Anaerobic Digestion of Commercial FOG & Food Solids at a Municipal WWTP

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Overview

- WRA Service Area & Details
- WRF – General Information
- Fats, Oils, & Grease Program
- FOG & Food Waste Disposal at the WRF
- Anaerobic Digestion
- Biogas / Renewable Energy Production
- Biosolids Recycling
WRA Service Area

- 17 member communities
- Serves 500,000 people
- Has over 2,000 restaurants, cafeterias, etc.
- 1 Wastewater Treatment Plant
Wastewater Reclamation Facility

- Treats 70 MGD avg.
- 200 MGD treatment capacity
- Six anaerobic digesters
  - 2.7 million gal. each
- Three hauled waste receiving stations
- Two 1.4 MW biomethane-powered engine generators
Fats, Oils, & Grease Program

- Established in 2006
- 2,000+ FSEs
- 800 grease interceptors
  - 1,000 – 5,000 gal. in-ground tanks
  - Roughly 1.5 million gal total capacity
- 700 grease traps
- Capture FOG and food solids; keeps from entering sewer system
  - Helps prevent sanitary sewer overflows & sewer back-ups
Food Waste Diversion

- Food waste from preparing meals, cooking & clean-up processed through garbage disposal
- Food waste is captured in grease interceptors
- Diverts food waste from landfill to WRF’s anaerobic digesters
Grease interceptor installation
Grease interceptor – working model

Needs to be cleaned out when **25% full** of FOG + food solids
(or minimum of quarterly)
Hauled Waste

- 20 licensed & certified “grease” haulers
- Hauled waste disposed of at the Des Moines Metro WRF anaerobic digesters
- Not just commercial food waste to WRF
  - Industrial food manufacturing / production waste
    - Meat processing, salad oil mfg., whey byproduct, expired milk, etc.
  - Various high-strength organic industrial wastes
Waste hauler scaling in
FOG & food solids to WRF

Restaurant Grease Interceptor Waste Hauled to WRF Digesters
Anaerobic Digestion

• Co-digestion of wastes
  • Primary sludge (from primary clarifiers)
  • Waste activated sludge (microbes/biomass from secondary treatment process)
  • Hauled waste sludge

• Biological processes decompose organic matter in absence of \( \text{O}_2 \) produces biogas

• Biogas is a mixture of gasses:
  • 60-65% \( \text{CH}_4 \) (methane)
  • 30% \( \text{CO}_2 \)
  • 4% Nitrogen
  • Trace amounts of \( \text{H}_2\text{S} \), siloxanes, VOCs, & moisture
Daily Biogas Production

Average = 1,916,000 cu ft

Aug 2016 - July 2017 Total = 699,467,391 cu. ft
Biogas Usage

• Two dual-fuel 1.4-MW I.C. engine generators
• Boiler fuel
• Biogas purchased by nearby industry for boiler fuel

• Future Plans: Pipeline injection & RINs recovery
Excess Biogas...

- Flaring converts excess biomethane to CO$_2$
- CH$_4$ is 20 times more potent of a GHG than CO$_2$
- Anaerobic digestion of food waste = almost 0 net GHG emissions
Biosolids Recycling

- **Biosolids** = dewatered solids removed from digesters
  - Non-digested volatile (organic) solids & inorganic solids
- **Recycled into the environment via land application**
- **Macronutrients**
  - N, P, K, Ca, S, Mg, Na
- **Micronutrients**
  - B, Cl, Mn, Fe, Zn, Cu, Mo, Ni, Co
- **Improves soil fertility**
Questions?

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