# Phone call with Dr. Fredrick Michel from the Ohio State University, Wooster – 6/29/2018

* Dr. Fredrick Michel is a Professor in the Food, Agricultural & Biological Engineering at the Ohio State University at Wooster.
* Quasar is the private firm that built the anaerobic digester, they run the digester
* Quasar rents the land from the university, but it is an industrial operation
* Ohio State University at Wooster has no dorms and there is only one cafeteria
* They are not collecting food waste from the campus
* Feedstocks
  + Walmart
  + Jelly making facility nearby
  + Expired dog food
* 2-stage digestion – Anaerobic digestion of waste
  + A giant hopper – 50 ft length, 30 ft wide, and 10 ft deep. Initial digestion takes place here – 2-3 days residence time. This is the blending tank
  + Then sent to the digesters – 20 days
  + Industrial digestion, so the digestion is not complete. Only in the digester for 20 days
* The digestate is sent to the composting facility for odor removal
* 8-10 times more energy than before
* Electricity for WWTP and Water Treatment facility (for Ground water)

# Phone call with Adam Huwe from the Wastewater Treatment facility at West Lafayette (Purdue University) – 6/26/2018

* Adam is a city of West Lafayette employee.
* WWTP is owned completely by the city of West Lafayette and Purdue is not a partner
  + They just collaborate
* Started the food waste to energy project with 4 larger dining halls and cafeteria
  + Right now – all cafeteria
  + Some cafeteria have pulpers and others don’t.
* Delivery to the WWTP is made by the University
  + They have separate trucks for food waste
  + Delivery is made every weekday during the school year. During the summer and winter break, food waste is not transported to the WWTP digesters.
  + Adam was in favor of accepting food waste during the breaks but university declined (?)
  + Summer – Pick up early morning and deliver the same day
  + Winter – Pick up during the night and deliver the next day
* WWTP was
  + Looking to upgrade their facility
  + Looking to increase their digester volume
  + Looking for alternative feedstock
* Digester at WWTP
  + There are 2 digesters, each ~500,000 gallons
* Currently, WWTP accepting
  + Food waste from the dining halls and cafeteria at the Purdue University
    - During school year, M-F they accept 3000-3500 lbs of food waste per day
  + Grease-trap waste from the restaurants
  + They provide bottles to the citizens and advise them to only send used cooking oil
* WWTP repurposed tanks to receive the food waste
  + There is piping installed, that connects the collection tank to the digester
  + Digester fluid is pumped into the collection tank, where the waste is mixed and homogenized before sending it to the digester
  + They used to have mobile tippers, but now have platform based tipping
* Food waste has ~90% Volatile content, and regular moisture content.
* **Purdue does not pay a tipping fee**
  + Net benefit for Pudue
    - Public perception
    - Diversion of waste from landfill
  + Purdue does not claim any Carbon Credits, RECs, or RINs.
  + Tipping fee for others is $0.10 per gallon (for grease waste)
* WWTP saves $3000-6000 per month on electricity
  + They were already producing methane from other sources
  + Adam was not sure about the reason of this variation. So with the thank you email, I asked for an explanation
* They have permit agreements with Grease-trap Haulers
  + Restaurants pay the haulers to take the grease
  + Haulers pay WWTP for the grease ($0.10/gallon)
* Adam gave me the contact information of Randy Drake, who is in-charge of the Delivery Crew at the Purdue University. I have emailed Randy and cc’ed Adam to that email.

