

Trip to EnerSHelF project site Kologo, Ghana November 2020

The purpose of this trip under the EnerSHelF project was to set up a Photovoltaic-Hybrid-System (PV-Hybrid-System) for a health facility in Kologo, Ghana. The German-Ghanaian project Energy Self-Sufficiency for Health Facilities in Ghana (EnerSHelF) aims to address this; experts from academia and industry work together on both technical, economic and political questions to improve and disseminate marketable PV based energy solutions for health facilities in Ghana. The aim of this project is not only to focus on sustainable Energy self-sufficiency for health facilities in Ghana, but also to help reduce global CO₂ emissions and identify important factors in the implementation of the PV power modules in other regions and sectors.

The EnerSHelF project consists of nine different project partners, with each partner having a specific work plan (WP). Among these project partners is WestfalenWIND Beyond, which is an industrial partner with the aim of implementing this project at the selected location (Kologo, Ghana) and promoting user acceptance and sustainability.

WestfalenWIND Beyond falls under the work plan (WP2), which is not only promoting user acceptance and sustainability and market PV-based energy solutions at the selected location, but also the construction of a PV-Hybrid-System for the selected health facility at Kologo, Ghana. It is a hybrid system because it will allow the system to be charged by the national grid when the PV modules are not producing any electricity.

Location

The selected location is Kologo, Ghana. Kologo is a small village in the northern part of Ghana (Upper East Region), 30 to 40 minutes drive away from Navrongo. The southern part of Ghana is different from the northern part. The culture (the way the people live) and the language is different compared to the north, but there are certain languages that are both spoken in the north and also in the south, like Hausa, Twi and the official language that almost all Ghanaians speak, English.

The North of Ghana is the warmest part of the country with an average daily high temperature of 34 degrees centigrade. The climate is very warm, but has only a very few tropical and humid months. It is yearlong warm or hot. Due to the lesser rain, the best time for travelling is from

November to March. Sometimes humidity is unpleasantly high from July to September. The most rainy days occur from June to October. In Kologo, there were days that the temperature was at 36 degrees during the project period. There are no direct flights to Kologo, and the closest one can get is to Tamale Airport, with an intercity flight from Accra Local Airport. At the Tamale Airport, one can get a shuttle or a taxi to Bolgatanga (also called Bolga), which is two hours drive away from Tamale. Bolga is a well developed town compared to Navrongo, with hotels, banks and all that one can expect in a big town. Our arrival in Bolga was on the 10th of November and we stayed in a hotel in Bolga for the entire project period.

Local customs

In Ghana, it is part of the customs, especially in remote areas, to pay a visit to the chief and some prominent people before the start of your work or whatever project one came there to do. This allows the local people to get to know you and know what you came there to do, as you will be introduced to the community and provided with help if needed. It is a best practice to involve the local people in your daily task. Again, it is very important to fulfil this customs, because it shows respect and allowing the elders of the community to give you their blessings. So to say, the way things work in Ghana is different as compared to Germany. The conditions on ground (at the project site) determine your working hours, when you have to start and when you have to stop. One cannot come with a working plan and expect it to go accordingly without any shortcomings. Punctuality is also another factor one needs to forget when in Ghana. Especially in more informal work environments it is not common to agree and stick to an exact time for a meeting or work start. People usually show up when they have to show up at work and not the time you set for them. Not all the time, but most of the time.

Day one

On the first day of work, a visit was first made to the District Regional Director, who lives in Navrongo. The road leading from Bolga to Navrongo is coated and smooth with a small number of potholes, but not the one from Navrongo to Kologo, where we made a second visit to the Chief of Kologo. The Chief's house is not far from the Kologo hospital where the container was located. An explanation of what we came there to do was given to both the District Regional Director and the Chief of Kolog and both agreed to give their support and provide help if needed. After satisfying all customs, we made our way to the Kologo hospital where the container was located.

An inspection of the container was first made to checklist all the components of the project that was sent to the location. A number of 24 PV modules, each 300 W with 39.9 v respectively, were still intact. The PV modules survived the rough roads from Accra to Kologo, but the 10 kW inverter was displaced from its permanent position to the floor of the container interior. Also, the air-condition, that is to keep the interior of the container at room temperature was loosely attached to its fixed position, and the workbench inside the container needed fixing. Not much progress was made on the first day at the project site, as the rails that came together with the container were nowhere to be found. After some enquiries we learned they were kept at a different location (in Navrongo), which means we would have to pick them up the next day. The container was positioned at the centre of the concrete floor together with the help of the local people, with the facing south. Next step was to sort out the tools and materials for the project, but because the rails were not at the project site, we had to close for the day after sorting out the tools and materials.

