Report to BSSEC: Community Based Green Energy Project, Kenya

March 2016

Sinteyo, a member of a women's farming group in Isiolo, with her tomatoes. Sinteyo's group now have a greenhouse and solar water pumps to irrigate their land.

Project overview

This is the final report for the **Community Based Green Energy Project (CB-GEP)** which took place between 1 November 2011 and 31 October 2015 in rural Kenya. The organisations that partnered with CAFOD to make this important work happen were the Catholic Diocese of Kitui, the Catholic Diocese of Isiolo, Dupoto-e-Maa Olkejuado Pastoralist Development Organisation and Solar Works East Africa Ltd.

The project's overall objective was to increase access to modern, affordable and sustainable energy for 407,792 people in 90 schools, 48 health centres, and 69 rural community-based groups in Isiolo, Kitui and Kajiado counties.

With the final assessments now complete, we are delighted to report that this major project has surpassed its original targets, reaching a total of **490,635 people** with sustainable energy services.

The 702 solar photovoltaic (PV) systems that were installed have led to the generation of 92,780 watts of clean renewable energy, enabling school children to attend classes for longer, health facilities to store medicines properly, and communities to irrigate their land, providing them with food to eat and surplus crops to sell. The project has also enabled IT centres to be established, now run by youth groups.

From initial consultations through to the conclusion of the project, community members have been involved in all aspects of project design. Our partners have also provided community members with the tools and skills needed to maintain the solar PV systems in the years to come. The project is therefore sustainable and continues **to transform the health, educational progress, livelihoods and overall quality of life of poor communities in rural Kenya.**

Project achievements

1. Improved school performance for poor children in 90 rural schools

- Solar PV systems were installed at **90 schools**, increasing learning hours by two to three hours daily at each school
- **29 schools** were provided with solar water purification systems, which enabling pupils and teachers to **access clean and safe drinking water**.

A total of **12,951** children in Isiolo, Kitui and Kajiado now have extra learning hours in the morning and in the evening, due to the sustainable lighting at their schools. These additional study hours are contributing to improved performance in national and internal examinations. For example, in 2013, 21 of the 90 schools reported improved national examination grades – but in the recently concluded project evaluation, a total of 60 schools reported improved grades sine the installation of solar panels.

Pupils studying in the evening at a school in Isiolo

Pupils washing their bowls with clean, safe water

The 29 which schools received water purification systems have reported a reduction in cases of water borne diseases, meaning that **pupils are falling ill less frequently and have more time to study and fulfil their potential.**

In addition, five solar water heating systems have been installed in five schools. The water heating systems are contributing to **improved health** for the **1,181** children in these schools as they can now access hot water for washing on cold mornings.

2. Improved drug storage for 48 health institutions

- Solar powered refrigeration systems installed in **48** rural health centres
- Solar PV systems for lighting installed in **48** health facilities
- 48 solar water purification system installed in **19** health centres

The new refrigeration systems have enabled a significant increase in immunisation services at the health centres, particularly for children. Before installation of the solar PV vaccine refrigerators, some of the health facilities ran gas-powered vaccine

refrigerators. However they faced the constant challenge of gas running out and finding funds to purchase refills. Vaccination services had to be halted until the gas was refilled. The rest had no way to keep medicines cool. They would use cool boxes to collect vaccines from major health institutions and could only offer vaccinations once a month.

Vaccines can now be stored locally and families no longer have to travel long distances to access clinics connected to the electricity grid. All the 48 health facilities with solar vaccine refrigeration systems offer vaccinations throughout the month. In total **43,015 children have been immunized** through these health facilities during the reporting period. Besides immunization services, lifesaving drugs such as snake bite anti-venom and anti-rabies treatments can now also be stored properly.

Nurse Monica Asikuku (blue top) with a mother and daughter at a clinic in Isiolo

As well as vital refrigeration, the health centres now have solar PV systems for lighting, enabling communities to access health services after dark. **933 patients have received treatment at night,** including many pregnant mothers, for example, while 11 lifesaving anti-venom injections have been given to patients with dog or snake bites. The solar lighting not only brings peace of mind to community members, who can access care around the clock, and increased security around the centres, but also enables laboratory services to be carried out at night. Patients at the clinics can be seen, diagnosed and treated much faster.

