Opportunity Project: Solar in Tanzania
Final Report

NAME OF PROJECT: Solar in Tanzania

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EXECUTIVE SUMMARY:

From 2017 through 2021, we began and completed a major project to solarize 111 primary schools in the two districts Karagwe and Kyerwa in Tanzania. With Mavuno as the on-site managing organization, and Zola Electric as the installing company, we provided each school with two 100 W solar panels, two 150 wH battery, 8 light bulbs, 2 tube lights, 2 phone chargers, 2 radios, and two 24-inch TVs. Post-completion surveys showed that the solarization improved both the quantity and quality of education and enhanced the utilization of the school facilities by teachers, administrators, parents, and community members. The total cost of the project was $150,679, thus the cost of providing clean cost-free energy and education equipment to each primary school was $1,357. With the average enrollment of each school being 830 pupils, we are positively impacting the education of 92,000 children each year for the foreseeable future.
HISTORY OF PROJECT:

In the summer of 2016, while in phone conversation with Erica Mackey, one of the co-founders of Off-Grid Electric, she told Sunny and Barbara Tang, Founders of AllPeopleBeHappy foundation that Off-Grid Electric is solar electrifying homes in Tanzania for the price of $50 to $75 each. This was an astonishing number to us, since the cost of solar electrifying an average home in the US range from $25,000 to $35,000. We know that in a wealth limited environment, providing electricity cheaply is extremely important in gaining acceptance and usage, thus solar is a natural choice for Africa. It is highly likely that solar energy will fundamentally transform Africa; just as in communication Africa has bypassed the landline on its way to cellular phone usage, Africa in energy utilization will bypass the power grid on its way to solar electrification.

Providing access to electricity is fundamental to the alleviation of extreme poverty, and hence solar electrification falls well within the mission of the AllPeopleBeHappy foundation. It is well known that in rural Africa almost all the primary schools, and indeed also most of the secondary schools, do not have electricity. We therefore decided to investigate providing solar energy to primary schools in rural Tanzania. Through Erica Mackey, we contacted Off-Grid Electric (dba Zola Electric) in Tanzania and received a quote of $1,208 for a 2-room school (2 solar panels, 8 light bulbs, 2 phone chargers, 2 tube lights, 2 TVs, 2 radios). This price includes 1) ownership of all the equipment by the school, 2) installation, and 3) 5-year equipment and service warranty. This means the electricity is essentially cost free to the school.

Over the past 11 years, the Foundation has funded several projects in Tanzania. In one case, with Amizade, we built a 300,000-liter water storage tank in Kawagwe, after installing several polyethylene tanks in several homes. We contacted Brandon Blache-Cohen, Executive Director of Amazide, and asked him to suggest a Tanzanian NGO who can work with us. He suggested Charles Bahati, Director of Mavuno (Mavuno Improvement for Community Relief & Services). We decided to embark on a pilot project to solarize 10 primary schools. For a cost of $1,100 ($1,000 to Mavuno and $100 to Amizade), Charles provided us a list of 10 schools (nine 2-room schools, one 1-room school) with a total enrollment of 7,675 students, and agreed to be our local coordinator, interfacing with the schools, and managing the installations. We then contacted Zola Electric in Tanzania and gave them the go-ahead and funds to proceed. The installations were completed in early second quarter of 2018, at a cost of $11,164.

After 5 months, we contacted Charles again and asked him to do a survey of the 10 schools to gauge the usage and utility of the installed system. The answers that came back was somewhat surprising: 1) more students are showing up for school because the school is now consider “modern”, and 2) all the schools were using the lighting at night to help boost the learning of the students who want to learn, and 3) the TVs and radios were not mentioned.

Importantly, Charles also reported:

“I have been visiting all schools where the project has been implemented, and I was asked to send you many thanks for your kind support towards installing solar power. Most of the schools
are expecting to do exceptionally well this time as both teachers and pupils have enough time to finish subject syllabuses and do revision during the evening time. “Most of my Pupils come from underprivileged families. It is important they use the solar light to study in the evening and they pass their exams and go on to secondary schools,” said teacher Evodius from Nyakasana Primary school.

“We are now noticing our children using their extra time in the evening to do more of exercises given by teachers at the school and we see them seeking more support from their teachers especially in Mathematics and English subjects” said one of the parent, Jacob Israel, who has a child in Karalo Primary school.

