

## INNOVATIVE ENERGY SAVING AS A FORM OF INCREASING THE COMPETITIVENESS OF ENTERPRISES

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### **Abstract**

*The article deals with the issues of innovative energy saving as a form of increasing the competitiveness of enterprises. In the conditions of growing consumption of energy resources, it is necessary to maintain a balance between depletion of fuel reserves and an increase in energy consumption to increase production efficiency. In addition, energy efficiency affects environmental and energy security issues, which makes energy efficiency a priority. To achieve positive results in reducing the energy intensity of production in the country, it is necessary to study the best foreign practices, to develop and introduce modern technologies, to implement and support at the state level projects aimed at improving energy efficiency.*

### **Key words**

*energy resources, innovations, energy conservation, energy efficiency, enterprise, competitiveness, energy security.*

**Introduction.** Saving energy resources and increasing the efficiency of their use are the key tasks of the modern economy of Uzbekistan. To a large extent, the welfare of the state, economic stability and the standard of living of the population depend on how fully and comprehensively these problems are solved. Rational use of energy resources creates a favorable climate for the continuous development and economic growth of the republic. In the conditions of growing consumption of energy resources, it is necessary to maintain a balance between depletion of fuel reserves and an increase in energy consumption to increase production efficiency. In addition, energy efficiency affects environmental and energy security issues, which makes energy efficiency a priority. To achieve positive results in reducing the energy intensity of production in the country, it is necessary to study the best foreign practices, to develop and introduce modern technologies, to implement and support at the state level projects aimed at improving energy efficiency.

**Formulation.** The economy of Uzbekistan is characterized by complexity. The accelerated transition to the market has aggravated Uzbekistan's technological lag behind Western countries. The remnants of a directive-driven economy negatively affect the development of technological structures. Currently, due to the technological lag, Uzbekistan uses several types of technological systems in production at once, ranging from primitive weaponry to modern high-tech. This determines the diversity of the organization of production, the forms of thought used and social norms of behavior. The experience of economic transformations in the country shows that the complexity of the economy cannot be eliminated as long as the production, technical and socio-economic foundations of the way of life are preserved, and the commodity production and market relations cannot be abolished by force.

Of course, the focus on the repetition of foreign technologies will reduce the technological lag of the country, but not more, because in this case the country has a permanent role of catching up, that is, backward, underdeveloped. The challenge is to get ahead. In the context of the country's success in the commodity markets, the development of science, invention and innovation, innovative entrepreneurship and other areas of activation of the creative potential of the people have somehow been pushed into the background. For which the country has paid for the growing uncompetitiveness of the economy.

The Law of the Republic of Uzbekistan "On Amendments and additions to the Law of the Republic of Uzbekistan "on rational use of energy" dated 14.07.2020 No. ZRU-628 defines the term "energy saving" - the implementation of legal, organizational, economic, technological, technical and other measures aimed at reducing the volume of energy resources used while maintaining the corresponding beneficial effect from their use, including the volume of work performed, products produced or services rendered.[1]

The Government of the country adopted a Strategy for the transition of the Republic of Uzbekistan to a "green" economy for the period 2019-2030 and the Concept of providing the Republic of Uzbekistan with electric energy for 2020-2030.

The main goal of the Strategy is to achieve long-term sustainable economic development and the fulfillment of the goal of Uzbekistan under its obligations under the Paris Agreement, which was ratified by Uzbekistan in 2018. The main goal of the Concept is to meet the growing demand for electricity (the deficit of which was estimated at 9.4% in 2012-2019, and the annual growth of consumption until 2030 - at the level of 6-7%) and to ensure further balanced development of the electric power industry.[2]

Table 1

**Investment roadmap to 2050. [3]**

Period, yy.	Stages	Installed capacity at the end of the period, GW	The volume of necessary investments, billion US dollars	Required investments in % of GDP
2020-2030	Modernization of existing gas-fired power plants	18 - GTU 8 - RES	397	4,8
2030-2040	Increase in renewable energy production capacity	12 - GTU 47 - ВИЭ	23	1,8
2040-2050	Net zero carbon dioxide emissions	97 - RES 39 - accum. capacities	34	1,9

There are four key national energy efficiency programmes and roadmaps relevant to the industrial sector. The Government recognizes the importance of this sector and seeks to diversify the economy by increasing the production of products with higher added value.

