

Interview with Melissa Pennington
Interview Conducted by BG Environmental Leader Paula Gonzalez Alvarez

Melissa Pennington is the team leader for the EPA food team. The food team's goal and objective is to keep food waste out of landfills. She also does work on some food donation activities, but for the most part her job is separating food waste out of all waste streams and keeping them out of landfills. There are lots of things that go into that and anaerobic digestion is one of the ways that they can process the food waste that do not involve landfilling or incineration.

Would you mind specifying what you do in relation to anaerobic digestion?

Here in the mid-atlantic region we have a lot of challenges with regards to how to manage food waste, so it's easy for me to say to you we want to keep food waste out of landfills. But the next most logical question is what do we do with that food waste? So here unlike places like New England or the West Coast, we do not have a lot of large commercial facilities that can take food waste. Which can be composting or anaerobic digestion facilities. A lot of what my team does is to work on things that will help or encourage the development of these types of facilities. Composting is more commonly known, both nationally and in this region. It is a little less scary for people I think. It is something you can do in your backyard, I certainly do and a lot of other people do as well. It is often done at a community scale, so community organizations have a composter and then there's the large-scale commercial type facilities. That is someone who builds their business around collecting food waste and other organic material and then selling their product. It is also more commonly known where you can do it and where the facilities are. So if you are a community or a municipality or a city and you want to get food waste out of your waste stream, and there are a lot of environmental reasons why you would want to do that, you need to know where you want to take it. So it would be either to one of these large commercial composting facilities, but the other alternative is anaerobic digestion facilities, and I got involved with it because EPA does not know a lot about how much anaerobic digestion was occurring in the country. We had some idea, but we really needed to gather data on it. So I spent the last 5 years of my EPA career identifying where AD facilities were in the country, surveying the facilities to find out how much food waste they processed, how much biogas was produced, what they did with their product... and I published three reports on that. So that is why my name is so intertwined with anaerobic digestion. I spend a lot of time researching and gathering data on the facilities that do it and then publishing those reports so that the public can have a better understanding of how much AD occurs in this country. I would be happy to share with you the links to those reports. We just published this last report this week. So yeah, that is my involvement with anaerobic digestion. I also led the team of AD experts all over the country to solidify what EPA's policy was about anaerobic digestion. At one point going back about 5 or 6 years, EPA did not have a solid policy for how to use anaerobic digestion and what our guidelines were for that. So I was working with people from all over the country and that is how

we got the anaerobic digestion website. I built the whole thing and designed it and put that information out there so that we could let people outside of our agency know what the EPA thought about AD.

How much can you profit from an anaerobic digestion plant?

That is a really good question. Of the three years that we collected data, it is only really this last year that we got some good data on how much you can make, well actually I don't know how much profit they make, but what we were able to gather this last year was information on how much money facilities took in for tipping fees*. So in the first three years of data collection we did not get good data on tipping fees, and that's probably because we didn't ask the questions in a very logical manner. This year we asked the questions a little more logically and we did get some data, so there is some information in there. But what that doesn't take into account is how much it costs to run a facility. So what is the maintenance cost, how much does it take to power it... But I will tell you this: people don't get in this business to make a lot of money. There is a very low margin of profit for organic recycling, both composting and anaerobic digestion. Most of the time facilities are owned and operated by municipalities or counties that have to manage waste somehow. So they use it as a way to manage their waste as opposed to a way to make money.

*Tipping fees is a pretty standard term used in the waste business and all it means is that that's the fee that you pay to the facility to dispose of your material. So it works for landfills, composting facilities, AD facilities... So if you have ten tons of food waste and you need to dispose of it somewhere, you take it to a facility and you pay them a price per ton for them to manage your material.

Why do you think it's not as widespread as composting, or recycling, or any other waste disposal?

The main reason is that it costs a lot of money. So to build a composting facility, that can cost a lot of money too, but it's less money. So for composting one way to do it is called windrowing, and you just pile the material in a pile and let it cook. So it costs less to set up a facility. For an anaerobic digestion facility you could be talking tens of millions of dollars to build one large scale. So just the overall capital cost is much more than it is to build a composting facility. The second reason is that it is a little bit more complicated. There are more moving parts and more types of things that can go wrong in anaerobic digestion than there are in composting. So it's a little more technically challenging, not rocket science, but a little more technically challenging and it definitely costs more to build and maintain facilities.

Hey, sorry this is Kim. Paula if you don't mind me asking a question. About the financial model, are most plants mostly breaking even or are they generating any sort of revenue or are they operating negatively.

I don't have all of the data on that particular thing, but I can tell you a couple of things that I know. So, the anaerobic digestion in this country fall into three different categories. There are the stand alone digesters and those are the digesters that are built by companies for profit, and that's not typically a municipality. And then our farm digesters, farm digesters are built primarily for

management of livestock manure, and then they add food sometimes. And then there are wastewater treatment plants that have anaerobic digesters that are designed to treat human waste, known as wastewater solids, and then sometimes food waste is added to the digesters at wastewater treatment plants. Now, I know that operating a wastewater treatment plant is really really power intensive. So if you make a lot of biogas from the wastewater solids that you have to treat, or by adding food waste, which increases the amount of biogas that you can produce, you can create enough biogas and use that biogas to power your plant. So, anaerobic digestion at wastewater treatment plants has been known at some plants to make the plant itself power neutral. So, they produce enough power, biogas, that they don't have to buy power from the grid and that's a big deal for the wastewater treatment industry because it is so power intensive.

Where do you think the future anaerobic digestion technology is going? Do you think people will find better ways to make it work at a lower cost and be more effective? Or do you think it might become obsolete if composting takes over?

