Co-Digestion and Organics Pretreatment Technology

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Presentation Overview

• Resource Recovery Program background
• Why food waste?
• Incoming materials, sources, quality
• Pretreatment or “Pre-processing”
• Contaminant accumulation, removal
• Lessons learned and path forward
Overcapacity or Opportunity?
Resource Recovery Program
Cogeneration Expansion
Renewable Power Growth
Percent of Plant Demand Met by Onsite Generation

[Graph showing the growth of renewable power generation from 1999 to 2019, with key milestones indicated: R2 Program Begins, Turbine Installed, and peak at 160% in 2019.]
Why Food Waste?

- Landfill diversion
- Digestion may be best use of food residuals
- High energy potential
- Locally available over long-term
- Ratepayer benefits

1 truck/day will power 260 homes
Landfill Diversion of Food Waste

- Largest category of municipal solid waste
  - Over 1,400 tpd generated in 5 Bay Area counties
  - Less than 4% currently diverted

- Diversion conserves landfill capacity and reduces greenhouse gas emissions
  - Landfilled food waste releases methane to the atmosphere
  - Driving food waste to WWTP may mean fewer truck miles than driving to landfill

Disposed Municipal Solid Waste
(EPA, 2011)

- Food Waste: 21%
- Plastics: 18%
- Paper and cardboard: 15%
- Other: 11%
- Rubber, leather, textiles: 9%
- Yard trimmings: 9%
- Metals: 5%
- Glass: 5%
- Wood: 8%
SB1383 Driving Landfill Diversion

Requiring reduction of organic waste methane emissions and driving organics out of landfills - but to where?

WWTPs with surplus capacity are well suited to turning locally sourced organics into energy! Now addressing contamination challenges.
Examples of Commercial Source Separated Organics - CSSO

- Food and Beverage Processors
- Produce Markets
- Supermarkets
- Restaurants
- Juice Bars
- Coffee Shops
- Hotels
- Institutional Dining
Outreach to Food Service Industry

• In-person technical assistance, outreach, and training

• Training food service managers and workers takes concerted effort, goals include:
  – Higher participation by businesses
  – Greater yield of materials
  – Cleaner material (source control)
Source-Separated Organics from Food Service Establishments

- **The Good**
  - Fruits
  - Vegetables
  - Grains

- **The Bad**
  - Food-soiled paper
  - Waxed cardboard

- **The Ugly**
  - Bones, shells, glass
  - Wooden crates
  - Plastics
Incoming Organic Material Quality

Ranges from:

- clean food scraps (strong source control)
- to low-digestible organics (paper products)
- to being a component of trash (mixed waste)
Solid Food Waste Preprocessing at EBMUD Today

1. CSSO on transfer station tip floor

2. Food waste after grinding

3. Off-loading at EBMUD

4. Contaminant removal at EBMUD
Current Solids and Liquids Receiving Facility
Current Preprocessing System

- Installed in 2004
- Capital cost = $6 M
- Estimated Capacity = 40 to 50 tpd
- Components: slurrying/mixing, rock trap/grinder, pumping, pulper with 3/8” screen
- Not as robust as needed
Examples of Food Waste Contamination

Key need: Pre-processing trains that remove contaminants to protect infrastructure
Contamination Types and Issues

Metal:
Severe Problem
Breaks Equipment
Breaks Pumps
Hard to sample
Can be removed at high TS%

Light Contamination (plastic):
Clogs Equipment
Doesn’t Settle Out
Can be removed at high TS%

Heavy Contamination (grit):
Settles out, expensive to remove from tanks
Increases equipment wear and tear
Can be removed at low TS%
Grit Accumulation - Easy to Find

Is there any grit down here?
But Difficult to Remove

Plenty! Grab a shovel!
Some Gritty Considerations

• How do you sample and measure grit fraction in food waste?
• Does grinding/pulverizing materials make the problem worse?
• What technologies separate grit and grit precursors from food waste well?
More Gritty Considerations

• How do you manage the fugitive grit accumulations in digesters?
• Does grit carry over downstream of digesters and present additional operational problems?
• Does some grit, such as glass, affect end product marketability?
## EBMUD Sources Comparison

<table>
<thead>
<tr>
<th>Receiving Method</th>
<th>Description</th>
<th>Contamination Control</th>
<th>Full Scale Experience</th>
<th>Contamination (dry weight)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solids (end dump)</strong></td>
<td>CSSO - Ground to 2&quot; minus</td>
<td>Customer Education Rejecting loads at pickup Magnet after grinding</td>
<td>Very difficult to process Metals (cutlery) an issue Not cost-effective</td>
<td>4.6%</td>
<td>4.6%</td>
</tr>
<tr>
<td>M – F Daytime hours only Closed Holidays</td>
<td>Pressed MSW</td>
<td>Press through screen</td>
<td>Limited experience Requires polishing</td>
<td>7.0%</td>
<td>5.0%</td>
</tr>
<tr>
<td>CSSO - preprocessed</td>
<td>hammermill</td>
<td>None</td>
<td></td>
<td>0.7%</td>
<td>7.6%</td>
</tr>
<tr>
<td><strong>Liquids</strong></td>
<td>CSSO - Processed to liquid</td>
<td>Screw Press 1/8th Inch shaker screen</td>
<td>Easy to process Grit mostly eggshells</td>
<td>0%</td>
<td>1.5%</td>
</tr>
<tr>
<td>24/7 - 365 days/year</td>
<td>Ground to liquid at generator site</td>
<td>Generator sorted (via “weak” grinder)</td>
<td>Limited experience Seems easy to process</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
A Fundamental Food Waste Question: Where best to sort and preprocess?

Sort at the generator?

CSSO Starts nice

Gets mixed....

Needs to be unmixed....

Easy to handle liquid
Or forget source separation and extract directly from MSW?

Anaergia Press (San Francisco)

Zero Waste (San Jose)
EBMUD’s Lessons Learned

• Source Separation is not enough
• Once contamination is in a tank, difficult to remove. Better to remove contamination before reaching the POTW
• Liquids can be handled easily but incurs greater hauling costs
• Helps to work with experienced public and private sector partners
• Still much to be learned, EBMUD actively exploring and is interested in a variety of approaches
EBMUD’s Path Forward

• Mitigate technology risk associated with contaminants by:
  – Provide contamination feedback to generators and haulers for improved source control
  – Developing materials specifications, mitigation procedures in long-term agreements with materials suppliers and processing partners
• Source Control not enough, some kind of physical screening needed
• Continue to look at a variety of approaches
• Planned grit removal pilot
Questions?

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