

# Sustainable water provision

100% solar-powered, safe & clean drinking water



<b>Subject</b>	Nzokani Solar Water ATM	<b>Location</b>	Kitui County, Kenya
<b>Application</b>	Drinking water	<b>Project Partner</b>	Solar Water Solutions and Epicenter Africa
<b>Size</b>	13 m <sup>3</sup> (3,434 gal.) water / per day	<b>Installation</b>	2019

Water is a scarce resource in Kitui County, Kenya. The climate is hot and dry with unreliable and unpredictable rainfall which fluctuates from year to year. Many boreholes have salty water and other contaminants making the water unsafe for human consumption. **Solar Water Solutions** has chosen **LORENTZ** as part of their

system to provide a sustainable water solution for this community. The project includes a Solar Water Solutions SolarRO water purification system. Two LORENTZ smartTAP Water Dispensers have been integrated into the system as a way for the water to be delivered. The solution supplies safe water to people living in remote

areas without electricity while at the same time greatly decreasing long distances for fetching water. Customers can now buy purified high-quality drinking water locally from the Nzokani Solar Water ATM at the same price as they used to buy untreated, contaminated water. The system supplies 13 m<sup>3</sup> (3,434 gal.) of clean drinking water each day for the community.

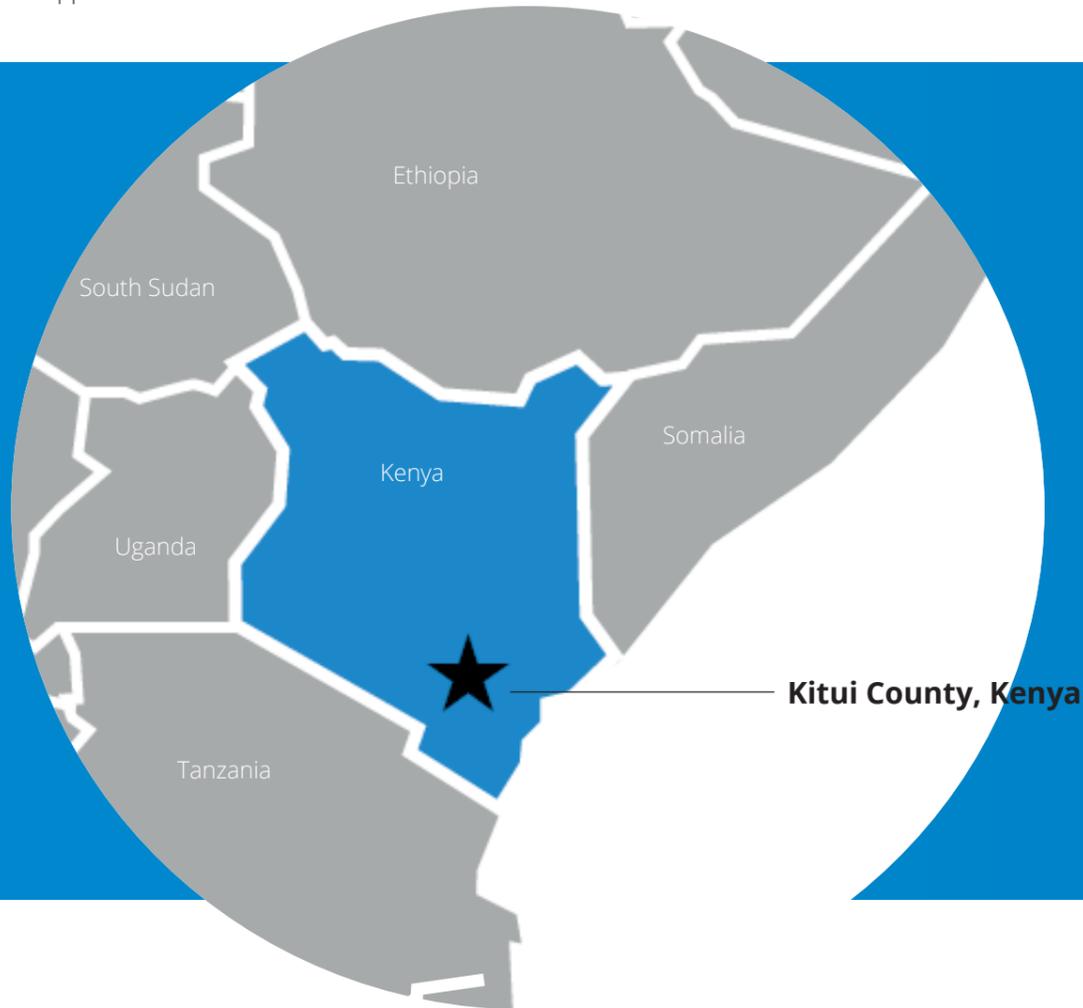
**LORENTZ**   
*The Solar Water Pumping Company*

