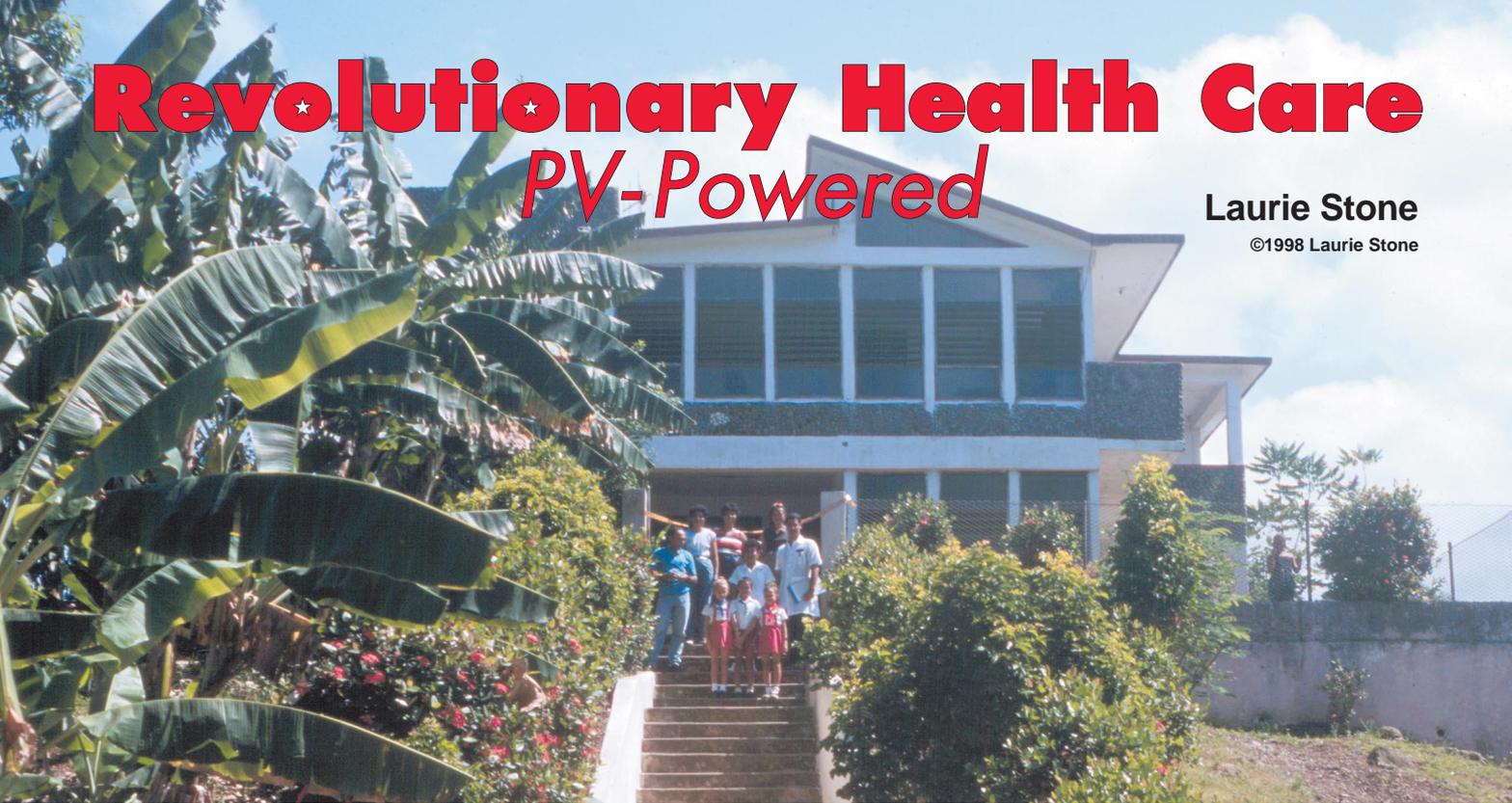


# Revolutionary Health Care PV-Powered

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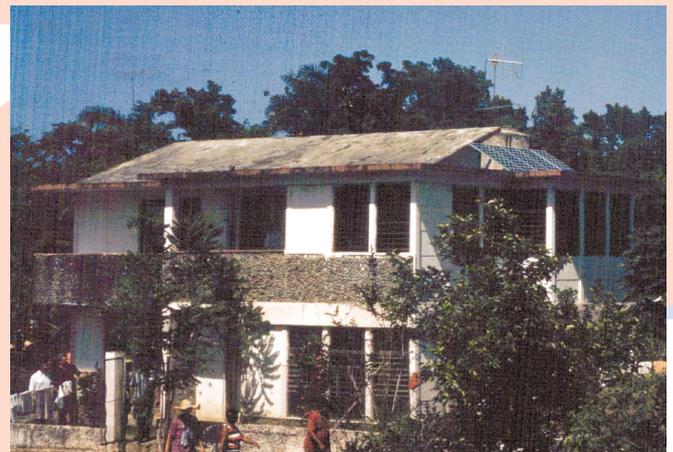
Above & Below: The Baez Health Clinic in Guantanamo province, Cuba.

