UC SANTA BARBARA
THE Current

December 21, 2010
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UCSB's Institute for Energy Efficiency Designs Lamps for Schoolchildren Around the World

Osei Darwka, president of Ghana Telecom University, has a lofty goal. A fierce advocate of education, he wants every household in his country to replace kerosene –– the fuel commonly used in home lighting –– with a healthier, safer, more environmentally friendly alternative that will allow schoolchildren to read and study in the evening.

With assistance from the Institute of Energy Efficiency (IEE) at UC Santa Barbara, Darwka has taken steps toward making that goal a reality.

During a recent visit to Santa Barbara, Darwka met with John Bowers, director of the IEE, to discuss a possible collaboration. Aware of its work on high-efficiency LED lights and high-efficiency solar cells, Darwka asked if the institute could design an affordable reading light. In Ghana –– and other developing countries –– the lack of safe, adequate home lighting is directly linked to illiteracy, poverty, and health issues.

Bowers, also a professor of electrical and computer engineering, pulled together a team that designed and produced a high-efficiency solar-powered LED lamp. Partnering with the Santa Barbara-based nonprofit organization Pangaea, the first group of lamps –– 100 in all –– was shipped to Ghana in July. Another 1,200 will be on

their way later this month to Ghana, Haiti, and Kenya, and another 10,000 have been ordered for delivery in early 2011. The goal for 2011 is to ship 100,000 lamps to Ghana, Uganda, Senegal, Kenya, Chad, India, and Haiti.

Distribution of the lamps is currently overseen by Unite to Light, a nonprofit organization in Santa Barbara established specifically to supply solar-based lighting to the developing world.

With assistance from local engineers Dave Schmidt and Norman Gardner, and from the organization Engineers without Borders, Bowers and his team designed a reading light that uses an LED that is eight times more efficient than an incandescent light bulb, and a corresponding solar cell efficient enough that a small area will provide a sufficient charge for the LED. "Two hours of daylight will provide an hour of illumination with the LED," Bowers explained. "And it operates with a single rechargeable battery, which helps keep the cost down."

According to Bowers, white light LEDs require approximately 4.5 volts of electricity, which generally translates to three AA batteries. However, the lamp designed by his team used a circuit that triples the output of a single battery. The cost of the lamp is dominated by the cost of the battery, Bowers noted, so running a 4.5-volt white light LED off a single battery means that for $7 –– roughly the cost of two months worth of kerosene for one family –– "we can send lamps to Haiti or Ghana or Kenya, or lots of other places in the world that need solutions to burning kerosene," Bowers said.

Added Claude Dorais, president of Unite to Light: "The benefits to a family, a village, and a nation that flow from something as simple as light –– when provided in sufficient quantities –– are incalculable. The lamps provided by Unite to Light are bright, clean, and efficient, and with a power source as reliable as the sun, they are virtually free to operate. The only cost during the life of the lamp will be a replacement for the AA rechargeable battery, which we will provide when a user turns in the old battery for recycling. A rural family in central Ghana can recoup the cost of a lamp within a month or two with the savings on what they would have spent on kerosene."

Video demonstrations of the lamp can be found at http://www.youtube.com/unitetolight.

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† Bottom photo: A student in Ghana completes his homework by the light of a solar-powered LED lamp designed at UCSB's Institute for Energy Efficiency.

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