**BIOGAS ASSESSMENT PROJECT**

**Site ID: 19**

**Date: July 25, 2022**

**Interviewer**: Thanks for granting us an interview. This interview is going to be short, as you have explained and demonstrated to my colleagues most of the things and have taken notes. Without further ado, where did this digester originate from?

**Interviewee**: It was a donation from a certain NGO through the DC [District commissioner] office. The NGO was responsible for funding, sourcing of contractor and everything else to do with the installation of the digester. But everything was coming through the district commissioner’s office. And, as Mangochi prison we did not contribute any money – we got all the money from the DCs office.

**Interviewer**: But, I would imagine you were involved in the building process i.e. digging of the digester bag. I mean, who built it?

**Interviewee**: We did all the work that did not involve very technical skills together with the inmates. For example, we dug the hole and constructed the brick wall that you saw; the brick wall was constructed to prevent soil from collapsing into the hole of the digester bag especially during the rainy season. The inmates and I executed these two activities; I am a builder so have skills bricklaying and that is why I took part in the building process; It wasn’t me who had special skills, as you know in prisons we also have people with special skills. We have electricians, carpenters, and I myself am a builder, as I have said. We decided to use local skills because we wanted to minimize the cost for its installation.

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

**Interviewee**: I was the only warder are involved, and I worked with ten inmates; Five had skills in bricklaying and I supervised them. The other inmates were supporting us by passing mortar – and they were the ones who essentially did most of the digging.

**Interviewer**: How many people were from the construction company?

**Interviewee**: It was two; one boss and his assistant, I guess. They were the ones who connected all the fittings and pipes together.

**Interviewer**: How long did it take to build?

**Interviewee**: It took about two months

**Interviewer**: We have many prisons and not all the prison digesters. How were you selected as a beneficiary out of the many prisons?

**Interviewee**: They chose Mangochi prison because this district has many environmental issues – and the digester came to enable us to minimize the cutting down of trees in the district. In an institution like this, we use a lot of wood to meet the high food demand of inmates, as a result more and more trees are cut down on a daily basis. So, the digester came to help us cook food using human manure instead of firewood – Basically, the digester came to protect trees in this area.

**Interviewer**: Okay. So I think almost if not all prisons are facing this kind of ordeal, and when you think of electrics bills, it`s like everyone prison needs a biogas. What was the selection process? Was it a prison lottery?

**Interviewer**: (Laughs) No, it was a gift (donation). It was something that came unexpectedly and we did not ask for it. As you know, these things tend to be expensive and not every prison in Malawi can get this, so it was just lucky. But, I think it is an ongoing thing; they started with us and I’m sure they will continue with other prisons as well. I heard there is one in Dedza too (central region)

**Interviewer**: Where did you learn this?

**Interviewee**: From my colleagues, if not it’s from the installers.

**Interviewer**: And yeah, there is another one in Mulanje as well.

**Interviewee**: You see, so with time, this thing will spread to other prisons – and we are just lucky that it started here.

**Interviewer**: You did mention it came from where DCs office with support from an NGO. Do you know the name of the NGO?

**Interviewee**: It`s UNDP - everything was done by UNDP in terms of payments, hiring of the contractor.

**Interviewer**: Who was the contractor?

**Interviewee**: It was [name redacted]

**Interviewer**: Oh, [name redacted] from Intrinsic was the contractor.

**Interviewer**: Yeah, it was [name redacted]. He is the one who designed and planted our biogas.

**Interviewer**: Okay, what were you expectations?

**Interviewee**: We were excited just like anyone else would be when receiving a new donation. Even at the village level, people are always excited about new projects and developments because one expects life to change for the better. As a result, our first expectation was that the work, which we were doing in regards to searching of firewood, was going to lessen. So, we expected to protect and conserve the environment like I said earlier on. So, it was really important – and we expected our work and life to change.

**Interviewer**: Where were you getting wood?

**Interviewee**: There are so many ways of sourcing wood. First, we buy, and in certain circumstances people, who want to build a house or anything else, come and ask us to help them cut the trees, and take the wood. But, in most cases our bosses by firewood.

**Interviewer**: Where do you buy wood?

**Interviewee**: They buy wood from wood suppliers.

**Interviewer**: So, after everything, what were you told to expect by the installers?

**Interviewee**: They told us that after installation, we would be able to cook food for the inmates using human waste and that was our biggest expectation. They also told us that biogas uses waste that goes through a process that converts the waste into energy through bacteria.

**Interviewer**: Nice, what kind of training did you receive?

**Interviewee**: ah, we did not receive any training. But after they finished the they explained about its operation, just like I said –and it was all basic – like this is how you switch on and off; when the pipes leak, it’s a problem, glue the pipes to stop the leakage. So, we just listened and followed what they were saying. And, it wasn’t a training were you would expect person to gain skills, like any other training or learning activity.

