SOLAR HOME SYSTEM (SHS) USERS SURVEY REPORT

2018-10-30

1.0. SUMMARY

This report provides a summary of the findings of the survey conducted by the Resource Efficiency and Waste Management for Off-grid Solar Products (REWMOS) project with the aim of seeking customer experiences from using Solar Home Systems(SHS) i.e., charging problems, repair, use, etc. This information will be used in the subsequent REWMOS activities that focus on life extension of SHS, proper disposal and recycling, as well as identifying a viable business model. Data was collected by interviewing households with SHS and those that did not have, either face to face of through phone call. Our results suggest that there exists a gap in knowledge among SHS users regarding proper use and maintenance of their SHS; and, appropriate ways to dispose SHS or components when they reach their end of life. We recommend that retailers, manufacturers and other stakeholders to conduct education, sensitization, and awareness creation about the importance of using SHS as directed by the manufacturer; awareness on proper disposal of obsolete SHS/components or when they come to end of their useful life. Lastly, we recommend networking and partnership among stakeholders involved in use, recycling and disposal of SHS.

2.0. INTRODUCTION

Inaccessibility to electricity is one of the big issues facing majority of people living in rural areas. Some of the reasons for this include high poverty levels and location in remote areas where it is hard to be reached by the national grid. For their lighting needs they rely on kerosene lanterns which is not only expensive in the long run, but also causes indoor pollution and chronic lung problems. This situation has attracted distribution and selling of thousands of SHS in rural areas, which is the most practical, effective, affordable and economical source of power to people in remote communities. However, these SHS have a life-span and when they reach their end of life, they require proper ways of disposal.

REWMOS project is jointly implemented by myclimate and Solibrium-Solar, with support from REPIC. REWMOS activities aim to reduce the negative environmental impacts of solar home systems (SHS), by introducing an economically viable business model for electrical waste management and recycling of Solar Home Systems (SHS) components. The primary aims of REWMOS include: 1)Reduce the negative environmental impacts of SHS at the end of their lifespan and increase the value associated with owning a SHS for the end-user; 2) Identify the best practices for disposal/recycling at the end of a SHS lifespan; develop a network of stakeholders and partners to facilitate the processes; and 3) Identify a viable business model that can bring all stakeholders together; that is attractive to the end-user, viable for retailers, wholesalers, manufacturers, and practical for recycling. We conducted a survey on SHS users and non-SHS users between June – August 2018, with a primary goal to seek customer experiences from using SHS kits i.e., charging problems, repair, use, etc.; and to identify what customers want or desire in terms of lifespan extension; to find out if they would be willing to pay more for the kits in exchange of a longer warranty or if they would be willing to have a separate optional long warranty; and also if they were interested in a lease model rather than a Pay As You Go(PAYG) payment model among others.

3.0. METHODS

3.1. Household Selection

Households of SHS users were selected from the Solibrium Master sales record. Additional SHS users were identified in the field with the help of local field guides and Solibrium Sales Representatives. Names of prospect SHS users were obtained from Solibrium monitoring records as well as Eco2libriums's Stoves for Life Master record. The survey was conducted in Vihiga and Kakamega Counties in Western Kenya (Figure1).

3.2. Interviews

Interviews were conducted through phones calls and face to face. The questionnaire (Appendix1) was programmed in to Kobocollect Android program that had been pre-installed on tablets. Prior to field interviews, interviewers were trained on data collection procedures using protocol for

filling web forms in Kobo Collect (an Android app installed on a tablet). Surveyors from Eco2librium & Solibrium Ltd contacted selected households by phone (if available) to schedule interview. REWMOS Project Coordinator (Hardley Malema) supervised the surveys, got surveyors to do a trial run prior to actual interviews. Surveyors then visited households and conducted surveys.

