BuildingEnergy Boston

Food Waste For Energy Production
U.S. FOOD WASTE
Did you know?

• 30-40% is wasted
• Valued at $165 billion annually
• Rotting food in landfills releases greenhouse gases

Source: NRDC
FOOD WASTE CONSUMES:

- **21%**
  - Of all fresh water

- **19%**
  - Of all fertilizer

- **18%**
  - Of cropland

- **21%**
  - Of landfill volume

Photo from [ReFED](https://www.refed.org)
Threshold: 1 ton of food/week

Image Source: BioCycle
ORGANICS WASTE BAN

- Encourage and improve food waste to energy infrastructure
- Encourage clean energy
- Reduce organics in landfill >> Reduce methane
- Produce energy and soil amendment
- Promote economic development and job creation
ORGANICS WASTE BAN

- Included in 2010 Solid Waste Master Plan
- Remove commercial food scraps from the waste stream
- Provide education, and technical assistance through RecyclingWorks in MA
- Encourage donation to feed people in need
FREE ASSISTANCE FOR BUSINESSES & INSTITUTIONS

RecyclingWorks MA is funded by MassDEP, delivered under contract by the Center for EcoTechnology

recyclingworksma.com
OUR APPROACH TO ADDRESSING WASTED FOOD

Food Recovery Hierarchy

- **Source Reduction**: Reduce the volume of surplus food generated
- **Feed Hungry People**: Donate extra food to food banks, soup kitchens and shelters
- **Feed Animals**: Divert food scraps to animal feed
- **Industrial Uses**: Provide waste oils for rendering and fuel conversion and food scraps for digestion to recover energy
- **Composting**: Create a nutrient-rich soil amendment
- **Landfill/Incineration**: Last resort to disposal

www.epa.gov/foodrecoverychallenge
FOOD WASTE ESTIMATOR

Restaurants

Note: RecyclingWorks now breaks out all forms of estimating food waste by the NAICS code definition for limited and full-service restaurants. Limited-Service Restaurants (NAICS 722211) are defined as “establishments primarily engaged in providing food services ... where patrons generally order or select items and pay before eating.” Full-Service Restaurants (NAICS 722511) are defined as “establishments primarily engaged in providing food services to patrons who order and are served while seated ... and pay after eating. Actual food waste generation rates within each of these categories can vary widely. Factors such as whether your establishment prepares food from scratch, offers buffet-style dining, or has mostly patrons that eat-in can contribute to higher amounts of food waste. Take into account your restaurant’s operations when considering which metric to use.

<table>
<thead>
<tr>
<th></th>
<th>Average Measurement</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meals served [Full Service]</td>
<td>1 lbs/meal</td>
<td>Food waste</td>
</tr>
<tr>
<td>Meals served [Limited-Service]</td>
<td>0.5 lbs/meal</td>
<td>Food waste</td>
</tr>
<tr>
<td>Employees [Full-Service]</td>
<td>3,000 lbs/employee/year</td>
<td>Food waste</td>
</tr>
<tr>
<td>Employees [Limited-Service]</td>
<td>2,200 lbs/employee/year</td>
<td>Food waste</td>
</tr>
<tr>
<td>Disposed Waste [Full-Service]</td>
<td>66 % of disposed waste by weight</td>
<td>Food waste</td>
</tr>
<tr>
<td>Disposed Waste [Limited-Service]</td>
<td>51 % of disposed waste by weight</td>
<td>Food waste</td>
</tr>
</tbody>
</table>
I. Kitchen Separation

Separation of food scraps starts in kitchens and dish rooms. Recommended practices for source separation, starting in the kitchen:

- Food scraps should be collected in dedicated receptacles, such as small trash cans, buckets, or barrels in the same area as trash is collected. Receptacles should be leak proof (impervious) and covered when not in use, or when full. They must be intended only for the purpose of food scraps and clearly marked.

- Food scraps should be collected and removed from the kitchen/dish room at the same time as trash is removed from these areas.

