ANALYSIS OF THE FINANCING OF PROJECTS IN THE ENERGY SECTOR

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Abstract. As can be seen from the article which discusses the state of financing projects in the energy sector and the problems observed in it, the development processes of the energy sector, the status of thermal, wind and solar power plants in our country and their difference from each other in terms of their effectiveness, as well as alternative financing directions. The purpose of the study is to analyze the financing and sustainability of infrastructure projects in the energy sector.

Keywords: private sector, energy, public-private partnership projects, financing, energy resources, thermal power plants, wind farms, nuclear power plant, hydroelectric power plant, renewable energy sources, power transmission networks, “green energy”.

Introduction. In Uzbekistan, the attention to the energy sector is increasing, in particular, considering that the demand for electricity is also increasing, it can be seen that the need to analyze the current state of financing in this sector is urgent. The observed climate changes, in particular, the persistence of anomalous cold weather for a certain period of time, have clearly shown the problems in the energy system. Because the use of reliable energy is important for the economic and social well-being of the population, the shortage of electricity in our republic has caused concern among many. Overloads on the natural gas system have had a direct negative impact, causing interruptions in services important to the population, such as the heating system and transport infrastructure, for a certain period of time. It is clear that it is necessary to study the causes of problems in the energy system of our republic, especially in the city of Tashkent , to correct the situation and ensure that the energy network is able to meet the growing needs of the city. This means investing in an entirely new infrastructure, while implementing practical measures and regulations that promote energy efficiency, diversification of the energy balance, and sustainable energy development.

Involvement of the private sector and promotion of private investments in the energy sector will play an important role in solving problems in the energy sector and ensuring a stable and reliable energy supply in the near future. This includes encouraging private companies to invest in renewable energy sources such as wind and solar, and to introduce innovative solutions that improve energy efficiency and reduce emissions. In addition, it is important to ensure responsible and transparent management and regulation of the energy sector, taking into account the interests of the state. This ensures clear standards and regulations for energy production and distribution, as well as sector accountability and public needs. It is clear that solving the observed problems in the republic's energy sector requires a multifaceted approach, taking into account economic and environmental factors. It is necessary to ensure a reliable

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and affordable energy supply for the city and its residents, as well as support its continuous development and growth, through cooperation and an integrated and sustainable approach to energy management.

Literature analysis and methods. If we analyze the work carried out in the field of electricity, we can cite the opinion expressed by our President: "Electricity is the "motor" of the economy, and socio-economic progress, it goes without saying that, life cannot be imagined without this sphere." Currently, our country has a total of 14 thousand megawatts of electricity generation, 86% of which is due to the contribution of thermal power plants. However, 84 percent of the thermal power plant capacity was launched almost half a century ago, and they are also operating at 83 percent capacity. In comparison, one of the main problems in the field is that in developed countries, 240-260 grams of fuel is used to generate 1 kilowatt of electricity, in some stations in our country this figure is twice. Judging by the analysis and forecasts, as a result of the development of our economy, the demand for electricity is expected to reach 20 thousand Megawatts by 2030. It is known that electricity in our country is produced mainly as a result of the use of natural gas. We must not forget that gas resources, on the other hand, are limited in today's conditions to spend it even more by 2030-to grow a huge amount of non – renewable natural resources. The launch of a nuclear power plant can be one of the completely new solutions for reducing fuel consumption, but it takes at least another decade to do this. Therefore, it is emphasized by our president that it is necessary to eliminate existing problems faster and radically develop the network, and most importantly, achieve significant positive changes in the system in a short time. By 2030, there is a need to take measures to create additional required 12.5 thousand megawatts, including the construction of steam-gas installations, nuclear power plant, hydroelectric power plants and modernization of existing ones, as well as to compensate for the necessary capacities by updating the energy blocks at the Syrdarya, Tashkent, Navoi, Taxiatosh thermal power plants, as well as introducing a public-private partnership into the power system. It is also worth saying that the State Committee on investments, Joint-Stock Company "Uzbekenergo" is carrying out appropriate work on the construction of steam-gas and gas-turbine units of 3.9 thousand MW and coal-fired thermal power plants, solar and wind power plants in the city of Angren and Surkhandarya region. There are also tasks to accelerate the construction of new electricity generating facilities. It is planned that from the coming years, 15% of the proceeds from the sale of electricity will be directed to finance investment projects and repay loans.

