

**List of 16 Development Marketplace Winners  
Lighting Africa 2008**

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**Developing a Delivery Model to Support Consumer Financing Schemes for Solar Powered Lighting Systems**

**COUNTRY:** Kenya

**PARTNER COUNTRY:** None

**ORGANIZATION:** Energy for Sustainable Development Africa

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**OBJECTIVE:** This project will set up an Energy Product and Service Delivery Company dedicated to supporting Microfinance Institutions and Financial Cooperatives to effectively implement the consumer financing PV delivery model in Kenya.

**RATIONALE:** Unless there is a significant decrease in the upfront cost of solar lighting systems and other modern energy products, consumer financing will continue to be the only option to providing increased access to modern energy products to a large majority of over 5 million rural households whose only other energy alternatives are traditional fuels and fossil fuels. Most approaches to developing and supporting consumer-financing delivery models in Kenya have not been successful. They have focused on the demand side, i.e., creating awareness and providing access to finance without paying much attention to the supply side. The assumption is that this could easily be filled by existing suppliers.

**INNOVATION/EXPECTED RESULTS:** This project will focus on the supply side by setting up a company that will reduce costs by redesigning PV systems to take advantage of new lighting technologies, simplifying installation procedures and directly sourcing components from manufacturers to shorten the supply chain. The project will improve the delivery of installation and maintenance services to ensure system performance, at least over the duration of the solar PV loan, by using Kenya's existing network of practicing freelance solar technicians across the country. They will also develop and use carbon finance to support after-sales services.

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**Technology Transfer and Development of Local Entrepreneurs in LED Based Home lighting in Kenya**

**COUNTRY:** Kenya

**PARTNER COUNTRY:** India

**ORGANISATION:** THRIVE

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**OBJECTIVE:** The overall objective of this project is to enhance opportunities and capacities for Kenyans to generate employment and income through sustainable, non-fossil fuel-based LED lighting

solutions. Specifically, the project aims to transfer the requisite LED lamp technologies to Kenyan SME businesses; create micro, small, and medium energy service enterprises to manufacture, sell and service LED lamps; and increase the local content of the LED lanterns from 0% to 80%.

**RATIONALE:** Kenya's population is estimated at about 36 million in about 7 million households (2006). 82.6% of households do not have access to good/affordable lighting. Lighting expenditures (for kerosene, half of disposable batteries and battery charging) account for approximately 11% of total non-food household expenditures.

**INNOVATION/EXPECTED RESULTS:** This project aims at developing around 10 entrepreneurs who will manufacture LED lights in Kenya and help install them in as many as 25,000 homes with the help of small local businesses within specified periods of time. THRIVE, an Indian NGO that spearheaded the LED lighting in India along with Kenyan Industrial Research Institute, will help transfer the technology of LED light making and installation to the local entrepreneurs. Good and efficient lighting will help Kenya enormously. Kenyan children located in remote and dark areas will now be able to extend their study time into the late evening thus being able to progress further in life and contribute to Kenya's growth. Owners of Micro and Small business too can extend business hours into the night without risking their health. With LED lighting, rapid efficiencies are a possibility.

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### **Kodesha Mwangaza – Rent a Light**

**COUNTRY:** Kenya

**PARTNER COUNTRY:** None

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**OBJECTIVE:** To address the need for an affordable modern lighting solution among low-income communities by eliminating the biggest barrier to adoption of modern lighting solutions – cost, through use of powerpacks.

**RATIONALE:** More than 80% of Kenyans, in particular the vulnerable groups living in slum areas lack access to the national grid and depend primarily on fossil fuels for their lighting needs, leading to respiratory diseases and environmental hazards associated with indoor air pollution. While there are several off-grid solutions available to this market including solar energy, the initial cost of these alternatives prohibits their uptake on a large scale. Addressing the energy needs of this bottom segment requires innovative service delivery models that increase access to modern energy on a sustainable basis, while at the same time remain affordable to the vast majority.

