



# reports

## Lighting the Way: Solar-Powered Access to Health, Literacy, and Education

By Julia Ransohoff

The absence of electricity in many rural regions of the world contributes substantially to building up barriers to health and education. In place of electric lighting, kerosene lamps are commonly used; however, kerosene poses dangers to both humans and

access to education, healthcare, and improving the quality of life.

The goal of one particular non-profit or-



Figure 1. Young girl holding a solar light.

*“I believe light is as fundamental as food, water and shelter. I chose light because it is not a consumable, it is an enabler. The lights change their life only if they want to change themselves and they go so much further than food or money.”*

ganization, One Million Lights, based in Palo Alto, California, is to bring large quantities of such lights to locations worldwide. Founded in 2003, using a solar-powered LED called the MightyLight, the organization strives to reach out to children and adults in rural areas and facilitate access to education and other fundamental opportunities such as clinical care and workplace environments that had been limited by the inaccessibility of lighting.

Anna Sidana, the founder of One Million Lights, articulates her cause: “I believe light is as fundamental as food, water and shelter. I chose light because it is not a consumable, it is an enabler. The lights change their life only if they want to change themselves and they go so much further than food or money.” She highlights the dramatic disadvantages of kerosene lighting, noting that the households in areas her organization has reached out to spend nearly half of their income on kerosene for lighting. Such a financial commitment to a lighting source also brings another barrier for women and children, whose responsibility it is to travel on foot to nearby towns to purchase kerosene or candles (3).

Sidana adds, “A fantastic side-effect of solar lights is that by replacing kerosene lamps we

the environment due to toxicity of the fumes and flammability of the kerosene. Over one million die each year from kerosene-related accidents (1). Furthermore, kerosene lamps emit only 1/30th of the levels of light that the World Health Organization recommends for reading (1). Projects that introduce small, portable, and solar-powered light emitting diode (LED) lights in place of kerosene lamps are crucial to improving the quality of life for millions living in such conditions. Such lights can be manufactured in large quantities and brought to rural areas worldwide, bringing with them tremendous opportunities for improved

credit: A. Sidana.



eliminate carbon emissions. If we distribute one million lights, in five years we will have eliminated one million tons of carbon [emissions].” Furthermore, the light provided by kerosene is insufficient and causes eyestrain, the harmful fumes often cause respiratory disease, and kerosene causes a dramatic level of deaths and fires. Sidana states that “60% of the deaths are of children under the age of 14. The recipients of the solar lights are no longer dependent on kerosene.” Indeed, these LED lights, according to Sidana, allow clinics to operate after sunset, thereby offering greater services and outreach. (3).

The lights have been distributed in Africa, India, and South America. Most recently, in September 2009, One Million Lights facilitated the delivery of lights to the Empurkel Primary School in a small village in Kenya to allow students to study after sunset. Through the American African Nuru Foundation, lights have also been distributed to the Enoosaen (Keyian) Clinic in the same village to allow for improved patient care delivery (2). The work of One Million Lights is supported by private contributions from individuals and corporations. Its model of assistance, however, could be adopted by other government and non-governmental organizations.

In the midst of our current domestic political focus on the American healthcare system, insufficient attention may be paid to areas of the world where basic gaps in infrastructure stand in the way of educational progress as well as pose immediate risks to health. Technological development in self-sustaining solar power and compact LED lighting promises great benefit to remote, rural areas of the world.

### Lebônê: An Alternative Method to Fuel LEDs

Lebônê Solutions, Inc., founded by a group of Harvard students through the Idea Translation Lab, provides an innovative alternative energy source to power LEDs and provide light to rural areas in Africa. The research behind the technology was done by Professor Girguis at Harvard. Lebônê (which means “lightstick” in a North Sotho dialect) utilizes Microbial Fuel Cell (MFC)

technology, an energy production method in which bacteria metabolize waste products in soil to generate electrons that are harnessed to generate an electrical current, analogous to the way batteries function. The watts of electricity generated are used to power LED lights, as well as charge cell phone batteries (4). The MFC technology is contained within cloth bags filled with sand, waste,



Figure 2. Recipients of solar lights in India.

and anodes and cathodes; the bags are buried in the ground, and watered regularly to maintain the bacterial metabolism. The anodes, where the bacteria reside, harness the products of bacterial metabolism and are linked through a circuit to the cathodes; electrical current is generated by the flow of electrons from the anode to cathode, where reduction takes place (5).

As an alternative to traditional electricity-generation methods or solar-powered technologies, Lebônê’s model provides a sustainable solution, as the systems can generate electricity for years, though the amount of energy produced is quite low per unit. Lebônê, among other groups pioneering similar methods, offers a sustainable fuel alternative through a collaborative social enterprise.

—*Julia Ransobhoff '13 is a prospective Human Developmental and Regenerative Biology concentrator in Greenough Hall.*

#### References:

1. One Million Lights. Impact. <http://onemillionlights.org/index.html>.
2. American African Nuru Foundation. Solar Massai Project. <http://www.aanurufoundation.org/default.asp>.
3. A. Sidana, personal communication.
4. Lebônê. The Innovation. <http://www.lebone.org/>.
5. Environmental Microbial Genomics Group. How Does an MFC Work? <http://www.genomenviron.org/Research/MFC.html>.