On-Site Pretreatment Equipment 101

NYC Food Waste Fair

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All Three Solutions Are Needed

Prevention

Recovery

Recycling

No Silver Bullet

- All recycling options have trade-offs, e.g., storage space for collection containers vs. management of outputs of on-site pretreatment systems
- Recycling decisions are **not** one size fits all - they must be tailored to your facility and operations
    - Before you commit, **visit** and **talk** to users
    - Ensure your selection is in compliance with local regulations

On-Site vs. Off-Site Choices

- Preprocessing: Slurry or dehydrate, then collection for off-site management
- **Pretreatment:** Conversion step with output requiring final treatment
- Complete treatment: Typically multi-week composting or dehydrating with composting or curing
- Off-site: On-site separation + collection service


COMPOSTABLES ONLY
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Primary Pretreatment Options

Biodigesters/Liquefiers

- Utilize fresh water and often biological additives like enzymes or microbes to liquify food waste
  - Reduces biochemical oxygen demand (BOD) and total suspended solids (TSS) prior to discharge
- Most systems have built-in grinder or shredder

Biodigesters/Liquefiers

- Output is a liquid effluent that must meet municipal sewer discharge requirements
- Is only “recycling” if biosolids generated at WWTP are recycled. Otherwise, only landfill diversion

Biodigesters/Liquefiers

Establishments covered by the NYC commercial organics rules are required to register on-site processing systems with DSNY, which in turn notifies the NYC Department of Environmental Protection about the installation.

NYCDEP continues to assess impact of effluent loadings from on-site systems on sewers and wastewater treatment systems.

Center for EcoTechnology's
"On-Site Systems for Managing Food Waste" Report

Materials Accepted
Capacity
Output Material/Mmgt.
Dimensions
Price Range
Lease/Rental Availability

Additional Inputs Required
Power Requirements
Energy Use
Maintenance Requirements
Maintenance Costs
Annual Operating Costs

Dehydrators

- Use heat (thermal process) to evaporate liquid in the food waste
- Built-in grinder or fed by a food waste pulper
- Does not use biological process to reduce pathogens and decompose food waste into a stable substance

Dehydrator Output

- Dry biomass often described by vendors as ready-to-use soil amendment or plant fertilizer. Typically requires additional “curing” prior to use.
- Effluent is primarily reconstituted steam

In-Vessel Accelerated Composting

- Typically a composting drum; food waste is mixed with an amendment such as sawdust or wood chips
- May be paired with pulper or shredder
- “Accelerated” because manufacturer states unit produces “ready-to-use” compost in 4-7 days
- Different from on-site composting systems with distinguishable composting and curing phases

User Experiences:
Dehydrators vs. Biodigesters

- Dehydrators can tolerate soiled paper, waxed cardboard and napkins; biodigesters cannot.
- Biodigesters require significantly higher amounts of water than dehydrators.
- Dehydrators use more electricity than biodigesters.

User Experiences:
Dehydrators vs. Biodigesters

- Most dehydrators are batch systems; biodigesters are continuous.
- Biodigesters are more prone to effluent composition issues related to biochemical oxygen demand (BOD), a measure of how much organic material is in discharge liquid. If too high, it can cause wastewater-related problems.

User Experiences:
Dehydrators vs. Biodigesters

- Some dehydrators are designed to be coupled with pulpers as a pretreatment step, which can benefit consistency of the end product.
- On-site source separation of food waste, including all contamination, is necessary with both pretreatment technologies.

Both dehydrators and biodigesters present waste collection savings compared to the traditional separate, collect, haul model of organics diversion.

Recent Interviews With Users

- **NFL Stadium with Biodigester:** BOD and TSS levels too high to discharge to on-site wastewater treatment facility; levels significantly beyond vendor specification
- **University with Dehydrator:** Dehydrated product has to be added as an amendment to soil that it composts once it is applied
- **Biodigester at Commercial Communal Kitchen:** Input had a lot of citrus and acid caused “upset” with enzymes leading to insufficient decomposition and effluent clogging drains

Case Study:
Fairway Market, NYC

- Biodigester units installed at 15 stores
- Capturing from 500 to 1,500 lbs/day of food waste
- Have maintenance contract with vendor; every 2 months do recharge of microorganisms and any necessary mechanical service
- All units plumbed to discharge through grease trap

Due Diligence Questions: **Biodigesters**

- What is water and energy usage?
- What are labor and time requirements?
- Does food waste need to be pulped or shredded prior to loading or is that built into unit?
- Is there a guarantee on BOD and TSS reduction if discharge limitations are adopted by wastewater authority?

Due Diligence Questions: **Biodigesters**

- Can you provide third-party verification performance documentation of effluent quality from similar installations?
- Are there limitations on food waste inputs, e.g., high loads of citrus, bones, or grease?
- What are tolerance limits of the enzymes or microorganisms?
- What are costs to operate, e.g., purchase of enzymes or microorganisms?

Due Diligence Questions: **Dehydrators**

- What is the energy usage?
- Does food waste need to be pulped or shredded prior to loading or is that built into unit?
- Any limitations on food waste inputs, e.g., bones, meat, fish, and grease?
- Can items like soiled paper or shredded waxed corrugate be added?

Due Diligence Questions: **Dehydrators**

- What is stability of the dehydrated output, i.e., is it still biologically active if it becomes wet?
- Can the finished product be used on-site without further processing? For what applications? What applications should be avoided?
- Is there third-party analysis of dehydrated food waste, including seedling germination tests?

Resources

- **https://www.biocycle.net/2017/07/05/site-food-waste-pretreatment/**
  - Links to CalRecycle Guidance on Food Waste Dehydrators and Liquefiers
  - Links to BioCycle 2-part Analysis of Biodigesters and Dehydrators
- Copy of presentation: biocycle.net/nycfair.pdf