

Ensuring food security through improved efficiency of pumping stations in Sughd province of Tajikistan

In Tajikistan, more than 90% of the country's area is occupied by mountains, the height of which reaches 7,000 meters and more. At the same time, part of the country is located at an altitude of more than 3,000 meters above sea level, and such a mountainous landscape creates the need for the rise of water from rivers and canals to irrigate land. In this regard, over 50% of the irrigated lands of Tajikistan are located in pumping irrigation zones, for which large pumping stations have been built in the country.



Photo: Golodnaya Stepskaya Pumping Station - 1 in Zafarabad district of Sughd Province

Agriculture is a major consumer of water and energy resources. The sector uses 90% of water resources and 10% of the country's total electricity consumption for pumping stations. Irrigated land produces about 80% of agricultural products, and agriculture creates jobs for 70% of the population, totally a share of 20% of the country's GDP.

In Tajikistan, the total area of potentially irrigable land is estimated at more than 1.5 million hectares, of which 762,198 hectares or 50% of land suitable for irrigation have been developed in 2020. The rate of development of new lands over the past 10 years averaged 1,834 hectares annually. The authorized agency is considering an increase in the area of irrigated land in the long term to ensure food security and employment of the population in rural areas, which will require additional technical resources.

The irrigated area per capita of the country in 2020 is only 0.08 hectares, while in 1970, for example, this figure was 0.17 hectares, and in 2004 - 0.11 hectares. According to average statistical data, the annual population growth in Tajikistan is 2.2%. With such a rate of demographic growth, it is expected that in 2030, the population of the republic may reach 11.2 million people. To maintain the level of 0.08 hectares of irrigated land per capita, it is necessary to develop land

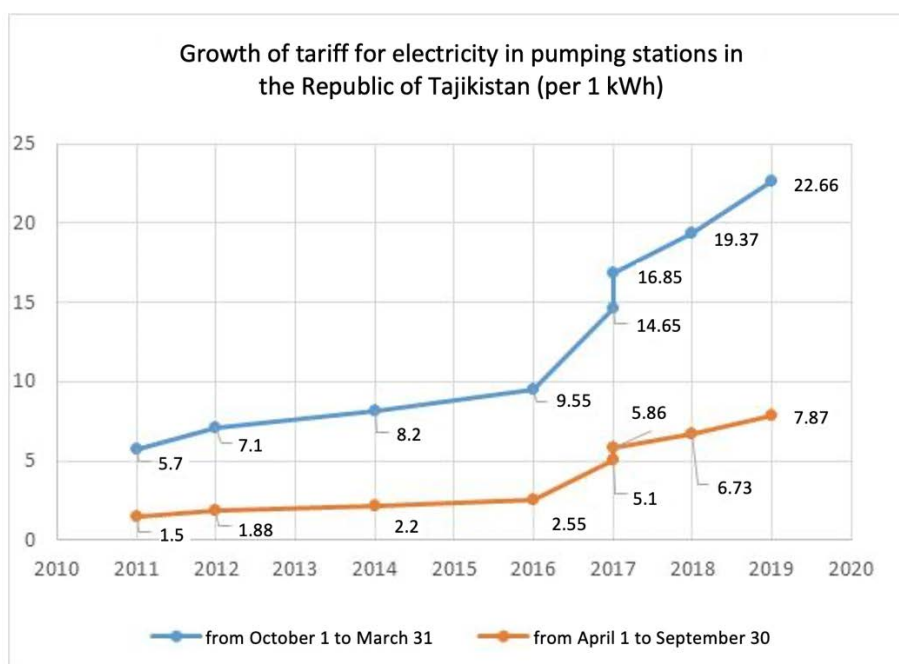
annually on an area of at least 15 thousand hectares, and, obviously, in the zones of pump irrigation.



Photo: Local farmers irrigate fields in Zafarabad district of Sughd Province

Meanwhile, pumping stations built in the 1950-70s have noticeable wear and tear. There are no energy saving equipment at the facilities, and electric meters for measuring electricity consumption in large pumping stations are not automated, which makes it difficult to calculate the actual power consumption.

With a low solvency of end consumers of agricultural enterprises and dekhan (farm) households, the government subsidizes the electricity tariff. So, during the growing season (from April 1 to September 30), the electricity tariff is 7.87 diram (0.69 US cents) per 1 kWh, and during the non-growing season (from October 1 to March 30) - 22.66 diram (2.0 US cents) per kWh. Meanwhile, the tariff of farmers' water usage is 2 diram (0.17 US cents) per 1 m³ of water.



Source: Agency for Land Reclamation and Irrigation under the Government of the Republic of Tajikistan

The cost of producing water exceeds the cost of delivering irrigation water to farms by a factor of four, as the same water has to be pumped by cascade pumping stations to get it to the right height. On average, the collection rate for water supply services is 55%.

Dekhkan (farm) households, on the other hand, depend on a sustainable and planned supply of water to farmers. However, it is not easy for farmers in pumping irrigation zones. If one or more pumping station units fail, there are interruptions in the supply of water to irrigation systems, which negatively affects the yield of agricultural crops, and farmers can incur losses.

Overall, the situation is making the irrigation sector unprofitable and may lead to instability in the water, energy and food (WEF) security of the country.



Photos: TM-2 Canal in the Zafarabad district, the beginning of the canal on the left and a shortage of water in the middle of the right.

Due to the lack of water through the TM-1, TM-2 and TM-4 canals, farmers are forced to drill wells to irrigate their lands. Well drilling costs range from \$ 20,000 to \$ 25,000. However, drilling is carried out without preliminary geological surveys. As a result, certain farmers are left without water after drilling the wells and incurring costs because they still cannot access the artery of the aquifer. But some farmers are still making progress in these activities, leading to uncontrolled groundwater withdrawals and lowering aquifer levels, contributing to land degradation in the Zafarabad district, as well as drying up orchards and other crops.



Photos: Drilling wells and dying gardens in the Zafarabad district of the Sughd Province

In this regard, the European Union project "[Nexus Dialogue in Central Asia](#)" and the project "Laboratory of Innovative Solutions for the Water Sector of Central Asia" implemented within the framework of the [Water and Energy Program for Central Asia](#) (CAWEP), have joined forces to support the authorized bodies of Tajikistan in search for innovative solutions for the efficient operation of pumping stations.

Currently, work is underway to automate the monitoring system for electricity consumption in pumping stations at the level of the Sughd Province, where pumping stations consume up to 70% of the country's total electricity consumption for pumping stations. Additionally, there is progress in introducing energy efficient technologies in the large Golodnaya Stepskaya Pumping Station of the Zafarabad district in the Sughd Province.



Photo: National experts examine 173 electricity meters in the Sughd Province of Tajikistan

The project also involves the international pump manufacturer Grundfos, which shares international experience in improving energy efficiency with national experts.

Based on the results of this work, investment proposals will be developed in early 2022 for the automation of power consumption at pumping stations and the modernization of the Golodnaya Stepskaya Pumping Station. These proposals will be presented for consideration at the government level and among potential investors.

The implementation of the demo project demonstrates close coordination between two competing industries, such as energy and water resources, in the search for solutions to provide end users with water and energy resources in the medium term.



Photo: Measurements of water and electricity consumption in the pumping station Golodnaya Stepskaya Pumping Station - 1 with the support of Grundfos

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