



Solar-Powered Irrigation Systems

Challenges & Opportunities in Kenya

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BACKGROUND

Solar-powered Irrigation Systems (SPIS) build communal resilience to the effects of climate change while delivering socioeconomic benefits to smallholder farmers through increased crop yields and incomes. Nevertheless, the uptake of SPIS remains low, especially in sub-Saharan Africa (SSA) and South Asia, where approximately 95% and 60% of farmland, respectively, is rainfed. Rainfall is inconsistent even in normal conditions, and this unreliability is only exacerbated by increased drought conditions brought on by environmental destruction.

Kenya, the most mature market for solar water pumps in sub-Saharan Africa, accounted for 65% of solar water pump sales in SSA between July 2018–June 2021, according to a [Sales & Impact Report by GOGLA](#). Another [study](#) by [VeraSol](#) and [Efficiency for Access](#) found that approximately 35,000 solar water pumps were in use in Kenya as of January 2021.

However, multiple factors hinder access for millions of smallholder farmers in Kenya, including: high upfront costs, limited access to consumer finance, low consumer awareness, stiff competition from fossil fuel-powered solutions such as diesel pumps, and lack of local technical capacity to offer installation, repair and maintenance services for SPIS. For example, a recent [solar water pump consumer awareness campaign](#) in Machakos County, Kenya, found that diesel-powered water pumps were the most commonly used (71%) form of irrigation. In comparison, solar water pumps were the least popular at 1%.

On 24 June 2022, CLASP convened a Stakeholders' Workshop in Nairobi to deliberate on the challenges and opportunities for scaling Solar-Powered Irrigation Systems in Kenya. The workshop provided a platform to share knowledge and facilitate interaction between various industry stakeholders with the goal of improving the livelihood of smallholder farmers through solar-powered irrigation systems in Kenya.

WORKSHOP OUTCOMES

31 participants from 22 organizations attended the workshop, including manufacturers, distributors, financiers, program implementors, and government officials. Discussions at the workshop focused on four key areas: **technology development & innovation, affordability and financing, consumer awareness, and business & operational models**. Participants collectively identified and prioritized the following action items:

TECHNOLOGY DEVELOPMENT & INNOVATION

- Develop high-performing, innovative, and low-cost technologies that require low maintenance & can work under low solar irradiance to adequately compete with other irrigation solutions like diesel, petrol, and electric pumps.
- Adopt quality standards for solar water pumps as part of market development initiatives to encourage the use of high-quality solar water pumps and irrigation equipment.
- Develop simple technologies that require minimal behavioural change by end-users and can be integrated easily into existing farming practices.

AFFORDABILITY AND FINANCING

- Develop innovative end-user financing solutions which match product repayment to crop harvesting cycles to reduce loan default rates.

- Bundle financing solutions for SWPs with other irrigation equipment, such as drip irrigation kits, water harvesting & storage structures.
- Develop strategic partnerships with private sector players such as local banks and micro-finance institutions to provide loans and special interest rates for irrigation equipment.
- Explore strategic partnerships between local financial institutions and SPIS distributors to allow smallholder farmers to access product financing without the risk of diverting funds to other competing household needs.
- Provide public sector support for the uptake of SPIS by reviewing unfavorable taxes, levies, and duties charged on SPIS. The government should reclassify irrigation equipment such as pumping kits, drip kits, and water harvesting and storage equipment as agricultural equipment and exempt it from importation tax.

CONSUMER AWARENESS

- Enhance consumer awareness by conducting SPIS awareness drives to educate farmers on appropriate SPIS technologies, available consumer financing options, sustainable water management, and good farming practices. Dissemination channels could include edutainment shows presented in national and vernacular languages or agricultural exhibitions that highlight the benefits and cost-savings opportunities of SPIS.
- Create centers of excellence or demonstration centers for experiential learning targeting smallholder farmers, including village-based champion farmers who can serve as ambassadors and trainers for fellow smallholder farmers.
- Reduce national and county-level advertising levies or subsidize costs of advertising for consumer awareness and product promotion.

BUSINESS AND OPERATIONAL MODELS

- SPIS technology providers and financiers should explore opportunities for working with agricultural produce off-takers, farmer-producer organizations, and farming cooperatives to provide equipment financing or credit facilities through structured partnerships with local financial institutions.
- Encourage product-bundling with seeds, fertilizer, and agronomy support, as these are crucial to a farmer's productivity and ability to repay for an irrigation system.
- Leverage the existing network of local technical installers by building their capacity through training and certification to build a healthy installation and aftersales support ecosystem.

NEXT STEPS

Deliberations at the workshop provided valuable insights which will inform the Kenya Productive Use of Renewable Energy Program. Supported by the IKEA Foundation, the Kenya PURE Program aims to improve the livelihood of smallholder farmers through productive use of renewable energy technologies, including solar-powered irrigation systems, cold chains, agro-processing equipment, egg incubators, and solar driers.