Cuba provides premium health care to all areas of this economically depressed island. To ensure adequate health care in remote mountain regions, Cuba is embarking on an ambitious PV electrification program.

## Cuba's Health Care

Every year, over 2 million children die from diseases that could have been prevented with vaccines. Two billion people live without access to electricity, causing many doctors in the developing world to perform surgery with flashlights or candles. In a world of such atrocities, it's inspiring to see a "developing" country that places top priority on people's health.

Cuba's health care system has been unrivaled since the 1959 revolution. The infant mortality rate is 7.2 per 1000 live births, while the life expectancy at birth is 76.1 years. This is on par with or above even the most industrialized nations. The national health system includes a network of institutions that provide coverage to 100% of the population. In every community, there is a family doctor and nurse who live and work there. In 1992, there were over 18,500 family doctors on the island. Between 1959 and 1989, Cuba's electrification program brought the electrified population up to 95%. Still, there are over 300 family doctors living and working in remote rural areas without electricity from either the national grid or the many micro-hydro systems around the country.



Cuba has relied heavily on foreign oil, having very little of its own. Most of this oil has come from the former Soviet Union on advantageous terms. The fall of the Soviet Union added to the already difficult circumstances caused by the economic blockade imposed by the United States, which has been in place for over 30 years. Cuba desperately needed to cut back on its oil consumption. Despite these hardships, Cuba has forged ahead with the plan to bring adequate health care to every Cuban citizen.

## CUBASOLAR

In 1988, Vladimir Diaz Denis and his wife went to work as doctor and nurse in a small community called El Mulato. The community of 400 had no electricity and was so remote that when the health clinic was built one year earlier, the building materials arrived by helicopter.

In the first year of Vladimir's work there, the clinic had a kerosene lantern for light. At night, when he treated people, he used a flashlight. One night, while his wife held the flashlight, he put stitches in a two-year old boy. Needless to say, conditions were rough.

CUBASOLAR is a non-governmental organization promoting the use of renewable energy and energy consciousness. In 1989, they conducted an evaluation of the community. After the government analyzed the evaluation, they decided to electrify El Mulato with photovoltaics. Vladimir's health clinic became the first in Cuba to be electrified with PV. Thus began CUBASOLAR's ambitious program to bring PV to all of the rural family doctors' clinics.

### **PV Powered Community Centers**

As of May 1998, 170 of these clinics in the remote mountain regions of Cuba have been electrified with PV. These systems have increased the quality of life and decreased the infant mortality rate in these areas. Initially, all of the systems included lights, a vaccine refrigerator, and other medical equipment such as electrocardiographs and x-ray machines. Because each clinic has a live-in doctor, the systems were modified to include a TV and radio.

The people at CUBASOLAR found that the children of the community were crowding around the TV at night. Because the TV was in the doctors' quarters, this left him without any down time. Now, when they electrify a clinic, they usually also install PV on the community center for TV and other social functions.

### **Radiotelephones Save Lives**

Very shortly after CUBASOLAR's electrification program, there were many health improvements in remote areas. Still, something was missing. The systems were all in remote regions, and when there were very serious cases, the doctors had no way to communicate with ambulances or hospitals. Thus began the program to add radio communications to each PV powered health clinic. Of these 170 clinics, 130 of them now have radiotelephones, allowing them to communicate with hospitals in the larger towns. The radiotelephones have already saved numerous lives.

Each communications system consists of a 25 Watt radiotelephone and costs \$870 including the antennas, repeaters, and communication equipment necessary for the ambulances and hospitals. The radiotelephones have been used to save lives during hurricanes and floods, to request ambulance or helicopter assistance, to inform relatives of the condition of a patient in a hospital, to inform hospitals about the status of vaccination campaigns, to ask for specific medicines needed by the clinic, and to solicit help from medical

specialists. The communications equipment adds only slightly to the cost of the total PV system.

### **PV System Components**

Although the PV systems at each health clinic vary slightly, a typical system includes:

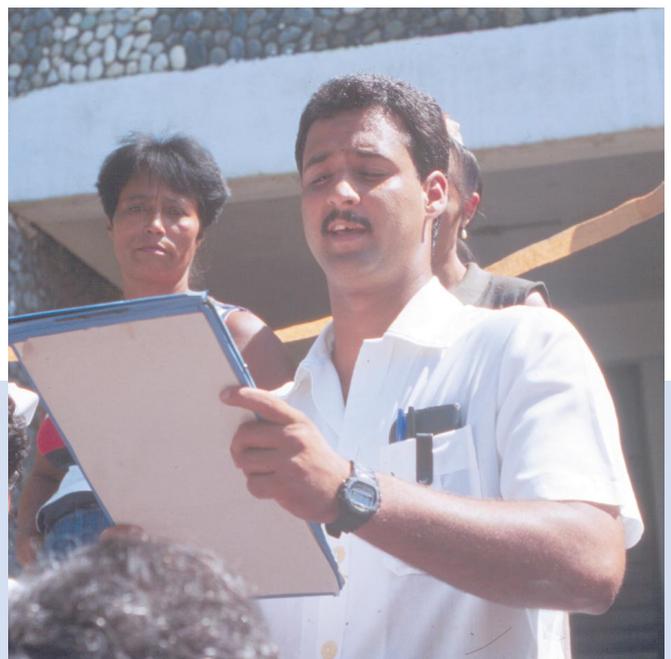
- 300-400 Watt PV array
- 30 Amp charge controller
- 400 A-h 12 Volt lead acid battery
- 14 fluorescent 20 Watt lights
- (1) 15 Watt TV
- (1) 25 Watt radiotelephone
- 3 electric medical tools
- 1 DC vaccine refrigerator