Day two

On the second day we let our driver drive us to Navrongo where the rails were kept – we could not have done that without the pickup truck. The rails were loaded at the back of the pickup truck and together we drove to the project site in Kologo. The rails in which the PV-modules needed to be fixed had to be joined together, since it was cut into halves. Mohammed (Mo) did that together with the help of the local people. We normally take our lunch break at 12 to 1pm. Therefore, we fixed all the legs after our break and we had to leave the mounting of the PV-modules for the next day because of the delay from picking up the rails in Navrongo. The renting of the pick-up truck for the duration of our work in Kologo made our work much easier as we could go to town and get all the things we need for our work, and just load them at the back of the pick-up.

Day three

The third day was the day when we started mounting/installing the PV-modules. We had 24 PV-modules each with 300w and 39.9v respectively. There was a strong wind blowing on that day and one of the panels fell down due to the strong wind, so we had to wait for some time for the wind to calm down – but nothing happened to the panel. Werner and Mo fixed the PV-modules in the first row, as there were four rows in total with each holding six PV modules. Mo did the rest with the local people and showed them how it works – it is also a type of

know-how transfer what we are using to do in this project; they helped in carrying the modules, as Mo was at the top fixing them in the rails. While Mo was at it (mounting the modules), Werner was repairing the mounting holder of the broken inverter and the air condition. All was successful and we then stopped for the day. We then left the wiring of the PV- modules for the next day.

Day four

On the fourth day we did the wiring of the 24 PV-modules. As usual, Mo did one with Werner and the rest with the local people. We connected 12 Modules in series with positive and negative terminals, and did the same with the other 12 Modules. Werner made the wiring connection to the inverter. We put on the system and everything was functioning well. The batteries were charging fine and the inverter showed an “OK”, which means everything was looking good. First, we tried the air condition. The first measuring device, called “Dust IQ” was mounted on this day, but not connected. This measuring device is for detecting the dust level and how much it may affect the output of the PV- modules. During our break, we made a stop at the Volta River Authority (VRA) to find out more about the voltage fluctuation in the area, and the minimum and maximum was between 220 and 255 V respectively.

Day five

On Sunday we installed the other measuring devices of Hochschule Bonn-Rhein-Sieg Universtiy of Applied Science (H-BRS). The solar irradiance and back panel temperature was the second measuring device that was installed, and then the Geovision Camera, which was done with the help of Nicola (from H-BRS). The Geovision camera is for cloud observation since clouds can reduce the output performance of the PV modules. The Econsense was already installed, and located in the fuse box of the container, but it must be installed during the connection of the container to the Kologo health centre when the PV is shut down. It is to measure power, current and voltage data of the health centre.

There were also some stickers with serial numbers, which Nicola asked Mo to stick on the measuring devices. After all we also had to document the work and give the information to our partner H-BRS.

Day six

On the sixth day Nicola got the pictures and we made a WhatsApp video call to show her how far we have come with the project. Everything was working and functioning well at this

moment, but we realised that the hospital has only a 1-phase meter instead of a 3-phase meter (a meter allows the Electricity Company of Ghana (ECG) to detect the amount of electricity taken from the grid). We checked the whole building to make sure; finally, we got a local electrician but he did not help much.

Day seven

We got the internet working on the seventh day after Mo bought the 10 GB data purchase at the MTN office. Immediately after the internet started working, Nicola notified me in the WhatsApp group, that she is remotely in Kologo and everything is working but not the measuring devices, Werner checked it and he fixed the problem. The seventh day also marked the last day of our work in Kologo and we had to wrap up everything. The last measuring device, the Voltcraft (for energy logger for individual devices) was set up in the hospital together with the staff.

Challenges

Kologo is a very remote area with no restaurants, shops, etc. Even to go for lunch one has to drive to Navrongo, the next bigger city, which is more developed than Kologo but not like Bolgatanga. During the project period when on site, we had to drive for 30 to 35 minutes to some part of Navrongo just to get food and on our way back, we would have to get all the bottled water we may need during the day. Some of the difficulties we had was when getting some parts for the project we had to either get it in Bolga or Navrongo, but we were able to get most of what we needed in Bolga. Also, the road from Kologo joining Navrongo is not safe to drive on after 6 pm, as the driver warned us. Some thugs do terrorize that area after that time and they may be checking our movement to try and take advantage on us. Therefore, we had to stop work every day before dawn. Because of the exterior conditions and challenges like safety, in punctuality of locals, location of missing parts etc. we were not able to follow a strict work plan. We rather had to show up early each day on the project site and try to finish as much of the work as possible on that day to be able to finish with the whole set up on the scheduled time.

Conclusion

The PV-Hybrid system was finally set up and all the measuring devices were mounted/installed according to the installation guide that came with it. Some metal parts (angle metal) were bought to stabilize the system to the concrete floor. What was not done is the connection of

the PV-Hybrid system to the Kologo hospital. This was because the hospital has two buildings and each with a single-phase meter, and the PV-hybrid system that was set up came with a 3-phase technology (modern or even better to say standard technology) that requires a 3-phase meter. The next step is to apply for either a 3-phase meter or another option must be taken to connect the PV-Hybrid system to the Kologo health facility centre.

Contact:

Mohammed Abass

m.abass@westfalenwind.de