HIGH LEVEL STAKEHOLDER CONSULTATION REPORT

RESOURCE EFFICIENCY AND WASTE MANAGEMENT FOR OFF-GRID SOLAR PRODUCTS (REWMOS) IN KENYA

2018

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INTRODUCTION:

Kenya like other countries has embraced the use of clean energy especially the off grid solar products. Solar is major renewable energy source with the great potential to mitigate many of the challenges facing Kenya and the rest of the world today. Use of solar energy for lighting, entertainment and for other domestic and industrial use is increasingly becoming popular because it is versatile with many benefits to people and the environment. Unfortunately, these same off-grid solar products generate waste at the end of their life cycles. For example, some of the components such as batteries that are included with solar kits are made with lithium-ion and could be potentially hazardous to the environment if not disposed of properly.

Resource Efficiency and Waste Management for Off-grid Solar products (REWMOS) is a project that is jointly implemented by Solibrium Limited (http://www.solibrium-solar.com/) in partnership with myclimate(https://www.myclimate.org/), and with generous support from REPIC (http://www.repic.ch/repic-en/). The primary aim is to identify best practices for disposal/recycling of the off-grid solar components at the end of their lifespan, and to identify a viable business model that can attractive to the end user, viable for retailer, wholesaler & manufacturer, and practical for recycling. REWMOS conducted interviews with key stakeholders involved in e-waste management. These included government sector, informal sector, recycling companies, repair shops, Solar manufacturers, Retailers, Financial Institutions, Micro finance institutions, Non-Governmental Organizations, Environmental Authorities, Energy Authorities, County Governments, National level Authorities Tax and Customs authorities.

This report provides a summary of the highlights from these interviews which is useful for REWMOS in preparation for a joint brainstorming meeting/workshop that will bring all the stakeholders together.

1. ENGAGING MICRO FINANCE INSTITUTIONS:

The aim of engaging the Micro finance institutions was to explore their commitment to Resource efficiency and waste management for off-grid solar products (REWMOS), and to determine their financial schemes of supporting their clients with small loans towards the purchase of solar home systems, e-waste activities and their contribution and/or interest in spreading awareness of e-waste management. Below are the key highlights from the interviews.

I. SMEP Micro Finance Bank

The interview/discussion was held on 18-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Anton Esari – anton.esari@smep.co.ke

General information about the stakeholder

- ❖ SMEP Bank is a one-stop shop that provides cutting edge financial solutions to clients. Accounts are customized for the local and diaspora from savings accounts to fixed deposits. SMEP provides loans to churches and registered groups.
- SMEP is grounded by Christian values that serve the bedrock of operations.
- The type of loans offered:
  - ✓ Business loans
  - ✓ Education loans
  - ✓ Wash loans such as stima loan.
  - ✓ Asset finance
  - ✓ Agri business
  - ✓ Institution loans.
- A person who has banked with SMEP for at least 3 months is eligible for a loan.
- An institution which has banked with SMEP for at least 6 weeks is eligible for a loan.

- Currently they have 40,000 clients.
- The repayment rates are 15% to 22% of the principal amount depending on product the customer is taking.
- SMEP used to support energy and renewable entities, but currently they do not.
- If ideas are brought forth they can consider supporting energy entities, but it involves a lot of consultations.
- SMEP does not fund solar companies. However, they do buy solar products and resell them to their clients through a check off system.
- SMEP used to work with Dlight Company, but management issues resulted in termination of the contract.

Interest in sustainability and Solar home systems

- SMEP used to follow growth in the local SHS market, but currently they do not.
- Micro financing would consider an invest in solar energy equipment but involves a lot of consultations. Currently, the only thing they do is give referrals to their clients.
- Clients can access small loans for purchase of solar home systems through wash loans.
- 70% of the small SHS loans are doing well.
- There is a funding within SMEP portfolio for sustainable solutions.
- A partnership existed between Dlight solar company and SMEP but was terminated due to management issues.
- Currently, they only give referrals for Mobisol products.
- Promotion of sustainable solutions is done through referrals and wash loans.
- Supporting of E-waste projects is not being done, but it can be considered if its viable.

Awareness and CSR

- CSR forms an intrinsic part of the business strategy and funding exists for it.

- CSR policies focuses on churches and they give contributions.
- This is done during the end of the year.
- Awareness creation activities for sustainability is not being done. There is no long-term goals or vision for renewable energy and solar power.

REWMOS

- SMEP is willing to participate in our project workshops.
- The interviewee would not mind if contacted again.
- The role SMEP can play in the workshop include:
  - ✓ Train people on solar loans and how to take advantage.

General comments.

- Can Solibrium continue with the REWMOS project with REPIC and myclimate?
- What Geographic area will be covered by REWMOS?

II. Premier Credit Limited Micro finance

The interview/discussion was held on 19-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Kedemi Stafford – kedemistafford@gmail.com

General information about the stakeholder

- Premier Credit Limited was established in 2013 as a credit only micro finance that aimed to provide financial solutions to corporates, government and individual entrepreneurs by building lasting relationships with a vision to see them achieve their aspirations.

- Premier group has implemented its country and regional expansion strategy evidenced by opening of branches in Kenya, Uganda, and Tanzania.
- The type of loans offered include:
  - ✓ Consumer loans
  - ✓ Business loans
  - ✓ Partnership products.
- Any one above 18 years old with a permanent or contractual job is eligible for a loan. Most of the clients are civil servants.
- The repayment rates are 1.5 to 3.5 %, but mostly they get customized rates depending on the principal amount.
- Premier Micro finance supports energy and renewable entities through the Partnership of product dealers. Premier has partnered with manufacturers and distributors of high quality products like water tanks, solar lamps, bio-gas digesters, and home appliances. Thus, enabling clients to purchase the said products using financial support from premier credit.
- Premier does not fund solar companies. However, they do buy solar products and resell them to their clients through a check off system.

Interest and sustainability and solar home systems

- Premier Micro finance has been following growth in the local SHS market.
- The views on SHS are as follows:
  - ✓ Cheap electricity is a great competition to SHS.
  - ✓ The check off system to clients on SHS should be encouraged as opposed to PAYG daily payments that are uncertain. Daily payments can hinder consumption.
  - ✓ Complete SHS that come with TV kits are doing well.

- The Micro finance is already investing with solar energy equipment.
- Clients can access small loans for purchase of solar home systems. The loans are doing well because there is no default.
- A partnership between Premier Micro finance and Sun king existed before. Premier buys the SHS from Sun King on a cash basis and sells them to their clients through the check off systems.
- Premier has a funding within their portfolio for sustainable solutions.
- No E-waste projects have been considered for support, but they would be interested in doing so if need be.

Awareness and CSR

- Most of their CSR is done to children homes. This is done once a year and funding for the CSR exists.
- Premier Micro finance long term goals and vision for renewable energy and solar power is to enable clients to improve their livelihood by accessing light in their homes.
- No creation awareness activities on sustainability. They focus more on sales.

REWMOS

- He is willing to participate in our project workshops.
- He would not mind if contacted again.
- The role he can play in the Workshop is to create awareness about different solar loans that clients can take advantage of and create awareness about REWMOS.

III. Kenya Women Micro Finance Bank

❖ **The interview/discussion was held on 23-07-2018 and was attended by**

Hardley Malema – hardley.malema@solibrium-solar.com

Stephen Ng'ang'a Njuguna – snjuguna@kwftbank.com

General information about the Stakeholder

- KWFT is a fully-fledged Micro finance bank offering banking services that include both savings and credit products that cater for the needs of micro to medium sized entrepreneurs. The bank serves over 800,000 clients.
- The products are open to organized groups, individuals, and corporates. Families through the women can access the loans too.
- The types of loans offered are:
  - ✓ Business loans
  - ✓ Emergency loans
  - ✓ Education loans
  - ✓ Consumer loans
  - ✓ Clean and Renewable energy loans
  - ✓ Water, sanitation and Hygiene loans
- KWFT supports energy and renewable entities through clean energy loans. They support clean energy cooking stoves, solar lighting solutions, Bio-gas loans, and Stima loans.
- KWFT supports funding for the manufacturing of cook stoves.
- KWFT does not fund any solar companies.

Interest in sustainability & SHS

- KWFT has been following growth in the local SHS market because they are in touch with the markets and they attend forums such as lighting Africa forums.
- The views on SHS growth is that it is progressing well, but not still there since most Kenyans are yet to be connected to the grid.
- KWFT is already investing in solar energy equipment and are in partnership with Sunking.
- KWFT gives small loans for purchase of SHS. These loans provide access for the acquisition of environmentally safe products for lighting solutions and charging simple domestic. Overall 98% of the loans are doing well.

- KWFT through a Micro finance enterprise program was in a partnership with sustainable solutions organizations, but the contract ended.
- KWFT promotes sustainable solutions through marketing materials and word of mouth.
- There is no funding portfolio for sustainable solutions
- KWFT has not considered supporting E-waste projects, but they are looking forward to.

Awareness and CSR

- KWFT CSR policies are to go where the customers are and offer unique services i.e. portfolios.
- There is no funding for CSR.
- The long-term goals and vision for renewable energy and solar power is to support ORB energy and innovations in solar.
- KWFT does not conduct awareness creation activities on sustainability.

REWMOS

- He will be willing to participate in project workshops.
- How we can partner in management of E-waste is the role he can play in the workshops.
- He would not mind if contacted again.

2. ENGAGING FINANCIAL INSTITUTIONS (BANKS):

The aim of engaging the banks was to identify their role in spreading sustainable solutions, their CSR policies, and any funding in support of these schemes. Also, to determine their market projections, their views on solar growth, what kind of revenues solar can produce, and if it is something they can invest in.

Just like the Micro finance institutions there was a need to explore their commitment to Resource efficiency and waste management for off-grid solar products (REWMOS). Plus, to determine their financial schemes in support of small loans towards the purchase of solar home systems, E-waste activities, their willingness and/or interest in spreading awareness, and if they are raising any awareness on the issue. Below are the results of the interviews.

I. Co-operative Bank of Kenya

The interview was held on 2018-07-20 and was attended by:

Hardley Malema- hardley.malema@solibrium-solar.com

Nelson Ochieng - ogonynel@gmail.com

General information about the Stakeholder

- Co-operative bank of Kenya limited, is incorporated in Kenya under the Company Act and is licensed to do the business of banking under the banking Act.
- The bank's core focus is retail banking.
- The types of loans offered are:
  - ✓ Personal loans
  - ✓ Business loans
  - ✓ Asset finance
  - ✓ Mortgage finance
- Any person who is above 18 years, i.e. a business person/employed person who is qualifies is eligible for a loan.
- The repayment rates vary with loan amount and period. A loan calculator is available at the website for anyone to calculate.

Interest in sustainability and SHS

- The bank does not support any energy and renewable entities.

- Growth in local SHS market has not been followed by the bank.
- The views on solar SHS growth is as follows:
  - ✓ Solar electricity is convenient and saves on costs.
- Co-Operative bank would consider investing in solar energy after consultations.
- The bank does not give small loans for the purchase of SHS to clients.
- Consultations must be made whether to consider developing a finance product for households to access SHS, micro grids, and other renewables.
- KCB has no partnership with any sustainable solutions.
- No promotion of sustainable solutions is being done, since there is no funding portfolio.
- No support is being considered in E-waste projects, but it will be raised for consultations.

