MILLION SOLAR URJA LAMP (SoUL) PROGRAM

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An Initiative of
Indian Institute of Technology Bombay

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Socio-Economic Impact of Million SoUL Program in Mandla District

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About Million SoUL Program

Million SoUL Program (MSP) is an initiative of Indian Institute of Technology - Bombay (IIT-B). MSP headquarter is located in Mumbai within the campus of IIT-B. Its principle funders include Ministry of New and Renewable Energy (MNRE), Madhya Pradesh Govt., Sir Dorabji Tata Trust (SDTT), Larsen and Turbo (L&T) and Tata Motors.

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List of Acronyms

CEA	Central Electricity Authority
MDG	Millennium Development Goals
MNRE	Ministry of New and Renewable Energy
MP	Madhya Pradesh
MSP	Million SoUL Program
NGO	Non Governmental Organization
IEA	International Energy Agency
IIT-B	Indian Institution of Technology, Bombay
PDS	Public Distribution System
RGGVY	Rajiv Gandhi Grameen Vidyutikaran Yojana
SDG	Sustainable Development Goals
SKO	Superior Kerosene Oil
SoUL	Solar Urja Lamps
SRC	SoUL Repair Centre
SRCM	SoUL Repair Centre Manager
TERI	The Energy and Resource Institute

Executive Summary

Lighting provision with Solar Portable Lights appears to be the most preferred intervention in remote rural areas inhabited by people whose energy needs are still found to be at primary stage. 'One Million SoUL' Program is envisioned to provide solar lamps for students to facilitate their education needs. To achieve last mile coverage, IIT-B decided on partnership approach where they would work along local NGOs for implementation having presence in the particular region. The purpose of this study is to assess the socio-economic impacts in Mandla District of Madhya Pradesh. Research for the assessment included literature review of existing initiatives and their impacts, which was followed by field visit to conduct focused group discussions and in-depth interviews with the different stakeholders involved in the 'One Million SoUL' Program implementation in Mandla District, Madhya Pradesh.

When trying to understand the socio-economic impacts of Million SoUL Program, it was found solar lamps distributed as part of the initiative fit into the multi-functional aspects of life of people. With the advent of lanterns, numbers of positive changes are observed with respect to increase in study hours, social interactions, improved working conditions at household and savings from reduced consumption of other lighting fuels. Through the study, a positive linkage is established between the better lighting source and its impacts on day to day lives of rural poor. However, the process of transition from traditional fuels to modern source of lighting is found to be slower than as anticipated. Several learnings from the present study can be used to improve upon the Program in further implementation stages.

Chapter 1: Introduction

Energy access is fundamental to human, social, and economic development and a prerequisite for achieving millennium development goals (MDGs). Energy access as defined United Nations (2010) in special report on Energy for Sustainable Future "access to clean, reliable and affordable energy services for cooking and heating, lighting, communications and productive uses." Without such access, communities in rural areas tends to remain energy poor. Tough energy poverty is multidimensional, we in this report look only at access to electricity, or rather lack of it and how decentralized solutions like "solar lamp" Program help in reducing the energy poverty. Energy poverty remains a critical challenge for developing countries with over 1.2 billion people still believed to not having access to electricity (IEA 2011).

1.1. Energy poverty as a reality

Literatures identifies affordability and accessibility as main barriers for adoption of modern energy services (Reddy and Srinivas 2009; Bhide and Monroy 2010). High capital costs are involved establishing energy services (also time consuming) and communities from lowest economic strata are unable to cover these cost thereby depriving poor communities of accessibility to energy. They meet their primary energy needs via traditional sources and surviving with minimal energy for productive purposes. With insufficient energy availability, their economic growth remains low with minimal amount left for purchase of modern energy sources. Interestingly, these lowest economic households spend more on their energy needs as compared to other households (Pachauri et al. 2004).