**INNOVATION/EXPECTED RESULTS:** By providing rental Powerpacks, this project makes electricity affordable for the majority of urban poor, rural households and slum dwellers. The rental system allows the consumer flexibility of renting a fully charged Powerpack from designated distributors in the neighborhood without having to invest in an off-grid power source, such as a solar panel. The project will set up 100 distribution agents and 10 service centers for the Powerpacks to reach approximately 8,000 households within 18 months. In addition the Powerpack will be used for mobile charging and powering radios, and it will create a new market concept for portable electrical energy distribution among the poor in Kenya.

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## **Rural Lighting Access Program**

**COUNTRY:** Kenya

**PARTNER COUNTRY:** None

**ORGANIZATION:** Gpower

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**OBJECTIVE:** Through a customized energy access model, work through community based organizations, establishing construction, implementation, operation and management of profitable power generation and lighting facilities in rural areas of Africa.

**RATIONALE:** Only 3.6% of rural Kenyan households are connected to the national grid. Even if the annual connection rate would double to 10,000 per year, it would take 400 years to connect the rural population. In Kirinyaga district, communities depend on kerosene and firewood, which are expensive, harmful to the environment and have health consequences. Without affordable electricity, private sector development is stifled. Green Power provides an economically viable solution to the diverse socio-economic problems within Kirinyaga region.

**INNOVATION/EXPECTED RESULTS:** Green Power establishes micro-hydro renewable energy generation and mini-grid systems connecting 800 - 1,600 households per community through a customized energy access model which is co-financed, constructed, owned and operated jointly with small-scale farmer shareholders. In collaboration with astute local engineering partners and local consultants, Green Power designs, manufactures and assembles energy generation units and distribution components, and it builds prime structures, sub-stations and distribution networks. Green Power's approach is environmentally friendly, cheaper than conventional micro-hydro electrification schemes, ensures knowledge transfers and provides assets that the rural communities can utilize to access credit markets and promote enterprise and social development. For the construction of the turbines, Green Power partners with advanced engineering companies in Nairobi such as Numerical Machining Complex and Sintronics Ltd. On legal aspects, Green Power benefits from a pro bono support program by Linkkaters Ltd., a large USA law firm.

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## **Recharging Fees for Lamps Can Buy Hours of Solar Light**

**COUNTRY:** Uganda

**PARTNER COUNTRY:** Laos

**ORGANISATION:** Sunlabob Renewable Energies Co., Ltd

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**OBJECTIVE:** Rural households in Uganda can afford electric lighting with the small incremental payments they are accustomed to making for bottles of kerosene, but with solar light they pay less per hour for better light.

**RATIONALE:** Kerosene for lighting is a steady cash drain on rural households. However when they buy solar lamps, they own expensive equipment for which they must account for maintenance and servicing by repairmen who may often not be reliable or trustworthy. Solar lighting for households must therefore: a) allow households to pay with small incremental expenses like they already do for kerosene, b) servicing and replacements must be such that households do not have to worry about it and, c) the delivery system must be a commercially viable service in order to allow sustainability and growth.

**INNOVATION/EXPECTED RESULTS:** Sunlabob-TSSD rents large solar charging stations to small village entrepreneurs who are specifically trained to service the equipment. The small entrepreneurs own solar lamps. Households can then take a charged lamp to their home, and a microprocessor in each lamp safeguards the battery against misuse and deep discharge. Households pay a fee to exchange depleted lamps for charged ones. With the income from these fees, the entrepreneur pays the rent for charging station, the depreciation of the lamps, and the operational expenses. A franchise arrangement maintains the relationship between entrepreneurs and TSSD-Sunlabob and is designed to spread throughout Ugandan and East Africa.

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### **Providing Affordable Home and Business Lighting for Africa with Dye Sensitized Solar and Mesopic LED Technology**

**COUNTRY:** Rwanda

**PARTNER COUNTRY:** United Kingdom

**ORGANIZATION:** G24 Innovations Limited

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**OBJECTIVE:** this project aims to use the breakthroughs in solar and Led technology to bring a reliable and affordable lighting solution to rural homes and businesses.

