Food Recovery Summit
Charleston, SC  Nov. 2015

Food Composting Opportunities and Challenges
Success Stories in Food Composting

- AgRecycle, Pittsburgh PA
- ASU, Boone, NC
- Barnes Nursery, Huron OH
- Black Bear, Crimora VA
- Brooks, Goldston NC
- Earth Farms, Dallas NC
- Two Particular Acres, Royersford PA
- Warren Wilson, Asheville NC
Brooks Food Scraps Truck – mid-2000

NC’s first food scraps collection program
Characteristics of Successful Operations

- Commitment to sound management
- Large, rural sites
- Start small, grow wisely
- Trained operators
- Pay-as-you-throw or other weight-based MSW billing
- Very supportive State government
  - High recycle rate goals (FL, CA)
  - Bans on landfilled organics (MA, VT, CT)
  - Supportive grant programs (NC, PA)
  - Updated rules and simplified permitting (VA, SC, PA)
Not-so-Successful Stories

- Wilmington, DE
- Hurlock, MD
- Annapolis, MD
- Riner, VA
- Cincinnati, OH
- Barnesville, GA
- Toccoa, GA
Commonalities of Failures

- Inability to control contamination
- Inadequate site area for processing feedstocks
- Taking in too much material too soon
- Insufficient carbon amendments
- Inadequate attention to storm water management
- Offsite odor episodes
- Lack of operator training
- Challenging state/local regulatory environments
Why are food scraps so hard to compost?

- Cost of collection
  - Difficulty of building adequate route density

- Diverse nature of feedstock
  - Fruits/veges to meats/dairy to breads to prepared foods
  - Soiled paper – plates/cups/servingware/etc.

- High moisture content
  - Water flush after 2-3 days as plant cells rupture

- Low pH
  - Helps form odorants

- Rapidly-formed odorous volatile acids and other odorants
## Volatile acids in food composting

<table>
<thead>
<tr>
<th>Volatile odorants:</th>
<th>Odor nature:</th>
<th>Detection Threshold:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic</td>
<td>Vinegar, sour</td>
<td>2 ppm</td>
</tr>
<tr>
<td>Butyric</td>
<td>Rancid butter</td>
<td>240 ppb</td>
</tr>
<tr>
<td>Formic</td>
<td>Urine</td>
<td>450 ppm</td>
</tr>
<tr>
<td>Indole</td>
<td>Fecal</td>
<td>140 ppb</td>
</tr>
<tr>
<td>Iso-valeric</td>
<td>Sweaty, leathery</td>
<td>120 ppb</td>
</tr>
<tr>
<td>Propionic</td>
<td>Body odor</td>
<td>20 ppm</td>
</tr>
</tbody>
</table>

1 ppm = one minute in two years
1 ppb = one second in nearly 32 years
Other challenges in food scraps composting

- Costs of food scraps collection
  - Added burden unless MSW costs can be reduced
    - Need resource management analyses for food scraps sources
- Not all carbon is alike
  - Need to adjust operations for non-biodegradable carbon
- Local governments and flow control
  - New expensive transfer stations, MRFs, etc. driving flow control efforts
- Costs of managing decontamination
  - Manual efforts costly and inadequate
  - Technology coming to market but is expensive
## Projected Commercial Food Waste Service Charges

Monthly costs for voluntary diversion of 2,500 tons/yr food scraps with 5,000 tpy ASP composting facility:

<table>
<thead>
<tr>
<th></th>
<th>Rollcart Size (3x/wk service)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Cost:</strong></td>
<td></td>
<td>90-gal</td>
<td>65-gal</td>
</tr>
<tr>
<td>Labor</td>
<td>$22.50</td>
<td>$22.50</td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>$5.00</td>
<td>$4.92</td>
<td></td>
</tr>
<tr>
<td>Composting (tip fee = $42.56/ton)</td>
<td>$102.47</td>
<td>$74.01</td>
<td></td>
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<tr>
<td><strong>Subtotal</strong></td>
<td>$129.97</td>
<td>$101.43</td>
<td></td>
</tr>
<tr>
<td>Admin/Overhead</td>
<td>$19.50</td>
<td>$15.21</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$149.47</td>
<td>$116.64</td>
<td></td>
</tr>
<tr>
<td><strong>Net of Revenues</strong></td>
<td>$80.28</td>
<td>$66.67</td>
<td></td>
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</tbody>
</table>
## Projected Residential Food Waste Monthly Service Charges

