**SMALL-SCALE BIOGAS DIGESTERS AS DEVELOPMENT AID: TALES OF HUBRIS AND FAILURE**

**Site ID: 03**

**Date: 1st June, 2021**

**Interviewer:** Where did this digester originate?

**Interviewee:** It was brought here by contractors.

**Interviewer:** What is name of the contractor?

**Interviewee:** It wasn’t like it was a company or an organization. It was two individuals. [name redacted] and some guy - I have forgotten the other. They are well known across the country for building biogas system– they have just started though.

**Interviewer:** Is it the same guy who built the one at Mangochi Prison? I think I saw on YouTube his Mangochi Prison work.

**Interviewee:** Yes, he said so.

**Interviewer:** Who designed it?

**Interviewee:** It was the same people.

**Interviewer:** Okay, who funded it?

**Interviewee:** It was a project of United Purpose done in conjunction with European Union.

**Interviewer:** I have seen structures there, the green house and other things, who built that digester?

**Interviewee:** It was the same two guys who brought the digester.

**Interviewer:** So at Mulanje Prison, what was your role?

**Interviewee:** It was funded by donors so our role was to provide guidance on aspects related to this premise.

**Interviewer:** Could you please elaborate on that?

**Interviewee:** We provide guidance as to where the digester was supposed to be built talking into future developmental plans as well as security of the prison.

**Interviewer:** We have many prisons in Malawi, if we go to Chikwawa we will find one, if we go to Blantyre we will find one. So, how were you selected as a beneficiary?

**Interviewee:** We used to have problems with electricity and cooking equipment that we were forced to cut down tree for firewood within Mulanje mountain which was damaging the environment drastically. As such were prioritized to protect trees from Mulanje Mountain, so I believe that’s why we were prioritized among other prisons in Malawi.

**Interviewer:** Before this intervention, did you know about biogas?

**Interviewee:** No, we didn’t.

**Interviewer:** Looking at the selection process was it like they looked at all the prisons or what was the selection process like?

**Interviewee:** I can’t really know, but I believe there were high level discussions. All I know we were partners with United Purpose so they were supporting Mulanje Prison unlike other prisons. So I believe that’s why they decided to choose Mulanje prison to be a beneficiary.

**Interviewer:** What were your expectations?

**Interviewee:** We had high expectations as I told you we were having cooking problems so we expected to solve this problem. Also, we were very much involved in cutting down of tree for firewood. So, we hoped to reduce firewood use which contributes to deforestation and environmental degradation. On top of that, we expected to drastically reduce use of electricity which was going to help reduce electricity bills.

**Interviewer:** What were you told to expect?

**Interviewee:** We were told that the system would help us reduce cooking time as it produces hot flames. We were also told that the system is very durable with a long life span, long as we avoid introducing chemicals or detergents into the digester. To do that we were told to close all valves so that no chemical would go into the system. Also, if we used detergents, we were required to close down the system for at least 3 days so that detergents would flush out the system. They also said with the coming in of the digester we were going to be in a better position to cook more food at once as the stoves were bigger than the ones which we were using with electricity. And lastly they said it’s easily to maintain.

**Interviewer:** Why did they say chemicals and detergents should not be allowed into the system?

**Interviewee:** They said digesters heavily rely on bacterial activity so introduction of chemicals would kill bacteria and eventually shut the system.

**Interviewer:** Why did they say it’s easy to maintain?

**Interviewee:** They said the pipes which were installed do not easily get punctured because gas which passes through the pipes does get hot that it damages the pipes. On top of that, they said once the system was installed there are less operation requirements. All we need to do was feed the digester with feedstock – it does need any maintenance.

**Interviewer:** After installation, what kind of training were you given by the installers?

**Interviewee:** We were told how to start it - for instance we were told to ensure that all the valves were open during ignition.

**Interviewer:** How many were trained? And who participated in the training?

**Interviewee:** They selected staff and prisoner.

**Interviewer:** How many?

**Interviewee:** It was about 15 people.

**Interviewer:** Were you part of the 15 people?

**Interviewee:** Yes…

**Interviewer:** How prepared to run operate the reactor did you feel you were after the training?

**Interviewee:** We felt very much prepared to run the reactor since there was nothing complicated about switching it on.

**Interviewer:** What about maintenance, did you feel you were prepared to maintain it?

**Interviewee:** Yes, we learn how to solve gas leakage problems, as well as how to kick start it once chemicals shut down the system.

**Interviewer:** How were you supposed to resolve these issues?

**Interviewee:** By replacing leaking pipes or sealing punctured pipes and equipment. In regards to chemical shutting down the system, we were told to allow water to flush out chemicals in the digester and ensure that feed which was contaminated with detergents is totally removed. Then, we were supposed to start feeding the digester once again with new feedstock.

