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USE OF WATER RESOURCES TO SUPPLY ELECTRICITY TO REMOTE AREAS

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ABSTRACT:

This work highlights the possibilieties of using small water sources in the Bulokbashi and Kurgantepe districts of the Andijan region to provide electricity using small hydropower plants in remote areas. Also provides an analysis of information useful for the use of some types of small hydropower plants.

KEYWORDS: small hydropower plants, gutter, water intake area, collector.

INTRODUCTION:

Today, crisis phenomena are observed in everything. There is a sharp shortage of energy resources for the development and launch of new innovative projects. Despite this, the main area of investment is the sector of alternative energy, primarily in the field of renewable energy sources [1]. This is due to the fact that economic growth cannot be achieved without the availability of electricity. To obtain electricity using the energy resources of hydropower, work is being carried out to improve the energy parameters of hydraulic structures [8, 9].

The territory of Uzbekistan, in terms of the provision of electricity resources, differ from each other. Tashkent, Navoi and Kashkarya regions have an excess of electricity production over demand, and the regions within the Eastern energy hub (Andijan, Namangan and Fergana regions), Samarkand-Bukhara energy hub (Bakhar, Samarkand, Surkhandarya regions) and the north-western energy hub (Khorezm region) have a deficit (up to 26%), so only 14% is produced on the territory of these regions at a consumption of 40% with a predicted tendency to increase the demand for electricity [4].

The development of the infrastructure and economy of the state is directly related to the constant increase in the possibilities of the energy sector. To solve this problem, a lot of attention has been attracted from government agencies, and the best specialists in the field of energy are attracted. In addition, attention is paid to the use of renewable types of electricity [1]. On the other hand, there is an increase in the capacity of hydraulic structures [1, 3] using various models for generating electricity using water resources in remote areas.

The widespread use of renewable types of electricity significantly increases the supply of electricity to the territory and at the same time decreases the dependence on external supplies. And from an economic point of view,

this means a decrease in the cost of supplying electricity to remote areas, which means they can be used for new similar energy projects. The received electricity with rational use will make it possible to develop the low-income territories of our region, to contribute to improving the well-being of the population [6,7].

Consider the possibilities of small hydroelectric power plants in remote areas. Take Bulakbashinsky and Kurgantepa districts of Andijan region as an example. Their territories have their own characteristics and are interconnected by an irrigation network. The network of collectors here can be used to generate electricity using small and mini hydroelectric power plants on water sources provided throughout the year, and the capacity can reach up to 9-15 kW / h in the form of single hydroelectric structures. In the form of a cascade up to 40-50kW / h. Their total capacity will be about 40-60 MW / h.

Today, all over the world, there is a tendency to increase capacities obtained with the help of renewable types of electricity, in particular, with the use of small and mini hydroelectric power plants. At the same time, the share of covering energy costs is increasing with the attraction of energy resources from renewable types of electricity, which makes it possible to reduce economic costs for conducting power lines to consumers (farms, various workshops, mini-factories and other objects). The use of the generated electricity from autonomous sources (hydropower) will pay off within 4-5 years by saving financial resources to pay for the used electricity.

The territory of Andijan region is saturated with water resources to varying degrees. There are areas, regions with a very good level of water resources, as well as with poor water resources.

From this point of view, let us consider some districts of the Andijan region. The borders of the Bulakashinsky district of the Andijan region pass with the state border with Kyrgyzstan and Zhalakuduk, Khujab districts. Water volumes in collectors located on the territory of this region depend on the level of inflow to this region. Therefore, when choosing the location of power sources using small and mini hydroelectric power plants, the above factor will have to be taken into account. On the other hand, there is an increase in the population with a decrease in territories suitable for the construction of hydraulic structures such as small and mini hydroelectric power plants.

There are 46 collectors of various lengths and throughput capacity on the territory of Bulakbashinsky district.

The level of the drain is suitable for the use of small hydraulic structures in terms of the volume of the collector's throughput capacity of about 87-95% relative to the total volume of the drain of the collectors to the entire area.

