ENGINEERING TOMORROW

Case story | VACON® 100 X

Bringing **clean drinking water** to rural Kenya with **100% renewable resources**

The situation

Nestled just east of Nairobi is Kitui, the capital city of Kitui County in Africa. The drought-stricken region faces regularly high temperatures—and the Kitui community, like many others, lacks clean drinking water and the infrastructure to support it. That is, until Finland-based Solar Water Solutions, a frontrunner in renewable-powered water desalination technology, brought their proprietary modular reverse osmosis system to them.

The desalination system in Kitui—a pilot project laying the foundation for 200 more to be installed across Kenya in 2023—gives the community affordable, clean, and sustainable drinking and irrigation water based entirely on solar power.

Discover how the Danfoss VACON® 100 X drives, Danfoss APP pumps, and DrivePro® Remote Monitoring system power Solar Water Solutions' innovative technology.

The challenge

Kitui is a rural, difficult-to-access location with weak municipal water and electrical supply infrastructure. That means it cannot support traditional water treatment systems nor on-site control and monitoring to overcome the town's polluted brackish water. Plus, water temperature, salt, and other solvents fluctuate and affect a treatment system's pressure—demanding constant adjustment for optimal performance.

Solar Water Solutions (SWS) identified the opportunity to leverage their 100% solar-powered SolarRO desalination solution in Kitui—and all across Kenya by taking action together with water infrastructure investor Climate Fund Managers. To achieve this goal, they needed the right technology backed by a collaborative partnership.

Danfoss, a long-time partner of Solar Water Solutions, co-developed a solution specifically for the Kitui project that integrated APP high-pressure pumps, VACON® 100 X drives, and the DrivePro® Remote Monitoring solution—together with SWS's ANVS® valve system—to be the driving force behind the SolarRO desalination system.

"Throughout years of collaboration, Danfoss products have proven to be highly reliable and adaptable to suit different capacity water purification systems in harsh environments."

Toni Korttila, Head of Manufacturing at Solar Water Solutions

The solution

The containerized and decentralized SolarRO water purification units from Solar Water Solutions are designed to operate in remote locations with renewable energy—and entirely without energy storage or a stable grid. Based on reverse osmosis, the SolarRO system also features SWS's patented Adaptive Nozzle Valve System (ANVS®) that maintains consistent pressure with the lowest energy consumption of all RO systems.

SWS has long used the versatile Danfoss APP high-pressure pumps that enable the SolarRO system to run at varying speeds with high accuracy. For Kitui, SWS and Danfoss took the solution to the next level, co-developing a new electrical infrastructure using the VACON® 100 X drives with Solar Pump application as the driving force behind the system.

Plus, the system features a tailor-made Danfoss DrivePro® Remote Monitoring platform. The cloud-based technology allows SWS specialists to adjust system parameters while preventing and resolving issues quickly and accurately—so that the SolarRO units operate independently in villages like Kitui.

Danfoss products installed in the Kitui pilot project:

- **5 VACON®** 100 X drives
- **DrivePro® Remote Monitoring**
- **5 Danfoss APP** high-pressure pumps

"The ease and reliability of controlling the RO process with VACON® drives, Danfoss APP pumps, and DrivePro® Remote Monitoring together with our ANVS® technology is a perfect match for off-grid desalination."

Tommi Kari, Head of Engineering at Solar Water Solutions

The outcome

The SolarRO desalination system provides Kitui with a sustainable and reliable clean water supply, delivering 1,200 liters/hour of affordable drinking water. Plus, the newly adapted system featuring VACON® 100 X drives, Danfoss APP pumps, and DrivePro® Remote Monitoring, takes brackish water desalination technology and performance to a completely new level.

The versatility of the SolarRO system has opened new possibilities—and, together with Danfoss, Solar Water Solutions has started a research and development project focused on increasing the water production efficiency of the reverse osmosis process to a level 50% higher than the current state-of-the-art systems.

Based on the success in Kitui, Solar Water Solutions, together with its partners, plans to install an additional 200 desalination units in Kenya—which will ultimately provide drinking water for approximately 400,000 citizens in 2023.

"By mobilizing a highly-efficient desalination system—bringing together our own patented technology and Danfoss' high-performance solutions—we're providing safe and affordable water in Kitui."

Julius Pohjola, Head of Channel Sales at Solar Water Solutions

SOLAR WATER SOLUTIONS

AE428735667759en-000101