

Report on Trip by Rich Komp to Nicaragua, Chile and Peru – August 2008

Nicaragua

This summer I took a complex trip to Latin America from the 27th of July through the 4th of September 2008. The trip started in Nicaragua where I taught the last day of the Grupo Fenix's Solar Culture Course and worked with students from the University of Dayton in Ohio on the third prototype of the solar autoclave, which sterilizes medical instruments in remote health clinics without needing any electric power. The second week of the visit to Nicaragua, Susan Kinne (the head of the Grupo Fenix) and I had our birthday bash. I was 70 and Susan was 60 so we celebrated at a tiny resort on the Pacific Ocean. I got to go body surfing on my birthday.

Chile

On Monday the 11th of August, I flew to Chile where it was mid-winter and I was a keynote speaker at the Renewable Energy Conference at the University of Concepcion. In addition to giving a big speech in the main auditorium, I gave two working seminars to students: on the physics of solar cells and on the design of PV systems. We then went from Concepcion to the University's other campus in Chillan, where I spent my second week in Chile starting a cottage industry to build photovoltaic (PV) modules. We built two 60 watt and one 30 watt PV module. We also built a small solar battery charger with the small pieces of the Evergreen Solar cells and started a solar cell phone charger but didn't finish it before I had to leave to fly to Peru.



Checking out the first PV module made in Chile. It measured a full 60 watt output.

Peru

On Monday the 25th of August, I arrived in Lima late at night from Chile where I was met at the airport by Pedro Cortez and his wife Beatriz. Pedro and Beatriz are professors at the Universidad Nacional Mayor de San Marcos (UNMSM) in Lima, a very old university incorporated in 1551. They also have their own small research company, Solartec Energias Renovables, E.I.R.L. which builds solar water heaters and installs large hydraulic ram pumps for village water systems up in the Andes. While in Lima, I stayed at their small house near the center of town.

As soon as possible the next day (the 26th), Beatriz called the agriculture cooperative SEPAR and got its head, Don Andres Vilchez Melo SEPAR's Coordinator of Environmental Development on the phone. We arranged to come up to Huancazo the next day. I spent the rest of the day with Pedro showing me his work in different alternative energy devices. We fired up a couple of the Sterling motors that he had built, and he showed me videos of the ram pumps he has been installing in the countryside to bring water to remote villages. Beatriz also took me on a tour of the old Lima that I hadn't gotten to see on my first trip here in June of 2007.

We reserved bus seats for all three of us and at 8:15 the next day, we headed for Huancayo. I really like taking the daytime bus, since you get to see so much on the spectacular road over the mountains to Huancayo. We arrived at mid-afternoon and went directly to SEPAR where we were met by Don Andres.

I had come to Huancayo with three reasons in mind:

1. To check out the sunspace we had built the year before in Achipampa and see both how well it is working and how well it is accepted by the campesinos.
2. To do preliminary work to get ready for Grupo Fenix's Nimea's trip to Peru to teach the solar cooker workshop in Achipampa later this year.
3. To visit both Achipampa and Ninacaca (Villages which I had visited on my first visit to Peru last year) and talk with the campesinos about other workshop possibilities, including PV module assembly and installation workshops

The first two of these activities are part of the work supported by Whole World Botanicals but the third was all on my own. However, Beatriz and Pedro are very excited by all the possibilities and wish to work with me to help organize the different workshops.

Early the next morning, we caught one of the little white Toyota station wagons that make the trip over the mountain to Achipampa. The Toyota wasn't completely filled since there were only eight of us in the car, but he took off anyway for a nice fast trip on the great switchback road. Huancayo has some smog but after we climbed out of the valley, the view was spectacular. Don Alejandro and his wife were very happy to see me when we arrived, as was everybody else who remembered me from the workshop there to build the sunspace. The sunspace has been fixed up to seal all the air leaks and is working very well. Apparently, nobody from SEPAR had been there to check it in quite a long time but Don Alejandro had figured out the principles of its operation and had tuned it up. They had made their bedroom in the middle loft space upstairs (actually up a ladder) where they used to dry corn (*see the photos below*). I actually got to see how well the sunspace worked when I took my usual afternoon nap up in the new bedroom and was completely comfortable using no blankets over me. Don Alejandro is quite happy with the operation now and plans to start building more of these sunspaces.



The sunspace in Altapampa after 14 months of operation

Don Alejandro and his family use the sunspace for several purposes. It definitely heats the casa during the day and for part of the night; they have built shelves and use them to dry maca (a medicinal root vegetable grown up in the Andes) corn, and other materials; and they bath the children there when it is warm in the afternoon. We discussed variations and improvements that could be done to make the sunspace more useful and more efficient. Don Alejandro will build the next sunspace at least twice as wide, so there is more usable interior space and the device becomes more like an extra room. I also suggested that he arrange to seal the small openable port in the upper corner. This port is designed to let heat out and ventilate the space when it gets too warm or too humid from drying maca, but it turns out they only need to open it for a short part of the year. They had also arranged a sliding blanket over the inside of the doorway and I suggested that they could do something similar for all the glazed area to keep heat in better at night. The sunspace loses a lot of heat all night long and by morning, the casa is still pretty cold.



