

"Solar Tuki" - a clean alternative to "wicked" kerosene lamp

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BACKGROUND

Household lighting is considered to be one of the basic requirements of the society. In Nepal, 2.4 million households are to this day compelled to use kerosene based wicked lamps (known as *Tuki* in local language, which is made by inserting strands of cloth or “wicks” in glass bottles filled with kerosene) for household lighting, as they do not have access to electricity (either because of the geographical remoteness from the national grid or because of not having the capacity to pay for the electricity connection even in the place where national electricity grid is available).

This form of lighting is neither cost effective nor is it environment friendly. Since kerosene has to be imported, the government annually spends its limited foreign currency reserve. Likewise, fumes from the *tuki* affect the eyes and lungs (specially those of children and women because they sit close to it in the evenings while studying or preparing food), contribute to global warming due to release of CO₂, the quality of light is inferior and there is a high risk of accidental fire hazards.

AIM

The aim is to displace kerosene wicked lamps by solar based household lighting thus improving the livelihood of the rural populace.

APPROACH

To replace the kerosene lamps, “Solar *Tuki*” is being used – it is a White Light Emitting Diodes (WLED) based solar lighting system that consists of two units of 0.3-Watt lamps with built-in Nickel Metal Hydride rechargeable batteries which is charged by 3 Watt solar photo voltaic panel. The lamp unit also has a 3 volt outlet for connecting a FM/AM radio.

As most of the targeted beneficiaries are below the poverty line, most of them will not be able to afford the upfront cost of the Solar *Tuki*, which is US\$50. Therefore, micro financing mechanism has been developed by mobilizing local groups, enabling the people to purchase the Solar *Tuki* on an installment basis (capital fund being provided from the revolving fund). Linkages have also been established with the existing Users’ group / Saving and Credit groups developed by various other projects (Government of Nepal/UNDP program, WWF, Winrock International, etc.).

TRAININGS CONDUCTED

- Motivator training to the field staffs of INGOs / NGOs and various projects
- Training camp for the youths focused on preparing the youths as promoters of alternative and renewable energy
- Training camp for the children and formation of children club - which conduct small scale follow-up activities and community orientation program in their local community
- Orientation on clean technology to the community, workers and staff of companies, Cooperatives, Forest Users' Group, women groups, etc.
- Repair and maintenance training: for the people from the area where solar tuki are being promoted
- Training on Users' group formation / saving and credit group formation: People from low-income group showed interest when they came to know about the micro-financing scheme. Later, many of them used this facility to buy the solar tuki.

DISTRIBUTION

During the period July 2005 – December 2007, total 7,000 sets have been distributed through micro-financing scheme supported by World Bank Global Development Marketplace, World Bank Nepal Development Marketplace, Global Environment Facility, WWF Nepal Program, and private Nepalese companies and directly on cash.

SOCIAL IMPACT STUDY

Based upon the field visits, the baseline information collected before the distribution of Solar Tuki, the post Tuki survey report and the feedback received from the village level partner organizations (through whom solar tukis are being promoted), Impact study report has been prepared. Some of the major points are:

- Light: 14,000 rooms have clean, white and smokeless light. The best part is that it can be moved around; and rain or wind storm, the light is on all the time.
- Radio: able to listen for a longer time and to a variety of programs without having to worry the increase in cost
- Poverty eradication and a new economy: resource (sun) is made into an economic value, creating employment
- Education: allows children to study longer, children listen to radio (are informed about current information) and stay competitive with the rest of the students. Children can now stay inside the mosquito net and study. In one village where the community charging station is in the school and all the children have to come to class in order to charge the Solar Tuki, there is an indirect but clear impact on the attendance numbers.
- Policy direction/Donor education: zero subsidy model, rather than providing subsidy - focus is to be made on supporting through start-up capital, quality control, central warehouse, access to credit market
- Long-term infrastructure: the infrastructure created can also be used to roll out new products and services. New campaign – “**Solar Tuki Plus**” includes mobile phone and CDMA phone (which has spread to rural areas where there is no electricity) charger, 12volt black & white TV, fan for improved cook-stove.
- Environment (no fumes emission, no indoor pollution)
- Better health (less amount spent in medicine, soap)
- Foreign currency saving

