

## Final results under Tajikistan demo project to support the energy and food security

*This article summarizes the final results under the demo project in Tajikistan that include the Concept on digitalization of the electricity metering system at 173 pumping stations, modernization of the Golodnayastepskaya pumping station and energy audit by international company Grundfos in Sughd Province of Tajikistan.*

After 8 months of intensive work, the demo project in Tajikistan on pumping stations marks its completion by delivering the products that support the Government's efforts on ensuring the energy and food security in the long run. Following the demo [project formal launch back](#) in July 2021, 5 national experts developed the recommendations on how to advance the efficient use of energy and water resources at the pumping stations in Sughd Province of Tajikistan under the European Union funded project "Nexus dialogue in Central Asia" and with technical support of the project "Laboratory of Innovative Solutions for the Water Sector of Central Asia" implemented within the framework of the CAWEP World Bank's TF.

*Photo 1: National experts brainstorming the demo project's implementation*



Due to the mountainous landscape over 50% of the irrigational land of Tajikistan requires the support of the pumping stations. Annually about 1.5 bln kWh of hydro-generated electricity is consumed by the pumping stations. Out of which about 1 bln kWh comes only for Sughd Province as it is located in the lowland of Syr Dariya River. The outdated irrigational infrastructure (40.6%) fails to deliver the high-quality service to the end user as *dekhan* households that reflects on the low collection rate for water transfer fee (below 80%). Annually, electricity bills makes 118 million somoni (11 million EURO), the fee received from the water users makes around 40 million somoni (around 3,8 million EURO). The difference between the bill and collected amount is charged by Barki Tojik as a debt to the Agency for Land Reclamation and Irrigation under the Government of the Republic of Tajikistan (ALRI). For the first quarter of 2022, debts for used electricity have been accumulated for the amount equal to 364 million somoni (34 million EURO) that ALRI cannot repay and remains in debt to Barki Tojik. Although, back in 2014 and 2018, the Government already written off the debts for the electricity bills of ALRI to Barki Tojik in the

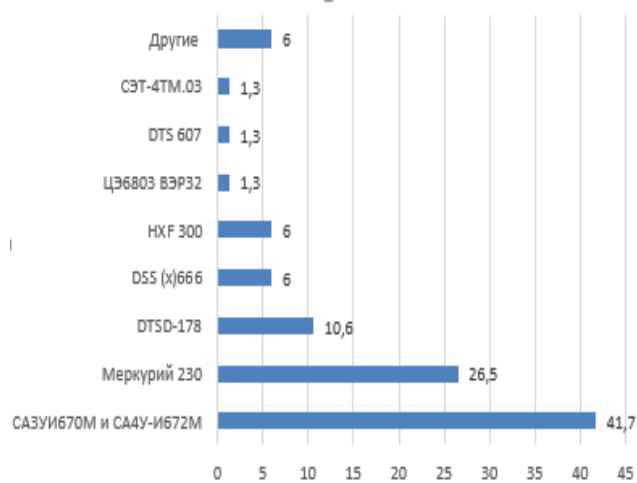
amount of 242.8 million somoni and 72 million somoni respectively that makes in total around 30 million EURO<sup>1</sup>.

All these put under the risk the energy and food security of the country. In addition, the high segregation of the *dekhans* households into smaller households makes the sector not attractive for investment. As such, only in Zafarobod District works 30 associations of the water users per 33 000 ha of the irrigated lands, out of which 4068 makes the *dekhan* households as of beginning of 2020.

While the institutional side on the operation of the pumping stations is cornerstone, the demonstration project covered the technical side as an entry point to showcase the saving and investment potential to the decision makers and investors on the metering of the electricity consumption and monitoring system and modernization of the large *Golodnayastepskaya* pumping station in Sughd Province as follows.

So far, the experts developed the **Concept on digitalization of electricity monitoring system for 173 pumping stations**. According to the expert calculations, a turnkey implementation of digitalized system on monitoring of the electricity consumption system (APCMS-PS) by a Chinese vendor would cost \$767,695. Considering labor, fuel and energy monetary savings, as estimated the system could allow savings up to \$100,680.4 annually, thus making the payback period 7.62 years. However, almost all electricity metering will need be replaced by the smart ones as the current metering models greatly varies and outdated (Fig 1.).

Fig.1 Types of the metering at 173 pumping stations



The expert surveyed the potential metering producers in European countries<sup>2</sup>, Russian Federation<sup>3</sup> and China<sup>4</sup>. It was found that the cost of e-meters by European vendors varies between \$215-320 per unit, and by Russian vendors between \$150-300. A Chinese manufacturer charges \$67 per unit for similar devices. The technical specifications of all the aforementioned meters are similar, yet the net cost calculations were based on the lowest manufacturer quote for smart meters available on Tajikistan's market. The Concept proposed to establish the APCMS-PS at ALRI with real-time transfer of electricity consumption data to Ministry of Energy and Water Resources of the Republic of Tajikistan (MEWR) and Barki Tojik.

In addition, the experts marked all inspected 173 pumping stations at GPS map that will ease the work of the technical staff of the public entities to reach the pumping stations to perform their duties in future (Photo 2).