Awareness and CSR

- No CSR policies currently exist.
- There is no funding of CSR, since the staff contribute as a team.
- There is no long-term goal and vision for renewable energy and solar power.
- No creation awareness is done on sustainability.

REWMOS

- He would be willing to participate in our project workshops.
- He is open to play any role of participation.
- He would not mind if we contacted him again.
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II. Equity Bank

The interview was held on 2018-07-19 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Allan Omondi - allan.veron@gmail.com

General information about the stakeholder

- Equity banks offers inclusive customer focused financial services that socially and economically empower their clients and other stakeholders.
- Equity Bank Limited is incorporated, registered under the Kenyan companies Act cap 486 and domiciled in Kenya.
- The core focus area is Retail and commercial banking.
- The type of loans offered include:
  - ✓ Consumer loans
  - ✓ Mortgage loans
  - ✓ Business loans
  - ✓ Asset finance
  - ✓ Development loans
- Any person who is employed/in business/pensioner/farmer is eligible for a loan.
- The repayment rates are 13.5%.
- Equity bank supports and finances energy and renewable entities. This is done through the system tools kit (STK) as well as offering office space to the energy companies.

Interest in sustainability and SHS

- Equity bank has not been keenly following growth in the local SHS market.
- The views on SHS growth is as follows:
  - ✓ There has been growth in SHS
  - ✓ Serious SHS brands are coming up.
  - ✓ SHS quality products slowly becoming an issue.
- The bank would invest in solar energy equipment after consultations.
- The bank offers small loan for purchase of SHS to clients. The payments from clients are as good as other products.
- The bank is in partnership with a sustainable solution organization called Eco-moto and Dlight.
- There is a funding portfolio for sustainable solutions and promotion of sustainable solutions is done through:
  - ✓ Equity Group Foundation Pillar
  - ✓ Master card
  - ✓ Education
  - ✓ Health
  - ✓ Environment
- E-waste projects are currently not supported, but they are interested in doing so.

Awareness and CSR

- CSR policies are based on conserving the environment.
- There is a funding for CSR, but it's not open to the public.

- The long-term goals and vision for renewable energy is to conserve the environment and promote clean energy.
- Awareness creation activities is done on sustainability through Equity Group Foundation and trainings.
- The specific areas focused on environment.
- Promotion is done through education, some funding and partnerships.

REWMOS

- He would be willing to participate in our project workshops.
- He would like to play the creation awareness role.
- He would not mind being contacted again.

General comments

- He wanted to know what Solibrium is doing in terms of competition to have an advantage/edge over other solar retailers.

III. Barclays Bank

The interview was held on 2018-07-23 and was attended by:

Gilfine Nyangasi – gilfine.nyangasi@solibrium-solar.com

Joseph Kirui – joseph.kirui@barclays.com

General information about the stakeholder

- Barclays bank deals in Retail Commercial and Investment banking
- It offers loans to both retail, commercial and SME clients
- The loans are issued as long as a client can demonstrate serviability.

- The interest rates applied by the bank on the loans are regulated by the Central bank of Kenya. At the moment the rate is at around 13.5% pa.

- The bank cannot single out a direct support offered to the energy and renewables entities. However, this can be derived from the loan facility issued to electrical and electronic entities.

Interest in sustainability and SHS

- Barclays bank has yet demonstrated any direct interest on SHS.

Awareness and CSR

- Barclay's CSR information is not open to the public and therefore no much on the same could be obtained.

REWMOS

- The respondent is willing to participate in REWMOS as an individual.
- He would be happy to give individual feedback and experience has had with SHS
- He is willing to be contacted again whenever there is need to do so.

3. ENGAGING GOVERNMENT INSTITUTIONS:

The aim of engaging the Energy Regulatory Commission was to explore their commitment to Resource efficiency and waste management for off-grid solar products (REWMOS). Also, to determine their views on SHS growth, expectations when SHS start to break down, the number of SHS users in Kenya, how they are promoting SHS usage, and if they have a sustainability approach. Plus, their commitment to encourage solar power awareness and how they are tackling the end-of-life period for SHS. Below are the results of the interviews.

I. Government (Energy Authority) – Energy Regulatory Commission

The interview/discussion was held on 24-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Chris Amutabi - chris.amutabi@solibrium-solar.com

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

Robert Chirchir - robert.chirchir@erc.go.ke

General information about the stakeholder

- The Energy Regulatory Commission is established under the Energy Act of 2006 with the following objectives and functions:
  - ✓ Regulate the electrical energy, petroleum and related products, renewable energy, and other forms of energy.
  - ✓ Protect the interests of consumers, investors, and other stakeholder interests.
  - ✓ Maintain a list of accredited energy auditors as may be prescribed.
  - ✓ Monitor to ensure implementation and observance of fair competition in the energy sector in coordination with other statutory authorities.
  - ✓ Provide such information and statistics to the Minister as he may require from time to time.
  - ✓ Collect and maintain energy data.
  - ✓ Prepare indicative national energy plan.
  - ✓ Perform any other function that is incidental or consequential to its function under the Energy Act or any other written law.
- ERC mostly deals with Regulatory agencies during the implementation of regulations. This is done in partnership with Kenya Revenue Authority. Following implementation projects are inspected to ensure they meet standards.
- ERC's vision is to encourage energy development and help Kenyans connect to the grid.

Interest in solar and SHS

- ERC is promoting solar by ensuring they are zero rated.
- SHS do not require licensing and that is to encourage solar power. They also ensure the components are up to standards.
- A survey is now in progress to identify the number of SHS users as well as the number of components that are in obsolete.
- Repair of SHS should be done by ERC certified technicians.
- Many of the components are failing since repairs are done by Quacks. Most components fail in the first year.

Regulation and enforcement

- Manufacture and disposal should be done according to MKA 1999 and OSHA 2000.
- ERC does not come up with any rules and regulations, as this is left to NEMA.

Awareness and Trainings

- General awareness creation activities are done for E-waste, but no off-grid solar products are covered.
- No red flags have been identified on disposal.
- Training is conducted to solar technicians who have licenses.

REWMOS

- He will be willing to participate in our project workshops.
- Sensitization and awareness are the roles ERC can be play.
- He would not mind being contacted again.

General comments

- Solibrium should consult with Rural Electrification Authority to acquire the number of SHS installed in the country.
- Awareness is done through workshops. This is occasionally done when needed.

II. Government (National Level Authority) – Ministry of Energy

The interview/discussion was held on 26-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Chris Amutabi - Chris.amutabi@solibrium-solar.com

Edwin Kipruto -edwin.kipruto@solibrium-solar.com

Engineer Kasanga.

General information about the stakeholder

- Ministry of energy main functions are
  - ✓ Energy Policy and Development.
  - ✓ Hydro power Development.
  - ✓ Geothermal Exploration and Development.
  - ✓ Rural Electrification Programing.
  - ✓ Renewable Energy Promotion and Development
  - ✓ Energy Regulation, Security, and Conservation.
  - ✓ Fossil Fuels Exploration and Development.
- Ministry of Energy is one of the key enablers of the 2030 Vision and believes that energy security remains a matter of national priority. The 2103 – 2017 Second medium plan identifies Ministry of Energy as one of the enablers for transformation into "a newly-industrializing, middle-income country providing a high quality of life to all its citizens in a clean and secure environment". They believe that access to competitive-priced,

reliable, quality, safe, and sustainable energy is essential for achievement of the Kenya Vision 2030.

- Ministry of Energy provides guidelines to ERC for implementation. ERC and Rural Electrification Authority are parastatals under the ministry in regulations.

Interest in Solar and SHS

- The ministry looks at the sources/supply of power, such as Wind, Solar and Hydroelectricity.
- Off-grid solar products are very minimal.
- Promotion of solar is done through:
  - ✓ Solar mini grids to the markets.
  - ✓ Stand-alone SHS.
  - ✓ Government supply of solar electricity to health centers, schools, and chief offices in marginalized areas.
- Ministry of Energy has installed some 2.5 Megawatts solar power in schools.

Regulations and Enforcement.

- No regulations on E-waste currently exists.
- The ministry of Energy does not come up with regulations. However, they feel that E-waste regulations should cut across the board for all types of E-waste.

Awareness

- Awareness is done on E-waste in general on as needed basis. Awareness is done through:
  - ✓ Exhibitions and Shows.
  - ✓ Fliers.
  - ✓ Energy centers.

- Special training for technicians is only done by ERC.

REWMOS

- He would not mind participating in our project workshops.
- He would not mind being contacted again.
- He would partner with REWMOS on creation of awareness on proper disposing and recycling.

III. Government (Tax Customs and Authority) – Kenya Revenue Authority

The interview/discussion was held on 23-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Brian Mbiyu - mbiyubrian@outlook.com

Moureen Komen - robireen@gmail.com

General information about the Stakeholder

- Kenya Revenue Authority is an agency of the government of Kenya that is responsible for the assessment, collection, and accounting for all revenues that are due to the government in accordance with Kenyan laws.
- Sustainability and renewable energy are not within their scope of work.

Interest in sustainability & SHS

- KRA promotes solar power by ensuring they are zero rated.
- This is done in partnership with KRA.
- No roles in recycling and repair have been laid out.
- No fiscal incentives exist to promote SHS to businesses.

Awareness

- No awareness creation activities are done on E-waste since there are no policies in place.
- NEMA oversees all E-waste management.

REWMOS

- They will be willing to participate in project workshops to find out more about the project.
- They would not mind being contacted again.

4. ENGAGING COUNTY GOVERNMENTS:

The aim of engaging the County governments was to determine the current laws regarding SHS and related components, plus to determine what extent the state of play is in their areas. All highly focusing on how the enforcement and procedures of encouraging the proper disposal and recycling are done.

I. Kakamega County Government

The interview/discussion was held on 20-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Palapala Muteshi –muteshi@yahoo.com

Jacob Shamala –jacob.shamala@gmail.com

Peter Mathia .

General information about the stakeholder

- The Constitution of Kenya along with other changes allows the establishment of forty-seven (47) County Governments. This helps to give the local people and communities an opportunity to make decisions and manage their own affairs through elected leaders and representatives. Kakamega County is one of the 47 counties created by the Constitution. There is need for future county planning in terms of economic, social, environmental, and political development. This requires full involvement of stakeholders to identify development needs, opportunities, and challenges. Then allowing them to come up with localized and home-grown interventions. The constitution recognizes the need for integrity in governance and public participation in public development issues. The people therefore need to originate development issues that address their needs.
- The devolved functions for the County include:
    - ✓ Agriculture
    - ✓ Health services
    - ✓ Control of air pollution, noise pollution and other public nuisances
    - ✓ Cultural activities
    - ✓ Trade development and regulation
    - ✓ County planning and development
    - ✓ Ensuring and coordinating the participation of communities and locations in governance at the local levels
    - ✓ Assisting communities and locations to develop the administrative capacity for effective exercise of functions, powers, and participation in governance at the local level

Interest in SHS

- The county government has not been keen on solar power.
- No clear frame work is outlined for when SHS begin to break down.
- Disposal of E-waste is expected to be a challenge soon, since more electronic equipment is being brought to the market.
- Issue of segregation and disposal will be a challenging if precautions are not taken in advance.

Regulations

- A bill of E-waste regulations has been drafted and is currently at the legal department for more interpretation.
- The draft bill will then be sent to the county assembly to be affected as a bill.
- The county government will draft some regulations for obsolete off-grid solar products in some time.
- The county government will share with REWMOS the proposed drafted bill in some time.
- No incentives exist for organizations that will comply with the regulations, but with time they might consider.