# Problem

Historically, Kitui County has had inadequate safe and clean water options for domestic uses with very high costs for potable water. The majority of the population depends on surface and sub-surface dams which often do not hold sufficient water due to low rainfall. Water is typically collected from traditional water taps and the water sales are operated by a local person. Communities use water for drinking and cooking from a borehole with a raw water TDS level of 2000 ppm.

Local water challenges include:

- high TDS level, quality of water not suitable for human consumption
- serious health risks for local community
- difficulty in water sales revenue monitoring



The percentage of the population accessing safe and clean water from current water sources is only 24%, as most of the sources are saline borehole sources and require desalination. Lack of access to adequate and clean water exposes people to the risk of contracting various water

borne diseases. As most of the county populace depends on water sourced from rivers, shallow wells and roof catchments, there is a need to provide a solution to this problem, ensuring that quality is key.

**The Solar Water Pumping Company**

# Solution

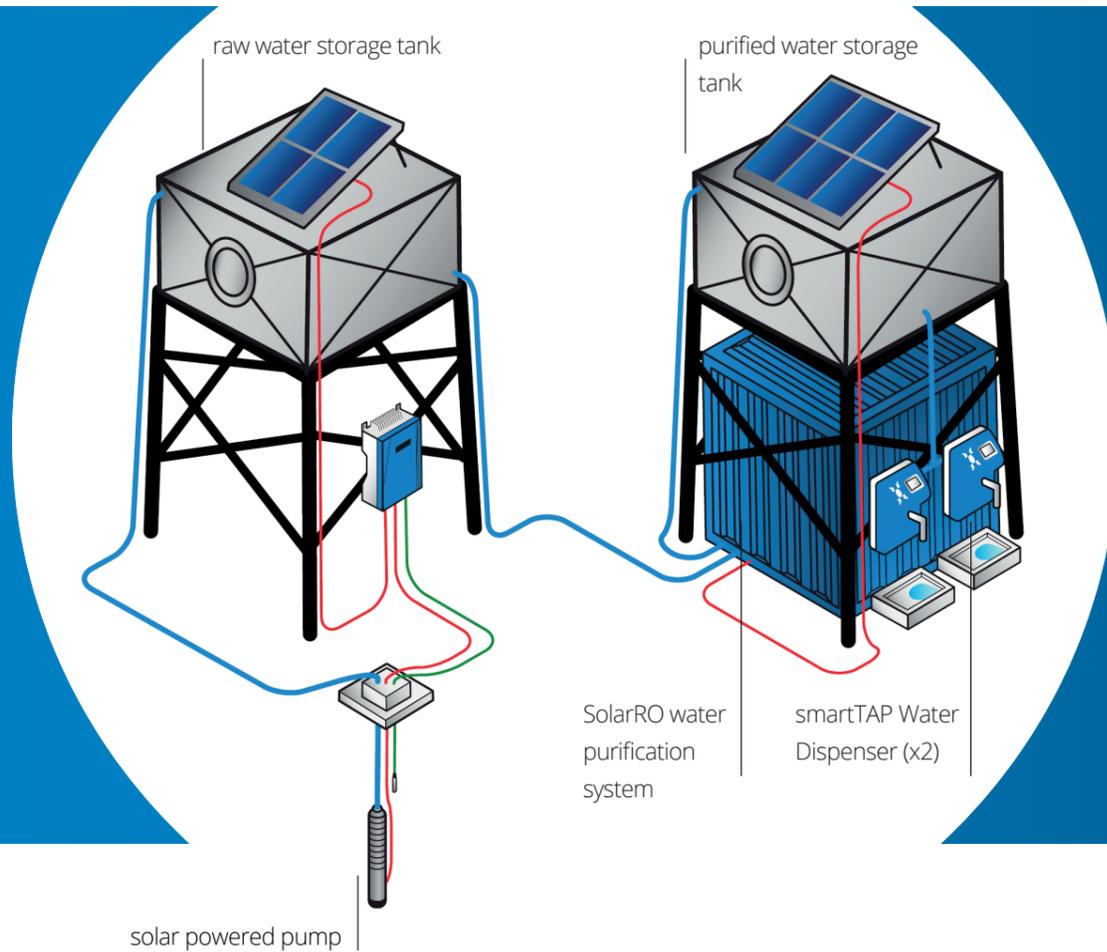


Solar Water Solutions has chosen LORENTZ equipment as part of their solution to provide an affordable, efficient and sustainable drinking water solution for the people of Kitui County. Epicenter Africa and the county government of Kitui have also provided support for the project.

In this system, a solar powered pump provides 22 m<sup>3</sup> (5,811 gal.) of raw water per day from a depth of 148 meters (485 ft).

This community-focused solution features a SolarRO water purification system (**SolarRO PRO 1500 BW**) designed by Solar Water Systems.

The SolarRO produces potable water using a unique solar powered reverse osmosis system that requires no batteries or energy-storage. The SolarRO water purification system makes clean drinking water without chemicals and emissions, directly from the source.