**RATIONALE:** There is enormous demand for home and small business lighting in Africa. However many millions of rural dwellers remain dependant on kerosene lamps. To date, solar PV products have not experienced mass uptake in Africa because of prohibitively high entry costs, lack of availability, and the fragility of the systems. This product will meet the high demand for integrated lighting for small dwellings and businesses. We have chosen Rwanda as our launch country, but the product suitability and distribution methodology are easily replicable in any other country.

**INNOVATION/EXPECTED RESULTS:** The product uses a new, light, flexible, robust and cost-effective solar cell, which provides the opportunity for rapid price reduction over the next 3-5 years. The light uses a new Mesopic LED light, which is tuned to the wavelengths most clearly seen by the human eye at low light levels. It offers more usable light for less energy, improving the business case for the product. The product will also function as a mobile phone charger, battery charger, and source of energy for a radio, offering added value to users. This multiple functionality will allow product deployment through the well established mobile phone channels.

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### **Providing Affordable and Reliable Solar Systems in Northern Tanzania**

**COUNTRY:** Tanzania

**PARTNER COUNTRY:** None  
**ORGANIZATION:** Zara Solar Limited  
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**OBJECTIVE:** Using solar photovoltaic to provide electricity to rural households and for income generating activities in northern Tanzania using savings and Credit Cooperative Societies (SACCOS).

**RATIONALE:** A majority of Tanzanians live in areas without electricity and depend on increasingly expensive kerosene for lighting. Grid electricity is not expected to be available for many years to come, making solar photovoltaic systems a viable option. The availability of electricity will help in reaching some of the MDG goals. Presently, major barriers hindering the rapid use of solar photovoltaic systems are high initial costs and lack of access to loans from financial institutions. Another setback is that the available micro finance institutions that could help are few. They are located in urban areas and charge exorbitant interest rates, making solar systems very expensive.

**INNOVATION/EXPECTED RESULTS:** SACCOS are established by people who live in the same locality and know each other or work together – like teachers, nurses, civil servants, etc. The government encourages the formation of SACCOS and fully supports them. There is a bank CRDB, which supports SACCOS by giving them loans at lower interest rates. As SACCOS become located in remote rural areas and charge lower interest rates to their members, using them will enable many people to have solar systems. What is needed is to convince SACCOS to finance PV which is considered risky. This project aims to use SACCOS, a network of solar technicians, and reasonably priced solar systems to reach remote areas where solar dealers are not present.

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### **One Child One Solar Light**

**COUNTRY:** Ghana  
**PARTNER COUNTRY:** Germany  
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**OBJECTIVE:** The project intends to provide portable solar lamps to school children and their families in rural areas who do not have access to the electrical grid. Teachers at the school are to serve as contact points with the affected families in order to guarantee the success of the project.

**RATIONALE:** About 50% of all families in Ghana do not have access to the electric grid, and during evening hours, kerosene lamps and similar light sources are only able to provide limited light. Having access to sufficient light opens up new freedom for learning, working and communicating and is therefore an appropriate instrument for combating poverty.

**INNOVATION/EXPECTED RESULTS:** The project intends to use the existing infrastructure that schools provide to form the basis of a country wide program to convince school children and their parents of the usefulness and cost effectiveness of solar lamps. Making information available through schools, as well as introduction of micro credits, will aid in making this project viable. The long-term relationship

between teachers and school children will ensure correct usage of lanterns and payback of the micro credits on schedule. The project will build up an independent sales organization in cooperation with local companies and schools, which will enable a sustainable sale of solar lamps based on the idea of social marketing. In addition, public relations work, cooperation with ministries, and partnerships with public figures will remove legal, fiscal, cultural and economic obstacles, which might otherwise complicate the sale of solar lamps.

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### **Power to the Poor: Off-Grid Lighting from Cassava Waste in Nigeria**

**COUNTRY:** Nigeria

**PARTNER COUNTRY:** None

**ORGANIZATION:** Global Network for Environment and Economic Development Research

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**OBJECTIVE:** Nigeria, the largest world producer of cassava, produces 32 million metric tons yearly out of the 168 million metric tons of total world production, and it also generates US\$ 5 billion in revenue annually. However, despite the economic and social benefits, cassava waste is a major public health issue in Nigeria, causing water pollution and greenhouse gas emissions.