It is rapidly becoming clear that the modernization and reconstruction work carried out in the system requires the involvement of the private sector in this area on the basis of public-private partnerships (PPP). But it should also be recognized that neither the regulatory framework nor the technical infrastructure is ready for this. For example, the issue of accepting electricity generated by private enterprises into my energy system still remains as a problem. For a comparison example, we can cite that 60 percent of electricity in Turkey and 20 percent in South Korea is generated by private enterprises. Therefore, it is necessary to attract the private sector to the industry with the involvement of international experts in our country and on the basis of their recommendations and conclusions, as well as to ensure the development

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of legal, institutional, technological foundations of the mechanism of Public-Private Partnership. The share of old networks, which has been used for many years, is 62%, therefore, 57% of lines and 39.6 thousand transformer points need to be updated in the distribution networks.

The issues of implementing an automated accounting system of energy resources have not yet been completed. Today, the Asian Infrastructure Investment Bank is cooperating in the development of the energy sector. In Uzbekistan, with the support of international financial institutions, practical work is being carried out on reforms in the energy sector, including financing projects for renewable energy sources, energy efficiency and energy savings, construction of thermal power plants, construction of power transmission networks and repair of hydro power plants. In particular, in the financing of renewable energy projects, cooperation has been established with international companies on renewable energy projects. It is also planned to build stations with a capacity of 500-1000 MW for their own needs on the principles of Public-Private Partnership, and in Surkhandarya region, as part of the project to build a thermal power plant with a capacity of 1560 MW, investors are considering the possibility of attracting funds from the Asian Infrastructure Investment Bank, at the same time, work is underway with “Xian Electric and state Grid – CET” to build new high-voltage power lines and 5 substations with a length of 1000 kilometers in order to finance projects for the construction of power lines and to provide uninterruptible electricity for new capacities. As part of the program to finance the production of solar panels in Uzbekistan and the transition to a “green” economy, in 2022, solar panels with a total capacity of 49 MW and solar water heaters with a volume of 722.6 million liters were installed on the roofs of public institutions and objects of the social sphere, and a specialized enterprise “green energy” was established. In order to accelerate the installation of panels, as well as reduce their cost, the issue of localization of the production of solar panels in Uzbekistan is also being considered. The issue of providing funds for the development of the technical and economic framework of “Zarafshan GES” is being considered. Effective work is being carried out between the governments of the republics of Uzbekistan and Tajikistan to study the construction of a hydroelectric power station on the Zarafshan River on the territory of the Republic of Tajikistan and to attract grant funds for the development of updated technical and economic foundations of the project.

Designing infrastructure objects and effectively organizing their financing is a very important process for the country's economy. Foreign research scientists Assaf, S. and Al-Hejji in their scientific work entitled "Reasons of delay in large infrastructure projects" showed the reasons and their consequences in several examples.

Scholars such as Chan, Albert PC, Chan, Daniel WM, Fan, Linda CN, Lam, Patrick TI & Yeung, John FY have analyzed the infrastructure projects, as well as the benefits of infrastructure projects based on public-private partnerships, financing in this area in the region. analyzed the processes in detail. In their research work, they scientifically assessed what the development of the current state of financing of projects related to the corporate energy sector would bring to the economy and society as a whole. It has also been found that the use of

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alternative sources of financing, not only loans, can give more effective results.

Konrad Spang studied the financing of infrastructure projects by the state on the example of Germany . The design and construction of public infrastructure in Germany is divided into two distinct phases. At the first stage, the client and the designer mutually plan the implementation of the project. Next, construction is carried out. In this case, one or more contractors are involved in the execution of the work. This indicates that the exchange of information between the two phases is an error. The reason is that planning at the design stage does not have theoretical and practical information. During the design phase, cost overruns occur throughout the project as a result of insufficient time and cost information. Therefore, it is necessary to use the knowledge of the contractor at the design stage. This, in turn, allows for more effective implementation of the project. The scientist elaborated on how to use executive knowledge for publicly funded infrastructure projects in Germany and the specifics of its practical application.

