

Solar Water Pumping Brief

JANUARY 2020

Solar pumps are emerging as a cost-effective, clean and sustainable technology in expanding irrigation to rural off-grid farmers. The prices of solar photovoltaics (PV) have been decreasing dramatically over the last decade and are forecast to further decrease. The International Renewable Agency (IRENA) projects a 59 per cent cost reduction for electricity generated by solar PV by 2025, as compared to 2015 prices, further creating a case for solar water pumping.

This brief highlights the benefits of solar water pumps, existing business models for supporting solar water pumps for local farmers, challenges in scaling solar water pumps and public interventions that can address some of the challenges.

Off-grid technologies – including standalone systems and mini-grids – have struggled to reach many consumer groups in Uganda due to low demand and slow growth. Currently, 70 per cent of the population lacks access to electricity, and the Government of Uganda (GoU) projects that over 30 per cent of the population is unlikely to be reached by the national grid for the next several decades. This re-emphasises the need to increase the uptake of off-grid technology among low- to middle-income rural communities, which have often struggled to afford them. Productive use appliances are a viable way of increasing energy access through raising consumers' productivity and income, eventually unlocking more disposable income that can then be spent on additional energy consumption, as shown in Figure 1.



POPULATION LACKS ACCESS TO ELECTRICITY IN UGANDA



POPULATION IN UGANDA THAT IS UNLIKELY TO BE REACHED BY THE NATIONAL GRID FOR THE NEXT SEVERAL DECADES

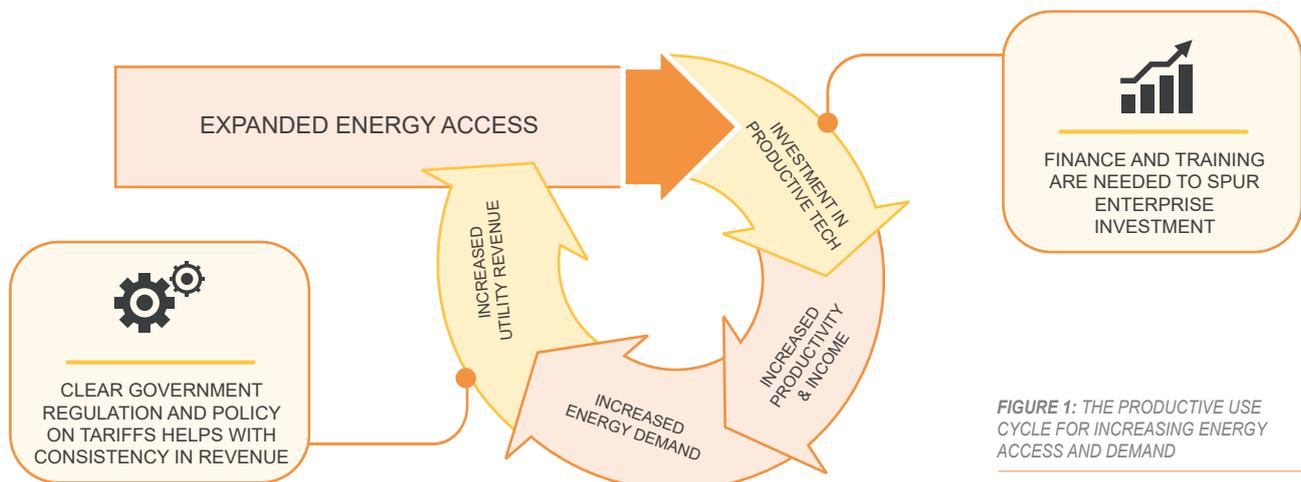


FIGURE 1: THE PRODUCTIVE USE CYCLE FOR INCREASING ENERGY ACCESS AND DEMAND

Benefits of Solar Water Pumps

Benefits for Farmers



Benefits for the Government



Case Study:

Pilots run by the Low Energy Inclusive Appliances Programme show significant impact

Under DFID's Energy for Efficiency Coalition, CLASP and Acumen interviewed 400 farmers who owned a pump for 4– 5 months in Kenya, Uganda and Tanzania. They were able to see significant impact:



REDUCTION IN EXPENDITURE
Majority had converted from diesel or manual pumping; fewer cases of first-time irrigators given the initial capital cost



MOVED UP THE ENERGY LADDER
Having previously had smaller lighting systems, they were now able to expand their use



FELT IT HAD IMPROVED THEIR LIVES
Increase in incomes and ability to count on extra harvest seasons

Business Models for Solar Irrigation

1



Manufacturers

In Uganda and many sub-Saharan African countries, solar water pumps are mostly imported from China and India. Current business models being used are:

Mostly established manufacturers who were already engaged in large-scale irrigation systems and have now developed products for small-scale irrigation. The delivery models they use are:

a



Business-to-b business: Usually, their focus is on selling to distributors.

b



Business-to-consumer: Some of the manufacturers sell directly to small-scale farmers. Recently, models like pay-as-you-grow have emerged. Companies like Future Pump are providing end-to-end services, including consumer financing and developing software for remote monitoring and tracking of farmer usage.

2



Distribution and After Sales Services

Companies in this category are:

a



Agricultural Appliance Providers: are adding solar water pumps to their stock. These operators reach out to savings groups, farmers cooperatives and women groups to reach the last mile. They have deep trust with consumers.

b



Solar Home System Companies: These are businesses that were already providing energy products to rural populations and have integrated solar water pumps into their product offering. The main concern with this model is the lack of technical capacity to support farmers given that most energy providers are not irrigation experts or agronomists, solar irrigation technology is unique, and operators cannot typically rely on existing technician networks.

c



Newer companies in the market who are targeting small-scale farmers and operating a model where they purchase products from manufacturers and use their own distribution channels to reach the last mile.

Challenges in Scaling Solar Water Pumps for Irrigation

While solar water pumps are a cost-effective alternative to diesel pumps and offer other benefits to farmers, there are some challenges that have hindered their adoption at different levels. These include:

Policy and Regulation



A

The existing policy environment does not have targeted interventions for small-scale farmers



B

Unavailability of data on water access



C

The configuration of solar water pumps is not standard, which affects business operations.

Supply Chain



D

Limited technical expertise to support farmers on how to maximise productivity



E

Inconsistent after-sales support

Farmers



F

Limited consumer awareness on the available products and benefits



G

Low affordability and limited access to finance for farmers



H

Limited access to inputs and crop markets

Public Sector Interventions to Promote Solar Irrigation

Many of the challenges highlighted above can be partially or wholly addressed through public sector interventions as well as strategies targeted at promoting private sector innovation in solar water pumping for irrigation. The interventions that GoU can consider are:



Increasing coordination within government agencies and other stakeholders in order to implement strategies that promote solar irrigation.



Creating a framework or adapting metrics for quality and standards



Developing fiscal policy interventions to support the sector such as tax incentives and subsidies



Improving farmers' knowledge and access to resources needed to maximise productivity.

Conclusion

Increased awareness on the benefits of solar water pumps among small scale farmers needs to be combined with consumer financing for greater adoption of the technology. Companies also need to be keen on after-sales support even as governments develop and implement interventions that target small scale farmers.

While the findings presented in this brief focus on Uganda, they also reflect the situation in many sub-Saharan African countries. The information presented here is therefore relevant for these countries.

NB: This is a brief extracted from:

Africa Clean Energy Programme Technical Assistance Facility and Open Capital Advisors (2019) Uganda Solar Water Pumping Report. Nairobi. Available:

<https://www.ace-taf.org/kb/uganda-solar-water-pumping-report/>



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