



Food and Agriculture Organization
of the United Nations



HOW DIFFERENT COUNTRIES PROMOTE AND MANAGE SOLAR-POWERED IRRIGATION

WATER HARVESTING RESERVOIR PILOT

KINONI , UGANDA.



FEBRUARY 17,2021

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Land and Water Division (NSL)

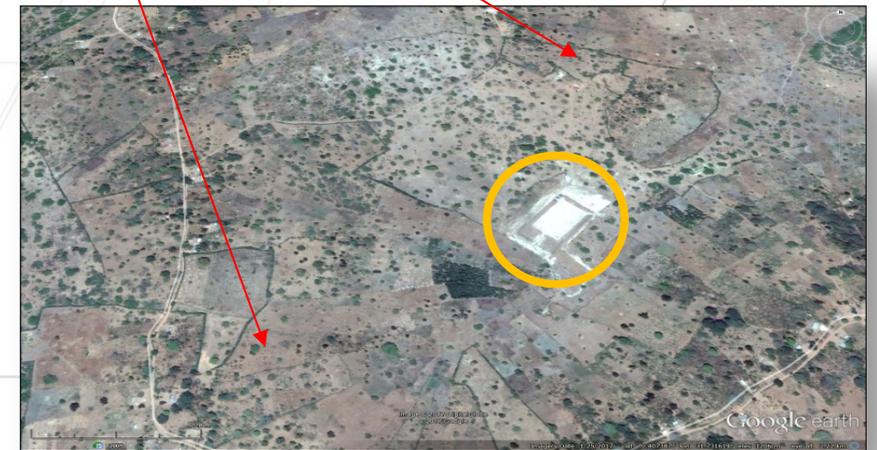
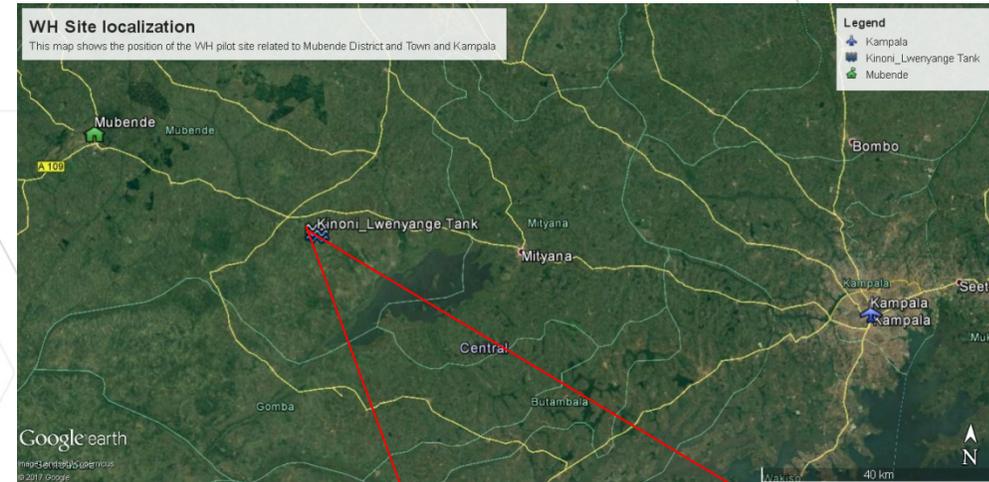
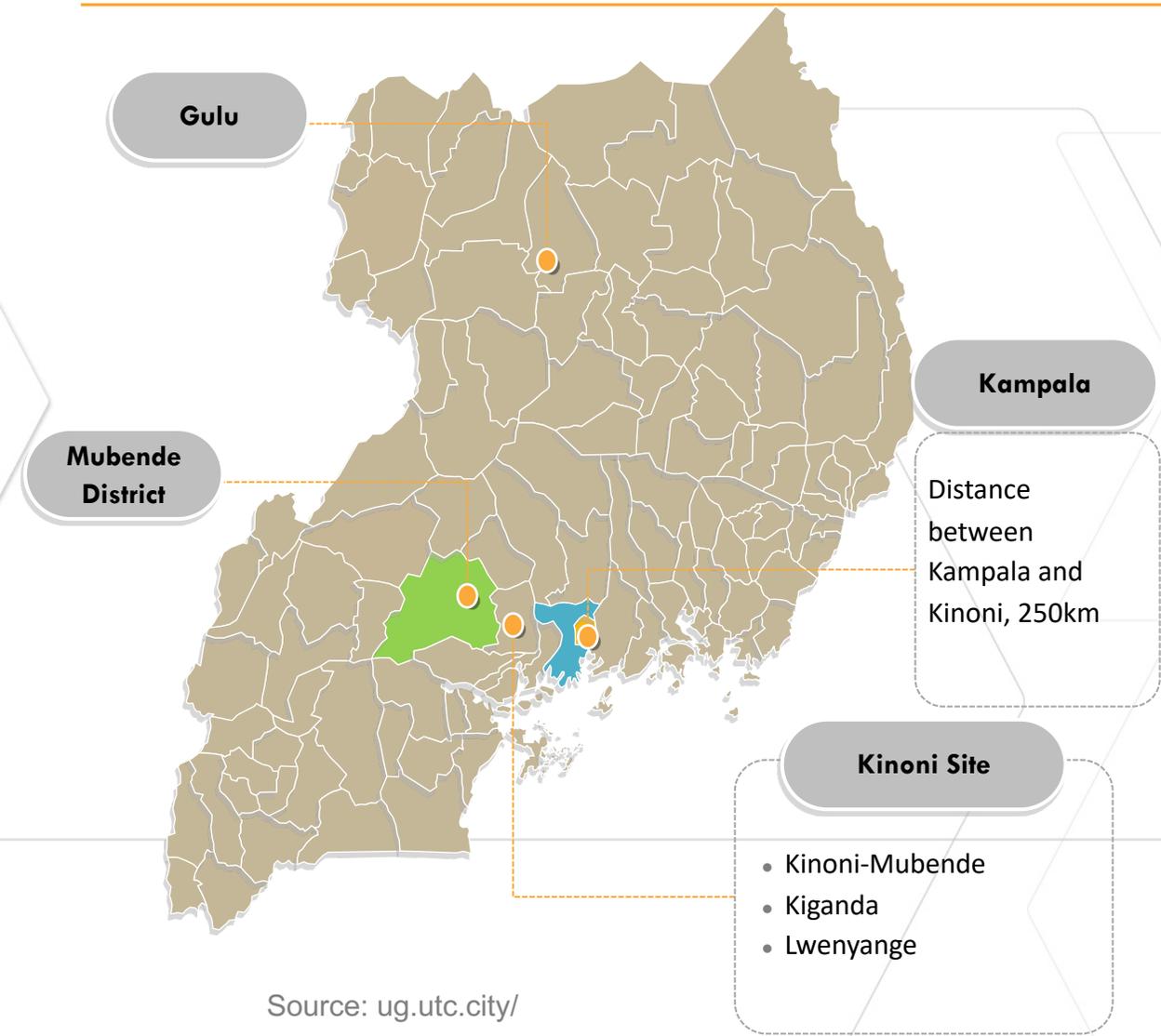
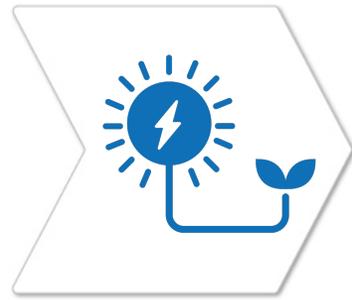
Natural Resources and Sustainable Production Stream
Food and Agriculture Organization of the United Nations
(FAO)



