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## Business

# Solar Power Is Reaching Where Wires Can't

By DAVID LIPSCHULTZ

**T**WO hours outside Durban, South Africa, deep in the Valley of a Thousand Hills, Myeka High School had no electricity. Students struggled to read by candlelight, and few textbooks and newspapers were available. The school was clearly having a hard time doing its job: only 30 percent of the students graduated, and even those had little hope of going beyond their isolated village.

Then, in the spring of last year, solar energy came to town. Photovoltaic solar panels, firing up 2.4 kilowatts of power, were brought into the school by the **Solar Electric Light Fund**, a nonprofit group based in Washington. SELF also persuaded **Dell Computer** and **Infosat Telecommunications** to donate computers and a satellite uplink so that the students could have Internet access.

Now that the students can download materials from the Internet and have access to the Learning Channel, the graduation rate has shot up to 70 percent. Some students have won science awards, and many are applying for college. "I never thought the sun could do all this," said Melusi Zwane, the school's principal.

Myeka is a vivid example of the impact of computers on society. But what makes this tale stand out is the arrival of solar power. "It's the reason for all that we have now," Mr. Zwane said. "Everything comes from power."

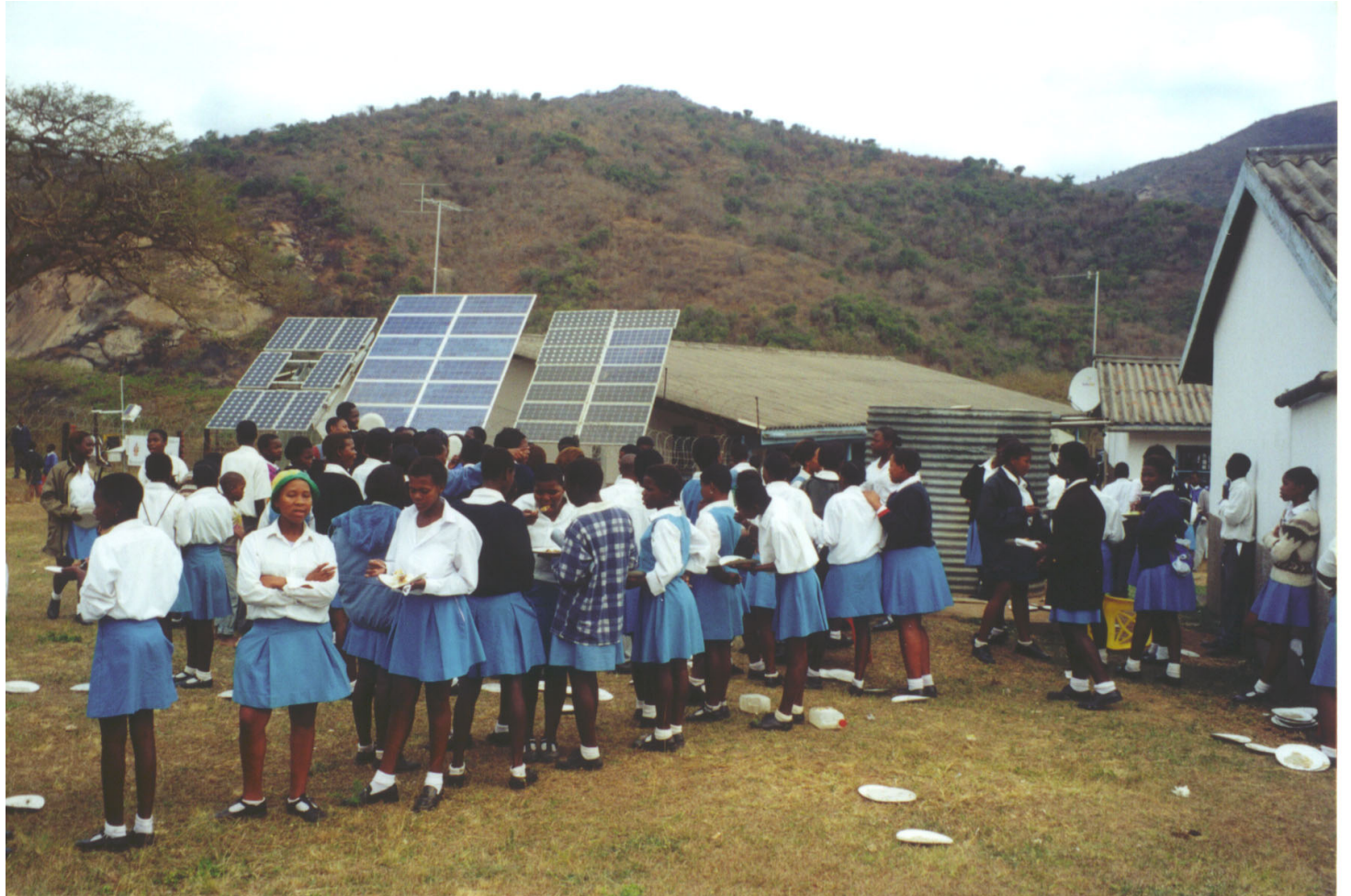
Business has long been keenly aware of the potential of providing energy to deprived areas. And interest in narrowing the world's much-discussed digital divide, between the connected and the unconnected, has only made the opportunity more inviting.

