EBC 4th Annual “Talking Trash” Conference
Southern New England
Welcome

Daniel K. Moon

President & Executive Director
Environmental Business Council
Thank you to our Collaborating Organization
Thank you to our Sponsors!
Introduction

David Murphy

Chair, EBC Solid Waste Management Committee

Vice President, Tighe & Bond
State & Municipal Reflections on Impending Shortfall of Regional Disposal

Greg Cooper

Division Director, Business Compliance and Recycling
Bureau of Air & Waste, Massachusetts Department of Environmental Protection
State & Municipal Reflections on Impending Shortfall of Regional Disposal

Ron San Angelo

Town Manager
Southbridge, Massachusetts
Industry Perspective: Planning for the Pending Shortfall

Jim Wollschlager

CEO
Organix Solutions

Environmental Business Council of New England
Energy Environment Economy
Legislation Around Organics in the United States

1,2 Sources: BioCycle 2014a survey from 39 states that responded; 2014b Rhode Island legislation effective 2016.

3 Source: MSW Management, 2015

4 Source: BioCycle 2015, denotes states that have 1 or more communities with residential SSO program; are not state-wide.
Our Mission

To provide cost-effective and sustainable collection and treatment solutions that recover organic waste and maximize the potential value of recyclable feed stocks.
### 2013 Statewide Waste Characterization

#### RECOVERABLE MATERIALS
<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Materials</td>
<td>31.0%</td>
</tr>
<tr>
<td>Paper</td>
<td>24.5%</td>
</tr>
<tr>
<td>Fines</td>
<td>10.5%</td>
</tr>
</tbody>
</table>

#### TRADITIONAL RECYCLABLES
<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastics &amp; Metals</td>
<td>9.8%</td>
</tr>
</tbody>
</table>

**Total Recoverable Materials: 75.8%**

#### NON-RECOVERABLE MATERIALS
<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Materials &amp; Glass/Electronics</td>
<td>3.4%</td>
</tr>
<tr>
<td>HHW/HW</td>
<td>0.4%</td>
</tr>
<tr>
<td>Other Waste/Other Plastics</td>
<td>20.4%</td>
</tr>
</tbody>
</table>

**Total Non-Recoverable Materials: 24.2%**

**Total: 100.0%**

### Waste Characterization
Solid Waste (MSW) – Minnesota 2013

#### 2013 Statewide Waste Characterization

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
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<tr>
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</tr>
</tbody>
</table>

**Recoverable MSW** 75.8%

Organix Solutions Layered Approach

1. Layer 1: Organics Co-Collection Municipal Curbside Program

2. Layer 2: Materials Recovery Facility Recovery of 2" Minus Material

3. Layer 3: BurCell® System Technology Processes Waste into Engineered Feedstock

4. Layer 4: Highest Value Use of Engineered Feedstock for AD or Compost

Waste Characterization

- Organic Materials
- Plastics & Metals
- Fines
- Paper
- Non-Recoverable
Layer 1: Organics Co-Collection Program
City of Wayzata in Hennepin County, Minnesota
How the Program Started - Organics Pilot 2002

Hennepin County - Organics Diversion

- 2 interested parties: City of Wayzata and Randy’s Environmental Services
- How to launch an organics pilot as part of recycling
- What evolved over a decade to the present system Blue Bag Organics® Co-collection in MN
- Amount of time and dedicated research invested for a solution

* Randy’s is the parent company of Organix Solutions.
Compostable Bag Development

Inception
• Dedicated truck and extra cart to collect organics wasn’t economically feasible: Scattered routes were inefficient
• Devised plan to develop a compostable bag to be collected with the trash and placed in the same cart
• No available compostable bag was suitable
• Team decided to design its own compostable bag strong enough to make it through the collection process
  – Selected a compostable biopolymer
  – Bag designed to be durable, flexible to withstand truck compaction and be completely compostable