We asked Charles about the TVs and radios, and he replied: “It might be hard to imagine but most of primary schools here have a limited number of classrooms and thus it is being hard for the children to have full time in classes. With an introduction of solar system it is very easier for candidate pupils to be back in the evening hours to continue with classes after normal hours. In this way the community has been very thankful for the donation of the solar systems and it is granted that the children will be able to do much better in their final examinations.

Secondly, the Solar power systems is cutting-edge and attractive to eco-minded pupils and teachers and such, a school that has installed a solar panel system could easily see an increase in enrollment of pupils as most of parents will be preferring taking their children to schools.

While talking with the teachers where the TV and Radio have been provides these are seen as a clear tool that help many young pupils to hear, see and learn. In order to give them an early start, they are using the TV and radio in a classroom environment. These equipments also help children to have interest and attend school every day. Since there is an introduction of these equipment there is much and more progress in terms of children attendance and this also work as an attraction for the children to like their subjects.”

In looking to continue with this project, Charles told us the region has 114 schools (111 primary, 3 secondary), and they would all love to be provided with solar energy. We considered providing all the schools with just solar lighting, with no TVs or radios. However, one of our Director suggested that we do a more extensive survey to get a clearer picture of usage. We again contacted Charles, and he agreed to send a person to each of our pilot schools to do interviews and provide us with a more in-depth summary. At a cost of $1,100 (funds through Amizade), the survey was completed in early December 2018.

The findings of the second survey were:

1) For the 10 schools, about 12% of the students were staying into evening hours (897 out of 7,675); almost 40% of the teachers/administrators were staying into the evening hours (46 out of 117).

2) Students staying are those who were preparing themselves for the national examinations for standard four and seven with their relevant teachers.
3) Other teachers use the school at night to prepare lessons for the next day. Some of the school neighbors gather at night to watch television news and sports.

4) During the day the teachers are using the TVs to teach the students through showing them pictures which support their subjects. Teachers reported that TV have helped them very much; they use it as a teaching aid for information and communication technology.

5) Some students are escorted by their parents come to school at night to watch the television for the children’s programmes like Ubongo kids and cartoons. (Ubongo kids is the children’s training programmes from Tanzania Broadcasting Television).

6) Before teachers would have waste time and money for cell phone, radio and touch charging. Now they can charge them at school and save time and money. In some of the school’s neighbors also benefited with the system for charging.

7) Now most of the schools are secured. Before the school compound were totally dark at night, now there are security lights and all people around the school feel secured.

It is quite clear now that solarizing schools benefit children’s education. This more extensive survey dispelled our earlier notion that the TVs were either stolen or not being used. It confirmed our earlier hope that the solarized schools would be useful to the entire community, serving as an ad hoc community center for parents and neighbors.

We therefore proposed to the Board of Directors of AllPeopleBeHappy foundation in early 2019 to embark on a multi-year effort to solarize the balance of the 111 primary schools, a dozen 2-room schools at a time. The goal was to complete the solarization of all 111 primary schools within 5 years, and this was accomplished.

IMPLEMENTATION OF PROJECT:

The solarization of the entire 111 primary schools was divided into 10 projects, with Project #1 being the first 10 schools in the initial phase, Project #2 to Project #9 with 12 schools each, and Project #10 being the final 5 schools. Project #1 was initiated in November of 2017, and Project #10 was completed in September of 2021, thus 5 years.

Each project can be broken down to 6 separate tasks: 1) Mavuno identify the set of schools to be solarize, 2) project management fee sent to Mavuno via Amazide, 3) exact price for the installation at the set of schools negotiated with Zola Electric and the money wired to Zola Electric, 4) Zola Electric perform the installation under the auspice of Mavuno, 5) completion pictures are sent to AllPeopleBeHappy foundation, and 6) 6-month survey is conducted by Mavuno and report provided.

In summary, the following statistics are provided:

1) The total enrollment at the 111 primary schools is 92,165 pupils, representing approximately 800 students per school.
2) There are 1,198 teachers at the 111 schools, representing approximately 11 teachers per school.

3) Student attendance has increased due to the presence of a conducive learning environment. The average increase in attendance for the schools after 6 months is 23%.

4) There is a significant increase of the student’s performance especially those at examination classes because they have extended studying time in school. The average increase in student performance found in the surveys is 20%.

5) In total, $136,929 was wired to Zola Electric, project management cost was $13,200, wiring fee was $550, adding up to a total project cost of $150,679, representing a per school cost of $1357.