Thus income influence on energy transition is linear. The argument presented here looks not only at who is energy poor, but also attempts to

look into the underlying factors which make them energy poor. Some practitioners argue energy poverty transcends just affordability and accessibility. Demographic, social, cultural, and political factors influence household decision making process towards energy consumption (Savacool 2012; Baiyegunhi and Hassan 2014). Having said, it is imperative to understand to though immeasurable these factors shape affordability and accessibility of modern energy services to rural poor. Stricter restrictions (policies) towards forest conservation will create shortfall of biomass availability of cooking. Energy ladder theory applied here will suggest communities will move towards subsidized kerosene as a cooking source from biomass. With restrictions on quota of subsidized kerosene availability and also being main source of lighting for rural poor, there seem to be no sustainable option left satisfying energy needs.

1.2. Energy Situation in India

Electrification status looks quite grim in the country. Although Census (2011) data suggest almost 95 percent of villages in India as electrified, only 55.2 percent rural households are non-electrified. In sheer number, population of over 400 million still lives darkness after sunset (Balachandran 2011). Even electrified households are plagued with constant power cut problems and intermittent supply. They particularly depend upon subsidized kerosene or candles, which pose substantial issues like health problems, energy poverty at community level and pose a burden on state and national financial budgets (Nouni et al. 2009).

1.3. Emergence of Alternative Solution

Alternative solutions to grid-electrification in form the solar technologies are making its way into rural areas through various initiatives by government and other development organizations. Although the solar energy

consumption in rural areas is low and still in primary stages, there has been a significant improvement in terms of their share over past few years. One such application is use of solar lamps that are seen low hanging fruit which is easier to implement as an alternative solution. With low cost and high adoption ratio, solar lamps have emerged as effective solution in providing better and cleaner source of lighting to economically poor communities. The study focuses on one such initiative namely "Million SoUL" by Indian Institute of Technology Bombay, where an impact assessment was conducted in Mandla district of Madhya Pradesh.

Chapter 2: Research Design

Scope of the current study is to get first-hand knowledge about the impact of solar lamps on the lifestyle and livelihoods of its beneficiaries in rural electrified and non-electrified households. The study also examines the challenges faced in the entire process of implementation and monitoring of the Million SoUL Program and in the performance of the solar lamps. The study evaluates the:

a. Socio-economic impact on the households
b. Localization model for scalability and replicability
c. Performance of SoUL Lamps
d. Market potential for solar products in rural areas

2.1. Study area

This study was conducted in three blocks of the Mandla District, Madhya Pradesh namely Bichiya, Ghughari and Mandla. Mandla is a tribal district in Madhya Pradesh. There is a dominance of scheduled tribes (ST) in most of the blocks in this district with smaller share of scheduled caste (SC) and of other backward castes (OBC). In the Bichiya and Ghugari block, the ST category was 62% and 70% respectively whereas in Mandla block represented only 37% of the population. On the other hand, the OBC category was dominant in Mandla block with a share of 58%, while Bichiya had 34% and Ghugari 27% share. SC category was the least in these blocks with 4% in Bichiya, 3% in Ghugari and 5% in Mandla. A total of 18 villages were selected for conducting the study. Among these, 9 villages were selected from Ghughari block, 5 villages from Bichiya and 4 villages from Mandla Block.

2.2. Methodology

This study primarily employed qualitative research methods of data collection. The participatory rural appraisal (PRA) which includes focus group discussions (daily activity schedule, and mobility maps) and key informant interviews (KIIs) were employed for the study. Stakeholder interactions were conducted at the level of community as well as at the institutional partner (IP) level for impact assessment of the Million SoUL Intervention.

2.2.1. Focus Group Discussions (FGDs)

FGDs were organized to assess the impact in some selected villages.FGD is a method of qualitative study used for capturing information not covered in the structured questionnaires. It involved stakeholders such as children and their parents, both fathers' and mothers'. A total of 54 FGDs were conducted in the selected sample villages. This exercise involved collecting both men and women's daily activity schedules and mobility maps. Testimonials and drawings of school children in classes V-XII were collected to assess the impact of SoUL lamps in their lives.

2.2.2. Key Informant Interviews (KIIs)

Key informant interviews were also conducted (74 interviews) during the study mainly with Sarpanchs, Public Distribution shop (PDS) owners, school teachers, IP staff, field officers, assemblers and distributors to determine the impact of SoUL.