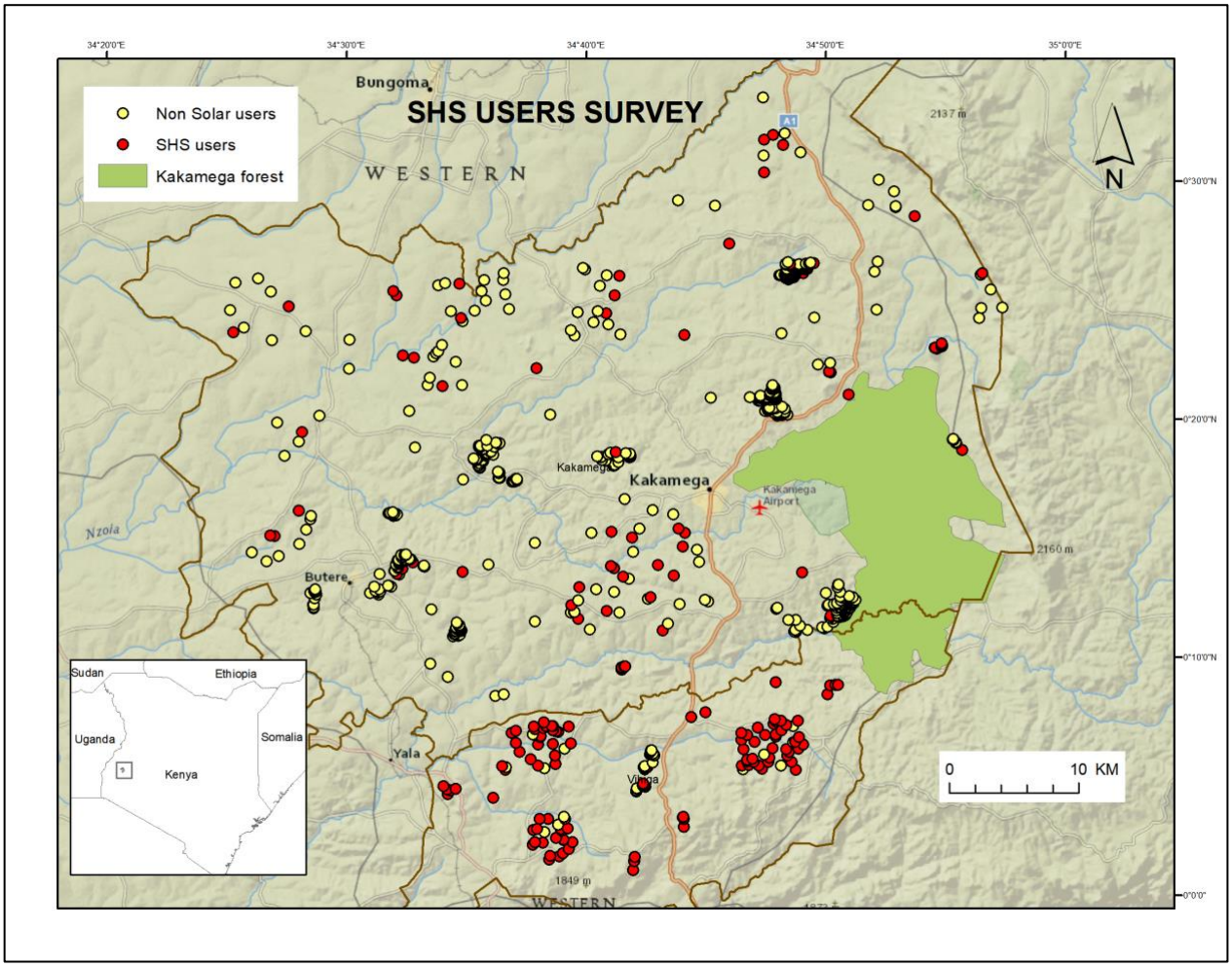

Figure 1: Location of surveyed households

4.0. RESULTS

4.1. General:

A total of 2096 household were successfully surveyed. These comprised of 1003 solar users and 1093 non-solar users. Out of the 1003 solar users, 223 (22.23%) were interviewed through phone calls while 780(77.77%) were interviewed face to face. Out of the 1093 non-solar users who were interviewed, 168 (15.37%) were interviewed through phone calls while 925(84.63%) were interviewed face to face. The median age of solar users and non-solar users was 39 and 42 respectively. The average family size for solar users was 6 ± 3, and 5±2 for non-solar users. 62.31% of solar users were female whereas 37.69% were male.