**Interviewer**: Okay, how many people were involved?

**Interviewee**: I was the only officer appointed to manage the digester as well as participate in the training or discussions; I don’t know what to call it.

**Interviewer**: Who else was part of training – orientations, or briefing, I don’t what to call it too?

**Interviewee**: There were inmates who were able to run with the gas in my absence. As you know, you cannot be present at work all the times. So, we had inmates who perform cooking duties that took part in the discussions. But it wasn’t training like a class session that one gains knowledge or skill. And, it was the same [name redacted] who went to the cooks and told them how to switch the stove on and off, and he told them that I was going to support them in its functionality and operation. Then, I taught them how to switch on and off; and in case of a pipe leakage, I told them what to do. So, I worked hand in hand with the inmates from the kitchen section throughout its life span.

**Interviewer**: How many inmates?

**Interviewee**: We had inmates from the kitchen section because they are the ones that go out of the prison to source wood and other items. So, we trained them in its operation since they were the ones to interact with it on a regular basis.

**Interviewer**: Approximately, how many inmates? 10 – 20 – 30?

**Interviewee**: In the kitchen section, the number keeps from on changing depending on how many prisoners we have. If we have many prisoners, we choose five or seven inmates to work as cooks. And when we see that there is too much work, we add in some inmates. Then, we had a problem because some of the inmates finished their sentences, but were taught on its maintenance. As a result, the number of inmates briefed on its operation kept declining and it was daunting task to find new inmates who we could trust to work at the kitchen and brief.

**Interviewer**: So, some of the inmates you initially briefed were released?

**Interviewee**: Yeah.

**Interviewer**: Like how many from the initial group, five or seven?

**Interviewee**: Maybe three or four.

**Interviewer:** Did it affect its operation?

**Interviewee:** No, it was just a concern. And, the things weren’t complicated as you would thing.

**Interviewer**: Before the intervention, what did you use for energy i.e. cooking?

**Interviewee**: Like I’ve already mentioned, we used firewood.

**Interviewer**: Just firewood, no electricity?

**Interviewee**: Yeah, just firewood.

**Interviewer**: How much wood did you use in a month, roughly? How much did it cost you to buy firewood in a month?

**Interviewee**: Ah, we used one ton of firewood for two or three days – one ton truck full of firewood. And with that, we were able to cook huge amounts of beans, a big pot of nsima, and porridge in the morning for the inmates for three days.

**Interviewer**: How much did one-ton truck of wood cost?

**Interviewer**: It’s hard to say the actual amount because prices vary a lot depending on the season of the year; firewood becomes more expensive in the rainy season. But, like I said, it’s not like we were buying firewood all the times; some of the firewood we got through donations. We only bought firewood when there was no wood in our store.

**Interviewer**: How much money were you in paying in the dry season and in the wet season?

**Interviewee**: I don’t know, but it wasn't less than K50000 for the wood only.

**Interviewer**: You told me it was running on human waste and food waste. Before the intervention, what were you doing with the food waste?

**Interviewee**: When the system was being installed, the installers considered that human waste might not be enough sometimes, so they made a provision for food waste, as the number of prisoners keeps on changing. Sometimes we do have 100 inmates, and as of now, we have 300 inmates. Thus, in a situation where the number inmates were small, we also expected feed to decrease, hence the need for extra feedstock.

**Interviewer**: Okay, so before the digester, what were you doing with the feedstock or food waste? Were you just throwing away the food leftovers?

**Interviewee**: Mostly, it’s nsima, beans and vegetables, and it's always not that much as inmates normally finish all the food in the plate, and if there is leftover, it’s only spillage – so we were collecting just a small amount – not enough to feed it.

**Interviewer:** So, what were you doing with the small food waste?

**Interviewee:** Just put it in the bin.

**Interviewer**: How much did you start it up?

**Interviewee**: After that the digester bag was placed in the hole, we fed it with half a ton of fresh cow manure to start it up, and we add water.

**Interviewer**: Where did you get the manure?

**Interviewee**: It was the responsibility of the contractor, so I don’t know where he got the manure.

**Interviewer**: How much water?

**Interviewee**: Of course, we did not measure the quantity of the water because we simply connected a water pump to the river, and water was going straight into the digester bag.

**Interviewer**: You did have a source of water here?

**Interviewee**: We have a borehole, but it could have taken a very long time to collect water since the digester bag is huge.

**Interviewer**: Where is the river?

**Interviewee**: We are not far from the Shire River. It is 150 meters away.

**Interviewer**: Oh?

**Interviewee**: Yeah, it is behind those buildings.

**Interviewer**: How did you prepare the feedstock? And how regularly were you feeding it with?

**Interviewee**: Feeding was dependent on the number of inmates. If the inmates were many, we did not add food waste even for a week. But, when we had a few inmates, the bag could not get inflated enough, so we were adding food waste to boost up the gas.