As of January 1, 2021, the total installed capacity of power plants in Uzbekistan was about 15.8 GW. In December 2021, 20 new energy projects with a total capacity of 7.0 GW (including 2.9 GW of wind and solar energy) were at various stages of implementation, and the planned investments amounted to \$5.9 billion. During 2010-2019, the installed capacity of thermal power plants increased by 3.3 GW, or 30.4%, and hydroelectric power plants – by 0.1 GW, or 6.4%. As of January 2021 the average age of thermal power plants was 42 years, thermal power plants – 63 years and large HPPs – 46 years. [7]

According to the assessment carried out within the framework of the UNDP and the Ministry of Economy project "Support of Uzbekistan in the transition to the path of low-carbon development of the national economy", the potential savings in the electricity sector will amount to 8.3 million tons of n.e., or 11 billion m<sup>3</sup> of natural gas per year. The study emphasizes that only the commissioning of high-efficiency PGTS can reduce the specific energy consumption from 0.275 to 0.175 tons n.e./MW/h. Additional savings of 2.63 million tons n. E., or 3.23 billion m<sup>3</sup> of natural gas per year can be achieved through the construction of cogeneration plants at energy-intensive industrial enterprises. [7]

In the CAREC study on the energy sector financing roadmap, the potential energy savings in the electricity sector by 2030 are estimated at 6.85 million tons n.e. The calculation takes into account an increase in the average efficiency of gas

thermal power plants, which was about 33% in 2013, and a reduction in technical and commercial losses, which accounted for 23% of the net admission to the network in the same year. The study also suggests that total energy savings in the next 15 years could reach 25%, although the analysis did not specify the exact baseline for such a forecast. [8]

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The ADB-funded Energy sector Assessment Report, prepared in 2020, is the most recent publicly available study. According to its assessment, the potential savings in the energy sector is 10% of the volume of natural gas production. Translating these figures into absolute values based on the energy balance of 2019, the potential savings can be estimated at 6.1 billion m<sup>3</sup> of natural gas, or 4.86 million tons of oil per year. The report also confirms that the weighted average efficiency of power plants in 2019 it remained at about 33%, which is significantly lower than the efficiency of modern gas turbines with a combined cycle, which is 55-60%. [7]

Table 2

**Показатели энергоэффективности Республики Узбекистан  
в разрезе областей за 2022 г. [7]**

Name	Energy efficiency %	share of fuel consumption	share of electricity consumption in	the share of heat energy consumption in the
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		in fuel and energy complex	the fuel and energy complex	fuel and energy complex
Republic of Uzbekistan	5,02	32,9	64,5	2,7
Republic of Karakalpakstan	3,2	0,9	0,6	0,1
Andijan	1,9	0,4	2,	0,04
Jizzakh	3,5	0,4	1,0	0,1
Kashkadarya	4,0	2,5	0,6	0,0
Navoi	6,6	4,9	4,9	0,2
Namangan	1,8	0,6	0,6	0,01
Samarkand	1,1	0,5	0,7	0,1
Surkhandary	2,1	0,6	0,3	0,001
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Syrdarya	1,8	0,3	0,3	0,001
Tashkent	6,4	7,6	6,7	0,2
Ferghana	2,4	0,9	1,5	0,3
Khorezm	3,7	0,6	1,0	0,1
Tashkent	6,7	11,5	42,0	1,5

Presidential Decree No. PP-4779 of 10.07.2020 provides for the planned savings of fuel and energy resources in the amount of 1.859 million tons n.e., which is a de facto mandatory energy efficiency target to be achieved in the electricity generation subsector by January 1, 2023. In accordance with the approved target parameters of fuel and energy saving, the relevant ministries and departments in the context of enterprises have developed and approved organizational and technical measures to save fuel and energy resources for 2020-2022 with justifying calculations of savings for each event.

Combined-cycle cogeneration plants can reach an energy efficiency level of about 90% and represent one of the most efficient and environmentally friendly ways of simultaneous production of electric and thermal energy. The EU Energy Efficiency Directive provides for the cost-benefit analysis of the use of cogeneration when planning the construction or major renovation of such installations as:

- thermal or electrical installation with a total thermal capacity of more than 20 MW;
- industrial plant generating waste heat with a total thermal capacity of more than 20 MW;
- a district heating and cooling network with a total thermal capacity of more than 20 MW.

As of June 2021, there are no incentives or obligations in Uzbekistan regarding the use of highly efficient cogeneration.

The Concept of providing the Republic of Uzbekistan with electric energy for 2020-2030, approved by the Order of the Ministry of Energy No. 70 dated 04/28/2020, provides for specific goals related to electricity losses, that is, reducing the level of losses by 2030 in trunk networks from 2.72 to 2.35%, and in distribution networks - from 12.47 to 6.7%. At the same time, in the legislative framework of Uzbekistan there are no targets for natural gas losses related to the operators of the transmission system (TSO) and distribution (DSO) of gas. [3]

When summarizing the key findings and conclusions of this section, the following main barriers are identified:

- there is no independent energy regulator in Uzbekistan;
- strategic decisions for the development of the energy system are based on options for measures relating to supply and do not take into account measures relative to demand;
- extremely old, outdated and inefficient technologies and equipment are used in the electric power industry, which leads to high vulnerability of the system and regular outages;
- information on the gas balance of Uzbekistan, including losses during transportation and distribution, is limited and is not publicly available, nor is there any data on individual losses of operators of main and distribution power grids for the periods up to 2019;
- there is no transparent methodology for calculating, monitoring and verifying planned savings. The existing legislative framework includes planned energy saving indicators for the electric power sector, but does not provide any targets for the transportation and distribution of natural gas;
- there is no policy to encourage highly efficient cogeneration;
- state-owned energy companies have no incentive to reduce their operating costs.

