



## Connected water systems provide rural communities the resilience to adapt and thrive

The combination of independent solar-powered microgrids, low-maintenance battery systems, water pumps, and internet access is increasing the resilience of isolated communities in Puerto Rico. Collaborative public-private partnerships are creating systems to send telemetry data to the microgrid operator so that issues can be resolved before outages occur. Towns can rely on this solution—and the opportunities it provides—long-term.

Look at the Puerto Rican town of Caguas from a bird's eye view and you'll see just about every shade of green. Look more closely and you'll see a small island of blue amid the palms and banana leaves. This break in the foliage—a solar installation—provides more than power. It is offering people in Caguas clean water, high-speed broadband, and the ability to pursue opportunities available through digital transformation.

*The Microsoft Airband Initiative advances digital equity—access to affordable internet, affordable devices, and digital skills—as a platform for empowerment and digital transformation across the world.*

### The problem

Many communities outside metro areas in Puerto Rico, especially those in the mountains, rely on wells because they are not connected to the water utility. Some towns do not have access to utility power, either. Natural disasters—such as Hurricane Maria in 2017—show communities' precarious circumstances.

Without power, people have to use a generator to run water pumps, at great financial and environmental cost, or wait for water deliveries from the municipality. This puts them at increased health, stress, and mental health risks.

Meanwhile, the lack of connectivity limits opportunity. Without internet access, children can't use the internet to research projects or attend virtual school, entrepreneurs can't reach new customers, and residents don't have the digital skills that have become a must-have in today's economy. Some residents had never even touched a computer.

## The partners

A mix of private companies, nonprofits, government agencies, and community leaders have stepped up to meet these challenges.

"The problems communities face are bigger than just one service can solve," explains Jalel Sager, CEO of the distributed power solutions company [New Sun Road](#). "We are coming together to create a solution that provides access to essential services such as energy, water, and information."

Each organization in the partnership leverages what it does best, complementing others' strengths. The project in Puerto Rico is just the most recent project of deep and long-standing ties among organizations dedicated to digital transformation. The partnership includes:

- [Por Los Nuestros](#) is the Puerto Rican nonprofit that works with communities to bring them the necessary tools and training to become prepared for the future. The nonprofit focuses on installing resilient solutions and facilitating digital literacy outreach.
- [Blue Planet Energy](#) supplies batteries with a 20-year life expectancy to store energy and power water systems for longer. The company also provides technical support and training to local installers who service the projects.
- [New Sun Road](#), an Airband partner, provides the energy system management to remotely monitor and control the water systems, in addition to providing project management and strategic support for the partnership.
- [Red Verde](#) is the social responsibility arm of the internet service provider (ISP) [VPNet](#), another Airband partner, which extends its fixed wireless network to cover more communities.
- [Microsoft Airband](#) has expertise in broadband and digital transformation to advance the technology of, and partnerships between, each of the partner organizations.

Working together, this coalition has built solar-powered, internet connected hubs that allow clean water access in three Puerto Rican communities, with plans to expand in the future.

## The process

Por Los Nuestros identified three communities—Caguas, Cidra, and Cayey—with existing solar-powered water pumps but unreliable internet access. The partnership then retrofitted existing systems to provide real-time monitoring, reliability, and additional connectivity.

A solar energy system provides power to a water pump and a Blue Planet Energy battery system stores excess power for nighttime use. The New Sun Road solar system monitors electricity usage, battery levels, and more—in real time.

The software sends data to a central platform where an engineer can monitor and adjust the solution. "The analytics keep the system reliable," explains Chris Johnson, CEO of Blue Planet Energy. "We can then do proactive maintenance to prolong the life of the energy storage system." An off-site expert can even coach local residents to make some changes themselves.

The hub also provides infrastructure for community internet access and empowerment. This looks different in every site: One town may set up a hotspot in a church or school while another crafts a mobile pop-up solution.

Airband is providing computers for each site and funding a trainer to teach residents basic digital literacy, such as how to use digital banking services or fill out social services forms online. The partnership anticipates a ripple effect.

"Education and digital literacy catalyze the community," Sager says. "Whoever you teach can help teach others."



*Por Los Nuestros team celebrates new solar energy system in Cidra, Puerto Rico*

## The impact

"We all know that the pandemic accelerated the digital era. Connectivity is no longer a luxury; it's a need," says Karla Soto, advertising and business manager at Red Verde. "With internet access, communities can adopt new ways of working, studying, and protecting their health."

The water pump systems were connected only recently, but people are already seeing massive impact. "With a more robust and resilient water and energy system, we have expanded our commitment to the community to meet basic needs and more," says Jose R. Oyola, president of the Pedro Calixto community in Caguas.

**Reliable clean water.** Communities can now pump clean water from wells, even as they are isolated from the country's power grid. "We envision the projects serving as an oasis to other communities," for example during a natural disaster that disrupts utility services, says Alex Rodriguez, executive director at Por Los Nuestros.

**Economic opportunity.** Digital literacy skills combined with broadband access help residents search for jobs, learn techniques to make entrepreneurial efforts more profitable, and make a living without moving to the city. One community, Caguas, is building a café and pizza parlor as part of their hotspot location, which generates much-needed jobs.

**Education.** Children can remotely access school and online resources for homework; older residents can enroll in classes to learn a new trade.

**Digital literacy.** "These communities deserve to have the skills and tools to access opportunities from their home," Johnson says. Por Los Nuestros is teaching local trainers so they can provide digital literacy education long-term.

**Emergency communications.** Hurricane Maria knocked out power—and the ability to reach anyone outside the community—to rural Puerto Rico for months. "Communication is key in times of emergency," Oyola says. "With this initiative we feel safer, knowing we have a nearby place with internet so we can contact our loved ones."

The impacts ladder up to an overall change for remote communities. "These solutions provide resilience," Sager says. "With these resources, communities are more resilient to external factors such as climate events, disasters, and other shocks. They also improve the community's ability to maintain economic viability."

*To learn how you can partner with us to close the broadband gap and advance digital equity, visit [aka.ms/Airband](https://aka.ms/Airband).*



## Promising practices for digital transformation partnerships

### 1 Stagger installations.

The partnership installed systems in communities one after another instead of simultaneously, applying lessons learned to the next installation.

### 2 Encourage sweat equity.

Although involving community members in the installation and maintenance of the systems may take longer than deploying a team of experts, "engagement helps people feel like the project is theirs," Rodriguez says. The buy-in builds long-term viability.

### 3 Create a distributed network.

Red Verde uses fixed wireless to connect a community hub. Transmitting broadband from that hub to another microsite is a cost-effective way to increase the number of people covered.