Anaerobic Digestion
Food Waste to Energy

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Food Waste Pyramid

Food Recovery Hierarchy

1. **Source Reduction**
   - Reduce the volume of surplus food generated

2. **Feed Hungry People**
   - Donate extra food to food banks, soup kitchens and shelters

3. **Feed Animals**
   - Divert food scraps to animal food

4. **Industrial Uses**
   - Provide waste oils for rendering and fuel conversion and food scraps for digestion to recover energy

5. **Composting**
   - Create a nutrient-rich soil amendment

6. **Landfill/Incineration**
   - Last resort to disposal

The pyramid illustrates the hierarchy of preferred food waste management strategies, starting with the most preferred (Source Reduction) at the top and the least preferred (Landfill/Incineration) at the bottom.
Food Waste – What’s the Problem?

• One third of all food does not make it from farm or factory to fork.
• 1.3 billion tons of food per year is wasted globally
  • Worth $1 trillion in US dollars
• Food waste contributes 4.4 gigatons of carbon dioxide equivalent each year.
  • 8% of total anthropogenic greenhouse gas emissions
  • If food waste was a country, it would be the third-largest emitter of GHG globally (behind the US and China)
• People who need food aren’t getting it.
• Wasted food is heating up the planet.
Food Waste – What’s the Problem?

- Locally, approximately 1/3 of all landfilled waste is food waste.
- Waste is transported 70 miles to the landfill in a truck using diesel fuel.
- Food waste is heavy and transportation costs to the landfill are based on weight.
- Food waste breaks down in the landfill and produces methane:
  - Methane leaks into the atmosphere and contributes to GHG emissions:
    - Methane is 28 times more potent GHG than carbon.
  - Methane is captured, flared, and burned.
  - Methane is captured and used to generate electricity or natural gas.
Anaerobic digestion is a process through which bacteria break down organic matter—such as animal manure, wastewater biosolids, and food wastes—in the absence of oxygen.
Anaerobic Digestion
Uses

- Food and other organic waste
- Animal manure from dairy and chicken operations
- Hog lagoons
- Wastewater treatment plants
How Anaerobic Digestion Works
Anaerobic Digestion of Food Waste Creates a Circular Economy

- Reduces food waste in the landfill
- Generates electricity or heat
- Creates a nitrogen and phosphorus rich soil amendment used to grow more food
### Anaerobic Digestion vs Capture of Landfill Gas

<table>
<thead>
<tr>
<th></th>
<th>Anaerobic Digestion</th>
<th>Landfill Gas Capture</th>
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<tbody>
<tr>
<td>Ensures methane is not released into the atmosphere</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td>Provides energy source (bio-gas) which can be injected into the natural gas pipeline or used to generate electricity</td>
<td>yes</td>
<td>Yes</td>
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<td>Provides a revenue source for the landfill owner/local government</td>
<td>yes</td>
<td>Yes</td>
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<tr>
<td>Third party (owner) provides capital and operating costs</td>
<td>yes</td>
<td>Yes</td>
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<tr>
<td>Eliminates food waste from the landfill</td>
<td>yes</td>
<td>No</td>
</tr>
<tr>
<td>Produces digestate (soil amendment) which can be sold</td>
<td>yes</td>
<td>No</td>
</tr>
<tr>
<td>Creates a Circular Economy</td>
<td>yes</td>
<td>No</td>
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Anaerobic Digester Technology
Remember...

Waste isn’t waste until you waste it!