Deploying the Program
• City of Wayzata was receptive to Blue Bag Organics program
  – Neighborhood coordinators volunteered to help spread information to their neighbors
  – Community effort and the city was very much in support of the program
  – Residential participation was good, very little contamination
• 3rd party tested compostable bag for integrity during residential use and being hauled in/out of the truck
  – Good puncture and tear resistant; withstands cold, rain, humidity and UV
  – Biodegrades within 45 days at an industrial composting facility
Blue Bag Organics Co-Collection
Program Launched 2012

Residents collect their food scraps and food soiled papers in the 13-gallon Extreme Duty Compostable Bag, tie a knot and place the compostable bag in the same cart with their trash.

• On the regular trash collection day, the hauler empties the cart
• Compostable bags are then sorted at a transfer station or MRF where they are diverted to a composting facility
• Helps reduce contamination (our data shows rate <3%)
• Co-collects organics with trash, no additional cart or truck is necessary - eliminates the need for a dedicated organics route
Today over 42 cities in Minnesota have implemented the Blue Bag Organics® program and more communities are signing on. Outside of Minnesota the program is marketed as the Green Bag Organix™.

- Organix Solutions manufactures its own proprietary 100% compostable liners branded as Blue Bag Organics and Green Bag Organix

- Certified by the Biodegradable Products Institute (BPI) to meet the industry standard test methods of ASTM D6400 for compostability at an industrial composting facility

- Same durable, compostable liner – just a different color
First of its kind program, the utility patent covers the method of collecting and processing of compostable organic waste material.

- Single waste collection vehicle can collect both organic waste and MSW waste in a single trip.
- Waste collection vehicles are typically large trucks with low gas mileage, eliminating the need for multiple trucks on even a relatively small scale has a significant environmental impact.
- Research conducted by both the Minnesota Pollution Control Agency (MPCA) and Aspen Research Corporation, an independent third-party laboratory confirmed the compostable bags were flexible and strong enough to withstand compaction in a waste collection vehicle.
Co-Collection Program
Financial Model Prepared for a City in Massachusetts

<table>
<thead>
<tr>
<th>Number of Households</th>
<th>8,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inbound MSW Tons Per Month</td>
<td>456</td>
</tr>
<tr>
<td>Tons Hourly Capacity</td>
<td>15</td>
</tr>
<tr>
<td>Monthly Sort Hours</td>
<td>30.4</td>
</tr>
<tr>
<td>Sort Labor</td>
<td>2</td>
</tr>
<tr>
<td>Staff Labor</td>
<td>1</td>
</tr>
<tr>
<td>Total Labor</td>
<td></td>
</tr>
<tr>
<td>Sort Line Conveyor Cost per month</td>
<td>$1,750.00</td>
</tr>
<tr>
<td>Total Monthly Sorting Expense</td>
<td>$3,726.00</td>
</tr>
<tr>
<td>Annual Sorting Expense</td>
<td></td>
</tr>
<tr>
<td>Revenue</td>
<td></td>
</tr>
<tr>
<td>Processing Fee</td>
<td>456</td>
</tr>
<tr>
<td>Annual Fee</td>
<td></td>
</tr>
<tr>
<td>Gross Profit (for hauler/processor)</td>
<td>$11,376.00</td>
</tr>
<tr>
<td>Monthly Processing Fee charged per Resident</td>
<td>$0.58</td>
</tr>
</tbody>
</table>

Cost of Green Bag Organix (GBO) Program @ $69.95 Per Year Per Household

<table>
<thead>
<tr>
<th>Participation</th>
<th>800</th>
<th>$69.95</th>
<th>$55,960.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>25% Participation</td>
<td>2,000</td>
<td>$69.95</td>
<td>$139,900.00</td>
</tr>
<tr>
<td>30% Participation</td>
<td>2,400</td>
<td>$69.95</td>
<td>$167,880.00</td>
</tr>
<tr>
<td>40% Participation</td>
<td>3,200</td>
<td>$69.95</td>
<td>$223,840.00</td>
</tr>
</tbody>
</table>