2.3. Data Analysis

FGDs and KIIs were conducted with various stakeholders and a general inductive approach was used for the content analysis involving repeated readings to identify the major themes of the overall impact of SoUL. The first step in the process was reading, which involved repeated reading of the field

notes for the language, content and format. The second step in the process was coding, which involved grouping the text into different themes. The third step in the process was collation, which involved compiling all the data into broader themes. The fourth and final step in the process was interpretation, which involved analyzing and interpreting the thematically grouped data contextually and theoretically.

2.4. Limitations of the study

As it was a qualitative study, it was not possible to quantify the impact. However, this study will help ratifying the findings from the quantitative study. Out of the three blocks that were covered by the study, solar lamps (SoUL lamps) were distributed in two blocks (Mandla and Bichiya) very recently. In some schools, it had not even been 10 days since its distribution; therefore impact assessment in such situations did not yield meaningful findings.

Chapter 3: Evaluation of Program Design - CARD

3.1. Institutional Approach

This was the first opportunity for CARD, the IP selected as partner in the Mandla region, to work in the energy domain. Their approach was limited to employing assemblers & distributors for implementation of the Program in the region. The IP had some learning to do as they were new in this area of work. They learned from experience that it was not possible to approach government schools directly to distribute lamps but that they required permission from higher education authorities to do so. CARD contacted the block development office (BDOs) to pledge their support towards the Program. After getting an official nod for distribution (implementation), distributors were asked to present the approval letter from the authorities to the school principal, who in turn permitted the distributors to distribute the lamps. However, misjudging the magnitude of work that was involved, CARD had not assigned an employee, exclusively to manage the Program but had distributed the work amongst their staff. This was evident from the conversation the research team had with Mr. Nilesh Dubey, cluster coordinator of the Mandla block, who explained his involvement in other Programs of the IP resulted in his being unable to devote his full attention towards this particular Program.

3.1.1. Selection of Assemblers and Distributors

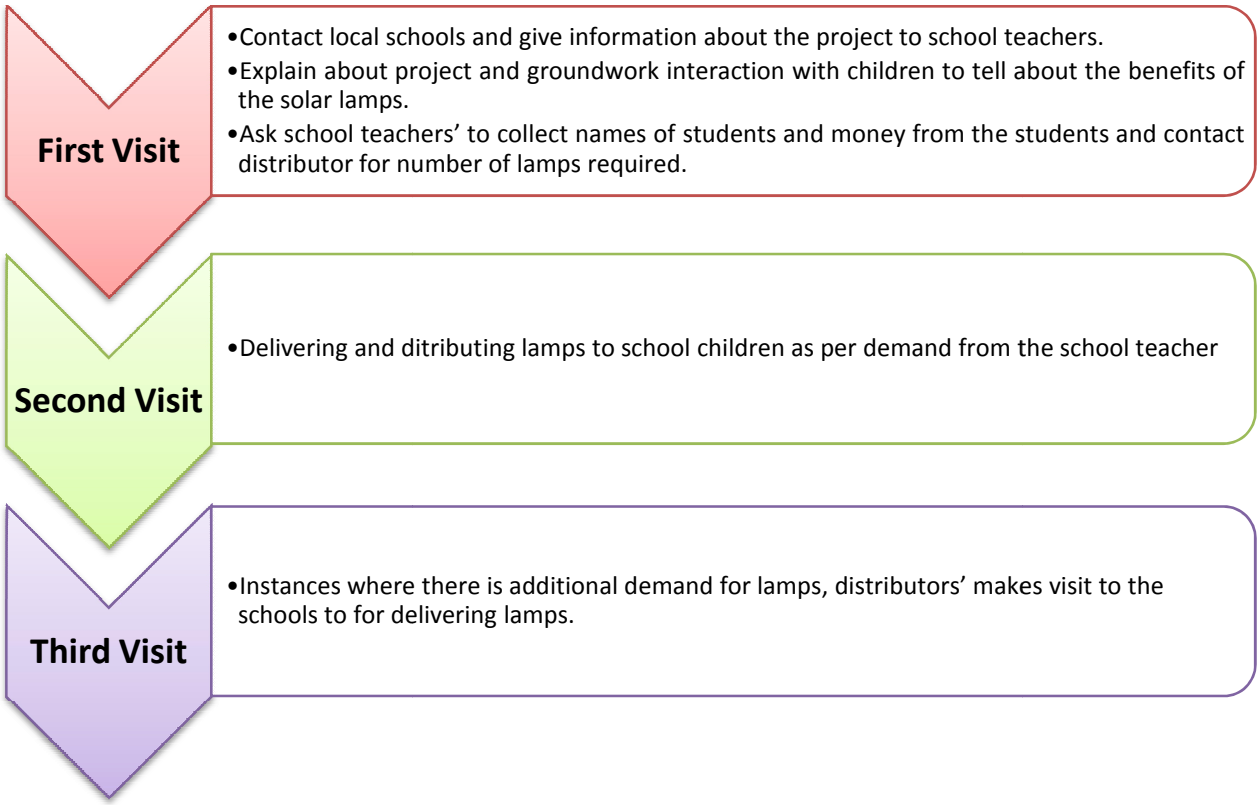
Selected Assemblers & Distributors initially were persons involved with the IP either as beneficiaries of earlier Programs or through reference from their contacts. New members, seeing an opportunity for gaining a livelihood, joined in different capacities.

