Creating Village Enterprises to Replace Kerosene Lamps with Solar Lighting System

TABLE OF CONTENTS

1 Background 3
2 Objectives 4
3 Methodology 4
4 Impact Expected 5
5 Budget 6

1 Background

The households in unelectrified and under electrified villages in Assam and northeast use kerosene as a source of energy for lighting. It is proposed to provide electricity to those households basically for lighting by replacing the kerosene lanterns with solar lighting devices. This will provide better illumination and kerosene-smoke-free indoor environment thereby enhance productivity and quality village artisans, cottage industries, schools, facilitate education of their children and improve lifestyle. Solar Lanterns (SL) and Solar Home System (SHS) are considered to be the most viable option to provide basic electricity need for lighting, mobile charging and entertainment etc. Two major challenges for promoting solar electricity are considered to be high upfront cost and lack of trained manpower.

Investment Barrier

The average cost of a Solar Lamp is Rs.3500.00 (10Wp system) Solar Home System unit for a household is around Rs.15000.00 (for 50-60Wp SHS unit). This is considered as the investment barrier for the poor cash-strapped people. With a large share of income being spent on meeting basic livelihood needs, it is unlikely that a household can afford to invest on SL or SHS. Therefore, the main barrier to the implementation of solar project activity is the initial investment cost of SL or SHS units. And without any additional financial support, poor rural households will not be able to afford a SL or SHS. An appropriate micro finance mechanism is necessary to overcome this barrier. However, life cycle cost of solar lighting system is much lower than a kerosene lamp. A detailed life cycle cost benefit analysis is given in the table below.

*Comparison of Kerosene lamp with solar lighting system**

Lighting Device	Initial Cost (Rs.)	Expected Life battery/ kerosene lamp/ lantern (year)	Replacement Cost over 20 years (Rs.)	Lifetime fuel cost (Rs)	Total Life cycle cost per lamp (Rs.)	Difference in cost taking kerosene as base line (Rs.)	Savings per year per lamp (Rs.)	CO2 emission over life time operation (kg)
Kerosene lamp	150	5	600	24000	24600	0	0	3096
LED Solar Lantern or Solar Light	2500	2	5000	0	5000	-19600	980	-3096
CFL Solar Lantern or LED Solar Light	3500	2	8500	0	8500	-16100	805	-3096
Solar Home Light with 3-4 x 7W CFL	15000	5	14000	0	4667	-19933	997	-9288

*Assumptions:

Amount of kerosene required per month to light one lamp	5	litres
Cost of kerosene	20	per litre
Cost of 4AH, 6V SMF battery	250	per battery
Cost of 7AH, 12V SMF battery	500	per battery
Cost of 40AH, 12V lead acid battery	3500	per battery
Cost of 50 -60Wp Solar Home System with 3x7W CFL	15000	Per system
Lifetime considered for lifecycle analysis	20	years
CO2 emission per litre of kerosene	2.58	kg

Lack of trained manpower

Lack of trained people and sales and service centers at village level is considered second major barrier. This could be addressed through formation of village level Micro Energy Service Companies (MESCOs) and providing training and establishing linkage between manufacturers and micro financing institutes for further business development for solar systems.

2 Objectives

The objective is to establish Micro Energy Supply Company (MESCO) with local educated technicians/ entrepreneurs and establish sale and service centres for solar lighting systems and its accessories in the project site to make the project sustainable on its own through generation of enterprise and employment.

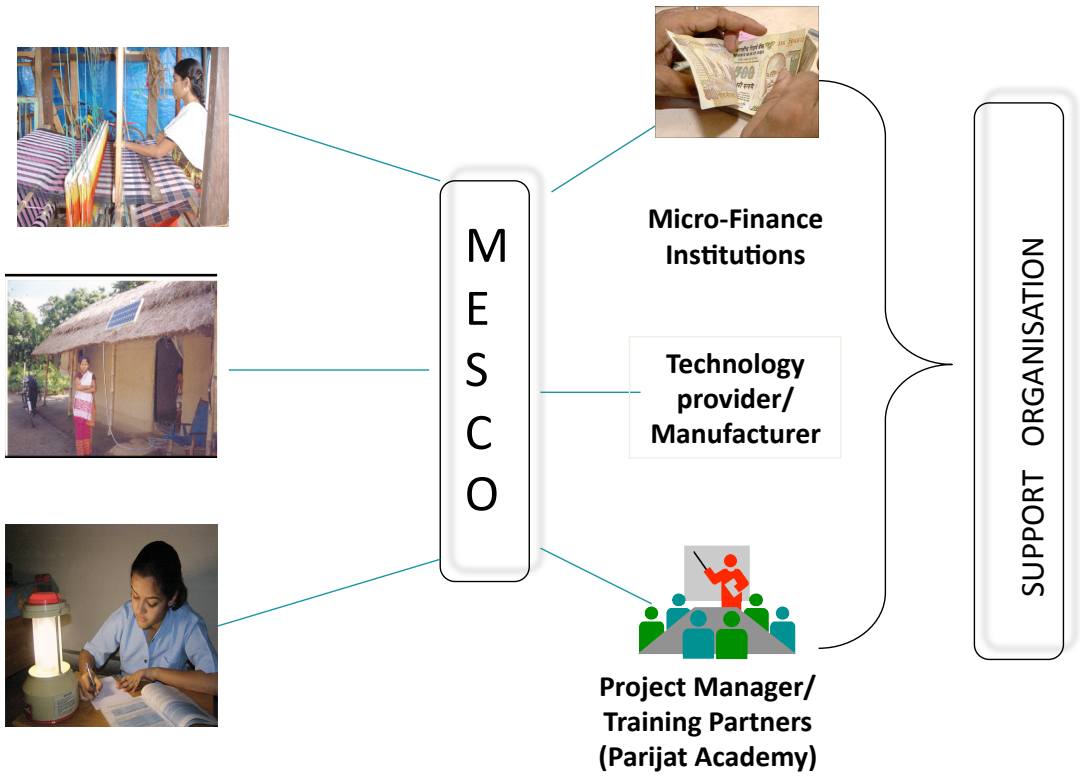
The objective is to develop mechanisms and establish linkage with Entrepreneurs, Financiers and Manufacturers to create a commercially viable business plan and suitable environment for finance institutes for promotion of solar lighting system replacing kerosene lamps.

