ecomaine
Organics Recycling Feasibility Study

Presentation for E2Tech
October 16, 2014

In Association with
Coker Composting & Consulting
Integrated Waste Management Consulting
Tech Environmental
Scope of the Organics Feasibility Study

- Waste Composition
- Collections Systems
- Processing Technology
  - Composting
  - Anaerobic Digestion
- Site Evaluations
  - Developing Processing Capacity on ecomaine-owned property
  - Partnering with Existing Maine Organics Processors
- Impacts of Organics Diversion on the Waste-to-Energy plant
- Markets for Products Derived from Organic Waste
  - Soil Amendments
  - Energy Products
    - Biogas $\rightarrow$ heat and/or electricity
    - CNG
    - Pipeline injection of RNG
- Economics of Various Collections/Processing and Marketing Configurations
TASK 1 – Waste Composition
Estimates of Achievable Residential Diversion Rate

• Based on the seasonal nature of the accumulation of yard trimmings (leaves, grass clippings, etc.) and due to the successful programs already in place for collections, new residential organics collection programs in ecomaine service area will likely not include yard trimmings

<table>
<thead>
<tr>
<th>Community</th>
<th>Reported Organics Recovery (#/HH/week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamilton, MA</td>
<td>10.5</td>
</tr>
<tr>
<td>Garbage to Garden</td>
<td>10-11</td>
</tr>
<tr>
<td>Brattleboro, VT</td>
<td>10-12</td>
</tr>
<tr>
<td>National Range</td>
<td>7-12</td>
</tr>
</tbody>
</table>

• Applying 10 pounds per household per week to the entire number of households in ecomaine member communities (at a theoretical 100% participating and setout rate) yields approximately 26,000 tons of targeted residential organics → confirmation that the results of a U Maine study may be a reasonable estimation of targeted organics in Maine’s residential solid waste stream.
TASK 1 – Estimates of Achievable Diversion Rates

- Scenarios of achievable organics diversion rates
  - Low $\rightarrow$ 3,100 tons residential SSO
  - Medium $\rightarrow$ 6,800 tons residential and 5,100 tons commercial $\rightarrow$ 11,900 tons SSO
  - High $\rightarrow$ 13,900 tons residential and 7,100 tons commercial $\rightarrow$ 21,000 tons SSO
TASK 2 – Potential Organics Collection Configurations

Dedicated Collection

- Dedicated Route for organics only
- Predominantly used in conjunction with dedicated organics carts
- Flexibility in types of trucks used
  - Rear loading packer
  - Side loader
  - Rendering truck
- Costs the same as adding an additional rubbish route until reduced volumes in rubbish allow for greater number of stops per rubbish route ➞ expensive option, especially in a voluntary program

Collection v. Processing Costs

- Processing
  - Disposal (landfill, incinerator) ➔ $65/ton
  - Organics processing ➔ $40/ton
- Dedicated Collection in southern Maine
  - $10/household/month
  - 12#/household/week
  - $384/ton
TASK 2 – Potential Organics Collection Configurations

Co-Collection with Rubbish (A type of commingling)

- Based on the Blue Bag Organics model currently in place in Minnesota
- Requires no change in current collection configurations; the organics are separated by residents and placed in a heavy duty, compostable bag and placed curbside to be co-collected with the rubbish
- Additional costs are in
  - the bag itself, which cost approximately $1.00 per bag in Minnesota program, but could be closer to $0.50 for smaller bags needed for Maine curbside collection
  - Separation of the Blue Bags, which in the Blue Bag model is currently completed manually at the MRF to which all rubbish, recyclables and organics are delivered.
- Within ecomaine’s current configuration, this program would likely require an addition to the WTE tipping floor and additional sorting equipment
TASK 2 – Potential Organics Collection Configurations

Co-Collection with Every-Other-Week Rubbish/Recycling
- Involves other every week collection of rubbish and recyclables and every week collection of organics
- Same number of routes, but new distribution of the wastes → no increase in collection costs
  - Some communities, including Hamilton, MA, report an overall decrease in costs due to decrease in tipping fees
- Generally seen only in mandatory organics and recycling programs
- Results in large increases in recycling rates
- Could work in either Portland’s current model or with the split bodies used in the remainder of the curbside collection communities
- Represents a huge paradigm shift in disposal/recycling behavior
- There can be unintended consequences from this type of shift in service → Portland, OR diaper issue
TASK 3 - Technology Alternatives Evaluation
Composting – Enclosed Aerated Static Pile

Source: Chittenden Solid Waste District ASP composting operation - Williston, VT
**TASK 4 – Site Evaluations – Partnering Options**

- In proximity to the ecomaine service area, including operating and permitted facilities, there is enough capacity for approximately 46,000 tons of SSO, most of which has been permitted in the past two years
  - 29,000 composting
  - 17,000 anaerobic digestion
  - A digestion operation with another 30,000 tons of capacity at the old Brunswick Naval Air Station is in the planning stages
- Price range for accepting organics at compost facilities in proximity to the ecomaine service area is generally $30 - $40 per ton
- Price range at anaerobic digesters is still to be determined, with the exception of Exeter Agri-Energy, which has lower tip fees but would required greater trucking costs
- Not all of the existing sites would meet ecomaine’s risk minimization goals
### Alternative Options Analysis