3.1.2. Training of Assemblers & Distributors

Assemblers & Distributors were trained by IIT-Bombay Program personnel with the help of CARD on the IP's premises. They were given a three day comprehensive training on SoUL Program covering aspects relating to need and objective of the Program, benefits of SoUL to the communities, assembling the solar lamps with the help of tool-kits and distribution aspect including demonstration and DIS form filling.

Localization of the Program focused on skill building and employment generation in rural communities. Assemblers and distributors selected were provided with training on solar lamps along with additional livelihoods options to support their existing income. Over time, distributors were seen to be motivated by the Program's objective. An instance of this is the case of Hari Patel, a distributor and also a CARD self-help group coordinator who distributed 5 lamps at his own expense to orphans who had no means to purchase the lamp. Distributors also report about gaining higher status and recognition for their work within communities. As described by Manish Patel, a distributor studying final year B.Sc., "*people in the villages where I have worked recognize me and give me a higher status.*"

Figure 1: Distribution process followed by Distributors



Chapter 4: Community level Socio-Economic Impact Assessment of SoUL Lamp

4.1. Educational Benefits

The parents of most beneficiaries, living in either electrified or non-electrified households, observed that their children were more motivated towards studying since they started using solar lamps, with student interactions also corroborating the findings. They claimed that there was ease in the completion of the homework at night as compared to earlier, when there was no electricity and children had to study by the light of the chimney lamp. Respondents observed that better lighting conditions as compared to kerosene lamps provide safer environment for children to study and enabled them to complete their homework on time. Students reported increase in average study time and more motivation towards study using solar lamps. In the testimonials almost all the children highlighted the benefits derived from the lamp in terms of education, health, cost effectiveness and energy saving. In one of the testimonials, a student of Class 11 named Chandni Thakur from Kudwan village highlighted the problem she used to face while studying with the kerosene wick lamps and how solar lamps has helped overcome that difficulty, "*Earlier I used to study with the kerosene wick lamp which had low luminosity and I experienced frequent headaches due to the smoke arising from kerosene wicks. The best part of this lamp is that it has no side effect*".

Teachers informed that the response of the children was good after receiving the lamps compared to earlier situation when lack of light did not allow them to finish their work on time. They have witnessed an improvement in the performance of the students in terms of homework being done on time, and students have better attendance, marks and classroom interactions. During

an interview session, a teacher named Mr.S.S.Pandey of Madhpuri village, informed that the students had been taught earlier about solar and other alternative sources of energy as part of their curriculum and now they have been better able to understand the importance of solar energy in their lives.