Awareness

- No public awareness on disposal/recycling of obsolete E-waste is being done.
- Tight budget allocations make it impossible to conduct awareness.

REWMOS

- The county government will be willing to attend project workshops.
- They would participate in environment education and sensitization.

- They would not mind being contacted again.

5. ENGAGING GOVERNMENT (ENVIRONMENTAL AUTHORITY) – NATIONAL ENVIRONMENTAL AUTHORITY

The aim of engaging the National Environment Authorities was to determine the current laws regarding SHS and related components. To determine the state of play in the area. All highly focused on how enforcement is done and what procedures are taken to encourage proper disposal and recycling.

I. National Environment Management Authority (NEMA)

The interview/discussion was held on 26-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Anne theuri –atheuri@nema.go.ke

Chris Amutabi - Chris.amutabi@solibrium-solar.com

Edwin Kipruto - edwin.kipruto@solibriumsolar.com

General information about the stakeholder

- The National Environment Management Authority (NEMA) is a government agency responsible for the management of the environment and environmental policies of Kenya. NEMA is in Nairobi.
- Sustainability and renewable energy are within their scope of work.

Interest in solar and SHS

- Electrical waste and electronic equipment commonly referred to as E-waste is on the rise in Kenya, as well as globally. This can be attributed to rapid changes in technology.
- NEMA targets both the formal and informal sectors.
- Collection structure models have been drafted on E-waste regulations.
- All NEMA agents are trained on E-waste, but there are no recycling and/or disposal technicians.
- The drafted compliance regulations on waste have not been passed into law during the past 5 years. So, no monitoring is being done.

Regulations and Enforcement

- The National Environment Management Authority (NEMA) developed the draft Environmental Management and Co-ordination (E-waste Management) regulations in 2013. This draft provides an appropriate legal of institutional framework and mechanisms for the management of E-waste handling, collection, transportation, recycling, and safe disposal. It also provides for improved legal and administrative co-ordination for the diverse sectoral initiatives in E-waste management and the E-waste. Which will improve the national capacity for the management of the E-waste. The Government of Kenya through NEMA, informs and invites the public to submit comments on the draft regulation to help pave the way for its finalization.

- The regulations have not yet been passed into law. The link to the regulation is https://www.nema.go.ke/index.php?option=com_content&view=article&id=35&Itemid=177
- EMCA 1999 also provides importing standards.
- One can view the drafted regulations by logging into NEMA's website.
- Issue of lifespan will be done in partnership with KEBS.
- UN resolution laws are also being factored.

Awareness

- NEMA organizes E-waste awareness and creation activities to the public on an as-needed basis.
- Awareness is done through workshops, capacity building, and environmental days.
- NEMA is in partnership with Safaricom. Safaricom provides collection centers.
- Private sector can fund some of the activities directly and provide labor.

REWMOS

- They would be willing to participate in our project workshops after we send them invitations and a concept.
- NEMA can work with REWMOS on:
    - ✓ Setting up collection points
    - ✓ Trainings
    - ✓ Creation awareness activities on sensitization of the public.
- They will not mind being contacted again.

II. Kenya National Cleaner Production Center

The interview/discussion was held on 26-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Chris Amutabi - chris.amutabi@solibrium-solar.com

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

Steve Nyamori - steveonyamori@gmail.com

General information about the stakeholder

- Kenya National Cleaner Production Center aims to build national capacity for resource efficiency and cleaner production applications in enterprises through creation of awareness, training, project implementation, and policy advice. Which helps increase enterprise productivity and sound environmental management.

- The KNCPC is mandated to promote the adoption of contemporary tools for environmental management in the Kenyan industrial establishments and related service sectors. The tools currently being promoted by the Center include, but not limited to are:

    - ✓ Cleaner Production (CP)/Pollution Prevention (PP)/Waste Minimization (WM)
    - ✓ Environmental Audits (EA)
    - ✓ Energy Audits (ENA)
    - ✓ Environmental Management Systems (ISO 14001)
    - ✓ Occupational Health and Safety Assessment Standard (OHSAS 18001 and 18002)
    - ✓ Environmental Performance Evaluation (EPE)
    - ✓ Environmental Cost Accounting (ECA)
    - ✓ Life Cycle Assessment (LCA) and Life Cycle Design (LCD)
    - ✓ Corporate Environmental Reporting (CER)
    - ✓ Global Reporting Initiative (GRI) Guidelines

Interest in sustainability & SHS

- KNCPC covers E-waste in general.
- Obsolete SHS units have not been identified so far
- KNCPC works with both formal and informal sectors.
- The views on SHS are as follows:
  - ✓ PAYG has made purchase of SHS affordable.
  - ✓ SHS users do not know if the products are off-grid.

Awareness

- Creation awareness activities are done on E-waste in general.
- The awareness is done in collaboration with Energy Regulation Commission and Rural Electrification Authority.
- The awareness is done on an as-needed basis.
- More awareness can be done in partnership with REWMOS.

REWMOS

- KNCPC can partner with REWMOS and provide:
  - ✓ Collection mechanisms – tracking, disposal, and transportation
- He will be willing to attend our workshops.
- He would not mind being contacted again.

General comments and Questions

- What is REWMOS budget and deliverables?
- REWMOS to familiarize itself with East Africa policies.

- There are no policies to address off-grid solar products on E-waste.
- E-waste is an emerging issue and being talked about everywhere.

6. ENGAGING NON-GOVERNMENTAL ORGANIZATIONS (NGO'S):

The aim of engaging Non-Governmental Organizations was to explore their commitment to Resource efficiency and waste management for off-grid solar products (REWMOS). Emphasizing their roles and interests in off-grid solar, the environment, possible reuse/repair/recycling, campaigns. Plus, to determine if they support such activities through financial, logistical and/or informational means. Exploring what NGO's doing to create awareness for problem of E-waste in general was also a focus.

I. One Acre Fund

The interview/discussion was held on 31-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Victor Kirubi - victor.kirubi@oneacrefund.org

General information about the stakeholder

- One Acre Fund supplies smallholder farmers with the financing and training as they grow their way out of hunger and poverty. Instead of giving handouts they invest in farmers to generate an increase in farm income.
- One Acre Fund works in Kenya, Uganda, Tanzania, Burundi, Rwanda and Malawi.
- A pilot for the project is being done on Nigeria, India, and Zambia.
- One Acre Fund's work relates to energy and renewables. They support:
    - ✓ Burn – Energy efficient cook stoves
    - ✓ Solar electricity – they are in partnership with Sun King and Bio Lite
- Currently they have 400,000 clients and 28% of them have solar.
- Solar components are given to clients on a credit bundle.
- They have 500,000 clients in other countries.
- Long term goals are to increase the clients from 400,000 clients to 1,000,000. With a goal to have 25% of them solar components through their "stima kwa wote" slogan.
- The want to see low income access to the grid, improved livelihoods, and improved education.

Awareness and trainings

- Awareness creation activities are not part of their frame work, but they focus on sustainability programs.
- No awareness creation activities are done for the problem of E-waste in general and off-grid solar.
- Awareness is done for clients in terms of usage and maintenance, which includes:
    - ✓ How to use the solar components correctly and safely
    - ✓ Making sure they get the right components for their needs

- ✓ Advising that the solar user cleans their components when dusty/dirty

Interest in SHS

- One Acre Fund has an interest in off-grid solar products and they encourage solar power through the advocation of clean energy and solar home systems.
- The views on SHS are as follows:
  - ✓ Makes power affordable
  - ✓ It's clean and easy to use
  - ✓ It improves livelihood and health
- The lifespans of SHS have not been considered, because they focus more on warranty.
- Diagnosis and replacement are done on faulty SHS.
- One Acre Fund can support recycling of SHS.
- Ways of supporting the activities will be discussed further.
- Environmental impact of SHS disposal does not fit into their programmatic objectives.

REWMOS

- He will be willing to attend our project workshops and learn more about it.
- He would not mind being contacted again.

II. Red cross

The interview/discussion was held on 26-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Chris Amutabi - Chris.amutabi@solibrium-solar.com

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

Elijah Muli - elijah.muli@redcross.or.ke

Shadrack Musyoka - musyoka.shadrack@redcross.or.ke

General information about the stakeholder

- The International Red Cross and Red Crescent Movement was born of a desire to bring assistance without discrimination to the wounded on the battlefield and to prevent/alleviate human suffering wherever it may be found at an international and national capacity**.** Its purpose is to protect life, health, and ensure respect for all humans.
- Energy and renewables are part of their scope of work, since they promote energy and environment restoration.
- The long-term goals include the use of humanitarian diplomatic law and adaptation of energy for Kenyans.

Awareness and trainings

- Awareness is done for food security and cross adaptation, but not the development of solar power.
- No special trainings are done for stakeholders in the solar business.

Interest in SHS

- Solar power is encouraged through community sensitization and partnerships with private sector stakeholders.
- Views on SHS are as follows:
    - ✓ Affordable and clean energy
    - ✓ Its efficient and effective
- The lifespan of off-grid solar products has not been considered.
- Support that can be done on repairing and recycling of SHS is through finding private sector partnerships, resource allocation, and Government investments.

REWMOS

- They will be willing to participate in our project and workshops after we send invitation letters, workshop concept, and deliverables.
- They would not mind being contacted again.

7. ENGAGING REPAIR SHOPS:

The aim of engaging Repair shops was to explore their commitment to Resource efficiency and waste management for off-grid solar products (REWMOS). Plus, to determine their role and interest in off-grid solar, the environment, possible reuse/repair/recycling campaigns, and if they support such activities either through financial support, logistical, and informational. It would also be important to know if they are doing any activities to create awareness about E-waste.

I. Eagle Core Electronics

The interview/discussion was held on 19-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Kepha Hitler - eaglecore01@gmail.com

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

General information about the stakeholder

- Eagle Core Electronics has been in operations for the last 5 years.
- All types of electronics are repaired including SHS.
- Solar components that are brought in for repair are in very low volumes, less than 10 a year.

- The main customers in the electronic field are business men, health centers, and homes.
- Most of the repairs that are done are very successful, even though:
    - ✓ Some components are acquired from far away
    - ✓ Some of the components differ with manufacturers
- Repairs are successful although they do not last for a long time, especially those from china.
- Parts for repairs are gotten from Nairobi, since most of the ones in Kakamega are not genuine.
- Most components brought in for repairs are power supplies and charge controllers.
- Repair averagely costs 1000 kshs.
- Eagle Electronics has 20 repeat clients.
- No partnership exists with solar companies.
- No proper ways of handling obsolete solar products because:
    - ✓ Some clients come back for their components after a very long time
    - ✓ Some parts of the obsolete solar products are used for samples when sourcing for new spare

Disposal

- They have about 200-300 capacitors from obsolete components in their repair shop.
- Batteries are also available, but in minimal numbers.
- Clients who bring in components that cannot be repaired are always told to buy new ones.
- Obsolete components are stored in the repair shops and some are sold to the scrap.
- Some components become obsolete in a short period of time since they are second hand.

- Batteries are not disposed, but they are stored at the repair shops.
- Broken components are also bought back from customers.
- Some components are recycled, such as charge controllers to form circuits.
- Eagle Core Electronics is not in partnership with any recycling companies and not aware of any.