LEARNINGS:

Much is learned by reading the words written or spoken by the beneficiaries themselves. The following paragraph is from the last Survey Report done:

“Solar power project for rural schools is a project that was directly aiming to the schools which had not connected to the national grid electricity program (mostly located at rural areas); but with the same need like those who are connected to that services. The lack of electricity in schools has led to many negative consequences as we will see in section 5.0 of this report. The project was introduced in 2018 whereby the main focus was to install solar systems in the schools Karagwe and Kyerwa districts all of Kagera - Tanzania. There are reasons to why the priority was given to the said districts over the remaining districts. Among them, is the geographical reason. Karagwe and Kyerwa districts have been exposed to the challenge of fog in the morning hours (especially during the rainy seasons), a situation that leads to darkness and thus makes the teaching exercise to be difficult. Up to July 2021; the record verifies that a total of 111 schools from the mentioned districts, were proved to be included in that reliable solar power system project, and the results have been encouraging for the children themselves, schools and the community at large. The initial expectations for project implementation were met and even crossed over! Suffice it to say that this project has been a great help to the current and future generations; according to the school beneficiaries. The assessments that have been conducted at the end of each phase shows that the performance, attendance, awareness and motivation of students and teachers have increased beyond expectations.”

For a project to succeed, ownership by the beneficiaries is extremely important. The following introductory paragraphs are from the last Survey Report:

“The Rural schools’ Solar Power project is one of the projects that will remain in history as one of the most successfully implemented project by Mavuno organization. In addition to providing tangible success, it is also a project that has changed the mindset and convinced the community to trust the technology. Indeed, this project can be used as a testament to the fact that plans are possible for the project to be successful implemented if there is an intention, collective understanding and empowerment, as evidenced in this report. The Mavuno organization would like to thank each stakeholder for his/her
contribution to the success of the witnessed events. To start with is the donor of the project ALL
PEOPLE BE HAPPY. We thank them first and foremost for their willingness to help, as well as for providing financial support for equipment, distribution, technicians and follow-up. They will remain as role models in the way they disbursed funds on time and be close to the project in a timely manner. We also thank the government authority for the support and mobilization of the community in collaboration with Mavuno organization. In fact, the success described today would not have been possible without their full participation. Their good cooperation very helpful. The leadership of the schools that benefited from this project also deserves gratitude. Teachers in collaboration with students have been an instrumental in making this project even more valuable. Their attention and care have been exemplified as an icon of the school in this project. In addition, their mobilization and creativity for the community including village government officials and parents has been a test of good leadership.

Final thanks are for the parents and guardians who despite of supporting the said project in different ways; they have been encouraging their children (students) to take full advantage for their present and future benefits. As well as encouraging them to attend evening / extra classes or self-study; yet for those who stay away from school they have been volunteering to accompany their children to school.”

Improvement to Schools:

• Availability of solar lights in these schools enabled students to come very early in the morning and starts the school sessions. Before it was not possible for the students to come early as all the school compounds were in total darkness.

• Teachers feel comfortable working in the school environment as they have lights, they watch television, listen to the radio, their mobile phones are charged all the time.

• Security in schools has been strengthened due to the presence of light and security light at night and thus a barrier to people with malicious intent.

• Many children have never seen television before the project introducing these screens sets being distributed to their schools because there was also not any service of the electricity at area.

• Teachers' access to phone charging has added stability and love to their schools.

• These solar-powered radios have helped to access a wide range of information that can be aired without the expense of buying batteries. They get a variety of national, international news, various educational programs as well as sports news. They also use radios as teaching aid for the children’s programs such as storytelling program.

Improvement to Education:

• There is a significant increase of the student’s performance especially those at examination classes because they have extended studying time in school. The average increase in student performance found in the surveys is 20%.
• Teachers have extended working hours for preparations of the next day session and correction of the student’s assignment using solar lights.

• Through TV screens, children are able to watch various programs, such as news bulletin, knowledge programs as well as various recorded programs. They are now updated to what is going on in our country and in the whole world.

• Now we have seen easily training young student using Ubongo kids’ program; Ubongo kids’ portal is a power of fun catchy songs and storylines which attract and deliver educational content in Swahili and English language.

• The television sets provided have been used as teaching tools especially for the ICT (Information and Communication Technology) subject.

• Student attendance has increased due to the presence of a conducive learning environment. The average increase in attendance for the schools after 6 months is 23%.

• Students' interest in school has increased due to the presence of various attractions in the school through television.

**Improvement to Community:**

• Communities have been coming to school for information and various events on television, especially at night.

• Cooperation between parents and teachers have improved thus making the exercise of monitoring student progress more effective and simpler.
Omukachili Primary school

Karukwanzi Primary school

Makazi primary school