Co-Digestion of Food Waste

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WM Recycling Services

Where We Recycle

Material Recovery Facilities (MRFs)
- 43 Single Stream
- 4 Dual Stream
- 37 Paper Only or Other Commercial Materials
- 8 Construction and Demolition Debris
- 6 High Grade
- 6 Other

WM’s Recycling/Composting Tonnages

<table>
<thead>
<tr>
<th>Material</th>
<th>Tonnage</th>
<th>Material</th>
<th>Tonnage</th>
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</thead>
<tbody>
<tr>
<td>Paper/OCC</td>
<td>8,925,573</td>
<td>Metals</td>
<td>525,473</td>
</tr>
<tr>
<td>Organics</td>
<td>2,694,334</td>
<td>Plastics</td>
<td>416,160</td>
</tr>
<tr>
<td>Glass</td>
<td>766,038</td>
<td>E-waste/Other</td>
<td>117,618</td>
</tr>
<tr>
<td>C&amp;D/Wood</td>
<td>100,982</td>
<td>Fly Ash</td>
<td>1,177,618</td>
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<tr>
<td><strong>Total all materials:</strong></td>
<td><strong>14,723,193</strong></td>
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WM CORe: Urban Solution to Food Waste

37 compost sites, 4 CORe, facilities, 3 chipping operations

WM is a net reducer of GHG emissions
Recovers energy in food while preserving nutrients for fertilizer

Urban solution with a compact footprint requiring little land

Local facility allows for easy access and efficient transportation

The lowest GHG footprint of all food recycling options

Sustainable, renewable Biogas displaces fossil fuel use

**Food Recovery Hierarchy**

- **Source Reduction**
- **Feed Hungry People**
- **Feed Animals**
- **Industrial Uses**
  - Recovers energy in food while preserving nutrients for fertilizer
  - Urban solution with a compact footprint requiring little land
  - Local facility allows for easy access and efficient transportation
  - The lowest GHG footprint of all food recycling options
  - Sustainable, renewable Biogas displaces fossil fuel use

**Composting**

**Landfill**

**EPA**
United States Environmental Protection Agency

**Waste Management**

**THINK GREEN.**
Co-digestion is a process whereby energy-rich organic waste materials (food scraps) are added to dairy or wastewater (WWTP) digesters with excess capacity. In addition to diverting food waste and FOG from landfills and the public sewer lines, these high-energy materials have at least three times the methane production potential (e.g. biogas) of biosolids and manure.

EPA
United States Environmental Protection Agency
Food is energy, let’s not waste it.

Helping solve climate change with the lowest Greenhouse Gas (GHG) footprint of food waste processing options

Co-Digestion is a proven solution for large scale, urban food waste

Through co-digestion, food waste can be recycled as both fertilizer and a renewable energy source
Operating Locations

BOSTON
Permitted for 300 t/d

NEW YORK
Permitted for 500 t/d

NORTHERN NEW JERSEY
Permitted for 500 t/d

LOS ANGELES
Permitted for 125 t/d
Waste Management’s **CORe®** process is a local, urban solution for NYC that takes food material and through our proprietary process we convert that material into our **EBS®** product.

**EBS®** is a high quality, consistent product that removes >97% of the physical contaminants found in urban food waste.

The **EBS®** product is used to create renewable, sustainable energy in cooperation under long term commitments with local WWTPs utilizing existing infrastructure, helping them approach zero energy.
WM CORe in Operation

https://binged.it/2xsqW21
Contaminant Removal

Contaminants Removed

Contamination Detail
EBS Product

WM CORe®
ORGANIC PROCESSING

CORe® SSO Receipt Hopper & Bioseparator
EBS® Mixing & Storage Tank
EBS® Product

EBS CREATION
AN ENGINEERED SLURRY
Testing for Consistency

- Focused on developing a consistent product, removing contamination to produce a known energy content end product EBS®
- Operating experience allows for optimizing EBS® value
Transport to WWTF for Energy Production

- EBS® TRANSPORT TO WWTP
- WWTP DIGESTER
- RENEWABLE ENERGY
Increase in renewable biogas production with as little as 10% EBS® volume addition

Conversion rate of EBS® from food waste that are converted to biogas

Little to no additional generation of biosolids with EBS® according to independent, peer reviewed research
Partnership with the City of West Lafayette

Sending food waste from campus dining halls to Local WWTP

Biogas from process provides 20% of facility power needs while Natural Gas consumption is reduced by 40%

Six 2.7 million gallon Anaerobic Digesters accepting over 60 truckloads per day of food waste

Co-digested with municipal sludge, this program produces over 2.1 million cubic feet of biogas per day

Biosolids from the digesters are recycled back to the land returning valuable macro- and micronutrients to the soil

Using a dry fermentation digester since 2011

Food waste generated on campus is mixed with agricultural plant waste to produce biogas

The digester produces enough biogas to power up to 10% of the 13,500 student campus

Biosolids from the digesters are recycled back to the land returning valuable macro- and micronutrients to the soil

Easy Bay Municipal Utility District (EBMUD) was the first to convert food waste into energy utilizing co-digestion

Local restaurants and businesses in the Oakland, CA area recycle up to 40 tons per day of food

After the methane is captured and used as a renewable energy source, the remaining material is used as a natural fertilizer

Sample of Highlighted Programs
Progressive WWTP in New England

Recognized by MassDEP and EPA for innovation

Investing over $24 million in the “Organics Energy Project”

Over $7 million provided by the DEP, DOER, CEC, and CWT of Massachusetts

Renewable energy produced will be used for facility heat and electricity

Energy savings of $2.5 million per year, with potential to export to grid

Longstanding, successful program creating fertilizer from biosolids

100% of fertilizer product sold to local agriculture and landscape businesses
Branded and distributed in bulk and bagged products under the earthlife® brand

Over 5,000 tons sold annually to agriculture and landscape projects since 2004

EPA Certified Class A EQ (Excellent Quality) product and is a Registered Fertilizer (#371) with the State of Massachusetts

A Massachusetts manufactured slow release product with NPK of 4-2-0 +Iron

Reducing local agriculture’s dependence on inorganic fertilizers made from fossil fuels
Of biosolids are recycled into nutrient rich fertilizer each year to **local communities and agriculture**. 55% of the biosolids produced by waste water treatment plants in the US are **safely recycled** each year as organic soil amendments and fertilizer.

Biosolids recycling is a safe and proven practice. 40 years of independent, peer reviewed research – including studies by the National Academy of Sciences – has demonstrated **the safety** and benefits of its use.

The **US EPA** reviews the federal regulations to ensure that the regulations are protective of the **public health and environment**. This review occurs every **two years** to ensure protections are in place and effective. All states in the northeast, including **Massachusetts**, also have stringent regulations subject to ongoing review.
“From a carbon footprint comparison, the WWTP/Hauler alternative had the **lowest carbon dioxide equivalent (CO₂E) emissions** compared to the other alternatives”
WM CORe® Co-digestion

- Acceptable contamination of up to 25% and a wide range of materials including pre-and-post consumer food waste
- Removes unwanted contaminants through dual separation process
- Able to accept packaged food material (PFM) that would otherwise be sent to disposal
- Compact footprint suitable for urban locations
- WM operates 4 CORe® facilities in the US

WM Composting

- Acceptable contamination limited to <1%
- Limited acceptability of non-homogenous commercial and residential food waste
- Limited screening capabilities mean contamination may end up in final product, reducing value
- Increased space requirements means moving operations outside of urban setting and increasing transportation costs
- WM operates 36 compost facilities in the US
Thank you!