<table>
<thead>
<tr>
<th>Alt.</th>
<th>Where</th>
<th>Ultimate Capacity</th>
<th>Collection</th>
<th>Processing Technology</th>
<th>Per Ton Cost (collections and processing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ecomaine property</td>
<td>12,000 ton/yr</td>
<td>EOW Collection</td>
<td>Composting Only</td>
<td>$71</td>
</tr>
<tr>
<td>2</td>
<td>ecomaine property</td>
<td>12,000 ton/yr</td>
<td>Blue Bag-type</td>
<td>Composting Only</td>
<td>$178</td>
</tr>
<tr>
<td>3</td>
<td>ecomaine property</td>
<td>12,000 ton/yr</td>
<td>Dedicated organics</td>
<td>Composting Only</td>
<td>$383</td>
</tr>
<tr>
<td>4</td>
<td>ecomaine property</td>
<td>12,000 ton/yr</td>
<td>Blue Bag-type</td>
<td>AD and Composting</td>
<td>$216</td>
</tr>
<tr>
<td>5</td>
<td>ecomaine property</td>
<td>12,000 ton/yr</td>
<td>Dedicated organics</td>
<td>AD and Composting</td>
<td>$421</td>
</tr>
<tr>
<td>6</td>
<td>Decentralized (partnering)</td>
<td>3,000 – 7,000 ton/yr</td>
<td>EOW collection</td>
<td>“Certified Merchant Processors”</td>
<td>$74</td>
</tr>
<tr>
<td>7</td>
<td>Decentralized (partnering)</td>
<td>3,000 – 7,000 ton/yr</td>
<td>Blue Bag-type</td>
<td>“Certified Merchant Processors”</td>
<td>$181</td>
</tr>
<tr>
<td>8</td>
<td>Decentralized (partnering)</td>
<td>3,000 – 7,000 ton/yr</td>
<td>Blue Bag-type</td>
<td>“Certified Merchant Processors”</td>
<td>$153</td>
</tr>
<tr>
<td>9</td>
<td>Decentralized (partnering)</td>
<td>3,000 – 7,000 ton/yr</td>
<td>Dedicated organics</td>
<td>“Certified Merchant Processors”</td>
<td>$386</td>
</tr>
<tr>
<td>10</td>
<td>Decentralized (free market)</td>
<td>3,000 – 7,000 ton/yr</td>
<td>Haulers develop</td>
<td>Any processor</td>
<td>NA ($186,000 per year loss due to leakage)</td>
</tr>
</tbody>
</table>
Sidebar on Anaerobic Digestion of Food Scraps

Stand-alone food scraps high solids digester

On-Farm manure digester with excess capacity for food scraps
## Curbside Collection Systems and Costs

<table>
<thead>
<tr>
<th>Curbside Collection System</th>
<th>Additional annual cost per participating household</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated Collection(^1)</td>
<td>$125</td>
<td>Currently used in most curbside collection programs for organics in the US.</td>
</tr>
<tr>
<td>Blue Bag-type Collection</td>
<td>$24</td>
<td>Organics are separated by residents into specially-colored bags and co-collected with trash in the same compartment of the hauling vehicle, does not add additional costs on the hauling end, but does require the development of a sorting operation, which in ecomaine’s case would be co-located with the WTE plant.</td>
</tr>
<tr>
<td>Every-Other-Week (EOW) Collection</td>
<td>$5</td>
<td>Organics are collected weekly and refuse and recycling are collected on alternating weeks, appears to be the least expensive option, but does involve a shift in residential behavior which will likely require strong political will and support to implement.</td>
</tr>
</tbody>
</table>

\(^1\)The costs for dedicated collection in the City of Portland is estimated to be lower (approximately $50 per participating household per year) based on their lower reported costs in their current trash and recycling collections programs.
Every-Other-Week Collection is Catching On

Millions of residents in the Toronto area are serviced by EOW collection with organics
Higher Participation Means More Contamination

- In order to make a dent in recycling rates it will be necessary to move beyond voluntary and subscription programs
- Inevitably this will require the flexibility to contend with more contamination in the feedstocks
Organics Recycling for ecomaine – The Long View

• ecomaine supports the solid waste hierarchy that prioritizes composting and anaerobic digestion over incineration with energy recovery over landfilling

• Due to the financial constraints of ecomaine’s member communities, large investments in new collection systems and processing capacity are not likely to occur in the near future; this is a longer term goal

• In order for Maine to make a dent in increasing solid waste recycling rates which have been stalled at between 35-40% for the last decade, policy changes on the state level are likely necessary, including mandated recycling

• EOW collections is a low cost potential for increasing organics and traditional recyclables, and it now has a proven track record in several large municipalities

• In the meantime, ecomaine is supportive of responsibly managed organics recycling efforts within its service area.