Ecological Risks Assessment and Hydro Energy of the Kyrgyz Republic

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ABSTRACT (TIMES 9, BOLD AND CENTRED)

An assessment of made a calculation to produce electric power in Kyrgyz Republic energy system. Characteristic of basic lowland water reservoirs within Tien-Shan in Kyrgyz Republic. Investigation of water resources and water usage.

Adjusted data certify of that in spite of favorable forecast of increasing water resources due to climate changing seemingly Kyrgyz Republic fully provides the own water demand under realization of accelerative scenario, neighboring countries located on lowland in down streams will feel the water shortage in the foreseeable future.

Providing the economic-drinking needs of population will be becoming most priority to taking in account increasing the water demand of per head.

Key words: hydroelectric power plants, water use

INTRODUCTION

Kyrgyz Republic – independent state, located in northern-east part of Central Asia. The territory spreads from west to east 900 km, from north to south 410 km, area is 198,5 thousand km^2. Population is 5 million (Fig.1).

The history of the power system can be traced to 1934 when a 13.2 kV network was constructed in the mountain region.

Today, power engineering in the sovereign Kyrgyz Republic is comprised of major hydroelectric and thermal power stations, including the flagship Toktogul hydroelectric power plant.

There is a strong future for the development of hydroelectric power engineering in Kyrgyz Republic, as it represents the foundation for the development of ecologically clean power for the Republic.

This future includes a unique network comprised of the Kambarata and Upper-Naryn hydroelectric power-plants and series of small scale hydroelectric power plants.

CURRENT STATE OF HYDRO ENERGY SYSTEM

The current power generating capacity of Kyrgyz Republic is comprised of 20 electric power plants with a total installed capacity of 3.4 million kw; 5.8 thousand km of 110-500 kV systems and main electric power transmission lines; over 63 thousand km of 0.4-35 kV power distribution networks and 490 km of main district heating networks.

The annual power output of the power plants in the Republic is of the order of 12-14 billion kWh.

Unique overhead 500 kV (500 kV OTL) transmission lines are employed on the power system. The 500 kV overhead lines are used at altitudes of up to 3,500 m above sea level. The Kyrgyz power system is unique in domestic and international powerline engineering for its coverage of high mountain regions and advanced engineering designs employed in its 500 kV OTLs (special mountain supports; experimental wire and insulation suspension designs and spans).

The development of energy sector in the Republic will be based on the effective utilization of the extensive hydroelectric power generation capacity. A truly inexhaustible energy source exists in the mountain rivers of Kyrgyz Republic.

Kyrgyz Republic is third among Commonwealth of Independent States nations in terms of hydro-resources (after Russia and Tadjikistan). The rivers of the Republic have an extraordinary high

concentration of potential power generation capacity per kilometer of river length. The specific power generation capacity of the Naryn river and its tributaries exceeds that of such major rivers as the Volga and Angara.

The hydroelectric potential of the Republic is 142.5 bin kWh/per year, of which only 9% has been developed. Current infrastructure makes it possible to utilize 72.9 bin kWh/per year, although only 48 billion kWh/per year are usable on a cost effective basis.

The Naryn River basin has potential resources of 56.9 bin kWh/per year. Twenty-two hydroelectric power plants producing on the order of 30 bin kWh/per year of electric power could be constructed on this river and its tributaries.

The comprehensive program for hydroelectric power resource development makes reference to the construction of hydroelectric power plants in the upper- and mid-river regions of the Naryn river for a total installed capacity of 5.85 billion kWh/per year.

The mountainous landscape facilitates the construction of reservoirs for hydroelectric power plants, while the deep, narrow canyons make damming highly efficient.

Recovery of capital investment on hydroelectric power plant construction is reached in periods ranging from 2 to 8 years.

High energy resources supply created favorable prerequisites for fast development of the energy complex of the Kyrgyz Republic which from the beginning of 80-ies became a large hydro power producer in the Central Asian region.

The Kyrgyz power system is one of few ones in the post soviet space which managed not only to preserve the electricity production level but also to support new capacities commissioning.

In a period of transition to the market economy, the power-engineering retained core productive capacities and qualified specialists. It also mobilized organizational and financial resources to meet new needs of our time.

A positive peculiarity of the Kyrgyz Energy System is the significant prevalence of hydro power plants in the capacities' balance in the presence of a large water-storage reservoir of Toktogul Hydro Power Plant with a- long-term regulation.

Potential hydroenergy resources of the Naryn river make 56,9 billion kWh. It is possible to build 22 new hydropower plants with electricity generation about 30 billion kWh on this river and its tributaries (pic.3).

The hydropower plants were build in downstream of the Naryn river - the one of the main tributaries of the Syrdaraya river on the south of the republic and they form coordinated hydroelectric system. Total capacity of power plants of the Kyrgyz energy system exceeds 3,6 million kWh including 2,9 million kWh or 82,2% belonging to hydropower plants.

The regulation of flow in river basin is carried out by the number of big water reservoirs: Toktogul, Kairakkum, Chardari, Andijan and Charvak designed for operation in irrigation mode for the Central-Asian republics.

JSC "Electric Power Plants" is a main producer of the electric and thermal energy in Kyrgyz Republic [1].Considering the impact of these processes on environment and regional population, we should note that Central Asia in the nature geographical relation presents itself as common territory. This unity provided with resources system and first of all two main – Syrdarya, Amurdarya. The very so water resources and their distribution in space and time are important defining factors both economy and ecology of this region.

During last tens years energies based on guided principles of using fresh water mentioned in chapter 18 of UNO agenda to 21 century in which says about quality protection and providing fresh water as well as integrated approaches to developing, managing and using water resources were focused on the following spheres:

- integrated developing and managing the water resources;
- assessment of the water resources;
- saving of the water resources, water quality and water ecosystem;
- water supply and sanitation;
- water and sustainable urban developing;
- water is necessary for sustainable producing food and rural developing;

- influencing of climate changing to the water resources.

Regional water resources are involved practically completely in economic using. Seasonal lack of water and water resource pollution keep back social-economic developing of Central Asia, according that the water resources often using with waste and prodigally.

Reserves of the regional water resources have been assessed for results of summation the reserves of surface and underground waters and subtraction of received results of water missing to produce hydro energy inter vegetation period correspond to average year of growth rate of hydro energy producing in maximal version i.e. 2,55 % annually. Volume of return water and influencing the climate changing under assessment of water resource reserves do not take in account.

CONCLUSION

Adjusted data certify of that in spite of favorable forecast of increasing water resources due to climate changing seemingly Kyrgyz Republic fully provides the own water demand under realization of accelerative scenario, neighboring countries located on lowland in down streams will feel the water shortage in the foreseeable future.

Providing the economic-drinking needs of population will be becoming most priority to taking in account increasing the water demand of per head.

- devote the deserved place to water saving policy on the targeted list of planned activity and measures;
- analyzing influencing to changing specific norm of water consumption per head on common country balance;
- include in program concrete sphere suggestions for water saving;
- include in capital investment to these measures into budget with preparation of state programs and projects;
- assessing the endowment of these measures to the economy of water resources;
- taking in account necessity of developing the organizing mechanisms water-economy agencies for realization of strategic measures to water supply;
- should be taking in account the questions linked with influencing to water consumption and water prize in agriculture and analyzing the influence to increasing tariffs in urban area [2].

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