TEACH AD Webinar Series
June 16, 2021 - Diverting Food Waste from Landfills through US EPA's TEACH AD Program
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I am the Moderator

Jane Epperson
Associate Director
UIC Energy Resources Center
NEW WEBINAR - STAY IN THE KNOW

06.16.2021 | 10:30 am CST

Diverting Food Waste from Landfills
US EPA’s New Technical Education & Analysis for Community Hauling and Anaerobic Digesters

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Q&A
Submit your questions to the host using the Q&A box in the upper right-hand corner.

Presentations
A recording of today’s webinar will be posted on the TEACH AD website and you will be emailed a link by early next week.

Survey
After the presentation you will receive a brief survey. We appreciate your feedback.

Technical Issues
Contact Sam Rinaldi at: samr@uic.edu or 312-996-2554 for assistance.
Agenda

• Importance of diverting food from landfills
• Overview of anaerobic digesters
  • Use of Anaerobic Digestion at Livestock Operations
  • Anaerobic Digestion at Water Resource Recovery Facilities
• How to work with the University of Illinois Chicago on the newly awarded US EPA Grant: Technical Education and Analysis for Community Hauling and Anaerobic Digesters (TEACH AD)
Diverting Food Waste from Landfills through US EPA's New Technical Education and Analysis for Community Hauling and Anaerobic Digesters (TEACH AD) Program

Marcello Pibiri

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Importance of diverting food waste from landfills

- Municipal solid waste (MSW) landfills are the third-largest source of human-related methane emissions in the United States.
- By reducing the amount of food waste landfilled, we reduce methane emissions.
Importance of diverting food waste from landfills

• One-third of all food produced for human consumption worldwide is lost or wasted
• Source Reduction
• Feed People, Not Landfills
• Industrial Uses
  • Anaerobic digestion
Overview of anaerobic digesters

- Anaerobic digestion is the natural process in which microorganisms break down organic materials in the absence of oxygen.
- Two valuable outputs
  - Biogas
  - Digestate
Overview of anaerobic digesters

- Digestors at Water Resource Recovery Facilities
- Stand-Alone Digesters
  - Community-based digester
  - Municipal Food Waste Digesters
  - Organics recycling businesses
  - Food processing digesters
- On-Farm Digesters
Use of Anaerobic Digestion at Livestock Operations

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Joe Kramer
ILLUME Advising
My Perspective

Biogas research since 2001
- 84 Case studies (ag and food)
  - Some other studies included:
    - Biogas storage for on-peak generation
    - Systems permitting
    - Study of performance evaluation protocol use
    - Barriers to use on swine farms

Deere Ridge Dairy, WI. Photo courtesy of DVO, Inc.
Why do livestock farms install anaerobic digesters?

• Primary purpose – manure treatment
• Secondary
  • Renewable energy generation
  • Nutrient management
  • Operational flexibility
  • Input cost reduction
  • Odor reduction
What do digesters do?

- Continue natural digestion process (warm, low O2 environment)
- Improve manure characteristics
  - Reduce oxygen-depleting compounds
  - Make nutrients more plant-available
  - Greatly-reduce pathogens
  - Raise pH (lowers acidity)
- Methane production controlled, captured
- Outputs: biogas, solids, liquid
Why would farms process food wastes?

Benefits

* Increases biogas production
* Tipping fees
* Helps local businesses with green disposal option

Possible Issues

* Nutrient management
* Feedstock variability

Five Star Dairy, WI. Photo courtesy of Microgy, Inc.
Farm Digesters and Food Waste

- 333 systems operating or under construction
- 224 processing only manure
- 19 process farm residues or process water
- 90 process other feedstocks including food

AD system information from AgSTAR Projects Database:
Livestock Anaerobic Digester Database | AgSTAR: Biogas Recovery in the Agriculture Sector | US EPA
Dane County Digester, Waunakee
Operating since 2011

Inputs
- Manure from 3 farms
- Local food wastes
- Restaurant waste grease
- Glycerin from biofuel production

Outputs
- Renewable electricity sold to utility
- Renewable natural gas injected into pipeline
- Separated high P solids sold for bedding
- Reduced P liquids piped back to farms for application
Dane County Digester Benefits

