MINISTRY OF FOREIGN AFFAIRS OF DENMARK
Danida

DGBP DANIDA GREEN BUSINESS PARTNERSHIPS

MERCY CORPS

POWERING THE UPTAKE OF CLIMATE CHANGE MITIGATING PUMPS - UGANDA PROJECT (PUMP-UP)

THE BUSINESS CASE FOR SOLAR IRRIGATION

JUNE 2024



Partners: ENERGY4IMPACT POWERED BY MERCY CORPS · Tulima Solar · Simusolar

Project overview

As the impacts of climate change ripple through the most vulnerable communities in Northern Uganda, Mercy Corps and its energy access platform Energy 4 Impact (E4I) bear witness to the profound toll it takes on smallholder farmers.

Striving to build more resilient livelihoods and assist smallholder farming communities, including women, youth and refugee farming communities in adapting, they have partnered with well-established private sector companies, Simusolar and Tulima Solar to implement the Powering the Uptake of Climate Change Mitigating Pumps Uganda Project (PUMP-UP).

With funding from Danida Green Business Partnership (DGBP), the project commenced in July 2023 and is set to run until June 2026 for a total duration of three years. The primary aim of the partnership is to facilitate the adoption of solar irrigation technologies among smallholder farmers in Northern Uganda (Gulu, Amuru, Omoro, Nwoya, Pader, Yumbe), along with the integration of climate-smart agricultural practices and water resource management.

Tulima solar & Simusolar

Tulima Solar is a Uganda-based company specializing in the distribution and financing of solar powered water pumps. They offer a wide range of irrigation systems tailored to different water sources, topographies and the specific water needs of their customers.

The company adopts a full-service approach, including irrigation system design, underwriting customer financial risks, installation, monitoring, and after sales services.

Tulima Solar is affiliated with Simusolar Inc. group, which also operates a subsidiary in Tanzania known as Simusolar Ltd. The company commenced operations in Uganda in 2019 and is currently expanding its presence in rural areas of the country.

With the PUMP-UP project, the company aims to accelerate sales of its solar powered water pumps using a Pay-GO business model. The plan is to increase its reach and market traction in Northern Uganda by adding an additional 430 Solar Water Pumps over three years.

This expansion strategy includes: 1) diversifying value chains and market segments to reach smallholder farmers, including women, youth and refugee communities, 2) adopting engagement terms and exploring financial products suitable for women, youth and refugees, 3) holding demonstration events that increase awareness and adoption.



In total,

2,220

smallholder farmers

living in rural Northern Uganda (Gulu, Amuru, Omoro, Nwoya, Pader, Yumbe) are expected to benefit from the project.

Solar water pumps promoted

The project is promoting different solar pumps targeting different categories of farmers. However, the KK is currently the most demanded pump due to it's affordability compared to other pumps.

PUMP-UP is promoting the KK solar water pump which is suitable for smallholder farmers due to its affordability. This portable surface solar water pump can be easily carried to the farm, used, and then taken back for safe keeping.

The system consists of;

- Control box
- 3 meters suction pipe
- 100 meters delivery pipe
- TDH: 20 meters
- Folding Solar panel of 200 Watts
- Recommended acreage 0.5 to 2 acres
- 9,000 Liters of water per day
- Price UGX 1,800,000

To increase farmer awareness and adoption of solar irrigation, climate smart agriculture best practices and production of high-value crops, the program established 11 demonstration sites in December 2023 for off-season production targeting high-value horticultural crops watermelon, tomatoes and cabbages.

The establishment of the demonstration sites involved collaboration with the sub-county Agricultural Officers and the agro-input suppliers to provide technical capacity building to the demonstration host farmers. The demonstration sites serve as learning centers for solar irrigation technologies, CSA and integrated water resource management practices targeting 100+ smallholder farmers per demonstration site (3-5 farmer groups).
The demo host farmers are tasked to influence sales of solar water pumps by converting at least 3 participating farmers/groups to acquire their own solar water pump within one year to replicate the practices on their field. The incentive to the host farmer is to permanently own the demo solar water pump afterwards.

Yield and sales data from the demonstration sites highlight high profitability of the horticultural enterprises, offering a high return on investment and requiring minimal land for production.

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Photo credit: Mercy Corps

Yield data from the pump-up demonstration sites

Demo Plot Cabbage case 0.17 (686.97 square meters)	
Payable for pump & accessories 100%	1,890,000
Down payment 40%	720,000
Monthly pay balance scheme	6
Monthly Instalments	195,000
Average cost per day	10,500
Pump operations days/season average	60
Water requirements cabbage	0.7 5 litre per plant
Total harvest from (60x60 cm spacing)	5,529
Sellable yield (Heads)	4,853
Break even yield	1,004
Average selling price per head	UGX 1,300
Gross revenue x 1 cycle cabbage	UGX 6,308,900
Net revenue less production costs & pump	UGX 3,557,900



