ANAEROBIC DIGESTER WORKSHOP:
The future of manure and food waste management

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Thanks to our hosts
Brightmark LLC & Chevron U.S.A – Castor Project Digester
Ottawa County Farm Co. LLC – Greg Stahl (farmer lead)
On Farm Manure

- Manure is stored until field and weather conditions allow the farm to spread these nutrients to crops while minimizing environmental risks.
- During storage, the anaerobic conditions and degradable OM result in the production of methane (CH4) and other gasses through naturally occurring processes.

- Farms with animal production make manure. A full grown dairy cow makes around 2.3 cu-ft of manure per day (18 gallons). When fully populated the farm we will be visiting today produces around 53 million gallons per year.
- That manure is comprised of digested and undigested food that passed through the animals as well as other waste (urine, parlor water, spoiled feed, runoff and leachate from feed, as well as precipitation.
- Manure is used as a nutrient source for the farm’s crops and we all know that manure is also a great source of organic mater.
- That manure is stored in designed structures and held until field conditions are appropriate for spreading the manure.
On Farm Methane

- The technology needed to generate methane from waste has been well known for about 100 years.
- Due to inexpensive fossil fuels, the cost effectiveness of generating and using methane from waste at larger scales had been limited.

- There are designs that can easily be implemented on small scales that are as simple as using one bucket to hold manure and another floating bucket with a vent on top to capture and hold the biogas.
- Fossil fuels were cheap, however, we are witnessing the hidden costs of cheap non-renewable fuels on the climate.
On Farm Methane Production

- Higher input costs, lower profit margins for farms, technology improvements, and increased interest in green energy has resulted in a re-evaluation of on-farm digesters for methane production from waste.
- New markets for Carbon Credits, GHG reductions, and greener energy sources.
- To some extent also driven by state and federal policies and incentives.

Global climate issues are also driving more renewable energy and the public’s willingness to make changes to greener energy sources.
Why use a digester?

- Methane is already produced in the manure storages
- Digester allows efficient generation and opportunity to collect the gas

Understanding Anaerobic Digestion

• Anaerobic digestion – Biological process where bacteria break down organic matter in the absence of oxygen.
Animals make manure. Manure is added to the digester. The digester is heated. Agitation of the manure mixes in the digester. Biogas bubbles to the surface. Biogas is collected, scrubbed, cleaned and the methane is compressed and ready for use. At today’s farm the remaining manure is pumped out of the digester, then separated into solids and liquids.
Factors influencing anaerobic digestion

- Temperature and pH – methanogenic bacteria thrive in a narrow temperature and pH range (6.8-7.2)
- Feedstock composition = energy density
- Retention time
- Tank size
- Mixing and agitation

I tell farmers that the digester is another animal with a very big stomach to fill at the farm. Just like any other animal at the farm, it needs appropriate feedstock, living conditions, and time to work. But like animals, it can also get sick. The digester provides the optimal conditions to turn the organic matter feedstock into biogas.
EGLE Digester Permitting in Michigan

EGLE has an FAQ Document
• “Many of the digesters currently being proposed to the WRD do not fit the current treatment system language included in the Part 31 2015 CAFO General Permit. Therefore, EGLE’s WRD is working to issue CAFO Individual Permits under Part 31.”

EGLE also has a “Regulatory Audit” from 2007 but it doesn’t cover all situations
• No mention of CAFOs

Reach out to EGLE early in the planning process to ensure that there is ample time to work through all the details
2-3 years from concept to final permit issuance...
Permitting In Michigan  (James’ Understanding)

- CAFO on-farm digester owned by the farm
  - Allowed under CAFO general permit and individual permits.
    - General permit allows up to 5% offsite material without modification of permit.
    - Between 5-20% outside material requires modifying the permit COC*.
    - Beyond 20% outside material requires individual permit.

- CAFO on-farm digester owned by 3rd party
  - Parties agree to General Consent order and can be approved under farm’s existing General CAFO permit.

- CAFO off-farm digester -- Groundwater Discharge Permit Application Site Specific Authorization: Rule 323.2210(y)

- Non-CAFO/ non-farm digester -- Possibly regulated by Materials Management Division.
  - Outputs are regulated depending on the final use. Probably under GW permit, possibly wastewater treatment facility.

*Not possible while permit is contested

Talk to EGLE permitting section for actual information.