ITALIAN AGENCY
FOR DEVELOPMENT
COOPERATION



STRENGTHENING AGRICULTURAL WATER EFFICIENCY AND PRODUCTIVITY ON THE AFRICAN AND GLOBAL LEVEL

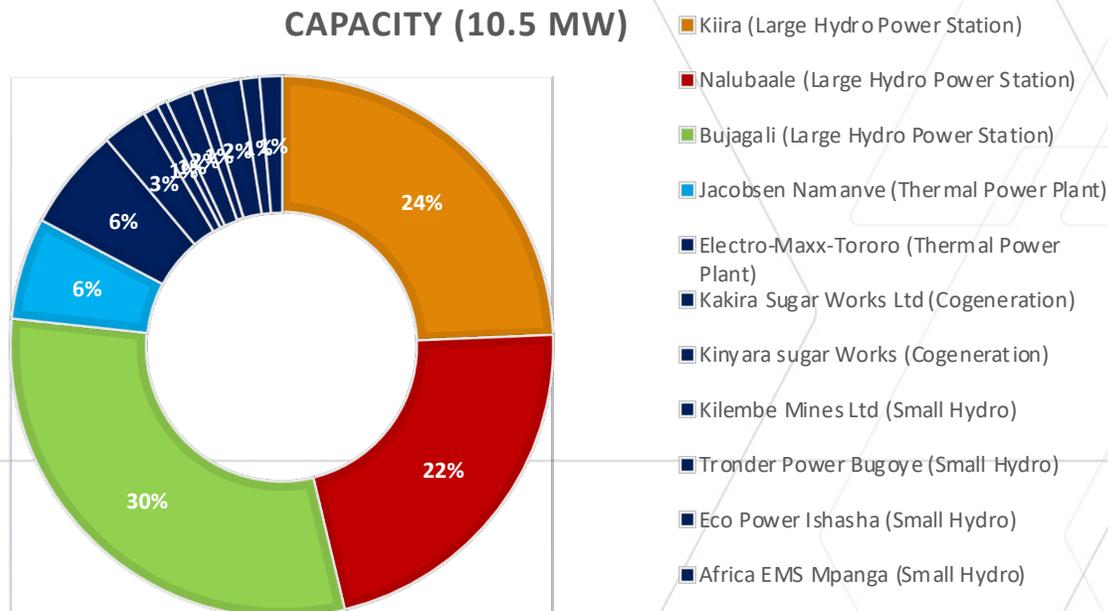


Kinoni site location relative to Mubende and Kampala cities and main roads (on the left) and tank and surrounding area (on the right) (Google Earth, 2017)

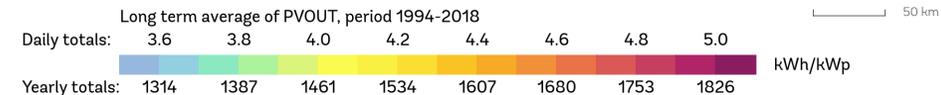
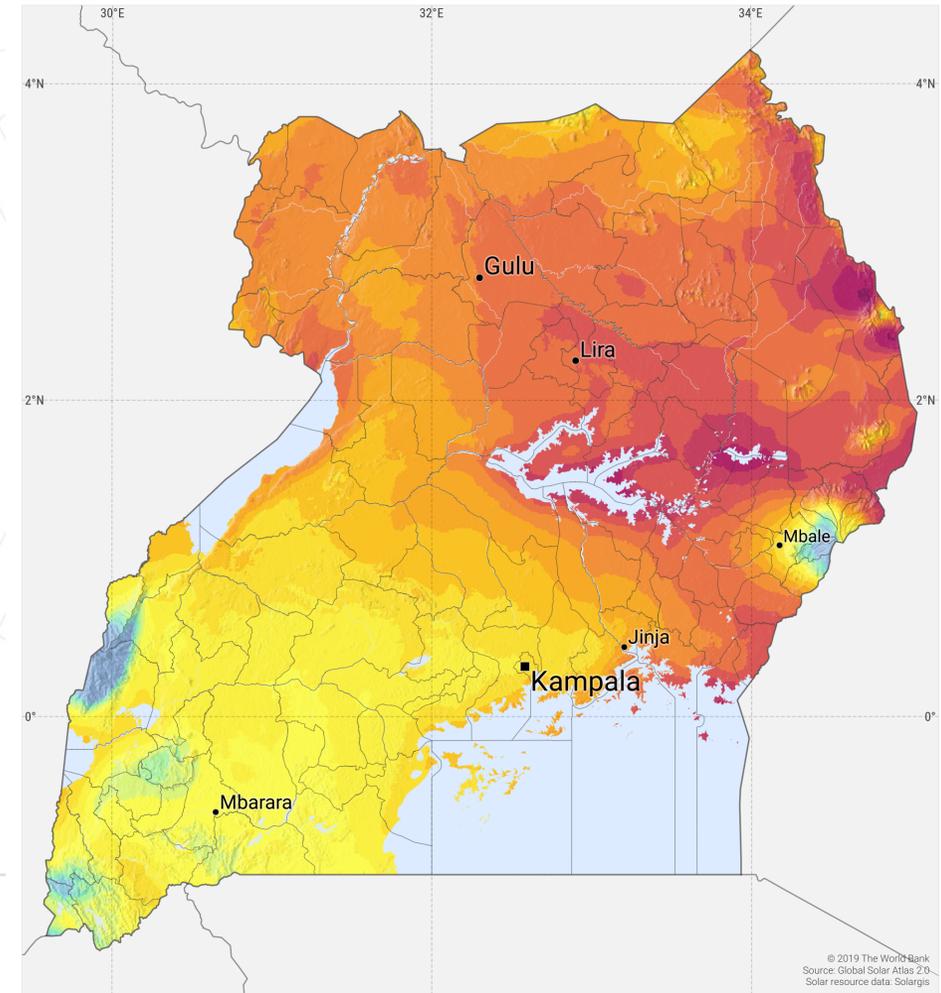
ENERGY IN UGA



