Here's a great article from today's New York Times , featuring new tech for off-grid electrical generation

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By CATE DOTY Published: November 10, 2008

Above: Stephen Lewendo, a Harvard engineer from Tanzania, working with the locals to vet the technology.

Start-UP companies around the world are looking at Africa — **where 74 percent of the population lives without electricity**
— as a test market for new, off-the-grid lighting technologiesMany of these efforts involve wind or
solar power
. But one group in Cambridge, Mass., is working to develop fuel cells made from the bacteria that occur in soil or waste.

“You can just literally make energy from dirt,” said Aviva Presser, a graduate student at the Harvard School of Engineering and Applied Sciences. “And there’s a lot of dirt in Africa.”

Ms. Presser is one of the founders of Lebone Solutions , which is being financed by a $200,000 World Bank grant and private investments. Lebone’s idea is a microbial fuel cell, a battery that makes a small amount of energy out of materials like manure, graphite cloth and soil, which are common to African households.

But Lebone — which means “light stick” in the Sotho language — does not just want to make the batteries and sell them to African consumers. The group hopes that eventually, as the technology becomes more refined, each household will be able to build a battery at a one-time cost of no more than $15.

“Africans are very, very creative,” said Hugo Van Vuuren, a Lebone founder. “It’s very entrepreneurial, just not in the way we traditionally define entrepreneurial.”

Mr. Van Vuuren, who is from Pretoria, South Africa, and who graduated from Harvard last year with a degree in economics, likened the simplicity of the battery to “the potato experiment that most of us did in high school class,” a two-step reaction that produces a simple charge.

But the bacteria in a microbial fuel cell produce electrons while doing what they naturally are supposed to do: metabolize organic waste, like dead leaves or grass or compost, for energy. The electrons then stick to an electrode, like a piece of graphite, and the chemical reaction that follows creates a small charge sufficient to power a small lamp or cellphone.

“It can be made by people with minimal training,” Ms. Presser said. “It doesn’t take a massive investment.”

The founders of the Lebone team were classmates at Harvard, and looking at sustainable lighting technologies for Africa was their class project. Last summer, they took the technology to Leguruki, a village in Tanzania, to see how the batteries work in households. For three hours each night, six families used batteries made of manure, graphite cloth and buckets, and a copper wire to conduct the current to a circuit board.

While in Leguruki, Mr. Van Vuuren said, the group learned as much about the people who used the batteries as the batteries themselves.

“People walk an hour or more a day to the local high schools to get their phones charged for two or three days,” he said, noting that the phones were sources of light as well as communication devices. The batteries are also used to power radios, Mr. Van Vuuren said, as important a medium of communication in Africa as the cellphone.

“Ideally, they would like to have a refrigerator,” Mr. Van Vuuren said. “But right now, their key need is a cellphone.”

Mr. Van Vuuren and several of his fellow Lebone researchers know the challenges of Africa personally, which he credits for the group’s commitment to focusing on Africa first.

“We are a group of Africans that have had the privilege of a first-rate education,” he said. “There are very few people who have insights into both. We lived through it.”

The group is expanding the refined prototypes into Namibia, where, over the next two years, it will examine how more easily available materials, like chicken wire, will create electricity. Mr. Van Vuuren said his group wanted to test the microbial cell batteries in African settings before bringing them to the American market.

Eventually, Lebone wants to create a new business model for energy distribution in Africa, helping to funnel fuel cells and other technologies tested in Africa to distributors there, rather than reducing developed technologies to meet African needs.

“If you work within those constraints, you can create something that works in the developed and developing world,” Mr. Van Vuuren said. “There’s no reason that people need to A: starve, or B: can’t read at night.”