4.2. Presence of electricity connection

Majority of the households (both solar users{89%} and non-solar users{81}) did not have electricity (Figure 2).

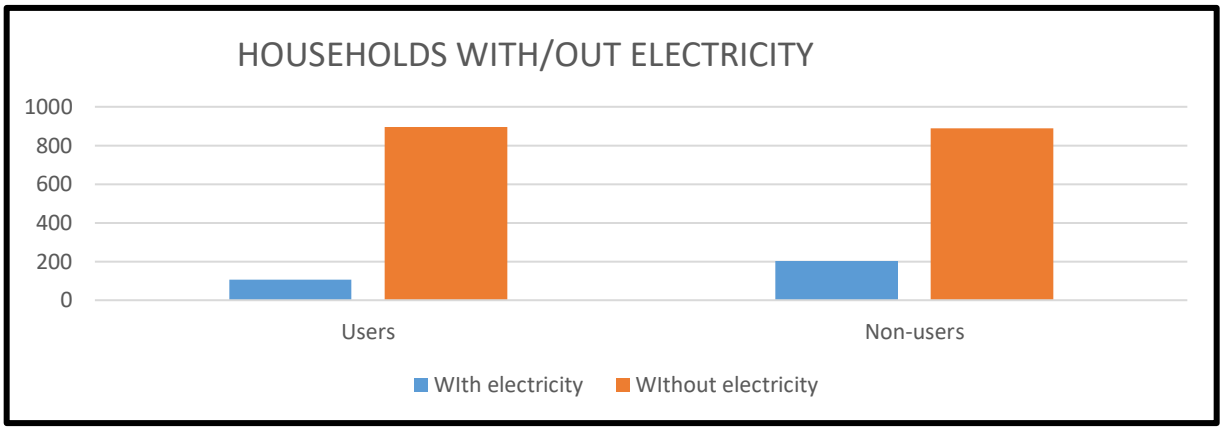

Figure 2: Number of households with electricity.

4.3. SHS retailers

There are several solar retailers in the region, and some of them included Agape electronics, M-kopa, Agrics, Mobisol, Azuri, One acre fund, Barefoot power company, Oparanya care, B-box, Solarpanda, Bidha sasa, Solartech, Biolite company, Solataa, Solibrium, Dlight, Sunking, Ecolof, World vision, and Fenix company. Two modes of payments for solar kits were prevalent: cash and PAYG. However, most of the kits were purchased on a PAYG payment system (83.65%). Majority of the solar users used their kits for lighting and phone charging.

4.4. Lease option vs PAYG

Even though most of the respondents (60%) understand what lease of SHS means, majority (95%) were not interested in lease but rather PAYG mode. In addition, at least 60% of all respondents were not willing to pay more for a longer warranty.

4.5. Types of SHS available

Regarding types and sizes of solar kits available, lighting kits were predominant. The second most prevalent kit was 4-lights solar kits. The least common type of kit was 7 lights with a TV (Figure3). Majority of the SHS users (75%) bought their SHS primarily for lighting and phone charging. 13% reported a combination of lighting, phone charging and entertainment.

4.6. SHS types & accessibility

When asked why they do not have solar home systems, majority of non-solar users attributed this situation to lack of access to SHS to this. Other reasons included lack of finances (Figure 4).

