

REPORT of TRAINING WORKSHOPS

How to build a solar bottle bulb (2013)

From

Yaoundé and Douala, Cameroon

(DRAFT REPORT)

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GENUS NETWORK SECRETARIAT'S OFFICE – UN-HABITAT

Presented by:

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EXECUTIVE SUMMARY

FCTV (Fondation Camerounaise de la Terre Vivante) and UN-Habitat have launched a Solar Bulb Project in Douala and Yaoundé. This consist of fitting a plastic bottle filled with water into the corrugated iron roofs of houseswithout ceiling found in informal settlements. A common characteristic of informal settlements is the lack of indoor lighting during the day. For the security purpose, the sizes of windows are most often small in size. This prevents the maximum penetration of natural daylight living indoor spaces in darkness. The lack of sufficient ambient lighting during the day hampers the ability of slum dwellers to carry out household chores and other important tasks in these rooms. They actually use candles, kerosene lamps, electricity bulbs, and battery torchesduring the day resulting in additional cost implications as well as the indoor air pollution and also the risk of having fire incidence.

The solar bottle bulb is an innovative passive lighting system. The lighting produced by one containing one and half litres of water is equivalent to the light produced by a 50 W incandescent light bulb. A solar bottle bulb last for (5) years before its luminescence capacity starts turning down. By using this technology, the members of these households are able to save on energy that was previously used for lighting during the day.

This project is being implemented in several informal settlements in Douala and Yaoundé. The project aims at installing 4,000 solar bottle bulbs within the next three (03) months under the framework of GENUS.

A baseline survey conducted for five (05) days each in both Douala and Yaoundé which has portrayed the energy utilisation patterns during the day, a list of project's potential beneficiaries (1,634) as well as an idea of the amount (5,384) of solar bulbs demand by the dwellers of these informal settlements. This will make it easier to settle 4,000 solar bottle bulbs on the corrugated iron roofs of rooms without ceiling by full training local voluntaries.

1. INTRODUCTION

1.1. Background to the workshops

The poor dwellers in Yaoundé and Douala living in informal settlements without ceiling have been facing challenges associated with the lack of indoor lighting during the day. The deployment of solar bottle bulbs can provide a sustainable solution to the day time lighting problems thus helping households to properly carry out their daytime main activities and tasks. This is going to enhance their lives from the social and economic points of view.

This report presents the process and output of the trainings on how to build a solar bottle bulb which was conducted on Wednesday 11th June 2013 in Yaoundé and Saturday 22th June 2013 in Douala. The training aimed at giving relevant and adequate techniques in the design, assembly and installation of solar bottle bulb. The information generated is expected to provide key observations for the project execution, project monitoring and evaluation

Over a period of 4 months the project targets to settle 4,000 solar bottle bulb amongst 3,000 informal settlement residents as well as having 6,000 of informal settlement residents aware of the benefits of solar bottle bulb

The Solar Bulb project will enhance the productivity of the beneficiary households by providing them with access to good quality day time lighting at no extra expense.

1.2. Objectives

The training workshops are an integral part of the Solar Bulb project. The Framework envisages 4,000 informal settlement residents aware about the benefits of solar bottle bulbs.

The general objective of those trainings was to have 20 local volunteer technicians full trained on how to build a solar bottle bulb.

An indicative list of key variables on which information is required is listed below and attached to this report:

- ⊕ List of voluntaries with name, phone number, e mail: All staff involved in planning and co-ordinating the training workshops,
- ⊕ Details of any training materials used as reference materials,
- ⊕ Training time period or agenda.

More specifically, the trainings have allowed:

- ⊕ To know tools required for settling a solar bottle bulb,
- ⊕ To explain and show up the steps of designing, assembling, and instalment of solar bulb,
- ⊕ To well-know the benefits provided by the use of this gadget.

2. DISCUSSIONS AND TRAINING ACTIVITIES

2.1. Discussions with volunteers

Sixteen (16) volunteers were motivated to attendee those trainings. A team has been made of two volunteers. This approach was aimed at ensuring that at the end of trainings the team has been built and ready to settle 4,000 solar bulbs.