- Uganda has one of the lowest electrification rates in Africa with a current access rate of 28%. There is limited productive use of electricity especially in rural areas which negatively affects demand growth, affordability and uptake. Agriculture dominates the Ugandan economy and society, contributing 44% of the total output and employing 80% of the labour force.
- The agricultural sector is the backbone of Uganda's economy as its main source of livelihood and contributes over 70 percent of Uganda's export earnings. Additionally, there is low access to modern energy sources and services, e.g. solar home systems, LPG, biogas and improved cookstoves, for lighting, heating and clean cooking.

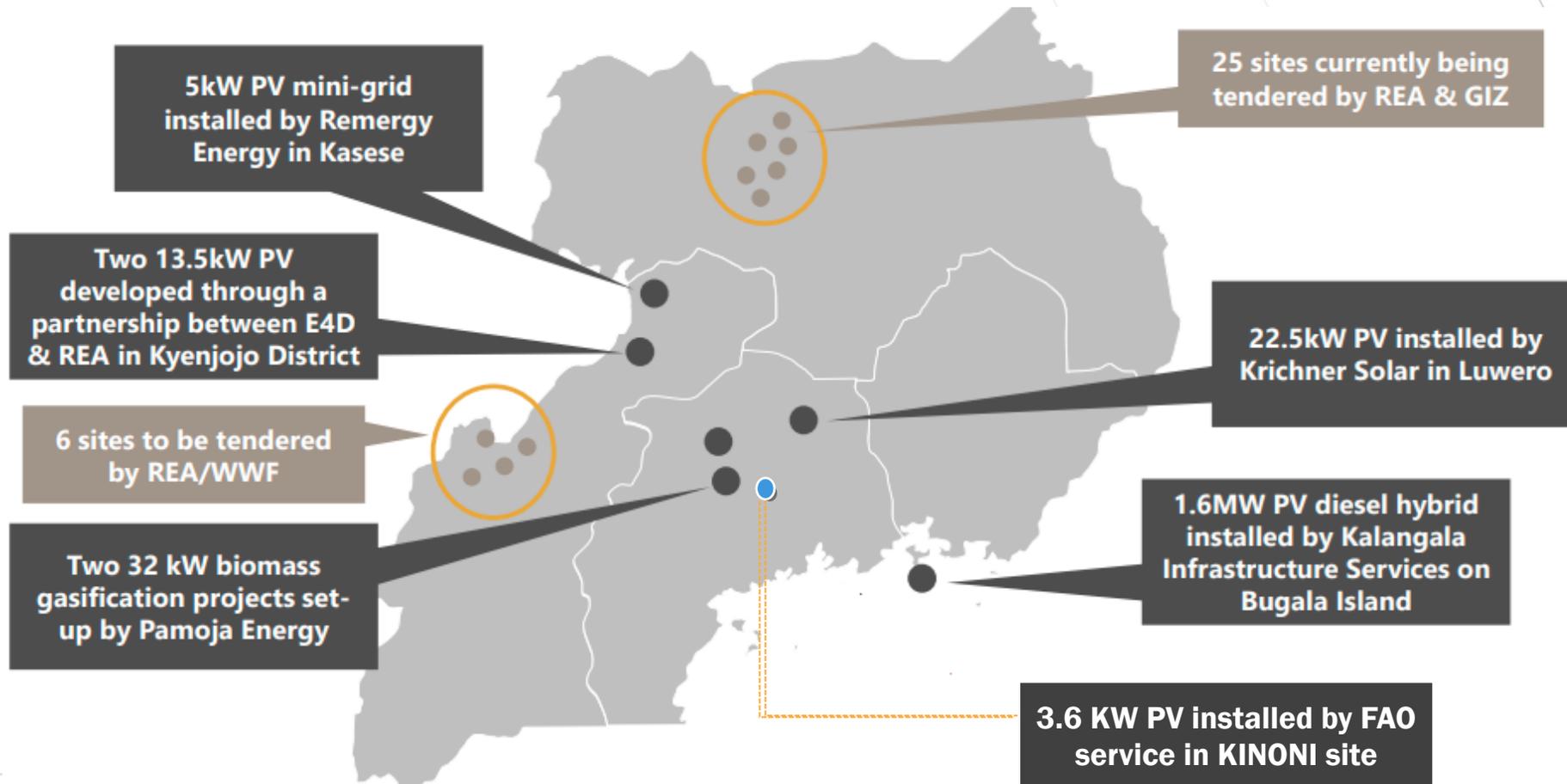
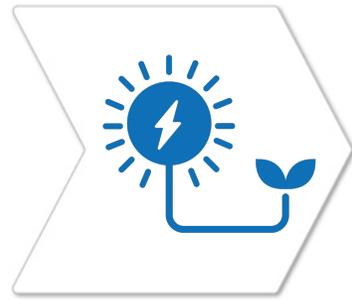


