

CASE STUDY | OFFGRIDBOX

Remotely monitoring solar power generation in Africa

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Emiliano Cecchini, OffGridBox
President & CTO

OVERVIEW

In remote villages across East Africa, electricity is often difficult to come by. Boston-based [OffGridBox](#) is making solar power more affordable and accessible by retrofitting shipping containers with solar panels and hiring local communities to operate them.

These power-generating “Boxes” are sophisticated systems that require careful monitoring to make sure they don’t fail. To keep an eye on the Boxes from a distance, OffGridBox has partnered with [eze System](#) to monitor the health and output of the equipment, and with [Swarm](#) to reliably transfer that data from remote areas at low cost.



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MAKING SOLAR POWER ACCESSIBLE IN RURAL AFRICA

Many villages in Africa are not wired into local power grids, making it difficult to keep the lights on and devices charged. By equipping standard 6 x 6' shipping containers with 24 solar panels and a solar energy conversion system (SECS), OffGridBox is able to provide a standalone and sustainable power supply to even the most remote areas. Local communities pool resources to purchase one of these Boxes, and OffGridBox hires local women to run the day-to-day operations.



OffGridBox hires local woman to operate each Box. Photos: EEP.

About 90% of the power generated by the solar panels is stored in power banks within each Box, and sold to individuals in smaller quantities. This electricity is in high demand to recharge mobile phones, light homes, and power professional equipment such as sewing machines, welding tools, and ice machines. The remaining 10% of the power produced is used to purify up to 20,000 liters of drinking water per day, another of the Box's capabilities.

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MONITORING EQUIPMENT HEALTH AND OUTPUT

Despite the in-person presence of local women managing the Boxes, there is still a need to monitor the health and output of each piece of equipment.

OffGridBox initially tried a manual approach. “We were using SD cards that we would plug in and download data from the Boxes over Bluetooth, and then have the cards mailed to us,” says Emiliano Cecchini, President and CTO of OffGridBox. “We really needed a more real-time solution that could be handled remotely, but many areas where the Boxes are deployed lack cellular coverage and traditional satellite data services were cost-prohibitive.”

To solve this, OffGridBox turned to Eze System for remote monitoring, and to Swarm for reliable and affordable data transfer.



CASE STUDY | OFFGRIDBOX

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REMOTE MONITORING AND LOW-COST CONNECTIVITY

Eze’s versatile IoT solution now monitors everything from solar output to the temperature inside the Box (sensitive electronics can be ruined by overheating). Every day, Eze’s ezeio© system gathers 12 routine health updates on each Box, with an additional 12 alerts available if a problem is detected.

Given the extremely limited cellular coverage in most regions where the Boxes are deployed, OffGridBox turned to Swarm to transmit data from the ezeio© system back to the OffGridBox team. Emiliano says OffGridBox had “desperately needed” a satellite connection, but legacy satellite providers were too expensive and hard to use. “At the end of the day, local communities are paying for our service and we can’t be charging them thousands of dollars a month for satellite connectivity,” says Emiliano. “Swarm is the only company offering what we need at a feasible price point.”

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CONNECTIVITY AROUND THE WORLD

In the future, Swarm's satellite modems will come fully embedded in the ezeio© system, making it a turnkey solution for OffGridBox. Supported by Swarm's two-way data transfer capability, Eze plans to enable remote control and automation so OffGridBox can make small adjustments to their systems at a distance. OffGridBox also plans to use Swarm's and Eze's GPS capabilities to track each Box's location, in case one is stolen or moved unexpectedly.



Emiliano Cecchini, President & CTO of OffGridBox, shows off a new unit, ready to be deployed.

OffGridBox currently has 47 units deployed across East Africa, with plans to expand operations to West Africa and South Asia, where similar power challenges exist. Data will start flowing from the ezeio© devices through the Swarm satellite network and back to Eze's backend platform later this year (pending regulatory approvals). With Swarm's help, OffGridBox is no longer limited by cell coverage or prohibitive satellite costs, and can deploy their technology around the world in the areas that need it most.