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Energy of the region: some conditions necessary for its development in the Central Asian region

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Abstract. The level of development is largely determined by the effectiveness of its individual structural elements and is strengthened under the influence of a number of factors. Among them, a special place is occupied by the problems of the optimal mechanism for the development of natural energy resources, which form the basis of the national strategy. In this regard, taking into account the peculiarities of the state and prospects for the development of the resource potential of Tajikistan and the entire Central Asian region, it became necessary to search for new forms of exploitation of natural and energy resources, since in our conditions, only the optimal development of the energy sector in the direction of developing mechanisms for the formation of the energy sector of the entire Central Asian region gives a chance to change the situation. However, in this area of the national economy there are a number of unresolved problems, which include: a low level of energy supply to the population of the regions, a high level of electricity losses, both during its transmission and during its use, insufficient electricity production in the presence of a resource component. The complex of these problems can be solved by a systematic method, one of which is the study and development of mechanisms for the formation of energy clusters in the Central Asian region, and the dynamic development of cluster formations of hydropower resources. In this regard, the study is aimed at studying current trends in the development of energy resources in the context of determining the prospects and mechanisms for the formation of an energy cluster in the Central Asian region and their application in the conditions of Tajikistan, which predetermines the relevance and relevance of the study.

1. Introduction

The development of the country's largely depends on the effective use of its individual structural elements, which is greatly influenced by many factors, among which the optimal mechanism for the development of natural energy resources stands out. The latter is becoming extremely popular and vital in the development of prospects and mechanisms for creating a unified energy system in the Central Asian region. These issues, determining the pace of economic development in Tajikistan, are of particular importance for the formation of energy clusters in it.

In this perspective, based on the current specifics of the achieved level of development of resource potential and its prospects in the Central Asian region, in general, and in the Republic of Tajikistan, in particular, the need to find new forms of efficient and expedient use of natural and energy resources has increased, since, namely, ensuring optimal development of the energy complex, aimed at finding

mechanisms for the formation of an energy cluster on the scale of the Central Asian region, can become a factor in changing the current situation.

However, there are the following unresolved problems in the energy complex: insufficient energy supply to the population of the regions, large energy losses during transmission and use, and the discrepancy between the volume of electricity production and its seasonal consumption. The solution of these problems involves the application of a systematic method, which includes the development of mechanisms for the formation of energy clusters that ensure the optimal use of hydropower resources in the Central Asian region.

The republics of the Central Asian region have large natural reserves of energy resources (Turkmenistan, Kazakhstan and Uzbekistan - oil and gas reserves, Kyrgyzstan and Tajikistan - water and energy resources) (table 1).

Consequently, for the latter (Kyrgyzstan and Tajikistan), the issues of developing a Strategy for Water and Energy Policy, designed to meet the demand for energy resources, are of decisive importance. Moreover, this Strategy significantly expands the boundaries of the export potential of the CAR and enhances the role of the Central Asian region in ensuring global security in the energy sector. These prospects enable the region to dynamically develop priority sectors of the world economy - metallurgy, mechanical engineering, light and heavy industry. Stimulation of integration processes in these sectors of the regional economy, of course, ensures the effectiveness of the natural potential of the CAR.

Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan and Kazakhstan are classified as developing countries according to the UN criteria. Occupying the seventh place in the world in terms of area (of which Kazakhstan, which occupies 2.7 million square kilometers, is among the top nine largest countries in the world), the CAR countries have significant land resources, in terms of arable land (Kazakhstan - 19.4 million hectares , Uzbekistan - 4, Kyrgyzstan - 1.4, Tajikistan - 0.9) can become a self-sufficient and developed region.

2. Materials and methods

The following research methods were used in the article: general scientific and special research methods, including methods of systemic economic analysis, economic, mathematical and statistical methods of information processing, modeling methods and expert forecasting.

Thus, the main information and experimental base of the study was the statistical data of the Agency on Statistics under the President of the Republic of Tajikistan, the National Development Strategy of the Republic of Tajikistan for the period up to 2030, data from the Ministry of Economy. The State Committee for Investments and State Property Management of the Republic of Tajikistan, the State Committee for investments and management of state property of the Republic of Tajikistan, as well as the use of Materials posted on the sites of the global Internet.

