



Above: Ken Olson visiting health centers on the Colombian coast. Here he tows a dug-out canoe through a creek in the province of Choco heading towards the town of Pie de Pato. Photo by Bernardo Ganter.

## Solarizing the Cold Chain

Walter Gallacher

**T**he Pan American Health Organization is committed to eradicating polio in South America before the turn of the century. Solar energy is playing a major role in this campaign. Here is a story of how three Colorado solar educators are helping introduce photovoltaic technology to improve rural health care. PV powered refrigeration is the key.

### Polio still kills

Polio once took the lives of hundreds of American children each year and left thousands crippled in its wake. That was until a vaccine was discovered in 1957. Today polio is no longer a threat in the United States; but for our neighbors in Central and South America polio is still one of the leading causes of death and deformity in young children.

The problem is not a lack of vaccine. Polio vaccine is plentiful and relatively inexpensive. The problem is a lack of refrigeration. In order to be effective, the vaccine must be kept cold, 0 to 8 degrees Centigrade (32° to 46°F.). Reliable refrigeration is virtually non-existent in rural areas of Central and South America. Kerosene and propane powered refrigeration is commonly used, but fuel supplies are unreliable. When there is fuel it is often contaminated.

During the 1960s and 70s, the absence of reliable refrigeration prevented the Pan American Health Organization from effectively

halting the spread of the disease in Central and South America. But with the refinement of photovoltaic technology in the 1980s, experts at Pan American Health began to look to solar energy for the answer to their problem. They realized a network of solar powered refrigerators would allow them to move vaccine from the point of manufacture to major storage points, then to regional storage facilities and ultimately to inoculation centers.

### The Solar Cold Chain Project

The Solar Cold Chain Project as it is referred to, had real possibilities if adequate installation sites could be found and people trained to maintain the equipment and teach others. Peter Carrasco, technical director of the immunization program at the Pan American Health Organization, began recruiting experts in solar refrigeration. He attended a two-week summer workshop in photovoltaics at Colorado Mountain College conducted by Steve McCarney, John Weiss, and Ken Olson. All three had earned national reputations for their knowledge of photovoltaics and their

ability to train others.

Carrasco explained the Cold Chain and asked them if they were interested in helping. The answer was a resounding yes. "We had always wanted to get this technology to the people who needed it the most," says McCarney. "This was a perfect opportunity."

Over the next two years the project evolved into a three stage plan that allowed each of the solar experts to direct a phase of the project. It was decided that Steve McCarney would take phase one, designing and field testing the training materials. Ken Olson would direct phase two, technician training, site surveys, and the final draft of the training manuals. John Weiss would handle the third stage — on-site installation and ongoing training of local technicians.

On November 12, 1988, McCarney left Colorado on phase one—an eight month journey with stops in Colombia, Chile, Bolivia, Peru, Guyana, Trinidad, Jamaica, St. Vincent, the Grenadines and Thailand. The first stop was the University of Valle in Cali, Colombia. The Pan American Health Organization has established a vaccine refrigeration testing lab on the campus. It is in this lab that solar refrigeration units are subjected to the extreme conditions that can be found in the jungles and deserts of Central and South America.

From Colombia, McCarney headed for Chile. In Chile, he field tested one of the "how-to" manuals he had drafted on photovoltaic installation for refrigeration technicians. From Chile, he traveled to the rainforests of Bolivia to set up equipment that would begin measuring the amount of sunlight the rainforest receives annually. The Bolivian rainforest data will eventually be used to design and build photovoltaics that maximize the use of the limited sunlight in that area. From Bolivia, McCarney flew to Trinidad, Jamaica, and Guyana to teach refrigeration experts how to adapt to PV power.

There was time along the way to visit some friends in Peru and to deliver a very special personal gift. The summer before his trip he had met two weavers at a mountain crafts fair in his home town of Carbondale. The weavers were from Tequile, a small island in the middle of Lake Titicaca. The lake is high in the Andes Mountains and covers 3200 square miles.

"Tequile is almost like a desert island in the middle of the lake," says McCarney. "The islanders have never figured out an efficient way to pump the water out of the lake." McCarney's gift was a solar powered pump.

The next stop was Thailand's Chon Ken University where McCarney consulted with Thai officials and members of a Canadian research team.

The research team was evaluating Thailand's economic development, and wanted the solar expert's advice on the role solar energy could play in the development of Thailand's agricultural industry.

McCarney returned home that summer with just enough time to brief his partners and help Ken Olson prepare for his trip. Peter Carrasco and Olson had worked out a year-long itinerary that would have Olson trekking across Columbia, Peru, Bolivia, Equador, and Panama teaching local technicians how to select appropriate sites and order materials for a solar installation. Olson spent six weeks in Cali, Columbia teaching technicians from Columbia, Peru, Bolivia, Guatamala, Panama, and Chile in solar refrigeration using the manuals that McCarney had developed during his stay.