4.2. Health Impact

Almost all the respondents (men, women, children, teacher, sarpanch or knowledgeable person) reported improved health benefits from the use of solar lamps. Earlier, the pollution caused by kerosene lamps caused damage to the health of the members of the households. Black soot emitted by the kerosene wick lamps affected the children's' eyes and noses, adversely. With high exposure to black soot they often complained about eye irritation, coughing and frequent headaches. This sometimes resulted in children missing school and even exams in some cases, as a result of poor health. Prolonged exposure even results in poor eyesight. Health benefits accrued from using solar lamps were helping students to concentrate better in their education. Sarawati Dibriya eight standard student from Tabalpani village said, "*Earlier when I used kerosene lamp for studying, smoke coming out of kerosene wicks caused frequent eye-irritation and blackening of nostril. Now, I don't face any such difficulties with use of solar lamps and am able to concentrate more while studying.*"

4.3. Economic Impact

During the study, most people emphasized the *cost effectiveness* of SoUL lamps. With one time investment on solar lamps more benefits were accrued as compared to other sources of lighting which have periodic expenses. They felt that solar lamps have helped to reduce electricity bill. Some respondents confirm the fact that such benefits translates into small financial savings through reduction in expenditure on other lighting sources like kerosene,

torch batteries and candles. Solar lamp's portability allows using it in various venues as one incident mentioned by Nandlal Yadav in Dhamangaon showed, "*recently, we held a children's' function in our village. We gathered 4 SoUL lamps for lighting purpose instead of gas lightings which helped us save around 400 rupees*."

During this study there was fair at Junwani village. Researcher visited around 12 shops. It was interesting to observe that among those 12 shops, 7 hawkers were using SoUL for lighting their shops.

4.4. Livelihood Benefits

Apart from supporting education and other household uses, communities perceive the solar lamps to be beneficial in conducting business activities. Solar lamps have assisted in conducting livelihood activities like *kirana shops* (grocery shops) or in *hatts* (local market). Women were able to conduct activities like "bheena" (sieve grains) better with help of brighter luminosity provided by solar lamps. SoUL was mostly used in agriculture-related activity. Villagers used SoUL to carrying straw back to the home from the fields in the evenings.

4.5. Employment generation through the Program

According to the chief functionary of CARD, an important aspect of this Million SoUL Program is employment generation through assembling and distribution activity. Program has enabled local youth become more confident with use of technology and in changing their mindsets towards employment at the local level. Now they are able to perceive benefits of solar

Figure 2: Women using SoUL while selling bangles at *Hatt* during evening

energy beyond the current scope of their work (that only looks at distributing lamps to children) and looks at various areas where solar technology could be used for the community's benefit. One distributor shared his thoughts about solar lamps stating it should be distributed among the farmers. Farmers need it for many agriculture related activities.

With local skill building, Million SoUL has given an opportunity to rural women to gain expertise in solar technology and a source of livelihood. The feeling of independence and confidence generated amongst the women assemblers and distributors was visible during their interactions with the research team. These women were now able to contribute to household income.

4.6. SoUL Use at Community gatherings

Soul is being used at evening gatherings of the people when they congregate to discuss various issues. It has been reported in many FGDs that people are using SoUL as lighting at engagement ceremonies, during small functions at home. There was an instance when it was used at a funeral in the Ahmadpur village.

Building a cadre of Independent Women – Transforming Lives

"My education was ridiculed by neighbors who said it is of no use if I am unable to a livelihood and that I should get married." recalls Anju Rajuk who lives in a family of 7 members. Anju Rajuk, a 20 year old girl from a small village Petegoan of Mandla Block got the opportunity to be associated SoUL programme as Assembler. Currently enrolled in B.Sc., her college is 11 Kms away from her residence.

She was searching job which would help her support her education. Her mother associated with the CARD organization as a SHG member introduced her to SoUL programme members. "Initially I was afraid towards assembling work. After my 4 days training I become confident about assembling lamp. After gaining expertise in assembling, I started to assemble 7 lamps per hour." Today, Anju has assembled total 1375 lamps. She also motivated her friend to join Million SoUL and allowed her to gain independence through working as a assembler.

