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Mini hydropower plants brighten rural Tajikistan



With its dense network of rivers, Tajikistan is the eighth richest country in the world in terms of hydropower resources. But lack of investment has meant that this resource is vastly underutilised with electricity supplies still failing to meet the country's needs.

Energy shortages mostly affect rural areas of the country, where 70% of the overall population resides. Traditionally, people in rural areas have relied heavily on fuels such as kerosene and firewood for lighting, heating and other household applications. However, most of Tajikistan's villages are located in river valleys where it is both technically and financially feasible to set up mini hydropower stations: a cleaner and more environmentally sustainable option with greater usability.

To make the most of this opportunity, the Islamic Development Bank (IsDB) has contributed to an ambitious project of the Government of Tajikistan. The "Construction of Mini Hydropower Plants (MHPP) in Rural Areas of Tajikistan" project aims to reduce the country's overall energy shortage by constructing over 170 mini hydropower plants in rural areas. These plants will be the main source of energy not just for households but also for critical social infrastructure such as schools, hospitals, agriculture and other social support and commercial activities. The initial phase of the project, which commenced in 2004, entailed constructing eight mini hydropower plants in various remote and rural areas of the country; construction of five of those power plants was financed by IsDB.

Addressing an ailing infrastructure

One of the tangible legacies of the former Soviet Union in Tajikistan has been a solid infrastructure providing electricity even in remote areas. However, since the independence of Tajikistan and with the progression of time, the country's available infrastructure has inevitably failed to keep pace with socio-economic development and demographic growth. Moreover, the total amount of electrical energy generated in Tajikistan – 90% from hydropower and 10% from thermal sources – has fallen by around 20% over the last 15 years.

Tajikistan's reduction in power generation capacity is mainly the result of ageing equipment and lack of maintenance. Despite the fact that Tajikistan possesses colossal reserves of hydro energy resources, the majority of the country's population – up to 70% – faces severe electricity shortages. The shortage of power affects the rural poor most of all and there are almost perpetual power outages in villages during the winter season.

Constructing new hydropower plants

The Government of Tajikistan is now working to rectify Tajikistan's power problems by constructing mini hydropower plants. These plants will be managed by Barki Tojik, Tajikistan's state utility company, to provide a reliable supply of electricity in rural areas where previously supply has been limited, especially during the winter periods.

Through the help of development partners, steady progress on the hydropower project is being made. Since the project's approval in 2004, IsDB has financed five out of eight mini hydropower plants. This financing amounts to US\$11.15 million out of an overall budget of US\$14.5 million. To date, seven (including the five IsDB-financed) mini hydropower plants have been successfully constructed and launched in Aini (Marzich MHPP), Tajikabad (Fathobod MHPP), Nurabad (Shashboloi MHPP), Jirgatal (Pitavkul MHPP), Rasht (Sangikar MHPP) and Tursunzade (Shirkent MHPP) districts; in Shahrinav (Toj MHPP), the project is in its final stage of completion. When fully completed, all eight plants will together produce 7.75 MW electricity.

Supplying 24-hour power

Tajikistan's hydropower project has already made a tremendous impact in rural areas. Some 3,000 families now benefit from a 24-hour continuous electricity supply instead of the previous limit of five hours a day. This electricity is provided through a local grid connected to the national grid, and uses an innovative heating system so that water flows rather than freezes during the winter months. This means that rural families are guaranteed an electricity supply that is

much more efficient and reliable than before.

The benefits of this new reliable supply are widespread. For example, in Marzich village of the Aini District located high in the mountains, inhabitants used to cut firewood and use kerosene to provide warmth and light in their houses and to compensate for the 19 hours a day when there was no electricity. This was especially the case during icy cold winter nights. With the new mini hydropower plant built under the project, the need for these fuels has significantly reduced.

And it does not end there. The newly built power plants not only provide light to about 3,000 households in the country's rural areas, but also provide 24-hour electricity to 15 schools, 4 public libraries, 25 mosques, 4 hospitals, 11 health clinics, 9 restaurants and several other businesses. Again, this compares with only five hours of electricity a day for these services before the project.

Improving health and education

Personal testimonies prove that a 24-hour electricity supply is having a massive positive impact on rural social services. For example, Berdova Gulbegim, head of the local healthcare centre in Aini which provides medical services to 1,200 households from three nearby villages, is very happy that the 24-hour supply is reducing her drudgery and saving lives.

In the past, Gulbegim had no means of safely storing medicines and had to administer vaccinations door to door. Nowadays, Gulbegim can use her fridge for storing vital medicines for her patients, and does not have to travel long distances to the district's administrative centre each time she needs a new batch of medication.