That is why energy projects like the one at Myeka High School are not solely philanthropic. Though many financing hurdles remain, there is money to be made, especially for solar energy companies, when markets like these go online.

In fact, according to Strategies Unlimited, a market research firm in Mountain View, Calif., for the solar industry, roughly 40 percent, or \$1.2 billion, of the \$3 billion worldwide solar business last year came from rural markets like the Valley of a Thousand Hills. In the United States, for example, solar has had decent sales as an environmentally friendly complement to the existing power grid, but there is a more immediate need for it in rural areas. Strategies Unlimited predicts that the leading companies in the industry, like the **Royal Dutch/Shell Group**, **Siemens**, **BP**, **Sanyo Electric**, **Sharp**, **Kyocera** and **AstroPower**, will continue to have revenue growth of about 20 percent a year from these markets. That will make the remote rural market alone worth roughly \$2.5 billion by 2005.

Two billion people, roughly 30 percent of the world population, are off the energy grid, living in areas without utility services. And a billion of them have the means to pay for power, said Prof. Daniel M. Kammen, director of the Renewable and Appropriate Energy Laboratory at the University of California at Berkeley.

According to solar industry vendors and analysts, many of these billion people spend \$5 to \$10 a month on kerosene, almost exclusively for lights. Solar power, of course, has many more uses,



Photographs from the Solar Electric Light Fund



**Solar power is opening doors to the Internet for many people with no access to traditional energy sources. The arrival of solar panels at Myeka High School in a remote area of South Africa, above, has allowed students to learn online skills, left. Panels are also used in homes, below.**



and by amortizing the start-up costs over perhaps five years, the total cash outlay is about the same.

"There's a lot of money to be made in converting those people to solar," said Dr. Allen M. Barnett, chief executive of AstroPower, a publicly traded company based in Newark.

In July, for example, Shell Solar signed

an agreement with the **Sun Oasis** Company, a distributor in Beijing, to supply systems for up to 78,000 households in rural western China.

**A**SIDE from selling directly to remote areas, solar energy companies are expected to achieve much of their growth in powering

telecommunications companies that want to extend their services, including the Internet.

"In some cases the economics involving off-grid power, such as power generators, don't allow telecom carriers to go further out," said David Dunsworth, director for power systems of Hutton Communications, a Dallas-based distributor of telecommunications equipment. "Solar allows them to do it."

Robert A. Freling, executive director of SELF, said, "There's no question that telecommunications and computer availability are major issues when trying to get communities online, but without energy you can't even talk about those."

Solar power has become the energy of choice in many rural markets, in large part because the price has dropped considerably in the last few years. Prorating over roughly 10 years, the upfront cost of solar panels and accompanying batteries gives the energy a cost of roughly 18 cents a kilowatt-hour, competitive with any off-grid power.