3 Methodology

(1) The trained Micro Energy Service Company (MESCO) will provide Solar Systems to the village households, schools and village artisans on rent or sale at affordable installments. The installment will be equivalent to the monthly bill they pay to buy kerosene.

(2) Micro Finance organization will provide finance to the MESCOs to run their business (to buy solar systems and rent or sale them to users at affordable installments).

(3) MESCOs will be established by local educated youths/ Self Help Groups and will be trained for energy supply business management, installation, commissioning, maintenance and monitoring of the systems.



(4) Parijat Academy will work as a project manager/ training partner and will use its premises to conduct training, identify local entrepreneurs, take up initial project and monitor and evaluate the project ensuring that the project is sustainable and replicable. A group of experts in the field will help Parijat Academy in establishment of the training centre, conducting training and ensure that the technology provider/ manufacturer supply systems maintaining high quality and performance guarantee. The centre will train the MESCOs in energy supply business management, installation, maintenance and repair.

4 Impact Expected

The project when implemented will have a long term impact through the following:

(1) Solar home systems will replace kerosene lamps and provide better illumination and smoke-free indoor environment thereby enhance productivity and quality of village woman artisans, facilitate education to their children and improve lifestyle of the most disadvantaged people. The target beneficiaries of the project will be woman artisans in the villages and most of their

productive working hours are occupied by household work, firewood collection and up-bringing of children. Providing SHS will extend their working hours, improve their working environment and income. Elimination of kerosene lamps will reduce indoor air pollution and associated diseases and accidental hazards. Apart from lighting, Solar Home System can also be used to operate a television/ radios and a communication system like mobile or wireless telephone. Providing these basic facilities will improve lifestyle, educate children and woman and improve maternal and children health.

(2) Trained people will be available at the doorsteps of the users to provide O&M services. This will establish a linkage between rural customers and technology providers ensuring better O&M service, monitoring and loan repayment mitigating investment risks thereby motivating financing institute to finance Solar Home System in Rural Areas and attract investors to invest for such projects through a sustainable business plan and financing mechanism.

(3) Bundling of Solar Home Systems installed through MESCOs will eliminate problem of financing low economies of scale and accesses finance through carbon market.

(4) Replication of the models in different parts of Assam, Northeast or other parts of the country

(5) Overall development of the rural areas through increased employment, education and increase in commercial activities

5 Budget

Sl. No.	Particulars	Rate	Quantity	Amount (Rs.)
A	**Fixed Cost**			
1	Systems for demonstration & Training (Annexure 1)	89000.00	1 set	89000.00
2	Tools required for training, installation & repair (Annexure 2)	L-S	1 set	25000.00
3	Professional cost for development of training materials and Manuel/ guidebook	L-S	1 set	150000.00
	Total for (A)			**264000.00**
B	**Cost for conducting Training ***			
1	Consumables for Training	L-S	1 set	10000.00
2	Remuneration for Trainers	L-S	1 set	20000.00
3	Food and refreshment during training (5 days)	L-S	1 set	20000.00
4	Local Travel	L-S	1 set	10000.00
5	Outstation travel (2 x return air fare)	L-S	1 set	30000.00
	Total for (B)			**90000.00**
C	**Revolving fund for solar lighting systems**	**To be discussed**		
	Grand Total (A) + (B) + (C)			

* Variable cost based on number of trainees and days of training

Annexure 1 : Sample system for demonstration and training

Sl. No.	Particulars	Cost per set	Quantity	Amount
1	Solar Lantern Model 1	2500.00	4	10000.00
2	Solar Lantern Model 2	3500.00	4	14000.00
3	Solar Home Lighting System Model 1	8000.00	2	16000.00
4	Solar Home Lighting System Model 2	12000.00	2	24000.00
5	Solar Home system with LED/LCD television	25000.00	1	25000.00
				89000.00

Annexure 2 List of Tools required for technicians for installation and repair

Sl. No.	Tools	Qty
1	Measuring Tape	1
2	Solar Pathfinder *	1
3	Compass	1
4	Angle finder	1
5	Torpedo level	1
6	Cordless drill	1
7	Hole punch	1
8	Torque wrench with deep sockets	1
9	Nut drivers	1
10	Soldering Iron DC and AC	1
11	Wire strippers	1
12	Crimpers	1
13	Needle-nose pliers	1
14	Lineman's pliers	1
15	Slip-joint pliers	1
16	Small cable cutters	1
17	Large cable cutters	1
18	AC/DC multimeter	1
19	Hacksaw	1
20	Hydrometer	1
21	Small flashlight	1
22	Rubber apron	1
23	Rubber gloves	1
24	Safety goggles	1
25	Funnel	1
26	Voltmeter	1

* Cost of Solar Path finder is about USD 300