With her remuneration, she paid Rs 5000/- as tuition fee. "I felt proud that I could make money for my education. Feeling of self dependency gives me confidence to dream big and achieve it." And she plans to buy two-wheeler vehicle for herself for commuting to college. She had also requested to distribution work from the NGO so as to earn more income for purchasing two-wheeler vehicle. When asked about future plans after the programme completion, she confidently replied, "I will continue my study. Assembling lamp is mostly sorted as men's work. If I could assemble lamp, then I can do many things to cover my education related expense. I will try to do small jobs like this. "

Her relatives and neighbors have recognized her work. "I have been provided with liberty to make my own life choices. I got the acceptance of my work." said by Anju with her confident smile.

4.7. Impact on Safety and Security

The positive impact of solar lamps on safety and security was uniformly felt by people across the three blocks. Most of the respondents informed us that they carry the solar lamps when they go to the farm fields at night, to meet their relatives and friends at night, to go to washrooms at a distance of about 250 meters. It was observed that the children experienced a new sense of freedom after receiving the solar lamp which allowed them to move around more confidently in the dark and run errands for their parents.

Another incidence which highlighted the safety aspect of solar lamps was narrated by Nilaram Bulke (a distributor). "*Once a woman was bitten by a snake in Dongariya village in the evening and there was no light then so the villagers got 10-12 lamps and treated the lady. After this incident there was higher demand for lamps. So the lamps have been very beneficial not only to students but also to others.*"

4.8. Impact on household activities

Solar lamps have brought a positive impact on household activities especially in the lives of women engaged in both on-farm and off-farm activities. The information gathered while conducting FGD with men and women, it was observed that earlier due to lack of access to clean and sustainable source of lighting, women found it difficult to complete household tasks during night hours or load shedding times. The daily activity schedule charts (FGD with men and women) revealed that with availability of SoUL lamps, household chores like cooking, eating, cleaning and accomplishing other household tasks have become easier. Visibility provided by the solar lamps helps reduce the time taken for completing the tasks thereby reducing physical and psychological burden on women.

4.9. Decline in use of Kerosene for lighting

Kerosene is supplied through *fair price shops* established under Public Distribution System at subsidized rate of 16 rupees per litre. The kerosene allocation to households depends upon a combination of two factors:

- economic status - above poverty line (APL), below poverty line (BPL), antyodaya anna yojana (AAY) and
- whether or not the household has cooking gas connection

Table 1: Basis of Kerosene Allocation in Madhya Pradesh

Economic Category	Kerosene oil*
APL	4 litres per card in case the beneficiary is non-gas user. 2 litres per card if the family has single cylinder connection and in case of double bottle connection (DBC), no kerosene is provided.
BPL	5 litres per card was allowed only in case of non-gas users.
AAY	-do-

*Maximum kerosene allocation to households with no LPG connection does not exceed 5 litres.

Lack of regular supply of kerosene to households is one of the main issues that communities face. While interacting with them, the people mentioned that they occasionally faced issues in even getting their allotted quota of kerosene. However, exchange of kerosene between households presents interesting picture of neighborly behavior where they borrow or purchase from each other in case of shortfall and return it when they get their own quota. Also purchasing kerosene beyond PDS prices [black market] was mentioned by some participants when their allotted quota did not meet their needs. In some cases, people quoted instances of individuals selling extra kerosene they had to tractor owners. In one case, the fair price shop owner

said, "*when someone comes to me for purchasing kerosene for commercial purpose, I just go to the chowk and call out to the people asking them if anyone has extra kerosene. Those who have extra kerosene will sell it to the person asking for it*." This was neither a common practice in this village nor was it practiced in other villages. However, this indicates the alternate uses of kerosene beyond households and/or the re-direction of subsidized kerosene for commercial use however at smaller quantity.