*Photo 2: Marked pumping stations in GPS*

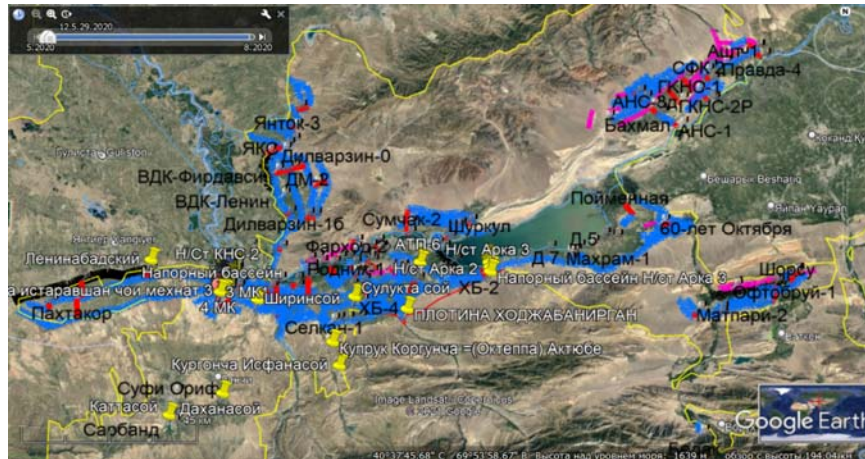
<sup>1</sup> 1 EURO= 10,7 somoni as of 6 July 2022 as per National Bank of Tajikistan <https://nbt.tj/ru/>

<sup>2</sup> ABB, Aclara, Emeter, GE Grid Solutions, IBM, Landis+Gyr, Opower, SEL, Siemens, Silver Spring and Networks.

<sup>3</sup> Kontsern Energomera JSC and SAURES Company.

<sup>4</sup> Yantai Dongfang Wisdom Electric Co., Ltd.





**In regards to Golodnayastepskaya Pumping Station**, that plays strategic role for Zafarobod District of Sughd Province in regards to the water supply from Syr Dariya River as the district has no surface water and very limited groundwater assets, the experts developed the investment proposal for replacing all pumping units, including 6 units at Golodnostepskaya Pumping Station -1 and 4 units at Golodnostepskaya Pumping Station -2. The experts reviewed the potential equipment suppliers from Europe, Russian Federation, Ukraine and China, and compared equipment capacity and estimated prices from several manufacturers per 1 set of vertical pumps and electric motors. A more detailed ROI assessment will be included in the Project Feasibility Study once the potential investor(s) and equipment supplier(s) are identified.

In addition, the Grundfos, the global manufacture of the pumping stations, voluntarily conducted the energy audit through pampthermography at Farkhod-2 and Golodnaya Stepskaya pumping stations. The audit revealed that the pumping stations pump for about 40% less water than declared in their technical specifications and consumes more electricity for production of 1 m<sup>3</sup> of water. At the same time, the efficiency of the pumps decreased to 60%. Grundfos estimated that the electricity savings can reach up to 37-40% with the existing water supply by pumps if the pumps are replaced for new one produced by Grundfos. These findings can be easily replicated to other pumping stations in the country.

*Photo 3: Grundfos specialists and local municipality during the energy audit conduction*



The findings of Grundfos that revealed that pumping stations actually pump *de facto* less water than declared in their technical specifications explain why the irrigational water does not reach the end users in particular in the lower part of the irrigational channels as TM-1 and TM-2. The lack of water forces the farmers to drill wells without conducting any geological surveys. It was found



that 400 wells have been already drilled without geological survey. The drilling of 1 well cost around USD\$20 00 without any guarantee to find source of the underground water. Not every single farmer can afford such spendings on the drilling the wells and has to lose the opportunity cost of the harvest. Albeit, some farmers succeeded to find the wells during the illegal drilling and able to supply the irrigational water to their household. Such practice leads to inequality of the water resources among the farmers and groundwater depletion (Photos 3,4,5.).

*Photo 3: Dried irrigational channel TM-1*



*Photo 4: Local farmers drilling the well*



*Photo 5: Dried gardens of the local farmers due to the lack of the water*



The findings of the study were developed timely to support the ongoing operation and investment policy of ALRI in regards to the pumping stations. As such, the ALRI and MEWR started

presenting the developed results at the high level and technical platforms to voice the existing challenges in the irrigational sector and its long-term impact on the social and economic development of the country and seek the investment and technical solutions. To this end, ALRI started submitting the investment proposals for the *digitalization of the electricity metering system* and modernization of the Golodnostepskaya pumping station that have been developed under the demonstration project to IFIs and other potential investors to seek the investments. ALRI will also seek the public budgeting as Golodnostepskaya pumping station's rehabilitation was included in the 2016-2020 State Investment Program endorsed by Government Decree of the RT №772 *On 2016-2020 State Investment Program* of December 30, 2015.

Hopefully, the comprehensive social economic analysis on operation of the pumping stations and investment proposals developed under this demo project will assist the Government to improve the irrigational infrastructure to the satisfaction of the end-users and ensure the food and energy security in the long run.

The full list of the produced deliverables under the demo project can be freely accessed at this [link](#).

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***Photo credit:*** *National experts of the demo project*

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