3. Results

In the Soviet era, the energy systems of the countries of Central Asia (CA) were closely interconnected and were part of the Unified Energy System of the Union. The energy "ring" of the CAR is an integrated system of all energy centers of the republics of the USSR, including eighty-three hydroelectric power stations in Kazakhstan, Turkmenistan, Kyrgyzstan, Uzbekistan and Tajikistan.

Meanwhile, the energy potential of the Central Asian countries, as shown by the data in table 1 on the hydropower resources of the Central Asian countries, is very high. This table shows that 74% of the hydropower resources of the Central Asian region are located in the Republic of Tajikistan, which indicates the great potential of hydropower resources.

The Central Asian Republics (CAR) are increasingly aware of the fact that the eventual recovery and further development of the economy, especially the energy sector, will depend on the growth of internal trade between them and the increase in electricity exports to neighboring countries. The four CARs - Kazakhstan, Uzbekistan, Kyrgyzstan and Tajikistan (with the exception of Turkmenistan) have formed the Central Asian Cooperation Organization (CACO), one of whose tasks is to strengthen

energy trade both within the region and beyond. The capacity structure of the system is determined during its design and its operation cannot be changed. The choice of structure is the most important task in the development of the energy system. The structure of capacities is selected for large regions of power supply and is associated with fuel and energy resources. When choosing a structure, the ratio of stations of various types is set, i.e. HPP, TPP, NPP and their parameters. The capabilities of stations are determined when they perform various functions, their economic characteristics (Table 2).

Table 1. Energy resource potential of the Central Asian countries for 2021 [13].

Energy sources / Countries	Oil (million tons)	Gas (billion cubic meters)	Gas* (billion cubic meters)	Coal (billion (t)	Uranium (t)	Uranium *(t)	Hydropower resources (billion kWh/year)
Kazakhstan	4000	3300	6800	35.8	622000	1690000	40.2
Turkmenistan	300	2860	23000	-	-	-	-
Uzbekistan	250	1875	5900	4	93000	185800	-
Kyrgyzstan	5	6	6	-	-	20000	142.5
Tajikistan	5	-	*	0.5	-	460000	527
Total for CA	4557	8041	37706	40.3	715000	2355800	709.7
Place in the world	11	4	2	8	2	1	6-8

Table 2. Structure of installed capacities in the Central Asian region, GW for 2021 [12].

Countries / Types of power station	Kyrgyzstan	Kazakhstan	Tajikistan	Turkmenistan	Uzbekistan	CAR
All power plants including	4.41	18.18	4.758	3.107	12.357	42.81
CHP	0.73	15.91	0.346	3.106	10.618	30.71
% to everything	16.5	87.5	7.27	99.9	85.9	28.17
HPP	3.68	2.27	4.412	0.001	1.739	12.10
% to everything	83.5	12.5	92.73	0.01	14.1	71.73

According to table 2, it can be seen that the total installed capacity in the CAR is approximately 42.81 GW, of which more than 72% is produced by hydroelectric power plants (HPP), the remaining 28% is produced by thermal power plants (CHPs).

It is no secret that the vast fuel and energy resources of the Central Asian Republic are unevenly distributed across regions. In the Republic of Kazakhstan, coal resources account for 88.6%, oil - 86%. In the Republic of Uzbekistan, coal resources are 4.9%. Gas resources are more or less equally distributed between Turkmenistan (43%), Uzbekistan (30%) and Kazakhstan (27%).

Production and consumption of fuel and energy resources of the countries of the Central Asian region are given in table. 3. The data in the table show that the production of gas, oil, coal, electricity - more than consumption. These figures show that these countries can export their surplus resources to neighboring countries on mutually beneficial terms.

The hydropower potential of the rivers of Central Asia is given in table. 4. The data in the table indicate that the Republic of Tajikistan occupies a leading position in all respects, which indicates a large hydropower potential of the country. The analysis shows that the share of the Republic of Tajikistan in the hydro potential of the Central Asian region is 69%.

In this regard, the issues of developing mechanisms and tools for the effectiveness of the integration processes of the CAR republics are of particular relevance. This will ensure sustainable rates of regional economic development and an increase in the living standards of the population.[2]

Tajikistan and Kyrgyzstan exported energy in the summer, when their hydropower was running at full capacity and at maximum capacity, and imported energy in the winter, when there was a shortage of energy. The coordination of water outlets from hydropower stations in Tajikistan and Kyrgyzstan

was carried out on the basis of the primary problems in meeting the irrigation needs of the downstream states.