**RATIONALE:** The idea is to abate pollution and mitigate greenhouse gas emissions, hence improving ecosystems and human health through investment in a sustainable biogas plant. The zero emission biogas technology treats the cassava waste and produces biogas, which would drive micro turbines for low cost, safe and reliable off grid energy efficient lighting to 2,250 peri-urban and rural poor homes. The sludge acts as environmentally safe organic fertilizer for low-income farmers.

**INNOVATION/EXPECTED RESULTS:** Existing interventions used the conventional anaerobic treatment process, which has several drawbacks, such as low treatment efficiency, odor, and long retention time. These obstacles are overcome by our proven and cutting-edge anaerobic fixed film biogas technology. Consequently, both the capital investments and operating costs are lowered, resulting in a more economic system. The project capital budget is US \$ 310,000 with US\$ 200,000 from LADM 2008 and US\$ 110,000 from Cows to kilowatts Partnership Limited. The pay-back period is 3.5 years, and the productive lifetime of the plant is 15 years. The return on the investment is enormous from the lifecycle perspective. The concept is a model that can be implemented in most developing countries where unabated pollution threatens citizen's health and an urgent need for affordable lighting exists.

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### **Lighting the Way**

**COUNTRY:** Zambia

**PARTNER COUNTRY:** United States

**ORGANIZATION:** The Regents of the University of California Office of Research

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**OBJECTIVE:** The goal of the project is to design and distribute an inexpensive, modular white LED lighting system that can displace or supplement kerosene lighting in Sub-Saharan Africa through existing market-based mechanisms.

**RATIONALE:** Although widespread, typical kerosene lamps provide poor light and contribute to respiratory problems when used indoors. In Zambia, 98% of the non-electrified households use kerosene lamps as their primary lighting source. By providing a renewable-based lighting alternative, these households will have better light for less money with a lower environmental and public health impact. With better light, shops can stay open and children and adults can study and learn after dark.

**INNOVATION/EXPECTED RESULTS:** To avoid dependency on micro-finance or charitable dissemination models, *Lighting the Way Zambia* will focus on developing a lighting system that can be purchased in increments, in much the same way that kerosene fuel is currently purchased in the developing world. The objective is to mimic the economics of how kerosene fuel is bought and sold, focusing on advanced lighting and micro-power technologies. The final product will cost less than \$3 per module and \$25 per watt, yielding a minimum of 50% reduction in life-cycle carbon emissions, and provide better light than a kerosene lamp. Initial roll out during the LADM support period will be to 5,000 households in rural and urban communities in Zambia, and then will be scaled up. In five years, we anticipate a half-million new light-emitting diode (LED) customers will benefit from better lighting, improved indoor air quality, and the potential reduction of CO<sub>2</sub> by 10,000 tons.

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### **Popularize a Local Solar Lantern**

**COUNTRY:** Burkina Faso

**PARTNER COUNTRY:** None

**ORGANIZATION:** CB Energie

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**OBJECTIVE:** More than 60 million persons in the Sahelian countries are affected by the lack of electricity. People are accustomed to using mainly oil lamps and torchlight. These solutions are not sustainable and charge a high price for a bad service, so the project aims to popularize a local solar lantern with a cheap operating cost and a very low impact on the environment and public health.

**RATIONALE:** Solar solutions for lighting already exist but the equipment is expensive and often difficult to maintain. Producing less expensive local solar lanterns that are easy to maintain is a solution to give poorer populations a modern light source. It provides work and comfort in a rural area and creates new capability in solar energy.

**INNOVATION/EXPECTED RESULTS:** The expected result is to create small solar lanterns, totally autonomous, based on oil lamps and produced locally. Using modern and high quality equipment, the solar lantern has high efficiency and a long life. Because they are produced locally, some adapted models could be applied for particular uses, such as reading, small business and light used for protection.