3. Increased income for 56 rural women's groups, five livestock groups and eight youth groups

The project has greatly **improved the income security of the local communities** through equipping

- 56 women's groups with greenhouses and solar water pumping systems
- five groups of livestock keepers in Kajiado with solar water pumping systems
- eight youth groups with solar powered ICT centres

Before the project began, 28 of the women's groups were using petrol generators for pumping water, while 41 groups were irrigating their farm plots by hand. These methods were slow, tiring and unsustainable. The new solar powered water systems have enabled the women's groups to irrigate their land from shallow wells and now that less time has to be spent watering crops, the women can focus on marketing their produce to earn a secure living.

Extreme weather presented some challenges during the reporting period, particularly to the water pumps, which function best in the shallow wells that are typically found in the area. With the onset of El Niño rains, a number of pumps became clogged with muddy water. Local technicians have been working with the

women's groups to make sure the pumps are more resilient, with support from Solar Works East Africa Ltd. The cost of repairing the pumps is being met by the groups, with subsidies from the Dioceses who are providing transport for technicians to the sites.

A women's group celebrate their new solar panels in Isiolo

The 56 greenhouses have provided suitable conditions for the women to diversify their food – the groups are now growing vegetables including tomatoes, onions, capsicum, cabbage and kale. These high value horticultural products have not only improved nutrition, but are now sold by the women in local markets. The income generated enables the group members to manage their domestic expenses, invest in the education of their children, and establish private businesses. So far, the 56 women's groups have made **1,668,716 Kenyan Shillings (approximately £11,594)** from the sale of vegetables produced in the greenhouses, directly benefitting **1,357** community members.

For the eight youth groups reached by this project, solar-powered ICT centres have been a hub for business opportunities. The groups have already made over £5,000 through offering services such as photocopying, internet browsing, mobile phone charging, basic computer training and photo printing. Besides the financial benefits to the youth groups, the wider community has also greatly benefited – for example, before the centres were set up, residents of Oldonyiro town in Isiolo had to travel over 80km to Nanyuki town for computing services.

Since the first ICT centre was opened in November 2014, **3,334** community members have used the ICT centres. In addition, basic computer training has been provided to **172** community members. These skills have been an asset in accessing valuable information and processes online, such as registering for national school exams and employment opportunities.

4. Improved management of natural resources by rural and peri-urban communities

- Solar powered water pumps now used by 56 women's groups to irrigate their land, rather than harmful petrol-powered pumps
- 180 energy saving *jikos* (stoves) in 91 schools
- 36 community environmental forums held

The installation of energy saving *jikos* in 91 schools has led to a **reduction in the cooking hours in schools**. Energy saving *jikos* each have a cooking capacity of 200 litres and are constructed using non-toxic stainless steel and insulated using fibre bricks. Pupils who may not eat regularly at home, now receive **improved quality food** at school. Most schools cook *githeri*, a mixture of maize and beans which require adequate cooking time to soften. The final evaluation indicates that

over 50 per cent of cooks felt that the energy saving *jikos* enable faster and more efficient cooking, allowing them to serve food on time.

The use of the *jikos* in schools also means that less firewood is required and **the local environment is increasingly protected**. For example Tii Primary School, which is one of the 91 schools that have benefited from this initiative, indicated in a recent monitoring visit that they have been able to cut the cost of firewood used for cooking by over 70 per cent, hence making savings on school funds and significantly reducing wood harvested from the forest.

In addition, our partners conducted **36 community environmental forums,** attended by 15,404 community members. During these forums the community members discussed issues related to climate change, waste disposal and conservation of the environment.

5. Partners and communities now have the skills to handle and maintain the energy systems

A total of 346 students and teachers, 54 local technicians, 31 ICT group members and 116 members of greenhouse groups have received training in how to operate and maintain the solar PV systems. Training focused on safety measures in handling the energy systems, basic operations and minor trouble shooting. Solar Works East Africa's contact details, along with those of a dedicated technician, have been provided to all the groups and institutions for further support. Our partners will continue to monitor the project and ensure continued linkages with other solar solution providers for schools and groups that require specialised services. The communities have taken ownership of the solar PV systems and now have the skills to keep the systems running for years to come.