**Interviewer:** How long was this training?

**Interviewee:** It was for one day.

**Interviewer:** How did you meet your energy needs befor

e the intervention? (i.e. cook)

**Interviewee:** Before the digester were using electricity and firewood for cooking. For nsima we were using firewood, as for beans we were using electricity as it takes a longer time to get cooked.

**Interviewer:** I have noted that your biogas use manure, food waste and other waste - How did you manage your waste (the feedstock) before the reactor?

**Interviewee:** Human waste is contained in the septic tank and is emptied when it is full, while food waste is disregarded in waste bins for disposal.

**Interviewer:** Okay, how did the system work after commissioning?

**Interviewee:** Initially, it worked perfectly well and we were able to use the two stoves we have at the same time. But, after two days, when we switched on both stoves we were not able to get the same level of heat, only one was heating up with the same intensity while the other couldn’t really heat up. We reported to the installers because at the time they had not formally handed over the biogas. They came and suggested that we should use one pot at a time. When we used one, it was good. When we switched on both stoves only one pot could heat up to cook on.

**Interviewer:** Did they ever manage to get both stoves back to a level where you could cook with both stoves on?

**Interviewee:** No

**Interviewer:** So, what did they say?

**Interviewee:** They said little gas was being produced, but as time goes it was going to pick up as bacteria activity in the digester was going to increase with time and more gas was going to be.

**Interviewer:** Okay, how much gas was being produced?

**Interviewee:** They didn’t tell us the amount gas it was producing but we were able to cook 3 times a day.

**Interviewer:** Aside from cooking, how did you use the gas?

**Interviewee:** Nothing else, it was simply for cooking.

**Interviewer:** What were the operation requirements?

**Interviewee:** They said we could use food waste and other biodegradable waste on top of, of course, human waste – Any other waste excerpt plastic waste,

**Interviewer:** Why no plastic?

**Interviewee:** Because plastic doesn’t decompose and can’t produce bacteria that produce gas.

**Interviewer:** How did you prepare that feedstock?

**Interviewee:** Before feeding the digester with food waste we were breakdown food waste into small by smashing and remove things like stones and plastics.

**Interviewer:** How much food waste and other waste were you feeding the digester on a daily basis?

**Interviewee:** It was dependent on the amount of food leftover. Some days we were not feeding the digester.

**Interviewer:** On average, how much were you feeding the digester?

**Interviewee:** I would say a 60 litre bucket of food waste a day.

**Interviewer:** How much water were you adding to the feedstock?

**Interviewee:** We were not adding water.

**Interviewer:** You mentioned that a septic tank for prisoners’ toilets is connected to the digester, who many prisoners were in the prison the time the biogas was working?

**Interviewee:** We had about 500 prisoners but now the number is less as some were released due to Covid to ease congestion. Now, we have about 200 prisoners.

**Interviewer:** That’s like 500 people human waste was used by the system when it was in operation. Okay

**Interviewee:** Yes…

**Interviewer:** Did they talk about maintenance requirements?

**Interviewee:** Yes, they did.

**Interviewer:** What did they say?

**Interviewee:** They said before the official handover everything that had to do with maintenance was there responsibility. But after handover, we were going to be responsible for maintenance. Besides that they said they were going to teach us more about maintenance after handover. Nonetheless, they talked about little things like how to replace valves, - Like when a valve malfunctions, we just need to buy and replace. They said before handover, we could do such kind of maintenance.

**Interviewer:** You were trained how to do such things I believe.

**Interviewee:** Yes, they showed us how to replace valves.

**Interviewer:** Before the digestor failed, did it meet your needs?

**Interviewee:** It didn’t.

**Interviewer:** How? What were the gaps?

**Interviewee:** We wanted it to work 100%. Unfortunately, we only managed to utilize it 50% as only one stove of the two functioned.

**Interviewer:** You said you classified the food you cook into two groups, one which needs more heat, and one which needs less heat. The time you were using the digester what were you cooking it for?

**Interviewer:** We used to use the digester to cook food which needs more heat. It was faster.

**Interviewee:** What challenges were there?

**Interviewer:** The challenge was that we could only use two stoves at once. We noticed that when we were using two pots at once things couldn’t get cooked and it was taking time for things to heat up. That’s when they suggested using one stove at a time when both stoves couldn’t heat up at the same time.

**Interviewer:** After you used it for two days you could only use one stove, I would like to know, how long did it take to stop working completely?

**Interviewee:** We used it from November of last year to end February of this year. We only used it for about four months.