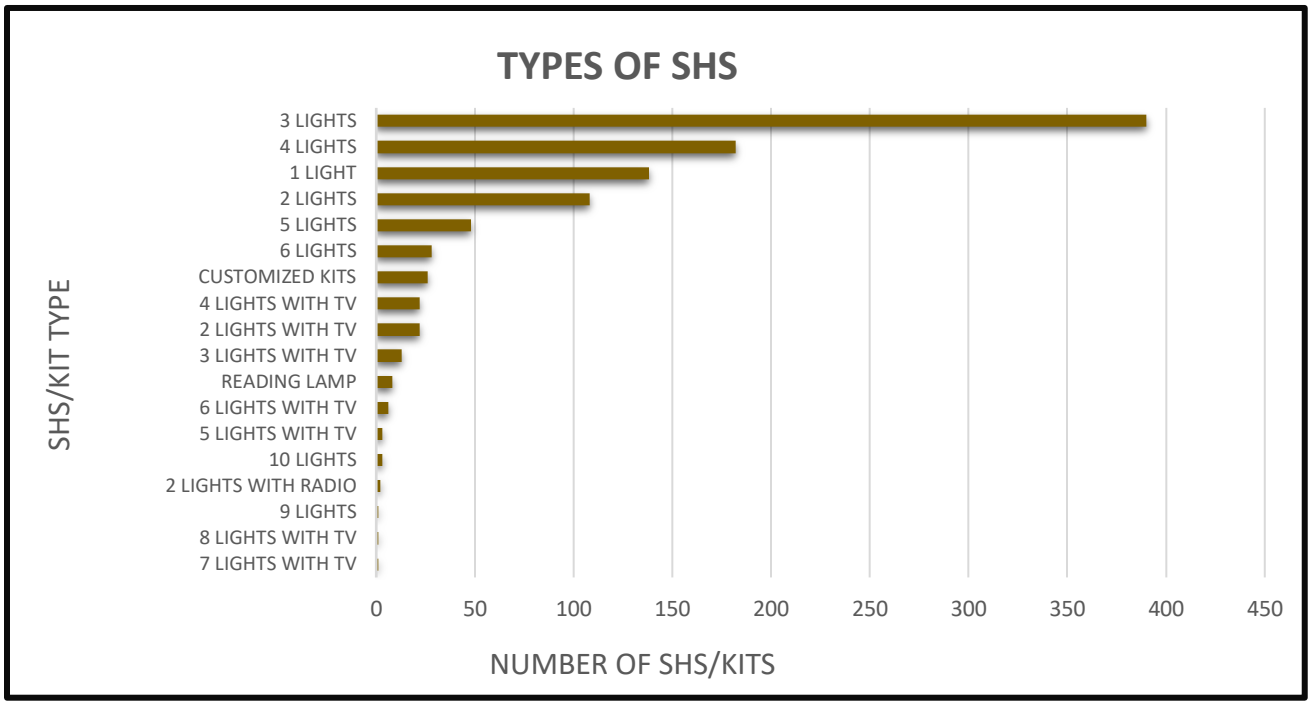

Figure 3: The types of SHS in households surveyed

4.7. Disposal of obsolete SHS and components

More than 85% of people who had solar kits were not aware of the lifespan of their SHS and components. Only 2% of the respondents were aware of recycling companies/facilities available in the region, and when asked how they intended to dispose their SHS when they become obsolete, majority said that they will seek advice from the seller/supplier. Other ways SHS users intend to dispose their kits when they reach end of life include: consult the National Environment Management Authority(NEMA), throw in a pit latrine, throw in the forest, give them to children as toys, sell to scrap dealers, take back to the company, burn, keep in the house (Figure 5). All SHS users said that their kits were wrapped in packaging materials at the time of purchase. Some of the packaging materials included or were made from cardboard boxes, Styrofoam, wrapping-papers, and plastic wrappings. These were disposed in various ways including keeping in the house, throwing in a pit latrine or toilets.

