

Renewable and Conventional Energy

Lighting a Path to Distribute Renewable Power to the Third World

by Bennett Daviss

Researchers struggle to master the secrets of new energy sources and processes, but their work is only part of the solution to the world's energy crisis. Equally urgent is the search for effective new ways to finance and distribute renewable, decentralized energy systems—especially among the Third World's estimated two billion people who live on less than \$1 a day and the three billion living without electricity.

The need is dire: the poorer the population, the greater damage it does to the natural world—stripping it of trees to use for fuel and shelter and burning animal dung for heat instead of using it to renew soil.

In many areas south of the Equator, the absence of energy to run simple pumps consigns hundreds of thousands of people—most of them women and children—to spend hours each day hauling water. In those places, a localized source of energy to run a simple pump could free thousands of person-hours each month for more useful work. It also would ease the pressure on families to produce more children to share the chores.

A small nonprofit group based in Washington, D.C., has set out to solve this facet of the world's energy equation. The Solar Electric Light Fund (SELF) doesn't just dispense photovoltaic power systems in poor countries. It's also shaping a model of entrepreneurial, self-financing power distribution that can work with any decentralized energy source.

In its early projects, SELF used funds donated by the World Bank, private philanthropies, or loans from development agencies, to buy home-size photovoltaic systems in bulk on the open market, usually enough for one small village at a time. It then sold the systems at slim mark-ups to villagers in developing areas, usually forming a partnership with an in-country nonprofit agency. Each participating household made a 20% down payment on a system and paid off the balance—usually between \$300 and \$400—over several years. The buyers' payments were pooled in a local revolving loan fund from which their neighbors could borrow to buy their own solar power gear. SELF used a portion of the mark-ups on the equipment to establish a local dealership and trained local residents as solar installers and technicians.

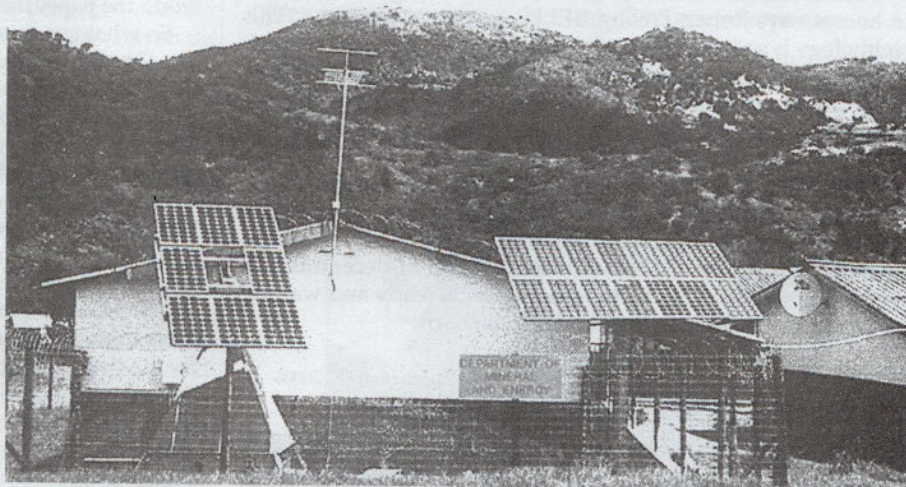
The arrangement brought power to the people in more ways than one. They had electricity for their homes and farms through equipment that they had paid for themselves. The technicians learned a profitable trade that also ensured that the power systems' continued operation didn't depend on return visits from outsiders with exotic knowledge. The loan fund made it possible for villagers to finance the continued dissemination of solar systems in their areas.

There have been broader benefits as well. In much of the developing world, the prime fuel for night lighting is kerosene. Although no agency keeps records, SELF estimates from anecdotal evidence that there are more than 20,000 kerosene-related injuries and house fires annually caused by spills and other accidents. In addition, every home burning the dim, kerosene-fueled lamps puts an average of six tons of carbon dioxide into the atmosphere annually and exposes family members to fumes as harmful as smoking two packs of cigarettes a day.

"Gone are the days when we have to spend up to \$50 each month for kerosene," one Solomon islander says, "and we no longer have fear because the electric current our equipment produces is safe."

Around the Equator, where darkness comes year-round by 6:30 p.m., children in PV-powered homes are able to study longer at night without eyestrain. And there is some evidence that when PVs power radios or small televisions in rural areas, birth rates fall: people have something else to do after dark.

SELF was founded in 1990 by Neville Williams, a former journalist who had promoted solar power as a staffer with the



Solar School Project, Myeka High, KwaZulu/Natal, South Africa. Myeka High's solar array and satellite dish bring distance learning into the classrooms.

U.S. Department of Energy during the Carter administration. By 1997, his modest operation had established eleven self-sustaining solar energy projects in eleven countries across Asia, Africa, and South America.

"We're seeking to accelerate commercial market acceptance of solar-generated electricity in developing countries through showcase projects, technology transfer, technical assistance, youth training, grass-roots financing mechanisms, and multilateral development bank support," Williams says.

It's a hefty agenda and, so far, SELF has been surprisingly effective in effecting it. In western China, SELF has brought sun power to 1,000 households in fourteen villages, created the Gansu PV Company to manufacture small-scale photovoltaic systems as a joint venture with SELF, and established the Gansu Solar Electric Light Fund to extend credit to villagers to buy the systems. In Sri Lanka, it helped a national development agency start a division to sell photovoltaic systems at prices that villagers can afford but that still will enable the agency to sustain itself. In Tanzania, SELF has worked with the Masai people—a widely-scattered group of herders—to help the tribe acquire solar-powered telephones and FM radios to share information about land speculators threatening to drive them off their ancestral lands. In a poor area of black South Africa, SELF installed a photovoltaic system in a school and used the energy to power computers and connect the school to the Internet.