Awareness

- Eagle Core Electronics is marketed through social media, referrals, and brochures.
- Awareness creation activities are done only to clients for the problem of general E-waste and solar product E-waste.
- Clients are told to store the junk components well and out of reach of children.
- More focus is put on disposal, but this depends on the clients.
- No workshops on proper waste management has ever been attended.
- Health and safety conditions include:
    - ✓ Ensure technicians have the right tools
    - ✓ Ensure spare parts are of the right quality
    - ✓ At times they do not perform the work themselves, but has other people do it

Repair as a business

- Repairing is a good business and puts food on the table
- He solely depends on repair business
- Eagle Core Electronics has 5 employees. 3 of them are well trained and gotten their training from technical institutes
- Challenges that are faced:
    - ✓ Supply of components

- ✓ Low quality of spare parts

- People prefer buying new components as opposed to repair, thus this hinders the growth of the repair business to serve a bigger customer base.
- Repair can be combined with recycling through innovation and modification.
- Recycling and disposal awareness would be done by Eagle Core through referrals and partnership with REWMOS.

REWMOS

- He is willing to attend our project workshops and learn more about it, as well provide advice on electronic repairs.
- He would not mind being contacted again. He would prefer to be contacted through phone calls.
- He is interested in partnering with REWMOS on public awareness about repairs, reuse, recycling, and proper disposal of SHS.

General comments

- He has clients who are interested in solar water heaters and would like Solibrium to venture into that.

II. Solar Expert Power Technology

The interview/discussion was held on 26-07-2018 and was attended by:

David Otieno

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

General information about the stakeholder

- Solar Expert Power Technology has been in operations for 14 years and deals with the repair of SHS.
- Number of components gotten from repairs are a good number. So, it makes it hard to quantify.
- At least 4 units are brought in for repairs per month.
- Main clients are solar users. Mostly those who he sold to SHS.
- He has experience in repairing panels, inverters, and charge controllers.
- 70% of the repairs are successful despite scarcity of replacement components.
- He has over 50 repeat clients.
- Repairs are gotten locally mostly from Nairobi and Mombasa.
- He is not in partnership with any solar companies for repairs.
- Inverters are most common components that customers seek to repair.
- The amount for repairs done are depend on the type of component.
- Solar Expert Power Technology does not have proper ways of handling obsolete solar products.

Disposal

- 5 obsolete components are available in their repair shops.
- Some items are gotten from their client's components which they could not repair. The components are returned to the clients or disposed.
- Solar Power Expert Technology does not handle the disposal of batteries or other toxic parts. They are returned to the suppliers.
- The buyback of components from customers is not done.

- He is aware of Parch Recycling Company in Athiriver, even though they are not in partnership with any.

Awareness

- The business is marketed through referrals.
- Awareness on creation activities is conducted for E- waste in general and off-grid solar E-waste.
- Proper disposal and safety are focused during the awareness.
- The target group for awareness activities their customers.
- He has not attended any workshops on proper E-waste management but would like to attend.
- Healthy and safety conditions include:
    - ✓ Wearing protective gear

Repair as a business

- Repair is a good business.
- Other business activities done include sales and installation.
- Solar Power Expert Technology has 5 employees who are all trained. The employees are trained through seminars.
- The main challenge faced is acquisition of repair components.
- Repair business can grow to serve a bigger customer base and could be combined with recycling.
- Awareness can be done through partnerships and advising customers to buy quality products.

REWMOS

- He will be willing to attend REWMOS workshops.

- He would be interested to participate as a partner in REWMOS workshops and he would represent the repairs.
- He is interested in partnering with REWMOS on public awareness on repair, reuse, recycling, and proper disposal of SHS.
- He would not mind being contacted again. This can be done through phone calls/face to face.

III. Sunlar Solar

The interview/discussion was held on 27-07-2018 and was attended by:

Alvin Makokha – alvinmakokha@gmail.com

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

General information about the stakeholder

- Sunlar solar ltd has been in operations for 2 years and deals in sales and repairs of SHS.
- About 100 components received for repairs.
- More than 200 units are brought for repairs per month.
- Main clients are solar users. Mostly those who he sold to SHS.
- He has experience in repairing solar panels, speakers, radios, solar and lanterns.
- 90% of the repairs are successful.
- They get about 20 repeat clients.
- Repairs are gotten from sunlar solar clients and other local clients within Nairobi.
- They have partnership with other solar companies like Solibrium ltd and Mkopa Retailers for repairs.

- The most common components that come for repairs are radios and speakers.
- The amount for repairs costs Kshs. 500 at average.
- Sunlar Solar sell obsolete solar products to local organizations collecting.

Disposal

- 250 obsolete components are available in their repair shops.
- Some items are gotten from their client's components which they could not repair. The components are sold to reuse organizations or electronic technicians.
- Sunlar Solar does not handle the disposal of batteries or other toxic parts.
- They buy broken components from customers for reuse.
- They are not aware of any recycling company

Awareness

- The business is marketed through seminars.
- Awareness creation activities is conducted for E- waste in general and off-grid solar E-waste through community SACCO meetings.
- Proper repairs and disposal are the main focus during the awareness.
- The target group for awareness activities their clients.
- He has attended quite number of workshops on proper E-waste management but would like to attend REWMOS one also
- Healthy and safety conditions include:
    - ✓ Wearing protective personal elements

Repair as a business

- Repair is a good business.

- Apart from repairs they also carry on SHS sales.
- Sunlar Solar has 25 employees out of which 1 is trained. The employee is trained through Technical college and workshops.
- The main challenge faced is acquisition of spare parts.
- Repair business can grow to serve a bigger customer base but not sure of its viability when combined with recycling.
- Awareness can be done through Seminars and SACCOS.

REWMOS

- He will be willing to attend REWMOS workshops.
- He would be interested to participate as a partner in REWMOS workshops and he would represent the repair sector.
- He is interested in partnering with REWMOS on public awareness on repair, reuse, recycling, and proper disposal of SHS.
- He would not mind being contacted again. This can be done through phone calls/email.

IV. Victor Yegon

The interview/discussion was held on 25-07-2018 and was attended by:

Victor Yegon

Gilfine Nyangasi – gilfine.nyangasi@solibrium-solar.com

General information about the stakeholder

- Victor runs an electronic repair shop. He has been in this business for close to 5 years since 2013.

- He does not do repair of SHS. However most of the things he repairs are mobile phones, computers and TVs.
- He has approximately 10 repeat customers.
- Most parts repaired are screens, charging systems and mouth piece at a cost of KES 100 to 500.

Disposal

- He does not have any obsolete components in his workshop.
- For components that cannot be repaired customers leave with them or they are disposed.
- Any toxic parts are disposed through the municipal council collection system.
- He buys broken components from customers and use them as spare parts.
- He neither works with nor does he know any recycling company.

Awareness

- The business is marketed through customers' word of mouth.
- He does not conduct any awareness creation activities for the problem of e-waste from off-grid solar products.
- He has not attended any workshop on proper e-waste management.

Repair as a business

- He views repair business as a good business.
- He does not conduct any other form of business besides repair.
- Major challenge faced is that some clients do not pay for the service offered.
- The business has grown over time and he believes it will continue to grow.
- He agrees that it can be combined with recycling

REWMOS

- He will be willing to attend REWMOS workshops.
- He is would be interested to share his experience in repair of electronics.
- He would not mind being contacted again and can be reached through phone call.

V. Godfrey Khatete

The interview/discussion was held on 25-07-2018 and was attended by:

Godfrey Khatete

Gilfine Nyangasi – gilfine.nyangasi@solibrium-solar.com

General information about the stakeholder

- He runs an electronic repair shop. He has been in this business for 10 years.
- He repairs SHS alongside other electronics.
- He has a vast knowledge on repair and maintenance.
- He has on average of 20 repeat customers who are mainly from local households.
- Most repairs done on SHS are on connecting cables at a cost of between Kes 500 to 6,000.
- He does not have any proper way of handling obsolete solar products.

Disposal

- He has a large volume of obsolete components most of which are computers.
- Customers take back their obsolete components that cannot be repaired.
- He buys some components from customers and use part of them as spare parts.

- He is aware that Safaricom does some recycling though he cannot verify that information.
- He is not in any partnership with a recycling company.

Awareness

- The business is marketed through customers.
- He does not conduct any awareness creation activities for the problem of e-waste from off-grid solar products.
- He has not attended any workshop on proper e-waste management.
- He uses gloves and goggles as a health and safety measure

Repair as a business

- He views repair business as a good one.
- He does not conduct any other form of business besides repair.
- Major challenge faced is that some components do not work even after investing much time to repair.
- Thee business has grown over time and can be a good move to combine it with recycling.

REWMOS

- He will be willing to attend REWMOS workshops.
- He would provide advisory support towards the REWMOS workshop.
- He would not mind being contacted again and can be reached through phone call.

VI. Sampro Solartronics Solutions

The interview/discussion was held on 25-07-2018 and was attended by:

Samwel Kogo –samkogs@yahoo.com.

Gilfine Nyangasi – gilfine.nyangasi@solibrium-solar.com

General information about the stakeholder

- He repairs SHS components and other electronics.
- He has been in the business for 6 years.
- He has a vast knowledge on repair and maintenance of SHS.
- He has on average of 100 repeat customers who are mainly from local households.
- He gets parts for repair from Finelane (Nairobi) and Unisol (Eldoret).

Disposal

- He has some obsolete components. However, he disposes them after sometime through the Municipal council collection system. Other are sold as scrap.
- He does not buy back any broken components from clients.
- He is not in any partnership with a recycling company and is not aware on any such company.

Awareness

- The business is marketed through customers and social media.
- He does not conduct any awareness creation activities for the problem of e-waste from off-grid solar products.
- He attends workshops on proper waste management when he is called upon to do so.
- He uses gloves, aprons and goggles as a health and safety measure.

Repair as a business

- He views repair business as a good one.

- He does solar installation business besides repair.
- He has 4 employees of which only 2 are well trained.
- Major challenge faced is that of accessing financing the business.
- In his opinion conducting public education on hazardous effects of toxic parts on air and water will boost the awareness on recycling need.

REWMOS

- He will be willing to attend REWMOS workshops.
- He would provide advisory and impacting knowledge from his experience.
- He would not mind being contacted again and can be reached through phone call.

8. ENGAGING SOLAR MANUFACTURERS:

I. Omnivoltaic (OV)

The interview was held though skype on 10-08-2018 and was attended by:

Hardley Malema- hardley.malema@solibrium-solar.com

Andy Gao - andygao@omnivoltaic.com

General information about the stakeholder

- The type of systems produced are solar home systems and solar lamps. The products are manufactured in China.
- The products come with lithium-ion batteries.
- The products are delivered to Kenya by Ship.
- OV offers manufacturing, financing, and direct business-to-business services.

Awareness creation for E-waste and off-grid solar products

- The company provides awareness creation activities among clients for the proper use and maintenance through:
    - ✓ Training of technicians
    - ✓ Providing diagnosis firmware and software to technicians
    - ✓ Providing spare parts
- Creation awareness activities are done to retailers for the problem of E-waste from off-grid solar products and for proper disposal at the end of their life. Even though the

volume is not big, OV engineers travel once a year to take back failed components such as control boards.

Production phase: Design/Raw materials

- The use of current technology makes it easier to design the products, which is important to the longer life cycle of their products.
- Repairability is considered during design of products, since it makes it easier to repair and replace and components. For example, is 1 shell, 1 cable and PVC this makes repairs take less than 5 minutes.
- All the raw materials originate from China. The raw materials are transported by taxi, trucks, and ubers to the production site.
- Some recycled material is used in the production, especially those for aluminum materials.