Its importance is further enhanced by the fact that projects in the energy sector are multi-year objects. Therefore, it is time to gradually finance projects in this field together with the private sector and use modern technologies effectively. The fact that most infrastructure facilities in the energy sector run on gas or coal also shows that the sector needs a deep change. Therefore, it is very important to diversify the financing of infrastructure projects.

Results. State monopoly in the energy sector creates challenges in terms of competition, efficiency and innovation. In monopolies, competition is often limited, leading to higher prices, lower service quality, and limited consumer choice. In addition, a state monopoly may not have the same incentives as a private company to improve efficiency and reduce costs, which also affects the cost and quality of services. At the same time, there are promising advantages of state monopoly. For example, there will be more control over the energy sector and an emphasis on ensuring that all citizens have access to energy. It may also allow the government to better regulate the energy sector and promote certain energy policies and initiatives that are in line with national priorities.

To maintain a state monopoly or open up the energy sector to private investment and management is a complex and politically charged issue that needs to be carefully analyzed based on a country's specific circumstances and goals. Any changes in the energy sector must be made in a transparent and consultative manner, taking into account the interests and concerns of all parties.

Table 1.

Public-private partnership projects in Uzbekistan*

№	Fields name	Number of projects	Amount ($ million)	As a percentage of the total
1.	**Energy**	**26**	**9 276**	**81.5**
2.	Utility service	3	1 668	14.7
3.	Transportation	2	93.9	0.8
4.	Health care	48	76.7	0.7

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5.	Irrigation	133	29.4	0.2
6.	Ecology	69	117.5	1.03
7.	Education	67	84.9	0.7
8.	Culture	26	9.3	0.08
9.	ICT	2	20	0.2
10.	Agriculture and industry	14	5.3	0.05
11.	Law enforcement	1	3	0.03
12.	Employment	2	0.3	0.003
Total		**393**	**11 384.3**	**100.0**

It can be seen from the data of the table that more than 80 percent of the implemented public-private partnership projects are in the energy sector. This, of course, indicates that the private sector has a large role in the field. Out of a total of 393 projects, 26 are directed to this field.

It is necessary to take into account the experience and lessons of other countries regarding the reform and privatization of the energy sector. In some countries, there are positive results of privatization of the energy sector, which has led to increased competition, lower prices and improved service quality. On the other hand, some countries have negative experiences such as reduced investment in the energy sector and reduced energy use for certain segments of the population.

It is an important component of any country's economy and well-being, and it is important to carefully approach decisions related to its management and regulation. For example, the Joint Stock Company "Regional Power Networks" should sell the "Regional Power Networks Enterprises" joint stock companies in the regions to the private sector or transfer them to corporate management. Private sectors are offered the option of buying energy from HETK and selling it to consumers. If retailers have no choice but to buy electricity only from the joint-stock company "Territorial Electric Networks", then this market is not interesting for them. Such a structure could limit competition in the energy sector and lead to higher prices for consumers. To facilitate the development of a more competitive and efficient energy market, it will be necessary to review the existing regulatory framework and accelerate reforms that encourage greater private sector participation and competition. This will help stimulate innovation and investment in the energy sector and lead to better services and lower prices for consumers.

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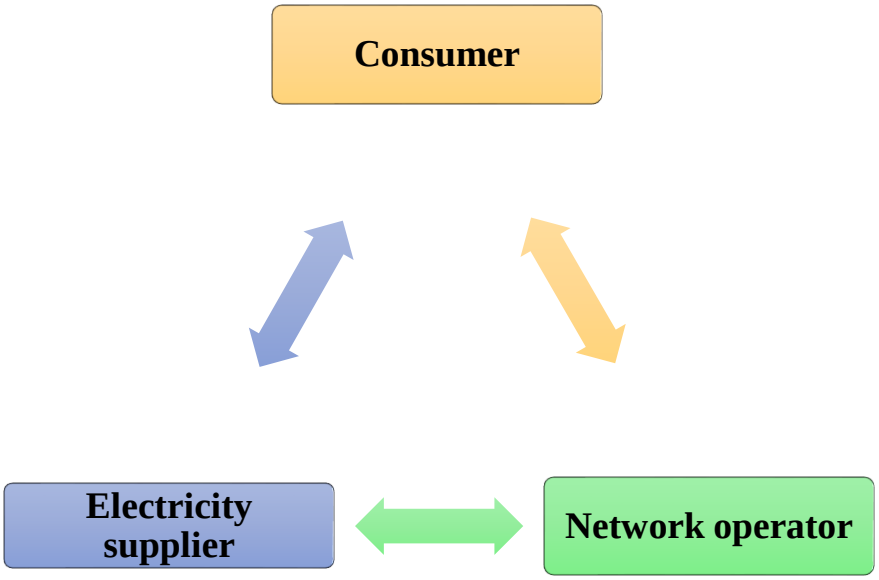
Drawing 1.