Moreover, solar energy has no moving parts, unlike other renewable sources, including wind and hydro, which makes it easy to maintain in areas where technicians are hard to find.

Solar power's attractiveness off the grid, and an overall interest among governments, corporations and international organizations in bridging the digital divide, have put it in a sweet spot.

"I think getting people online in rural areas will be a huge growth driver going

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forward for local solar companies," said Steve Cunningham, an investment officer for the Energy House Capital Corporation of Bloomfield, N.J., one of several private American equity firms that have millions of dollars to invest in energy companies in rural markets in the developing world.

But big challenges remain. Though they can last for 20 years, solar panels and batteries cost a minimum of \$500 for a small house. That would be a huge up-front payment for many people, said Charles Gay, a director of Greenstar, a nonprofit group based in Los Angeles that promotes the use of solar energy in bringing remote areas online.

"Coming up with a viable financing arrangement is definitely one of the biggest challenges," Mr. Barnett of AstroPower said.

International organizations like the World Bank and the United Nations Development Program have started to put money into projects, and businesses, to help solve the financing problem.

Two years ago, the International Finance Corporation, the private investment arm of the World Bank, began investing \$30 million through its Photovoltaic Mar-

ket Transformation Initiative for solar projects in developing countries like India and Morocco.

But some people contend that even though these projects provide power for remote areas, many people in those areas have more pressing priorities than spending their scarce dollars on computers and Internet access.

"Clearly, for those numerous people in the developing world that are hungry or sick, food and health must take priority over everything, even education," said Lester Brown, chairman of the Worldwatch Institute in Washington.

But many people who are involved in solar projects say the access to power can help deal with those issues, too.

In some remote villages, the economy is "a barter system where they exchange crops for kerosene, kerosene for medicine and things like that," Mr. Gay said. "You have to give them the resources to transform themselves into a real currency-earning society."

**I**N Parvathapur, a remote village in south-central India that is off the power grid, Greenstar is starting to find evidence of that. Last year, Greenstar invested about \$75,000 in solar panels,

computers and Internet access to provide the village with money-generating tools.

The village now sells its music, art and calendars online to customers who include expatriate Indians in the United States. Fifty-five percent of the revenue now goes to Greenstar to pay back the initial solar and infrastructure expenditure. "Within four years, we expect to have recovered our investment," Mr. Gay said.

Once the money is paid back, Greenstar's share will fall to 10 percent, which will go toward financing other projects in places like Jamaica, Ghana and the West Bank or future ones in Brazil and Tibet. "It's a self-replicating finance mechanism," he said.

In return, villages like Parvathapur receive not only a way to build a micro-economy for their music and arts products, but also a tool to better support their principal source of income, agriculture.

Mr. Gay said the village is using the Internet to learn the most efficient times to plant and harvest crops and the best markets in which to sell them. "The village is making more money than before," he said.

Over the last two years, with a similar goal in mind, the Grameen Bank has fi-

nanced more than 30 rural communities in Bangladesh for energy projects. It gives interest-bearing loans to people in those areas to buy Internet connectivity products like solar panels and phone equipment. Enough entrepreneurial activity has emerged to achieve a 90 percent payback rate on the loans.

SELF has provided revolving-credit loans to various areas for home lighting. When it comes to projects with fully integrated Internet access, SELF relies on grants and does not have a specific repayment plan. It says it hopes that some type of commerce arises from the efforts.

Building such commerce appears crucial. Many vendors and project managers agree that if a village cannot set up a business model and generate enough income from the new energy and the Internet access, it will eventually be in the dark again.

"I've seen it many times," Mr. Gay said. "If the community isn't self-sustaining after a while, none of this will work."

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**Solar Electric Light Fund**

1775 K Street NW, Suite 595  
Washington, DC 20006

T: (202) 234-7265  
F: (202) 328-9512

E-mail: [solarlight@self.org](mailto:solarlight@self.org)

On the Web at: [www.self.org](http://www.self.org)