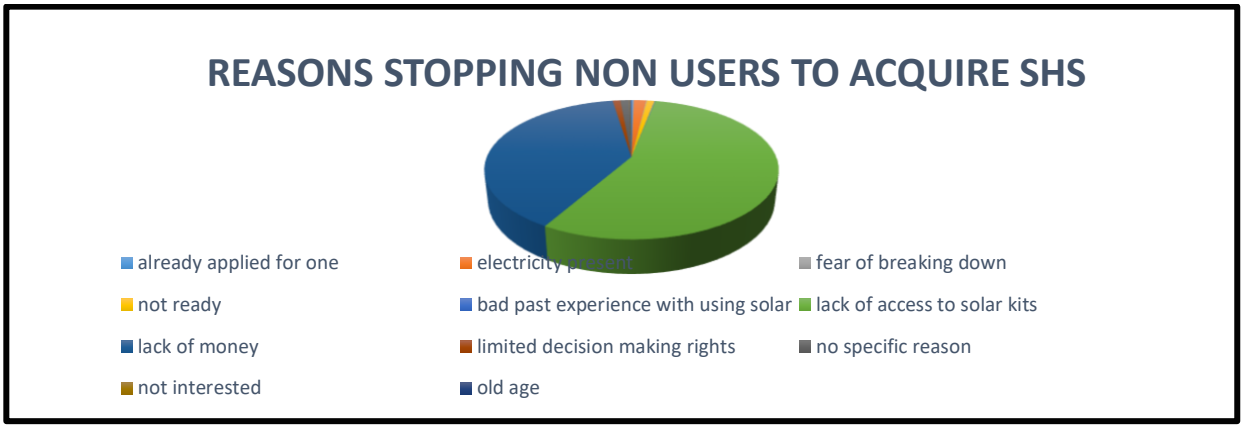

Figure 4: Reasons stopping people from acquiring SHSs

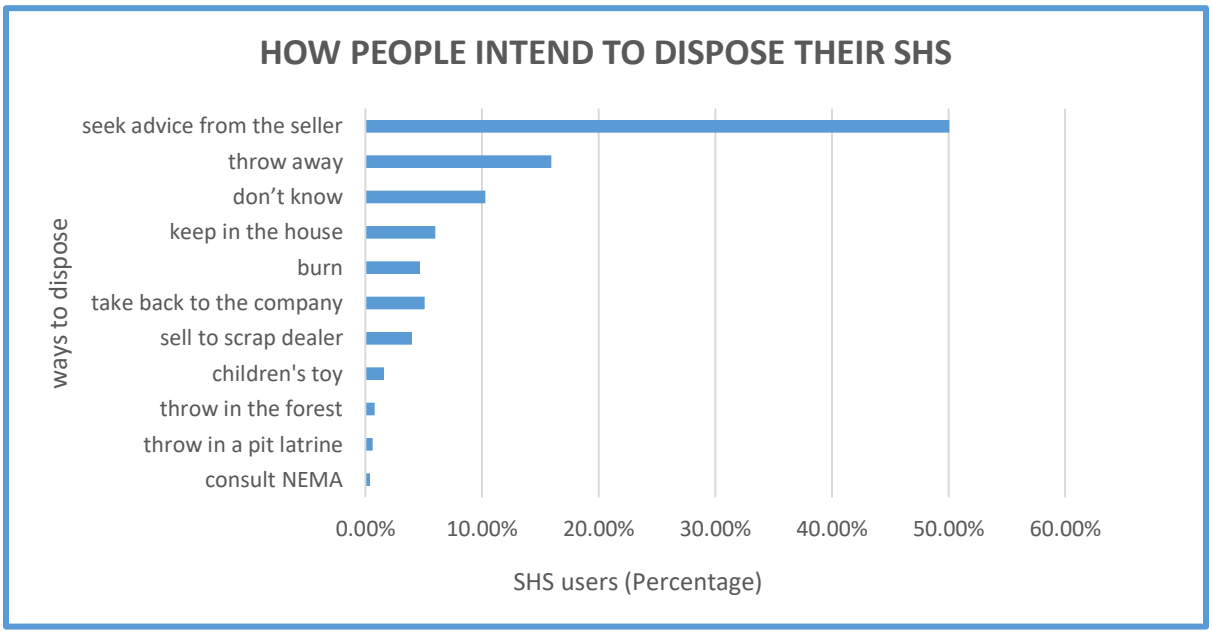

Figure 5: How do houesholds intend to dispose of the obsolete SHS?

5.0. DISCUSSION

Lack of access to electricity in rural areas remain as a challenge to many but it is slowly getting a solution with the increasing supply of solar home systems to rural areas. Women form a bigger percentage of people who have for a long time been directly affected by lack of electricity and other essential amenities in rural areas. This is consistent with our findings whereby most people who were found in homes at the time of interviews were women. Even with the increasing manufacture and supply of the SHS, people in rural areas still face several challenges that hinder them from accessing these SHS. Poor infrastructure is one of them. National and County governments continue to make efforts to distribute national electricity grid to rural areas, but lack of proper road and communication infrastructure continue to be a stumbling block. Similarly, many people in rural areas who have the ability and willingness to acquire SHS are hindered by limited accessibility to SHS. This problem can be addressed by all stakeholders (manufactures, retailers, repairers, government and all relevant institutions) working together to ensure that SHS reach the end users at affordable cost.