During the reporting period, four exchange visits were arranged for partner staff from across Africa to compare their work and learn from each other. Exchanges took place with Caritas Kotido from Uganda, Caritas Moroto in Uganda, CAFOD Sudan, World Vision Sudan and Norwegian Church Aid Sudan. During these visits lots of ideas were exchanged, creating great interest among teams from other countries in implementing similar green energy projects for income generation within their own programmes.

The future

The CB-GEP has not only improved the daily lives of the community members, but also provided considerable opportunities to break cultural barriers between members of different communities. In Isiolo, for instance, groups have been working together as a single community rather than along tribal or ethnic lines, as they focus on the common benefit of the project.

Communities throughout Isiolo, Kitui and Kajiado now have a greater understanding of the importance of protecting the environment, as well as the long term upkeep of sustainable energy systems.

The technologies used in this important project are simple and easily replicable. The CB-GEB is seen as a model project by other agencies — CAFOD and our partners will continue to seek ways in which to share and apply lessons learned from the implementation of the project.

Nancy Wanja

Nancy Wanja is the school cook at Entasopia Primary School in Nguruman, Kajiado County. She is responsible for preparing food for 643 pupils every day. Entasopia Primary School receives food from the government through a school feeding programme, in support of free primary education. Through the feeding programme, each pupil receives approximately 150g of maize and 40g of beans every day.

Nancy demonstrating how she used to light the school kitchen fires before energy saving stoves were installed.

Before energy saving *jikos* arrived at the school, cooking for so many children was a huge challenge:

"Initially I had to use concrete bricks and arrange them to make four jikos to enable me cook for the students. With the four fires, the kitchen was very smoky and hot", Nancy says.

"This negatively affected my health. I had itchy, teary eyes, frequent coughs and a chest problem frequently. The kitchen was getting dirty because of the accumulation of soot.

"Now that we are using jikos provided by CAFOD, I no longer experience these health problems - the jikos have minimal smoke emission. The kitchen doesn't get as dirty as it used to and I find it easier to work because it's not as hot. Moreover I had to continuously feed firewood into the old jikos for over four hours to ensure the meals got ready and even this did not cook the food properly.

Nancy with two new jikos

"Now I only feed the energy saving jikos twice and the food is ready in one and a half hours. It's soft enough to be eaten by the pre primary pupils. This has saved me time and energy so I can attend to my household chores."

Sinteyo Legei

Sinteyo Legei and her family live in a Maasai village about an hour's drive from Isiolo. Sinteyo is a member of a women's group in the village. Together, the women are growing tomatoes in a greenhouse installed by CAFOD's partner Caritas Isiolo.

Sinteyo says "*I am a member of a women's group called Sotua ('bringing people together'). There are 22 of us in the group. Even before the greenhouse project began, we were already in a co-operative. We would contribute money and pool together to give money when someone needed something.*

When we heard about the greenhouse, we decided it was something we wanted to try together. When Nicholas from Caritas came, we were very grateful because we knew that the idea would help us. Everything was going to be started from scratch, but all we needed to do was nurture it to success. It was a godsend for us.

The greenhouse was built in January. I keep the key to the greenhouse. Even before I do other chores, I go there because it is near my home. I go to check that there is water in the tank, and I take part in group activities related to the greenhouse.

There have been a lot of benefits, because we never knew how to grow tomatoes before, but we were trained and shown how to do it. We had the training before we planted, and now the tomatoes have grown and we have started harvesting and selling. We mostly sell the tomatoes in the community. After we have sold the tomatoes, we work out how much money there is and it becomes money for the group. If we earn enough, we share it out among group members.

We use the solar pump to bring water from the stream, so we can fill the tank above the greenhouse and water the tomatoes. The power for the pump comes from the sun. I'm fascinated by the fact that you can point an object at the sun and the water will just come. Even when there are no rains, we continue to harvest our tomatoes and continue to sell.

Sinteyo in the group's greenhouse with Nicholas, from Caritas Isiolo

The greenhouse has helped us to cope with the climatic conditions. It is always there and whenever you lack food - you just come into the greenhouse to get a few of the tomatoes, and you are able to save money from selling them. That helps us to feed ourselves and our families.

With the climate changing there is need for people to work together. When there are no rains it is important to support each other, so you need your neighbour. The conditions we live in are not of our own making. If we don't work together, we are alone, and we will not survive alone. Even when there is scarcity of food, we all share what we have."