Report on
Installation of
Solar Tuki – Community Charging System
In Kaleshwor VDC, Lalitpur

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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 languages, which are 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). 2.3 out of 2.4 million households use kerosene each day to meet their lighting needs. Also, this kerosene which is not cheap by any means is also very difficult to get and frequent road blockades is creating troubles in its regular supply.

The burning of kerosene through the use of wicked *tuki* gives an inferior light, produces a lot of smoke and release CO_2 affecting eyes and lungs (specially those of children and women because they sit close to it in the evenings while studying and preparing food), contribute to global warming due to release of CO_2, can cause accidents and fires that can be fatal and economically a disaster. In addition to that, the government also has to spend its limited foreign currency reserve annually to import the kerosene.

Photo: Solar tuki set (along with the radio)

Keeping these things under major concern and to replace the kerosene lamps, "Solar Tuki" is being developed. Solar tuki is an alternative lamp consisting White Light Emitting Diodes (WLED) based solar lighting system with two units of 0.4 watt lamps with built-in Nickel Metal Hydride rechargeable batteries which is charged by 3 watt solar photo voltaic panel. The lamp unit has a 3 volt outlet for connecting a FM/AM radio. Charging of 4 hours in the sun will make the battery/lamp work continuously for ten hours at night.

INSTALLATION

As a pilot project, ECCA installed 2 types of solar tuki community charging station (in May – June 2007) in Kaleshwor VDC, Lalitpur in coordination with Janajagaran Saving & Credit Group (local organization promoting micro finance and credit facility for the community) - who is also acting as local service centre for the solar tuki for the community. The program was implemented with the financial help of four students through Trinity College and Tufts University supported through Davis Foundation, USA. Through the establishment of community charging centre, 160 pcs. of solar tuki had been distributed targeting the students who are studying at Shree Bhagbhairab Higher Secondary School. Subsidy of Rs. 270 per pc of solar tuki was also provided to the consumers/students. Remaining cost of the solar tuki was supported through loan from the revolving fund of Global Development Marketplace, World Bank. The loan amount is being paid back by the users through microfinance in monthly installment basis.

Before the installation of community charging station in this village, 115 sets of solar tuki (one set = one 3 Watt solar photovoltaic panel + 2 lamp units) had been promoted in the VDC.

COMMUNITY CHARGING CENTRE INSTALLED LOCATION

S. No.	Venue of Installation	Charging Capacity
1	Shree Bhagbhairab Higher Secondary School	30 pc. per charge x 2 times charging = 60 pc. per day
2	Community Learning Centre	40 pc. per charge x 2 times charging = 80 pc. per day

TECHNICAL SPECIFICATION

Technically, 2 types of Multiple chargers were developed and used:

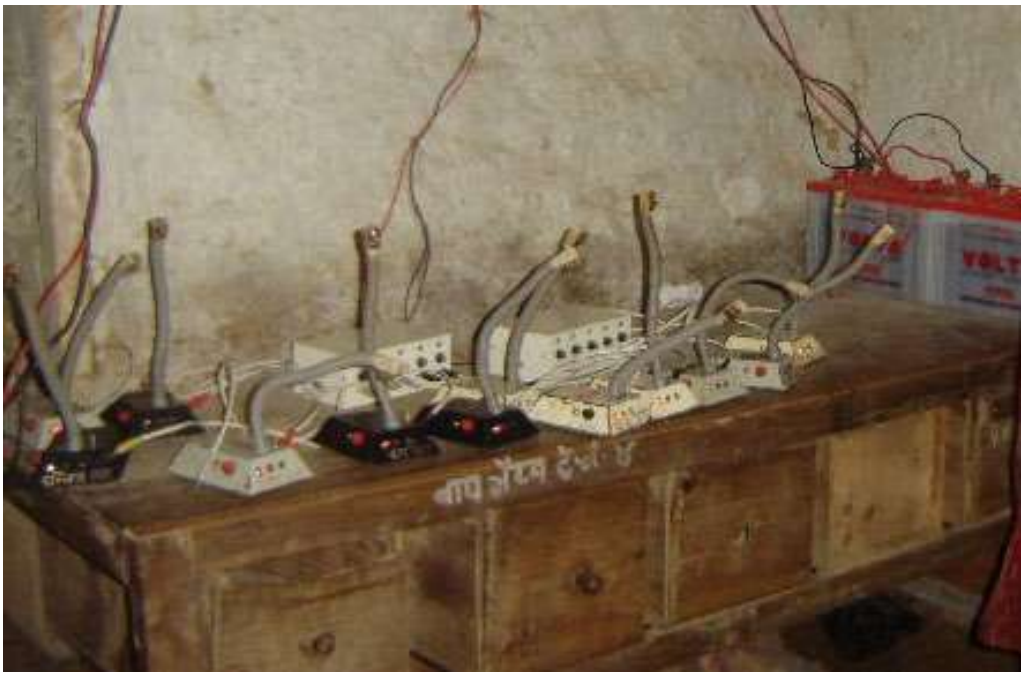
1. Multiple Charger Model without using Lead Acid Battery (located at Shree Bhagbhairab Higher Secondary School)