Our findings show that many people prefer PAYG as opposed to cash payments. This can be attributed to low income which makes it hard for people to make one-off cash payments for the SHS. Partnerships with local banks and/or microfinance organizations to provide soft loans people can help low income earners to make the initial payments on PAYG plan. This can help overcome the large initial investment associated with purchasing a system. Subsequently, energy savings can then result from not having to buy kerosene fuel, money that can be redirected for daily or monthly payments.

An increase in demand for SHS has opened business opportunities to may solar retailers. These retailers sell different SHS types from different manufacturers. Potential problem associated with the increased retailing of SHS is that there exists a potential risk of selling substandard SHS whose lifespan is short and cannot meet the needs of the people. Negative experiences with the use of SHS is likely to affect people's acceptance of the new technology. In the long term, counterfeit kits and lack of proper education on maintenance, care and use of the SHS can result to large volumes of obsolete or faulty SHS whose proper disposal would be a challenge. However, this can be taken care of by all stakeholders paying attention to quality of the SHS at manufacturing stage, proper education and awareness on use & maintenance at selling and usage stage.

Distribution and supply of SHS remain to be the most efficient, economical and practical solution to lighting problems for many people living in the rural areas. This however require guidelines and regulations that will help ensure that this meet the needs of the SHS users. Proper education and sensitization by the sellers on the need to follow recommended usage guidelines is important to contribution to extended useful life of the SHS. If this is done, then the projected problem on disposal can be mitigated. It is important for government to ensure that qualified technicians are certified to do repair of faulty SHS, as well as supporting institutions that are engaged in recycling of obsolete components.

6.0. CONCLUSIONS & WAY FORWARD

This survey showed that majority of both SHS users and non-users are NOT connected to grid electricity(KPLC) and that 3 & 4 lights were the predominant SHS. The main Solar electricity need for people is lighting and phone charging. The main hinderance to acquiring solar electricity is Lack of access to SHS. Majority of solar users are NOT aware of the lifespan of their SHS/components. Majority of both SHS users and non-users understand what LEASE means but are not interested in leasing option rather than PAYG. All (100%) of SHS come with packaging material. Some of these include: cardboards, Styrofoam, and plastic. Many people dispose or plan to dispose their obsolete SHS in ways that will create more harm than good both to people and environment. Some of the packaging materials are disposed by throwing away, keeping in the house, throwing in pit latrine. At the end of life of SHS, majority of the users intend to seek advice from the SHS on how to dispose their obsolete SHS/components.

This study provides the following recommendations and way forward:

- At the time of selling SHS, users should be educated and sensitized about the importance of using SHS as directed by the manufacturer, including plugging only recommended components. Manufactures can play a role on this through provision of manuals with pictorial/graphic guidelines e.g. location of ports for specific functions. Also, online, SMS and app-based sharing of instructions and information can be important.

- There is need for awareness creation on proper disposal of obsolete SHS/components or when they come to end of their useful life. For example, under no circumstances should components be disposed of in domestic fires, gardens or pit-latrines, and obsolete SHS components, especially batteries, should not be given to children as toys.

- Networking and partnership are recommended among stakeholders involved in use, recycling and disposal of SHS.

- Establishment of e-waste collection centres especially in rural and urban areas is highly recommended to make it easier for SHS users to surrender obsolete components for proper disposal and recycling. Also, a buy-back mechanism by recyclers, or manufacturers can act as an incentive for SHS users to surrender their obsolete SHS or components for recycling and proper disposal.

APPENDIX

Appendix 1: SOLAR CUSTOMER FEEDBACK QUESTIONNAIRE

Introduction	
1. Name of the interviewer	
2. Date of the interview	
3. Method of the interview	
4. Disclaimer: Thank you for agreeing to take part in this survey. Your responses, opinions, & thoughts will enable us to develop a framework for lifetime extension of off-grid solar products, introduction of economic viable business models for waste management, and the recycling of solar home systems. As such, any information given here will be used only for the intended purposes and any personal information will be kept confidential.	
Section 1. Personal details	
1.1.Name of the person interviewed	
1.2. Gender	
1.3. Respondent's phone number/Email	
1.4. Age	
Section 2. Demographic and Income details	
2.1. What is the size of the family?	
2.2. What is your role in the family?	
2.3. What is your source of income? And others in the family?	
2.4. Are you the decision maker when it comes to purchases?	