**Results and discussion.** Taking into account these circumstances, the country's entry into a new technological order is a matter of survival, economic development, security and the international status of the country. The unilateral orientation of the domestic economy and society towards limited resources and dwindling traditional hydrocarbon energy from the turn of the XXI century begins to slow down economic growth and social progress.

Energy saving is one of the main forms of resource saving, which, in turn, serves as an important reserve for increasing the competitiveness of domestic

industry in the world market. Energy saving is a system of economic relations to ensure more efficient use of fuel and energy resources.

In the domestic economy, the competitive potential of energy saving remains largely unused. The economic obstacles to its activation have a twofold basis and are related to the problems of development of both the energy sector and the innovative sphere of national reproduction. In particular, the development of domestic energy is taking place in conditions of transformation of the conjuncture of world energy markets, volatile prices for oil and gas, products of their processing. This significantly reduces, first of all, the competitiveness of domestic energy producers, which is aggravated by the unfavorable ratio of cost and tax burdens of domestic energy producers. Furthermore, the high cost of energy production in the economy is passed over the chain of production of raw materials and goods to the end consumers of energy and energy carriers. The over-monopolized industry, in the face of a significant increase in the cost of extraction and production of fuel and energy resources, tougher environmental requirements, pursuing the goal of maximizing profits, is increasing investments in the production of energy and energy carriers. Financing of innovative developments in the field of energy conservation initiated by both producers and consumers of energy and energy carriers does not "fit" into this process.

Along with the negative impact of the instability of the global energy market on the production process and, accordingly, energy conservation, it is impossible not to note the inertia to reduce energy consumption of monopoly fuel and energy complex. In turn, the obstacles to the development of energy saving on the part of the country's innovation system are associated with the lack of a support system for technological innovations in basic industries, as well as the demand for energy-saving technologies and equipment from energy and energy consumer enterprises.

Thus, the presence of a number of significant problems in the development of innovative energy saving in the economy, in using its potential to increase the competitiveness of its subjects makes it necessary to recognize the leading role of innovation in this process. An important place here is given to the analysis of regional problems and opportunities to activate the innovative and energy-saving factor of increasing the competitiveness of enterprises.

Problems preventing the activation of innovative activities in the domestic field of energy saving:

- lack of formation of scientific, technical, information, financial infrastructure of innovative energy saving projects for business;

- the shortage of private investments in new energy-saving technologies, the dominance among the sources of financing of sectoral R&D budget financing of ministries and working capital of energy producers and consumers, which is clearly insufficient. Accordingly, the emphasis is placed only on low-cost and quickly recouped projects, whereas the economic specifics of the energy industry require large capital expenditures with a sufficiently long payback period;

- the absence of a common system for accounting for energy consumption and monitoring energy savings, which leads to weak incentives for energy cost reduction and underestimated demand for innovative energy-saving technologies and equipment.

At the same time, significant industrial, technological and economic changes are taking place in the global energy system, which are associated with an increase in the importance of energy conservation in energy production and consumption.

First, the world economy has entered a long-term period of depletion of fossil fuel reserves, and fluctuations in energy prices can take a catastrophic character. Therefore, energy saving becomes the main factor of national competitiveness.

Secondly, fluctuations in energy prices are becoming the main source of industrial risks for large national enterprises, which is especially characteristic of the economy, the real sector of which is mostly represented by raw materials companies.

Thirdly, the need to reduce energy consumption in the domestic industry in order to increase the competitiveness of its products requires an almost complete renewal of its fixed assets.

**Conclusion.** In order to overcome obstacles to the development of energy saving in the domestic economy, it seems appropriate to implement the following areas of innovation.

The first direction is to improve the regulatory framework for energy conservation, especially in the field of R& D and innovation, the development of strategic documents in this area, taking into account the need for technological renewal of energy production and consumption.

The second direction is the development of scientific research in the field of equipment replacement and modernization of technological processes of industrial enterprises based on increasing energy efficiency, reducing the need for fuel and energy. To do this, it is important to ensure the diversification of fuel and energy sources, the transition to local fuel sources and the utilization of secondary energy resources (VER).



The possibilities of solving this problem are in innovation, especially in the basic sectors of the Russian economy.

The third direction is the development of a techno-park form of activation of innovative activities in the field of energy saving of domestic industry enterprises. Its implementation is designed to help maximize the potential of innovative energy saving in increasing the competitiveness of domestic industrial enterprises.

Thus, improving energy efficiency and energy conservation is a complex problem, since energy consumption affects all spheres of the economy and society. The experience of European countries in improving energy efficiency shows that the most important driving force in the development of this issue is the involvement of all economic entities and almost the entire population in it.

To address this problem, an effective energy policy in the country with the participation of the state, business and the population is necessary. This will require a systemic approach based on economic, scientific, technical and organizational measures.

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