Source: Ministry of Energy and Mineral Development



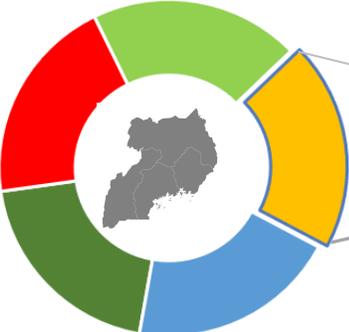
© 2019 The World Bank
Source: Global Solar Atlas 2.0
Solar resource data: Solargis

ONLY SMALL NUMBER OF MINI-GRID PROJECTS INSTALLED IN UGA



Source: research supplemented by REA documents on mini-grid opportunities

WH PILOT PROJECT IN UGA



Solar Energy



Water harvesting: (WH)



Water Accounting (WA)



Water Productivity (WP)



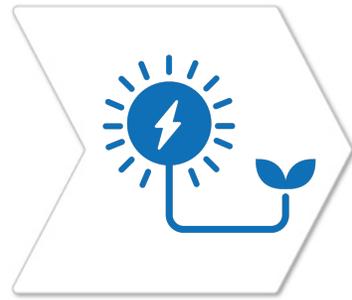
Water Efficiency (WE)

The pilot focused on water harvesting (WH) techniques, integrated with Water accounting , water productivity , water efficiency with solar energy main concept and solar water pumping from the tank, for small-scale localized irrigation of high value crops.

