. Management activities.
4. Information support.
5. Attracting investments.
6. Monitoring with control of the effectiveness of implemented measures in the field of energy conservation.
7. Introduction of modern technologies in the field of energy-efficient agriculture and energy-efficient equipment for agriculture, renewable energy sources, automation systems.
8. Scientific developments.

The author provides a scheme of interaction between the participants of the integrated information resource "Industry Center for Energy Saving in Agriculture"

Dissertation candidate



A.K.Mazina