### **Improved Lifestyles**

A doctor from the recently electrified Baez clinic in Guantanamo province believes that the PV-powered electricity has contributed to a very high quality of medical care in the community. He is convinced that the solar installations demonstrate "how to develop without polluting the world we live in."

The electrification of the clinics has brought much more than improved health care to the mountains. Vladimir Diaz Denis has noted significant improvements in all areas of life. When Vladimir arrived in the small coffee and fruit producing community of El Mulato, there was not a single newspaper. There were six pregnant girls under the age of 14, three of whom were under the age

Below: A Doctor from the Baez Health Clinic.



*“Concentrated, hard or conventional energy (this is oil, coal and nuclear reactors) is a weapon.... Since a long time ago, the principal cause of wars in the world has been energy. Who controls the energy, controls the world.... It was also used against the Cuban Revolution, when one of the first measures that was taken against Cuba was to cut us off from the oil delivery. Conventional energy responds to the interests of the rich, of the powerful, and makes the poor each day poorer, more indebted, more enslaved. Renewable, soft or non-conventional energy (this is solar), is a weapon against capitalism and against imperialism, yet it is for everyone. The sun shines for the Chinese, the Blacks, the Indians and the Whites; for women, men, elderly and children; for the poor and it is so generous that it also shines for the rich. The sun can't be blockaded, it can't be dominated, it can't be destroyed. Solar energy is a weapon of the people.... It is the only thing that can produce the true economic and social development that humanity needs.”*

— Luis Berriz, President, CUBASOLAR

of twelve. There were eleven children with learning disabilities, and 151 at-risk alcoholics. In 1989, CUBASOLAR installed a 48 module, 1.5 kW PV system to provide electricity to the clinic, community store, community center, and two houses. Separate 400 Watt systems were installed on 30 additional houses. Vladimir says that the change in the community was like the difference between night and day.

The health situation in El Mulato improved greatly with addition of the vaccine refrigerator and electrical medical equipment. Improved health also influenced the local economy when coffee and fruit production increased dramatically. In addition, electricity brought additional opportunities for women. This resulted in a decrease in average birth rate, which went from five or six children per woman down to two or three.

The emotional wellbeing of the children also improved. Vladimir noticed that they no longer walk hunched-over, but stand up straight instead. In photos that were taken in El Mulato before and after the electrification, you can visibly notice the difference. Vladimir attributes this to the culture that was brought into the community with the electricity. Now, the children have access to the outside world and more of an opportunity to socialize. These improvements are not unique to El Mulato. Over 100 communities in Cuba have had similar experiences.

With access to outside information, education progressed. The teacher's work was made much easier, and a new school was built. Of the eleven children with learning disabilities, only two remain at lower learning levels. There are now no teenage pregnancies, and less than 40 at-risk alcoholics, with only five serious alcoholism cases.

### Use the Sun

Although Vladimir realizes the importance of electrifying the health clinics, he states that he is opposed to using the grid. He points out that using the grid would be more costly. Not only that, but Cuba would be “depending every day on the US blockade.” When Vladimir first heard that CUBASOLAR wanted to use the sun to bring electricity to El Mulato, he thought they were crazy. Now he knows that he was the one who was crazy. He believes that Cuba needs to use the sun, wind, and water so that they are independent from the blockade. “When we use solar energy, the blockade can't hurt us energy-wise. By using these resources, the isolated communities will be living much better, and we'll also be helping the world. Even the richest people will be poor if they don't use the sun's energy.”

### Neighbor to Neighbor: PV

Cuba is also helping its Latin American neighbors. CUBASOLAR recently brought PV-powered health care to Bolivia. La Higuera is the remote Bolivian community where the Latin American revolutionary Che Guevara was murdered in a schoolhouse in 1967. Thanks to CUBASOLAR, the Cuban government, and international support, the school has become a health clinic electrified with PV. The 675 people in this town now have access to good health care, thanks to the vision of their Cuban friends.

### PV Vision, Revolution & Reality

Cuba's amazing program to improve the health care in remote communities utilizing PV is much more than just a vision. It's a reality, which is being carried out under extremely harsh conditions. The high indices of health “have been achieved under very difficult circumstances due to the strong pressure put on Cuba by the blockade,” according to Pedro Fuentes Padrón, director of the health clinic radio communication systems. “The training of highly qualified doctors and the construction of the family doctor clinics in remote areas of very difficult access show what a true revolution can do.”

### Access

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