**Interviewer:** After 4 months you stopped using both stoves completely?

**Interviewee:** Yes…

**Interviewer:** It doesn’t show any sign of working? Zero?

**Interviewee:** It produces a little gas but you can’t cook with it.

**Interviewer:** You said you were trained about 15 of you on its operation and how to fix it, so once the biogas reactor broke, what did you do? Did you try to fix it?

**Interviewee:** We didn’t do anything because we were never told that problem – The issue was not part of the training. So, we were never told how to fix the problem. Therefore, we called them and they said the system was producing little gas and would come to fix it.

**Interviewer:** When was that?

**Interviewee:** Early March.

**Interviewer:** Since March have they come to fix it?

**Interviewee:** We have never gotten in touch since they said they were going to come to fix the digester. So, we are simply waiting for them to come and fix it.

**Interviewer:** Do you feel they will come?

**Interviewee:** (Laughs) I’m not quite sure, but I still think they will come because they didn’t handover the project.

**Interviewer:** Did they tell you the cause?

**Interviewee:** No.

**Interviewer:** Have you seen something like this? What do you think about this kind of information and do you think it would have helped you?

**Interviewee:** I have never seen this before. But, I think the information would have helped solve the problem and would increase our knowledge on the subject of biogas.

**Interviewer:** We have done almost 80% of the interview. We are going towards the end. How would you describe the current state of the digester?

**Interviewee:** I can say it`s 50 – 50. It just needs little fixing so we can start using the biogas again. It needs a complete overhaul of the feed and then introduce new feed to get the bacteria back on track. In my opinion, I feel there is something they didn’t do right that time. They just need to come and address that something. Like they said, the digester is producing little gas, and they said will come and assess the digester to rectify the problem.

**Interviewer:** What makes you feel and say – they didn’t do something right that time.

**Interviewee:** Because if they hadn’t missed something we would have been able to cook with two stoves for some time. As I have said, it only took 2 days for one stove to stop functioning properly, so it shows there was a deficit on their part.

**Interviewer:** In your opinion, what is the caused it to reach this state?

**Interviewee:** I believe what it caused it to reach this state is poor background in terms of installation as it didn’t produce enough gas. Like I said, it didn’t take long to stop working. It is also likely that there is a leakage somewhere. As you might observe, you can smell strange gas odor around the digester which shows that gas is escaping from the digester. So, you have a reactor which was producing small gas, and now some it’s also leaking out gas. That’s where we are now.

**Interviewer:** Okay, how do you manage your waste (feedstock) now that the reactor isn’t working?

**Interviewee:** We don’t produce lots food leftovers as the population of prisoners was reduced to almost half due to Covid. They little waste we get we dispose in a refuse pit, and after some time we use it as manure in the garden. I believe if it starts working again we will be advised to put extra waste on top of human waste to cover food waste deficit caused by the depopulation of the prisoners.

**Interviewer:** We are doing to the last sections, you have said you don’t know how much money was spent, but it was funded by donors. Did Mulanje Prison contribute anything in kind?

**Interviewee:** There was nothing we contributed except for labor which cleared the site. As for digging, they came with an excavator which excavates the site. We also helped with labor which was responsible for carrying the materials.

**Interviewer:** How many people were involved?

**Interviewee:** It was about 18 – 25 people.

**Interviewer:** What kinds of special items had to be imported from another country?

**Interviewee:** They said they got the stoves from South Africa – The biodigester bag was from South Africa. The other things were like cement and pipes were not imported.

**Interviewer:** We are remaining with 3 questions. Okay, the time it was working did it save you money in terms of energy consumption?

**Interviewee:** Yes

**Interviewer:** Like how much were you spending on electricity and firewood?

**Interviewee:** Before biogas we were getting a bill of K500, 000 per month. But when it was installed we were spending about K300, 000 per month.

**Interviewer:** Oh impressive, what is your opinion of biogas?

**Interviewee:** Biogas is good to use at an institution as well as at household level because it helps to protect environment. It is also important because it makes use of waste which we normally disregard to produce energy for cooking – it’s really a good thing.

**Interviewer:** Last one, If you could have designed your own waste or energy intervention, what would you have chosen instead?

**Interviewee:** I would prefer solar.

**Interviewer**: Why solar?

**Interviewee**: Because it’s cheap and it uses locally available resources so it’s easy to maintain.

**Interviewer:** When you say it uses local available resources, what do you have in mind?

**Interviewee:** Solar panels, battery and invertors - such things are easily found here in Malawi. We have plenty of them in the hardware stores.

**Interviewer:** This is the end of our interview. Thanks for your time.

**Interviewee:** Welcome.