Particulars	**Quantity**
Solar Panel (50 W)	1 Pc
Multiple Charger	1 Pc
Wire	

In this model, 30 pieces of solar tuki lamps are directly connected to the solar photovoltaic panel (as in the case of normal solar tuki set). No intermediary lead acid battery is used to store solar energy. Hence, solar tuki can be charged only during the day time.

2. Multiple Charger Model with Lead Acid Battery (located at Community Learning Centre, near the school)

Particulars	**Quantity**
Solar Panel (50 W)	2 Pc
Wire	
Charge Controller	2 Pc
Lead Acid Battery	4 Pc
Multiple Charger	4 Pc



In this model, each multiple charger box has the capacity to charge 10 pieces of solar tuki lamps (4 multiple charger box x 10 lamp units = 40 lamp units). The solar photovoltaic panel charges the lead acid battery (which stores electrical energy) which, in turn, charges the solar tuki lamp units. In this system, since the solar energy is already stored in the lead acid battery, solar tuki lamp units can be charged in the evenings and night also. However, it is not practical to do so since, in the evening and night time, the lamp need to be used for other works instead of leaving it for charging.

Note:

Among the above 2 types, the first type without the lead acid battery has been proven to be more effective, and will be used / promoted in future. Though only 30 pc. of lamp units are being charged (at present) at one time from the first type, research is going on to make it capable to charge 48 lamp units at one time. Additional advantage in the first type is that lead acid battery need not be used.

SOCIAL IMPACT STUDY

Based upon the field visits to the local area, the information collected through a set of questionnaire and the feedback received from the local promoting organization, some of the major impacts found through the promotion of solar tuki and installation of community charging station are as follows:

- Light
  - 210 households (in Kaleswor VDC) are benefited through white and smokeless light of solar tuki (115 households through Solar tuki Set plus 95 households through community charging lamp units)
  - Students are getting cleaner & brighter light than the light from kerosene
  - Installation of Community Charging Centre has supported the families and students who are not being able to afford the complete solar tuki set (1pc panel & 2 pc tuki)[1] – thus, reaching the poorest of the poor.

- Information
  - The households (and the students) having solar tuki lamps are benefited with different informative and entertaining programs since the battery inside the base of the solar tuki lamp unit powers radio as well (thereby saving the cost of the dry cell battery)

- Poverty Eradication & Economic Enlistment
  - Because of the cleaner and better light being provided through solar tuki - the housewives are attracted towards different income generating activities (stitching of cloths, etc)
  - Utilization of extra time for income generating activities
  - Use of Solar tuki in small cottage industries i.e. Khuwa making industry.
  - Creating employment opportunity in the community through establishment of community service centre.
  - Saving of economy through unnecessary expenses in kerosene and dry cells for radio.

- Education
  - Increase in study hours of students and children
  - Feeling of competitiveness to get good grade in the class due to longer hrs of study and good light.
  - Increase in the attendance of students in school due to installation of two community charging centers – one at the school premises and second at the Community Learning Center (also located near to the school)[2]
  - Accessibility of studying inside the mosquito net during summer season
  - Clean school dress and copies / books (no meshing of black sooth as in the case of kerosene lamp)
  - Better hand writing of the students

[1] Since solar photovoltaic panel is the costliest item in the set

[2] Students bring the solar tuki lamp units to the school in the morning (when they come to attend the class), get it charged during the day time, and take it back home when returning from school

- Fire Hazard
  - Fire hazards reduced to zero level in the homes where kerosene tuki had been previously used for the lighting purpose
  - Burning of eyelashes of the students' were also reduced to zero level

- Health:
  - Better health condition of students, housewives and family
  - Less amount spent in medicine
  - Less amount spent in soap
  - Less time spent for washing of Cloths
  - Time saved for purchase of kerosene from market

- Others:
  - Solar tuki being used as torch light: Traveling (walking) from one place to another (within the village) made easy in the evening and night time, as well as for the students coming to school in morning shift.
  - Solar tuki being used as torch light: Monitoring the agriculture field in the evening / night for irrigating from the village canal
  - Environment: No fumes, No CO_2 emission, No indoor pollution
  - Foreign currency saving
  - Energy security