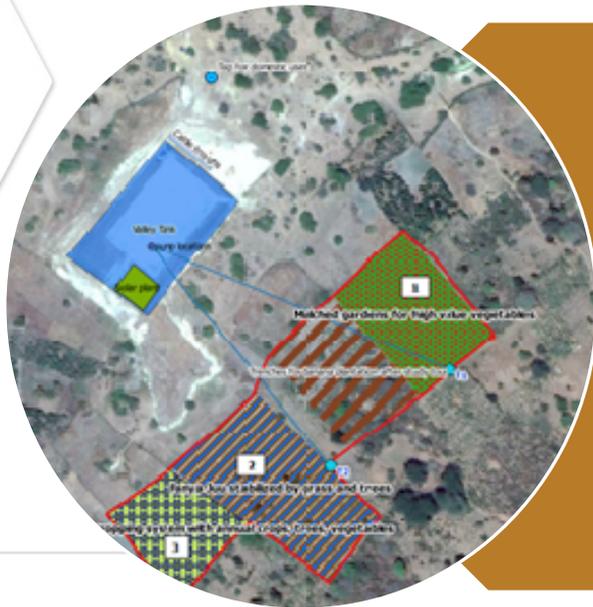
During the first implementation phase of the project, the following actions have been carried out, related to outputs Enhanced capacity of water harvesting for agriculture in Uganda , detailed assessment examined water harvesting best practices using Multi-Criteria Analysis , working closely with communities, conducting demonstration and field trainings of farmers.

Water and energy are vital resources for efficient agricultural production, water is usually pumped during the day when the sun is shining, The most efficient way to use a solar pump is PV-direct and the water itself is stored in storage tank to be used when needed as we did in Kinoni pilot . It's much easier to store water than power. which mean that the buffering way has been differed

PILOT CONCEPT



Installed capacity: 3'600 Wp
Modules: Polycrystalline PV-Modules.
Mounting: Ground mounting structures.
Application: Solar water pumping/ diesel hybrid solution



Surface reservoir with 10,000m³ Storage capacity (Inlet, silt trap and overflow) • 3 cattle troughs: troughs built with reinforced concrete. Water flows by gravity from the overhead tanks to cattle troughs. Elevated water tanks: 2 PE tanks are installed each with a capacity of 10 m³ Water point for domestic uses



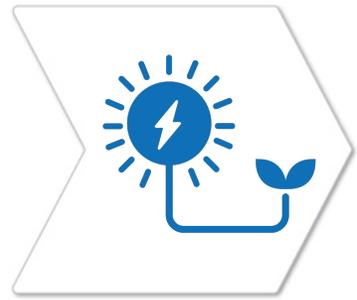
Source: FAO, 2018, Kinoni/Mubende, Uganda



The system is designed at maximum water discharge of 24 m³/day , The pump directly connected to a solar pump inverter and starts operate in the morning when the solar output is higher than the minimum power required to start the pump.

Submersible pump is very flexible regarding its energy supply and performance and has been designed for intermittent and continuous operation.

	m ³ /hr	Head	
		m	Hp
pump	2.5	60	3

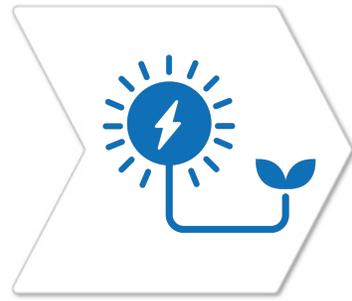


The water harvesting reservoir of Kinoni is situated in a depression, far from the area of water use and in a low level, which calls for pumping and energy (the area is a remote one and electrical energy is not available)

DELIVERABLES/ACHIEVABLE

- Provide a pathway to accelerate the availability and affordability of technologies that can help improve the efficiency and performance of solar water pumps used in weak- and off-grid areas.
- Providing different uses of water from the macro-catchment system
- Increase crop productivity through a combination of in-field WH and SWC techniques and improved agronomic/forestry practices on collective pilot fields.
- Providing different uses of water from an improved runoff water harvesting system, by improving the design of the current valley tank and providing water for agriculture, livestock and domestic purposes.
- Implementing a combination of in-field WH and SWC techniques and/or improved agronomic/forestry practices on collective pilot fields around the macro-catchment system (area between 2-10 ha)





THANK YOU

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