Hydropower of Kyrgyzstan: Opportunities for Cooperation

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Introduction

It is impossible to imagine a modern world without electricity. It is the basis for the development of industries, characterises the progress of people, social production. Electric energy is present in all spheres of life: science, technology, industry and agriculture, in transport, in everyday life. Without electricity, work in various fields stops. The work of modern communications, various gadgets is based on the use of electricity. Electricity provides a comfortable life for a person. In general, we can say that the electric power industry is the basis of the economy.

The structure of the electric power industry consists of coal, oil, gas, nuclear power plants, hydroelectric power stations (alternative energy sources). Kyrgyzstan does not have sufficient oil, gas and coal resources, and the available resources are located in remote climatic and mountainous areas. At the same time, Kyrgyzstan has sufficient water resources, as located in the headwaters of the Syr Darya River, the largest river in Central Asia. Hydropower in Kyrgyzstan is predominant, it produces more than 90 per cent of electricity (UNDP, 2015). This is due to the existing energy potential of the country. Of the 18 power plants operated in Kyrgyzstan, 16 are hydropower plants, 2 Thermo-Power plants are located in Bishkek and Osh.

Based on the fact that the power industry is the basis of the economy, and water resources are an important natural wealth of Kyrgyzstan, the prospects for the development of the country's economy and cooperation at the regional level depend on the effective use of this resource. For over 20 years at various sites and levels, it has been stated that hydropower is a strategic industry in Kyrgyzstan and has export potential. The urgent question remains about what opportunities for the development of cooperation at the present stage are available in the hydropower industry of Kyrgyzstan.

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Hydropower Resources

"El bash bolboy, suu bash bol" translation "Do not be at the head of the people, but be chief at the source of water / at the head of water". (Kyrgyz proverb)

One of the cheapest and environmentally friendly sources of electricity is water energy. One of the features of hydropower resources is their renewability, therefore, the electricity generated at hydroelectric power plants is cheaper than the electricity received at thermal power plants. Another positive point is that hydroelectric power plants are characterized by a faster payback than thermal power plants and create an energy base for the development of other sectors of the national economy.

Kyrgyzstan is a country with significant water resources. A feature and advantage of Kyrgyzstan in Central Asia is that the water resources of Kyrgyzstan are fully formed on its territory. The country has significant hydropower resources, which is one of its main wealth.

There are more than 2000 rivers in the country, the length of which exceeds 10 km, their total length is almost 35 thousand km. A significant amount of water is concentrated in the country's water bodies (lakes, shallow ponds, reservoirs). The total area of water resources is 6836 square meters. km Lakes are mainly located in the highlands - 3-4 thousand meters above sea level.[1]

The State Agency for Water Resources under the Government of the Kyrgyz Republic regarding the hydropower potential provides the following data: "The hydropower potential of rivers is about 174 billion kW. hour, and power - 19.8 million kW. Huge volumes of water resources are concentrated in 6580 glaciers, whose reserves are about 760 billion cubic meters." (Government of Kyrgyzstan, 2020).

The expert on water resources in Kyrgyzstan V. Kasymova provides the following data on water resources: "In Kyrgyzstan, the total river flow is 47.2 km3. Explored and approved fresh underground water reserves of 34 deposits are equal to 3.5 km3 per year, but their potential reserves are 13 km3. The country uses 20 per cent of the surface water resources formed on its territory. More than 80 per cent of the flow is transit and flows to the underlying basin areas in Uzbekistan, Kazakhstan, China and Tajikistan. At the same time, Uzbekistan uses about 50 per cent of transit flow. To regulate the flow of transboundary rivers Chu, Talas, Naryn, Ak-Bura, Karadarya, 18 large reservoirs were built. The regulated river flow is 23.5 km3, or 47 per cent of the surface water resources."[2] These data indicate the availability of sufficient water resources for the development of hydropower in Kyrgyzstan and the possibility for further development.

The main hydropower resource of Kyrgyzstan is the flow of rivers that begin on the territory of Kyrgyzstan. As noted, water resources formed on

Table 1: Hydrolectric Power stations in Kyrgyzstan

Name	Installed capacity, MWt	Available capacity, MWt
Toktogul hydroelectric station	1200	1200
Kurpsay hydroelectric station	800	800
Tash-Kumyr hydroelectric station	450	450
Shamaldy-Say hydroelectric station	240	240
Uch-Kurgan hydroelectric station	180	175
At-Bashy hydroelectric station	40	37
Kambaraty hydroelectric station-2	120	100
Small hydroelectric stations – 12 шт.	42	30
Thermo-Power Plant (TEPP) of Bishkek	666	520
Thermo-Power Plant (TEPP) of Osh	50	35
Total	3788	3587

Source: Author's own compilation.

the territory of Kyrgyzstan exceed the amount of own consumption. If you look at the structure of water use, it looks like this: about 90% is spent on the needs of irrigated agriculture, about 6 per cent - on the needs of industry, less than 3% on the water supply of the population. Forestry and fisheries, energy and the service sector together use up to 1% of total domestic water consumption.

The total capacity of Kyrgyzstan's power plants is 3,788 MWt, including 19 hydroelectric power stations with a total capacity of 3,071 MWt and 2 thermal power plants with a total capacity of 716 MWt[3]. (Table 1)

This tables show that the available technical capabilities fully satisfy the needs of the country. There also remains some excess of generated electricity, which in different years has been exported to neighboring countries (Kazakhstan, China, Uzbekistan).

Challenges and Opportunities

Despite the existing hydropotential of the country, which could have a positive effect on the development of the country's economy, Kyrgyzstan did not fully feel the effect of its natural resource. The situation in the hydropower industry requires a serious decision. Actual issues in the hydropower sector include the following areas:

1. Natural. One of the problems is the dependence of this industry on one source and the water level in the river. Naryn (Syrdarya river), water accumulation in the Toktogul reservoir.