But, over time, SELF began to evolve more elaborate project structures. In one joint venture in India, SELF formed a for-profit subsidiary with local partners. Through India's Renewable Energy Development Agency, the venture tapped World Bank funds set aside specifically for photovoltaic installations. In part, the company used the money to finance rural co-op's bulk purchase of solar-energy systems for its members, install the systems, train local technicians, then repaid the World Bank's loan from funds the company collected from the co-ops.

In 1997, SELF gathered assets it developed through for-profit partnerships in India, Sri Lanka, and Vietnam to form SELCO, the Solar Electric Light Company. SELCO seeds new for-profit partnerships and helps to manage existing ones; SELF continues as a nonprofit entity developing new demonstration projects. For its part in establishing the partnerships, SELF received a 20% equity stake in SELCO.

"There's a lot of capital flowing into the developing world, but it's building Nike factories and five-star hotels," says Williams, now SELCO's president. "How does that benefit the ordinary person in these countries? We've shown that there are markets in these countries where capital can earn a profit by building an essential infrastructure for ordinary people."

That infrastructure can do far more than run lights and radios in homes, says Robert Freling, SELF's executive director. "This technology is so versatile that it can be used to improve the quality of rural life in areas of health, education, micro-enterprise, and communication. SELF's challenge now is to develop programs and projects that demonstrate—through examples like the South African school—that this technology can be used in a holistic, environmentally benign way for rural development."

But he's really talking about two technologies. One is photovoltaic hardware. The other is the method that SELF has pioneered to finance and grow an infrastructure of decentralized, renewable energy. That method now stands ready and waiting for other new energy sources about to be born.

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Bennett Daviss contributes to several national and international magazines including *Discover*, *New Scientist*, and *Air & Space*.



Earth Day! Not Again?

Remy Chevalier

Editor's Note: In this Invited Opinion, we are pleased to present the heartfelt frustrations of a dedicated environmental activist with the traditional green movement. Though we may not agree with his every sentiment, we applaud Remy Chevalier's wake-up call to mainstream environmentalists to consider fairly the prospects of cold fusion and new energy. They should examine the scientific evidence, ignore the negative propaganda, and—steal from a phrase from the sixties—give infinite energy a chance! — EFM

If former U.S. Senator Gaylord Nelson was the father of Earth Day, Denis Hayes was its engine. Thirty years ago they managed to get thirty million Americans out into the streets to protest the abject corporate impact on the environment. In 1990, these same corporations became Earth Day sponsors, lavishing this country in a sea of greenwash. It had come around full circle. Little progress had been made. For every Band-aid solution, ten other disasters loomed ahead with no quick fix. The Reagan administration took its toll. Denis went from being director of the Solar Energy Research Institute in Denver, back then stripped of all funding, to being president of the Bullitt Foundation in Seattle, another one of those very wealthy green tax-shelter organizations with top-heavy objectives and nebulous results.

I met Denis in 1989 when I booked him as a speaker for an Eco-Saloon at Wetlands, a New York nightclub fronting direct-action groups. We talked about the role the military could play in the environmental movement. Pentagon procurement eventually became a major supporter of Eco-Expo. Then in 1996, I contacted Denis again about work I was doing trying to bring attention to "new energy" research. I did call him an ill-advised icon for not taking these possibilities into consideration. But I was stunned by his reaction. He lumped "new energy" research with "hopes to power humankind with Swedish Stones and alchemy," adding he had "no tolerance for conscious fraud."

We have since lost touch. Earth Day degenerated into Keep America Beautiful. Where I live, in the Connecticut suburbs, the roads are still littered with Budweiser cans and now Snapple bottles. Nothing has changed very much. Yes, there is a photovoltaic industry, but it's a blip on the radar screen of the oil companies that own them. General Motors just recalled most of its few electric cars because of some convenient fire hazard. American rivers might be a bit cleaner than they were twenty years ago, but in Europe and elsewhere, they are dead or dying, like the Danube. Earth, from space, shows the deserts gaining ground and the ice caps melting. Humanity has decided immediate survival is more important than long-term ozone concerns. The Rio and Kyoto agreements were not worth the paper they were printed on.

So what can another Earth Day do? In the spirit of *50 Things You Can Do To Save The Planet*, published back in 1990, and its three dozens variation on the theme, Denis has written a new little booklet: *The Official Earth Day Guide To Planet Repair*. Island Press publishes academic environmental books. Their titles rarely reach super-bookstores. I can't understand why this book which was meant as another how-to for Earth Day activities, had a publishing date of March 15, only a month before the event! Shouldn't this book have been out over the summer, giving a chance for people to plan things out?

The aspiration this year is that the Internet will make it a much more vibrant and immediate event. But in the wake of the WTO Seattle riots, I'm sure Earth Day organizers were not ready to really rock the boat. They lavished the distinction of celebrity spokesperson Leonardo DiCaprio, a guy who, let's face it, is a great actor, but a spoiled brat. He has spent the last two years partying on the rave beach scene of Thailand under the pretext of shooting a movie. Interestingly enough, the crew was blamed for trashing its location. Whether that accusation is true or not,