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

**Site ID: 08**

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**Interviewer:** Okay, where did the digester originate?

**Interviewee:** It was sponsored by Waste Advisors, who had a technician who came up with the design and everything. And we provided the place for the digester to be built, and also we provided supervision after construction.

**Interviewer:** Do you know the actual name of this technician?

**Interviewee:** It was Waste Advisors themselves but I can’t remember the name of the person, and he is not working with Waste Advisors anymore.

**Interviewer:** Who else funded the digester?

**Interviewee:** The funds came solely through Waste Advisors**.**

**Interviewer:** Okay, so how were you selected as a beneficiary?

**Interviewee:** At the time, Waste Advisors had already sponsored 3 toilets on our premises – The Ecosan toilet, Tiger worm toilet, Urine separation toilet, and they were looking for a demonstrate site, and that time we had 20 cows, so it was a perfect setup for the demonstration.

**Interviewer:** How did you know about biogas?

**Interviewee:** I was familiar with it, and I have observed it in several places, and I desired to have it on our place. That’s why I was happy when they came with the proposal that they wanted to build one here.

**Interviewer:** How did you come familiar with it, and where did you observe it?

**Interviewee:** I can’t recall exactly how I was introduced to it (Laughs). However, when I was travelling in Europe it was quite common to see households having biogas from long ago, plus I read about it on the internet. So, I just thought it was an amazing way of using waste to produce energy. I observed one in Thete, Mozambique with a household there and it worked well. It was a simple digester. They used a septic tank, they had a water tank like 2500 or 5000 L in the septic tank, and the bottom was open. And they dumped all the biodegradables in the flush toilet and flushed it with faecal sludge into the bio digester, and it produced methane gas, and it would build up in the container, the pressure would rise and push the water out. Then they would just tap it off the top of that tap – and it worked really well.

**Interviewer:** You said before waste advisor built the digester, you were already involved with them, like you had already worked with them on 3 projects. So, how did it all start?

**Interviewee:** What were your expectations?

**Interviewee:** My expectation was that with the cattle we had were going to use manure to produce energy to meet our cooking needs.

**Interviewer:** Okay, what were you told to expect from the installer?

**Interviewee:** We were told that we would use manure to produce energy enough to meet our need and in the process alleviate environmental impacts.

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

**Interviewee:** Actually, we had a technician who was dedicated to the process, he was the same person who was responsible for making compost, and he was trained, not me myself so much, he was trained how to introduce manure, how to stir the slurry. Basically, the process was supposed to work on its own long as it was being fed everyday primarily with fresh cow manure mixed with water.

**Interviewer:** So, basically one person was trained?

**Interviewee:** Yes, of course, I was there sometimes, but I was mostly occupied with other duties. Mainly, it was our then operator and farm manager, [name redacted], who was trained.

**Interviewer:** Okay, so after you were trained how to prepare feedstock, how prepared to run operate the reactor did you feel you were?

Interviewee: As an organisation we felt that we were in a position to run the digester, and also the installer were around so felt confident to run it.

**Interviewer:** Okay, how did you meet your energy needs before the intervention? (I.e. cook)

**Interviewee:** We were using firewood on a rocket stove

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

**Interviewee:** We were producing enough firewood from trees within the compound as the number of students was initially low. As enrolment increased, we ran out tree so we started buying wood from people around the communities. At the same time, we planted a woodlot but trees haven’t matured yet.

**Interviewer:** You mentioned that you were using manure to run the digester, before the reactor, how did you manage your manure waste?

**Interviewee:** We were using all the manure for composting so we had no challenge in managing such waste.

**Interviewer:** How many cows did you have that particular time?

**Interviewee:** We had 20 cows

**Interviewer:** How did the system work after commissioning?

**Interviewee:** It actually never worked despite us having all the cow dung required. It was so disappointing to see that a lot of money spent, though it wasn’t our money, but with such good lay out of funds you would expect to get a good benefit from. We managed to get a little flame, but it never built up any pressure that we could even boil water with it.

**Interviewer:** How much gas was being produced?

**Interviewee:** There was no way to measure it because there was no way to capture it in a bag or a container to see how much gas was being produced.