Standard communication processes in the liberalized electricity market in Europe*



*Prepared based on information from the Internet.

Based on the data of the above drawing, it can be said that when an electricity supply contract is concluded between the Consumer and the Electricity supplier, a network usage agreement is concluded between the Consumer and the Network operator, as well as the Electricity supplier and E-account of network usage is maintained between the network operator. Electricity is a commodity in Germany. Most providers offer the same services, but their prices may vary. In Germany, every household can choose from around 100 electricity suppliers. In addition, there are more than 1000 of them throughout the country. Therefore, choosing a new energy company for your apartment or house can be confusing. There are four main electricity providers in Germany: E.ON, RWE, EnBW and Vattenfall. In addition to these, there are several "green" suppliers such as Lichtblick, Polarstern, Ostrom, Grünwelt and Greenpeace Energy. In addition, you can choose from different companies with low, medium and high prices. True, in many countries, including Uzbekistan, the price of electricity is lower than the world average, which limits the possibilities of modernization and expansion of the energy sector. Improving the situation of electricity supply requires raising tariffs and eliminating monopoly. But this should be done in a transparent, fair and not too burdensome manner for the population. Differentiated tariffs and other measures, such as subsidies for low-income households, help manage this process.

It should also be recognized that raising electricity prices is not the only solution to the problem. Governments and energy companies should also consider other ways to improve energy efficiency, invest in renewable energy and improve grid infrastructure. In addition to economic and public opinion factors, environmental and technological aspects should also be taken into account when improving the energy sector. Investing in renewable energy sources such as solar, wind, and hydropower can help reduce greenhouse gas emissions, reduce

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dependence on fossil fuels, and increase energy security. It is also important to monitor the development of energy technologies such as energy storage and advanced grid management methods. These technologies serve to increase the efficiency and reliability of the energy system, reduce energy losses and ensure the integration of renewable energy sources into the system.

Another important aspect of improving the energy sector is to increase the level of energy education and awareness of the population. This situation helps people to save energy, understand the importance of renewable energy sources and the environmental impact of their energy consumption.

That any changes to the regulatory framework are transparent and fair and take into account the interests of all parties, including consumers, energy companies and the government. A well-designed regulatory framework helps the energy sector operate in a manner that serves the public interest and protects consumer rights. Solving the energy crisis in the republic requires a multifaceted approach. The government must recognize the problem and solve it by regulating electricity prices, de-monopolizing the energy sector and introducing new technologies. Citizens also have a role to play in their willingness to pay a fair price for reliable and uninterrupted energy supply. It should be useful for the development and modernization of the energy sector. Differentiated tariffs and other measures may be introduced to mitigate the impact on the population. However, in the end, the population will have to choose cheap but unreliable electricity or pay a little more for a reliable supply. On January 16, 2023, the President of the Republic of Uzbekistan held a meeting on the supply of energy resources and set the task of bringing qualified specialists from abroad and starting practical work on digitalization of management and production processes within two months. In addition to these steps, there are policy and regulatory measures that can be implemented to support the improvement of the energy sector. For example, the government can provide tax incentives for companies that invest in renewable energy, and set energy efficiency standards for buildings and equipment. The government can also provide financial assistance to low-income households in accessing energy services. International cooperation can also play an important role in improving the energy sector. By sharing knowledge, technology and best practices, nations work together to increase access to energy and improve energy efficiency and reliability.