Use phase/life extension: maintenance/repairs

- The warranty for their products is 2 years based on retail date and not date of manufacture.
- The average life of components are as follows: It is good to note that only the capacity is by half.
    - ✓ Panel - 20 years
    - ✓ Battery - 5 years
    - ✓ TV - 5 years
    - ✓ Lights - more than 10 years
- It is possible to disassemble and reassemble the solar products, but only technicians can do it by using special screwdrivers, software, and firmware.
- The batteries and circuit boards can be replaced by technicians and are offered to retailers/distributors.

- Spare parts are brought to distributors from China upon request. The spare parts include batteries, cables, and circuit boards.
- Instructions are given on how to disassemble and repair products to the distributor's technicians. This is done through emails and skype, it is dependent on which is more convenient. Maintenance and repair manuals are also given.
- Currently there are no hubs in Kenya for clients and retailers to take their failed systems for repair.
- Maintenance activities that need to be performed for solar home systems include:
    - ✓ Cleaning the components
    - ✓ Using the kits everyday
    - ✓ Batteries be recharged
    - ✓ For retailers the stock should not be in store for more than 3 months
- Most of the repairs commonly done are associated with cables by rats that eat the cables. This is not a quality issue.
- The main challenges regarding repairs and maintenance is:
    - ✓ Awareness of end-user to properly use and maintain the solar systems
    - ✓ Awareness of distributor on how to install the components correctly
    - ✓ Some distributors are more focused on pushing for sales
- Options to extend the life time of the products include:
    - ✓ Asking clients to always recharge their components
    - ✓ New and unique technology called expandable battery management

End of life: takeback/recycling/disposal

- Recyclability is considered in the design of the products mostly for the aluminum frame work, batteries, and plastics.

- Only one type of plastic is used to help reduce plastic barriers.
- The plastics are labelled with ports for charging and entertainment.
- No glues or adhesives are used that may contaminate plastic components.
- The packaging material is recyclable, bio-degradable, and reusable.
- No components contain toxic or hazardous materials, since they all pass through the material safety data sheet.
- Failed products are taken back within and beyond the warranty period. Mostly the circuit boards picked through their journey to their distributors once a year.
- Disposal or recycling systems are not in Kenya.
- Only 20 systems have been taken back over a 2-year period.
- Disposal and recycling are a good business in China. The company covers the costs for the products that have recyclable materials.
- OV does not have a contract with any recycling companies, since the volume is quite low. However, they are in talks with NGO'S.
- The costs for recycling are too high especially for transportation.
- There is a possibility to include disposal/recycling costs into the sales model of the products, but the barrier comes from the distributor. Because it would be costly for them.
- Main challenges regarding take back, recycling, and disposal of SHS include:
    - ✓ No local recycling facilities
    - ✓ High costs in transportation of the components
    - ✓ Low volumes of obsolete SHS.

REWMOS

- He is likely to be in Kenya in September and would attend the workshop to learn more about the project.

- He would not mind being contacted again.

General comments

- REWMOS is a good project.
- Will REWMOS help in setting up hubs for the collection of obsolete products at the end of life.

II. Mobisol

The interview was held on 8-08-2018 and was attended by:

Paula berning - paula.berning@plugintheworld.com

Tobias Hoeck – tobias.hoeck@myclimate.org

General information about the stakeholder

- Mobisol is not really a manufacturer, however they let produce self-developed systems (battery and control board). Mobisol has its own branded products produces solar home systems and solar lamps.
- Most of the batteries are lead acid and some are lithium-ion batteries.
- The products are designed and tested in Germany but are produced in China.
- The products are transported to Kenya by ship.
- The company offers manufacturing and direct sales of solar products,repair and financing.

Awareness creation for E-waste from off grid solar products

- Awareness creation activities is not done to clients.
- Mobisol conducts academies for sales personnel and technicians for customer care staff. Focus is on battery and toxic materials. Have education material for local staff. EOL is only relevant for clients once warranty period has ended.
- Mobisol is currently thinking about what services shall be offered for post-warranty-period clients.
- They have educational videos (for proper use) for technicians and sales staff and also for clients (shown upon installation of the system through mobisol).

- They will soon launch a new client App for interactions with clients (could be used for awareness creation).
- They have SMS alert for technical problems.
- No creation awareness activities are being done for the problem of E-waste from off-grid solar products and the proper disposal at end of life.

❖ **Production phase: design/raw materials**

- longevity (long-life cycle) an important key issue in the design of your products and yes, 3-4 years warranty period (pay down period) is quite long. Thus it is important that the systems work well and last long. Free maintenance and repair during warranty period would otherwise generate too high costs for mobisol.
- Repairability is very important. Mobisol needs to be able to repair the systems during the warranty period at reasonable costs.
- The solar kits are designed as plug and play systems. You can easily exchange certain components such as the circuit board, etc.
- Built in raw materials originate from china. The means of transport to the production site is not known.
- Mobisol is checking if recycled plastic could be used for the control board.
- Use recycled material in the packaging (box). Have mostly replaced Styrofoam and plastic in packaging. However, if manufacturer (like for TVs) only guarantee its warranty when shipped in Styrofoam then they must keep it in.
- Recycled lead in batteries lead to a decrease of the battery quality. Thus, currently no option.

Use-phase/life extension: maintenance/repairs

- Warranty period is 3 years for older systems and 4 years for newer systems (with newer lead acid battery generation)
- It is difficult to say Average life of the components in general for solar kits. Critical component is the battery. Battery lifetime is 3 years for 1st generation lead acid batteries and 4-5 years for newer generations.
- Disassemble and reassemble of products is possible an important for mobisol because technicians need to be able to repair or replace at the least costs possible during the warranty period.

- Batteries can be replaced mobisol technicians can do it. They will come to the client and replace the battery.
- Reuse of battery is difficult as spare parts. After one year the battery has quality status of 80%. Thus, it is not possible to use it as a "replacement" battery. Mobisol is experimenting with de-sulfurization of batteries in a pilot to see if it is possible to raise quality of used batteries againand circuit boards can be replaced. These are found in their retail shops and warehouse.
- Circuit boards can be replaced too.
- Repairs are done by trained mobisol technicians. Spare parts are available.
- Instructions on how to disassemble and repair the products is not given but technicians are trained on replacements.
- Clients can call the customer care hotline and in case the problem cannot be solved via phone, mobisol send a technician to the client.
- Most common maintenance activities done is software updates.
- Most common repair activities come from most common complaints are with appliances such as TVs (no connection), with overheating of TVs or questions regarding payment.
- Software problems can be remotely solved (software update, etc.).
- Most hardware problems are with appliances and not with solar kit
- High costs for client visits and customer care hotline (free of charge) during warranty period are the main challenge regarding repairs and maintenance of SHS.
- Options to extend lifetime of the products is done through in-house innovation and development (better batteries, software updates, etc.)

End of life: takeback/recycling/disposal

- Recyclability in the design of the products is not yet known.
- She is not sure if the plastics are labelled.
- Batteries can be recycled at 99%.
- Solar panel very difficult to recycle.
- Control boards very difficult to recycle.
- Mobisol already tries to separate materials/components before sending it to the recycler.

- The battery is the only component that contains toxic materials.
- Take back of the products is being done within the warranty period. Mobisol would take back systems also beyond warranty period, however there is no incentive for clients to bring back systems.
- For failed products, Mobisol repairs and reuses whatever possible. Failed parts are handed over to a recycling company.
- On disposal and recycling, Lead acid batteries are transported to recycler in Nairobi, Kenya.
- All other e-waste is transported to Rwanda to a recycler. Recycler accepts all waste at no cost for mobisol.
- They do not work with WEEE centre, because they charge very high costs (1000 USD/t). Total and M-Kopa cooperate with the WEEE centre.
- There is no number for already systems taken back. Mobisol generates around 20 tons/a of e-waste in Tanzania and 200 tons of failed batteries per year. Volumes are too low in order to negotiate good terms with recyclers. Thus, collaboration with industry (e.g. mobile phone sector) would be necessary in order to benefit from bulk prices at recyclers.
- Value chain only for lead acid batteries exists disposal and recycling.
- Mobisol has a contract with lead acid battery recycler in Kenya and with recycling company in Rwanda (takes all products and components for free). Mobisol transports e-waste from Tanzania to Rwanda with Associate battery manufacturers, Phenix recycling, and Enviroserve in Rwanda.
- E-waste recycling with recycler in Rwanda is free of charge (In Kenya the same company would charge costs for it. Mobisol does not know why it is for free in Rwanda). Mobisol pays for transport to recycler.
- The main challenges regarding take back, recycling, and disposal are:
    - ✓ High costs and so far no incentive scheme for solar kits beyond warranty period.
    - ✓ In Kenya legislation still not accepted and in place: however the suggestion is extended producer responsibility (the one, who imports products to Kenya is responsible for e-waste recycling)

III. Green Light Planet Kenya

The interview was held on 24-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Chris Amutabi - chrs.amutabi@solibrium-solar.com

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

Davis Akeno - davies@greenlightplanet.com

General information about the stakeholder

- Green Light Planet produces solar homes systems, solar lanterns, and PICO.
- The batteries that come with the products are lithium-ion.
- The products are manufactured in China and transported to Kenya via Ship.
- The services offered by the company are manufacturing, direct sales of solar products, and repairs.

Awareness creation for E-waste from off-grid solar products

- Creation awareness activities is done to clients and retailers for the proper use and maintenance. This is done by:
    - ✓ Awareness upon purchase
    - ✓ Service units to retailers
    - ✓ Trainings with partners for retailers
    - ✓ A fully-fledged awareness team is available to give information to clients
    - ✓ Users bypass on the use of products such as cleaning the components and how to position them in the sun

- ✓ Providing information on different powering modes such as turbo and orbit

- Awareness creation activities are done to clients for the problem of E-waste from off-grid solar products for the proper disposal at the end of life. The awareness is done through their retail shops in different towns. They provided awareness information to clients. Not much else has been done, but it's being exploited.

- Awareness creation activities are done to retailers through account managers.

Production phase: Design/raw materials

- Design of the products is an important issue for longevity and for repairs.

- There is no information on the repairability of the product design, but he will find out more.

- Raw materials originate from China and delivered by truck to the production site.

- Information of recycled materials are used in the production process and will be communicated soon.

Use-phase/life extension: maintenance/repairs

- Warranty period for the products is 2 years.

- Average lifespan of the products is more than 5 years, the battery is 5 years, and the panel is 10 years.

- It's possible to disassemble and reassemble the products, but only a technician can do this with special tools.

- Batteries and circuit boards can be replaced at their repair shops and it only takes 24 hours.

- Maintenance and repair manuals for the products are not given, since it's a control document.

- Clients and retailers bring their failed systems to their retail shops for repairs. This also takes 24 hours.

- There is a research and development department that is looking into ideas of extending the life of the products.
- Repair shops are in different centers and most importantly through retail shops across the country. These are where clients can bring back their components for repair.
- The most common maintenance relates to cleaning the components and ensuring they are recharged.
- The most common repairs done are charging ports and cables. Cables mostly are eaten by rats and are replaced. The repairs are done for free.
- The main challenge regarding repairs and maintenance is the lack of education by the clients. It is also very difficult to convince the client that the damage caused was self-initiated.