Domestic consumption of kerosene is mainly for lighting and cooking. Kerosene is used in wick lamps & lanterns for meeting lighting needs while it is also used for igniting biomass and in stoves for cooking purposes. With heavy reliance on biomass as a primary fuel for cooking, majority of households' reiterate the fact that consumption of kerosene is more for lighting than for cooking. Kerosene usage for lighting purposes is perceived to be on the decline, in general, within the communities, post purchase of solar lamps. Feedback from community interactions suggests that people now use less kerosene for lighting as a result of SoUL lamp. During one of the interactions with communities, a female respondent said, "*we can't go to buy kerosene in the rainy reason to society (fair price shop) because it is far away from the home, so we use saved kerosene for rainy season (next month).*" The reduction in use of kerosene is however mentioned in terms of using fewe*r number of kerosene wick lamps* or *lesser number of hours used* by some participants as compared to reduction in use of kerosene in terms of quantity.

Chapter 5: Conclusion

Catering to rural markets also presents unique challenges right from product/service delivery to post sales servicing. All issues prove to be a substantial challenge to the sustainability of the Program. Several constraints were faced by different stakeholders during the implementation of the Program.

1. Consignment Delays:

One important challenge faced in implementation was in relation to delay in product (lamp) delivery to the Program area. This is primarily a responsibility of the Programs' supplier. This consistent delay in the delivery of lamps created hurdles in effective functioning of partner institutions, field officers and distributors. Distributor retention becomes difficult under such circumstances since distributors are also involved in other livelihood activities and will not always be available for distribution on short notice.

2. Schedule:

Some non-beneficiaries' parents explained their inability to purchase the lamps due to the timing of distribution. As they do not have a fixed source of income, their household cash flow is irregular. Steps need to be taken to accommodate such students through appropriate credit based mechanisms.

3. IPs Participation:

All implementation activities such as receiving the consignment are co-ordinated by IITs field officers, while the IPs task is limited to providing the premises for assembly and to monitoring distribution by distributors. Data entry of the baseline data collected from the field is also one of the important tasks of the IP. However, they have failed many times to abide by the timeline set by the IIT team and the quality of data entry is often poor.

With excessive amount of data and no incentive to improve quality, CARD is facing severe challenges in terms of data management. Also central in achieving the SoUL objective is appropriate information dissemination and campaigning about the scheme. This must be done before scheme implementation and during the implementation phase. However, no such promotional activity was observed to be done in Mandla. Also, lack of campaigning strategy of established SRCs to the communities adds to the increasing shortfalls in post-sales servicing.

4. Servicing:

Concerns over increasing servicing needs are a major challenge emerging in the Mandla district. The users have started complaining about poor battery life and switch malfunctioning. Also, with communities being unaware of the warranty given with the solar lamps, they do not approach anyone for technical help. Though some SRCs are already established, people are still not aware of these facilities.

Lessons Learned

1. Positive Impact of Million Soul Program:

Program has demonstrated significant benefits to energy challenged households in the rural areas. Impact assessment and anecdotal evidences from the field effectively demonstrate how the solar lamps have impacted lives and livelihoods of the communities in these areas. Irrespective of whether it is subsidy based solution or direct investment by rural community, solar technology offers viable and cost-effective solution to energy poor communities.

2. Building effective monitoring management system

Results Based Management requires clearly and well defined targets that convey the Quality, Quantity and Time aspects. Without such targets it is remarkably difficult to maintain perspective of how much progress is being made, and how much more is required. While all Program risks clearly cannot be removed, a strategy that seeks to reduce the risk and ensure quick delivery of local outputs is desirable.

3. Partnership for Energy Access

Excellent co-operation shown by the various stakeholders' show the benefits of co-operation, with a partnership model is established for delivering essential services.

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Annexure

Annexure 1: Qualitative Approach

Aspects to be covered	Stakeholders	Tool
Socio-economic impact of SoUL on the beneficiary households & beyond		
1A. Economic Aspects		
➢ Employment generation • During implementation	IP staff, assemblers, distributors, repair & maintenance (R&M) service providers	**KII and FGDs**
• Potential (post-implementation)	IP Staff	**KII**
➢ Household level kerosene expenditure (reduced or not & why) ➢ Purchase of kerosene (amt. spent, stopped or not, if not used for what purposes) ➢ Saving from kerosene & used where ➢ Kerosene availability ➢ Kerosene quota per village	Parents of beneficiary students, PDS supplier/operator	**FGDs and KII**
1B.Social Aspects		
➢ Contribution of SoUL towards improvement in existing livelihood activity (even on a small scale)	IP in-charge, Parents of beneficiary students	**KII and FGDs**
➢ Performance in studies (attendance, grades, homework, interest, class interactions)	Principal, Teachers, Parents of beneficiary students	**FGDs and KII**
➢ Standard of living (ease of performing domestic activities, safety during movement at night)	Beneficiary students, Parents of	**FGDs + Daily Activity**