Two **smartTAP Water Dispensers** have been integrated into the containerized water purification system, providing an easy, secure and affordable solution for dispensing water. The smartTAP dispenses clean water using a simple to use NFC tag.

This water solution provides affordable and clean water which is accessible 24 hrs a day and supports the entire community.

## smartTAP Water Dispenser

**LORENTZ smartTAP enables revenue collection and sustainable water provision with remote monitoring.**



### smartTAP Water Dispenser

- off-grid, self-contained water dispenser
- solar powered with battery backup
- 72 hrs of operation without any sun
- easy to use for water customers
- cloud based management system for smartTAPs & water services

LORENTZ smartTAP is an off-grid water dispensing and management system which enables revenue collection, water entitlement and sustainable water provision. A simple graphical display allows users to comfortably operate it without training.

Users of the system access water using a tag. The tag is precharged

with water credits at a local shop or directly via mobile money. Adding credit to a tag is possible through the smartTAP App, providing a simple point of sale service without complex and expensive infrastructure.

The revenue collection function allows the system to be maintained, any investments to be returned and

for the system to be expanded to more users.

## SolarRO water purification system

**SolarRO produces potable water using a unique solar powered water purification system.**



### SolarRO PRO 1500 BW

- solar PV panels 20 pcs a' 275Wp
- permeate TDS <100
- permeate daily output 13 m<sup>3</sup>
- permeate max volume 1.3 m<sup>3</sup>/h
- max daily solar runtime 10 hrs
- actual power consumption 1.6 kWh
- for raw water TDS <6000 mg/l

The SolarRO water purification system makes clean drinking water without chemicals and emissions, directly from seawater, impure lakes and rivers, or saline boreholes. The unit has been certified as yielding excellent quality drinking water according to the World Health Organization (WHO) standards.

