

***Switch On* Episode 6: Building Solar Microgrids Part 1 Transcript**

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Scott Tinker: One billion people today have limited access to electricity that's unreliable, unaffordable, or unsafe. Another one billion people have no electricity at all. Most of them live in remote areas so far off the electric grid that it won't be coming to them any time soon. These are people like the Arhuaco, a tribal nation in Northern Colombia. Most Arhuacos live on small family farms in the Sierra Nevada Mountains. They come down once a week to trade goods and see friends. They've lived this way for many centuries since before the Spanish arrived in Colombia. They grow their own food, make their own clothes, and still speak their own language, Iku. They've never had electricity and still don't, except in a handful of villages like Sabana Crespo, where a couple of years ago the Solar Electric Light Fund or SELF installed a solar microgrid.

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ST: There are nearly 3 billion people today who still live with little or no energy. And what I want to know, is how they'll finally get it. So this is sort of what it was, and that's the future. I'm Scott Tinker and I study energy. Come with me around the world to meet people and communities as they *Switch On*.

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Robert Freling: This is the central array here, 12 and a half kilowatts of solar power, and it's now changed the lives of this community

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ST: Yeah, how did you discover Sabana Crespo and get involved in this village?

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RF: Well it all happened when Danilo Villafañe, a leader of the Arhuaco people, came to Washington DC and requested our support to come in and bring solar power to his and several other villages here in the Sierra Nevada mountains in Northern Columbia.

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ST: That is a remarkably rapid transformation for indigenous people to make though right?

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RF: It's true, not everybody in the world wants this. We would never go and impose our solutions on a community that has not invited us. For example, they have asked us not to bring power to their homes.

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ST: So this array, this micro grid, is powering more of the community center type thing?

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RF: Correct. This is all for community-based needs.

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ST: Of the many non-profits building solar micro grids, Solar Electric Light Fund is one of the leaders. They've installed more than a hundred in developing communities using an aid based model which has several key steps. First, a community requests the system. Then a donor funds the equipment. Next SELF installs it and teaches the community to manage it. Finally the community raises money to maintain and replace the system when needed. And that's the plan here, too. The solar micro grid powers lights in the school and health center and on the streets at night. It also helps power the community store and their coffee operations, the only crop they trade with outsiders. Both of these will help pay for replacement of the battery solar panels or other equipment as it wears out. Steve McCarney is SELF's project manager for Latin America.

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Steve McCarney: This project had another component and that has to do with sustainability.

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RF: We recognize that if we were to power everything with solar energy it was going to take a lot and we were trying to minimize the use of batteries.

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ST: I'm just, my head's going to other options, renewable options, of course you got this beautiful river here.

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SM: Yeah, the hydro was the technical solution and a day we came in here they said 'no hydro'.

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RF: The elders of the village, the Mamos, decided that it wasn't in conformity with some of the spiritual values that they hold sacred. Apparently one of the intake pipes from the hydro plant

was going to cut through sacred waters. And so they basically nixed the whole plan and it forced us to reevaluate our solutions going forward.

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ST: So cultural components play pretty large in probably everything you've done around the world, I would think, in different ways.

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RF: Yeah and especially with a group like the Arhuaco, they take their cultural values very seriously. And if they say no, that's pretty much the final answer.

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SM: So the need is here. It can't be met by hydro under the current belief, but everywhere in the seven villages, solar was a reliable option.

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ST: Yeah, yeah, so what's the size of, in terms of people, the human population, we've seen a lot of folks coming in and out of this village, how many does it serve?

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RF: The catchment area for this village is approximately 17,000 people.

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ST: 17,000 people! So your 12 and a half kilowatt microarray, and some smaller ones around, is actually servicing a community of 17,000.

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RF: You've seen what a little bit of energy can do, right? We think about a few watts, or a few thousand watts, in the United States, it's nothing. But a few thousand watts of energy make all the difference in the world.

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ST: I wanted to visit one of the families living in the catchment area, to see what life looks like without modern energy of any kind. The Arhuacos took me to the farm of one of their tribal elders. He lives here with his wife and daughters, their husbands, and lots of grandkids. Using farming methods passed down over centuries, the Arhuacos grow what they need. So this feeds everybody. What is this? For grinding. All right, here we go! Everything here is produced with manual labor. This press is their only machine. What did we make, sugar cane? Is good?

That's good, I wouldn't drink it every night, but it's pretty good. I think he's done this before, look at that. That's good! This looks like a pretty good life, but it's a hard life. Infant mortality rate is 50%. Except for subsistence farming, there are few opportunities to do anything else. And so, many of their young people are leaving to look for work in the outside world. Arhuaco elders have realized that, to keep their communities intact, they need electricity, but in a way that's appropriate for their culture. When it gets dark here, there's no light but fire, so I needed to leave too. I had a long walk ahead of me, and on it, I decided we would partner with SELF to install a solar micro grid.

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ST: Steve and his wife, Osi McCarney, an operations manager for SELF in Colombia, took us to Gunchukwa, an Arhuaco village on the other side of the mountain. Here my son Derek and Doug Ratcliff, both from our own non-profit the Switch Energy Alliance, would go through an Arhuaco cleansing ritual in their sacred waters. Osi showed us how it's done. These are democratic societies led by elders, like the one I'd met at his farm, and spiritual leaders called Mamos. Thank you for welcoming us to your village and we appreciate very much the nice ceremony that we went through this morning. It's very meaningful to us and we want to extend our respect back to you.