Table 3. Production and consumption of fuel and energy resources of the countries of the Central Asian region for 2021 [12].

Types of energy resources \ Countries	Kyrgyzstan	Kazakhstan	Tajikistan	Turkmenistan	Uzbekistan	CAR
Gas, billion m^3: production	0.03	25.7	0.04	68	62.7	156.47
consumption	0.6	12	1.2	9.0	49.4	72.2
Oil, million tons: production	0.1	64.5	0.02	9.8	5.5	79.92
consumption	0.2	11	0.5	5.2	5.9	22.8
Coal, million tons: production	0.4	88	2	0	3.2	93.6
consumption	0.4	65	1.1	0	3.2	69.7
Power industry GWh: production	14.5	69	19.7	9.8	49.3	159.3
including hydropower: production	13.8	8	19.4	0.47	5.2	44.87
consumption	11.8	65	19.3	9.0	49	137.4

Table 4. Hydropower potential of the rivers of Central Asia for 2021.

Indicators / Countries	Installed HPP capacity, MW	Electricity generation HPP billion kW/h	Economic hydro potential, billion kW/h per year	Use of hydro potential %	Share in the hydro potential of the CAR, %
Tajikistan	4037	19.7	317	6	69
Kyrgyzstan	2910	14.0	99	14	22
Kazakhstan	2248	7.9	27	29	6
Uzbekistan	1420	6.0	15	49	3
Turkmenistan	1	0	2	0	0

Source: Author's calculations based on data from the Eurasian Development Bank

Consequently, based on the need to ensure the interconnection between energy and irrigation, electric modes of energy systems in the CAR were built. Under the conditions of general planning in the energy sector, these regimes were reflected in plans and developments for the use of electricity for all energy facilities (all energy systems, energy hubs of regional importance, power plants, enterprises of infrastructural electrical networks, etc.).

The states of the Central Asian Republic (Tajikistan, Kazakhstan, Uzbekistan, Kyrgyzstan, Turkmenistan) with the acquisition of independence in 1991 formed their strategy of energy "self-sufficiency" and "self-sufficiency". The rise in energy prices has led to the fact that the republics, which have significant reserves of fuel energy resources, have become more profitable as an export item for the export of organic fuels outside the Central Asian Republic, which leads to the destruction of the existing schemes of energy exchanges. The crisis of the unified credit system of the USSR and the introduction of national currencies necessitated the implementation of widespread barter schemes for energy exchanges.

The logical consequence of these processes is that technical intersystem flows have been replaced by commercial flows, which are the results of the “balancing” of technical flows. The main functions for calculating commercial flows were assigned to the Joint Dispatching Office of the CAR (ODU CAR), now the Coordinating Dispatching Center Energia of the CAR.

As a result of their activities, electricity sales were reduced from 25 gigawatt-hours (GWh) in 1990 to 2.3 GWh in 2010.

It should be clear that these volume reductions occurred primarily due to the transfer of energy exchanges from technical to commercial flows into the new system for calculating the number of energy exchanges.

The participating countries of the Central Asia Regional Economic Cooperation (CAREC) program are committed to a common vision for the region's energy sector [3].

This vision will enable all participating countries to have access to sufficient reliable, affordable, financially sustainable and environmentally friendly commercial energy. It requires the implementation of an ongoing policy to ensure:

- Energy security through the balanced development of energy resources, infrastructure and institutions of the region.
- Enhanced integration of the region's energy markets.
- Economic growth through energy trade.

Within this framework, the Strategy and Work Plan for Regional Cooperation in the Energy Sector of the CAREC Countries (2016-2020), among other activities, aims to promote new technologies and remove market barriers to their adoption in the region.

In 2017, work was completed on a new Turkmenistan-Afghanistan-Pakistan (TAP) Grid Connection Agreement and the countries agreed to sign a joint ministerial statement within the framework of the project to initiate preparatory work for the project. The concept of the project was previously approved by the heads of the three governments in December 2015. TAP has become an addition to the existing network connections of TUTAP and CASA within the framework of the Central Asia - South Asia regional electricity markets.

While significant progress has been made in the area of traditional cross-border interconnection projects, in 2017 CAREC cooperation in the energy sector expanded its efforts to go beyond the traditional definition of regional cooperation to include the creation of common energy markets, especially for new technologies.