End of life: takeback/recycling/disposal

- No information in the recyclability of the design is currently in the documents.
- Only one type of plastic is used in the product and its branded Sun King.
- No glue or adhesives is used that may contaminate the plastic components.
- Lamps, control units, and panels are recyclable. The materials can easily be separated from other components.
- The packaging materials used for the products are bio-degradable.
- The battery contains toxic and hazardous materials.
- The laid down channels are on reverse logistic is done by arrangements through forward logistics with the transportation companies. For example, since G4S transports their components to various retail shops in the country, then it's their duty to bring back failed components to the warehouse.
- The systems that have been taken back have been of low quantity.
- Disposal and recycling are financed through reverse and forward logistics.
- Green Light Planet had a contract with a recycling facility, but it has expired.

- The possibility to include disposal and recycling costs into a sales model is being considered and addressed by the leadership. Not just for Kenya but other regions even though it's still in development stage.

- The costs for recycling and disposal are financed by the company. This is because the company is under green energy.

- The main challenges regarding takeback, recycling, and disposal of solar systems is how to get the products from the clients at the end of life.

REWMOS

- He would be willing to attend and participate in our workshops after an invitation letter and structure of the workshop has been sent.

- They would not mind being contacted again.

9. ENGAGING SOLAR RETAILERS:

I. Chloride Exide

The interview was held on 19-07-2018 and was attended by:

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

William Adongo - william@chlorideexide.com

Adam Mumbatsi - adam@chlorideexide.com

❖ General information about the stakeholder

- Chloride deals with distribution of automotive batteries, solar systems installation, power backup systems installation, solar water heating systems installations.
- Chloride sells Solar Home Systems and batteries that are lead acid and deep cycle.
- Most of their clients are rural, urban, and peri urban.
- The company offers sale of solar products, repairs, and servicing of solar products.
- The sales models are cash upon purchase.
- Repairs of SHS on warranty are accompanied through the cash sale scheme.

Awareness creation for e waste from off grid solar products

- Awareness creation activities for proper use and maintenance is done through battery clinics and customer fleet visits.
- Awareness creation activities for the problem of E-waste from off-grid solar products is encouraged and clients are asked to bring back used batteries for some monetary payment.

Life extension: maintenance/repairs

- Maintenance and repair scheme to client is done beyond the warranty period but is on a case to case basis.
- Warranty period of the off-grid solar products is 1 to 5 years depending on terms from the manufacturers. Average life of off-grid solar products is dependent on the type of systems.
- The use of charge controllers for PV systems are done to extend life of the product.
- Chloride Exide has their own repair centers where clients take failed systems.
- Most common maintenance activities include cleaning the panels.
- Common repairs done include the weakest parts which are the inverters, because the board gets overloaded and the board must be replaced.
- Tracking of the solar products is optional and comes at a cost.
- Advice during purchase, fliers, and brochures are the training materials provided to clients to ensure proper use and maintenance for solar systems.
- The main challenges regarding repairs and maintenance are overloads and the under sizing of systems.

End of life: take back/recycling/disposal

- A take back mechanism for used products or components with and beyond warranty period is organized by a department and the products are bought back on a cash basis.
- Cash is given as an incentive to clients who bring back product at their end of life.
- Recycling and disposal are done for failed products. Chloride Exide has their own recycling facilities.
- Solar and automotive batteries are components that they have taken back.

- It will be challenging to include disposal/recycling into sales models of the products since competitors are already in the market place.
- Chloride Exide has a contract with REAL recycling company. Recycling and disposal are not paid for since the companies are sister companies and offer mutual benefits.
- The main challenges for take back, recycling, and disposal include low volumes of obsolete products and how to get them.

REWMOS

- They will be willing to attend our project workshops and learn more about it.
- They do not mind being contacted again.

II. Generation Kenya limited (Felicity Solar)

The interview was held on 24-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Chris Amutabi - chris.amutabi@solibrium-solar.com

Cyrus Muiru- cyrus@generationkenyaltd.co.ke

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

General information about the stakeholder

- Generation (k) Ltd is an international company that provides innovative energy Solutions
- Felicity solar deals with SHS, solar lamps, and small grids.
- Lithium-ion batteries are the type of batteries that accompany their products.
- Most of the clients are in rural areas.
- The sales model is only cash and comes with free repairs during the warranty period.

Awareness creation for E-waste from off grid solar products

- Awareness creation activities on proper use and maintenance is done to clients upon purchase and manuals are given.
- No creation activities are done for the problem of E-waste from off-grid solar products and the proper disposal at their end of life.

Life extension: maintenance/repairs

- Maintenance and repairs are done to clients within and beyond the warranty period and the costs depends with the components.
- Warranty period for the products is 1 year.
- Average life of off grid solar products is 3 years. Nothing is done now to extend life of the products.
- Clients can bring back failed systems at their shops for repair.
- Common maintenance activities include charging the battery and cleaning the components.
- No common repairs have been done so far. Only one inverter was brought back for repair.
- Tracking of the products cannot be done.
- Manuals are given to clients to ensure proper use and maintenance.
- No challenges have been faced regarding repair and maintenance.

End of life: takeback/recycling and disposal

- A take back system for used products exist. The clients bring back components to the shops. No incentive is offered to clients to bring back products at the end of life.
- Photos of failed products are taken to the manufacturer in Germany who sends spares.
- Only 1 inverter has been taken back.

- Disposal and recycling are not done.
- It's not easy to include the possibility for disposal and recycling into models since this will make products expensive.
- Felicity Solar has no contract with any recycling company in Kenya.

REWMOS

- He would be willing to attend project workshops and learn more.
- He would not mind being contacted again.

III. Davis and Shirtliff

The interview was held on 24/07/2018 and was attended by:

Hardley Malema - hardley.malema@solibrium-solar.com

Dennis Nderitu - dennis.nderitu@dayliff.com

Chris Amutabi - chris.amutabi@solibrium-solar.com

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

General information about the stakeholder

- The company deals with SHS, solar lamps, inverters and water heaters.
- The batteries accompanied with some of the components are lead acid and lithium-ion batteries.
- The company offers sale of solar products and repairs. The sales model is purely on cash and warranty is given to the clients.

Awareness creation from E-waste from off grid solar products

- Awareness is done for clients for proper use and maintenance upon purchase through manuals and explanations from technicians.

- No awareness creation activities are being done for the problem of E-waste from off-grid solar products and proper disposal at end of life.

Life extension: maintenance/repairs

- Free maintenance is done only within the warranty period. Beyond the warranty period, a client is required to pay for the costs which are dependent on the type of repair.
- Warranty is between 1 to 2 years.
- Average life of off-grid solar products is 4 to 6 years.
- No options are done to extend life of the products.
- The company has repair centers where clients bring back failed systems.
- Common repairs done, and weakest parts is confidential information.
- The products cannot be tracked once they are sold.
- Manuals are given to clients to ensure proper use and maintenance of solar products.

End of life: take back/recycling/disposal

- There is no take back scheme for used products or components within and beyond warranty period.
- No incentives are offered to clients who bring back products.
- Low volume of systems has been taken back.
- Recycling and disposal are not in their framework.
- There is no possibility of including disposal and recycling costs into the sales model since they are not concerned with end of life of products.

REWMOS

- He will be willing to attend our project workshops and learn more about the project.
- He does not mind being contacted again.

IV. Ryson International

The interview was held on 26-07-2018 and attended by:

Hardley Malema –hardley.malema@solibrium-solar.com

Kevin Yang - kevin@rysoninternational.com

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

Chris Amutabi - chris.amutabi@solibrium-solar.com

Adrian Omondi - adrianomondi2018@gmail.com

General information about the stakeholder

- Ryson international is a solar retailer company that aims to start operations in August 2018.
- They will deal with solar home systems and solar lamps. The company will offer only sale of solar products.
- Lithium-ion batteries will be used to power the SHS.
- The target market clients will be on rural, urban, and peri urban.
- The sales models will only be cash to clients and distributors.

Awareness creation from e-waste from off grid solar products

- No awareness creation has been put into consideration now.

Life extension: maintenance/repairs

- No warranty will be given for the products.
- Location of the products will not be able tracked.
- Manuals will be given to ensure proper use and maintenance of solar products.

End of life: take back/recycling /disposal

- End of life of the products is not in their scope of work now.
- No contracts with recycling companies exist or will be made.



The figures above show some of the SHS to be sold by Ryson international.

REWMOS

- They would be willing to participate in our project workshops and get to learn more about the project.
- They would not mind being contacted again.

V. M-KOPA Solar

The interview was held on 27-07-2018 and was attended by:

Hardley Malema – harldley.malema@solibrium-solar.com

Kevin Murgor - kevin.murgor@m-kopa.com

General information about the stakeholder

- M-KOPA deals with solar home systems and torches.
- The batteries that come with the products are lithium-ion batteries.

- Main clients are rural and peri urban.
- The company offers sale of products, financing, and repairs.
- Sales models offered by the company are cash and Pay As You Go. Free maintenance and repairs are included in the sale schemes within the warranty period.
- The most successful model is Pay As You Go, since it has enabled clients to get energy through affordable daily payments, thus upgrading their life.

Awareness creation for E-waste from off grid solar products

- Awareness creation activities is done among clients for proper use and maintenance. This is done through:
    - ✓ Customer care
    - ✓ Customer education team
    - ✓ Regular calls and texts
- No awareness creation activity is done among clients for the problem for E-waste from off-grid solar products and for proper disposal at the end of life. However, there is a pilot phase being carried out.

Life extension: maintenance/repairs

- The company offers free maintenance and repair within the warranty period. Beyond the warranty period repairs are done at a cost depending on the type of repair.
- The warranty period for the off grid solar products is 2 years.
- The average life of the off-grid solar products is 5 years.
- An engineering department exists to innovate the products to extend the life of the products.
- Repair centers are in M-KOPA distributor shops where clients can take failed systems for repairs. If the systems cannot be repaired at the shops they are taken to the fully-fledged repair shop at their headquarters.

- Most common repairs are done on radios and torches.
- The location of the solar products can be tracked, since they are equipped with GSM networks.
- Training materials are given to clients to ensure proper use and maintenance of the solar product through manuals, fliers, calls, and field guys.
- Main challenges regarding repair and maintenance are regarding the users, because they lack knowledge on how to use them correctly.

End of life: take back/recycling/disposal

- There is no take back scheme for used products or components, currently they are in a pilot phase.
- No incentives are offered to clients.
- Failed products are repaired, if they cannot be repaired they are taken to WEEE center and/or Enviroserve for recycling and disposal.
- The volume for products is very small, but more are expected since this is the sixth year in operations and they expect them to start to break down.
- Disposal of the components are fully bared by the company. The recycling company records weight of the products and invoices M-KOPA for payment.
- There is a possibility to include disposal and recycling costs into a sales model, but this is currently on a pilot phase. Factors like unlikeliness of clients to bring back components without incentive is being taken into consideration.
- M-KOPA is in contract with WEEE center and Enviroserve for recycling and the disposal of products.
- Costs for recycling and disposal are based on weight and are paid for by the company.
- Take back, recycling, and disposal of SHS is currently in a pilot stage and no challenges have come up.

REWMOS

- He would be willing to participate in our project workshops by sharing ideas.
- He would not mind being contacted again.

General comments

- REWMOS project is a good idea.
- Extended producer responsibility should be really thought through.