	beneficiary students	**Schedule**
➢ Health (kerosene, candle, fuel wood, smoke; accidents) ➢ Kerosene quality	Beneficiary students, Parents of beneficiary students	**FGDs**
➢ Gender	Mothers of beneficiary student, male & female beneficiaries	**FGDs**
➢ Drudgery reduction (procuring kerosene & cooking)	Beneficiary girl students, mother of beneficiary student	**FGDs + Mobility Maps**
➢ Other uses (during social functions, emergencies, livelihood activity, domestic chores etc.)	Beneficiary students, Parents of beneficiary students	**FGDs**
➢ Problems faced while using SoUL		**FGDs**
'Value' of SoUL (including environmental) perceived by beneficiary students, their families, and community (village)		
➢ Reduction in kerosene consumption for lighting	Beneficiary students, Parents of beneficiary students, teachers	**FGDs, KIIs**
➢ Perceptions about environmental benefits by people		
➢ Disposal of SoUL batteries		
➢ Feeling of ownership & care taken by the beneficiaries		
Replicability of 'localisation' model for solar based products		
• Campaigning & Distribution strategy, innovation if any & problems faced while implementing the Program	IP&Distributors, Field Officers	**KII**
• Problems faced by field officers, assemblers, distributors and data entry operators	FOs, Assemblers, Distributors	**KII, FGDs**

• Incentive structure for IP staff (supervisor, assemblers, distributors, data entry operators)	IP, Assemblers &Distributors	**KII**
• Saturation benchmark (percent of students not purchasing SoUL in the school out of eligible students and reasons for it)	IP, teachers, knowledgeable person in the community, non-beneficiaries	**KII, FGDs**
➢ Reasons for not purchasing SoUL	Parents of non-beneficiaries, teachers, IP, IITB Field officers	**FGD, KIIs**
Potential for solar energy products (domestic & non-domestic)		
• Domestic (lighting, cooking, heating) and non-domestic (irrigation, drying agricultural products and small enterprises) needs	Parents of beneficiary students	**FGDs**
• Institutional forms of implementation envisaged	IP	**KII and FGDs**
• Motivation and willingness for entrepreneurship due to skill transfer through SoUL Program	IP; SRCs	**FGDs**

Annexure 2: Sampling

State	District	Block	Block Code	Villages	Men FGD	Women FGD	Children FGD	KII Sarpanch	KII PDS	KII Teacher	KII Field officers	KII NGO	KII Assemblers	KII Distributors
Madhya Pradesh	Mandla	Ghughri	01	Dongarmandla	5	5	22	1	1	1	2	2	17	12
				Naytar	7	7	9			1				
				Gajraj	5		13	1		1				
				Jamwani	6	6	25	1		1				
				Devkura	8	6	15	2		1				
				Khoudakhurda	6		12	1	1	1				
				Padi	7	5	9	1	1	1				
				Mehli	7	5	17			1				
				Tabalpani	5	5	21	1		1				
		Bichhiya	02	Ahmadpur	11	8	15	1		1				
				Jagnathar	5	5	11	1	1	1				
				Dhutka	7	6	15	1	1	1				
				Mangavely	10	5	15		1	1				
				Dhanangaon	11	5	18		1	1				
		Mandla	03	Kudwan	6	5	8	1		1				
				Madhpuri	9	6	8	1	1	1				
				Surajpura	8	5	16	1		1				
				Bujbujiya	7	5	9	1		1				
Total Participants					**130**	**89**	**258**	**15**	**8**	**18**	**2**	**2**	**17**	**12**
Total FGD Participants					**477**									
Total Key Informant Interviews					**74**									

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