Looking down into the sunspace from the new bedroom

Other people showed up and we had a nice meeting about sunspaces and also about the upcoming solar cooker workshop. Most everybody agreed with the assessment we had made (using the Peru Solar Atlas) about the sunlight and weather in October but felt that it might be better to have the solar cooker workshop in Huancayo, since that city might have better weather in October and since it is also more central for people from the other villages.

Everybody in Achipampa is very excited about the upcoming solar cooker workshop and we had a nice meeting planning some of the details. Pedro and Beatriz spent quite a while with the campesinos discussing how and when they cook food and eat. It turns out that for several months, the entire family will leave their casa every day in the morning and go up to the pastures with their flock to spend the day in new pastures. They usually go to a new pasture every day or so, so they eat a big brunch early before they go and bring some food to munch on cold during the day, then have a relatively small supper when they get back at dark (which is always around 6 pm in the tropics). I came up with an idea for a portable solar box cooker that could be carried on the back of a llama. The design is based on the standard Fenix solar cooker but uses two layers of Mylar as the glazing and is made with small pieces of wood with aluminum instead of a

galvanized sheet metal exterior. It is also smaller. The idea is to build a cooker that is much lighter but still works efficiently. We also talked about PV module manufacturing, which is of interest to the campesinos.

We had some trouble getting one of the Toyota taxis to take us back, since they were all pretty full by the time they got down the road to Altapampa, but finally one driver squeezed four of us in (Don Alejandro went back to Chupaca with us). 10 people plus the children really fill one of those little cars and the driver had to take the longer route back since he didn't think the car would get over the mountain with the load. A couple of hours and one flat tire later, we were back in Hotel Olympio where we were staying.

At 6 pm that evening, we had our final meeting at SEPAR with Andres Melo. I had loaded my memory stick and created a Fenix folder in Andres's computer and transferred a good number of files to his computer. The young man who does the computer work was very excited by the files so he had me transfer a lot of extra files like the ones on the photovoltaic still and the PV-thermal hybrid designs, as well as both the latest Spanish and English version of the Fenix solar box cooker instruction, which are very complete. The meeting was quite short. Andres seemed rather lukewarm about the idea of the solar cooker workshop and when we mentioned the idea of doing it in Huancayo, he didn't think it would be a good idea. He didn't really respond to my idea of getting into making PV modules at a workshop, but did like the idea of solar microdrip irrigation.

The Trip to Ninacaca

That night we put Beatriz on the bus back to Lima to go to her work as an electrical engineering professor, and very early the next morning, Pedro and I caught the 5:30 am National Express bus that would drop us off in Ninacaca. We got there in good time by 9 am, which was good since the bus had no toilet (I had suspected as much from my Nicaraguan experience so we had eaten or drank nothing before getting on the bus).

Felimon and Abel Quispe (The people I stayed with the last time I was in Ninacaca) were waiting for us when we got to the plaza in the center of town and everybody there was very happy to see me (although they chided me softly for taking so long to get back). We had a nice soup and coffee breakfast waiting for us and basically went into meetings right away. The first order of business was the solar cooker workshop. Everybody in Ninacaca is waiting for the workshop to happen and they also think that October is a fine time for it. Since SEPAR didn't like the idea of a workshop in Huancayo, and it would be difficult to organize it there without them and find places for everybody to stay for the five days or so to do the workshop properly, we all decided that Achipampa is still the best place to hold the workshop. The group decided that they should expect about 12 workshop participants, including 3 or 4 carpenters and that 3 solar cookers could be built by three teams of four people each.

The campesinos brought up the topic of the PV cottage industry. We spent a good part of the meeting going over all the details of the costs and expected selling prices of PV modules and they even walked us to the end of the power line to show us the many homes further out (you can see for miles in that clear air at 14,500 feet with no trees) that don't have any electricity. They were working hard to convince me that I need to come back to do the PV workshop. We set a tentative date for next April, and Pedro and I will spend some of my time here in Lima looking for the proper materials to build both the solar cookers and the PV modules. We need to find the right aluminum extrusions and see if the local newspapers still use aluminum printing plates, which we use as reflectors and to make the inner boxes in the solar cookers.

After the meetings were over, Felimon took us to the next town to start our trip back to Lima.



The festival near Ninacaca

There was a big festival going on so that we had some problems getting a bus back to La Oroya (Where the Doe Run mine is located) where we were to catch an express bus back to Lima. We took local buses as far as they would go, then did the next leg in a long distance taxi. At La Oroya one of the 8 other people we shared the Toyota station wagon with was also going on to Lima, so we got a long distance taxi to take four of us all the way there. A really nice, fast ride on the twisty road at night and in about 3 ½ hours we were back at Pedro and Beatriz's house in Lima. That trip cost us the equivalent of \$10 each.

We visited UNMSM, Beatriz and Pedro's university and I was introduced to many of the professors and department heads. They (like the people at the University of Concepcion in Chile) are very interested in my coming back in a more formal visit to give seminars and possibly work with them on various solar projects. During a lunch with Beatriz's department head in Electrical Engineering, we worked out plans so it looks like I now have a more permanent connection with Peru and will be back there working in the future. I have been in contact with both the professors in Chile, and with Beatriz and Pedro in Peru; they are now making plans for my return to Chile and Peru, possibly as soon as next March and April.