2.5. How many dependents do you have?	
2.6. What is your employment position?	
2.7. Do you have any position in your community?	
2.8. Do you own any property?	
Section 3. Solar home systems purchase	
3.1. Do you have electricity in your home?	
3.2. Do you have a solar home system?	☐ Yes ☐ No
3.3. What are the specifications and model of your SHS?	
3.4. Where did you buy it from?	
3.5. If the answer is NO on question 3.2, would you be interested in solar electricity that you pay in installments in your home?	☐ Yes ☐ No
3.6. If yes in the above question, what kind of SHS will you be willing you buy?	
3.7. If no, what is the biggest factor stopping you from buying an SHS?	
Section 4. Use and Maintenance	
4.1. Is the SHS in use?	
4.2. Are you satisfied with it?	

4.3. Please give reasons if the SHS is not in use?	
4.4. How would you improve your SHS?	
4.5. Have you acquired any additional components? If yes, please tick appropriately	a) Radio b) Speaker c) Reading Lamp d) Other – please specify ……
4.6. What do you use your kit for?	
4.7. How many users of SHS are in your family?	
4.8. Have you experienced any problems while using the SHS? Please describe.	
4.9. Do you maintain your kit?	
4.10. If yes, how often?	
4.11. If no, why not?	
4.12. Would you like to learn more about SHS maintenance?	
4.13. How do you charge your SHS?	
4.14. How long do you charge for?	
4.15. After how long does your battery run out?	
4.16. Do you plug additional items in the SHS?	
4.17. If yes, please name them	
Section 5. Payment of SHS and Lease Options	
5.1. How did you pay your kit? Cash or PAYG?	
5.2. If cash, how much	

5.3. If PAYG, how long is your repayment period?	
5.4. What are your daily/weekly/Monthly Payments?	
5.5. What interval payment do you prefer?	
5.6. Do you make payments on a regular basis based on your preferred time duration stated above?	
5.7. Are you aware of the lifespan of your SHS and its different components?	
5.8. If yes, how did you learn about it?	
5.9. If no, would you like to learn more?	
5.10. Would you be interested in paying more for the kit in exchange for a longer warranty?	
5.11. What is your take on the pay as you go model?	
5.12. Would you be interested in a lease model rather than the PAYG model?	
5.13. Do you understand what a lease is?	
5.14. If yes, please explain on your expectations.	
5.15. How much will you be willing to pay for the lease model?	
Section 6. Recycling and disposal	
6.1. Did your SHS & accessories come with packaging?	☐ Yes ☐ No

6.2. If yes, what did the packing consist of?	☐ Carboard box ☐ Plastic wrapping ☐ Styrofoam ☐ Wooden pellets / support ☐ Other plastic support ☐ Wrapping paper / paper support ☐ Other materials List / explain:
6.3. How did you dispose of the packaging materials?	Explain / list:
6.4. Did you reuse any of the packaging material in any way in your household?	Explain / list:
6.5. Have you ever replaced your SHS or a component on your SHS?	
6.6. If yes, how did you dispose of it?	
6.7. If no, how do you expect to replace a broken component?	
6.8. How would you dispose of it?	
6.9. Are you aware of any recycling companies or facilities?	
6.10. Would you return the kit for recycling without compensation / with compensation?	

6.11. What kind of compensation would you expect?	
6.12. Are you aware of the negative environmental impacts of SHS components?	
Section 7. REWMOS	
7.1. Are you aware of our project?	
7.2. Would you like to learn more?	
7.3. Would you be willing to participate?	
7.4Are you interested in learning more about maintenance, repair, recycling & disposal?	
7.5. Which of these interests you the most and which the least?	
7.6. Are you willing to attend REWMOS trainings?	
7.7. Will you expect compensation after attending the training?	
Section 8. General comments and feedback	
8.1. General comments	
Section 9. Signature and authorization to use information for the project	
9.1. Signature	