

LESSONS LEARNED

Accelerating Solar Water Pumping via Innovative Financing in Tanzania



DEVELOPMENT CHALLENGE

Achieving sustainable water service delivery in rural areas of Tanzania has been a challenge for decades. In 2013, a nationwide mapping exercise found that only 55 percent of Tanzania's 74,250 water points were functional. Given a lack of viable alternatives, many rural communities have water schemes with electric submersible pumps powered by diesel generators with high operational costs, leading to high water tariffs and unsustainable service. Recent price reductions and technological advancements have made photovoltaic water pumping (PVP), technology that converts sunlight into electricity to pump water, a financially, operationally, and environmentally feasible option for sustainable rural water supply. However, in Tanzania's decentralized rural water sector, limited local PVP awareness and insufficient upfront capital to invest in the technology have prohibited PVP adoption.

THE PROJECT AND DESIGN

In September 2017, the World Bank approved a \$4.5 million pilot project with the Tanzania Ministry of Water and Irrigation to support sustainable access to water in selected rural communities of Tanzania by replacing existing inefficient diesel electric pumps with PVP systems. The proposed interventions aimed to decarbonize off-grid water pumping in Tanzania and reduce operational costs for Community-Based Water Supply Organizations (CBWSOs).

The project's core component was \$4.2 million worth of Output-Based Aid (OBA) subsidies to support CBWSOs to access loans for retrofitting the diesel pumps with

PVP systems. This blended finance approach combined (i) debt finance from the local financing institution (TIB Development Bank Limited) equivalent to 38.5 percent of the upfront PVP costs, with (ii) 60 percent OBA grant subsidies, and (iii) remaining 1.5 percent downpayment from CBWSOs.

Soft loan repayment terms, rates, and durations, coupled with the OBA subsidy, intended to make the total capital costs repayable by CBWSOs manageable. The installed PVP systems included mobile banking-enabled prepaid water meter technology to digitize all water revenue and to gradually repay the TIB loans. The first of its kind in rural Tanzania, the project also employed private sector contracting to retrofit the diesel water pumps with the PVP systems and to maintain the new systems across the participating communities.

The project components to (a) increase access to low-cost capital through the OBA subsidies to purchase and install the PVP technology, (b) improve water services through CBWSOs' partnership with private sector service providers, and (c) increase revenue generation through the water meters, ultimately sought to lower the price of water for users and enable CBWSOs to expand services to unserved communities.

RESULTS

Following restructuring and extensions caused, in part, by the COVID-19, the project successfully closed in August 2022. The project improved energy supply to



133 rural settlements with 472,000 direct beneficiaries (94.5% target). A total of 110 total PVP were installed (100% target), including 104 diesel pumps retrofit with PVP systems—all installed and operated by three private contractors and two service providers. Thanks to the project, annual diesel consumption is estimated to be reduced by 690 tons, offsetting 1,087 tons of CO2 emissions per year.

The monthly repayment instalments by the CBWSOs will also generate positive credit history that can be leveraged to borrow commercially from banks in the future to expand services. Additionally, the project has set a good precedent for private sector participation in commercial financing, building infrastructure, and delivering services in Tanzania's rural water systems – opening possibilities for future private sector collaborations to ensure sustained water services.

As a testament to the pilot project's success, following the project's closure, the Tanzanian Government issued a concept note and pre-feasibility study on a public-private partnership (PPP) model for future operations in the sector. Since then, the next phase of the project has begun, totaling \$6 million in grant funding from the Danish International Development Agency (DANIDA).

LESSONS LEARNED

1 Mainstreaming prepaid water meters can enhance revenue collection. Collecting monthly water revenues from remote rural villages poses numerous challenges, particularly if services are unreliable. And while mobile money-enabled prepaid water dispenser technology has been around for about a decade, its widespread adoption was previously inhibited by its high upfront costs. The project demonstrated that the price of prepaid water meters has fallen and digitizing revenue collection to a ring-fenced bank account has anecdotally shown to increase revenue collection by 50 to 400 percent in rural Tanzania.

2 Scaled pilot projects are essential to demonstrate suitability and impact of public and private collaborations, paving the way for more ambitious future initiatives. The financial model under the project showed that extending the loan term from the current 4 years to 12–15 years, could, if scaled, make it possible for the private sector to finance rural water infrastructure without the use of government resources and without raising the price of water for communities.

3 Providing access to operational data for implementing partners is critical to effectively monitor project activities. The national Rural Water Supply and Sanitation Agency (RUWASA) which oversees rural water systems and CBWSOs did not have access to real-time data from the prepaid meters, inhibiting their ability to fulfill their mandate. Given the novelty of the PPP in rural water systems, RUWASA's ability to monitor the performance of the private sector contractors and promote transparency was particularly important and marked a major gap in the project.

4 Water tariffs should ideally incorporate context-specific operational and maintenance service costs to reduce the potential for COWSOs' economic losses that would jeopardize service sustainability. However, given that PVP is a new technology in rural Tanzania, there was no historical operational and maintenance service cost data to inform the tariff calculations.