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### **Solar Energy Provision for Lighting and Portable Water Provision to the Low Income Rural Community of the Nganha village in the Adamaoua Province of Cameroon.**

**COUNTRY:** Cameroon  
**PARTNER COUNTRY:** None  
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**OBJECTIVE:** To provide electricity and portable water to the low income village of Nganha from solar energy in order to promote the conservation of nature and socio-economic and cultural development of the village.

**RATIONALE:** To promote solar energy contribution, nature conservation, and poverty alleviation in Nganha. This project will reduce consumption of fossil fuels and firewood, dependency on the centralized national grid connection, increase school attendance, improve on health and sanitation, and promote local businesses and tourism.

**INNOVATION/EXPECTED RESULTS:** Provision of energy from solar markets makes this affordable for the majority of rural households in Nganha. Benefits of contributing to the functioning of the system promotes reliable servicing, gives consumers the flexibility of returning or changing the system to suit their needs, and creates local jobs through a services delivery mechanism. This project lights about 150 households, health centers, schools, and offices. Water well pumps will be developed to provide portable water to the community to reduce mortality and cholera. Portable water and energy will also improve the reproductive health of women. Income generating activities in Nganha will increase leading to an associated increase in infrastructure, equipment and services that will attract tourists. Nganha is on the road leading to Chad and Central African Republic so will be a safe stopping point for travelers. There will be a local reduction in greenhouse emissions from firewood and kerosene used for light.

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### **Lights for Life in Sub-Saharan Africa**

**COUNTRY:** Multi-Country: Kenya, Rwanda, and Uganda  
**PARTNER COUNTRY:** Canada  
**ORGANIZATION:** Lights for Life International  
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**OBJECTIVE:** To light up rural households in Sub-Saharan Africa by delivering an innovative, affordable, low-maintenance, off-grid LED lighting system.

**RATIONALE:** Like much of Sub-Saharan Africa (SSA), Rwanda, Uganda, and Kenya face an electricity supply crisis. The problem is especially dismal in Rwanda where fewer than 2 % of the 8.4 million people, who live mostly in rural areas, have access to lighting after dark. Most attempts to address the need for rural lighting in these countries have been unsuccessful, as they have either involved the slow and expensive extension of an already under-provisioned electricity grid to rural areas or the development of expensive, difficult –to-scale and maintain small-scale projects from hydro, wind, solar and biomass resources. Lighting and poverty are inextricably linked in SSA. Lighting facilitates many productive

activities and significantly contributes to human development. An off-grid lighting solution that is affordable and easy to scale and maintain can help break the cycle of poverty.

**INNOVATION/EXPECTED RESULTS:** LFL's 'Nuru' (meaning "light" in Swahili) is a state-of-the-art, grid-independent, modular, portable lighting system, offering dependable lighting anywhere and anytime. Co-created with local beneficiaries and stakeholders, Nuru will address rural lighting like no other product in the marketplace. Prototypes of the Nuru lighting system will be field tested in Rwanda, Uganda, and Kenya through two delivery mechanisms. In Kenya, LFL and UNICEF will provide Nuru to rural schools. In Rwanda and Uganda, LFL will set-up rural lighting micro franchises that will each provide fee-based lighting services to rural communities.

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### **Family Pedal Power and Lighting Project – East Africa**

**COUNTRY:** Tanzania

**PARTNER COUNTRY:** United States

**ORGANIZATION:** Dissigno

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**OBJECTIVE:** To create a sustainable, community based distributed lighting and power service that provides an alternative to dangerous kerosene lanterns currently in use in Africa.

**RATIONALE:** Lighting contributes directly to the improvement of education, health, and living conditions, especially for women and children. Lighting contributes to the development of economic activities and wealth generation. Light allows students to study after dark, shops to stay open later, and adults to engage in wealth-generation activities. Kerosene and candle light produce toxic smoke, inferior luminescence and present burning risk. Improved lighting is critical to reducing toxins, fire danger and eye strain. Environmental benign electricity allows isolated communities access to improved lighting, which can also foster additional business opportunities. Improved lighting coupled with environmentally friendly electricity, supported by a sustainable enterprise will directly address millennium development goals.

