Haiti battery management systems

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In podcast Episode 209, Robert J. Marks continues the discussion with Brian Thomas and Kayla Garrett of JustEnergy about appropriate technology for energy-starved Haiti: Solar powering hospitals, orphanages & schools (October 20, 2022):

Robert J. Marks: I was informed that people [in Haiti] on average make a dollar a day and they have to go out and they have to buy gas sometimes on the black market for $20, $30 a gallon. It"s just crazy.. So one of the things that you"re concentrated on as engineers is to increase the energy access to Haitians. So what"s the technology that you use to increase the energy access?

Brian Thomas: Haiti doesn"t have any petroleum -- any oil, gasoline, diesel... or even coal so they have to import all that. And that"s part of the problem. But one resource that they do have in abundance is solar energy. All you have to do is go for a visit to be convinced that the sun is a little brighter down there.

Brian Thomas: Well, it"s closer than we are. It"s at about 19 degrees latitude. But trust me, it"s hot, and that sun is intense and well, that"s great. It"s great for generating electricity with solar photovoltaics.

There"s different kinds of solar energy. There"s solar thermal where we use the sun"s heat to make something hot and then generate steam and turn a turbine. But that"s not what we"re talking about. We"re talking about direct conversion to electricity with your standard solar panels.

Brian Thomas: The systems we"re putting in are off grid. There is no grid connection so they need some kind of way to store energy for the evening. And traditionally this has been done with lead acid batteries. Lead acid batteries are an old technology. It"s similar to an automotive battery and they require a lot of maintenance. They don"t last very long and there are some better technologies out there.

What we have started using -- and this is a little bit unusual in the international development world, I think -- is lithium ferro-phosphate batteries (LFP). This is the type of lithium battery chemistry that is very durable.

You can leave the batteries in a mostly discharged state without damaging them, which is not true of lead acid batteries. You can mix old and new batteries together because they have built in electronic battery management systems. That"s also not true of older lead acid chemistry batteries. If you mix old ones and new ones, then they"ll charge and discharge at different rates and it causes all kinds of problems.

Kayla Garrett: As Brian said, the conditions in Haiti can be pretty intense with heat, but also with storms, just general ruggedness and we find that these LFP batteries are robust enough to handle the less than test conditions that are in the country.

Brian Thomas: Our biggest project was for a hospital, a large public hospital called Justinien University Hospital, specifically for the pediatric wing of that hospital. It"s a large public hospital in downtown Cap-Haitien. W put a system together there that was sponsored by USAID, through a cooperative agreement with another NGO called Konbit Sante.

Brian Thomas: And with this other NGO, we kind of partnered with them. We were a bit of a subcontractor for them to work with USAID to do this project. I think our budget was around $150,000 and so that"s a 34 kilowatt solar array. It"s about 150 solar panels that had been put in on an earlier project and we rewire them to be a battery operating system and a inverter system that is capable of producing three-phase output power at about 21 kilowatts.

The system"s working well, and we can even monitor it with the inverters we use, which have this SCADA capability. SCADA stands for Supervisory Control and Data Acquisition. So in other words, the electronics are connected to the internet and we can monitor them from here. So we get up and have a cup of coffee and check the solar panels down in Haiti and see if they"re producing the energy that we expect them to. Well, that is when the internet works.