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Helping Accelerate Poverty Reduction in Asia and the Pacific

INCREASING THE POOR'S ACCESS TO ELECTRICITY IN RURAL TAJIKISTAN

A technical assistance was designed to pilot a sustainable and self-sufficient model of community-managed micro-hydropower-based energy delivery in Tajikistan in response to the issue of increasing access of the poor to electricity identified in the Government's poverty reduction strategy paper in 2002.

There is an ongoing energy crisis in Central Asia, and the unusually cold winters—with temperatures reaching -20 degrees Celsius—have caused so much hardship for the region's rural poor. Hardest hit by the crisis is Tajikistan, the poorest and among the most fragile of the Commonwealth of Independent States (CIS) countries, with a gross domestic product per capita of about \$340 in 2005¹ and over two thirds of its population living on less than \$2.15 a day.²

During the crisis, food production and distribution businesses are at less than half capacity due to power shortages and transportation paralysis. High prices for food and fuel exacerbate the dire situation of millions of people who are cold, in the dark, and without access to clean water since waterpipes are frozen. During winter months (from October to May), rural communities have only 4–5 hours of electricity a day or often none at all. Households, especially women and children, resort to using wood fires and kerosene for heating, cooking, and lighting, which cause respiratory diseases, and the natural environment is also damaged due to uncontrolled deforestation.

Ironically, Tajikistan has the greatest hydropower potential in the region (over 300 billion kilowatt-hours annually) and is home to the hydroelectric power station Nurek, the highest dam in the world.³ However, the country often depends on electricity imported from Turkmenistan and Uzbekistan since the water used for hydroelectricity freezes up and the demand is too great. However, since these neighboring countries also experience power shortages, sharing electricity has been severely restricted.

Micro-Hydropower in Rural Communities

Tajikistan's whole electricity network was developed during the Soviet era when even the remote rural communities were connected to the main electricity grid. The entire electric system (generation, transmission, and distribution) is very old and significant investment is needed for rehabilitation and

modernization. The Government's focus is on modernization of existing energy infrastructure, and is considering pursuing the option of community-managed micro-hydropower to meet the remote rural villages' wide energy supply gap during the winter. The Government identified increasing the poor's access to electricity as one of the main issues in its 2002 poverty reduction strategy paper.

As a response, Technical Assistance (TA) 4423 Development of Community Based Micro-Hydropower Supply in Rural Areas of Tajikistan⁴ was designed to pilot a sustainable and self-sufficient model of community-managed micro-hydropower-based energy delivery.

Tajikistan has very few fossil fuels, such as oil, natural gas, or coal, and because of its mountainous topography, run-of-river micro-hydropower generation tends to be the least-cost solution for providing additional electricity supplies to remote communities.

The TA's first phase focused on identifying two sites suitable for piloting micro-hydropower generation and developing an appropriate implementation scheme. Six potential sites (Obi-Shurak, Kalandak, Saripool, Dushohazamin, Gultepa 2, and Tangai) located in rural and mountainous areas north and east of Tajikistan's capital city of Dushanbe were identified.

The following surveys and studies were undertaken in the six sites: topographical survey, engineering studies, hydrological studies, geological studies, environmental studies, social studies, economics and financial analysis, and legal studies. Based on the studies conducted and the selection criteria used, Kalandak and Dushohazamin were selected with the recommendation that the pilot schemes in both sites be owned, operated, and maintained by newly-formed community-based organizations called Electricity Users Associations (EUAs). These EUAs are registered with the Ministry of Justice.⁵

Detailed technical designs for the pilots were prepared under Phase 2. Implementation of two pilot Micro hydropower projects (MHPPs) started in January 2006 and were completed by September 2007.⁶ Both MHPPs are connected to the existing Barki Tojik (BT) grid, and transformers and 1.5km of high voltage overhead power line with poles, insulator, and switches were installed.