Each Resident paying $2.33 per month for GBO

|          | 8,000 | $2.33 | $223,680.00 |

Total Monthly Cost Per Household for GBO

Program with Estimated Processing Fee x 12 months

|          | 8,000 | $2.91 | $279,360.00 |
An Example of a Dedicated Organics Route

Community in Minnesota: Monthly Costs for Dedicated Organics

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck Collection Hours</td>
<td>13</td>
</tr>
<tr>
<td>Truck Rate per Hour</td>
<td>$90.00</td>
</tr>
<tr>
<td>Number of Customers</td>
<td>344</td>
</tr>
<tr>
<td>Amortized Cost of Cart</td>
<td>$1.05</td>
</tr>
<tr>
<td>Disposal Tons</td>
<td>1.3</td>
</tr>
<tr>
<td>Tip Fee</td>
<td>$45.00</td>
</tr>
<tr>
<td>Truck Rate per Month</td>
<td>$5,066.10</td>
</tr>
<tr>
<td>Cost per Resident</td>
<td>$14.73</td>
</tr>
<tr>
<td>Cost per Resident w/Dedicated Organics Cart</td>
<td>$15.78</td>
</tr>
<tr>
<td>Tip Fee per Customer</td>
<td>$0.17</td>
</tr>
</tbody>
</table>

**Total Monthly Cost Per Household for Dedicated Organics Including disposal** $15.95
Organics Collection Carbon Emissions Baseline Study
Elk River, Minnesota

Data Results Key Findings:

- GHG emissions per ton for SSOM-only are over 100 times that of MSW-only or Blue Bag Organics.

- Blue Bag Organics emits far less GHGs than SSOM-only collection.

- Notable contributing factor is the low quantity of organics collected per route through SSOM-only (1.07 – 1.46 tons) compared to MSW-only (11.77 – 23.56 tons) and Blue Bag Organics (11.77 – 23.53 tons).

- Ratio of waste collected to fuel consumed greatly reduces GHG emissions per ton.

Organics Collection GHG Analysis Table 1: Metric tons (MT) of greenhouse gases (GHG) emitted per ton for SSOM-only, MSW-only and Blue Bag Organics collection. Measured in metric ton GHG equivalents per ton (MTCO2e/ton).

<table>
<thead>
<tr>
<th></th>
<th>SSOM-only</th>
<th>MSW-only</th>
<th>Blue Bag Organics*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Fuel</td>
<td>0.343</td>
<td>0.025</td>
<td>0.026</td>
</tr>
</tbody>
</table>
Layer 2: Materials Recovery Facility (MRF)
Layer 2: Materials Recovery Facility (MRF)

Recovery of 2-inch Minus Material

MRF is designed to recover smaller organic materials trapped in the waste stream, along with traditional recyclables.

2-inch Minus Material

- 20% - 30% of the waste stream is captured on 40’ long trommel screens
- Of this 20% - 30%, **57% is organic material**

Removing this material allows for additional capacity and improved efficiencies for other downstream processing and RDF facilities.

*Woods End Laboratories, Inc. 2015 Study*
Potential for Bioreactor Landfill

2-inch Minus Material

In an anaerobic bioreactor landfill, moisture is added to the waste mass in the form of re-circulated leachate and other sources to obtain optimal moisture levels.

- Biodegradation occurs in the absence of oxygen (anaerobically) and produces landfill gas.
- Landfill gas - primarily methane - can be captured to minimize greenhouse gas emissions and can be used for energy projects.