- House practices are dependent on the volume produced. Collection at the same time as trash is reasonable for most establishments and seasons; in others, food waste collected as often as necessary to keep the area sanitary and to prevent odor, vermin harborage. At a minimum, collection should be every shift. Once collected, food scraps are loaded into a storage area near the trash dumpster/compactor where the hauler will pick up the material.

II. Hauler Collection Frequencies

- Suggested timelines for hauler collection of food waste

III. Outdoor Storage Practices

- Guidelines for proper storage, from cleanliness to container maintenance

https://recyclingworksma.com/
Sites Accepting Diverted Food Material

Method of Diversion:
- Anaerobic Digestion (8)
- Animal Feed (6)
- Animal Feed/Compost (5)
- Compost (26)
- Organics Processor (5)

Legend:
- Interstate
- U.S. Highway
- State Route
- Number corresponds to "Map Label" in table

This map and list show operations that are willing and able to accept food materials from off-site generators for animal feed, composting, anaerobic digestion, or other processing. This document does not represent the full capacity to manage food materials in the Commonwealth, as there are other facilities that handle food materials from specific businesses or institutions. These types of operations are not included in this list, but do represent additional management capacity for food materials.

1:1,250,000

DATA SOURCES:
- Major Roads: MassDOT OTP, MassGIS, June 2014
- Food Material Diverters: MassDEP, BAW, November 2018

Map Updated November 2018
MassDEP, BAW, J. Cook
COLLECTION PRACTICES

- Container placement
- Color coding
- Easily accessible and available bins
- Good housekeeping practices
**Bottles & Cans**

EMPTY BEVERAGE CONTAINERS
Aluminum & steel cans, glass jars & bottles, plastic bottles & containers

**NO**
Liquids
Plastic Bags
Tissues/Paper Towels
Styrofoam
Food-Soiled Materials

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**Food Scraps**

**COMPOST**
All Food Scraps
Napkins & Paper Towels
Fruits, vegetables, dairy, bread, grains, meat & fish, bones & shells, eggs

**NO**
No gloves, plastic, wrappers
Styrofoam, or any other trash
STAFF TRAINING

• Educate staff on the specifics of their end site, so they understand the how, what, and why of collection
• Monitor collection containers for re-training opportunities
• Empower staff to identify ways to improve program
FOOD WASTE REDUCTION TECHNOLOGY
FOOD DONATION

Waste Less, Feed More
www.meansdatabase.com

FOOD for all

FOOD RESCUE US
BENEFITS OF FOOD WASTE DIVERSION

• Reduces waste tonnage and may reduce costs
• Increases recycling because it brings awareness to separation
• Provides a cleaner waste stream
• Food waste is utilized for animal feed, soil amendment, or anaerobic digestion
CASE STUDIES

https://recyclingworksma.com/case-studies/

Anthony DiCillo
Executive Chef
Westin Boston Waterfront Hotel

Hotel Waste Diversion Case Study
Westin Boston Waterfront Hotel
Boston, MA

AT-A-GLANCE:
- The Westin provides single stream recycling in the lobby, common areas,
- The Westin Boston Waterfront Hotel, located in the Seaport District, provides guests with luxurious and convenient accommodations while also supporting the community and the environment with their dedication to operating a sustainable hotel. The hotel implemented successful recycling, food donation, and food scrap diversion programs, and installed a number of environmentally-friendly measures including electric vehicle charging stations, solar powered electronics charging stations, low flow faucets, toilets and shower heads, and high-efficiency lighting. This case study focuses on the comprehensive waste diversion program at The Westin Boston Waterfront Hotel.
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 waste recycling options
- Sustainable, renewable Biogas displaces fossil fuel use

Composting

Disposal

WM Waste Management

CORE®
“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.”
Waste Management’s CORe® process is a local, urban solution for Boston 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 partnership with long term local partnerships, helping them approach zero waste.

1 ton of SSO = 305 gallons of EBS = ~3MMBTU of Energy
1 ton of SSO = 305 gallons of EBS = ~3MMBTU of Energy
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.

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

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

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.
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.

**Food is energy, let’s not waste it.**