Even though the Terms of reference of the recruitment of volunteers was elaborate enough and explicit on the scope of work, before starting work on the aforesaid tasks, a planning meeting with volunteers was held a day before to secure their availability and agreement for doing these tasks. During the planning meeting, FCTV project team leaders shared the field work condition plan (field materials including GPS, list of beneficiaries from the baseline survey, handling) with volunteers and also made known what was required of the volunteers during this exercise.

2.2. Training activities

The training started with the presentation of the required tools for keeping the roof weather-proof and perfectly embedded the bottle into corrugated iron roofs. Then the teacher presented the role and the instructions for use each tool and built team made of two volunteers. Afterwards, the tools have been distributed to each team.

Generally, the training followed the steps here below:

2.2.1. Presentation of tools, their role and their direction for use

At the annex 1 of this report, you will have detail information regarding this step. However during its exposition, the teacher noticed that this gadget was invented by a Brazilian engineer named ALFREDO MOSER as well as the advantages through the use of this gadget. It also mentioned that this technology span at least 5 years and recommendations regarding its recycling process.

The next step was to constitute and distribute the tools to the team. Therefore, three team have been built and equipped for the realization of the next step which consist of simulating a roof

2.2.2. Making trial roofs

In order to be certain that all of the volunteers known how to embed a solar bottle bulb into a corrugated iron roofs, the teacher has recommended that we need to build artisanal making of small boxes as you see on this picture. Those small boxes were quite looking as a conventional roof.



Figure 1: Making trial roofs

2.2.3. Instalment of solar bottle bulb properly on a roof

This is the last step consisting of set a solar bottle bulb up on the simulating roof by following the instruction figure out on the annex 1 (4.1.3).

Along this step, the volunteers have not encountered any difficulties and they went more than expected by setting solar bottle bulb as rapidly as the team of the teacher. He has properly overseen all those steps.

2.3.Challenges during the trainings and discussion of limitations

Everything went well throughout those trainings. However during the discussion phase following the training, we went through some upcoming issue listed here bellow since they were required to each team to install at least 10 solar bottle bulbs on the roofs per day.

2.3.1. Weather concerns

Actually in Douala, this is the great issue that has a great impact on the indicators that must have to be achieved by the team at the end of the project. The raining season has started soon as expected (June) and up to this date we were thinking about go ahead by installing 370 solar bottle bulbs during two weeks from Thursday 4th to Friday 19th July 2013 to make a decision on whether the instalment phase have to be postponed to another date (ideally to the middle of September or dry season) or not for achieving the goal.

While in Yaoundé, the instalment phase has already started and those 3 teams have already settled 50 there will not be much relevant issues with weather up to September.

2.3.2. Fund limited concerns

We were not being able to hiring 20 volunteers with the project fund available. In fact, for doing a solar bottle bulb, we need to purchase main appropriate tools at \$25 and then operational cost is around \$1.8 (which can become the market value).

During the interviewing process even as the ToRs specified that this a voluntary work and the benefits they might have after the project (doing a business as usual), there were very few person who has been motivated for doing these tasks without receiving fund in exchange as well as without taking into account any security and mobility concern (ladder, mobility fee, laths for displacement on the roofs, etc.).

In the purpose to incorporate all these unforeseen concerns at the planning stage, we were obliged to review the main goal down to 3,000 with 2,000 in Douala and 1,000 in Yaoundé within a couple of months depending on the meteorological conditions.

3. CONCLUSIONS & RECOMMANDATIONS

3.1. Conclusion

At the end of the training, the teacher didn't hesitate to thank the volunteer for their behaviour and enthusiasm throughout the course. This has facilitated the establishment of an agenda for settling out those gadgets to the benefits of slum dwellers in Yaoundé as well as in Douala, but the weather fashion don't allow to be sure on this.

3.2. Recommendations

- ⊕ The main goal have to review from 4,000 down to 3,000 solar bottle bulbs embedded on the corrugated iron roofs of rooms without ceiling in informal settlements. More specifically, 2,000 solar bottle bulbs in Douala and 1,000 solar bottle bulbs in Yaoundé
- ⊕ The instalment phase in Douala has to be postponed in a most appropriated period such as the middle of September (dry season round the corner).

