Africa's Solar Light Movement: Electrification without circular economy?

This research idea is developed after a preliminary field research conducted last September/October in West Africa. The proposed research presented here is intended for a peer-reviewed journal article to be published within the framework of a project entitled 'Climate Information for Renewable Electricity Generation- CIREG'. At the same time, this journal article will contribute to my cumulative PhD project in the emerging field of Sustainability Transitions ST at the Faculty of Philosophy of the University of Bonn.

I. Background

In recent years, there has been a surge in the amount of solar light used in the African continent as part of the electrification efforts for a continent still struggling with ensuring electricity access to many parts of its population especially in rural areas. According to a recent study on off-grid renewable energy solutions by the International Renewable Energy Agency (IRENA), in the course of the last decade alone, solar lights have become the most pervasive off-grid solution servicing the African populations. This is not surprising since in the context of many Sub-Saharan African countries especially those which are Least Developed Countries (LDC), off-grid energy solutions are more economically and logistically viable to reach remote un-electrified areas. Despite being a trend in the right direction towards electrification, the extent in which the expansion of solar lights is pushing in the direction of sustainability is still in need of further investigation.

II. Assumption and hypothesis

Prima facie, abundance of resources disincentivises circle economy practices. As such, countries where there is a prevalence of energy poverty and resource scarcity are potentially more inclined to adapt strategies in line with circular economy principles in their daily practices. According to the Multidimensional Poverty Index (MPI) adopted by the UN Human Development Program in 2010 access to electricity is one of the poverty indicators. Sub-Saharan African and West African countries more specifically are among the poorest in this regard. Moreover, many of the electrification programmes, projects and strategies put in place aim to address the African electrification challenge from the sustainability prism by attempting to apply a 'leapfrogging' model in which the phase of reliance on dirty energy sources that most other countries had to go through is skipped. However, in contrast to this logic, the spread of solar lights solution in many parts of Africa has morphed into to the problem of what is coined as 'solar waste'. This has prompted the spring-up of several local initiatives to counter it. Circular economy notions and theoretical frameworks can offer useful tools to better assess the provision of energy services to a society with material artifacts like solar light bulbs as a sustainability strategy.

III. Objectives and Research Questions

The main research aim is the contribution to the advancement of knowledge on the interplay between off-grid electricity regime and waste regimes of electricity artifacts. As such the research is aimed at understanding the user practices, consumption patterns, waste management habits and procedures of disposing of nonfunctioning solar light bulbs. It also aims to investigate the cognitive framings and consumer behavior guided by the meaning of lighting in a sub-urban context is concerned. It also looks into innovative social practices in these communities for extending product's life and incorporating its uses in everyday practices.

The main research questions are:

1. How does electrification with solar lights in one or two-Sub-Saharan communities co-exist, reinforce, interrupt or impede existing or potential circular economy practices towards sustainability?
2. When and how do solar light bulb stop being an artifacts of modernity and electricity provision and become waste? What is the social life and 'afterlife' of the non-functioning solar lights?

IV. Theoretical Approach

The research is embedded in several theoretical frameworks and concepts including those borrowed from Circular Economy frameworks to address different parts of the research questions:

1. Product- service systems (PSS)
2. Multi-Level Perspective (MLP)
3. Social Practice theory

V. Methodology

a. Data Collection: case studies, ethnographic study, surveys, structured interviews and semi-structured interviews.

- The research is based on the selection criterion of 1-2 case studies in a sub-urban area with ongoing electrification using off-grid solutions.
- Part of the data will be collected during a field stay in Ghana and Togo or Burkina Faso (TBD latest by mid-December) in January and February 2019 using ethnographic study method.
- During the field research stay, surveys, structured and semi-structured interviews of all solar lights user groups will be conducted. These groups include: end users, distributors, manufactures (if local) and the waste managers.

b. Analysis

- Local level/ scale i.e. a sub-urban neighborhood
- Comparative: Ghana, Togo/Burkina Faso (TBD)
- Trade related issues are outside the scope of the research and as such issues regarding dependence on imported solar light bulbs rather than local R&D and networks in the region of study are not considered in the analysis.