VI. Mobisol

The interview was held on 8-08-2018 and was attended by:

Tobias Hoeck - tobias.hoeck@myclimate.org

Paula Berning - paula.berning@plugintheworld.com

General information about the stakeholder

- Mobisol deals with solar home systems with lead-acid batteries including lamps, TV, radio, phone charging and special kits for small businesses.
- For 1.5 years, they also had a solar TV set with li-ion battery included in the TV
- Most of their batteries are lead acid and some are lithium-ion batteries.
- Most of their clients are in rural areas and peri urban areas.
- The company offers solar products, conducts maintenance, repairs, have customers care hotline, develop lead acid batteries and control system, (circuit board), developed their own software for managing solar kits, finance systems via pay-as-you-go also in collaboration with local banks (asset-based financing) services.
- The sales model offered to clients are 99% pay-as-you-go with 3-4 years payback (rent-to-own). The rest is cash.
- Pay-as-you-go includes free repairs, replacement and maintenance within the warranty period, which is 3 years and for newer systems it is 4 years. So far no offer beyond warranty period.

- The most popular sales model is PAYG because it is all inclusive and affordable.

Awareness creation for E-waste from off grid solar products

- Awareness creation activities is not done to clients.
- Mobisol conducts academies for sales personnel and technicians for customer care staff. Focus is on battery and toxic materials. Have education material for local staff. EOL is only relevant for clients once warranty period has ended.
- Mobisol is currently thinking about what services shall be offered for post-warranty-period clients.
- They have educational videos (for proper use) for technicians and sales staff and also for clients (shown upon installation of the system through mobisol).
- They will soon launch a new client App for interactions with clients (could be used for awareness creation).
- They have SMS alert for technical problems.
- No creation awareness activities are being done for the problem of E-waste from off-grid solar products and the proper disposal at end of life.

Life extension: maintenance/repairs

- Maintenance and repair schemes are done to clients within the 3 -4 years warranty period.
- No scheme beyond warranty period. Plan to launch beyond-warranty period scheme by 2019.
- Warranty period is 3 years for older systems and 4 years for newer systems (with newer lead acid battery generation)
- It is difficult to say Average life of the components in general for solar kits. Critical component is the battery. Battery lifetime is 3 years for 1st generation lead acid batteries and 4-5 years for newer generations.
- Extending the life of the products is done through in-house innovation: extending the lifetime of the battery through research and development. Latest 4th generation battery will have 8 years lifetime.
- They don't see a potential for lifetime extension by the user, but rather through in-house development/improvement of software and hardware,

- Repair/maintenance/replacement is done through customer care hotline and thereafter mobisol technicians conducts household visits. No repair centres, where client come, because mobisol goes to the client.
- Most common maintenance activities done is software updates.
- Most common repair activities come from most common complaints are with appliances such as TVs (no connection), with overheating of TVs or questions regarding payment.
- Software problems can be remotely solved (software update, etc.).
- Most hardware problems are with appliances and not with solar kit
- location of system is known for almost 100% of systems within warranty period and for 90% of systems beyond warranty period (as long as the systems send data to mobisol).
- Training materials given to the clients to ensure proper use and maintenance is a user manual, however hardly anybody reads it.
- Mobisol has videos about use of systems, that are shown to clients upon installation.
- Challenges faced regarding repairs and maintenance of SHS are High costs for customer care and repairs (households visits).

End of life: take back/recycling/disposal

- The company offers take back mechanism within warranty period (free repair, replacement). Repair components whenever possible, use as spare parts, and dispose e-waste with recycling partners.
- No incentive scheme beyond warranty period.
- In case of default, mobisol goes to the field to take back the solar system.
- The idea of offering an incentive to clients at the end of life is being figured out.As of now no incentive beyond warranty period and within warranty period the incentive is free replacement.
- Failed products are taken for repair if possible,use still working components as spare parts and hands over products/components to recycling partner in Tanzania.
- Number of taken back systems is not known. They have around 30,000 systems beyond warranty period (out of over 100,000 systems).
- There is a value chain for lead acid batteries, however recycler is based in Naroibi, Kenya. EOL batteries need to be transported from Tanzania to Kenya (export), which is time consuming, complex and expensive. At best you get a zero-balance.

- Costs for repair, replacement and maintenance, recycling and disposal within the warranty period is included in the PAYG sales price
- Clients are very price sensitive. Upfront recycling fee would be difficult to implement.
- One possibility could be to price in recycling costs e.g. for battery in the price of the replacement battery (usually a newer battery generation with better performance, which would allow for charging a higher price).
- Mobisol currently conducts field research with clients to evaluate their preferences with regard to take-back and beyond warranty schemes.
- Mobisol has a contract with lead acid battery recycler in Kenya and with recycling company in Rwanda (takes all products and components for free). Mobisol transports e-waste from Tanzania to Rwanda with Associate battery manufacturers, Phenix recycling, and Enviroserve in Rwanda.
- E-waste recycling with recycler in Rwanda is free of charge (In Kenya the same company would charge costs for it. Mobisol does not know why it is for free in Rwanda). Mobisol pays for transport to recycler.
- Battery recycling: recycler pays a little for the batteries, but mobisol pays for transport to the recycler (export from TZ to Kenya). Thus at best you get a zero balance.
- The main challenges faced regarding takeback, recycling, and disposal of solar home systems are:
    - ✓ Works well during warranty period.
    - ✓ No scheme beyond the warranty period.
    - ✓ Advantage of PAYG is that you can track systems and can organise for tack-back during warranty period. The problem however is that there is no incentive for the client to bring back systems beyond warranty period.
    - ✓ Maybe PAYG model not the right approach. Leasing models would work better to ensure take-back.
    - ✓ The worst is cash sale of small solar lamps, where no interaction between retailer and clients exists. These systems are lost.

REWMOS

- if the right person from mobisol is available. It makes no sense to send someone who has no idea about the topic. Best would be the German colleague based in Arusha. Not sure, if he will be available. Paul will check with him.

VII. Green Light Planet Kenya

The interview was held on 24-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Chris Amutabi- chrs.amutabi@solibrium-solar.com

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

Davis Akeno - davies@greenlightplanet.com

General information about the stakeholder

- Green light planet deals with Solar homes systems, solar lanterns, and PICO.
- The batteries that come with the products are lithium-ion.
- The target clients are found in rural areas.
- The company offers sale of solar products, repairs, and manufacturing of products.
- The sales model is PAYG and cash.
- The sales schemes come with free maintenance and repairs within the warranty period.
- The most successful sales model is PAYG since it makes it very affordable to clients.

Awareness creation for e-waste from off grid solar products

- Creation awareness activities is done to clients for proper use and maintenance. This is done by:
    - ✓ Awareness upon purchase
    - ✓ A fully-fledged awareness team is available to give information to clients
    - ✓ Users bypass on use of products such as cleaning the components and how to position in the sun

- ✓ Providing information on different powering modes such as turbo and orbit lower

- Awareness creation activities is done to clients for the problem of E-waste from off-grid solar products and the proper disposal at the end of life. The awareness is done through their retail shops in different towns. Clients are also advised to properly dispose the packaging materials.

Life extension: maintenance/repairs

- Free maintenance and repairs are done to clients within and after the warranty period
- Warranty period for the products is 2 years.
- Average lifespan of the products is more than 5 years.
- There is a research and development who are looking into ideas of extending the life of the products.
- Repair shops are in different centers and most importantly through their retail shops country wide. That is where clients can bring back their components for repair.
- The most common maintenance relates to charging whereby the battery drains power quickly.
- The location of the products can be tracked since they use GSM.
- The training materials provided to clients to ensure proper use and maintenance is general manuals and knowledge sharing.
- The main challenges faced regarding repairs and maintenance is lack of education to the clients on how to use their products correctly. It's even harder for clients to admit that it's part of their problem for the products faultiness.

End of life: takeback/recycling/disposal

- There is no take back system that exists now for used products are the warranty. Within the warranty, clients are asked to take the products to the retailer shops where its handled on a case by case basis.

- Reverse logistic is done by arrangements through forward logistics with the transportation companies. For example, since G4S transports their components to various retail shops in the country, then it's their duty to bring back failed components back to the warehouse.
- The take back mechanisms are still in the development stage.
- The volume taken back from the users is negligible.
- The disposal and recycling are financed by the company since were in partnership with recycling companies even though the contract has expired.
- The possibility to include disposal and recycling costs into a sales model is being considered and addressed by the leadership. Not just in Kenya but more regions, even though it's still at the development stage.
- The costs for recycling or disposal are financed by the company. This is because the company is under green energy.
- The main challenges regarding take back, recycling, and disposal of solar systems is how to get the products back from the clients at the end of life.

REWMOS

- He would be willing to attend and participate in our workshops after an invitation letter and structure of the workshop has been sent.
- They would not mind being contacted again.

VIII. Solibrium Limited

The interview was held on 20-08-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

General information about the stakeholder

- Solibrium Ltd is a distributor of solar homes systems and solar lanterns.
- The batteries that come with the products are lithium iron phosphate (LFP).
- The target clients are found in rural and Semi-urban areas.
- The company offers sale of solar products and repairs.
- The sales model is PAYG and cash.
- The sales schemes come with free maintenance and repairs within the warranty period.
- The most successful sales model is PAYG since it makes it very affordable to clients.

Awareness creation for e-waste from off grid solar products

- Creation awareness activities is done to clients for proper use and maintenance. This is done by:
    - ✓ Awareness upon purchase
    - ✓ Users are trained on proper use of products such as cleaning the components and how to position in the sun
- Awareness creation activities is done to clients for the problem of E-waste from off-grid solar products and the proper disposal at the end of life. The awareness is done through messages and phone calls. Clients are also advised to properly dispose the packaging materials.

Life extension: maintenance/repairs

- Free maintenance and repairs are done to clients within and after the warranty period
- Warranty period for the products is 2 years.
- Average lifespan of the products is more than 5 years.
- Part of repairs is done in the office while some sent to partners repair shops.

- The most common maintenance is recharging, proper use and cleaning of solar panels
- The training materials provided to clients to ensure proper use and maintenance is general manuals and knowledge sharing.

End of life: take back/recycling/disposal

- There is no take back system that exists now for used products and out of warranty. Within the warranty, clients are asked to bring their kits/components to office for checkup.
- No incentives are offered to clients.
- Solibrium is not in partnership with any recycling company.
- The volume for products is very small but more are expected in 7 years from now.
- The disposal and recycling of solar components hasn't yet but in progress.
- The possibility to include disposal and recycling costs into a sales model is being considered and still in development stage
- The main challenges regarding take back, recycling, and disposal of solar systems is how to get the products back from the clients at the end of life since the volumes may be small and logistics may not be economical.

IX. Bottosolar Ltd Company

The interview was held on 27-07-2018 and was attended by:

Gilfine Nyangasi- gilfine.nyangasi@solibrium-solar.com

Juliet Anyiso – juliet1991anyiso@gmail.com

General information about the stakeholder

- BottoSolar Ltd is a retailor of solar homes systems and solar lamps.
- The batteries that come with the products are lead acid batteries and Calcium batteries.

- The target clients are found in rural and Semi-urban areas.
- The company offers sale of solar products and repairs.
- The sales model is in cash. However, they allow customers to deposit money with them on installment and collect the components after completion of payment.
- The sales schemes come with free maintenance and repairs within the warranty period.
- The cash sale has proved to be more successful for the company.

