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Consulting Engineers

MEMORANDUM

TO: Ann Arbor Energy Commission

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DATE: June 25, 2024

SUBJECT: June 11, 2024, Energy Commission Meeting

The following questions were asked at the June 11, 2024, Energy Commission meeting, and the responses to these questions are provided in this memorandum.

1. The City of Ann Arbor previously looked at anaerobic digestion, and it was determined that it was not feasible to locate a digester at the WRRF. What has changed?

   At the time of the 2017 Feasibility Study, facility renovation was ongoing, and the old plant was being totally removed from the site. Thoughts of unforeseen issues made the WRRF hesitant to place a biodigester on site.

   The 2017 Feasibility Study therefore evaluated the economics of constructing a biodigester on the Wheeler Center property, which is located approximately 5.5 miles from the Ann Arbor WRRF. The study evaluated the expected volume of solids from the WRRF along with the expected volume of food waste, including FOG, generated from restaurants, schools, groceries, hospitals, hotels, and food banks in the city, as well as Washtenaw County. The study showed that the trucking costs were cost prohibitive for construction and operation of a biodigester at that location.

   Since that time, the residuals-handling process was changed, and the gravity thickener tank was no longer needed for normal operations. This created a prime location on the WRRF site for a biodigester.

2. The city is expecting a lot of growth in approved housing developments. Provide confirmation of the space needs and growth projections.

   Digester sizing is based on many factors, including the volume and characteristics of biosolids generated at the WRRF along with any food waste streams transported to the facility. Although the size of the digester is not directly calculated based on population, population growth was used to estimate the projected increase in biosolids in future years. The projected growth rate was determined by evaluating the growth rates of the city of Ann Arbor and the townships served by the Ann Arbor WRRF, and calculating a weighted average based on population.

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Conservative values and assumptions were used when evaluating the biosolids data and calculating the size of the anaerobic digester:

a. *Maximum month volumes of primary solids and thickened waste-activated sludge (TWAS) based on evaluation of plant data.*

b. *Conservative TWAS concentration typical of current plant operations was used to determine volume. Achieving a higher concentration of thickened solids will decrease the volume of biosolids entering the digester, thereby allowing additional capacity.*

c. *Adjusted the volume of biosolids to include projected growth.*

d. *Assumed the full volume of food waste projected in the feasibility study would be added to the digester.*

3. What happens to PFAS/PFOS when they are "burned"? Will they spread to the environment? Are they destroyed in the digester?

Anaerobic digestion, in research trials, has shown a reduction in PFAS compounds. More research is being conducted to better understand the potential removal rates.

Thermal processes for wastewater solids and biosolids, such as incineration, pyrolysis, and gasification, have been shown to reduce the levels of PFAS in the resulting solid product, including ash and biochar. The processes can remove most of the PFAS compounds from the solid phase, often to below current detection limits. However, there are still unknowns relative to the overall fate and mass balance of these compounds through these processes.

Research conducted to-date indicates that these thermal processes may not destroy PFAS, but rather that they volatilize PFAS from the solids and break carbon-carbon bonds before breaking the carbon-fluorine bonds, which results in the formation of smaller-chain PFAS compounds. These transformed compounds, that are still classified as PFAS, can reside in the sidestreams, including process gasses. Further research will provide more definitive results. In general, these thermal processes can be categorized as "PFAS removal processes" because they remove PFAS from solids and biosolids, but not as "PFAS destruction processes" because they do not completely destroy all carbon-fluorine bonds that make up PFAS.

The WRRF is a receiver of PFAS compounds that are used daily in products including cookware, packaging, cosmetics, clothing, carpets, electronics, and firefighting foam. The best way to remove PFAS compounds from wastewater solids is to remove it from the influent wastewater. Part of the Michigan Department of Environment, Great Lakes, and Environment's (EGLE) approach to minimizing PFAS in wastewater solids and biosolids is to identify the sources of PFAS and control or eliminate those through wastewater pretreatment. This approach is being replicated in several other states, including Wisconsin, Colorado, and New York. EGLE is also supporting the US EPA's ongoing risk-based assessment of PFAS compounds in biosolids.

4. What are OSI and Public Works' thoughts on a biodigester?

   Keith Sanders reached out to the Ann Arbor Office of Sustainability and Innovations (OSI) and to the Ann Arbor Public Works Department after the meeting to follow up on this question. Missy Stults, PhD, Sustainability and Innovations Director, confirmed that OSI is supportive of the project and is very interested in helping find the funding to make it happen. Paul Matthews, Public Works Manager, also confirmed support for this effort.

5. The Grand Rapids digester project went way over budget (estimated cost of $40M and final project cost of $85M). What type of contingency is built into these estimates?

   A 30 percent contingency was built into the Ann Arbor project estimates. This is consistent with widely accepted engineering practices and AACE cost estimating guidelines.

   Although we were not involved in the Grand Rapids digester project, we are aware of a number of factors unique to that particular project that likely contributed to the cost escalation. The project included a delivery method whereby only 30 percent project design had been achieved at the time project costs were estimated. COVID-associated price adjustments then impacted project pricing, and unknown site conditions found during construction led to additional costs for contaminated soil removal and site dewatering.

6. What makes RINs more attractive than CHP? Just revenue? Which is environmentally friendlier?

   RINs produced from renewable natural gas have monetary value due to the federal Renewable Fuel Standard (RFS). The EPA, which administers the RFS, does not currently allow for electricity used as vehicle fuel to be eligible for RINs. In general, the electrical power generation requires less equipment and parasitic electrical loads when compared to RNG production.

   Both scenarios are alternative fuel sources and are environmentally friendly. An environmental impact analysis was not performed to compare these options.

7. Only one digester was proposed. Why wasn't this designed as a two-digester system so that one digester can remain operational when the other is taken down for cleaning or maintenance?

   Ideally, two digesters would be constructed to provide redundancy. However, there is very limited space available on the current WRRF site. As a result, only one digester can be constructed at the site.

   Only the digestion tank itself would be without redundancy. The other components of the process (pumps, heating, mixing, and biogas management) will have redundancy included in their design. When the digester system needs to be offline for a short period of time, the solids can be held within the treatment process. For longer term shutdowns such as tank cleaning or longer biogas management system repairs, the raw solids would be dewatered and landfilled as is the current practice.

8. Can the material collected in the residential organic carts be brought to the digester?

The material collected from the residential organic carts can be processed by the digester. Additional equipment would be needed to accept, screen, and process the organic waste prior to feeding the material to the digester. The minimal equipment required at the plant to accept food waste and FOG was planned for in this study. The organic material will still require processing into a food waste slurry before coming to the facility.