Photo credit: Mercy Corps

Demo Plot Water melon case 0.971 (3930 sqare meters)	
Payable for pump & accessories 100%	1,890,000
Down payment 40%	720,000
Monthly pay balance scheme	6
Monthly Instalments	195,000
Average cost per day	10,500
Pump operations days/season average	60
Weekly water requirements litres per plant	3.54
Total harvest in fruits	1,330
Sellable yield (fruits)	1,167
Break even yield in fruits	668
Average selling price	UGX 4,194
Gross revenue x 1 cycle	UGX 4,894,398
Net revenue less production costs & pump	UGX 1,291,898



Photo credit: Mercy Corps

Demo Plot Tomato case 0.21677 (877.24 square meters)	
Payable for pump & accessories 100%	1,890,000
Down payment 40%	720,000
Monthly pay balance scheme	6
Monthly Instalments	195,000
Average cost per day	10,500
Pump operations days/season average	60
Weekly water requirements litres per plant	3.54
Total harvest in crates	94
Average number of tomatoes in a crate	600-800
Sellable yield (crates)	87
Break even yield in crates	14
Average selling price per crate	UGX 198,611
Gross revenue x 1 cycle	UGX 17,279,157
Net revenue less production costs & pump	UGX 12,589,407

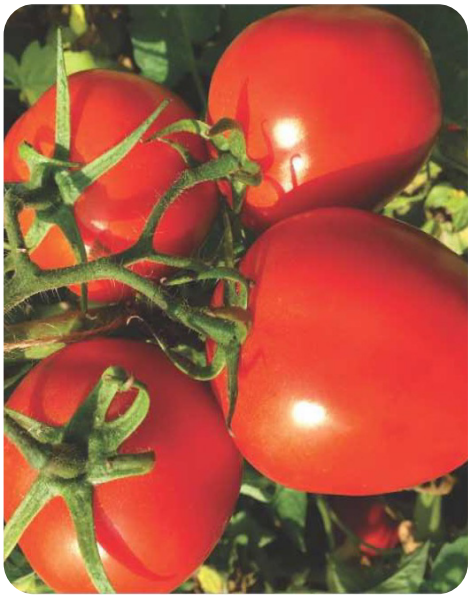


Photo credit: Mercy Corps

Financial modeling of selected enterprises

SURFACE PUMP KK 200 WATTS		Land size		
9000 litres per day yield potential		1/4 acre (UGX)	Half Acre (UGX)	One acre (UGX)
Tomatoes	Revenue	3,040,000	6,080,000	12,160,000
	69% cost of pump for season	1,305,000	1,305,000	1,305,000
	Production Costs	1,399,750	2,799,750	5,729,000
	Net Margin	335,250	1,975,250	5,126,000
SoyBeans	Revenue	0	540,000	1,080,000
	69% cost of pump for season	0	1,305,000	1,305,000
	Production Costs	0	440,000	880,000
	Net Margin-less cost of pump	0	(1,205,000)	(1,105,000)
Cabbage	Revenue	2,506,945	5,013,889	10,027,778
	69% cost of pump for season	1,305,000	1,305,000	1,305,000
	Production Costs	861,000	1,722,000	3,444,000
	Net Margin- less cost of pump	340,945	1,986,889	5,278,778
Water Melon	Revenue	3,610,000	7,220,000	14,440,000
	69% cost of pump for season	1,305,000	1,305,000	1,305,000
	Production Costs	856,250	1,712,500	3,425,000
	Net Margin- less cost of pump	1,448,750	4,202,500	9,710,000
Onions	Revenue	2,700,000	5,400,000	10,800,000
	69% cost of pump for season	1,305,000	1,305,000	1,305,000
	Production Costs	1,075,000	2,150,000	4,300,000
	Net Margin- less cost of pump	320,000	1,945,000	5,195,000

NOTE: *Through the PayGo-model the farmer is able to pay 69% of the pump cost by the end of the first season.*

Key Learnings

- Investment in solar irrigation is viable for high-value horticultural enterprises like tomatoes, watermelon and cabbages but not economically viable for field crops such as soybeans, sunflower and sesame.
- Size of land required for horticultural production to cover solar water pump loan repayment is half an acre within one cycle
- To maximize water-use efficiency, it is advisable for farmers to invest in add-ons such as drip lines
- Affordability and access to water for production remains a barrier for uptake amongst vulnerable households, including refugees
- The current Pay-Go financing model, which requires monthly repayments, does not align with the seasonal income profile of smallholder farmers

Recommendations

- Leverage DSS & EASP subsidy schemes and develop asset financing products to increase affordability for vulnerable households
- Explore flexible repayment schemes, with repayment schedules aligned to the income profiles of small holder farmers
- Invest in water for production to boost uptake and utilization of pumps. Rainwater harvesting solutions can be explored as an option for farmers with limited access to permanent water sources
- Intensify awareness creation through demonstration sites and media engagement to drive market uptake



Mercy Corps Program Assistant together with the family of demonstration garden host farmers during harvesting of cabbages in Ariwa Sub-County.



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About Mercy Corps

Mercy Corps is a leading global organization powered by the belief that a better world is possible. In disaster, in hardship, in more than 40 countries around the world, we partner to put bold solutions into action — helping people triumph over adversity and build stronger communities from within. Now, and for the future.

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