**Interviewer**: What were you doing with the gas?

**Interviewee**: We used it for cooking only.

**Interviewer**: How much gas was being produced? Or, how much cooking time were you getting?

**Interviewee**: We’re getting three hours of cooking time. One hour was for nsima, and two hour for porridge and side dishes.

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

**Interviewee**: We had challenges with the pipes; pipes used to get punctured or damaged, and would start leaking gas. Then, we would go buy and replace the pipes to stop the gas leakages.

**Interviewer**: Who was doing this?

**Interviewee**: I was doing that together with the inmates.

**Interviewer**: Did you have any problems fixing the pipes?

**Interviewee**: No, the pipes were not difficult to repair.

**Interviewer**: How was it like to find the pipes?

**Interviewee**: It was not difficult to find the pipes in the markets.

**Interviewer**: When did the pipes start to develop issues?

**Interviewee**: The issues of pipes started after 5 or 6 months, before we had no issues with gas leakages.

**Interviewee**: Did it meet your needs?

**Interviewer**: At first, it was meeting our cooking needs – and everything was going on smoothly. Then, as time went on, it stopped meeting our needs. This started happening when the bag was the filled with human waste such that the space that was supposed to be filled with gas was filled with human waste. As you know gas is lighter than water, so when the effluent or digestate filled up the bag, the space that was supposed to be occupied by the gas was filled up with effluent or digestate. As a result, gas production started declining to a point we could not manage to cook nsima but vegetables only. Then, it stopped altogether.

**Interviewer**: What were the challenges?

**Interviewee**: We did not have the skills to maintain it since we did not receive training; we had limited knowledge and skills to repair and maintain the digester – and, mostly, we did not have the skills to deal with the big issues. For example, in my case, I failed to find a solution to remove the digestate from the bag - and since we did not have that skill, our digester eventually failed. Secondly, it also needed money regularly to maintain things like the pipes. Thirdly, we had a problem with the gas-pumping device, which was powered by electricity and solar. So, during power cuts, you recall how severe power outages were, it was difficult to use the pump especially when there was minimal sun to use solar power. In regards to the battery of the solar system, that was not much of a problem because we could go to the DCs office and get another battery; the battery you saw is not the one, which came with the pumping device. It’s a second one, which replaced the first one. The other problem was that the inverter malfunctioned and the DC's office brought us another one – so, you can see all these need money. Also, it was taking us time to replace these things, as you know; government things tend to take time as they follow long procedures.

**Interviewer**: Like how much time was it taking?

**Interviewee**: Two weeks, sometimes one week.

**Interviewer**: Let me ask, how did you know or figure that the declining of gas production at gas at the stove was attributed to the digester bag being filled with waste?

**Interviewer**: We knew that because initially when we cooked and exhausted the gas in the bag, the bag was deflating to the ground level of pit, 1.5 meter under. But, after some time when all the gas was used up, the bag would not deflate to the ground level of the pit. We could note that the bag was not deflating to the ground even when it had no gas to use. – And, that’s how we realized that the digester bag was filled with digestate, because when there is no gas in the bag you expect it is deflate to ground since it cannot stand on its own– and also when we pressed the bag we felt the pinch of human manure.

**Interviewer**: How long did it work before it stopped?

**Interviewee**: It was after two years; gas production stopped after years because the bag was filled with manure.

**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**: Ah, no. He gave me his number to call when we had a challenge that was beyond my capacity. For example, when the digester bag had filled up, I called him to inform him and he told me to put more water in the bag so that the slurry would become more watery, and then flush it out. Then, in the morning, I asked the inmates to put more water in the digester bags, but nothing happened.

**Interviewer**: Like how much water?

**Interviewee**: 15 to 20 buckets of 20 liters. And after that, we were convinced that we had put enough water because even the outlet started overflowing with water; there was too much water at the outlet that everyone was convinced that we had put enough water, still nothing changed.

**Interviewer**: What happened next?

**Interviewee**: I told him that it did not work and he said they were going to come to fix it, but they never came.

**Interviewer**: Up to date?

**Interviewee**: Yeah

**Interviewer**: Why do you think he did not come?

**Interviewee**: Maybe, there was no follow up plan in their agreement – I don’t know

**Interviewer**: How would you describe the current state of the digester?

**Interviewee**: The bags are intact and good. In my mind, even though I have limited knowledge, as I was not trained in this, I think we need a truck like those, which empty pit latrines to come, and empty the bags. That way, there will be space in the bags for the gas to occupy. Then, we would also need money to buy new pipes, because most of them have stayed a long unused, and are damaged. Also, the battery needs replacing, since it has also stayed for two years without working.