Support for new technologies is taking place on multiple fronts, from training and capacity building to pilot projects to improve technology fidelity to address the ongoing challenges of CAREC countries being slow to adopt new technologies due to supply and demand constraints.

Likewise, several technical assistance projects will provide demand-side support in the area of technical capacity development and increased understanding of government officials and institutions. This will create an enabling environment for policies and regulations that support the adoption of new technologies by all parties. Pilot projects and active use of social media will reduce perceived risk, the resistance of incumbents and the negative image created by low quality new technology products in emerging markets.

It should be noted that the national policy for the development of hydropower in Tajikistan is aimed not only at improving the welfare of the population of the republic and further developing the country's economy, but also at not causing damage to neighboring states, mutually beneficial cooperation.

At the same time, it should be noted that in the countries of Central Asia the problem of distribution of water resources, which had an intrastate character in the Soviet period, has acquired a transboundary aspect and is part of interstate relations. Here it is appropriate to briefly review the structure and brief characteristics of the generating capacities of the Republic of Tajikistan (table 5).

Table 5. Structure and brief characteristics of the existing, designing facilities under construction in the Republic of Tajikistan as of 2021 [12].

No.		Existing installed (MW)	Designed, power (MW)	Under construction, power (MW)
			Hydroelectric	
1	Sogdian	126		
2	Khatlon	5624.6	4297	
3	GBAO	189.736	3410	135
4	RRS	27.7		
			Thermal power plant	
1	Sogdian	140		
2	Khatlon	120		
3	Dushanbe	580		
			Hydroelectric facilities, which is under development	
1	Sogdian	125		
2	Khatlon	3600		
3	GBAO			
4	RRP			
5	Dushanbe			

The largest power plants in the Republic of Tatarstan are:

- Nurek HPP on the Vakhsh River with a capacity of 3000 MW (1972-1979 with an average annual electricity generation of more than 11.2 billion kWh).
- Baipazinskaya HPP with a capacity of 600 MW (1988 with an annual electricity generation of 2.5 billion kWh).
- Sangtudinskaya HPP-1 (2009 with an installed capacity of 670 MW).
- Sangtudinskaya HPP-2 (2014 with an installed capacity of 220 MW).

As of January 1, 2020, the total installed capacity of power plants in the Republic of Tajikistan (including thermal plants) is more than 5,757 MW.

Current power balance of the Republic of Tajikistan for 2013-2020 shown in table 6.

In order to implement this Development Strategy, at this stage, agreements between the Republic of Tajikistan with the governments of a number of states, as well as with international financial institutions to attract investment, are of paramount importance.

As part of the implementation of these agreements, a number of investment projects have been successfully completed and are currently being implemented (table 6.).

Table 6. Current power balance of the Republic of Tajikistan (million kWh) for 2013-2020 [10].

	Years								2020/2013 %
	2013	2014	2015	2016	2017	2018	2019	2020	
Electricity produced	17715	16472	17162	17232	18144	19742	20677	19771	111.6
Received electricity from outside the Republic of Tajikistan	117	52	63	103	110	559	281	379	323.9
Electricity supplied outside the Republic of Tatarstan	1061	1364	1396	1428	1421	2945	3175	1870	176.2
Total network loss	2528	2804	2670	2746	2884	2878	2429	2549	100.8
Expenses for your needs	109.4	140.1	140.2	164.1	229.3	204.0	213.3	311.4	284.6
Electricity consumed	13643	12356	13159	13161	13949	14274	15141	15420	113.0
Including:									
Industry	5251	3935	4242	4114	3790	3783	3990	2744	52.6
construction	245	122	45	67	227	39	46	57	23.3
Transport	38	41	45	35	30	7	8	8	21.1
agriculture	2600	2328	2496	2807	2754	2241	2338	2619	100.7
Other industries	1006	1238	1417	1293	1742	2625	2740	3135	311.6
Population	4503	4692	4914	4845	5424	5579	6019	6857	152.3

Table 7. List of new generating capacities put into operation in the period for 2015-2017 [12].