The given territories of the Andijan region have their own characteristics and are interconnected by an irrigation network. The network of collectors here can be used to generate electricity using small hydroelectric power plants on water sources provided throughout the year, and the available capacities can reach up to 9-15 kW / h in the form of single hydraulic structures. In one cascade it is possible to place up to 5 such hydraulic structures, which means an increase in power. The number of cascades can vary according to the flow conditions of a given water source over the seasons. For these territories, the following conclusions can be drawn:

The ratio of the entire length of collectors by 1.5 times (139.84 km and 89.47 km, respectively),

In relation to the drain, it is 3.4 - 4.5 times less (9.58 - 13.40 m3 / s and 33.05 - 62.20 m3 / s, respectively) [5].

In the Bulakbashinsky district, it is better to use a cascade of 3-4 small and mini-, as well as superminihydro power plants. At the same time, the received power can reach 9-15 kW / h, which will reduce the load on the energy network of this territory and has a project self-sufficiency period of 5-6 years. The total capacity of one cascade will be 20-30MW / h, in the presence of 3-4 cascades, the total capacity will be about 60-90MW / h. When calculating the total capacity, the seasonal variability of the supply of the water source is taken into account.

From the above, the following conclusions can be drawn:

- to create a network of small and mini hydroelectric power plants, it is advisable to use water sources with a throughput of 0.15 m3 / sec and more with a collector length of at least 1 km, and for collectors with a length of 2 km or more, it is possible to create a cascade of small and mini hydroelectric power plants;

- when calculating and forecasting the indicators of water sources, one should take into account the presence of an admissible minimum water level during the year, since the available water sources have a character to change the water level depending on the period of the year and the amount of precipitation in the winter and spring months.

The use of renewable types of energy in the electricity supply network in the form of a combined version makes a positive contribution to the development of the economic activity of this territory of the Andijan region. At the same time, the dependence on external energy supply decreases [1, 2, 4].

Based on this, it can be concluded that the energy reserves of small rivers with a secured level of at least 1 m with a throughput of 0.15 m3 / sec and more are sufficient to provide electricity with a capacity of 5 kW / h and more to the needs of remote representatives of various economic entities (farms, small production workshops, fattening bases, etc.) with the rational use of the generated types of electricity [3]. The total capacity will be 15-20 MW / h, and in the case of using a cascade of 3 - 4 hydraulic structures, we get electricity of about 50-70 MW / h. The received power capacity can be used to reduce the load in the power grid of the Andijan region. In addition, it becomes possible to use medium and small economic facilities to meet the needs. For example, a remotely located farm or industrial building with electricity consumption of up to 7-12 kW / h can carry out its activities and reimburse the costs of creating its own independent electricity line in 4-6 years. Additionally, the generated electricity can be used to develop economic opportunities in remote areas. On the other hand, the use of small and mini hydroelectric power plants requires much lower financial costs compared to the installation and laying of power transmission lines using high-voltage lines. The cost of each 1 kW / h obtained with the help of small and mini hydro power plants is higher compared to traditional types of energy sources, but at the same time we have much lower costs and cheaper maintenance compared to large hydro power plants.

On this side, in order to reduce the total load on the energy network and to partially replenish the electricity consumption in remote areas, it is advisable to attract water resources of large drainage volumes. In the case of

Bulakbashi district, it is better to use a cascade consisting of a combination of mini- and supermini-type hydraulic structures in the amount of 3-4 cascades. At the same time, the received power can reach 10-12 kW / h, which will reduce the load on the energy network of this territory. And for the Kurgantepa region, it is advisable to create cascades of hydraulic structures such as mini-hydroelectric power plants, 2-3 structures per cascade, and the number of cascades can be increased to 4. At the same time, the generated electricity can be used to develop the industrial sector and reduce the load on the central energy system. These projects have a payback period of 5-6 years.

In conclusion, it should be noted that the reserves of energy resources for each territory differ among themselves and when choosing a source of their receipt, it is better to use renewable types of electricity. Here it is necessary to take into account the geographical location, as well as other parameters affecting the possibility and economic performance of the projected hydraulic structures.

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