- Help reduce P loading in watershed
- Greenhouse gas reduction
- Help farmers manage seasonal application restrictions
- Odor reduction in community
Thank you

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Flame cow courtesy of Kurt Hjort-Gregersen of AgroTech (www.agrotech.dk).
Anaerobic Digestion at Water Resource Recovery Facilities

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Nick Menninga
Former General Manager at the Downers Grove Sanitary District
Municipal Wastewater Treatment Plant (WWTP)...AKA

- Water Resource Recovery Facility (WRFF)
- Water Reclamation Facility (WRF)
- Publicly Owned Treatment Works (POTW)
- Sewage Treatment Plant (STP)
Ownership

- Municipalities
- Special Districts
  - Sanitary Districts
  - Water Reclamation Districts
- Utility Companies (Private)
- Homeowners Associations
Sizes / Technologies

- Smaller Facilities
  - Typically low-tech passive technologies
  - Lagoons
  - Septic tanks/seepage fields
  - Require significant investment to introduce digestion
Sizes / Technologies

- Larger Facilities
  - Mechanical Infrastructure
  - Energy Intensive Operation
  - Purifying Wastewater for Discharge to Surface Water Body
  - Continuous Production of Sludge
  - Very Reliable Operation: Standby Power Available
Sludge

- Nutrient-Rich
- Low in Toxics - Source Control Enforced
- Pathogenic
- Vector Attraction
- Makes Good Soil Supplement, but needs stabilization
Sludge Digestion
Aerobic vs Anaerobic

- Aerobic - more common at mid-sized facilities
  - Lower capital cost - simple tankage
  - Energy intensive - aeration must be supplied
  - Odor source - typical operation generates periodic odors

- Anaerobic - typical at larger facilities - often conservatively sized
  - Higher capital cost - covered tanks
  - Energy efficient - generates more methane than needed to sustain process
  - More specialized operational control required
Anaerobic Digestion
Energy Considerations

- Raw sludge high in volatile carbon
- Anaerobic microbes convert volatile carbon to methane and carbon dioxide
- Raw digester gas is flammable, used in hot water boilers (70% efficiency typical)
- Some energy used for mixing, moving sludge
- Generally more gas than needed for heat - flared off
Alternative Uses for Methane

- Co-generation of heat and power (CHP)
- Renewable Natural Gas (RNG)
  - Vehicle fuel (R-CNG)
  - Pipeline gas
- HVAC fuel (absorption chillers, dehumidification, building heat)
Downers Grove Sanitary District

- Gas cleaning and engine genset to co-generate heat and power
Downers Grove Sanitary District

- Co-digest Restaurant FOG
• Add second CHP Unit, net-zero energy across STP
Thank You

Nick Menninga
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Agenda

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• How to work with the University of Illinois Chicago on the newly awarded US EPA Grant: Technical Education and Analysis for Community Hauling and Anaerobic Digesters (TEACH AD)
The goal of this program is to help communities and water resource recovery facilities in the Midwest region divert food waste from landfills by providing education and no-cost technical assistance to explore the increased adoption of anaerobic digestion and renewable energy biogas technologies.

- Educational Assistance
- Technical Assistance
TEACH AD – Educational Assistance

- In person workshops (2)
  - Onsite events
  - Tour of the site
- Webinars (10)
  - Will cover different aspect of an anaerobic digestion project
- Project profiles (8)
  - Will highlight successful AD projects
TEACH AD – Technical Assistance

- Anaerobic Digestion Technical Assessments (20)
  - U.S. EPA's Co-Digestion Economic Analysis Tool (CoEAT)
  - Initial economic and physical feasibility assessment for (co)digestion of organic wastes
  - Standardized 2-4 page letter report
TEACH AD - Contact

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Questions & Answers

Jane Epperson  
UIC Energy Resources Center

Joe Kramer  
Illume Advising

Nick Menninga  
Downers Grove Sanitary District

Marcello Pibiri  
UIC Energy Resources Center
TEACH AD Webinar Series

Join us again on September for our second Webinar!
Thank You

Please fill out our survey.

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Thank You