**Interviewer**: Now that it is not working, how do you meet your needs for energy i.e. cooking?

**Interviewee**: We have returned to cooking using firewood.

**Interviewer**: We are going towards the end of our interview. We have done 85%. Do you know how much the reactor costs?

**Interviewee**: No, I would be a liar if I say I know how much money was involved. Like I said, it was a donation from UNDP through the district commissioners` office. So, it`s UNDP and the DCs that has information regarding finances, hiring of the contractor etc.; We were simply told to dig the holes for the digester bags and to build a wall, which I did as I am a builder, and that did not involve money; we did not ask for money because it was our thing. So, if you want to know about finances, like how much it cost, how much money was spent on the contractor, you need to consult the DCs office.

**Interviewer**: Sure, what kind of special items had to be imported from another country?

**Interviewee**: During installation I had a chat with the contractor and he told me he gets in the digester bags from South Africa, as for the stoves gets them from Zimbabwe - The contractor has all the information regarding where the materials came from as well as their cost.

**Interviewer**: We are remaining with three questions. What was the biggest difference or changes you noted the time you had the digester?

**Interviewee**: I will say two or three things. First, it helped us to save money, which we spend on firewood as well as procuring costs. Secondly, it stopped us from cutting down trees for cooking; as a result, we were able to reduce deforestation and converse the environment.

**Interviewer**: Okay, what is your opinion of biogas?

**Interviewee**: Biogas is good a good thing; it's not like electricity which requires money to buy vouchers to have power. Also, you don’t need application fees to have it installed. So, it is good for people who have money issues because once it is installed, you don't buy anything else; you only need human faeces, which are free of charge. Secondly, it’s easy to operate; it’s not tiresome as cooking using firewood, which requires one to blow air constantly to have strong fire. With biogas, you only need to switch it on, like an electric cooker, thereby saving time which can be used on other things.

**Interviewer**: What is the future of biogas in Malawi?

**Interviewee**: In my opinion, biogas is a good thing considering the fact that as a nation we are facing environmental degradation. As a country, if we can have a number of them, it would help us conserve the environment. It can also help people financially at family level especially those who use wood or electric for cooking. Since, once it is installed you don't need to buy anything else.

**Interviewer**: Do you see it continuing?

**Interviewee**: I cannot say it will continue or not, but it will depend on how others view it. As far as, I’m concerned, I would like to see biogas continuing.

**Interviewer**: You had it for nearly for three years and you wanted it to continue, but today it is dead. Do you it is possible to run it for three years?

**Interviewee**: It's possible. It can be maintained.

**Interviewer**: You had and have the desire to keep running, and as an institution I believe you had and have resources to keep it going, but if failed. How and why?

**Interviewee**: That's a good question. The problem is that I did not go to a college or to a training class to learn about biogas. So, even if money was there, but without proper training, there was nothing I could have done – it was hard! There was a need to train me, and then I would have been liaising with the bosses to make provisions in case of failures. Everything else, we were doing that time was trial and error, and that did not help when we had a big problem. Therefore, biogas beneficiaries need to be given necessary skills, because without adequate skills there is no way a person can maintain this

**Interviewer**: So, what could have or be done to improve the skills of operators an institutional level?

**Interviewee:** I would like to see all biogas operators in institutions to go through a rigorous training. They need to know how to deal with the problems – they need to know all the information regard maintenance of biogas such as the one you showed me. We need practical skills on that. People need to master that. We need to learn how to deal with all the problems first hand, so that when we return to our respective institutions we can solve every problem.

**Interviewer**: Okay, great. Last question, if you could have designed your own waste or energy intervention, what could you have chosen instead of biogas?

**Interviewee**: Instead of biogas, I would have liked this institution to procure electric cookers, so that we can stop relying on wood for fuel. I have also heard people using liquid petroleum gas, but I don’t think it’s practical here since we have big pots that we use for cooking – it may need big cylinders, which I don’t think are available on the market. Still, instead of biogas, I would have chosen LPG gas or electric cookers.

**Interviewer**: In closing, is there anything you'd like to say regarding biogas.

**Interviewee**: I just want to say thank you for coming. The time you called informing me I was in Makanjira, I’m still there. I'm on school leave. I’m at Nansawa Technical now doing brick laying studies. But, like you said it was going to be difficult without my presence since everyone who was working here that tome is no longer here. It’s far but it was worth it. you have enlightened us on some of the issues regarding biogas. It’s important that you have learned about the challenges we faced, and I hope you can use them positively to come with solutions. Many thanks.

**Interviewer;** Thanks for making it. Thanks for your effort. Most of all, thanks for welcoming us and for the interview.