**Interviewer:** what were other operation requirements?

**Interviewee:** It was primarily cow dung mixed with water.

**Interviewer:** Okay, how much manure was needed?

**Interviewee:** I can’t really remember – I think it was one wheelbarrow of cow dung every day.

**Interviewer:** How much water did you add?

**Interviewee:** (Laughs) I can’t really remember.

**Interviewer:** Who was responsible for feeding the digester?

**Interviewee:** [name redacted]

**Interviewer:** [name redacted], Full time?

**Interviewee:** Yes, it is a small thing to do – it’s just put one wheelbarrow of manure add water and mix it with a stir. Then he would carry on with his other duties.

**Interviewer:** Okay, what were the maintenance requirements?

**Interviewee:** Well, when we first saw that the digester was not producing any gas with pressure, we wondered if it was not leaking somewhere. So, we actual emptied it and put a second layer of screed inside it. We plastered it over again – it was a big job because it’s huge digester. We had to hire a constructor to do all that for us to make sure that there were no cracks or leaks. And then we thought the outlet on top of the dome was leaking, so we could put water to see if bubbles would develop, but we did not see anything because it could not produce gas so something was wrong with the production of methane in the digester – we could not get any pressure, so even if it was leaking we could not know it because you need pressure to see if there is any leak somewhere.

**Interviewer:** Okay, Did it meet your needs?

**Interviewee:** No, it never met our energy needs because it never worked. Like I said, we never used it.

**Interviewer:** Okay, what other challenges did you encounter apart from what you have already discussed?

**Interviewee:** We came to a point where we sold the cattle, the reason we kept the cattle was for chess production. But, it became evident to us that we could actual buy the milk cheaper than we were able to produce it ourselves. So, we sold the herd, after that of course it wasn’t viable for us to feed the digester anymore because we had no source of manure on the premises, and to buy and transport manure with the experience we had, it couldn’t work (Laughs), so we just abandoned it.

**Interviewer:** No other challenges?

**Interviewee:** Yes.

**Interviewer:** How long did you use it for before it stopped working? I mean how long did it take for you to abandon it?

**Interviewee:**we never used it, and we abandoned it after 3 to 5 months.

**Interviewer:** What did you do to try to fix it on your own?

**Interviewee:** Yes, we thought initially, the problem was gas leakages, so we worked very hard to fix that. Then, we tried different recipes, we changed the input, we tried whey because we have a lot of whey water here, we tried to mix that into the mix, we changed some of the plumbing and so on. Because, initially we thought we would get a lot pressure out of it, we actually had a drum with water that we thought we would be able to filter out the impurities from the gas by peculating through the water but we never came to a point where it produced any, so we removed that, we just made the pipe straight to the stove but yeah, nothing could ever produce a flame.

**Interviewer:** Did your call the project implementers to come and help? Did you call Waste Advisors?

**Interviewee:** Yes, for sure. We called them and they tried different things, they suggested a few things but none of those imitative made any difference.

**Interviewer:** Could you please be specific with me, which things in particular?

**Interviewee:** Mmmh, I think we tried to faecal sludge at some stage, like I said we tried whey water. It was mostly, if I remember well, changing the recipe, that was the initiative that was suggested. I think at some stage, so we looked at the outlet where waste would be pushed out by the pressure to flow over into the chambers on the other side of the digester. We thought maybe the levels are not right, that was measured and be looked at again, the point of entry and point of exit and it seem everything was according to the design that should be.

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

**Interviewee:** Oh, yeah. Of course, we read up as much as we could about it because I wanted it to work (Laughs). Without Waste Advisors involvement we tried our best because it was of high interest to me to see it working. But, the deduction we made in the end was that the thing is too big – it’s the biggest digester that I have ever seen. And it required so much input that it was not possible for us to generate all that that input. If I would do it again, if I would have the opportunity to have a biogas digester again, I would probably start very small with just a 200 L drum and test my recipes, and until I see it is actually producing gas then I would increase the volume of digester.