Awareness creation for e-waste from off grid solar products

- At the point of sale, the customers are briefed on proper use and maintenance of the products.
- No awareness creation activities is done to clients for the problem of E-waste from off-grid solar products and the proper disposal at the end of life.

Life extension: maintenance/repairs

- Maintenance and repairs are done to clients within and after the warranty period. However, after warranty period this is done at a cost.
- Warranty period for the products is 2 years.
- Average lifespan of the products is more than 2 years.
- All repairs are done at their outlet shop point in Nakuru.
- Most repair done is on the poser controller unit.
- So far, the has not been major challenges on the products apart from breakages.

End of life: take back/recycling/disposal

- The company has no take back mechanism for used products or components
- No incentives are offered to clients.
- The company have a contract with Indigo Company on matters of recycling.

- They have not experienced any major challenge on take back, recycling and disposal of solar systems since it is not yet happening.

REWMOS

- Bottosolar would be willing to attend and participate in our workshops.
- They would not mind being contacted again.
- They advise that REWMOS should also do something that will benefit the community.

10. ENGAGING RECYCLING COMPANIES:

I. Computer for Schools Kenya (Waste Electrical and Electronic Equipment center)

The interview/discussion was held on 23-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Nessy Wangari – info@weecentre.com

Seth Munyambu - seth@weeecentre.com

Dr. Tom Musili - tom@cfsk.org

General information about the stakeholder

- Computer for Schools Kenya was recognized to set up the Waste Electrical and Electronic center, the first national E-waste management facility in Kenya and the East African Region.
- Its core value is eco-friendliness. It endeavors to ensure that its operations are eco-neutral and helps safeguard the environment and human health.
- Its innovative management program for decommissioned computers and auxiliary equipment is a unique combination of conversion to alternative uses, local recycling, and selective take-back by partners overseas.
- Electronic equipment that is no longer usable are disposed of in a way that is not harmful to the human body and environment.
- WEEE center offers collection, sorting, reuse, recycling, and disposal.
- The company does not have a recycling plant and therefore does not treat any waste.
- WEEE center aims to have a recycling plant in the next 20 years.
- Lithium-ion batteries are exported to Europe, since they are highly dangerous.
- Lead acid batteries are delivered to local battery manufacturers.

- The number of solar products is negligible since solar components have quite a longer life span.

Awareness creation activities from off grid solar products

- Awareness creation activities are done on E-waste in general to the public.
- Awareness creation activities include: E-waste sensitization and management, Road shows, Community sensitization and ICT is done.

Figures above showa the trucks that are used in awareness creation activities.

Life extension: maintainance and repairs

- Most of the solar products have quite a longer lifespan than the batteries.
- Lithium-ion batteries are exported to Europe. This is after the terminals have been insulated with masking tape.
- Repairs are not highly encouraged, because of intellectual property rights.
- Bulbs are taken to light industires in Embakasi.

End of life: take back/recycling/disposal

- WEEE centre has a logistics department that organizes the transportion.
- E-waste is not picked uo from end-users.

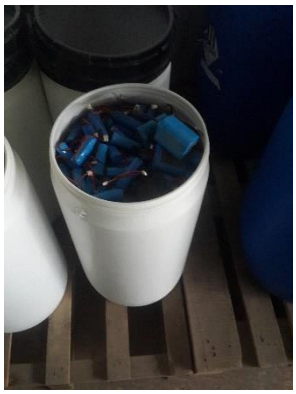
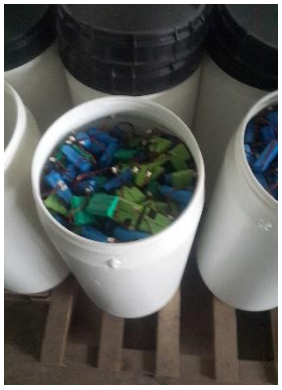
- Collection centers are operated in partnership with Safaricom country wide. All Safaricom shops operate as collection centers and other places include Giraffe center.
- Only schools, individuals, and NGO's do not pay for costs to take back, recycle, and disposal. Corporates have to pay the costs.
- At the SHS end of life cycle the recycling and disposal of components follows:
  - ✓ T.V. glass is crushed
  - ✓ Plastics are delivered to other local plastic manufacturers
  - ✓ Copper wires are taken out of the insulated wires
  - ✓ Bulbs and aluminium components shipped to plastic recyclers
  - ✓ Motherboards and batteries are exported to Europe
- Components with a positive value include:
  - ✓ Bulbs
  - ✓ Solar panels
  - ✓ Wires
  - ✓ Plastic component
  - ✓ Lead batteries
  - ✓ Glass
- Components with a negative value include:
  - ✓ Lithium-ion batteries
  - ✓ CRT Motherboards
- A business case for recycling lithium-ion batteries is next to impossible. The batteries are exported.
- Lithium-ion batteries are very toxic and they are exported. Lithium-ion phosphate is very hazardous.

- Challenges faced for recycling off-grid solar products are:
  - ✓ Negative value of some components such as batteries
  - ✓ Handling some of the components such as PV cells
  - ✓ Access to products because no awareness is being done

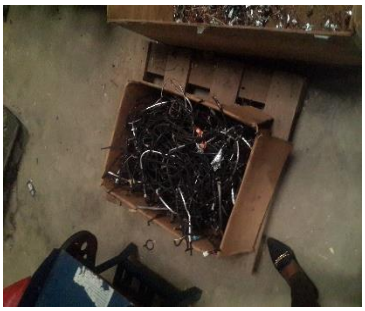
Above figures show some of their storage facilities for E-waste.

Above figures show lithium-ion batteries and CRT mother boards waiting to be exported to Europe.



Above Figures show how different types of components are sorted to their respective places.


Above figures shows the extracted copper from wires ready to be resold to to the market.

Above figure is a plastic shredder machine

Above figure shows glasses that have been crushed

REWMOS

- They would be willing to participate in our project workshops
- The role they can play is E-waste sensitization programmer
- They would not mind being contacted again
- They would like a work partnership with time

General comments

- REWMOS is a good initiative.

II. Recycla International

The interview discussion was held on 23-07-2018 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Eric Guantai - guantaierick@gmail.com

Josua Patroba - joshuapatroba@yahoo.com

General information about the stakeholder

- Recycla International is a mobile application that is web based and it links clients with E-waste recyclers and ideal strategies for disposal and recycling.
- The company collects, facilitates repatriation, and offers rent storage space.
- The collect different types of E-waste including solar products, consumables, and accessories.
- The company does not have any recycling plant and therefore does not treat E-waste but assists companies in policy making.
- The annual volume of obsolete off-grid solar products is very small.

Awareness creation of E-waste from off-grid solar products

- Awareness creation is done to the public but depending with resources.
- Awareness creation is partnered with other stakeholders.
- E waste management is always the key aspect of the awareness to the public.

End of life: take back/recycling and disposal

- No awareness has been done so far, because quantities received have been so small.
- Collection is done country wide in partnership with agents in the rural areas. For example, Malimali people.
- Collection centers are set up occasionally.
- Most of the E-waste is from the informal sector.
- The components are bought in from the users, even though corporates are willing to buy.
- Components with a positive value include:
    - ✓ Bulbs

- ✓ Solar panel
- ✓ Cables

- Components with a negative value include:
  - ✓ Lithium-ion batteries
  - ✓ Some plastics cannot be recycled
- Batteries are highly hazardous since they contain lead, mercury, and lithium-ion phosphate. Some cause skin reactions during handling.
- Lithium-ion batteries are exported to Hong Kong.
- A business case for recycling of lithium-ion batteries is possible when more awareness is done, and technology is enhanced.
- Challenges for recycling of off-grid solar products include:
  - ✓ Disassembly of product
  - ✓ Lot of counterfeits in the market
  - ✓ Disposal
  - ✓ Take back and access to products
  - ✓ Lack of authorized repair shops

REWMOS

- They will be willing to participate in our project workshops.
- They would assist in policy making during the workshop.
- They do not mind if we contacted them again.

General comments and questions

- Advanced recycling fee and extended producer responsibility is not being affected, since there are no policies in place. Directives should be guided by international standards.

- What is the budget for the project.
- What are the deliverables for each year.
- Can myclimate factor in E-waste from fridges and CFC gas?
- A baseline survey to be done with NEMA.
- What would be REWMOS's storage mechanism once the products become obsolete?
- Partnerships with both formal and informal sector is key.
- There is no policy addressing solar waste only E-waste in general.
- What is going to be unique about the workshop?
- How will we promote kickback mechanisms?
- How is REWMOS going to grow and promote itself?
- Is REWMOS going to rely on existing infrastructure or it will come up with our own?
- Are there any donors? And what are the expectations?

III. E – Waste Initiative Kenya (EWIK)

The interview was held on 18-07-20 and was attended by:

Hardley Malema – hardley.malema@solibrium-solar.com

Edwin Kipruto - edwin.kipruto@solibrium-solar.com

Chris Amutabi - chris.amutabi@solibrium-solar.com

Lawrence Thuo – mthuo@ewik.org

General information about the stakeholder

- EWIK is a Kenyan based NGO founded in 2015. Their core business is electronic waste management specifically in the informal sector. They provide safe disposal options across the country through networks. This is done through proven technology and establishing public private partnerships and working co-operatively with member communities.
- The company offers collection, sorting, reuse, recycling, and disposal.
- The company does not have a recycling plant, but it modifies and innovates E-waste.
- The company treats both lead acid and lithium-ion batteries.
- Valued recycled materials are recovered.
- Volume for off-grid solar waste is so small and does not even account for 1.5 tons.

Awareness creation from E-waste from off grid solar products

- Public awareness campaigns on e-waste and solid waste management issues are low. The primary segregation of recycled materials is largely under developed.
- Outreach and education programs are done to show how to segregate municipal waste at its source. Plus discuss public health and environmental benefits.
- Creation activities are done through fliers, public awareness programs, design thinking and door to door campaigns through agents.

Life extension: maintenance/repairs

- Solar components can be repaired and reused. Especially the panels, batteries and inverters. There has been very small quantity of solar E-waste.

End of life: takeback/recycling/disposal

- Waste collection and transfer system provides a collection point for every waste that is generated throughout the country. This includes direct vehicle collection, door to door, and community collection methods.
- Collection events are done often through churches and Barazas.
- There is also distance collection where end-users send it through a special courier to the collector.
- The company finances all the take back costs and pays the users and agents for accepting the returns of the components. For example, the company pays 200 ksh to a user to take back the battery.
- The components are bought back, because of the addition value they will generate when they are done and resold to the market.
- Components that have a positive value include:
  - ✓ Wires
  - ✓ Bulbs
  - ✓ Inverters
  - ✓ Batteries
- Components with a negative value include:
  - ✓ Glass
  - ✓ Lithium-ion batteries
  - ✓ Power boards and TV circuits
  - ✓ Plastic
- Toxic materials are lithium-ion batteries. They contain lithium ion phosphate.
- A business case for recycling lithium-ion batteries is possible even through it's currently easier to outsource.

- Challenges faced for recycling off-grid solar products are:
  - ✓ Negative value
  - ✓ Volume is low
  - ✓ Not bulky in terms of weight
  - ✓ Design affects recycling

REWMOS

- He will be willing to participate in our project workshops.
- He will represent the informal sector.
- He will not mind being contacted again.

General comments

- He would like to know each year's deliverables for the project.
- He will charge KES25,000 to participate and give a talk during the workshop.