Supplemental Organic Wastes Boost Biogas Production
Resource Recovery Legislation

• Resource Recovery Bill signed into law in July 2014

• Grants the Metropolitan Water Reclamation District of Greater Chicago the authority to capture recovered resources and produce renewable energy resources.

• “The District has the opportunity and the ability to change the approach to wastewater treatment from that of a waste material to be disposed of to one of a collection of resources to be recovered, reused, and sold, with the opportunity to provide the District with additional sources of revenue and reduce operating costs.”
Anaerobic Digestion

- Process in which different groups of bacteria play a role to systematically break down organic matter into simpler compounds in the absence of oxygen.
- Byproduct is a gas containing methane and carbon dioxide: “Biogas”
- Biogas is a fuel for energy
- Increase biogas production: increase energy production
Co-Digestion

Digester

Biogas

Sewage Solids

High strength waste

Food Waste

Fats, oils, grease

Food Waste

Sewage Solids
### Feedstock Market--Analysis and Challenges

<table>
<thead>
<tr>
<th>Organic Feedstock</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOG, Yellow Grease</td>
<td>Readily available in Chicago. But competitive uses.</td>
</tr>
<tr>
<td>Good quality industrial food waste</td>
<td>Available, often sold for animal feed</td>
</tr>
<tr>
<td>Source separated food wastes</td>
<td>Variable availability, cannot guarantee long-term supply, cannot control quality</td>
</tr>
<tr>
<td>Wet Commercial Waste/ Municipal Solid Waste</td>
<td>Available in large quantities, but organic material co-mingled with other debris</td>
</tr>
</tbody>
</table>
Chicago Waste Diversion and Waste Characterization Study (2007)*

- City of Chicago generates 7 million tons per year waste
- Organics represent ~29% of waste
- 547,000 tons per year is food scraps
- Dept. of Streets and Sanitation collects 40%, rest by private haulers

*City of Chicago Department of the Environment
GOAL:
Find a consistent, long term (20-year) supply of organic waste to provide stability from both a process perspective and a financial perspective.
Accessing Organic Fraction of Wet Commercial Waste --Organics Extrusion Press

- Processes wet commercial waste at a private trash transfer station
- Recover 95% of organics
- Dry fraction to recycling
- Produces slurry of 30% TS. Trucked to wastewater treatment plant.

Photos: Anaergia Services
Organics Polishing System

- Two step cleaning process
  1.) Small Plastics Removal
  2.) Grit settling
- Diluted with plant water to 12% total solids before blending to digesters
- Improved digester performance
- Keeps digestate clean to be blended with biosolids for land application

Images: Anaergia Services
## Calumet Water Reclamation Plant
**Organic Waste Receiving Plan**

<table>
<thead>
<tr>
<th>Feedstock Type</th>
<th>Quantity (ton/day) (approximate)</th>
<th>Biogas Generation (sfc/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Fraction WCW</td>
<td>285</td>
<td>1,617,093</td>
</tr>
<tr>
<td>Liquid Waste</td>
<td>120</td>
<td>107,930</td>
</tr>
<tr>
<td>FOG</td>
<td>35</td>
<td>126,976</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>440</strong></td>
<td><strong>1,852,000</strong></td>
</tr>
</tbody>
</table>

- Increase biogas production by 160%
- Total heating value: 1,770 mmBTU/day
- Equivalent to heating demand of 6,400 households
- Over $1 million/yr revenue from tipping fees
Renewable Energy—Biomethane Production

- Clean biogas using Pressure Swing Absorption (PSA)
- Produce 1,500 mmBTU/day pipeline quality gas (“biomethane”)
- Biomethane sold to natural gas pipeline
- Sale price of biomethane connected to market RIN value of biofuel under EPA’s Renewable Fuel Standards program
- Potential revenue of $7 million/yr, assuming recent RIN market prices and natural gas prices
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