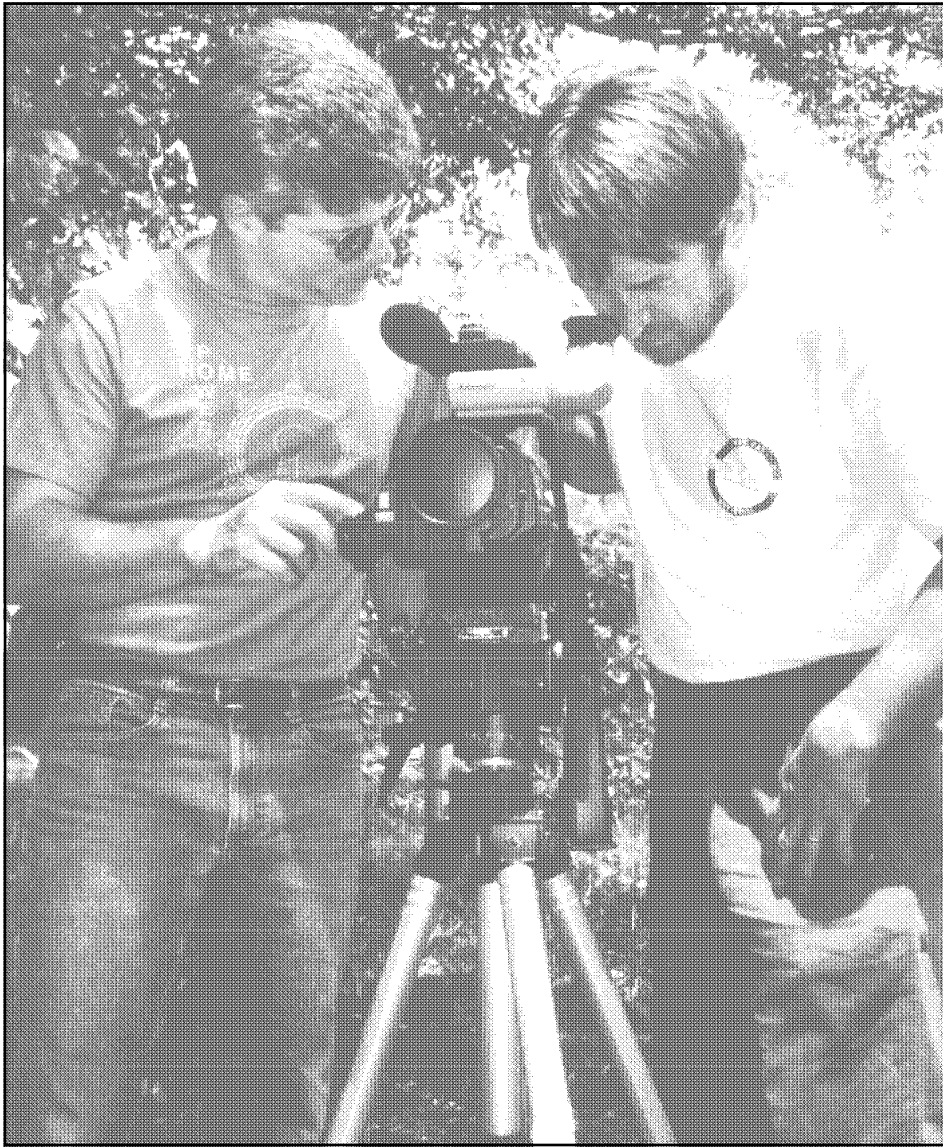
From Cali, Olson trekked to the Sierra Nevada de Santa Marta mountains in northern Colombia. It took three weeks to visit four of the twenty sites government officials had chosen for solar installations.

"Travel was slow," says Olson. "Occasionally we went by jeep, but most of the time we made it on foot or by mule. Traveling through this country was like turning back the pages of history two hundred years," says Olson. "I met Indians that I never knew existed and from the looks on their faces they had never seen anybody like me." Blond haired anglos are rarely seen in the jungles of South America.

Some of the most memorable moments of Olson's trip were spent with the Kogi Indians. He tells the story of a small village that had been burned out and taken over by marijuana growers. With the help of the Columbian government the Indians were able to reclaim and rebuild their village. They are especially proud of their school.



Above: From left to right, Ken Olson, Carlos Dierolf (an engineer for the University of Valle), José Miguel (the Kogi Indian guide), and Bolo Bolo (the hispanic guide).