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Osi McCarney: They want to have a communication with us about what are the reasons that we are here. And what they would like for us to bring.

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ST: We are in a partnership with SELF and Switch, so our interest is to understand your needs. And if you have a need for electricity, in a way that we could help you, we would like to learn that. But only to the extent that you want it. And we would work with you to bring electricity to your village and work with you to teach you how to maintain.

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ST: Here as in Sabana Crespo the Arhuacos decided they did not want electricity in their homes, to preserve their traditional way of life, but they wanted lights and fans in the village meeting hall and communal kitchen and a street light in the square. All to encourage community gatherings. And they wanted a refrigerator in their store to sell cold drinks and popsicles, a real luxury here, which would help fund the upkeep of the solar microgrid. We promised to help provide it, but first, we needed someone to fund the equipment. Just 100 miles from the Arhuaco tribal reserve is the modern port city of Santa Marta Colombia. We went there to an

energy conference to try to find support for our solar installation. Our plan was to spread the message to as many people as we could. Alright! I love it when a plan comes together.

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Derek Tinker: 30 pounds of magnets. Here we go!

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ST: Some in Spanish, that's good. To try to raise funds for the microgrid, we met with executives from Ecopetrol, the Columbia national oil company. So we came to Ecuador and Colombia in January this year and partnered with SELF to electrify part of a village and we made a commitment to try to come back.

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Ecopetrol Executive: This is a part of the responsibility of the companies who are involved in the energy industry, to try to bring prosperity to those communities.

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ST: It's just the participation in something that's here, but global. Things were looking good. He set us up with their vice president of sustainability.

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Eduardo Uribe: In essence, let me make sure I understand. In essence, what the product of your organization would be communications about a project with alternative sources of energy. Help me to understand why an oil company would do this and how will we benefit from it? Yeah, that's the question I have.

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ST: So oil companies like us, because we don't try to make anybody look like a winner and a loser, we try to make energy a winner, okay and feature it for all that it is. And at the end of the day people walk away from our educational materials and say 'Ah I think I understand things that I never understood before'.

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EU: And how do people, how will people know that we have participated? Because I have to go and tell people this story. Because, in essence, a private company, we have shareholders you have to explain every dime we spend. So we have to make sure we are very careful with that. That's why I have to think about it carefully and talk about it inside my company.

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ST: Yeah, we'd love to work with you.

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EU: Thank you, no I would too, let me think about it a little more.

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ST: It was pretty apparent this wasn't going to happen. This is not their kind of energy and their Arhuacos are not their customers. I understand their position, but still, it was disappointing. But we weren't ready to give up. What other resources could we tap into? There were lots of excited young geologists at the conference. We asked a few of them if they might like to help with our solar microgrid project. One of the things we'd like to talk about is whether or not younger people, you all count, are interested in that?

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Young Geologist: I think that it would be kind of something bad for those people. Because I mean, they've lived that way for hundreds of years and that's the way they live, so it depends on what the energy would be used for.

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DT: My observation, when we were in the village, with the Arhuacos, I agree I think that the people there seemed content you know and it was interesting to me because I expected to I didn't know what poverty was, but now they are seeing their young people leave the village and one of their leaders said we're losing sight of our culture and we need to do our best to teach our community about what it means to be Arhuaco. And we need energy in order to help build that.

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ST: Yeah, it's tough to say is it a good thing or a bad thing, it's hard to qualify that. I mean have you seen some of that, Mayra?

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Mayra Vargas: I mean if they have electricity there with solar panels, they will remain sustainable. I think it will bring quality to their life actually.

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ST: If we come back here and can bring electricity to a village is it something you'd like to join us and do? Would you like to come with us and do that?

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MV: Certainly, I would really like to do that.

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ST: Put on the work clothes with shovels and wrenches and wires in our hands, putting up solar panels.

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MV: I would really like to do that.

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ST: The older executives may not have been able to help but these young professionals were ready to volunteer their time. And that inspired us to make it happen. It took us a year, but we finally organized and raised some funds for our return trip to Gunchukwa. People and equipment converged from the tiny village of Pueblo Bello, the end of the pavement before the road heads into the jungle.

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OM: So everybody that is going to pull is up, right?

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ST: We asked our friends at REC Solar, who you may remember from our first film, *Switch*, to donate the solar panels.

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OM: Yay another one!

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ST: The panels don't make electricity at night, which is when the Arhuacos need it most. And during the day, their output is inefficient in morning and evening and intermittent if there's cloud cover. This means that every solar micro grid must have a large battery system capable of storing a few days worth of energy. Since we had limited funding, my wife and I bought this one ourselves. The batteries were made in China, shipped to LA, trucked to Ohio for testing, then trucked again to Miami. There they joined the solar panels which had made a similar trip from Singapore, for another boat ride to Barranquilla, Colombia. From there they pass through three different trucks and finally into ours.

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SM: Well I guess we got over the first challenge, there'll be a few more.

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ST: To install the solar micro grid our team of 17 people had made a long journey themselves. All our students and young professionals, Steve and Osi from SELF, all of us from Switch, were volunteers. As we made the four hour drive into the jungle, I was struck by how much energy, diesel fuel, jet fuel, and gasoline it had taken to get everything here. And how much money. The equipment and provisions cost more than fifty thousand dollars. If we had to pay for the volunteers and their transportation, it could be over one hundred thousand. A solar micro grid, it turns out, is a macro project. It would take a similar commitment, people, resources to bring a solar microgrid to any one of hundreds of thousands of rural villages around the world like Gunchukwa. But we would focus on just this one.