4. ANNEXE ATTACHED TO THE REPORT

4.1. Annex 1: Details of training materials and the building technique including illustration

4.1.1. The tools

Table 1: The Tools

Two circular patterns in cardboard or plastic	Pencil
Galvanized steel sheet (25cm×25cm)	Chisel
Plastic transparent bottle (1.5 litter)	Water mixed with soap
Glue gun rubber sealant	Curved metal sheet cutter and plier
Riveter and rivets	Pair of gloves, a ladder (if needed)
Nail	Bleach
Sandpaper	Plastic protective tube with the same dimension as the cap of the bottle
Hammer	Putty (as prevention to the water drop in)

4.1.2. How to assembly solar bottle bulb

Step 1:

Prepare the galvanized steel sheet by tracing two circular patterns with the pencil

- (1) Outer: similar to the circumference of the bottle
- (2) Inner: 1cm smaller from the first circular pattern

Step 2:

Carefully cut the inner circle of the galvanized steel sheet with the use of chisel, hammer and curved metal sheet cutter



Figure 2: Cutting the inner circle

Step 3:

Cut and make small strips by using curved metal sheet cutter and bend them 45% upward perpendicular to the galvanized steel sheet with the metal sheet plier. This will serve as the teeth that will hold the bottle

Step 4:

Ensure the good sanding of the bottle by scratching it diagonally (45%C) before applying the rubber sealant. This will secure the sticking of the bottle to the galvanized steel sheet after the use of the rubber sealant.



Figure 3: Applying sealant rubber round the bottle

Step 5:

Put rubber sealant to the upper part of the bottle container. While processing this step, use water mixed with soap to avoid the glue keep in on the hand

Step 6:

Fill the bottle with filtered water and added 10 ml of bleach (or 4 caps of bleach)

Step 7:

Protect the bottle cap from cracking under the sun with a protective plastic tube and apply rubber sealant. Clearly, Apply glue round the top before closed it with its proper cap and applied the glue again around the cap, then put the plastic tube and then applies the rubber at its overall top.

Step 8: making 6 (4-2) holes with the nail on the galvanized steel sheet around the bottle.

4.1.3. How to install solar bottle bulb

Step 1:

Use the previous circular patterns similar to the circumference of the bottle in tracing and cutting a hole on the roof.

Step 2:

Carefully insert the bottle into the hole to check if it is perfectly fit

Step 3: put rubber sealant on the perimeter of the galvanized sheet and an inch outside the hole of the roof. Then place the bottle on the roof by using riveter and rivets (at least 6 rivets 4-2 by

making the holes with the nail on the roof corresponding to the previous made on the galvanized steel sheet in *step 8 of how to build solar bottle bulb*)

Step 4:

To prevent water leakage, put a rubber sealant at the edge of the bottle galvanized steel sheet. Then put a metal strip (20cm×5cm) above the rubber sealant and also fixed it by six (06) rivets.

Step 5:

Seal the bottle from the inside. Make sure that there is no air hole to prevent water leakage.



Figure 4: Three solar bottle bulbs built

Your solar bottle bulb is now ready!!

Enjoy it



Because of rain, we are obliged to buy this equipment

FIRST BENEFICIARIES OF SOLAR BULB INSTALLATION IN YAOUNDE GPS coordinates

NAME	CONTACT	NUMBER OF BOTTLES	COORDONNEES GPS
PAPY		01	32 N 0777458 UT M 0429082
MOHAMED		01	32N0777465 UTM 049093
SALIHOU	94 18 45 89	01	32 N 0777639 UTM 0428972
WIYLILAKA MAYAM DIANE	74 89 45 70	13	32 N 0777 554 UTM 0429 022
AMERICAIN		01	32 N 0777 461 UTM 0429 080
FANKEP		08	32 N 0777 458 UTM 0429 097
AMADOU ABDOU	75 18 75 53	04	
TCHINDA MIMOSSETTE	70 57 87 34	02	32 N 0777 450 UTM 0429 068
NJOMO		04	32 N 0777 474 UTM 0429 122
DAIROU		06	