Source: EPA [www.epa.gov/landfills/bioreactor-landfills](http://www.epa.gov/landfills/bioreactor-landfills)

- Research should be conducted to determine how use of the **2-inch minus material** would benefit bioreactor landfill.
# Composition Analysis of 2-inch Minus Material

Woods End Laboratories Report 2015

## COMPOSITION ANALYSIS

**Sample Identification:** Compost: Processed MSW: 05262015 2045

<table>
<thead>
<tr>
<th>VARIABLE MEASURED</th>
<th>Unit</th>
<th>dry basis</th>
<th>as is basis</th>
<th>Notations †</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk Density</td>
<td>lbs·ft(^3)</td>
<td>-</td>
<td>41</td>
<td>1095 lbs/yard(^3)</td>
</tr>
<tr>
<td>Total Solids (dry matter)</td>
<td>%</td>
<td>100.0</td>
<td>36.8</td>
<td>736 lbs/ton</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>%</td>
<td>0.0</td>
<td>63.2</td>
<td>152 gals/ton</td>
</tr>
<tr>
<td>Water Holding Capacity (calc)</td>
<td>%</td>
<td>182</td>
<td>65</td>
<td>155 gals/ton</td>
</tr>
<tr>
<td>pH (sat. paste in H(_2)O)</td>
<td>-logH(^+)</td>
<td>~</td>
<td>5.99</td>
<td>Ex Low</td>
</tr>
<tr>
<td>Free Carbonates (CO(_3)) .... (Range 1-3)</td>
<td></td>
<td>~</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>Total Organic Matter</td>
<td>%</td>
<td>57.0</td>
<td>21.0</td>
<td>420 lbs/ton</td>
</tr>
<tr>
<td>Conductivity (salinity)</td>
<td>dS·m(^{-1})</td>
<td>~</td>
<td>2.9</td>
<td>Med Low</td>
</tr>
<tr>
<td>Total Carbon:Nitrogen (C:N) Ratio w:w</td>
<td></td>
<td>19.4</td>
<td>19.4</td>
<td>Med High</td>
</tr>
<tr>
<td>Respiration, Volumetric ... (Solvita 1-8)</td>
<td></td>
<td>~</td>
<td>5.49</td>
<td>Medium</td>
</tr>
<tr>
<td>Ammonia Volatization .... (Solvita 1-5)</td>
<td></td>
<td>~</td>
<td>5.00</td>
<td>low or none</td>
</tr>
</tbody>
</table>

©2001-2012 WOODS END LABORATORIES, Inc.
Layer 3: BurCell System Technology
Layer 3
BurCell System

The BurCell® System captures the other 42% of valuable organic material that would be trapped in the waste stream beyond Layer 2 and be destined for:

- Significant benefits for an MSW based anaerobic digestion and compost project

![Waste Characterization Diagram]

Recovered Material from Waste Stream
The BurCell® System improves the biodegradation potential of recyclable feedstocks. The process improves the quality of both composting and AD feedstocks.

The benefit to a composting facility lies in the ability of the BurCell System to modify the physical and chemical characteristics of the feedstocks to increase the surface area-to-volume ratio (thus increasing the number of opportunities for biodegradation of organics) and to increase the carbon-to-nitrogen ratio (and reduce the potential for odor formation). The tables below show the differences.

### Table 1: Carbon-to-Nitrogen Ratio*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pre- BurCell® System</th>
<th>Post- BurCell® System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon-nitrogen ratio</td>
<td>17:1</td>
<td>47:1</td>
</tr>
<tr>
<td>Bulk density</td>
<td>944 lbs/cubic yard</td>
<td>1095 lbs/cubic yard</td>
</tr>
</tbody>
</table>

*Pre-BurCell System is Nov. 2012 lab analysis of 2" minus organics-rich fraction of municipal solid waste from a Delano, MN materials recovery facility; Post-BurCell System data is Sept. 2015 pilot testing of BurCell System output in a privately-owned anaerobic digestion/composting facility.