# Meeting with Carter Phillips from the Bevier Café – 6/25/2018

* Bevier Café is only open from M-F
* Carter was concerned about collection and pick-up
  + Ideal situation for food waste collection: 4 bins
    - 2 in the loading dock
    - 1 for pre-consumer (kitchen)
    - 1 for post-consumer
  + They will have to train the Café staff and the BSW staff as well
  + Collection point near the Busey Evans dining hall will be very challenging for them, especially during the winters
  + Food waste must be collected by Friday of every week (at least once a week on Fridays)
    - Who will pick it up?
    - How often will they pick it up?
* Carter estimated that Bevier Café produces 50-100 lbs of food waste per day – post + pre
* Carter said that Food Science department
  + is a learning lab for manufacturing
  + they grow tomatoes for the pizza sauce
  + they grow wheat which is milled at the Pilot Plant at the FSHN department
* Brian Jacobson is in-charge at IBRL
  + Ask him if there are any projects currently that produce food waste
* Jane Norder at ECE’s Café Byte
* Carlos something at IGB’s Array Café
* Carter is very interested in this program. He offered to start weighing the food waste now so that we can have an estimate for the future.
  + Although, I think that he would prefer to participate once we have started the pilot with Busey Evans.
  + I told him that I would like this project to start by the end of October

# Meeting with Angela Urban from the US Army Corps – 6/22/2018

* Angela Urban works for the Army Corps in Champaign, IL
* She asked me to reach out to Dave Guth and Dawn Aubrey
* She said that the Dining Halls do not use much FOG
  + Except for Ikenberry dining hall. They have a fast food place within.
* Department of Agricultural and Biological Engineering (ABE) working with **tomatoes**. There must be a lot of waste from tomatoes.
* Angela talked to Carle Hospital during her graduate studies, and they said that they don’t have any solution for food waste.
  + Hospital food waste could be used
* Are Frat houses and sorority houses university-owned?
  + They have a lot of food waste

# Phone call with Dana Kirk from the Michigan State University, East Lansing – 6/22/2018

* Dana Kirk is an assistant professor in Biosystems and Agricultural Engineering at Michigan State University
* 6000 acre campus
* They have 2 digesters on-campus and they are considering adding one more digester at the WWTP – Anaergia, Inc. constructed the digesters
  + Industrial project construction cheaper than WWTP at the time
  + MSU owns 40% of the Wastewater Treatment facility
  + 2 digesters
    - 1 Plug-flow digester constructed in 2010. – Decommissioned for the last 4 years
    - 1 Complete-mix digester (commercial) constructed in 2013
      * Service units to the university
      * 400,000 gallon capacity
      * Usually reuns at 100oF, but currently at 103o or 106oF
* Total waste that they process – 22000 – 25000 tons/year
  + Dairy manure makes up almost 50% – 9000 – 11000 tons/year
  + 9 Dining halls (one big and 8 smaller)
    - Brody Hall – 35000 – 40000 meals every week
      * They have a pulper (Somat pulper)
      * 200 tons of food waste – both pre- and post-consumer
      * Bones are not recommended to go through the pulper. Smaller bones like chicken wings are acceptable
    - Rest of the 8 dining halls don’t have pulper
      * Only pre-consumer food waste is collected
      * 150-200 tons of food waste every year
  + Remaining 10000 tons/year
    - FOG from restaurants and Milk Processing waste makes up 80%
    - Rest comes from the wash-down from Slaughter house material and some distilleries
* Food waste collection
  + Brody Hall
    - 2 times a week during school year
    - 1 time a week during breaks (since they are always open and serve almost 25000-30000 meals a week during the summer and winter break)
  + From all other Academic buildings
    - 3 times a week during school year
    - Not very frequent during summer and winter break
* On-site electricity generation – Internal Combustion Engine
  + Maximum output – 380 kW
  + Typically, 350 kW (because they don’t want to go for maximum production value)
  + They are not claiming any high-value RINs right now. There are no subsidies right now.
  + No Carbon Credits
* HRT – 20 days
  + 20,000 gallon in and 20,000 gallon out
* GHG emission reduced – 5000 metric tons from GHG reduction and energy offset
* Total project cost – $5.1 M
  + Funded completely by the University Foundation – Internal loan
  + Payback period – 8-12 years
  + 2 engines failed/malfunctioned, so they had to replace those – increasing the payback period
  + Construction in 9 months – only idle time in the last 5 years
* Challenges
  + Contamination from pre-consumer food waste
    - Nitrile gloves
    - Plastics
    - FOG have contamination problems
      * Only has 4% solid content
      * MSU considering a dewatering system
  + Training the workers
* Tipping fee – $0.10 a gallon, and a flat fee for a load
* Operating Staff – 3.5 FTE