No.	Name of power plants and generating capacities	Power (MW)
	2014	
1.	Dushanbe CHPP 2 (first stage)	100
	2016	
2.	Dushanbe CHPP 2 (second stage)	300

In accordance with the Loan Agreement between the Government of the Republic of Tajikistan and Eximbank of the People's Republic of China in 2014, the first stage of the Dushanbe CHPP-2 with a capacity of 100 MW was put into operation. In 2015, the construction work of the second stage of the Dushanbe-2 CHPP with a capacity of 300 MW was started. This facility was put into operation in December 2016 and at the moment the total capacity of the combined heat and power plant, taking into account the first stage (100 MW), is 400 MW (table 7).

As part of the complex construction of the Dushanbe-2 CHPP, the electric substations Shakhrinav 220/110 kV, Khonako 110/35/10, 110 kV power lines Khonako-Shakhrinav, 17 kilometers of the highway were built and are operating. The implementation of the project is aimed primarily at reliable energy and heat supply to the city of Dushanbe and in the future will increase the industrial potential of the city of Dushanbe, as well as the agro-industrial potential of the regions of republican subordination.

In 2009, a 500 kV transmission line "South-North" was put into operation (table 8). This transmission line is one of the components of the interstate power transmission network, which ensures the unification of the southern and northern parts of the energy system of the Republic of Tajikistan, which makes it possible to ensure a reliable energy supply to the Sughd region.

In 2011, an interstate power transmission line 220 kV between Tajikistan and Afghanistan was put into operation. This line will make it possible to export electricity from Tajikistan to Afghanistan in the summer and will help reduce electricity losses in Tajikistan.

In 2015, a 220 kV power line "Kairokum-Asht" was put into operation in the Sughd region with a length of 74.3 km and consisting of 181 towers. This transmission line supplies electricity from the Karakum hydroelectric power station to the residents of the Asht region, and through these towers, the consumers of the Asht region join the unified energy system of the republic. It is necessary to consider the republic's needs for electricity (table 9).

Table 8. Backbone grid complex of the Republic of Tajikistan for 2020.

No.	Backbone transmission lines		Total length (km)
1.	500 kV power transmission line		489.74
2.	Power transmission line with a voltage of 220 kV		1161.29
3.	110 kV power transmission line		-
	Total		1651.03
No.	Backbone electrical substations	Quantity (pcs)	Transformer power (MVA)
1.	Substation with a voltage of 750 kV	-	-
2.	Substation with a voltage of 500 kV	3	3906
3.	Substation with a voltage of 220 kV	7	2528
4.	Substation voltage 110 kV	-	-
	Total	10	6434

Table 9. Distribution power grid complex Republic of Tajikistan [12].

No.	Backbone transmission lines		Total length (km)
1.	Power transmission line with a voltage of 220 kV		563.315
2.	110 kV power transmission line		3055.208
3.	Power transmission line with a voltage of 35 kV		2476.219
4.	Power lines with a voltage of 6-10-20 kV		21499.851
	Total		27594.593
No.	Backbone electrical substations	Quantity (pcs)	Transformer power (MVA)
1.	Substation voltage 220kV	21	2720
2.	Substation voltage 110kV	174	4673.8
3.	Substation voltage 35kV	223	1831.91
	Total	418	9225.71

At present, there are approximately 280 operational small hydropower plants (from 5 to 4300 kW) legally registered in Tajikistan. Of this number, 16 small HPPs were created and operated by OJHC "Barki Tojik", i.e. are state property.

The largest of them are:

- "Marzich" (4300 kW) Aininsky district.
- "Sangikar" (1000 kW) Rasht region.
- "Pitovkul-2" (1100 kW) Jirgital district.
- "Kukhiston" (500 kW) Gorno-Matchinsky district.

The regulatory framework of the Republic of Tajikistan, which regulates the state and development of the energy industry, is regulated by the following legislative program documents:

I. Laws of the Republic of Tajikistan:

- The Constitution of the Republic of Tajikistan.

- Messages of the President of the Republic of Tajikistan, Leader of the Nation Emomali Rahmon to the Majlisi Oli of the Republic of Tajikistan.
- Law of the Republic of Tajikistan "On Energy" dated November 29, 2000, No. 33.
- Law of the Republic of Tajikistan "On natural monopolies" dated 13.12.1997.
- Law of the Republic of Tajikistan "On Amendments to the Law of the Republic of Tajikistan "On Natural Monopolies" and its Enactment" dated 12.05.2001.
- Law of the Republic of Tajikistan "On the use of renewable energy sources" dated 12.01.2010, No. 587.
- Law of the Republic of Tajikistan "On the safety of hydraulic structures" dated December 29, 2010, No. 666.
- Law of the Republic of Tajikistan "On Energy Saving and Energy Efficiency" dated September 19, 2013, No. 1018.

