ASIA LEDS PARTNERSHIP

Case Studies on Low Emission Development

TERI's Lighting a Billion Lives initiative in India

February 2013

One of the challenges facing the world today is to provide sustainable energy to all citizens. The task is massive but solutions often come from small, localized initiatives. The Lighting a Billion Lives (LaBL) initiative launched by The Energy and Resources Institute (TERI) aims to replace kerosene-based lighting with cleaner, more efficient, and more reliable solar lighting devices. LaBL employs an entrepreneurial model of last mile energy delivery to establish micro solar-enterprises in un-electrified or poorly electrified villages. A local entrepreneur trained by TERI and its partner organizations provisions clean energy access to the community for an affordable fee. The initiative has reached to around half-a-million people in 1860 villages across 22 states of India. The initiative has also been expanded to countries like Afghanistan, Seirra Leone, Kenya, Uganda, Ethiopia, Mozambique, Myanmar etc.

Origins

In 2007, at the Clinton Global Initiative annual meeting, TERI committed to bring light and socio-economic development to one million rural people in India. The idea has evolved to encompass a billion people around the world.

Implementation

LaBL is based on an entrepreneurial model of energy service delivery which seeks to provide high-quality and cost-effective solar lamps, disseminated through micro solar enterprises set up in un-electrified or poorly electrified villages. These enterprises are operated and managed by a local entrepreneur trained under the initiative, who rents the solar lamps every evening, for an affordable fee, to the rural populace. The approach includes:

- **Fee-for-service model:** This approach makes solar lighting affordable to the poorer sections of society with the user paying only a nominal daily rent. Capital costs are supported to a large extent by grants.
- **Loan finance model:** This provides an option for operators to start solar enterprises as their own business by facilitating loans (through financial institutions) and subsidizing some of the cost of the enterprise (via TERI and/or the partner organizations, including government agencies).

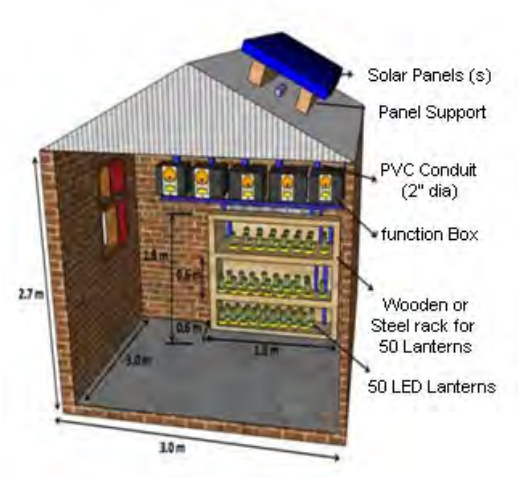
Success Factors

- **Quality control:** Establishing quality standards in solar lighting products and services is key. The program endeavors to create channels of quality control and set up standard operating procedures to ensure timely supply of quality products and to prevent inefficient products from being sold at energy enterprises.
- **Technological innovation**: TERI helps customize new technology products and services, and connects rural energy enterprises to reputed **suppliers**. Researchers at TERI also work with technology partners to develop innovative products based on feedback provided by the local-level energy enterprises.
- **Financial innovation**: Moving from an initial grant-based model, LaBL tested a more market-based, entrepreneurial fee-for-service delivery model. The approach has gradually moved to a more flexible equity and investment model to facilitate scaling up.
- **Public-Private-People** Partnerships: LaBL has gained support of both public agencies and businesses, aiding the execution of the program on the scale it exists today, while providing business partners with opportunities to demonstrate their corporate social responsibility.

Technology Options

Solar Charging Station

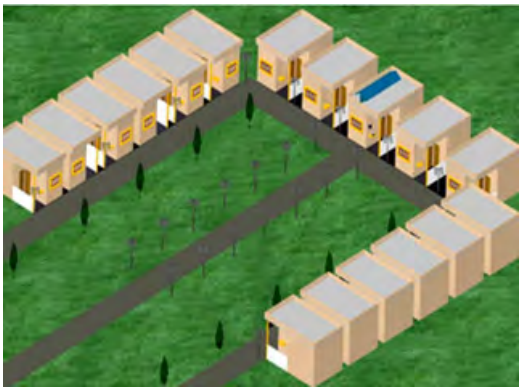
A typical solar charging station consists of 50 solar lanterns, 5 solar panels, and 5 junction boxes. The solar lantern generates light for 4-6 hours daily, providing illumination of 200-250 lumens or the light equivalent to a 40 W incandescent bulb. The LED lamps work for a full night (about eight hours) if operated on the dimming mode. The centralized solar charging stations are set up in villages and lanterns are provided on a rental basis to households and enterprises in the evening.



Graphic: TERI

Solar DC Micro Grid

In this approach, photovoltaic power panels are installed in modular units allowing generation capacity to scale up easily to meet demand. Power is generated during the day but consumed at night. To bridge this gap, one or two battery banks charge during the day while power is generated and discharged at night when consumers are lighting their houses. Power is distributed over a short distance from the battery banks to the cluster of households or shops (each cluster comprises of 20 to 100 households or shops) within the village. Low voltage electricity is distributed for 4 hours each night to power household/shop lights. By utilizing LED lights, power consumption per connection is reduced, thus decreasing the requirements to distribute large quantities of power. Each household/shop is provided with one or two LED lights which provide superior quality lighting compared to kerosene lamps, at comparable cost. Use of solar energy eliminates any fuel supply need.



