

Technical Appendix

City of Gresham, Oregon
Department of Environmental Services
Gresham WWTP Anaerobic Digestion Expansion

Climate Pollution Reduction Grants Program

March 29, 2021

Introduction:

The City of Gresham, Oregon has calculated the magnitude of GHG emission reductions based on planned improvements in the proposed measure, and following the guidance in the EPA PRG Notice of Funding Opportunity. Two documents are provided as attachments with this application that how the GHG emission reductions were quantified:

- “GHGCalcs_Gresham Oregon” – this Excel spreadsheet contains historical data and new calculations to quantify specific inputs for the model that estimated the GHG emission reduction
- BEAM_2022v2_Gresham Oregon – this Excel spreadsheet was developed by North East Biosolids and Residuals Association (NEBRA) and Northwest Biosolids.

This technical appendix is provided with the CPRG application to describe the methodology and assumptions used in the calculation of GHG emission reductions for the proposed measure.

Methodology:

The BEAM*2022 model estimated GHG emissions for the two considered cases in this application: the ‘baseline’ case where a specified quantity of FOG is disposed of in landfills, and the proposed case where that specified quantity of FOG is instead processed through anaerobic digestion and the resulting methane is combusted.

Data inputs calculated in “GHGCalcs_Gresham Oregon” spreadsheet include:

- Daily quantity (wet weight) of FOG (fats, oils, and grease) waste product diverted from landfill to Gresham WWTP – this calculation was based on average daily FOG delivery to the WWTP and on the design intent to triple the quantity of FOG received. Current average daily FOG delivery quantity is around 12,300 gallons. To triple that amount gives a new total around 37,000 gallons, and the difference is the new 24,700-gallon FOG quantity under the proposed measure.
- Volatile solids content of FOG diverted from landfill – total solids and volatile solids of FOG are sampled and tested regularly at the WWTP and average values were used to represent future FOG. The last three years of monthly averages for FOG data are given to substantiate the assumed values. The reviewer will note that a six-month period in the data is omitted from calculations because a digester cleaning project caused one digester to be out of service, which disrupted typical FOG and digestion operations.

- Daily weight of volatile solids diverted from landfill – this is equal to the average volatile solids content of FOG, multiplied by the additional FOG quantity to be received at the Gresham WWTP.
- Daily biogas production from diverted FOG in WWTP digesters – this is based on an assumed typical value of 15 standard cubic feet of biogas produced per pound of volatile solids consumed.
- Additional electricity used for processing diverted FOG – three pumps control the Gresham WWTP FOG system and account for most of the electrical usage. These are an offload pump for FOG receiving, and recirculation pump to keep the FOG mixed, and an injection pump to add FOG to the digesters. The offload and recirculation pumps are identical, while the injection pump is smaller but was assumed to have the same power consumption as the other two because more accurate data was not available.
- Magnitude of GHG reductions on 2025-2030 and 2025-2050 time periods – using the above inputs, the BEAM*2022 model generated an annual GHG emission reduction of 7,630 mtCO₂e per year for the proposed measure. The design and construction timeframe for the proposed measure showed that the improvements should be operational by July 1, 2028, giving roughly 2.5 years of operation in the 2025-2030 time period and roughly 22.5 years of operation in the 2025-2050 time period. The annual emission reduction rate was applied to these time durations to determine magnitude of reductions.
- Cost effectiveness of GHG reduction measure in 2025-2030 time period – This is defined as the funding request amount divided by the magnitude of GHG emission reductions on the 2025-2030 time period.

Assumptions:

- Market conditions support delivery of additional FOG to the Gresham WWTP – initial research by Jacobs for the “Predesign Report for the WWTP Anaerobic Digestion and Cogeneration Expansion Project” (Jacobs, 2023) indicates that there is sufficient additional FOG, and potentially other high-strength organic wastes, to support the increased quantities assumed to be delivered to the Gresham WWTP in this measure.
- Increased FOG deliveries begin immediately after completion of the implementation project – FOG haulers under existing contracts will be notified of additional receiving capacity at the Gresham WWTP, and new haulers will be notified as well. Notifications will go out in advance of project completion so that the City and haulers can prepare for new delivery schedules and contract changes.
- Future FOG has, on average, a composition similar to historical FOG averages such as total solids content and volatile solids content – historical FOG deliveries to the WWTP include a wide variation in composition including total solids and volatile solids. FOG disposal companies that bring FOG to the WWTP collect the material from various sources such as grease interceptors at restaurants, and dairy and other food waste from industrial food processing facilities. Other types of liquid waste have also been considered for delivery to the WWTP, including juice waste from a local fruit juice processing facility, and mash waste from a local gin distillery. Future FOG and other liquid wastes may have varying composition, but to simplify the calculations they are assumed to be consistent with historical averages.