II. Decrees of the Government of the Republic of Tajikistan:

- "On measures to implement the Decree of the President of the Republic of Tajikistan dated March 28, 2006 No. 1718" dated May 03, 2006, No. 196.
- "On the targeted comprehensive program for the widespread use of renewable energy sources, such as the energy of small rivers, the sun, wind, biomass, energy from underground sources for 2007-2015" dated February 2, 2007, No. 41.
- "On the Program for the Development of Renewable Energy Sources and the Construction of Small Hydro Power Plants for 2016-2020" dated December 30, 2015, No. 795.

Based on the foregoing, we will analyze the emerging market in terms of the state and development of energy clusters in the region.

The Law of the Republic of Tajikistan "On Energy" determines the main directions and organizational and legal principles and methods for regulating economic activities in the field of energy in the Republic of Tajikistan.

The state strategy of the Republic of Tajikistan in the field of energy is based on institutional, market and information mechanisms and is aimed at ensuring its reliability, dynamics and protecting the interests of electricity consumers. Legislative support, licensing, taxation, lending, financing, implementation of investment, social and scientific and technical policy, control over the performance of enterprises in the fuel and energy complex is provided through state regulation in the energy sector through the legislation of the Republic of Tajikistan.

On the basis of a permit issued by the Ministry of Energy and Water Resources of the Republic of Tajikistan (license), and in the manner established by the Government of the Republic of Tajikistan, activities in the energy sector are carried out and energy services are provided. These licenses are issued on a competitive basis, observing the principles of openness and transparency of competitions.

In cases where the energy activities of energy services are detrimental to the interests of the Republic of Tajikistan, licenses are prohibited. All energy programs and projects for the construction of large energy facilities are subject to mandatory state expertise, the procedure for which is determined by the Government of the Republic of Tajikistan. The Ministry of Energy and Water Resources of the Republic of Tajikistan is the main governing body responsible for the implementation of state policy in the energy sector.

The Government of the Republic of Tajikistan has established an Interdepartmental Consultative Commission (IAC) on Energy under the chairmanship of the Minister of Energy and Water Resources of the Republic of Tajikistan.

The composition of the ICC on energy was supplemented by representatives of the LSG (local self-government bodies), relevant ministries and departments, research institutes, energy enterprises and consumers at the discretion and approval of the Government of the Republic of Tajikistan.

The ICC of the Republic of Tajikistan on energy carries out its activities on the basis of the Regulation approved by the Government of the Republic of Tajikistan. All economic entities of the fuel and energy complex (FEC of the Republic of Tajikistan) are granted independence in economic and production activities.

Gosenergonadzor is carried out and organized by specialized state bodies. According to the Decree of the Government of the Republic of Tajikistan dated August 29, 2017, No. 412 "On Tariffs for Electricity and Heat", a new electricity tariff was approved for all categories of consumers except for the State Unitary Enterprise "Tajik Aluminum Company".

The potential of the energy industry in the region is revealed through its resource provision (figure 1).