Another beneficiary of the hydropower project funded by IsDB is a local school in Nurabad District. This



With the new reliable electricity supply, rural schools in Tajikistan are able to improve their facilities and offer computer classes to students.

school is connected to the Shashboloi mini hydropower plant. From this plant, the school now receives an uninterrupted supply of electricity on a 24-hour basis; this compares to a mere two hours per day maximum before the hydropower plant was built.

"This year we started to use computers in our IT lab. I am very excited to learn more about computer application as it will help me tremendously when I study in university once I graduate from school."

Nargis, 7th class local student, Aini District school #35 supplied by 24-hour electricity from a new mini hydropower plant

A non-stop supply of electricity has made it possible for the school in Nurabad District to heat its classrooms more effectively and to run a two-shift rather than one-shift schedule, thus benefiting a much larger number of students. It has also allowed the school to set up computer classes, a facility long awaited by the students.

Enabling enterprise development

An uninterrupted electricity supply has also made all the difference for small businesses in rural areas. For example, Munisa, a newly wedded woman who has just finished her studies, has capitalised on 24-hour electricity to build her business as a tailor in Aini.

Thanks to the new hydropower plant, Munisa no longer has to sit in a room filled with kerosene smoke and sew her dresses manually. With electric light, Munisa no longer strains her eyes and can use her electric sewing machine all the time. In fact, 24-hour electricity has enabled Munisa to double her income; instead of making one dress at a price of US\$25 to US\$100 a day, she can now sew two.

Reaching isolated communities

The rural communities benefiting from the mini hydropower plants funded by IsDB inhabit remote mountain areas. Some of these areas are not accessible during the winter months or in spring because of high river levels caused by snow melt.

For communities in such isolated situations, the main source of income is agriculture. Any industrial or commercial development in the area has been severely constrained by the lack of a reliable power supply. The IsDB-funded project provides households with the vital electricity supply to extend their work hours and improve their agricultural activities. Moreover, the advent of electricity provides energy for irrigation and increases agricultural employment which may to some extent curb rural migration to urban areas.



Local business men and women in rural Tajikistan can use the new 24-hour electricity supply to increase their productivity.

Providing clean, sustainable power

The arrival of full-time electricity in rural parts of Tajikistan is bringing about socio-economic development by improving standards of living. But there are other benefits too. One outstanding advantage of the project is that it is environmentally safe; hydropower is considered a clean method of generating power that does not require any kind of fuel consumption and runs on water alone.

Success factors

Effective management

Establishing a project management unit (PMU) proved to be a vital decision for the successful implementation of the mini hydropower project. The PMU leadership was not only able to add efficacy to all aspects of the project management, but also succeeded in establishing a competent project team. This team was able to closely supervise contractors even in the absence of the supervision consultant, thereby ensuring effective implementation of the project.

Efficient work schedules

The decision to engage local contractors rather than a single international contractor proved to be optimal as it allowed for an uninterrupted work schedule at multiple sites in parallel. In addition, the local contractors have shown a technical capacity sufficient for implementing the mini hydropower plants.



Hydropower plants do not emit hazardous chemicals or greenhouse gases into the atmosphere and thus do not contribute to thinning of the ozone layer or global climate change. The hydropower plants also significantly reduce the need to use kerosene or other types of oil, thereby preventing air pollution and associated health problems, particularly in the indoor environment where women and children are at risk.



With all-day electricity supplied by the new hydropower plants, shopkeepers in rural Tajikistan can install fridges to sell meat and dairy products.

Moreover, the hydropower project contributes to green development by radically reducing or even eliminating deforestation in rural areas where people had been harvesting firewood at an unsustainable rate.

"I am very thankful to have the 24/7 power availability. Now that I have two fridges in my store, I am selling dairy and meat products and my income has increased from US\$300 to US\$550 [per month]; the extra money goes for my kids' school lunches and transportation money."

Khudodod, a local shopkeeper who has been running his business in Aini village for almost 20 years

Payoffs

24-hour reliable electricity

The project provides a more reliable supply of electricity in rural areas of Tajikistan, especially during winter periods when demand peaks. The project provides a 24-hour reliable electricity supply to over 3,000 households, replacing the previous five-hour schedule in rural areas where the mini hydropower plants were built.

An additional source of electricity

The project allows excess energy generated by the mini hydropower plants to be supplied to the national grid, especially during summer periods.

Socio-economic development

The full-time electricity supplied by the hydropower project has made a huge difference to the lives of people living in the project areas. Small businesses have increased production, schools can run additional classes and healthcare centres are able to store and administer medicines round the clock.

Environmental and health benefits

The project is not just environmentally safe, but also contributes to green development. It radically reduces deforestation and air pollution by significantly reducing the need to use wood, kerosene or other types of oil as fuel.

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