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

**Interviewee:** It’s a white elephant

**Interviewer:** Ummhu, okay, what do you mean?

**Interviewee:** It’s just sitting there doing nothing (Laughs).

**Interviewer:** (Laughs) how did it reach this state? In your opinion, what is the caused it to be a failure?

**Interviewee:** I don’t know if it was the design because even when we had sufficient manure it never really worked. I actually felt the person who designed and installed it was not good enough. According to him he built digesters in Indian and places like that, but I felt his expertise was not there. I don’t know what the problem was, but it was disappointing.

**Interviewer:** We are going towards the end; we have about 20% remaining. What do you do for energy now that the reactor isn’t working?

**Interviewee:** we are still using firewood on a rocket stove.

**Interviewer:** Sure, how do you manage your waste now that the reactor isn’t working?

**Interviewee:** We have now less waste because we got rid of the cows. The waste we generate in the Ecosan toilet and worm toilet is not a challenge at all because we are always looking for source of nitrogen, potassium and phosphorus to introduce in our composting systems. So, it`s never a problem to manage our waste.

**Interviewer:** How much did the reactor cost to build?

**Interviewee:** If I can remember well, it was a lot of money, over a million I guess.

**Interviewer:** Did you or your organization have to contribute anything in kind?

**Interviewee:** We contributed oversight of the building process, and we also sourced the contractor, and of course Waste Advisor was just there to come every now and then to check if everything was done according to the design, and we provided the operator also.

**Interviewer:** Who was the contractor?

**Interviewee:** The building contractor was [name redacted], who we usually hire from the village.

**Interviewer:** How much labour do you think went into digging?

**Interviewee:** Eeeh (speak Chichewa) ochuluka – Eeeh so many. Actually, we built the whole building with the soil that came out of that hole. We built a building of 36 by 6 meters using the soil, because the soil is ideal for making hydroform or soil stabilised blocks so we used all the soil to construct 3 large classrooms on the property so it was a lot of work to dig that hole.

**Interviewer**: So, it was like 20 people?

**Interviewee:** No, No, No, it was just a few people. But they were really working hard. Maybe, it was 3 people who dug it.

**Interviewer:** How long did they take?

**Interviewee:** (Laughs) now you asking me. It was too long ago I can remember.

**Interviewer:** When was that?

**Interviewee:** Maybe 5 years ago.

**Interviewer:** How much labour was involved in masonry work?

**Interviewee:** Maybe a team of 4.

**Interviewer:** What other work was involved?

**Interviewee:** Maybe fitting of pipes and I was the one responsible for that.

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

**Interviewee:** Nothing, excerpt for galvanised pipes – fixings, and some of the reinforcement steel, I don’t think it’s made in Malawi.

**Interviewer:** We are going towards the end of our interview. We are remaining with two questions. What is your opinion of biogas?

**Interviewee**: Biogas is amazing, I would like it to see it operating and working on our premises. I think it’s a wonderful way of managing waste. Instead of producing methane on a landfill, you can rather produce it and burn it and cook something on it, so much better that to throw it or pile it that it can escape into the atmosphere as poisonous gas.

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

**Interviewee:** I would choose a 200L barrel, simple system for a small family, and then I could experiment with different recipes. I would start with a 200L because I don’t need such volume of waste to keep it going, and if that one works I could upgrade to a bigger system.

**Interviewer:** Thanks for the interview, that’s the end, final remarks

**Interviewee:** Wonderful. You see what makes it stuck is, we don’t have enough source of waste. I don’t think it will ever work because it’s just too big – it’s too big for our needs. It was designed according to that heard of 20 cattle and we did not foresee that time we would sell the cattle, now I don’t know what to do with it. Maybe, if we could use whey or add something to it then it would work because we produce a lot of whey – 400 litres. If someone can come up with a solution to use the whey in the digester that can awake the system because that’s the only waste we are falling to manage right now.

**Interviewer:** like I said, we are looking at why many digester daily, so with the experience, why do you thing many are failing?

**Interviewee:** In general it’s about management. I think a lot of people are not feeding the digesters adequately and with the correct recipe for the microbes to thrive and produce adequate gas. But, in our case it wasn’t management, but the design because it never worked – we need a specialist to figure out what the problem.

**Interviewer:** Thanks for the interview.

**Interviewee:** Welcome.