The SolarRO uses reverse osmosis (RO) which typically requires large amounts of energy. Solar Water Solutions provides a patented technology that creates constant pressure for the reverse osmosis process without the need for electricity.

The SolarRO is easy to use and has been designed for continuous use.

This system is one of the most cost-efficient ways to build decentralized water infrastructure. Water purification / desalination is possible with zero energy costs.

Maintenance costs for the SolarRO and the smartTAP can be covered with water sales revenue for long term use in a sustainable way.

# RoI calculation



**Clean drinking water**

As a result of this solution, customers in Kitui County now have access to clean and safe drinking water in accordance to WHO standards.

**Affordable**

Customers can now buy purified high-quality drinking water locally from the Nzokani Water Kiosk at the same price as they used to buy untreated, contaminated water. The price per liter and the environmental footprint are significantly lower than those of single-use plastic bottles in local kiosks.

**Achieving SDGs**

This sustainable solution makes clean water available locally which creates many empowering opportunities for the community as the need to walk many kilometers to collect water is decreased. As the solution enables revenue collection, investments can be returned and put towards maintenance and infrastructure development for the community.

These achievements are in line with the UN Sustainable Development Goals (SDGs) such as SDG 6 (clean water and sanitation), SDG 13 (climate action) and SDG 7 (renewable energy).

**Zero emissions**

This local solution supplies safe water to people living in remote areas without electricity with no need to transport water. The need for single-use plastic bottles is also decreased.

**Complete solution**

The Solar Water Solutions patented SolarRO technology combined with the LORENTZ smartTAP solution enables instant savings, zero emissions and a long term sustainable solution.

<b>Typical example of a sustainable water solution</b>	
<b>Note: This is a typical example and does not reflect the costs of this actual project or Solar Water Solutions technology. As an example, the cost of a reverse osmosis water treatment technology is included.</b>	
End user water cost (per liter)	0.005 USD
Water production (volume per day)	15,000 l (3960 gal.)
<b>Capital investment</b>	
LORENTZ solar pump - 55m (ca. 180 ft.) borehole installed including PV	4,000 USD
Water tank (15,000 l / ca. 3,960 gal.)	1,800 USD
Water treatment plant - RO - Reverse osmosis (saline water or more complex impurities)	40,000 USD
Number of smartTAP Water Dispensers	2
Total cost for the water distribution (dispensers and tags)	3,700 USD
<b>Total capital (RO)</b>	<b>49,500 USD</b>
<b>Operating costs</b>	
Yearly maintenance consumables (spare filters) for water treatment	1,000 USD
<b>Other operational costs (annual) - e.g. pump service, water testing, commission / salary for water sellers, housekeeping (labor), water treatment service / maintenance / ancillaries, system management</b>	<b>5,000 USD</b>
<b>Annual income</b>	<b>27,375 USD</b>
<b>Minus operating costs</b>	<b>22,375 USD</b>
Payback time	26.5 mo.

# Contact

## About Solar Water Solutions

Solar Water Solutions (SWS), a Finnish water technology company, has solved how to make affordable clean water with direct solar power. One-of-its-kind technology turns seawater and water from contaminated wells into drinking water. SWS has developed and patented a technology that automatically keeps the RO pressure constant even when it's cloudy. The innovation turns energy intensive RO desalination into an affordable and sustainable process.

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**SOLAR WATER  
SOLUTIONS**

## About LORENTZ

LORENTZ is the global market leader in solar powered water pumping solutions. Founded in Germany during 1993 LORENTZ has pioneered, innovated and excelled in the engineering and manufacturing of solar powered water pumping. Today LORENTZ is active in over 130 countries through a dedicated network of professional partners. LORENTZ technology uses the power of the sun to pump water, sustaining and enhancing the life of millions of people, their livestock and crops.

Simply - **Sun. Water. Life.**

Note: Photos in case study by Konsta Punkka / Solar Water Solutions



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