

MIA Made in Africa

Solar Lamps and Jobs for Africa

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Solar Lamps have been promoted since long time to replace candles and kerosene lamps. A lot of advantages such as lower cost, less indoor pollution and lower risk for fire have been proven. Nevertheless the market for these lanterns does not develop as fast as expected. One of the key reasons is the missing local service for these products. In the rough rural environment there is a high chance that parts of the lamps break. Most of these failures are not a classical case of warranty. And if there are cases of warranty there is in most cases nobody who can handle the repair or replacement.

At the same time lamps, powered by disposable dry cell battery are booming. These lamps solve some of the above mentioned problems, but they create new problems at the same time. Main problem is the huge amount of poisoning waste which come from used dry cell batteries. There is usually no recycling or even garbage collection for these batteries.

To prevent such problems the MIA lantern has been developed. The concept of this product is to use local assembly and to move big part of the value chain to the country where the product is needed.

Technology

A comparison between different basic lamp technology has shown that the least cost option would be a concept based on a single NiMeH accumulator. Advantage of this battery is its robustness and the fact that a charge controller can be prevented [1]. The ecological impact of these batteries has been analysed in a separate study [2]. Due to the low voltage of this battery type, a DC/DC converter is needed to provide a voltage high enough to operate a high efficient white LED. Except the LED all components are selected as "true hole"-components to allow local soldering. A PET-laminated solar cell allow more than 5 years of operation.

Mechanical components such as the housing can come from local sources.

The lamp was designed to provide a luminous flux of above 20lm. This is the same luminous flux of a kerosene lamp. Due to the fact that LED provide directed light. The illuminance of a LED lamp (measured in lux) will be several times higher.

At higher quantities (>1000 units) the kit can be delivered to Africa below 2\$.

Advantages

Main advantage of the concept is, that local assemblers can maintain and repair the product. Any component can be replaced. The local assembly ensure as well the availability of spare parts.

Another important advantage is the fact that most of the value is generated locally. In addition transportation cost are significant lower compared to finished products. Local assembly, maintenance and service create local jobs, income and development.

MIA Project

The project is designed as an open source project. The local companies and other developers are invited to make adoptions and modifications.

Diagrams and Pictures:

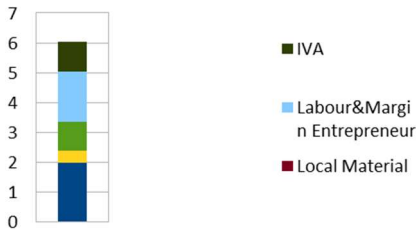
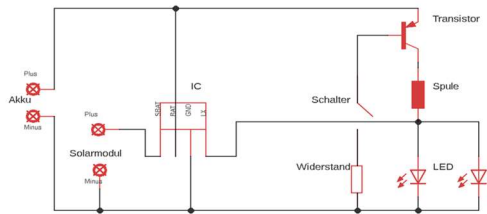


Diagram 1: Cost (in \$) for a local assembled MIA lamp



Picture 1: Circuit Diagram of the lamp



Picture 2: Assembled lamp; as housing a jam jar is used; a tilt switch (from mobile phone) allow switching by turning the lamp upside down.

Literature:

- [1] Bachelor thesis Manuel Götz; Technical University Ulm; 2019
- [2] Marcel Weil et.al.; KIT; CO2 footprint of solar batteries; 2017