- Energy security
- Reduced fire hazards

THE FUTURE: MOVING ONE STEP AHEAD

- Focus on community charging model of solar tuki (deviation from the present house-to-house charging model)

From the experience and the feedback received from the community, we have learned that more no. of poorest of the poor people could be reached through the community charging model. In this model, one large size solar panel (say 50 Watt or 65 Watt) along with charger having many (say, 20 or 30 or 40) outlets (where lamp units brought by villagers will be connected) will be placed in a community building (say, school, ward office, etc.). People will bring their solar tuki lamp to charge there. This way, people will have to buy only the solar tuki lamp (which costs only \$11 per piece) - which means, it would not be necessary for each consumer to buy the costlier solar panel (\$28) (which means, poor people will have to invest less money). Thus, more no. of poor people could be reached.

Extra value addition will be the use of the solar panel in charging the local battery system so as to light the community building itself (where adult literacy class, income generation activities, etc. could be conducted during the evening hours).

In the present house-to-house charging model, each house owns 2.5 Watt solar panel to charge 2 lamp units. Cost of panel is high. They have to pay US\$50 for one panel and 2 lamp units.

- New campaign of “**Solar Tuki Plus**”

As people have become familiar and used-to with the new technology of Solar Tuki, they are now demanding additional features. The recent introduction of mobile phone and CDMA phone and its network expansion by the Nepalese telecom companies have also influenced the demand (of solar powered phone chargers) by the rural communities (since most part of the country lacks electricity supply). “**Solar Tuki Plus**” package includes mobile phone and CDMA phone (which has spread to rural areas where there is no electricity) charger, 12volt black & white TV, fan for improved cook-stove.

ADDITIONAL ACTIVITIES

- Long-term strategy has been developed considering the production aspect, distribution aspect and social mobilization
- Understandings have been developed with different institutions (e.g. development banks, others INGOs, local savings and credit groups) for promoting as well as investing in the solar tuki
- Manufacturing and distribution of the solar tuki is being developed as a self-sustaining business, for which, training for the entrepreneurs (who want to start manufacturing) has been given, concept of central warehouse has been developed
- The participation of the private sector has opened the door of unlimited opportunity in scaling and sustainability. Based upon this agreement, possibility has been enhanced in including the private sector in this LIGHT FOR ALL campaign.
- WWF Nepal Program has also contributed financially in the revolving fund managed by the local community group in Bardiya (Far Western Nepal) through their on-going program. The possibility of

solar tuki promotion through Forest User Group Coordination Committee and using the income to support the health post was discussed. The fund from micro-financing institutes and Saving Credit Group formed by Winrock International will also be used along with support from GDM Revolving Fund

- 47 sets solar tukis and 54 pcs of lamp units and 2 larger sets for adult literacy classes were promoted through Community Learning Centers (located in Dadeldhura in far west Nepal) established by UNESCO Nepal
- Solar Tuki Sharing Workshop for Members of Parliament
To share the knowledge and experience gained during the solar tuki promotion in the past two years, sharing workshop was organized in Kathmandu for the Members of House of Representatives on August 9, 2006. The program was attended by 23 persons including 7 Members of Parliament (MP) from the 9 districts targeted by the Government of Nepal for the “**Karnali Illuminated Program**” (where 60,000 solar tuki are planned to be promoted from the national budget of fiscal year 2006/07).

