

TECHNICAL ASSISTANCE COMPLETION REPORT

Division : CWEN

TA No., Country and Name: TA 4423-TAJ: Development of Community Based Micro-Hydropower Supply in Remote Rural Areas			Amount Approved: \$ 800,000	
			Revised Amount: None	
Executing Agency: Ministry of Energy and Industry	Source of Funding: National Poverty Reduction Cooperation Fund		Amount Undisbursed: \$ 29,604.71	Amount Utilized: \$ 770,395.29
TA Approval Date: 5 Nov. 2004	TA Signing Date: 23 Dec. 2004	Fielding of First Consultant(s): 04 Jun 2005	TA Completion Date Original: 31 March 2006 Actual: 15 August 2007 Account Closing Date Original: 31 March 2006 Actual: 31 January 2008	

Description

The Republic of Tajikistan (Tajikistan) is a mountainous country relying primarily on hydropower for electricity. Over 70% of Tajikistan's electricity is generated by Nurek Hydroelectric Power Plant (HEPP). Most of the remote rural communities have been connected to the electricity grid by the former Soviet regime, but many are cut off in the winter when Nurek HEPP and other major hydropower stations of the Vakhsh River suffer from limited river discharge. Furthermore, the entire electricity system is obsolete and requires significant investment for rehabilitation and modernization. Given the harsh winter conditions in Tajikistan, the Government of Tajikistan (the Government) focused on developing off-grid power supply in remote rural areas.

The ADB Country Strategy and Program, 2004-2008 for Tajikistan focused on integrated rural development. Energy services constitute a key building block for successful, integrated rural development. Off-grid electricity, despite relatively higher generation costs, is a viable alternative to supplement the existing unreliable grid supply. Because of the mountainous topography, a run-of-river micro-hydropower plant (MHP) tends to be the least-cost solution for providing additional electricity supplies to remote communities. Other renewable sources of energy, such as wind and solar power, are likely to have a higher life-period cost as the region lacks an appropriate maintenance system.

The Government, considering the option of community-managed MHP to meet the wide energy supply gap during the winter in remote villages, requested the Asian Development Bank (ADB) to carry out a technical assistance (TA) to identify and develop MHPs in remote rural areas on a pilot basis. The TA was included in ADB's 2004 TA program, and complemented the earlier ADB TA for developing a hydropower strategy for Tajikistan. The TA was endorsed for funding by the Poverty Reduction Corporation Fund of the Department for International Development (DFID) in March 2004. Ministry of Energy and Industry (MEI) was the executing agency (EA).

Expected Impact, Outcome and Outputs

The expected impacts of the TA were the improved quality of life during the winter in the remote rural project areas and demonstration of community-based MHPs as a viable option. The expected outcome was the improved power services during the winter. The TA was divided into two phases. The expected outputs of Phase 1 were: (i) identification of two sites suitable for pilot MHPs and assessment of project feasibility, (ii) identification of community organizations that are motivated and capable of managing and owning a MHP, and (iii) preparation of an appropriate organization framework for providing the utility power services. DFID assessed the Phase 1 report along with ADB's recommendation and approved the start of Phase 2. The expected outputs of Phase 2 were (i) establishment of two viable community-based energy organizations, (ii) implementation of two pilot MHPs and strengthening of distribution networks, (iii) supply of energy in pilot project areas, (iv) greater awareness of energy saving in pilot project areas, and (v) creation of partnerships with other agencies for income-generating activities.

Delivery of Inputs and Conduct of Activities

The implementation of the TA required 131 person-months of consulting services (international: 11 person-months; national: 120 person-months). Consultants were recruited and contractors were procured in accordance with ADB's guidelines.

The consultant's terms of reference (TOR) were generally clear but a major short-coming was the lack of on-site hydrological survey (as detailed further below). The consultants executed the TOR satisfactorily given the limited timeframe. ADB adequately supervised the TA through regular meetings, reporting and review missions. EA's support to the TA was less than satisfactory, due to lack of ownership and slow response to consultants' requests.

The TA was to be implemented in 15 months, but was extended by 17 months mainly due to (i) delays in procurement of electromechanical equipment and civil works caused by bids that were much higher than the engineer's estimates; (ii) long processing period to obtain licenses and authorizations for the communities to own MHPs, and (iii) slow progress on works. The high priced bids resulted in additional time and resources being needed to redesign the schemes to more simplified designs with lower costs, and required a fresh round of bidding.

Evaluation of Outputs and Achievement of Outcome

Phase 1 outputs were achieved. The MHP designs were accepted by ADB on the basis that the EA and the Government's hydro-meteorological agency endorsed the designs.

In Phase 2, community-based Energy User Associations (EUAs) were established and were provided with all necessary licenses and other administrative authorizations to enable them to generate and sell electricity. MHP operators received adequate training from the manufacturers and the consultants.

The main outputs of Phase 2 were the development of Dushohazamin MHP (80 kW) and Kalandak MHP (200 kW). These outputs were only partly achieved, since although the MHPs were constructed, they are currently not operating as designed. Dushohazamin MHP could not be operated at full capacity due to insufficient discharge during winter. This is attributed to the anomalous weathers that resulted in decreased winter river discharges. River discharge during winter 2007/2008 was exceptionally low due to the drought in spring and summer followed by an extremely cold winter. If sufficient time and resources were allocated to hydrological survey and analysis, such tendency may have been predicted to a certain extent. Kalandak MHP's waterway (using an existing irrigation canal) was damaged by an avalanche and has not been replaced since a consensus has not been reached on whether it should be the EUA or the owner of the irrigation canal, the Ministry of Amelioration (MOA), who should rehabilitate the structure. Such situation was not foreseen and was not included in the agreement between EUA and MOA.

Due to the MHPs not functioning as designed, the expected outcome to supply power services during the winter was not fully achieved.

Overall Assessment and Rating

The TA is rated partly successful. The TA was relevant, but the TA design could have been improved since time and person-months for planning, design and construction was insufficient. The MHPs were developed but are not operating as designed. The EUAs were successfully trained for day-to-day operations, but they were not trained to resolve major problems as those experienced in the pilot schemes.

Major Lessons

- More time and person-months should be allocated for thorough site selection and hydrological survey especially in light of the recent anomalous weathers in the region.
- Equipment and civil works should not have been packaged separately, but into a single contract in order to attract more reputable bidders, thereby promoting price competition, and simplifying the procurement process.
- The use of existing irrigation infrastructure can lower costs, but agreement at a higher level (e.g. MEI and MOA) is necessary to avoid disputes during operation.
- A mechanism should be in place to support the EUAs to cope with major incidents since there is a limit to what the communities can independently resolve.

Recommendations and Follow-Up Actions

Off-grid MHPs are dependent on site specific hydrological and topographical conditions. It is recommended that similar projects allocate more time and input for technical investigations, namely hydrological analysis involving on-site surveys.

To facilitate community-based MHP development and avoid unnecessary delays, the Government should promulgate a law on community-based MHP and streamline the licensing and authorization process.

It is important to notice that EUAs alone cannot operate the MHPs in a sustainable manner. If the Government is to encourage MHP development, they should consider establishing a support facility (e.g. maintenance workshops, expertise, funds, etc.) to assist MHP implementation and operation including periodic maintenance and major remedial works that require much higher levels of expertise and costs than in day-to-day operations.

While the MHPs constructed under the TA have been handed over to the EUAs, it is recommended that the Government provide adequate support to make the MHPs serviceable.

ADB should follow-up the above through policy dialogues and future interventions.

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