Details of the 2 MHPPs⁷

Kalandak MHPP	Dushohazamin MHPP
Located 1 kilometer (km) west of the village Kalandak, 7 kms from the village of Togoba and about 50 kms from the town of Garm	located 1.5 kms northwest of the village of Dushohazamin, 3 kms from the town of Nurobod
Has a capacity of 200 kilowatts and will provide electricity for 9 months (September–June) to the villages of Kalandak, Duoba and Porvog—covering about 220 households. From June–September, the powerhouse will be closed and the project used solely for irrigation.	Has a capacity of 70 kW and will provide electricity to the village of Dushohazamin covering 56 households.
Makes use of the existing irrigation infrastructure (intake structure and pipeline) owned by the Ministry of Agriculture; more economical, doubled in capacity and would be able to serve three communities	Involved construction of a new intake structure, 306m long steel pipeline as well as the powerhouse
Final cost (200 kw) is US\$167,147; cost per 1kW of power generated is US\$836	Final cost (80 kw) is US\$211,945; cost per 1kW of power generated is US\$2,650

Community-Managed, Community-Owned MHPP

A significant aspect of the MHPPs is the concept of community management and ownership by the EUAs. These are the first EUAs formed in Tajikistan. The EUAs have contributed their labor in setting up the MHPPs and were trained in organizational management, MHPP operation and maintenance, tariff setting and collection, office management, and in the appropriate and safe use of energy at the household level.

Apart from becoming legal entities, the EUAs had to secure a number of requisite registrations and licenses for the MHPPs to be constructed and the electricity produced and consumed, particularly the energy license. In addition, a Memorandum of Agreement was prepared between the EUAs and the BT Rasht Distribution Network establishing the rights and obligations of the EUAs and the BT in relation to the usage of the existing BT infrastructure (overhead powerlines, step-down transformers, meters, etc.).

A key outcome of TA 4423 is the drafting and submission of a proposed section covering EUAs and MHPPs owned and managed by EUAs to the new Energy Law.

Project stakeholders, particularly the benefiting communities, laud the formation of the EUAs as owner-managers of the MHPPs

and the concept is being proposed to be replicated in other areas.

The following lessons and recommendations were put forward to guide future community-owned and managed MHPP replications:⁸

- While the Ministry of Energy and the BT have been supportive and cooperative, there is no part of the BT equipped to support the EUAs, and as such, there has been minimal participation by BT in the development process; if the model is to be more widely replicated, it would be of value for BT (as the institution with overall responsibility for electricity generation and use) to build capacity and commission a department with responsibility for supporting community-based organizations.
- The focus on community-awareness raising and participation was deemed a conceptual strength of the MHPPs piloted under the TA, more especially because the model is community-owned and managed. However, the time allotted for the TA was not enough for the participative social and organizational development activities designed for the project.
- The two pilot projects' limited scale and opportunities for income-generating activities did not make any significant impact on the pilot villages' economic development: The limited power provided to each household did encourage the development of power-based small industries beyond the use of light to facilitate handicrafts. Also, alternative income-generating activities should be developed by addressing the marketing infrastructure and economies of scale.
- The difference in the cost of power generated from the two pilot MHPPs show that it would be more economical for future similar projects to make use of existing irrigation infrastructure where appropriate.

If properly sustained, TA 4423's community-owned and managed MHPPs offer opportunities for community capacity building at a various of levels. Rural villages gain technical expertise in electricity generation and organizational management, including fund management once tariff collection has begun. In a way, the TA has initiated the basic steps for promoting a sense of community responsibility.

Continued monitoring of the MHPPs would eventually determine if there has been an increase in the household power utilization and what life improvements this increase translates to.



Endnotes

- ¹ United Nations Development Programme. Tajikistan.
Available: http://www.undp.tj/index.php?option=com_content&task=view&id=224
- ² World Bank. *Country Brief 2007*.
Available: <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/TAJKISTANEXTN/0,,menuPK:287257~pagePK:141132~piPK:141107~theSitePK:258744,00.html>
- ³ 1998 ICOLD World Register of Dams.
Available: <http://npdp.stanford.edu/damhigh.html>
- ⁴ TA 4423 Development of Community Based Micro-Hydropower Supply in Remote Rural Areas. TA Approval Date: November 2004. TA Completion Date: October 2006. Executing Agency: Ministry of Energy. TA Amount: \$800,000 was financed by Poverty Reduction Fund (contributed by the United Kingdom Department for International Development Fund and administered by the ADB) and \$200,000 from the Government of Tajikistan.
- ⁵ JacobsGIBB Ltd. 2007. *Final Report of the TA, Volume 1*. TA 4423 Development of Community Based Micro-Hydropower Supply in Remote Rural Areas.
- ⁶ NPRS-PRF Semi-Annual Project Status Report for the period January to June 2007.
- ⁷ See endnote No. 5.
- ⁸ See endnote No. 6.

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