### Table 2: Biochemical Methane Potential (BMP)*

<table>
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<tr>
<th>Parameter</th>
<th>Pre- BurCell® System</th>
<th>Post- BurCell® System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemical Methane Potential</td>
<td>1663.6 cubic feet CH₄ / dry ton</td>
<td>4357.0 cubic feet CH₄ / dry ton</td>
</tr>
</tbody>
</table>
BurCell System Pilot Scale Testing
Delano, MN Facility

BurCell® System cycles on unprocessed residential MSW

**Figure 1:** Residential MSW being loaded

**Figure 2:** Processed MSW

**Figure 3:** 2” Screen Organics
Materials Recovered Through Layers 1, 2, and 3

- 33 recoverable MSW
- 31.0% non-recoverable MSW
- 24.2% traditional recyclables

Statewide Waste Characterization 2013 (MN)

Layered Approach

- 75.8% recoverable MSW
- 24.2% non-recoverable MSW

Recovered Material from Waste Stream
Layer 4: Highest Value Use of Processed Engineered Feedstock (PEF)
Thank You.

Jim Wollschlager  
CEO Organix Solutions  
Jim.Wollschlager@OrganixSolutions.com

Debra Darby  
Program & Marketing Director  
Debra.Darby@OrganixSolutions.com
Industry Perspective: Planning for the Pending Shortfall

Chris Carney
Owner
C. Carney Recycling Solutions
EBC 4th Annual “Talking Trash”

Chris Carney
Carney Environmental

March 1, 2018
The industry is Changing

- Three Impending Landfill Closures
- 890,000 tons per year in soon shifting
- 3,400+ TPD Hitting the Streets
WMI Chicopee Landfill
365,000 TPY
Casella Southbridge Landfill
405,600 TPY
So Where do we go??

- North to Turnkey?
- Will Covanta or Wheelabrator add a boiler?
- Rail Haul to Ohio?
- Long haul to NY/PA?
Industry Perspective: Planning for the Pending Shortfall

Mark Troiano

Owner

Troiano Trucking
ECO FEED, INC.

Owner & CEO: Mark Troiano
ECO FEED
Large Capacity Mixing Tanks
Thank You For Your Time!

Questions?
Comments?
Industry Perspective: Planning for the Pending Shortfall

Ben Harvey

President

E. L. Harvey & Sons, Inc.
Industry Perspective: Planning for the Pending Shortfall

John Farese

Market Manager

Wheelabrator Technologies
Industry Perspective: Planning for the Pending Shortfall

Paul Degnan

General Manager

Casella Recycling
CASELLA WASTE SYSTEMS

Paul E. Degnan
Auburn MRF & Oxford Transfer
March 1, 2018
OVERVIEW
- FOUNDED IN 1975
- APPROX. 2000 EMPLOYEES
- OPERATING IN MA, ME, NH, NY, PA, VT
LOCATIONS
Disposal Capacity
Recycling
Logistics
Future Planning
- Southbridge closing 2018 Q4
- Chicopee closing 2018
- Aging Incinerators
- Economy Improving
- National Sword
  - Contamination
  - Processing
  - Effect on Markets
- Glass
- Diversion
Trucks
- Distance = More Equipment
- Electronic Logs
- Driver Shortage
- Lanes/Backhauls/Seasonal

Rail
- Unpredictable Service
- Cars Needed
- Wrapped & Covered
- Sites/Permitting
Future Planning

- Sustainability
  - Reduce/Reuse/Recycle
  - Sharing Risks/Rewards

- Mergers & Acquisitions
  - Complete Material Management – Holyoke
    - 750 tpd
    - Rail Served
  - Plans

- Landfills Outside MA
  - Internal Assets
  - Partnerships
QUESTIONS

paul.degnan@casella.com
Panel Discussion

Moderator:
• David Murphy, Tighe & Bond

Panel Members:
• Chris Carney, C. Carney Recycling Solutions
• Greg Cooper, MassDEP
• Paul Degnan, Casella Recycling
• John Farese, Wheelabrator Technologies
• Ron San Angelo, Town of Southbridge, Massachusetts