**INNOVATION/EXPECTED RESULTS:** Pedal project will provide the service of light to replace kerosene lanterns and candles. Battery-powered lights supported by human-powered generators will be rented to community members at price parity with kerosene cost. Project plans will install 20 generators and 3,000 lights through local NGO partnerships. Revenue-generated user fees will support Pedal Power enterprise operations and expansion. Other community enterprises will benefit from available investment capital and employment opportunities. Given the urgency of the MDGs, this project can help reduce child mortality, improve maternal health, eradicate poverty and create economic opportunities. Based on prior experience in Haiti, Pedal Power can financially break even by year two, allowing re-investment for market growth.

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### **Village Lighting Solutions to Improve Education, Health, Safety and Productivity in Rural Namibia**

**COUNTRY:** Namibia

**PARTNER COUNTRY:** United States

**ORGANIZATION:** Lebone Solutions

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**OBJECTIVE:** To bring lighting to rural households in Namibia by introducing a low-cost combination of microbial fuel cell (MFC) and polymer light emitting diode (PLED) technology, and thereby improve education, health, safety, quality of life, and income levels in rural villages.

**RATIONALE:** 1.3 million people in Namibia, 88% of the rural population, have no access to modern electricity. These households are paying high costs for inefficient forms of energy and lighting (such as candles, firewood, and paraffin) that are hazardous to health and safety and an obstacle to educational achievement and productivity for children and family businesses. The only clean energy alternative currently available to rural households in Namibia is solar power, but this requires a major multi-year investment to purchase and, despite subsidized loan schemes, has not been accessible to the 56% of Namibians who live on less than \$2 a day.

**INNOVATION/EXPECTED RESULTS:** Lebone Solutions, composed of graduates, students and professors of Harvard and MIT, have extensive personal experience and connections in Africa. They will use a bottom-up approach to lighting Namibia by working directly with a grassroots youth network to introduce a low-cost combination of emerging technologies – MFCs that passively generate energy from organic waste matter, and PLEDs that require low power inputs and are rugged, flexible, and highly adaptable to all lighting needs – into off-grid villages across Namibia. In 27 months, we will introduce lighting devices into 9,000 households in three regions of Namibia and will help 900 young entrepreneurs start profitable micro-enterprises.

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### **Working Through Faith-Based Organizations to Provide Improved Lighting and Battery Charging for Low-income Households and Street Vendors in Rural Communities**

**COUNTRY:** Liberia

**PARTNER COUNTRY:** None

**ORGANIZATION:** Center for Sustainable Energy Technology

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**OBJECTIVE:** To provide improved lighting for low-income households and street vendors in rural Liberia through the use of micro-financed solar/LED lanterns.

**RATIONALE:** The lack of quality lighting for low-income households and street vendors in rural Liberia is an impediment to improving social and economic well-being. Good quality lighting enhances evening studies, improves security, and increases evening business hours and therefore sales for street vendors. According to the Government's draft Poverty Reduction Strategy Paper, less than 2% of rural residents have access to electricity, produced mainly from private generator sets at prohibitive costs; the remainder depend on traditional sources of candles, kerosene, and palm oil for lighting. Since their expendable income is low, an innovative approach is needed in providing improved lighting.

**INNOVATION/EXPECTED RESULTS:** The idea is to develop a micro-credit financing mechanism in a post-conflict setting by utilizing and building upon the strength of the church-community relationship in Liberia's rural communities. A new but proven lighting technology will be introduced that is sustainable, high quality, and has multiple uses –phone charging, lighting, and other battery charging in areas lacking these services. Working through the social network of the church will ensure high repayment rates and effective advertising; this unique supply chain will create a rural market. Innovative financing will provide needed micro-credit services to rural communities, and will introduce solar/LED technologies on a commercial basis and at an economic level accessible to such communities. Finally, bringing service-oriented NGO in a partnership with a private sector enterprise creates a sustainable business model.