

Lighting the Way to Safer Birth: Improving the Solar Suitcase

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Abstract

We Care Solar, a non-governmental organization, attempted to solve the issue of maternal mortality due to improper lighting in Sub-Saharan Africa with their solar suitcase. We analyzed the suitcase and found major complications with the battery, solar panels, and user manual.

Our project seeks to resolve these complications. We propose to replace the lead-acid battery with a lithium-ion battery, implement more cost-effective solar panels which have non-stick coatings, and translate the manual for easier use by the local population.

Objectives

We sought to redesign a long-lasting and more cost-effective solar suitcase by focusing on three aspects:

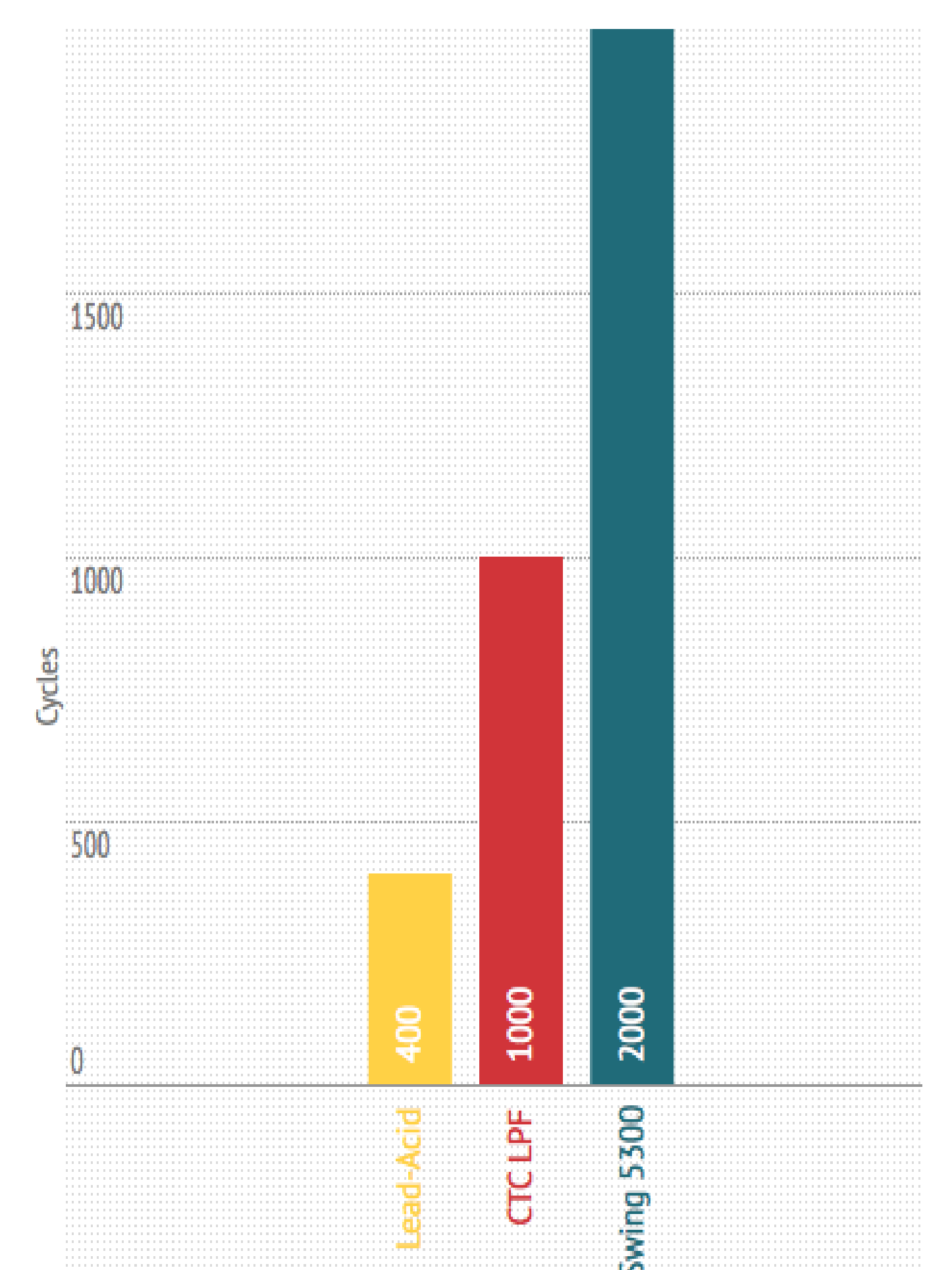
- 1. Battery** – Increase life cycle
- 2. Solar Panels** – Decrease cost to make the suitcase more cost-effective
- 3. Translation** – Update user manual to make it more understandable

Proposed Solutions

Battery:

Build a lithium-ion battery pack with Boston-Power Swing® 5300 cells.

Cycle Life



Solar Panels:

- Replace with Value Line Solar 20W 12V solar panels – decrease cost of the current panels by 50%
- Test developing technologies, such as 1366 Technologies' Direct Wafer™ Technology – potentially reduce price of panels by 90%
- Apply C-Voltaics' SCHN 107™ Glass coating, a non-stick coating, to the surface of the panel to restrict dust buildup

Translation:

Translate the manual into French and Swahili.

Background

Energy Poverty in Sub-Saharan Africa

65%
of the population has no access to electricity

Improper Lighting in Healthcare Facilities

30%
of clinics operate without electricity

Maternal Mortality

265,000
Mothers die each year from birth-related issues

1,160,000
Babies die within the first month of birth each year



7/10 Deaths can be Prevented

Solar Suitcase

More than **300** cases in action

Hindered Performance

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Analysis

Battery:

- × Short life cycle
- × Low energy density

Solar Panels:

- ✓ Rugged construction
- ✓ Adequate performance
- × High cost

Translation:

- ✓ Main languages: French and Swahili
- × English manual – ineffective

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Conclusions

We Care Solar's solar suitcase is an effective solution to the problem of maternal mortality caused by improper lighting. However, it can be improved by replacing the lead-acid battery with a more durable lithium-ion battery, implementing cheaper solar panels with a non-stick coating, and translating the user manual into French and Swahili. Our proposal will provide a longer-lasting solar suitcase for future use in Sub-Saharan Africa.