Paula, that is a really good question and I wish I had a crystal ball. What I will tell you is this, and this is Melissa Pennington's opinion, it is not necessarily the EPA. Because we are now moving into the Biden administration, we as an agency are definitely going to be prioritizing and emphasizing renewable energy opportunities, and anaerobic digestion is a renewable energy opportunity. It processes a waste, and that's partly a good thing, but it also produces energy from something that is considered a waste by other standards. So, if you know about, say, the solar industry and the wind for power industry, those two industries have been very highly subsidized by our government, because they are clean power sources. Biogas is a clean power renewable source, so if enough emphasis is placed on it and now we as an agency, EPA, get redirected to work on clean energy because it's important, because climate change is real, I think that anaerobic digestion has a future, even though it costs so much. I think there will be much more opportunity for us and EPA will probably continue to make money available to support the industry, because it can get us off our fossil fuel dependence.

Yeah, and I think in Brazil, I think a lot of fuel for their cars is made from biogas from anaerobic digestion because they use their excess sugar crops for anaerobic digestion. So those are crops that are made specifically for anaerobic digestion and are being mass produced to make energy. Apparently, this way to approach anaerobic digestion is more economically advantageous than food waste from homes because there are no contaminants. Do you think that the United States might move in that direction and start producing crops just to be anaerobically digested and leave the at home food waste for composting?

I have to say that I do not have any idea if we might move in that direction. I actually do not know anything at all about Brazil's use of specified crops. I'm not familiar with that at all. So, perhaps? But, you were absolutely right about contamination in food waste. You would be amazed at the type of stuff found in some food waste sources and how they can mess up an anaerobic digestion system.

I wanted to know a bit about the legislation around anaerobic digestion. Is it national, or is it state? What are the prerequisites for anaerobic digestion plants? Because I know that there's not that many, for example in Maryland there's maybe one or two. So even if the legislation is created on a state by state basis, each AD plant in each state would basically get to run however they want.

That's a good question. So, there is legislation, which is like laws that are made by Congress or a state legislature, and then there is regulation, which is a little bit different. But in both cases I will tell you that nationally, the federal government doesn't have any legislation on anaerobic digestion for the entire country. And so, all of the laws are enacted at the state level, but you're probably not going to find any legislation or laws that would say anything about anaerobic digestion. The laws will say what you have to do with your food waste. So Massachusetts for instance has a ban on putting any food waste in a landfill. But it doesn't say anything about the technology or the facilities that it can go to. Aside from the fact that if there is an organic recycling facility within a certain distance of where the food waste is being generated, then the food waste needs to go to that type of facility rather than a landfill. But I think what you're getting at is regulation. Regulations are things that occur nationally, but there aren't any national regulations for anaerobic digestion either. The only thing that is anywhere close with regards to a national regulation would be the 503 regulation. But that really has to do with biosolids, and biosolids are pretty much the nice word for human waste. So when a wastewater treatment plant collects human waste, all of it together is noted as biosolids, and the 503 regulation says what you are allowed to do with that biosolid. But when it comes to rules on how anaerobic digestion plants are operated, those rules are set by each individual state so it's hard to know what the rules are because they are different in every state. So if you wanted to set up a facility in Pennsylvania, you would need to know what Pennsylvania law says about it. And I'll tell you, Pennsylvania law is pretty outdated. There's not a whole lot of logical information about composting in the Pennsylvania regulations. Most states just combine the composting and anaerobic digestion regulations together. There are very few states that do a good job describing what you can or can't do with regards to anaerobic digestion. Typically what they do right now is they just say things like "You need to follow the environmental laws in your state." For example this would be the Clean Air Act or Clean Water Act. Even though anaerobic digestion isn't really that new there aren't really a lot of rules on how to run it, you have to dig deep to find them.

Can you talk about some of the uses of biogas?

Yes, and in the reports that I'll send you, you will see all of the different uses. So you have already mentioned it can be used for vehicle fuel, but it has to be processed before you can use it as a vehicle fuel. They call it compressed natural gas CNG or LNG, those are the fuels that are used for vehicles. More and more, now you are seeing vehicles that can be operated on compressed natural gas.

Can the entire fuel for the gas be made out of biogas or is the fuel only partly made out of biogas?

I think that you take biogas and you process it to the point that it is the sole fuel for a vehicle. So it has to be a special vehicle that could run on that. I live in Marion County and all of our school buses run on compressed natural gas. So that's vehicle fuel. You can take biogas and put it in a combined heat power unit and you can produce heat, and that heat can be used to either warm the AD plant or other facilities. You can make it into electricity, you can clean it until it is pipeline quality and put it into the natural gas pipeline. And then you can use it in any way that natural gas is used. I'm probably missing a few ways but there are tons of options.

We are approaching thirty minutes and I don't want to go way past the time because I know you said you had 30-45 minutes, so I'll ask you one more question and then let you say anything else that you think might be important or any resources I could look into. So what do you think are the most important conditions for an anaerobic digestion plant to work at its best efficiency (ex. the temperature, the bacteria used to decompose...)? What is so challenging or what makes anaerobic digestion so specific?

I actually do not have that expertise. EPA does not own or operate or build any of our own facilities and honestly if we were to do something like that we would probably use contractors. Most of the work that I do, although I do know the science of it and many of the specifics, does not include the building or operating side of anaerobic digestion.

No worries. Is there anything other information you think I might have missed or that you think might be useful?

Well, I'm really glad that there's interest because I think that using AD could be very useful in the country overall for our environmental state. Big commercial facilities are expensive, but there are ways to build digesters that are less expensive and can be used in third world countries. It doesn't have to be more complicated, there are other ways to make these facilities while accommodating other needs.

Thank you so much for taking the time to talk to me and have a great day! I'm looking forward to reading those reports and learning more about it.