Above: Johnny Weiss and Juan Livingstone direct a video production documenting PV powered health care in South America.

Photo by Solar Technology Institute of Colorado.

From Colombia Olson traveled to the jungles of Bolivia where he installed three solar gauges like the one McCarney had installed a year before. From there it was back to Colombia, but this time to the jungles along the country's Pacific coast. All the communities in this region are built along the river. "The only way to get around is in hollowed-out logs," says Olson. The Colombian government had designated eight communities as sites for solar refrigerators. Olson's job was to teach his companions how to determine if a site is appropriate for a solar installation, and then how to prepare the site and order materials.

The project on Columbia's Pacific coast went smoothly, but the same could not be said for the next leg of Olson's trip, Peru. Olson and his party quickly discovered that everything they had heard about Peru's instability was true. The mountains and inland jungles are controlled by the Indians and guerillas. One of the technicians was held up four times by different groups of Indians and guerillas. Within a few weeks Peru's project was postponed. Olson utilized the time he would have spent on Peru's cold chain to make a trip to the states and work on his report to Pan American Health. In his report, "The Photovoltaic Volunteer Transfer Program," Olson outlined a plan for developing the skills and experience of native people so they could utilize photovoltaic technology without prolonged dependence on industrialized nations.

The last stop on Olson's journey was Panama. The chaos of Peru was a contrast to the smooth efficiency of Panama. Olson revised his report during his visit and presented it to Panama's government health officials. The report was well received and plans are being made for a return visit.

While Olson was wrapping up in Panama, John Weiss was packing for a trip to the University of Valle in Cali, Colombia where he would spend a month in orientation preparing for the installation phase of the project. Traveling with Weiss was a former student, Juan Livingstone. Livingstone

"The kids are being taught three languages and they are all Indian. No English, no French, no Spanish," says Olson.

Olson had another experience he will never forget while he climbed through the Sierra Nevada de Santa Marta mountains. He and three team members had just jeeped out of a village when two armed guerillas stopped them. Olson's blond hair and U.S. passport made him the focus of attention. The guerillas wanted to know if he was related to Bruce Olson, a U.S. sociologist who had been recently released after being held captive for nine months by their group. After some very tense moments Olson and his three companions convinced the two men that Ken was not even distantly related to their former hostage.

"At that point they seemed to relax a bit," says Olson. "They asked us if we had any questions. We found out that their objective is to free Colombia of foreign oil investments. They blow up pipelines. They fund their activities through kidnapping and extortion." Olson still cringes when he thinks about where he might be today if it hadn't been for his fast talking companions.

had grown up in Chile and emigrated to the United States when he was eighteen. He spent twelve years in California before moving to Colorado to study solar technology.

Weiss and Livingstone flew to Cali in the summer of 1990 to spend a month at the University of Valle studying refrigeration systems used in South America and learning more about the politics of this vast continent. "Each of the countries involved in this project are at different stages of the process," says Weiss. "Some are in the planning stage while others are ready for installation. Pan American Health can only advise and recommend, it is up to the ministry of health in each country to decide what approach to take." For years, Weiss, Olson and McCarney have taught students how to adapt solar energy to suit individual needs. "Solar energy, like any appropriate technology for the developing world, has to be done carefully and in the context of that particular culture," says Weiss. "If that perspective isn't maintained the Cold Chain won't work because the solar systems will not be sustainable."

In September, Livingstone spent two weeks in the Dominican Republic assessing that country's needs and establishing contacts with officials at the Ministry of Health. Weiss left January 7th for a month in Honduras where he will visit potential installation sites, inspect solar equipment and work with Honduran health officials on the refinement of their Cold Chain plan. Plans are also being made to assist El Salvador and Nicaragua and follow-up visits are scheduled for Guatemala, Peru, Panama, Bolivia and Colombia.

Slowly and deliberately, war is being waged against polio and other communicable diseases in South and Central America. "Solarizing the Cold Chain is a huge project that can seem overwhelming at times," says Weiss "but I think Pan American Health can improve rural health care with PV powered vaccine refrigerators. We feel that this is the most rewarding work we have done in solar energy."

**Access**

Ken Olson and Johnny Weiss have established the Solar Technology Institute of Colorado, (see Happenings in this issue). They will be offering the following summer workshops: Photovoltaic Design and Installation, Solar for the Developing World, and Solar Technology for Rural Health Care. For details, contact Ken or Johnny at P.O Box 1115, Carbondale CO. 81623-1115 or phone (303) 963-0715.

Steve McCarney is now Caribbean Regional Manager for Photocomm Inc.. He is based in San Juan, Puerto Rico.