2. Technical and technological. There are high losses and depreciation of equipment in the industry, as well as a lag in the use of innovative technologies.

3. Economic. Energy tariffs do not cover the costs of energy companies and the lack of own funds for modernization.

4. Management. One of the significant problems is the issues of state regulation of the energy sector.

5. Threats to energy security.

6. Political. The annual change of government, the events of 2005 and 2010, when there was a change in the top political leadership, all this negatively affects the investment climate of the country and does not contribute to attracting investment in the country's hydropower.

It is also worth noting that there are opportunities for its development in the hydropower industry of Kyrgyzstan. So one of the areas often mentioned by experts is the prospects for the development of small hydropower plants, renewable energy sources.

In order to increase exports and increase the level of energy security of the country, it is advisable to encourage the construction of small and medium-sized hydroelectric power stations with sufficient hydropower potential. For this, investors may be involved. For example, the Kirov hydroelectric station in the Talas region, the Papan hydroelectric station in the Osh region, the Tortkul hydroelectric station in the Batken region. Such hydropower plants can be attractive because reduced costs required for the construction of hydropower plants, which requires less investment.

In addition, it is possible to use micro-hydroelectric stations. In Kyrgyzstan, micro-hydro power plants of various capacities were used to generate electricity; Envod JSC. The data were used not only in Kyrgyzstan, but also in other countries (Georgia, Kazakhstan, Tajikistan, Cuba, Mongolia). Energy experts make calculations that, when using the energy of small streams throughout the country, can provide an additional estimate of 5-8 billion kWh of electricity.

Those the completion of the existing hydropower plants and the commissioning of small hydropower plants, with appropriate investment, will help expand the country's hydropower capabilities.

Areas of Cooperation in Projects

At the present stage, the hydropower industry of Kyrgyzstan is implementing projects in the following areas: to increase generating capacities (Rehabilitation of the Toktogul HPP –2023, commissioning of the second unit of the Kambaratinskaya HPP – 2 –2021, etc.) and projects to ensure reliable power supply and reduce losses (CASA 1000 - 2022, etc.).[4]

Along with the implementation of large projects, the conditions for the development of small and medium-sized hydroelectric power stations on

small rivers are also increasing. The resources of small rivers in Kyrgyzstan are mastered only by 3 per cent, and this is an attractive niche for realizing investment opportunities. There are some concessions for investors who have invested in the electricity sector of Kyrgyzstan, since since 2017 a simplified procedure for obtaining an investment visa has been in force. Also, a relatively liberal legislative framework has been created in the country regarding the protection of the rights of foreign investors; privileges may be provided in accordance with state programs and development projects.

In Kyrgyzstan, 7 regions and two industrially developed cities (Bishkek and Osh) are connected by heating and electric networks, which form the country's electric power system. The Kyrgyz energy system has the ability to produce, transport, distribute electricity both domestically and export, import to neighboring countries, participate in covering the power shortage and cover peak loads in the energy systems of Central Asian countries.

Experts note that Kyrgyzstan occupies a strategic location between the CIS and the Asia-Pacific Economic Community, representing one of the main transit routes through the Central Asian corridor. Since independence, Kyrgyzstan has managed to build mutual relations not only with the countries of the region, but also with non-CIS countries.[5]

One example of cooperation is the CASA-1000 project. This is one of the priority projects aimed at exporting clean energy from Central Asia to South Asia in the summer. The project provides for the construction of a high-voltage power line connecting the energy systems of Kyrgyzstan and Tajikistan with Afghanistan and Pakistan. Upon completion of the project, electricity will go from the Kyrgyz Republic to Tajikistan (477 km), and from Tajikistan to Afghanistan and Pakistan (another 750 km).[6]

Indo- Kyrgyz Cooperation in Hydel Projects

In 2019, Mr. Chingiz Azamatovich Aidarbekov, Foreign Minister of the Kyrgyz Republic, on his first ever official visit to India, met Indian External Affairs Minister. The two Ministers held wide-ranging discussions on bilateral, regional and multilateral issues of mutual interest. During the meeting, Kyrgyzstan sought India's assistance to build hydel projects besides other sectors (The Economic Times, 2019).

Conclusion

Kyrgyzstan has sufficient reserves for the production and provision of water resources for its needs. However, the country is currently experiencing certain technological and financial difficulties and is not fully utilizing its potential. Moreover, when implementing projects to modernize existing and develop small hydropower plants, some of the generated energy can be exported to neighboring countries (Kazakhstan, China, Tajikistan and Uzbekistan). The cooperation with India on the development of hydel projects in Kyrgyzstan will help in utilizing the huge hydropower potential of the country.

Endnotes

1 https://www.water.gov.kg/index.php?option=com_content&view=article&id=228&Itemid=1274&lang=ru

2 http://rudmet.net/media/articles/Article_MJ_08_16_pp.37-41.pdf

3 https://www.unece.org/fileadmin/DAM/project-monitoring/unda/16_17X/E2_A2.3/NSEAP_Kyrgyzstan_RUS.pdf

4 http://www.gkpen.kg/index.php/2018-01-06-09-25-07

5 https://www.unece.org/fileadmin/DAM/project-monitoring/unda/16_17X/E2_A2.3/NSEAP_Kyrgyzstan_RUS.pdf

6 http://www.casa-1000.org/indexr.php

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The Economic Times. 2019. Kyrgyzstan seeks India's assistance in defence; railways; hydel power sectors. https://economictimes.indiatimes.com/news/defence/kyrgyzstan-seeks-indias-assistance-in-defence-railways-hydel-power-sectors/articleshow/67751928.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst