Rural communities get online for sustainable development

Benefit corporation New Sun Road partners with Microsoft Airband to provide electricity, internet access to world's most underserved places

Kitobo Island, a small fishing village in the middle of Uganda's Lake Victoria, is isolated: It is cut off by water, of course, and until recently it was also hemmed in by lack of electricity and internet access.

Then in 2016 California-based New Sun Road (NSR) installed a community hub that provides reliable solar power and a strong Wi-Fi signal for the island's 1,500 residents. With reliable internet and power, the island's only medical practitioner researches prescriptions and investigates his patients' complaints. The market owner can refrigerate perishable goods. Entrepreneurs can run light machinery, take online trainings and access markets on the mainland. Their lives are forever changed.

NSR speeds development in remote communities like Kitobo Island via sustainable solar microgrids, high-speed internet access and partnerships with private, governmental and nonprofit agencies to train people. The benefit corporation partners with the Microsoft Airband Initiative, which expands communities' ability to participate in the digital economy by bringing affordable, reliable broadband across the globe.

"Getting communities online and equipped with the skills to use the information there gives them an extraordinarily powerful and self-sufficient means to improve livelihoods, increase income, and improve education," says Jalel Sager, CEO and co-founder of New Sun Road.

Ensure long-term health of solar systems and microgrids
New Sun Road combines its solar microgrid systems with custom internet of things-enabled (IoT) devices, called SolSense. The sensors connect to the microgrid and send data to an Azure cloud-based monitoring platform, NSR's Stellar Power Platform. When the microgrid's performance dips, the data triggers an alert. That way, a staff member can troubleshoot from afar or send an expert on the ground, instead of leaving repairs to the untrained community.

"This system is like an electrocardiogram so we can check the vitals of microgrids and keep them alive," Sager says. "That's crucial to keeping them running long enough to pay off the investment so we can roll this out across the world."

Fine-tune microgrids from afar
Using the Azure Machine Learning Workbench, the system automatically adjusts microgrids for highest efficiency. For example, if a battery is nearly drained, the system might reduce its output to lessen the strain on the rest of the microgrid.

Making these automated changes remotely saves untold numbers of staff hours and lengthens the life of the more than 200 power systems NSR currently monitors.

47%
The percentage of people worldwide who do not use the internet

70 million
The number of people worldwide projected to live under coverage in the next five years through Microsoft TVWS project deployments

16
The number of villages one SolStation can connect to the internet via TVWS technology

Scale services to empower more communities
When NSR began offering power and connectivity services in 2016, it supported 2 microgrids; now it serves 100 times that number. The benefit corporation is poised to multiply that number another 100-fold within the next few years.

NSR would never have been able to withstand such rapid growth without the Microsoft Airband Initiative's support and Microsoft's cloud-based tools, Sager says. By building machine learning and automated workflows into its Stellar Power Platform, the organization can bring even more people into the 21st century digital economy.

Accelerate the development of IoT devices
Several times over the last two years, NSR has sent a team to Microsoft's Redmond campus to work with IoT experts in one to two-week sprints. "We accomplish two or three months' worth of work in that time," Sager explains.

The organization has also worked with some of the industry's foremost experts in designing chips and embedded software for their rugged devices. "Working with the Microsoft IoT & AI Insider Lab has amplified the capacity of our company far beyond what we as a small group of engineers could otherwise do," Sager says.

Customize an Azure platform
When NSR was founded, the company used another cloud universe but transitioned to Azure in 2016 as its ambitions grew. The Azure features that most help NSR stretch power and internet access to rural communities are:

IoT Hub. NSR monitors microgrid performance via approximately 200 sites reporting 40-50 metrics to the cloud as often as every 10 seconds. That's a lot of data. "The IoT Hub acts as our traffic cop," directing data to other areas of the Azure platform, Sager says.

Machine Learning Workbench. With buckets of data streaming in 24/7, Azure's machine learning tools analyze more data than any person or team could reasonably accomplish, thereby identifying tweaks to make the microgrid systems more efficient.

Analytics. NSR crunches data in Azure to educate its clients—like the co-ops that run SolStations in rural Guatemala—to fine-tune the technology for even more reliable internet and power.

Developing deep support for a true partnership
Airband experts from Microsoft have assisted and trained NSR staff in rolling out TV White Space (TVWS) technology, which broadcasts internet signals via unused television frequencies. The emerging technology is a crucial tool for serving those who can't be connected with traditional fiber or cellular data.

For example, when NSR's TVWS-connected SolStation first powered on in Guatemala, students—who had never touched a computer—were too nervous to even move the mouse; within a half-hour, though, they grinned and laughed while surfing the web for the first time ever.

Sager knows there are billions more who hunger for access to education and the digital economy. And, as he points out, there is no time to lose.

"The stakes are high. Addressing the information and opportunity gaps in rural communities in the developing world can be a big piece of the puzzle in addressing climate change, disaster resilience and global equality," Sager says. "We're working toward some of the higher dreams of development—rural transformation amplified by digital access."