It should be said that the state of financing of energy projects in the form of large public-private partnerships. The total number of projects is 19, of which 3 projects correspond to Navoi, Syrdarya, Bukhara and Tashkent regions, and 1 energy projects are planned to be financed in Jizzakh, Khorezm and Republic of Karakalpakstan. More than 30 percent of the funds were directed to the implementation of projects in the Syrdarya region. Also, new projects worth 1.4 billion dollars were financed in Bukhara and Surkhandarya regions. A total of 19 projects worth 7.4 billion dollars have been allocated across the country. It is important to monitor and evaluate progress in the energy sector over time. It helps identify areas for improvement, track the impact of policy measures, and evaluate the effectiveness of energy education programs.

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Investments in energy infrastructure are another important aspect of improving the energy sector. This includes modernization of existing energy systems, expansion of access to electricity in rural areas, and construction of new energy infrastructure to meet energy demand. Energy infrastructure projects create jobs, stimulate economic growth and improve energy security. Furthermore, energy access and affordability must be addressed, especially for vulnerable and marginalized communities. The use of energy is a basic human right, a key factor in economic and social development. Governments and organizations must work together to increase access to energy services, especially for those who currently lack or have limited access to energy. And finally, transparency and accountability are critical components of a successful energy sector. Governments and organizations must be transparent about their energy policies, practices and investments and be accountable for their actions and decisions. This will help increase public confidence in the energy sector and strengthen support for energy solutions.

If we analyze the power of the existing energy in our country, the total length of power grids with a voltage of 0.4-110 kW is 23483.35 km, and there are 179 small stations with a voltage of 35-110 kW and higher, and the total power of transformers in them is 2191, It is 35 MW. Also, 5438 transformer points with voltage of 6-10 kW are working today. Their total capacity is approximately 92.79 kW. The directions for the development of electricity in our country until 2020 include the following, i.e.:

- ✓ Complete repair of 2345,68 km long power transmission lines and 972 6-10 kV transformer points;
- ✓ perfect repair of 29 substations of 35 kV;
- ✓ also planned to build 156,15 km long power transmission lines and 124 transformer points with a voltage of 6-10 kV.

Table 2.

Energy projects in the region financing plan*

Areas	**Deadline**	**Power**	**Project cost** *($ million)*	**Projects the number**	***Which is***		
					Solar photoelectric plant	*Portable power station*	*Thermal power plant*
Navoi	2024	600 MW	500	2	1	1	-
Samarkand	2024	1 320 MW	1 100	3	3	-	-
Jizzakh	2023	220 MW	190	1	1	-	-
Syrdarya	2026	3 293 MW	2 800	3	-	-	3
Tashkent city	2022	1 110 MW	940	4	1	-	3
Bukhara	2024	1 520 MW	1 300	4	1	2	1
Khorezm	2025	274 MW	220	2	1	-	1

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Surkhandarya	2025	2 017 MW	1 700	2	1	-	1
Republic of Karakalpakstan	2025	1 600 MW	1 400	4	-	4	-
Total		**11 954 MW**	**10 148**	**25**	**9**	**7**	**9**

* Prepared by the author based on Minenergy.uz data.

As can be seen from the above table, in recent years, 25 electricity purchase agreements and investment agreements with a total capacity of 11,954 MW have been signed with international companies in order to increase generation capacity in our republic with a total value of 10 billion 148 million dollars. According to these agreements, by the end of 2026, 25 power plants with a total capacity of 11,954 MW (9 heat, 9 solar and 7 wind power plants) will be put into operation in our country. This is more than 60 percent of the current electricity production volume in Uzbekistan.

Summary. By conclusion, it should be noted that the financing of the energy sector and its stabilization is a difficult task, but it is important for the economic growth of the country. There is an increasing need to find new alternative options for financing new projects and implementing them. In-depth study of the global experience of financing energy projects should accelerate the implementation of new environmentally friendly options. Financing of projects on the basis of public-private partnership is a new solution. Building a brighter energy future for all is achieved by taking a holistic approach, working with communities, investing in infrastructure and promoting transparency and accountability. The use of modern technologies for the construction of new energy-producing capacities, the widespread introduction of renewable energy sources are considered the most important tasks to be done in this regard. In the development of the country's energy sector, it is important to properly and effectively finance it on time.

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