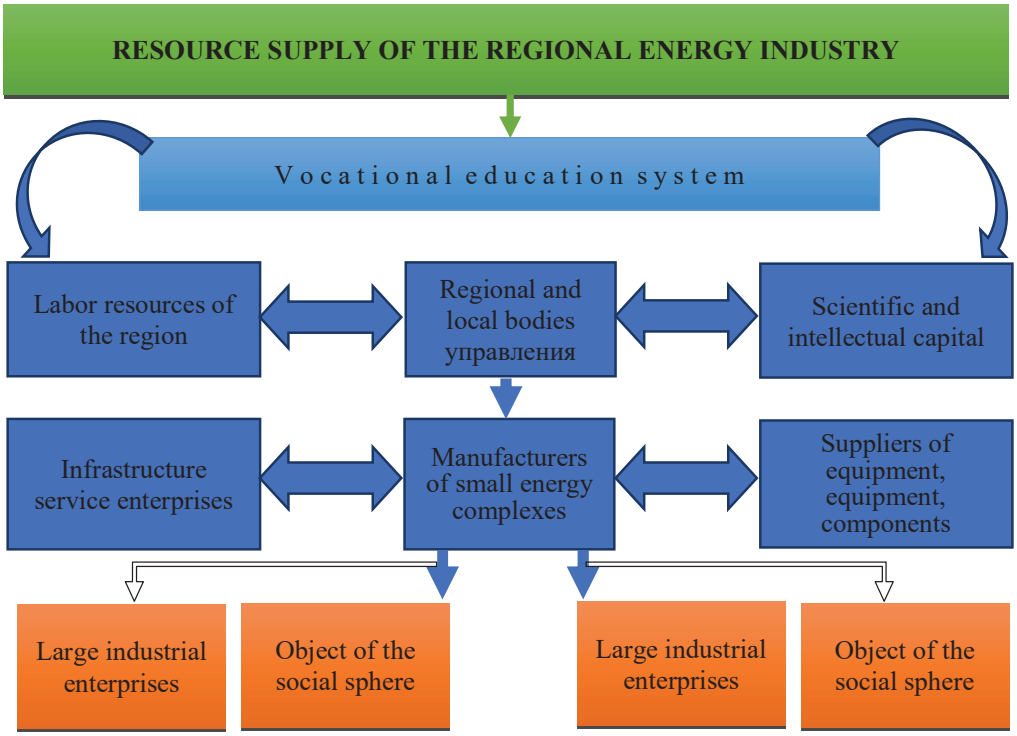

Figure 1. Resource support for the regional energy industry in Central Asia (developed by the author).

4. Discussion

Discussions and disputes about the role, significance and prospects of innovative energy technologies lead to the realization of the fact that the effectiveness of clusters is largely determined by the potential dynamics of network cross-border cooperation. According to experts, the advantage of network structures, in addition to their openness to the exogenous environment, is their multipolarity. Consequently, they become even more stable than traditional (hierarchical) forms and methods of production management and business organization.

Consequently, it was determined that with an increase in the number of hydroelectric power plants, one can face the environmental problems of the country's humid climate, which reduces agricultural productivity, as well as the melting of glaciers, as the main source of hydropower, which also needs to be regulated [4].

Consequently, at present, the stability and efficiency of the development of the regional economy is mainly provided by the investment factor [5].

The totality of existing theories in the context of modern forms of organization of production on a territorial and geographical basis can be divided into 3 main scientific schools - English, Scandinavian and American (this classification of the theory of competitiveness of regions is supported by I.V. Pilipenko) [6].

At the same time, the implementation of schemes for the further joint use of water and energy, transport, irrigation and reclamation and natural resource potentials brings not only certain mutually acceptable benefits, but also creates real prerequisites for achieving promising parameters for sustainable environmental and economic development of the region as a whole [7].

The scientifically substantiated concept of Michael Porter considers a cluster as territorially neighboring and interconnected organizations (economic entities) and related infrastructure potential, functioning in a certain area and complementing each other [8].

5. Conclusion

An analysis of modern realities and the development of energy clusters in the Central Asian region showed that a feature of the development of the CAR is that the republics of the region have significant energy resources (Kyrgyzstan and Tajikistan have powerful water and energy potential, Kazakhstan, Uzbekistan, and Turkmenistan have large reserves of oil and gas).

The study of the problems of the development of the energy complex in the context of integration processes in the Central Asian Republic shows that Tajikistan is one of the republics in Central Asia, which has one of the world's largest reserves of environmentally friendly hydro resources in the form of water, which flows down from mountain ranges every summer and fills the channels rec.

The above countries are coming out with an initiative to build a new transmission line system (TL) that will connect the four countries. According to the developers, this project, called CASA-1000, will allow the most efficient use of environmentally friendly hydropower resources in the Central Asian republics, giving them preferences for selling the summer surplus of energy resources to other countries.

A deeper and more extended presentation of the cluster is that the energy cluster is a separate regional set of legally independent entities that optimally apply the competitive preferences of this region as a result of their interaction. The authors conclude that the peculiarity of the energy cluster is the mutual competition and cooperation of its subjects and, in general, determines the growth of the overall competitiveness of the CAR.

In modern conditions, the main type of organization of interaction between the CAR energy complex is becoming vertically integrated structures that have a number of shortcomings that hinder planned and effective development. In this regard, there is an urgent need to develop an innovative and strategic model that stimulates the dynamic development of the energy industry.

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