<table>
<thead>
<tr>
<th>Participation:</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
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</thead>
<tbody>
<tr>
<td>Number of HHs</td>
<td>748</td>
<td>2,245</td>
<td>3,742</td>
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<tr>
<td>Labor</td>
<td>$0.63</td>
<td>$0.63</td>
<td>$0.63</td>
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<tr>
<td>Containers</td>
<td>$0.89</td>
<td>$0.88</td>
<td>$0.87</td>
</tr>
<tr>
<td>Equipment</td>
<td>$0.15</td>
<td>$0.15</td>
<td>$0.15</td>
</tr>
<tr>
<td>Composting</td>
<td>$11.07</td>
<td>$11.07</td>
<td>$11.07</td>
</tr>
<tr>
<td>Vehicle R&amp;M</td>
<td>$0.06</td>
<td>$0.06</td>
<td>$0.06</td>
</tr>
<tr>
<td>Fuel</td>
<td>$0.11</td>
<td>$0.11</td>
<td>$0.11</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$12.91</td>
<td>$12.90</td>
<td>$12.89</td>
</tr>
<tr>
<td>Program Admin</td>
<td>$1.94</td>
<td>$1.93</td>
<td>$1.93</td>
</tr>
<tr>
<td><strong>Total Monthly Cost Per HH =</strong></td>
<td>$14.84</td>
<td>$14.83</td>
<td>$14.82</td>
</tr>
<tr>
<td><strong>Net of Revenues</strong></td>
<td>$7.37</td>
<td>$7.36</td>
<td>$7.35</td>
</tr>
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</table>
### C/N<sub>total</sub> vs. C/N<sub>degradable</sub>

<table>
<thead>
<tr>
<th>Feedstock</th>
<th>VS&lt;sub&gt;fraction&lt;/sub&gt;</th>
<th>BF&lt;sub&gt;fraction&lt;/sub&gt;</th>
<th>[C/N]&lt;sub&gt;total&lt;/sub&gt;</th>
<th>[C/N]&lt;sub&gt;biodegradable&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food scraps</td>
<td>0.9684</td>
<td>0.8188</td>
<td>15.6</td>
<td>12.4</td>
</tr>
<tr>
<td>Yard trimmings</td>
<td>0.8880</td>
<td>0.7152</td>
<td>22.9</td>
<td>14.5</td>
</tr>
</tbody>
</table>

Knowing biodegradable C/N avoids low C/N problems and can help in process and odor control.
More challenges ahead

- **Competition from LFG-to-Energy projects**
  - 645 operational projects producing 2,066 MW and 298 mmsfcd of biogas; $3.1 Bil. Invested to date
  - Burlington, NJ Study by GBB*

    *Carlson, J. “How will diversion of organics impact landfill gas-to-energy projects?”, presented at SWANA WasteCon, Aug. 2015

    - Modeled diversion of 43,000 tons/yr of food scraps
    - Loss of LFG production: 147 – 550 scfm
    - Loss of electricity revenue: $450,000/yr
    - Loss of tip fee revenue: $3.3 million/yr

- **Reductions in food scraps quantities generated**
  - Due to source reduction, other food recovery programs
  - New composting facility plans shouldn’t be based solely on food scraps
Opportunities Ahead

- Decentralized, community-scale diversion programs and composting facilities
  - Linked to CSA programs
  - Need greater regulatory permitting exemptions
  - Need wider distribution of training programs

- Co-collection programs
  - Offer potential to minimize cost increases for voluntary SSO diversion
    - Collect food scraps SSO in same truck with MSW
    - Separate out at transfer station or MRF; route to composter
  - Blue Bag (comm’l.) and Green Bag (resid.) Organics program in Minnesota and New England
Culver’s – restaurant chain in Midwest – one store reduced MSW from 16 CY/wk to 6 CY/wk with Blue Bag program
More opportunities ahead

- Public-private partnerships
  - Prince William County, VA
    - 30,000+ ton/year integrated AD + composting facility in Manassas, VA
    - Technologies by Quasar Energy and ECS – operational July 2017
  - New York City
    - 30,000 – 40,000 ton/yr PPP contract for food scraps SSO
    - Bids received 10/21/2015
  - Alachua County, FL
    - Contemplating PPP for MWMRF and Organics Recycling Facility for 35,000 ton/yr facility
    - RFP to be published 1Q2016
Composting has a role in food scraps diversion

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 feed

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

Most Preferred
Least Preferred
Questions?

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