MAJOR ACHIEVEMENTS REGARDING REPLICATION AND SCALABILITY

- Tech Museum Award¹ (in the category “Economic Development”) was received on November 7, 2007 (www.techawards.org)
- The project won Honorable Mention in the World Bank DM Photography Competition 2007.
- The no. of Solar Tuki sets distributed through the micro-financing scheme exceeded the planned target.
- The biggest achievement is the acceptance of the technology by the Government. Based upon the success of the solar tuki initiative, Government of Nepal announced (in July 2006) 95% subsidy for 60,000 sets of solar tuki to be promoted in 9 rural districts through “Karnali Illuminated Program” through the national budget.
- European Commission and Dannida have committed to support the Government of Nepal for the promotion of the solar tuki.
- Understanding has been developed with local savings and credit groups for promoting as well as investing in the solar tuki
- The participation of the private sector has opened the door of unlimited opportunity in scaling and sustainability. Possibility has now been enhanced in including the private sector in LIGHT FOR ALL campaign.
- Private financial institutions (development banks) have shown interest to provide loans to the entrepreneurs to manufacture solar tuki. This will help in self-sustaining the supply chain.
- Multilateral Development Agencies are promoting solar tuki in their respective project areas. Some have even contributed to establish revolving fund at the local level.
- For installing a community charging model (in a school) and to produce video (on solar tuki), support was received from (a) Davis Foundation (100 Projects for Peace) through Trinity College and (b) Tufts University. Four students from these two colleges were in ECCA-Nepal in May-June 2007. They were actively involved in solar tuki promotion, community charging system installation and in filming the video.

¹ The Tech Museum of Innovation is a hands-on technology and science museum for people of all ages and backgrounds. Located in San Jose, California - the Capital of Silicon Valley - its mission, as a public-benefit corporation, is to inspire the innovator in everyone. Through hands-on exhibits, educational programs, the annual Tech Challenge team competition for youth, and the internationally recognized **Tech Museum Awards**, presented by Applied Materials, Inc., The Tech Museum of Innovation honors the past, celebrates the present, and encourages the development of innovative ideas for a more promising future.

- Repair and maintenance training has now been incorporated in the regular work plan of the manufacturer. The manufacturers have now been convinced to bear this cost as well – which will support in the long-term sustainability of the solar tuki program. Through this approach, the technical skill has been transferred to the local level Solar Tuki service centre without additional cost to the consumer. The local transportation cost is borne by the user's group/trainee and the cost of food and accommodation during the training period is borne by the manufacturer. Also, now, no separate fund needs to be searched for the repair and maintenance trainings.

ANTICIPATED NEXT STEPS

As the main target beneficiaries are the rural poor (who do not have the financial capacity to make down payment), the solar tuki need to be provided to them on credit through installment payback scheme (through the revolving fund). Furthermore, collecting the installments from the end-users is a slow process – though it is continuing. Hence, there is a need to increase the amount in the revolving fund.

Also, to further reduce the per-household cost and reach the poorest of the poor, and also to increase the attendance of the students in the school, more no. of community charging model of solar tuki need to be installed. Extra value addition will be the use of the solar panel in charging the local battery system so as to light the community building itself (where adult literacy class, income generation activities, etc. could be conducted during the evening hours).

ECCA-NEPAL SOLAR TUKI ON THE WEB

- ECCA-Nepal Project page <http://www.ecca.org.np/projects.php>
- Global Development Marketplace (DM) announces the winners of its first **Photography Contest** 2007! <http://go.worldbank.org/IJX6FHKM20>
- Global Development Marketplace (DM) **Photography Contest** 2007 award winning photographs on ECCA-Nepal Solar Tuki <http://go.worldbank.org/DSY7CF7WT0>
- ECCA-Nepal Solar Tuki movie clip www.youtube.com/watch?v=q1LjRcVygjg
- Global Development Marketplace (DM) 2005 ECCA-Nepal solar tuki project photo page <http://web.worldbank.org/WBSITE/EXTERNAL/OPPORTUNITIES/GRANTS/DEVMARKETPLACE/0,,contentMDK:20834648~menuPK:1519354~pagePK:180691~piPK:174492~theSitePK:205098,00.html>
- ECCA-Nepal Solar Tuki for support collection www.globalgiving.com/1268
- <http://tinyurl.com/285cyt>
- <http://www.techawards.org/>
- <http://www.techawards.org/laureates/>
- <http://www.techawards.org/laureates/stories/index.php?id=160>