Graphic: TERI

Technology Innovations
Improving the performance of light output and light distribution through optimum selection of low power, high efficient LEDs and luminary design
Achieving electronic circuit efficiency up to 90% by incorporating the latest digital technologies
Integrating newer, more efficient, longer life (1000-1500 cycle), compact, environmentally-friendly batteries into the solar lighting system
Adding reliability, flexibility, and easy-reparability into the solar system through improvement in overall system design and system integration based on regular field-based technical and performance evaluation
Developing multi-purpose, high-efficiency (up to 85%), versatile junction boxes or solar chargers with wide input-output ranges and a power maximizing circuit for the solar lighting system
Developing a cost-effective, modular, easily deployable solar charging station configuration with different solar PV technologies
Following standard operating and monitoring procedures for quality controls and product approval

Institutional Innovation

To support sustainability of rural energy projects LaBL employs a network of local-level institutions that facilitate micro-implementation of project deliverables, carry out training and capacity building, and ensure after-sales services. TERI realized the need for creating a new institution, which it calls Energy Enterprises (Uttam Urja Shops). An Energy Enterprise (EE) is a local-level enterprise that caters to after-sales service support to LaBL solar charging stations (SCSs) and is also authorized to market and sell TERI-approved clean energy products such as solar lights and improved cookstoves in a specified area. Apart from providing next door and reliable after-sales support, the EE also assists in creating local capacities of rural youth for the execution of other energy access projects in the area. Currently the United Kingdom's Department for International Development (DFID) is supporting TERI to set up more than 400 such enterprises across the country.

Financing

LaBL demonstrates how public-private-people partnerships can support developmental schemes and initiatives, particularly in the area of rural energy access. To finance the campaign, TERI moved from the initial grant-based model to testing an entrepreneurial fee-for-service delivery approach, then gradually moving to a more flexible equity and investment-based model. By demonstrating credibility through results on the ground and proof of the concept, this process has helped address two key challenges: (i) scaling up and (ii) diversification of funds. LaBL offers financial viability to attract equity along with technology customization and an effective monitoring mechanism, and aligned its approach with the government agenda to enable greater likelihood of success.

Innovation in Delivery Model

In addition to the fee-for-service and loan finance models, TERI is **harnessing public-private-partnerships** for delivering clean energy and increasing energy access. Examples include:

- Extending mobile phone charging options through solar charging stations, in cooperation with the Department of Telecommunication, Government of India
- Providing solar lighting to residential schools in remote rural areas, in partnership with the Universal Primary Education program of the Government of India
- Extending stitching and sewing training to rural women at the LaBL solar charging stations, in addition to the provision of solar lanterns, in partnership with Mawana Sugars and Usha International.
- Creating income generation opportunities for rural women entrepreneurs by training them on selling mobile telecom services locally in addition to the provision of solar lanterns, in collaboration with Uninor
- Linking lighting with conservation activities through collaboration with the Forest Departments, and organizations like the World Wildlife Fund, The Corbett Foundation, and Wildlife Trust of India.

LaBL is also **linking with micro-finance institutions** to augment new and existing rural enterprises, such as:

- Setting up solar charging stations with microfinance institutions that receive funding from the National Bank for Agriculture and Rural Development and state-run rural livelihood programs.
- Promoting innovative financing of solar charging stations with YES Bank Limited to design and implement a scalable semi-commercial business model for financing of solar charging stations.

Implications

The LaBL initiative is helping to address critical clean and sustainable energy challenges while spurring innovations that help enable energy access for all. The campaign has adopted a localized, bottom-up approach that has provided a valuable set of lessons and good practices on how to address the challenges of providing clean lighting to billions of people that are at the bottom of the pyramid.

For more information on the LaBL initiative, visit: http://labl.teriin.org/

This document is based on content presented at the 2013 Delhi Sustainable Development Summit, in a session entitled *Learning from Green Growth Initiatives in Asia*. This session was funded by the Climate & Development Knowledge Network (CDKN) and the US Agency for International Development (USAID), and was organized by the Asia Low Emission Development Strategies (LEDS) Partnership.

About the Asia LEDS Partnership

The Asia LEDS Partnership is a voluntary network of government, nongovernmental partners working to advance LEDS and green growth in Asia. It builds on, and cooperates with, existing regional Asian networks and initiatives, and links efforts in Asia with related work in other regions. Representatives from over a dozen Asian countries are actively engaged in the Asia LEDS Partnership, as well as numerous international partners. Membership is free and is open to individuals or organizations. For more details, visit: http://en.openei.org/wiki/Asia_LEDS_Partnership

About the Climate & Development Knowledge Network

The Climate & Development Knowledge Network aims to help decision-makers in developing countries design and deliver climate compatible development. We do this by providing demand-led research and technical assistance, and channeling the best available knowledge on climate change and development to support policy processes at the country level. For more details, visit: http://cdkn.org/

About the US Agency for International Development

The US Agency for International Development (USAID) is committed to helping developing countries pursue sustainable economic development and improve living standards worldwide. As the lead entity in the US Government for bilateral and regional assistance, USAID focuses on helping partner countries to establish the policy environments, improved governance, and financial incentives to set their economies on a low-emissions path of sustainable development and reduce vulnerability to climate impacts. For more details, visit: http://www.usaid.gov/